Study design: Qualitative study of the impacts of a complex intervention randomised control trial

Title: Qualitative study of the impacts of the 5As Team study to change clinical practice in primary care obesity management
Running Title: Impacts of the 5As Team intervention

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Ethics
The 5AsT study was approved by the University of Alberta Research Ethics Board (Pro00036740). Participants gave informed consent prior to taking part in the study.

Authors
DCS and AMS, supported by JJ, conceived of the study, wrote the grant, and supervised the project.
DCS, JA, and AO wrote the ethics and protocol
JA led the qualitative data collection, supported by DCS, AMO, AAO, and AC. All participated in regular data analysis and review meetings. All authors had full access to data and can take responsibility for data integrity and accuracy. ES, DCS, JA wrote the manuscript, all authors reviewed the manuscript and provided comments

Contributors
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Guarantors
This work is guaranteed by JA, DCS and AS with full access to the data and with the decision to publish. We affirm that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned and registered have been explained.

What we already know

- Primary care providers have a unique role in addressing obesity across the lifecycle, yet many do not feel equipped to do so.
- Interventions aimed at changing behaviour of health professionals and organization of care to support persons with obesity are lacking.
- Sustained change comes from theoretically informed interventions targeting the collective mindlines of teams.

What this adds

- Provider-level interdisciplinary learning collaboratives serve as useful vehicle for supporting practice change.
- Provider-driven flexible interventions can identify learning needs and strategies to improve patient care for obesity prevention and management.
- Process interventions like 5AsT are useful for determining systemic issues, which are important to facilitate knowledge transfer and effective implementation.

ABSTRACT

Context: The *5As of Obesity Management* ™ framework provides best practices to address drivers and consequences of obesity and barriers to management in primary care. However, implementing it in practice is challenging. Many primary care providers feel ill-equipped to address obesity prevention and management. Little information exists on changing provider behaviour and organization of care to improve care in this area.

Objectives: Create, implement, and evaluate an intervention that is theoretically informed, contextually appropriate, and evidence based to increase the quantity and quality of obesity prevention and management in primary care. This paper evaluates qualitative impacts of the study.

Design: Randomized controlled trial with convergent mixed methods evaluation.

Setting: A large urban primary care network serving 157 470 patients in Alberta, Canada.

Participants: Chronic disease teams from 24 primary care clinics were included in the overall study. For this qualitative study the participants from the 12 intervention clinics were enrolled: 29 registered nurses/ nurse practitioners (N=15, 1 withdrawal), mental health workers (N=7), and dieticians (N=7).

Intervention: The intervention was co-created with providers: kick-off planning session, twelve intervention sessions (one every two weeks for six months) and evaluation workshops at six and

twelve months. The intervention was supported with internal and external practice facilitation and clinical and research resources.

Main outcome and analysis: Contextual factors that influence provider confidence and ability to incorporate weight management in their practice, and impact of the intervention on these factors. Qualitative data collected on intervention, process, context, and impact through semi-structured interviews, field notes, notes from evaluation workshops, and two questionnaires. Thematic network analysis was used.

Results: Providers internalized 5as Team intervention concepts, deepening self-evaluation and changing clinical reasoning around obesity. Providers perceived that this internalization changed the provider–patient relationship positively. The intervention changed relationships between providers, increasing collaboration and discovery of areas for improvement. These personal and interpersonal changes initiated change to the clinical environment and the entire network.

Conclusion: The 5As Team intervention for providers had multifaceted impacts on provider behaviour and organization of teams to improve weight management in primary care. Future research will assess utility of a similar intervention for improvement of patient outcomes.

Trial registration: NCT01967797

INTRODUCTION

Obesity is a significant healthcare issue with multiple co-morbidities and a high healthcare cost. Effective strategies are urgently needed to manage obesity in the healthcare system.(1) Primary care providers have a unique role in addressing obesity, yet many do not feel equipped to do so.(2) Interventions aimed at changing behaviour of health professionals and organization of care to support persons with obesity are lacking.(3,4) Misinformation about obesity's complexity and chronicity leads to unrealistic expectations by healthcare providers and patients that hamper care.(4)

To address these problems, the Canadian Obesity Network – Réseau canadien en obésité developed the *5As of Obesity Management*™ framework (Ask, Assess, Advise, Agree, Assist).(5–7) The 5As framework emphasizes encouraging providers to *Ask* permission to discuss weight; to fully *Assess* the history, root causes, contextual factors, comorbidities, and health goals; to *Advise* the person around their particular health situation and healthy approaches to managing their weight and weight loss; to come to a shared understanding and *Agree* on a course of action; and to *Assist* the person over time in accessing the needed supports. This patient-centric approach leverages motivational interviewing skills and aims to better address drivers and consequences of obesity and barriers to management for patients in primary care settings, and has been demonstrated to improve clinical encounters and support patient weight loss.(8–11) Implementation, however, is challenging.

The 5As Team (5AsT) study was conceived and developed collaboratively with frontline primary care practitioners to identify and address barriers to sustainably implementing obesity

prevention and management, herein referred to as "weight management", in primary care.(12) The primary objectives of the study were improvement in quality and quantity of patient visits for weight management through training that built upon the 5As framework. The primary quantitative outcome measure was the number of weight management visits conducted by the nursing participants in the study. This paper presents results of the study's qualitative arm and reports 5AsT intervention's multifaceted impacts on clinical practice of the nurses, nurse practitioners, dieticians, and mental health workers beyond the primary quantitative outcome measure.

METHODS

Study design

The 5AsT randomized controlled trial (12) was designed with convergent mixed methods evaluation to: 1) determine contextual facilitators and barriers affecting the primary outcome measure, 2) fully describe the intervention and its implementation, and 3) uncover impacts beyond numerical changes in patient visits. This paper focuses on qualitative evaluation of the 5AsT intervention to address objective three.

Intervention

The 5AsT intervention structure, content, and theoretical foundation has been reported in detail elsewhere.(13) It was created with frontline providers based on self-assessed participant need of skills and resources to improve their ability to help patients with weight management. The format was twelve two-hour sessions over six months, with a kick-off and wrap-up session. The focus was on aspects of weight management, with a presentation by content expert(s) and

facilitated discussion with clinic team groups. Through collaborative learning, participants shared practical tips, clinical experiences, and challenges to set personal practice goals and to engage with 5AsT materials. The six-month intervention phase was followed by a nine-month sustainability phase with further data collection on the primary outcome measure. The first six months post-intervention is termed the passive phase as there was no further contact with the participants. At the six-month post-intervention mark there was a follow-up workshop to present the qualitative results to the participants to ensure they resonated with them, and administer follow-up questionnaires. Both an internal practice facilitator, or clinical champion, and external practice facilitators supported the intervention.(13)

Setting and participants

The 5AsT trial took place in the Edmonton Southside Primary Care Network (ESPCN). Alberta's publically funded PCNs provide access to multidisciplinary team care to 3.2 million Albertans.(14) They are partnerships of family physician clinics that implement interdisciplinary care models in primary healthcare to address needs of local populations. The ESPCN serves an ethnically and socially diverse population, reflecting an urban/suburban Canadian setting.(15)

The ESPCN linked 67 family clinics with 178 physicians serving 195 992 patients in April 2013 when the study was approved.(15) PCN resources are used to fund embedded extended primary care teams in family practice clinics. The physician-owned private clinics are fee for service; physician billings for patient care activities are their only revenue stream. One teaching clinic has a salaried alternative relationship model. Embedded interdisciplinary teams paid by the PCN bring additional resources to primary care. These teams focus on improving chronic disease

management (such as diabetes, obesity, and depression) and prenatal and elder care. Clinics eligible for the 5AsT intervention had a primary care team (registered nurse/nurse practitioner, mental health worker, and dietician) embedded by April 2013. 24 eligible clinics serving 157 470 patients were allocation concealed and randomized by computer, by a statistician not involved with the project. Randomization was stratified by clinic panel size (number of patients per physician), with three strata of eight clinics each: panel size ≤2 754, panel size from 2 755 to 6 576, and panel size ≥6 577. The results of the quantitative portion of the study are presented in our companion paper.

Study sample for the qualitative component of 5AsT was all 29 PCN interdisciplinary providers (registered nurses/ nurse practitioners (RN/NP) (15), dieticians (7), mental health workers (7) affiliated with the 12 clinics randomized to the 5AsT intervention arm. All providers consented to the study and were released from clinical duties to participate in intervention sessions. Two mental health workers could not actively participate in the intervention sessions due to personal scheduling conflicts; their data was included in the analysis. One RN/NP withdrew from the study and their data was redacted. Of note, all team participants were included in the intervention as they all had a crucial role in team-based obesity care, and were sources for the qualitative data. The quantitative outcome measure of the number of weight management visits conducted pertained only to the RN/NP.

Data collection

The core qualitative data set comes from interviews with 28 participants during the intervention. Field notes on the 12 intervention sessions, written answers to exit questionnaires, diaries of the

practice facilitators, and activity sheets from evaluation workshops at months six and 12 augmented this data set.

Semi-structured interviews with participants were audio recorded, transcribed, and entered into NVIVO 10 qualitative data analysis software (QSR International, Burlington, MA, USA**.** Interviews focused on contextual factors that could influence intervention success, provided a reflection space for participants, and allowed the research team to assess intervention impact in a real-world setting.

Field notes followed the observational method of Shaw et al.(16) and were collected during the 12 intervention sessions. Immediately after, facilitators and team members synthesized field notes into comprehensive documents on each session that were coded and organized using NVIVO 10. Information was collected on participant behaviour change, challenges, needs, and intervention process.

Questionnaire data were collected after the intervention and passive phases (at months six and 12 respectively). De-identified participant responses were logged in Microsoft Excel for further analysis and assessment. The coding method of Attride-Sterling (17) was used to assess long answer responses.

In evaluation workshops after intervention and passive phases, participants developed activity charts that we used to assess concrete changes made by participants post intervention.

Analysis

Our thematic analysis approach (17) had three stages: familiarization, reduction, and exploration. In familiarization we read transcripts multiple times to gain an overall understanding of the qualitative data. Reduction applied qualitative coding to organize data by broad subject, assigning labels or meaningful descriptors to units of text. (17) A coding manual was derived from the data during early stages of analysis and was vetted by four researchers. Four members of the analytical team cross-coded a subset of interviews. Coding led to creation of nodes, clusters of text segments relating to a data pattern. Exploration or theme formation followed Attride-Sterling's (17) method of thematic network analysis to develop thematic maps that organized text from nodes into higher level themes. We defined themes as integrations of disparate pieces of data (18) that were consistently present, linked numerous codes, and were latent or manifest. Three research team members assessed all themes for agreement, and an external qualitative researcher independently reviewed coding for consistency.

RESULTS

Provider level impacts: Participant internalization of 5AsT

A core finding was the internal impact of the 5AsT intervention on participants, namely changes to how participants thought, spoke about, and managed obesity in their clinical practice (Table 1). Participants reported that the intervention revealed their intrinsic biases, particularly on weight. This increased self-awareness led many to re-frame their view of obesity as a chronic disease, rather than a lifestyle choice. Internal changes to conceptualizing obesity also impelled participants to be gentler in their approach to patients and more inclusive in their language.

Although changes to perceptions and moments of sudden insight appear frequently in the data, the most widely reported personal perceived effect of the intervention was on participant confidence. Participants reported increased willingness to initiate weight management conversations and specifically cited learning during the intervention as the source of their confidence.

Related to all aspects of internalization is the idea of participant *buy in*. Participants reported that they believed in and accepted the ideas behind the program whether or not they made changes to their practice. Participants frequently reported that they loved the concept or thought it was valid and applicable to their practice.

Table 1: Provider level impacts of 5AsT intervention

Provider level Impact	Representative Quotes
Increased self awareness	"I think it gives me a different perspective … because sometimes we're so used to doing what we do, we do it every day that we don't self evaluate, we don't self reflect so this it allows me to do that. It kind of forces me to do that ..." — Dietician 4 "I think it's definitely given me a more rounded perspective in particular towards like weight, weight bias, that sort of thing … but is it something that am I going to remember everything that we talked about? Not a hundred percent right but I think it's definitely useful information." — Dietician 1 "[Provider X] mentioned she was very surprised about her score (on an weight-bias test)– was surprised she has so much bias. She has the training so was wondering if it wasn't something more personal coming from some place else. *All nodding*." — Field Notes Session 1
Re-framing obesity as chronic disease	"You know doing the sessions here, I have come to realize that no I have not... I'm beginning to realize or at least see it more of a chronic disease." — Dietician 4 "... I'll start off by telling them obesity is a chronic disease management so setting some expectations right away versus saying well how much weight would you like to lose..." — Nurse 3 "Well I think there's definitely pieces that stand out … I'm talking to people it triggers like 'oh I heard this', you know maybe I should do that. So definitely that asking part of it, and that it's a chronic disease, and that stopping the weight gain, that's a big one..." — Dietician 2
Change to vocabulary	"…I've learned enough to ask 'is that something that we can discuss, is that something you want to look at?' and stuff like that which, which was something that I wouldn't have done before the asking. You know … I would definitely lead in softly type of thing but that, that's not the vocabulary that I would have used so certainly more awareness there…" — Mental Health Worker 5
Increased Confidence	"I think, I feel more confident with some of the learning that I've done, even with just the presentations of actually taking on these clients and referring them onto [an external program] whereas I can do probably better follow up since I've done this." — Nurse 27 "I'm getting comfortable in, in asking and going over them (the 5As) ..." — Nurse 3 "I'm not afraid to discuss weight and I think that you know that I've learned enough to ask is you know is that something that we can discuss…,which was something that I wouldn't have done before." — Mental Health Worker 5

Buy-in to the 5AsT concepts	"… I really, I love the concept of the five As. I think it's packaged well. I think that the Canadian Obesity Network has done a, a brilliant job in creating a template in which we can use." — Dietician 3 "You know education is always empowerment right and it, always gives us the opportunity to improve our practice so I think in that way it will. Absolutely, you know when you learn something new and you have that kind of ah-ha moment, then it changes, you know it changes things forever so in that way I think it's helpful." — Mental Health Worker 5 "I do. I, you know I bring it back (to) what I've learned and I say …this is an approach we can try." — Nurse 28

Quotes are edited for readability.

Provider–patient impacts

Participants reported that the 5AsT intervention positively affected their relationships with patients through their increased willingness to initiate discussion of weight management, increased patient focus, and improved goal setting (Table 2).

Increased participant willingness to ask about weight management was common. An emphasis on Ask is the first step of the 5As framework, followed by assessing patients for causes of obesity (Assess), providing treatment plans (Advise), gaining patient buy-in to treatment options (Agree), and supporting patients in formulation and following through on their plans (Assist).(7) Deploying the 5As principle of Ask was the most frequent change seen in our data, throughout the interviews, session notes, and questionnaires. In our exit questionnaire, participants noted that 'Asking permission to discuss weight' was among the easiest changes they made post-intervention.

A prominent finding was a more patient-centred approach. Participants reported increased focus on setting aside their personal agendas and care plans when speaking to patients. They cited their previous tendency to focus on what they thought was best for patients, and detailed how the

intervention pushed them to fashion care plans around patient preferences. They frequently mentioned their greater attentiveness to thoughts, feelings, and motivations of patients. This increased sensitivity to patient needs manifested as both simple concern and efforts to foster rapport. Intervention sessions spurred participants to think more about cultural sensitivity as a dimension of patient-centred care and attempt to adapt weight management to different cultural contexts.

Table 2: Provider–patient impacts of the 5AsT intervention

Quotes edited to improve readability.

Provider Patient Impact	Representative Quotes
Increased 'Ask'	"I think I talk about weight more initiated by me I would say now." — Nurse 7 "I tried it [asking about weight] twice now because of the sessions because if they come in for something other than that so like diabetes for example but they have a weight issue, then yes I do try and ask them ..." — Dietician 4 " I think that that's something (asking permission to talk about weight) that may be I'm doing much more diligently than I have in the past because of being involved in, in this group…"— Mental Health Worker 3
Agenda shift	"... I really promote kind of getting away from the numbers and focusing on health and I never weigh them initially so I'll ask them if that's something they want, like do you want to focus on numbers 'cause some people do, they just want to know the numbers and it's going down but it's not anything, like I never promote it or I never just automatically do it anymore, whereas before I would, as we're walking to the room at the back, we would stop and do height and weight so that's something I never do anymore and it's completely up to the patient if they want that or not." –— Dietician 6 "I think it's a really good, it's helped me kind of sit back and have a little bit more structure to my appointments and come in with more of an open mind to see what the patient wants from me more as you know me coming in and telling them what they need to change or what they should do…" — Nurse 4 " I think the biggest thing to remember is to just be patient focused 'cause I think we all have our own motives and our own desires for what we want our patients to do but it needs to be what they want to do. …." — Nurse 11
Increased attentiveness to patient feelings	"I'm more aware of asking them if they want to change, what are, how are they feeling which I probably never would have before." — Nurse 19 "You know how it's going to impact my practice, I guess just increased awareness and sensitivity for people..." — Mental Health Worker 5
Fostering rapport	"I think its just going to have to depend on the patient 'cause some patients are, I don't know, they like a more gentler approach than others and you just have to know your patient. ...If they're nervous and uncomfortable, you know I think sometimes they just want to be heard and so just giving them the time and I think nurses have that time…" — Nurse 11 "Well I think it's just that consistency and, and just always be open and honest and, and allowing for the conversation to keep happening..." — Nurse 20

Cultural sensitivity	"The cultural one, I think I'll try to figure out what a good way to ask about the food 'cause it's important and I know lots of the ones that I talk to some of them are traditional, some are very western, like they've adapted and some are kind of in between but I think I always assume that they're still quite traditional so finding more about what, what role food plays in their household now…" — Dietician 6
Changes in goal setting	"... I'm remembering the session when she said you know trying to … nurture your body versus nourish [your emotions] so those people that get cravings at night, try to find activity that's not necessarily food focused so like go for a walk or take a bubble bath or whatever … I find those are what's more helpful that I take out because I apply those to practice definitely." — Dietician 7 "The concept of weight maintenance is new to me because honestly I would have focused on getting down to maybe not an ideal body mass index but at least approaching that and so I think its a different focus for me since, since the program started…" — Nurse 9
Patient Empowerment	"Yeah, you have to meet them where they're at so it, its not something that we can do for them. They have to do that exercise piece. They have to you know monitor their diet and they have to, if its the surgery they want they have to take those steps to get into that program and we can just guide them." — Nurse 26

Participants reported active patient empowerment as part of their more patient-centred care, emphasizing the patient's central role in directing a weight management strategy. Improving communication between patient and provider also empowered patients with access to the right information.

Finally, participants changed the tone of clinical recommendations and goal setting, focusing less on weight loss and more on weight management and health.

Provider–provider impacts

Participants reported more interdisciplinary work between nurses, dieticians, and mental health workers as a result of the 5AsT intervention (Table 3). They adapted principles of interdisciplinary teamwork emphasized in the intervention sessions to their specific clinical environments. Examples ranged from quick debriefs and patient face-to-face referrals to complete interdisciplinary clinical interviews.

Participants noted their increased empowerment from participating in the intervention, which armed them with effective weight management knowledge and supported them as change agents in their clinics. Many described their increased willingness to challenge views of other team members on weight management and to actively educate and change colleagues' perceptions.

Detailed and sensitive discourse during intervention sessions indicated that sessions were a safe space for participants to speak candidly about interprofessional teamwork at their clinics. We have expanded upon the challenges of interdisciplinary team care for weight management in detail elsewhere.(19) Data were roughly evenly split on positive and negative work environments. Some participants spoke positively, citing effective communication and strong rapport as assets. For instance, Nurse 20 described a collaborative environment where team members are comfortable sharing new information and engaging in peer teaching with physician colleagues. Other participants spoke pointedly about difficult working environments. For instance, Mental Health Worker 6 spoke about difficulties in implementing 5AsT learning with physician colleagues. Other participants echoed this, citing colleagues' different values and lack of willingness to change as major issues. Dieticians and mental health workers who move from clinic to clinic added another dimension, with some citing their 'home' clinics as positive and

easy to work in and other clinics as far less receptive. Of note, great care was taken not to have participants move between intervention and control clinics. Participants also noted that a longer working relationship could improve the level of teamwork and interdisciplinary work. The impact of work environment on study outcomes is detailed in the companion study results paper.

Table 3: Provider–provider impacts of the 5AsT intervention

Quotes are edited to improve readability.

Provider–Provider Impacts	Representative Quotes
Development of the 5AsT team	"Dietician 1 said she started seeing more patients jointly and that it helps her learn more, and the patient." — Field Notes Session 4 "One other thing that came up was that afterwards Nurse Y came up to X and pointed out that her and another dietician are doing a new prenatal class in French around weight management. A goal they set." — Field Notes Session 5 "Nurse 8 shared how her and Dietician 3 piggy back on each other's appointments and do the pass off [direct summary communication] in front of the patient." — Field Notes Session 12 "…I actually like the interaction between all team members because I found we all have slightly different perspective which is super, it's great.— Nurse 7
Provider Empowerment	"…since I've done it, I can talk more comfortably and not be so afraid to kind of challenge some of the physician's statements and opinions so that's been helpful to feel a little bit more, more assertive I guess in that and have something to back it up with so…" — Mental Health Worker 6 "I was really excited… the first morning back I went around to all the doctors and gave them a copy of each of the tear offs saying you know … this is finally actually on one piece of paper, the approach we've been using with weight ..." — Nurse 20 "X gave an example of a doctor who is telling patients that walking is not physical activity and they should aim for something different if they want to be active. She disagrees strongly and asked for the groups' advice. She is going to speak to the doctor and bring a source that Y mentioned in her talk about the benefits of walking." — Field Notes Session 8
Inter-professional Relationships	**Areas for Improvement** "The hardest thing I find obviously is the coordination with the physicians because they sort of have a different mind-set and it's not that we have sort of sit down meetings about our patients and that sort of thing." — Nurse 7 " – said she sees in clinic all the time – that when they weigh people the MOA will yell the weight out loud – she doesn't know what to say to make it stop." — Nurse 3 in Field Notes Session 1 "What do you do when you have a problem with one of the doctors? What do you do when it is the person on the top of the chain doing these things? Referred to the slide X gave about physicians. She was nodding on every point as she has a provider and this is everything he believes. She has tried to challenge it especially in the area of mental health. But the doctor is set in his ways and his comments make her feel sad and helpless." — Mental Health Worker 6 in Field Notes Session 1

	Strengths "Very good. Yeah, my doctors are very supportive, receptive, you know they're, they're really great to work with and very appreciative so yeah it couldn't be better." — Nurse 8 "We have a really good relationship, Dr. X and I. We're on the same page with managing patients, great communication." — Nurse 21 "Oh yeah. It's great working here. Oh yeah, we get along. It's wonderful. I can talk to Dr. Y across the hall. If I come up with something from a patient that I don't understand, he'll explain it to me, like I don't feel that he would criticize me for not knowing anything or not knowing that. …." — Nurse 19 **Importance of Context** "Oh boy, complicated. It depends on what clinic you go to. Some, some are very dysfunctional. They see me more as someone to talk about diabetes but not weight management. They wouldn't, you know they would probably tell their patient to go to Weight Watchers before they would refer to me and then my home clinic, the environment is excellent and they're very open and I think if I said you know why don't you start telling people to come see me for weight management, I think they would do that." — Nurse 26 "... they have never had nurses before and we're really just working through it and trying to figure out, like they've been together for over 30 years so they can't just have me coming in and saying this is how we're going to do it now so it's something that I will probably bring up." — Nurse 26
Differential disciplinary Impact	[In response to the question, is weight management important in your practice] "No. No it's not. …Often sometimes they'll bring it up to me you know because they've, you know when they go into the ... downward spiral of depression, they often get quite sedentary, sometimes they put on a lot of weight, sometimes it's exact opposite, they're not eating and they're losing a lot of weight so I mean there is that aspect of it and I think that maybe it has brought me to a place where I'll tick it off in, in terms of addressing it which maybe I didn't necessarily do before, I would only look at the symptoms of depression or anxiety or, or whatever so I think that, that has been helpful but again it's not their primary concern ever when they're coming to see me… — Mental Health Worker 3

The 5AsT intervention had uneven impact on different professions in this study. Although all types of participants reported making changes to their practice as a result of the intervention, mental health workers consistently reported having less use for the 5AsT intervention. They

described how weight issues are interconnected with the psychological and emotional issues seen frequently in their clinics, but felt that weight management is secondary to their goals as providers and is infrequently the focus of their clinical practice. Conversely, the dieticians are more aware of mental health issues, and the need to support patients with these issues as part of their weight management.

Clinic level impacts

Impacts of the 5AsT intervention on participants' clinics encompassed changes to the physical environment to improve patient experience (Table 4). Participants mentioned their efforts to make the clinic space more inclusive. Actions such as moving weigh scales to more private areas or assuring availability of bariatric scales, were reported in both session field notes and interviews. Participants occasionally connected their motivation to change the clinic to poor experiences observed in practice that compromised patient dignity and comfort.

Participants further reported improvement to their clinical visits. They felt better equipped to initiate discussions of weight management (described under patient–provider relations, above) and they improved their visit organization, comprehensiveness, and follow-up. In addition, participants mentioned changing their line of clinical questioning based on the intervention, asking about and considering patient history they would not have included before. Improved clinical practices were often linked to the 5AsT tools, which participants used as sources of information and organizational aids.

Lastly, participants described some adapting of the 5AsT approach to their clinical environment

and style. This was implicit in participant feedback, as they described each change or improvement made as an extension of their usual routine (Tables 1–4). This quote particularly reflected the process of using 5AsT concepts, adapting to changing patient need, and being aware of clinical context:

> "…do you think we could do a weight today? and hoping that they would say yes. Most of them do, but there's the odd one I get that doesn't want to. I just actually saw a client this morning, it's my third visit with her, and the first one she said I do not want to be weighed, I think she was straight up with me, I said oh that's totally fine, when you're ready you let me know. The second visit she said I think I'm ready to be weighed. I said great, let's do it and we don't focus around the number on the scale or if they ask me 'what was my weight last time?', I go in and I'll take a peek and I discuss it. And if there is a gain or a loss, depending on which way it's going, we cover that aspect of it and then we set goals. Then they'll just say no I do want to lose weight, we set realistic goals and say okay so what are you going to be doing, what do you plan on doing, the SMART goals and we do some goal setting and usually then monitor the effect." — Nurse 27

Table 4: Clinic level impacts of the 5AsT intervention

Clinic Level Impact	Representative Quotes
Changes to clinical environment	"One provider mentioned that she wanted to move the scale in the her clinic and ended up moving it herself." — Field Notes Session 2 "One provider said that she spoke with a nurse at their clinic and how they have ordered special chairs and portable scales so weighing can be more private." — Field Notes Session 2

Improved clinical visits	"Structure things more and how I'm going to address patients and using the tools to kind of help me a bit more with patients as well." — Nurse 21 "I think, I feel more confident with some of the learning that I've done, even with just the presentations of actually taking on these clients and referring them onto Weight Wise [a tertiary bariatric program] whereas I can do probably better follow up since I've done this." — Nurse A27 "Absolutely. I find some of the questions that I ask are different than what they were before, I'm looking for slightly different things now than I was so it, again it gives me kind of a different perspective so…" — Dietician 1
Use of 5AsT tools	"I'm actually using the 5As sheet where you can just jot down notes and actually putting that into the patient's EMR so its helping me chart as well just keeping my interactions with patients more organized as well." — Nurse 3 "And, certainly I'm frequently given patients 'cause they so many come with odd ideas from, that they gathered from the Web when they've got so many sites and none of them credible so to be able give them a handout that has good websites on them." — Nurse 20

Participants adapting the 5AsT tools to their clinical context was an important dimension to changes resulting from the 5AsT intervention.

PCN impacts

The 5AsT intervention gave participants a forum to discuss strengths and weaknesses of the ESPCN in weight management (Table 5): gaps in existing programming, issues with scheduling, resource allocation, access to existing programming, and areas of identified need. Frontline staff could critically evaluate the PCN's existing plans to address obesity, as a possible catalyst for change. De-identified feedback was shared with the PCN.

Table 5: PCN level impacts of the 5AsT intervention

PCN Level Impact	Representative Quotes
Gaps in programming	"... so after listening to (the) talk about the four M's, we had staff members say well I want to know what are questions that I can ask to help me identify the four M's and I sat there a little bit with my jaw open because as a PCN we've already created that framework and we've created the questions and we trained the staff on it but we haven't followed up." — Dietician 3
Scheduling	"Well its mostly time right so like even if it would be., I don't know, I find the schedule is a little bit too full but I think that's more like a clinic problem than anything."— Nurse 29 "More time. That's the biggest things honestly is just time because part of my role is to improve access to this clinic so we have four physicians with varying panel sizes from 1500-4000 patients so if you can't, they can't get into see that doctor three to four weeks…so if I book hour long appointments with everybody, I'm not improving I am for a very, very small proportion of these people but them I'm going to be booked up for a month ahead…." — Nurse 9
Access	"X and Y talked about waiting time for weight loss clinics and how they can wait for years and then find out they are not eligible and how some go out of the country to get it (procedures) done." — Field Notes Session 10
Resource allocation	"...she thinks the PCN is a lot better than the picture X painted. That the PCN has all this equipment but they have the staff but not their clinics." — Nurse 7
Identified need	"From this a discussion came up around the PCN offering more support to patients who are thinking of entering a bariatric program to who have lost weight and might need emotional support." — Field Notes Session 10

DISCUSSION

Qualitatively, the 5AsT intervention resulted in multifaceted impacts on participating primary care providers relating to internalization of the new approaches to clinical weight management. Internalization describes a process by which people transform the regulation of their behaviour

by external values and norms into regulation by internal processes. Within self-determination theory (20) internalization is a process that is relational and depends on the social context. In its ideal form internalization means that regulation is fully integrated with the individual's other values, needs, and identities. The resulting behaviour is self-determined and characterized by qualities such as conceptual or intuitive understanding, creativity, and confidence in own capacities. Our use of the term internalization fully acknowledges the social, cultural and developmental quality of the process, rather than a unidirectional movement of values across and arbitrary boundary between external and internal.(21)

1. Participants internalized the 5AsT concepts, deepening their self-reflection/self-evaluation and changing their line of clinical reasoning around obesity.
2. Internalization of 5AsT concepts by participating providers improved their perception of the quality of their provider–patient relationships.
3. The 5AsT intervention increased collaboration among providers and led to joint discovery of areas for improvement.
4. These personal and interpersonal changes catalysed change to the clinical environment and to the PCN as a whole.

The 5AsT intervention engendered changes in provider behaviour, clinical environments, and patient interactions in the context of the PCN. Clinical significance is threefold. First, intervention participants reported being more apt to make small changes such as speaking using more patient-centric language, moving a scale for privacy, or ordering bariatric equipment. Participants emphasized how they augmented their everyday practice with these changes. Small changes, in line with the evidence-based 5As principles and with the structure and nature of a

clinical environment, may be easier to implement and to sustain, facilitating tackling larger changes. Second, a process intervention such as 5AsT was able to expose existing strengths and weaknesses in PCN programming, leading to reflections on how to continue to evolve it. For example, the clinical champion has revamped the training program for new staff to incorporate the 5AsT intervention materials. The 5AsT initiative was a forum for participants to discuss current issues in their PCN, and to work through challenges to implementation in the diverse affiliated clinics. By sharing personal experiences and ideas, participants were better able to crystallize their thoughts about needs in their clinic environments. Interviews and intervention sessions also gave participants platforms to speak about subjects they might otherwise keep to themselves, such as their lack of confidence in weight management or gaps in knowledge. Third, in the context of a large PCN, provider internalization and adaptation of an intervention is key to lasting change to weight management. 'Buy-in' of participants was integral to blending 5AsT into their practices and becoming agents of change in their clinics. The core clinical implication of this study is that internalization through increased self-awareness, conceptual knowledge, and tools for continuing to implement learned concepts is central to individual practice change. Team-based learning collaboratives provided a vehicle for telling stories, comparing notes, setting and reporting on their personal goals if they chose, externalizing their tacit knowledge and work through how to integrate the new information into their collective practice. This was supported through the co-creation of tools which served as anchors for the new information and facilitated them integrating it into their interactions.(22) There was room for each individual to contextualize the new information to their personal practice and adapt it flexibly to different patients, while checking back with their learning collaborative and benefiting from reciprocal learning. Although future research must assess the transferability of

this effect in different populations and care settings, this initial study demonstrates how a provider-level intervention can create lasting change.

The process of the 5AsT intervention leveraging longitudinal interdisciplinary learning collaboratives, clinical champions, and goal setting is in alignment with the work of Choo.(23) Choo emphasizes the importance of collective social processes to make sense of new information and conceptualize it, while specifically acknowledging that there are further individual practical decisions on each occasion the knowledge is used. Drawing on this we used two complementary approaches to knowledge creation in the learning collaboratives: (1) creation of enabling conditions to encourage knowledge creation and sense making, sharing and use; and (2) through providing and co-creating enabling tools that support the creation of knowledge-in-practice in context.

This idea is linked to the work of Gabbay and Le May has underscored that practitioners shift their clinical practice through the creation of individual mental maps of their approach to different presentations, or "mindlines", which are made up of evidence and guidance, past experience, practice norms, and patient preferences.(24) In situations where sustained practice change requires a team approach, practitioners work together to integrate new information into their practice and to evolve the setting to support the change. This concept is particularly important in weight management as it is not sufficient to change an individual providers' practice, rather there is a need to co-create a new clinical paradigm for the whole team – or in their terminology to co-create a "collective mindline". As illustrated in these results, we see the individual providers shifting their personal approach to their weight management consultations,

and how they have shifted their team work with their PCN colleagues to develop new collective approaches. This is particularly important given the finding that weight management is embedded within other reasons for clinical encounters in primary care.(25) We have demonstrated previously that the clinic-level team environment with the non-PCN staff is crucially important to whether the individual participants were able to make higher level shifts to establish new group norms in practice.(19) This relates to the relationship between knowledge and its social origins; both social and organizational context shape knowledge-in practice-in context.(24) Moving from changes in ones individual mindline to a new norm for the group relies upon a supportive, respectful environment that supports change.

This is why team factors are so important in whether or not individuals were able to achieve higher-level change in the 5AsT study.

Overall, literature focusing on long-term weight management interventions for providers is scant, making comparison of our core findings difficult.(3,26) The few studies that assess provider level interventions focus on patient outcomes, specifically the amount of weight loss achieved, rather than on the process of change among providers.(3) In their review of the existing literature, Flodgren et al. found only one high quality study that assessed the behaviour change of providers.(3) Studies often deployed shorter interventions (several hours to several days) and rarely had qualitative accompaniment to their randomized controlled trials.(3,26,27) The qualitative component of the 5AsT study is similarly unique when compared to the existing qualitative literature on primary care providers and weight management. Past qualitative studies focused on providers' self-reported barriers to weight management,(28–30) assessment of provider's existing weight management ability,(31,32) and provider views on the utility of

weight management interventions.(33) Additionally, a cluster of papers focuses on weight biases of practitioners and their attitudes towards conducting weight management.(34) Current qualitative literature does not describe processes of provider change and development in capacity for supporting weight management in response to an intervention.(11) The findings of this study open up new questions and considerations for future research.

Methodological significance of this study is twofold. First, the diversity of impacts illustrates that complex interventions in real-world contexts benefit from a mixed methods approach. We obtained rich qualitative data on a multitude of intervention impacts not captured by the primary quantitative outcome measure. The literature contains little research of this kind, and this approach adds to knowledge on complex weight management interventions in primary care. Second, this study highlights possible outcome measures for future research. Given the complex nature of weight management in patient encounters,(28,34) qualitative study components may offer utility in understanding the breadth of impacts from complex interventions such as 5AsT. Future research could include qualitative methods to expand or validate the primary outcome measure of the quantitative portion in mixed methods studies.

Strengths and limitations

Strengths: 1) Interdisciplinary approach. Professional perspectives of mental health workers, nurses, nurse practitioners, and dieticians are integral to successful weight management. Including these key disciplines in 5AsT gave us the perspectives of diverse participants in the clinical environment, and let us track how they responded to the intervention. This brought richer understanding of the spectrum of impacts, both positive and negative. 2) Extensive peer debrief

and cross-coding in our analysis. Using five reviewers, one not directly part of delivering the intervention, confers greater validity on the findings. 3) Diverse data set. Data assessed for this study were multifaceted, capturing participant perspectives from semi-structured interviews, group sessions, and questionnaires. This diversity of data allowed assessment of both stated changes and goals/ of providers. We could also observe the process of change, both internal and external, over the course of the intervention. 4) Qualitative study within a randomized controlled trial provides a rich explanation of the context, intervention, and the individual provider barriers and facilitators affecting the impacts of the intervention.

Limitation: In this study the data impact of the intervention are from the providers' perspective only. Our on going work is exploring patient values, preferences and expectations of their primary care providers, and their evaluation of the 5As approach and tools to support their weight management and health. Exclusion of primary care physicians from the provider intervention: we were unable to provide monetary compensation for the substantial physician time required for participation in the trial. Existing literature on physicians using the 5As shows that training programs improve patient–provider interactions and the comprehensiveness of weight management plans.(11) In future studies we plan to use a modified short course intervention on the 5As to add physician involvement, similar to studies conducted with family medicine residents.(35) A current sub-study in 5AsT implements a short course on the 5As framework for first year family medicine residents and thus will add to this body of literature.

CONCLUSION

The 5AsT study demonstrates that an extended training intervention for primary care providers

can engender impacts on obesity and weight management at multiple levels. This intervention changed participants' personal understanding of and clinical approach to obesity, and their interactions in collaborative practice. Participants reported internalization of the 5AsT concepts, facilitating improved communication and teamwork in the clinic, as well as transfer of newly acquired skills to clinic colleagues. Beyond effects on individual participants, the intervention brought participant-reported improvements in patient interactions and new insights into better organization of care in primary care clinics for persons with obesity. The intervention spurred concrete changes to clinical environments in creating a more dignified experience for persons with obesity. The 5AsT intervention can be one model for training interventions that deliver concrete impacts for practice.

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Table 1: Provider level impacts of 5AsT intervention

	Representative Quotes
Increased self-awareness	"I think it gives me a different perspective … because sometimes we're so used to doing what we do, we do it every day that we don't self-evaluate, we don't self-reflect so this it allows me to do that. It kind of forces me to do that ..." — Dietician B4 "I think it's definitely given me a more rounded perspective in particular towards like weight, weight bias, that sort of thing … but is it something that am I going to remember everything that we talked about? Not a hundred percent right but I think it's definitely useful information." — Dietician B1 "[Provider X] mentioned she was very surprised about her score (on an weight-bias test) – was surprised she has so much bias. She has the training so was wondering if it wasn't something more personal coming from some place else. *All nodding*." — Field Notes Session 1
Re-framing obesity as chronic disease	"You know doing the sessions here, I have come to realize that, no I have not... I'm beginning to realize or at least see it more of a chronic disease." — Dietician 4 "... I'll start off by telling them obesity is a chronic disease management so setting some expectations right away versus saying well how much weight would you like to lose..." — Nurse A12 "Well I think there's definitely pieces that stand out … I'm talking to people it triggers like 'oh I heard this', you know maybe I should do that. So definitely that asking part of it, and that it's a chronic disease, and that stopping the weight gain, that's a big one..." — Dietician B2
Change to vocabulary	"…I've learned enough to ask 'is that something that we can discuss, is that something you want to look at?' and stuff like that which, which was something that I wouldn't have done before the asking. You know … I would definitely lead in softly type of thing but that, that's not the vocabulary that I would have used so certainly more awareness there…" — Mental Health Worker C5
Increased Confidence	"I think, I feel more confident with some of the learning that I've done, even with just the presentations of actually taking on these clients and referring them onto [an external program] whereas I can do probably better follow up since I've done this." — Nurse A15 "I'm getting comfortable in, in asking and going over them (the 5As) ..." — Nurse A12

	"I'm not afraid to discuss weight and I think that you know that I've learned enough to ask is you know is that something that we can discuss…,which was something that I wouldn't have done before." — Mental Health Worker C5
Buy-in to the 5AsT concepts	"… I really, I love the concept of the five As. I think it's packaged well. I think that the Canadian Obesity Network has done a, a brilliant job in creating a template in which we can use." — Dietician B3 "You know education is always empowerment right and it, always gives us the opportunity to improve our practice so I think in that way it will. Absolutely, you know youwhen you learn something new and you have that kind of ah-ha moment, then it changes, you know it changes things forever so in that way I think it's helpful." — Mental Health Worker C5 "I do. I, you know I bring it back (to)what I've learned and I say …this is an approach we can try." — Nurse 22a

[Paper 2] Table 2: Provider–patient impacts of the 5AsT intervention

Quotes edited to improve readability.

Provider Patient Impact	Quote
Increased 'Ask'	"I think I talk about weight more initiated by me I would say now." — Nurse A4 "I tried it [asking about weight] twice now because of the sessions because if they come in for something other than that so like diabetes for example but they have a weight issue, then yes I do try and ask them ..." — Dietician B4 " I think that that's something (asking permission to talk about weight) that may be I'm doing much more diligently than I have in the past because of being involved in, in this group…"— Mental Health Worker C3
Agenda shift	"... I really promote kind of getting away from the numbers and focusing on health and I never weigh them initially so I'll ask them if that's something they want, like do you want to focus on numbers 'cause some people do, they just want to know the numbers and it's going down but it's not anything, like I never promote it or I never just automatically do it anymore, whereas before I would, as we're walking to the room at the back, we would stop and do height and weight so that's something I never do anymore and it's completely up to the patient if they want that or not." –— Dietician B6 "I think it's a really good, it's helped me kind of sit back and have a little bit more structure to my appointments and come in with more of an open mind to see what the patient wants from me more as you know me coming in and telling them what they need to change or what they should do…" — Nurse A11 " I think the biggest thing to remember is to just be patient focused 'cause I think we all have our own motives and our own desires for what we want our patients to do but it needs to be what they want to do. …." — Nurse A9
Increased attentiveness to patient feelings	"I'm more aware of asking them if they want to change, what are, how are they feeling which I probably never would have before." — Nurse A13 "You know how it's going to impact my practice, I guess just increased awareness and sensitivity for people..." — Mental Health Worker C5

Fostering rapport	"I think its just going to have to depend on the patient 'cause some patients are, I don't know, they like a more gentler approach than others and you just have to know your patient. ...If they're nervous and uncomfortable, you know I think sometimes they just want to be heard and so just giving them the time and I think nurses have that time…" — Nurse A9 "Well I think it's just that consistency and, and just always be open and honest and, and allowing for the conversation to keep happening..." — Nurse A3
Cultural sensitivity	"The cultural one, I think I'll try to figure out what a good way to ask about the food 'cause it's important and I know lots of the ones that I talk to some of them are traditional, some are very western, like they've adapted and some are kind of in between but I think I always assume that they're still quite traditional so finding more about what, what role food plays in their household now…" — Dietician B6
Changes in goal setting	"... I'm remembering the session when she said you know trying to … nurture your body versus nourish [your emotions] so those people that get cravings at night, try to find activity that's not necessarily food focused so like go for a walk or take a bubble bath or whatever … I find those are what's more helpful that I take out because I apply those to practice definitely." — Dietician B7 "The concept of weight maintenance is new to me because honestly I would have focused on getting down to maybe not an ideal body mass index but at least approaching that and so I think its a different focus for me since, since the program started…" — Nurse A7
Patient Empowerment	"Yeah, you have to meet them where they're at so it, its not something that we can do for them. They have to do that exercise piece. They have to you know monitor their diet and they have to, if its the surgery they want they have to take those steps to get into that program and we can just guide them." — Nurse A1 "And, certainly I'm frequently given patients cause they so many come with odd ideas from, that they gathered from the Web ... so to be able give them a handout that has good websites on them…" — Nurse A3

Table 3: Provider–provider impacts of the 5AsT intervention

Quotes are edited to improve readability.

Provider–Provider Impacts	Quote
Development of the 5AsT team	"B1 said she started seeing more patients jointly and that it helps her learn more, and the patient." — Field Notes Session 4 "One other thing that came up was that afterwards Nurse Y came up to X and pointed out that her and another dietician are doing a new prenatal class in French around weight management. A goal they set." — Field Notes Session 5 "A8 shared how her and B3 piggy back on each other's appointments and do the pass off in front of the patient." — Field Notes Session 12 "…I actually like the interaction between all team members because I found we all have slightly different perspective which is super, it's great.— Nurse A4
Provider Empowerment	"…since I've done it, I can talk more comfortably and not be so afraid to kind of challenge some of the physician's statements and opinions so that's been helpful to feel a little bit more, more assertive I guess in that and have something to back it up with so…" — Mental Health Worker C6 "I was really excited… the first morning back I went around to all the doctors and gave them a copy of each of the tear offs saying you know … this is finally actually on one piece of paper, the approach we've been using with weight ..." — Nurse A3 "X gave an example of a doctor who is telling patients that walking is not physical activity and they should aim for something different if they want to be active. She disagrees strongly and asked for the groups' advice. She is going to speak to the doctor and bring a source that X mentioned in her talk about the benefits of walking." — Discussion from Session 8
Inter-professional Relationships	[**Areas for Improvement** "The hardest thing I find obviously is the coordination with the physicians because they sort of have a different mindset and it's not that we have sort of sit down meetings about our patients and that sort of thing." — Nurse A4 " – said she sees in clinic all the time – that when they weigh people the MOA will yell the weight out loud – she doesn't know what to say to make it stop." — Nurse A12 [Field Notes Session 1]

	"What do you do when you have a problem with one of the doctor? What do you do when it is the person on the top of the chain doing these things? Referred to the slide X gave about physicians. She was nodding on every point as she has a provider and this is everything he believes. She has tried to challenge it especially in the area of mental health. But the doctor is set in his ways and his comments make her feel sad and helpless." — Mental Health Worker C6 [Field Notes Session 1] **Strengths** "Very good. Yeah, my doctors are very supportive, receptive, you know they're, they're really great to work with and very appreciative so yeah it couldn't be better." — Nurse A5 "We have a really good relationship, Dr. X and I. We're on the same page with managing patients, great communication." — Nurse A2 "Oh yeah. It's great working here. Oh yeah, we get along. It's wonderful. I can talk to Dr. X across the hall. If I come up with something from a patient that I don't understand, he'll explain it to me, like I don't feel that he would criticize me for not knowing anything or not knowing that. …." — Nurse A13 **Importance of Context** "Oh boy, complicated. It depends on what clinic you go to. Some, some are very dysfunctional. They see me more as someone to talk about diabetes but not weight management. They wouldn't, you know they would probably tell their patient to go to Weight Watchers before they would refer to me and then my home clinic, the environment is excellent and they're very open and I think if I said you know why don't you start telling people to come see me for weight management, I think they would do that." — Nurse A1 "... they have never had nurses before and we're really just working through it and trying to figure out, like they've been together for over 30 years so they can't just have me coming in and saying this is how we're going to do it now so it's something that I will probably bring up." — Nurse A1
Differential disciplinary Impact	[In response to the question, is weight management important in your practice] "No. No it's not. …Often sometimes they'll bring it up to me you know because they've, you know when they go into the ... downward spiral of depression, they often get quite sedentary, sometimes they put on a lot of weight, sometimes it's exact opposite, they're not eating and they're losing a lot of weight so I mean there is that aspect of it and I think that maybe it has brought me to a place where I'll tick it off in, in terms of addressing it which maybe I didn't necessarily do before, I would only look at the symptoms of depression or anxiety or, or whatever so I think that, that has been helpful but again it's not their primary concern ever when they're coming to see me… — Mental Health

	Worker C3

Table 4: Clinic level impacts of the 5AsT intervention

Clinic Level Impact	Quote
Changes to clinical environment	"One provider mentioned that she wanted to move the scale in the her clinic and ended up moving it herself." — Field Notes Session 2 "One provider said that she spoke with a nurse at their clinic and how they have ordered special chairs and portable scales so weighing can be more private." — Field Notes Session 2
Improved clinical visits	"Structure things more and how I'm going to address patients and using the tools to kind of help me a bit more with patients as well." — Nurse A2 "I think, I feel more confident with some of the learning that I've done, even with just the presentations of actually taking on these clients and referring them onto Weight Wise [a tertiary bariatric program] whereas I can do probably better follow up since I've done this." — Nurse A15 "Absolutely. I find some of the questions that I ask are different than what they were before, I'm looking for slightly different things now than I was so it, again it gives me kind of a different perspective so…" — Dietician B1
Use of 5AsT tools	"I'm actually using the 5As sheet where you can just jot down notes and actually putting that into the patient's EMR so its helping me chart as well as long as week as just keep my interactions with patients more organized as well." — Nurse A12 "And, certainly I'm frequently given patients 'cause they so many come with odd ideas from, that they gathered from the Web when they've got so many sites and none of them credible so to be able give them a handout that has good websites on them." — Nurse A3

Table 5: PCN level impacts of the 5AsT intervention

PCN Level Impact	Quote
Gaps in programming	"... so after listening to (the) talk about the four M's, we had staff members say well I want to know what are questions that I can ask to help me identify the four M's and I sat there a little bit with my jaw open because as a PCN we've already created that framework and we've created the questions and we trained the staff on it but we haven't followed up." — Dietician B3
Scheduling	"Well its mostly time right so like even if it would be., I don't know, I find the schedule is a little bit too full but I think that's more like a clinic problem than anything."— Nurse A6 "More time. That's the biggest things honestly is just time because part of my role is to improve access to this clinic so we have four physicians with varying panel sizes from 1500-4000 patients so if you can't, they can't get into see that doctor three to four weeks…so if I book hour long appointments with everybody, I'm not improving I am for a very, very small proportion of these people but them I'm going to be booked up for a month ahead…." — Nurse A7
Access	"X and Y talked about waiting time for weight loss clinics and how they can wait for years and then find out they are not eligible and how some go out of the country to get it (procedures) done." — Field Notes Session 10
Resource allocation	"...she thinks the PCN is a lot better than the picture X painted. That the PCN has all this equipment but they have the staff but not their clinics." — Nurse A4
Identified need	"From this a discussion came up around the PCN offering more support to patients who are thinking of entering a bariatric program to who have lost weight and might need emotional support." — Field Notes Session 10

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IMPLEMENTATION SCIENCE

STUDY PROTOCOL Open Access

Implementation and evaluation of the 5As framework of obesity management in primary care: design of the 5As Team (5AsT) randomized control trial

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Abstract

Background: Obesity is a pressing public health concern, which frequently presents in primary care. With the explosive obesity epidemic, there is an urgent need to maximize effective management in primary care. The 5As of Obesity Management™ (5As) are a collection of knowledge tools developed by the Canadian Obesity Network. Low rates of obesity management visits in primary care suggest provider behaviour may be an important variable. The goal of the present study is to increase frequency and quality of obesity management in primary care using the 5As Team (5AsT) intervention to change provider behaviour.

Methods/design: The 5AsT trial is a theoretically informed, pragmatic randomized controlled trial with mixed methods evaluation. Clinic-based multidisciplinary teams (RN/NP, mental health, dietitians) will be randomized to control or the 5AsT intervention group, to participate in biweekly learning collaborative sessions supported by internal and external practice facilitation. The learning collaborative content addresses provider-identified barriers to effective obesity management in primary care. Evidence-based shared decision making tools will be co-developed and iteratively tested by practitioners. Evaluation will be informed by the RE-AIM framework. The primary outcome measure, to which participants are blinded, is number of weight management visits/full-time equivalent (FTE) position. Patient-level outcomes will also be assessed, through a longitudinal cohort study of patients from randomized practices. Patient outcomes include clinical (*e.g.*, body mass index [BMI], blood pressure), health-related quality of life (SF-12, EQ5D), and satisfaction with care. Qualitative data collected from providers and patients will be evaluated using thematic analysis to understand the context, implementation and effectiveness of the 5AsT program.

Discussion: The 5AsT trial will provide a wide range of insights into current practices, knowledge gaps and barriers that limit obesity management in primary practice. The use of existing resources, collaborative design, practice facilitation, and integrated feedback loops cultivate an applicable, adaptable and sustainable approach to increasing the quantity and quality of weight management visits in primary care.

Trial registration: NCT01967797.

Keywords: Primary healthcare, Obesity, Randomized control trial, Evaluation studies, Family medicine, Practice facilitation

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Background

Obesity is a common problem in primary care [1,2]. There are substantial direct and indirect costs to the healthcare system; conservative estimate of costs attributable to obesity in Alberta in 2005 totaled $1.27 billion [3]. Studies suggest that a primary care-based obesity treatment model could be cost-effective over the long term [2] and that treating obesity can reduce the incidence of a variety of chronic diseases [4-7]. However, obesity is 'not effectively managed within our current primary health system' [4-6]. To address this problem, a tool for obesity counseling and management in primary care settings, known as the 5As of Obesity Management™ has been developed [7]. This tool incorporates the conceptual structure of the Best Practices in Weight Management document, the Canadian Obesity Clinical Practice Guidelines [8], and the 5As methodological framework (Ask, Assess, Advise, Agree, Assist) [9]. Preliminary evidence shows that use of the 5As of Obesity Management can increase provider-client interactions in weight management [10]. However, the 5As have not been evaluated in a system-wide implementation study.

The Primary Care Network (PCN) model in Alberta has a 10-year history of embedding multidisciplinary teams in pre-existing family physician clinics. Chronic disease nurses and nurse practitioners working in this multi-disciplinary setting (with family physicians, mental health workers and dieticians) present a good model to target and assess improvement in obesity management.

The goal of this project is to implement and evaluate the 5AsT team intervention aimed at changing provider behaviour with regard to obesity management. This intervention, informed by the theoretical domains framework for behaviour change and the conceptual framework of complex innovation implementation, is co-developed with end-users, emphasizing bidirectional knowledge transfer among multidisciplinary team members to develop a pragmatic and sustainable approach to obesity management in primary care.

Methods

5AsT study overview

The 5AsT trial is a theoretically informed, pragmatic randomized controlled trial with convergent mixed methods evaluation of an intervention on primary care providers to improve obesity management. Clinic-based multidisciplinary teams (RN/NP, mental health, dieticians) will be randomized to control or the 5AsT intervention group. The intervention providers will participate in biweekly learning collaborative sessions supported by internal and external practice facilitation. These learning collaboratives will explore provider-identified barriers to effective weight management in primary care. Evidence-based shared decision making tools will be co-developed and iteratively tested by practitioners. The primary outcome measure is the number of weight management visits per full-time equivalent (FTE) RN/NP position. This measure is longstanding, routine administrative data in the PCN. Participants are unaware of the primary outcome measure, and the research team is blinded to the result during the study period. Patient-level outcomes will be assessed, through a longitudinal cohort study of patients from randomized practices. Qualitative data will be collected from providers and patients, and evaluated using thematic analysis to understand the context, implementation and the effectiveness of the 5AsT intervention. Patient-level outcomes including clinical, health-related quality of life, and satisfaction with care will also be assessed.

Figure 1 provides an overview of the 5AsT trial, which consists of both a provider-level intervention study and a patient-level impact assessment. The 5AsT provider-level study is divided into three phases. Phase 1 is the 'Intervention Phase,' which consists of a kick-off session followed by bi-weekly two-hour learning collaborative sessions over six months. Phase 2 is the 'Passive Phase,' a six-month period where we provide no direct support to the 5As Teams but continue to collect data to determine if behavior change has been internalized. Phase 3 is the 'sustainability phase,' where the primary outcome measure continues to be collected over 12 months to determine if change can be sustained over time. The patient-level study will assess how patients coming from 5AsT intervention practices engage in weight management efforts over time compared to patients from control practices.

Guiding theoretical frameworks

Conceptual framework of complex innovation implementation

Complex innovations such as behavioral change interventions in primary care can be conceived using this validated framework [11]. Our alignment with this framework reduces the chance that context change will negatively affect implementation or completion of the project. This framework informed the decision to have a clinical champion act as an internal practice facilitator from within the primary care network.

Theoretical domains framework for behaviour change

The Theoretical Domains Framework is a validated, comprehensive overview of the core domains important to consider in behavioural change interventions in healthcare improvement [4]. This Framework informs our intervention on the practitioners to expand from knowledge alone, towards engaging in all components critical for their behaviour change. The 5AsT intervention leverages the clinical champion role for coaching and, the practice facilitation role to aid in logistical support, and the learning collaborative model to increase role identification, goal

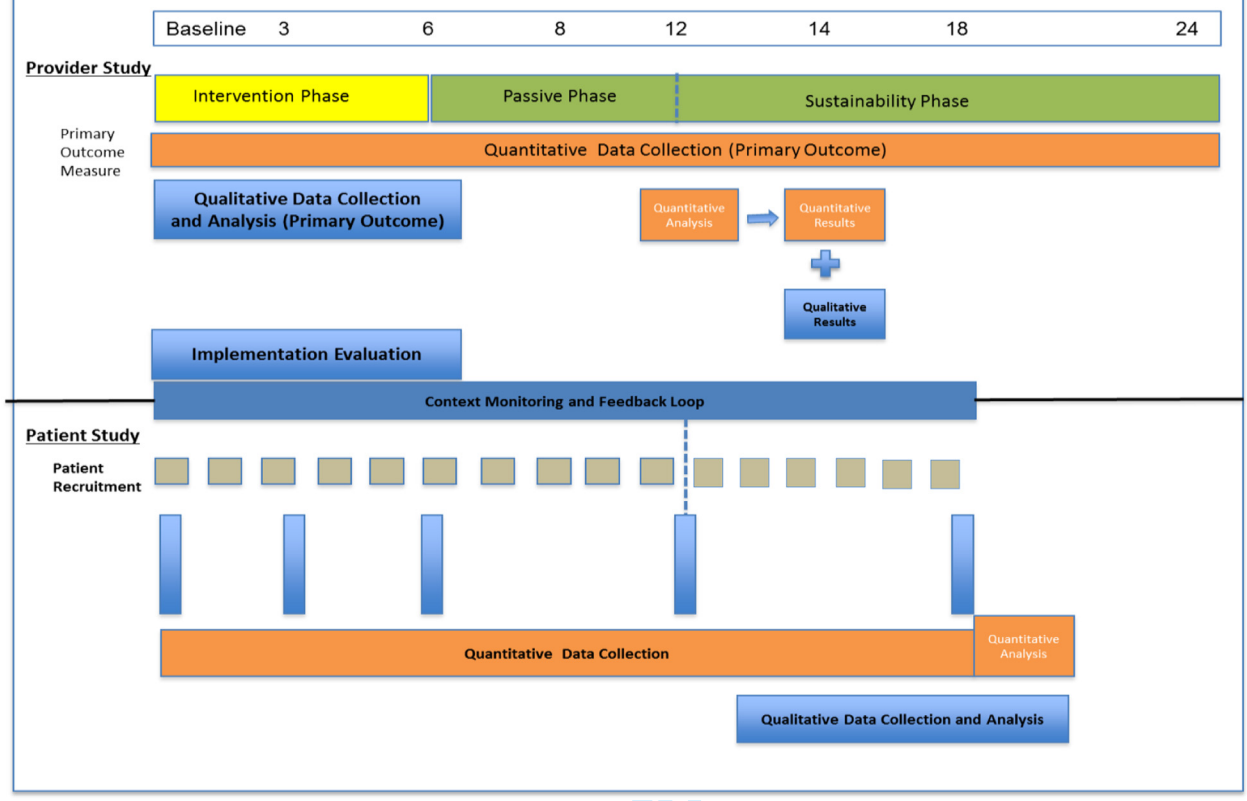

Figure 1 5AsT study overview. The upper portion pertains to the provider-level study and shows intervention and evaluation timeline. The lower portion pertains to the parallel patient-level study.

setting, identification of barriers and facilitators to action. We also used this framework to determine the target patient population. The patient study focuses on patients who have committed to action prior to recruitment ('activated patients'), assessing their ability to initiate and sustain weight management efforts.

Guiding evaluation framework: RE-AIM

Our overall evaluation summarized in Table 1, is guided by the RE-AIM framework: Reach into the target population; Effectiveness of the intervention; Adoption by target settings; Implementation including consistency and cost of delivery; and Maintenance of intervention effects over time (sustainability) [5,6,12,13].

Setting/population

The 5AsT intervention was designed with our partner primary care network (PCN), which consists of 59 dedicated multidisciplinary healthcare providers (nurses, nurse practitioners, mental health workers, dieticians, exercise physiologists, respiratory therapists) embedded in 46 family practices with over 160 family physicians serving 192 655 Albertans. The PCN has been in a period of rapid growth.

At the practice level, the RN/NPs in the PCN are responsible for significant chronic disease management, including diabetes and weight management, as well as prenatal care.

To be eligible to be randomized to the intervention, PCN-affiliated family practice clinics must have joined the PCN by April 2013, and must have a multidisciplinary team including a nurse/nurse practitioner, mental health worker and a dietician affiliated with the clinic, resulting in 24 eligible clinic teams. The intervention unit is the PCN multidisciplinary team affiliated with the clinic, referred to as the '5AsT team.'

Patients are eligible to be recruited to the longitudinal cohort study if they declare activation for behaviour change through their enrolment and participation in one of the PCN programs for health (*e.g.*, weight management groups, activity groups, mental health groups). These are run independently from the clinic-based 5AsT team. Patients are eligible regardless of what clinic they attend for their regular care.

Table 1 RE-AIM framework as a guide for project evaluation

Domain	Description	Measure for patients	Measure for providers
Reach	Degree to which target population is reached	• number recruited	• Control/intervention groups
		• percent attrition	• Intervention attendance
		• patient characteristics	• Provider-chosen topics (subject appropriateness)
Effectiveness	Impact on study outcome	• SF 12	• Quantitative primary
		• BMI	outcome measure
		• 5AsT vs. non 5AsT patients	• Self-reported efficacy
Adaptation	Organizational uptake	Not applicable	• Sustainability phase
			• Repeat provider interviews
Implementation	Intervention implementation as intended	Not applicable	• Learning collaborative
			• Organizational by-in
			• Practice facilitation
			• Feedback loops
Maintenance	Can program outcomes be sustained over time?	• Longitudinal data collection	• Longitudinal data collection

Intervention and control

The 5AsT intervention builds upon the knowledge product of the 5As of Obesity Management™ and extends it to a pragmatic, practice-based intervention for provider behaviour change. The 5AsT intervention will occur in biweekly learning collaborative sessions for six months. The content of the 5AsT learning collaborative sessions will be determined with the practitioners randomized to the intervention. The 5As teams will be supported by a 5As Champion, a recognized clinical leader in weight management from the PCN. This individual is identified and remunerated through the PCN and functions as an internal practice facilitator for the project. In addition to assisting the research team with coordinating their actions with the clinical operations of the PCN, the Clinical Champion serves as a coach and mentor to the 5AsT team members, and as a facilitator for the learning collaborative. Additional support to the 5AsT teams is provided by two external practice facilitators who identify resources, design prototype tools, collect feedback and coordinate with content experts, physicians, and graphic designers to refine the 5AsT tools.

Providers randomized to the control arm of the study all receive usual professional development courses for obesity management through Alberta Health Services and the PCN, which includes didactic training on the 5As of Obesity Management tool kit. Control providers will not take part in bi-weekly learning collaboratives, will not be given circulated learning materials, and will not receive added support from practice facilitators.

Provider-level study

To test the effect of the 5AsT intervention, we will conduct a pragmatic, mixed methods, allocation concealed, randomized, blinded (outcome, data analysts), clinical trial. Figure 1 (upper) details the provider-level study.

Hypotheses

1. Implementation of the 5AsT in primary care practice will increase the number of weight management visits per FTE conducted by the PCN RN/NPs. The primary outcome measure is the number of weight management visits as a function of provider full time equivalent (FTE) work (*i.e.*, a half time nurse has an FTE of 0.5).
2. Implementation of the 5AsT in primary care practice will result in sustained changes in medical practice as evaluated by the RE-AIM framework [13,14].

Qualitative primary question

What contextual factors affect the number of weight management visits conducted by the PCN practitioners?

Allocation concealment and randomization

Following ethical approval and study registration, the eligible clinics (N = 24) were allocation concealed and randomized in a 1:1 ratio using a computer generated random sequence by a statistician external to the project. Randomization was stratified for larger vs. smaller patient panel sizes. Three strata with eight practices were created from the 24 eligible practice units. The first 8 units (Group 1) have panel size ≤2,754; Group 2 has clinic panel size from 2,755 to 6,576, and Group 3 has clinic panel size ≥6,577.

Outcome ascertainment, blinding and equal treatment

The primary outcome measure is the number of weight management visits conducted by the RN/NP participants in their individual practices. Their practice involves

many different kinds of clinical activities like prenatal visits, diabetes care, and other chronic disease management visits.

The primary outcome measure is a routine measure of clinical activity collected on standardized forms within the PCN at every clinical encounter; there is already an audit and quality assurance process in place for this measure. Due to the fact some provider participants work part time, or fractional FTE (full-time equivalent), this must be included in the primary outcome measure.

The provider subjects will be blinded to knowledge of the primary outcome measure so as not to influence their behavior in data collection. The research team will not be involved with the collection of the primary outcome measure. The investigators and health practitioners will have no access to this data and will remain blinded to the results until 12 months following implementation. Data analysts will remain blinded to the allocation of intervention versus control.

Aside from the 5AsT intervention programming, there is no difference in treatment between the intervention and control practitioners. The RN/NPs' clinical practices are geographically dispersed and do not routinely interact.

Quantitative statistical analysis plan

The data will be stored in PCN clinical database and will be extracted after the 12-month intervention and passive period. We will assess the outcome at baseline, 3-month, 6-month, and 12-month time points. The data will be analyzed for multiple time points to allow for a comparison between immediate and long-term provider impact and to increase the reliability of observed trends. Following the sustainability period of 12 to 24 months, the data will be extracted again, and analyzed by blinded data analysts.

Primary outcomes

Two stage summary statistics will be used for the analysis of the primary outcome; the number of weight management visits/FTE for each practitioner will be derived for each time point, and the average of the weight management visits/FTE for the intervention and the control group will be calculated. Weight management visit/FTE trends at pre-intervention, baseline, 3, 6, 12 and 18 months post intervention will be plotted to compare the two groups.

The intervention group and control group will be compared using Wilcoxon-Mann–Whitney test. As generalized estimating equation (GEE) can adjust for clustering effect and does not require a normal distribution, we will perform GEE models to compare the 5AsT intervention group and the control group for our primary outcome at 3, 6, 12 and 18 months. Analysis will be by intention to treat.

Power considerations

Power calculations were performed using both simple and cluster randomization where each clinic is considered as a cluster and RNs are clustered within units. The intra class correlation was estimated to be 0.40. Power calculations with the two approaches were very similar. Given the large numbers of units with only one nurse, we opted in favor of a simple randomization approach. Briefly, this initial approach was as follows:

For simple randomization, a power of 77% was estimated from N = 31 (total number of nurses in the study). The power for a clustered randomized trial was estimated for two scenarios: in 24 clinics with an average of two nurses per clinic, this resulted in a power of 80%; in 24 clinics with an average of one nurse per clinic, it resulted in a power of 65%. These two were presented because we have 31 nurses in total, with an average of 1.3 nurses per clinic, and the exact calculation is not available because an integer is required. However, from the two scenarios, the exact power should be somewhere between 65% and 80%, which is similar to the resulting power from a simple randomization (77%), thus explaining our rationale of opting for a simple randomization.

Effect size was determined using the 22 units for which complete baseline data was available. The mean number of weight management visits/FTE was 69.2 with a standard deviation of 48.1. The study will have 80% power to detect an effect size of 1.19 (absolute difference of 57-weight management visits/FTE between intervention and control groups).

Qualitative data collection

Qualitative data will include description of context, implementation process, and effect of the 5AsT intervention on provider behaviour change. The approach is summarized in Table 2. Primary data sources for the intervention include guided field notes taken during bi-weekly learning collaborative sessions, and logs kept by the clinical champion and the practice facilitators. Data sources for provider impact include semi-structured interviews with key informants, and focus groups. Potential participants will include all providers and key PCN implementation personnel involved in the 5As Team project.

Qualitative data handling and analysis

Analysis of qualitative data will continue throughout the project. Immediately following each observed intervention session, observers will meet at the PCN and construct a composite field note of the event directly into one of the team computers. Field notes will be entered into NVIVO 10 software (QSR International, Burlington, Mass.) Interviews will be audio recorded, transcribed verbatim, and entered into NVIVO.

Table 2 Qualitative data collection plan

Method	Justification	Timeframe
Intervention Phase		
Session field notes	Description: context, implementation process.	0-6 months
Semi-Structured Interviews	All 5AsT randomized providers. Baseline data: intervention content and process feedback-loop.	Initial 3 months
	Personal views and practice, values fit, clinic climate.	
Focus Groups	Evaluation of tools developed during sessions.	6 months
Passive Phase		
Log book Diary notes of passive observations on clinical impact. 0–12 months Clinical Champion		
Sustainability Phase		
Focus Groups	Best practices and intervention impact during the passive phase.	12-24 months
Data Mixing		
Semi-structured interviews with key providers.	Follow-up of emergent questions.	14-16 months
Semi-Structured interviews with selected patients.	Contextual factors that may have influenced patient behaviors.	18-24 months

Thematic Analysis will be the primary qualitative analysis approach for this project [15-18]. Thematic analysis refers to the systematic search for and identification of common themes that are present in data (transcripts and field notes). The unit of analysis will be the healthcare practitioner. Inductive rather than predetermined coding was chosen in order to allow themes to emerge from the data itself and reflects an exploratory rather than explanatory approach.

All interview transcripts will be coded and compared by more than one individual to ensure reliability. A coding manual will clearly outline code definitions and use. A clear record of how themes were generated from raw data will be reviewed by all team members.

Qualitative and quantitative data mixing

Qualitative data analysis will be conducted on an iterative base and informs the intervention. The quantitative data for the primary outcome measure, number of weight management visits/FTE, will be collected in a blinded fashion for the first 12 months. At this point, the primary outcome measure will be analyzed. The study team will then be un-blinded and results will be compared with those from the qualitative analysis. It is expected that themes emerging from qualitative data will be reflected in patterns of quantitative data. Any correlation, or lack thereof, will be explored using key informant semi-structured interviews and focus groups. The purpose of this parallel mixed methods design is fourfold: first, to avoid bias during qualitative analysis; second, to explain any variability of the primary outcome measure; third, to record elements of RE-AIM not captured in the quantitative measures for the different providers in the intervention group; and fourth, to monitor the impact of context, and implementation process in part allowing for real-time feedback loops to maximize effective implementation.

Patient-level study

The 5AsT patient portion of the study occurs concurrently with the provider study. Figure 1 (lower) details the patient-level study.

Hypotheses

1. Implementation of the 5AsT in primary care, in addition to PCN weight management programs, will improve patient important outcomes: primary measures (weight, body mass index [BMI], Short Form 12-item Health Survey [SF-12]) and secondary measures (blood pressure [BP], waist circumference [WC], EuroQol EQ-5D [EQ-5D^{TM}], modified Patient Assessment of Chronic Illness Care [PACIC] [19-22] and completion of recommended biomedical testing for those age > 40 or diabetic).
2. Activated patients, as defined as those who have elected to participate in PCN programming for weight management, will have improvement in patient-important outcomes with PCN programming.
3. Patients who attend 5AsT intervention practices will see improved sustained results greater than in those who attend practices that have standard PCN programming alone.

Qualitative primary question

What contextual factors affect patient perception of in-clinic weight management efforts?

Subject recruitment

A key feature of pragmatic trials is that the participants reflect the population for which the treatment is intended. For the widest generalizability, it is therefore essential that

exclusion criteria be kept to a minimum. Inclusion criteria will be all adult patients older than 18 years with a BMI ≥25, enrolling in PCN programs for health, able and willing to give written informed consent in English. Children and pregnant women will be excluded. Since this is a trial of the primary care management of obesity, patients whose obesity is co-managed by an obesity specialist or tertiary care center will also be excluded (*e.g.*, patients referred for bariatric surgery), as well as patients who are unable to participate in regular clinic visits or programs due to geographic, social or physical reasons.

Power considerations

The sample size calculation for the patient cohort study is powered based upon the SF-12 and the BMI. For SF-12, a moderate effect size is 0.3, and for a 5% reduction in BMI, a moderate effect size is 0.23 to 0.25. We will aim for 80% power. We will gear our enrolment goal to anticipate a 30% lack of adherence to the complete measurement protocol, ensuring that in this scenario the power will remain reasonable at 70%.

Procedures: enrollment and data collection visits

Due to ethical and logistical considerations, we were not permitted to randomize directly at the patient level. Thus, we have randomized at the clinic level. We cannot control how many patients enter the evaluation from each clinic, but based on baseline practice size data, we anticipate that there should be balanced representation from 5AsT and control clinics.

Activated patients will be approached for recruitment into the study. Signed informed consent will be obtained at the PCN by trained staff. Patient visits will occur at baseline, 3, 6, 12 and 18 months at the PCN. We will endeavour to have a minimum of 6 months of data on all patients; thus recruitment must end in October 2015 to close the study by end of March 2016. Proposed baseline characteristics of the patients will also be included (Table 3).

Patient assessment includes: baseline demographics and chronic disease presence (Table 3), measures of self-reported quality of life (EQ5D, SF-12), for follow-up visits a survey on weight management as a chronic disease (modified PACIC, self-report of change behaviour, *i.e.* gym participation, external weight loss programs, number of visits to a healthcare provider for weight management), and measurement of resting heart rate, blood pressure, and basic anthropometric measurements (including height, weight, waist circumferences). We will also monitor compliance with recommended laboratory studies (HbA1c for those with diabetes q 6 months, and for patients over 40 years, fasting cholesterol panel and glucose). If patients are unable to participate in the follow-up in person, a telephone option will be offered. The in-person visit will take 30 minutes per visit on up to five occasions.

Table 3 Demographic characteristics and health variables to be collected on patients

Age in years (mean ± SD)	BMI (mean ±SD)
Gender (% female)	Weight status (%):
Ethnic group:	• Overweight:
Caucasian (%)	• Obese:
Attendance to any other weight loss program (%)	o 30-34
Education (%):	o 35-39
• High school	o >40
• Post-Secondary school	Waist circumference (mean ±SD)
Income (%):	Blood Pressure (mean ±SD)
• <$15,000	• Systolic BP
• $15,000-$29,999	• Diastolic BP
• $30000-$49,999	HbA1c (mean ±SD)
• $50000-$79,999	Type II Diabetes (%)
• >$80,000	Hypertensive (%)
	Depression (%)
	Other co-morbidity (%)
	PACIC score (mean ±SD)
Distance to practice (mean±SD)	SF-12 (mean ±SD)
	EQ5D (mean ±SD)

Quantitative data analysis: patient study

Demographic and health variables (Table 3) will be compared using either *t*-test for continuous variables or chi-square test for categorical variables. Main outcome measures are SF-12 and change in weight and BMI. Practice level clustering effects on the secondary outcomes, multilevel models (random effects model) will be considered. Adjustments will be made for individual level characteristics, the random factor (intervention or control practice), nurse and other practice level characteristics. Changes at follow-up will be analyzed using multilevel models with the baseline values as a covariate and to handle missing data [23]. Data modeling is hypothesis-led rather than data-driven, hence all analysis are predetermined. STATA 12 (StataCorp, TX, USA) will be used for statistical analyses.

Selection of participants for qualitative patient sub-study

At 12 months, a sample of patients who agreed to be contacted will be selected and consented for individual semi-structured interviews. This will address patient-specific experiences of PCN weight management efforts.

Purposive sampling will deliberately seek out a wide range of individuals. We will use a pragmatic approach, sampling until thematic saturation is reached. Selection factors will include 5AsT versus control practice affiliation, weight loss success, comorbid medical conditions, and PCN program attendance. Results of the quantitative and qualitative data merge will determine the focus and extent of patient interviews and sub-analyses.

Qualitative data handling and analysis

Patient interviews will be handled and analyzed using the same techniques and tools as the provider study. The codebook created for the provider study will influence transcript coding.

Trial status

The 5AsT has been approved by the University of Alberta ethics board and has been registered at Trials.gov (NCT01967797). It is funded by an Alberta Innovates Health Solutions grant.

Discussion

The 5AsT trial is a theoretically informed, pragmatic trial that uses a multi-level collaborative approach to aim to sustainably change practitioner behaviors to improve obesity management in primary care.

This project is grounded in established theoretical frameworks for behavior change and complex innovations and leverages bi-directional knowledge translation between clinical and academic partners to comprehensively evaluate the implementation of the 5AsT practice change intervention.

Evaluation guided by the RE-AIM framework is particularly useful for determining programs that work in real-world environments [13]. By widening the evaluative focus beyond efficacy, the overall suitability and investment-to-results assessment of the intervention can be made.

As suggested in the conceptual framework of complex innovation implementation Complex Innovations, process is distinct from the evaluation of the 5AsT providers' behaviour change [11]. We will use a rigorous mixed-methods study design to distinguish issues with implementation process from effectiveness of the intervention. Maximal systemic impact of the research is attained by implementing an integrated approach for sustainability at the outset of the project [24]. Sustainability will be achieved by leveraging existing clinical resources and infrastructure. We will continue to monitor the primary outcome measure for another year post the intervention phase of the project.

Main findings/messages

This research proposal uses a pragmatic design particularly suited for evaluating the complex, real-world interventions typical of primary care settings [13]. Pragmatic trials measure effectiveness (*i.e.*, the degree of beneficial effect in real clinical practice) and are conducted on participants who represent the full spectrum of the population to which the treatment might be applied. It is important to extensively describe the context and population in detail. In addition to the complexity of this research setting, our target patient population (patients who are overweight or obese) constitute one additional level of complexity, given the large variability in the etiology, comorbidity, and drivers of obesity as well as the variable compliance, readiness to change, and treatment preferences. Nevertheless, a key methodological issue in pragmatic trials is finding the right balance between external and internal validity [25]. Provider behaviour is a key feature in any primary care intervention. If providers do not have the skills, beliefs and confidence to be able to intervene effectively with patients, there will not be an improvement in obesity management in primary care. The 5AsT trial aims to understand what provider factors are instrumental to increase the quality of obesity management in primary care.

Strengths

The strengths of this study are that it is a pragmatic intervention conducted in a real-world setting of a large and diverse Primary Care Network. The mixed methods study design will provide contextual insights into the intervention process and the outcomes. The bidirectional nature of the design of the intervention will ensure relevance to practitioners.

Limitations

The pragmatic nature of the study design limits the ability to restrict or steer patients' access to programming within the system, resulting in possible imbalance between practice contributions to the patient cohort. Furthermore, the dynamic and evolving clinical environment may result in shifting context and priorities within the network over time. Generalizability to other primary care networks and practitioners may require further adaption and intervention strategies tailored to those settings.

Summary

The 5AsT trial addresses a need for knowledge exchange around obesity management in primary care in a practical and sustainable format geared towards real-life situations. The use of existing resources, collaborative design, practice facilitation, and integrated feedback loops cultivate an applicable, repeatable and adaptable approach to increasing the quality and quantity of primary care weight

management visits. Its mixed method design will provide rich material to evaluate intervention effectiveness. A comprehensive 5AsT intervention implementation plan will address identified key barriers to obesity management in primary care.

Abbreviations

CON: Canadian Obesity Network – Réseau Canadien en Obésité (CON-RCO); FTE: Fraction of a full time (1.0) appointment held by a practitioner (*i.e.*, 0.5 is half time); Panel: Number of patients affiliated with a primary care practice; PCN: Primary care network; RN: Registered nurse; ESPCN: Edmonton south side primary care network.

Competing interests

The 5As Team Study is funded by an Alberta Innovates Health Solutions CRIO Project Grant, with significant in kind support from the Edmonton South Side Primary Care Network.
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Dr. Sharma is a member of an Advisory Board or equivalent with a commercial organization (Vivus: Consultancy for anti-obesity drug; Novo Nordisk: National [Canada] Advisory Board for anti-diabetes drug; Boeinger-Ingelheim: National and International Advisory Boards for Anti-hypertension and anti-diabetes drug).
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Authors' contributions

DCS, CRC, AS conceived and designed the study with support from JJ, DM, SF, RA, and AC. DCS, AOs, and JA refined the protocol. AOg wrote the quantitative analysis plan. DCS, JA, AS drafted this manuscript with all authors providing critical comments and revisions. All authors have read and approved the final version.

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BMC Research Notes

PROJECT NOTE

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The 5As team intervention: bridging the knowledge gap in obesity management among primary care practitioners

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Abstract

Background: Despite opportunities for didactic education on obesity management, we still observe low rates of weight management visits in our primary care setting. This paper describes the co-creation by front-line interdisciplinary health care providers and researchers of the 5As Team intervention to improve obesity prevention and management in primary care.

Methods: We describe the theoretical foundations, design, and core elements of the 5AsT intervention, and the process of eliciting practitioners' self-identified knowledge gaps to inform the curricula for the 5AsT intervention. Themes and topics were identified through facilitated group discussion and a curriculum relevant to this group of practitioners was developed and delivered in a series of 12 workshops.

Result: The research question and approach were co-created with the clinical leadership of the PCN; the PCN committed internal resources and a practice facilitator to the effort. Practice facilitation and learning collaboratives were used in the intervention For the content, front-line providers identified 43 topics, related to 13 themes around obesity assessment and management for which they felt the need for further education and training. These needs included: cultural identity and body image, emotional and mental health, motivation, setting goals, managing expectations, weight-bias, caregiver fatigue, clinic dynamics and team-based care, greater understanding of physiology and the use of a systematic framework for obesity assessment (the "4Ms" of obesity). The content of the 12 intervention sessions were designed based on these themes. There was a strong innovation values fit with the 5AsT intervention, and providers were more comfortable with obesity management following the intervention. The 5AsT intervention, including videos, resources and tools, has been compiled for use by clinical teams and is available online at http://www.obesitynetwork.ca/5As_Team.

Conclusions: Primary care interdisciplinary practitioners perceive important knowledge gaps across a wide range of topics relevant to obesity assessment and management. This description of the intervention provides important information for trial replication. The 5AsT intervention may be a useful aid for primary care teams interested to improve their knowledge of obesity prevention and management.

Clinical Trials.gov (NCT01967797)

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Background

Improving health outcomes for people living with obesity is paramount to healthcare providers and policymakers. This is in part because the annual total costs of obesity in Canada ranges up to $11.08 billion Canadian dollars [1]. Studies suggest that a primary care-based obesity treatment model could be cost-effective over the long term [2]. However, there is a paucity of evidence on the effectiveness of the current obesity management services provided through primary care [3, 4]. The Canadian Obesity Network—Réseau canadien en obésité (CON-RCO) has developed the "5As of obesity management" framework [5], which incorporates the conceptual structure of the best practices in obesity management in a step-wise approach (ask, assess, advise, agree and assist) to facilitate obesity management in primary care [5]. The aim of the 5As Team (5AsT) study is to examine the impact of a team-based intervention on the frequency and quality of obesity management encounters in a primary care setting. [6]

Recently there has been increased awareness on the need for improved reporting of the details of complex innovations being testing in real-world settings in pragmatic study designs [7, 8]. This has led to the international panel from the EQUATOR network creating the TIDieR guide, with the intent to have sufficient detail to permit more nuanced understanding of the context, and content of the intervention [9]. 5AsT is a pragmatic study that seeks to work in real world context, and to create an intervention that works in this setting. Thus, context, and the end-user's input is crucial in creating the intervention [10]. The focus of this paper is to provide a detailed overview of the 5AsT intervention to support complete reporting and replication.

Methods

The intervention was informed by the conceptual framework of Complex Innovation Implementation (CII) [11] and by the Theoretical Domains Framework (TDF) [12], illustrated in Figs. 1 and 2. CII is important because ensuring good alignment with the care organizations' visions and business plan, increases the likelihood for ongoing stable partnership for the duration of the intervention. The detailed negotiation of the study question, and mode of delivery of the intervention was important as it led to a strong innovations-values fit with the organization and supported the implementation climate. A key insight from CII was the need for a clinical champion, a trusted clinical member of the team, who could act as a liaison between the care organization and the research team. This individual was provided by the partner organization as an in kind contribution, and was crucial for the intervention implementation. The TDF was important as it informed the nature of the intervention as having to include not only knowledge elements, but also deliberate efforts to promote social/professional role identity, and social influences, peer support, practice, and the setting of individual provider goals. This led to the structure of the intervention having a content element, and a learning collaborative element.

This intervention was designed to be tested in a pragmatic randomized control trial with a longitudinal convergent mixed-method design, which has been described in detail in the protocol elsewhere [6]. Briefly, 5AsT is an allocation concealed; pragmatic randomized controlled trial with longitudinal convergent mixed-method evaluation aimed at increasing the number and quality of weight management visits conducted by primary care providers [6]. Of note, there was ongoing monitoring of the intervention delivery, the context and the impact of the intervention using interviews, log books, and field notes [6]. We present here only data pertinent to provider views of the intervention itself.

Participants in the intervention design were team members from primary care clinics randomized to the 5AsT intervention (Registered Nurses/Nurse Practitioners, Mental health workers, Registered Dieticians), and the researcher team (family physicians, obesity specialist, anthropologist, epidemiologist, public health). In this paper, we describe the derivation of the 5AsT intervention, including the co-creation with the community partners of the research questions, and the process of eliciting practitioners' self-identified knowledge gaps to inform the curricula for the 5AsT intervention. Themes and topics were identified through facilitated group discussion and a curriculum relevant to this group of practitioners was developed and delivered in a series of 12 workshops. The intervention commenced with a kick-off session October 21, 2013, 12 × 2-h workshop sessions held biweekly for 6 months (November 2013–April 2014); and, an evaluation session post-intervention in May 2014, and 6-months after the end of the intervention (October 2014). See Fig. 3 for a schematic diagram of the 5AsT intervention.

Study setting

The 5AsT study was conducted in a primary care network (PCN) in Alberta, which employs dedicated multidisciplinary healthcare providers (nurses, nurse practitioners, mental health workers, dieticians, exercise physiologists, respiratory therapists) embedded in 67 family practices with over 170 family physician members serving 192,655 Albertans. This PCN is an extension of the primary care services, which provides a comprehensive family medicine through multi-disciplinary teams that include physicians, nurses, dietitians, social

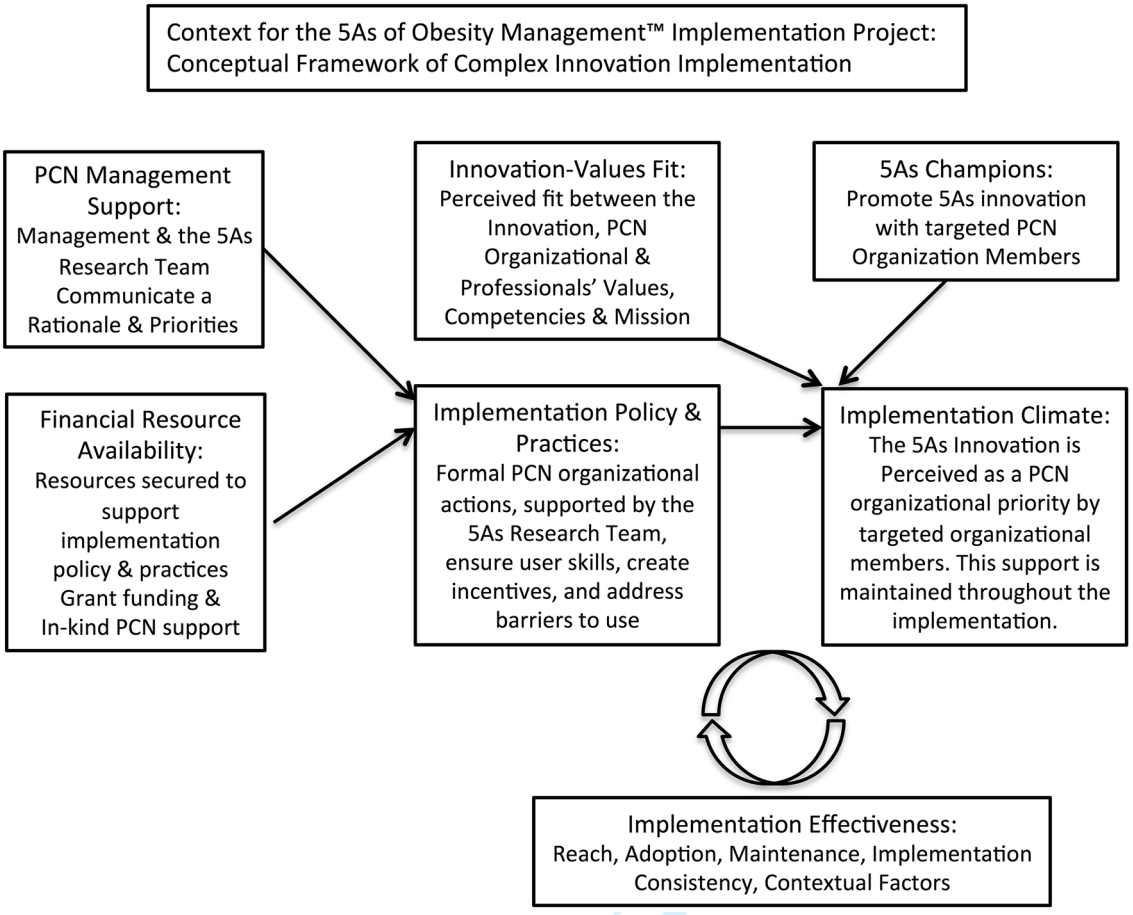

Fig. 1 Conceptual framework of complex innovation implementation (adapted from [11])

workers, respiratory therapists and exercise specialists. These extended teams are embedded in community family practices and provide support for chronic disease management. As the physicians are fee for service, and the interdisciplinary team members are salaried, it was easier for the team members to participate in this initial intervention. Ongoing work external to this project is ongoing for physicians, evaluating more condensed training formats.

Intervention group

The multidisciplinary providers in the clinics randomized to the 5AsT intervention group (n = 29) were consented at each stage of our evaluation (in order to give them the chance to decline participation at any point). All providers were age ≥18 years, one provider was male and all others were female. Six of the providers were registered dieticians, with a seventh new hire joining 1 month into the intervention; seven mental health workers; and 15 registered nurses/nurse practitioners (one withdrew post-randomization). All providers contributed to the design of the intervention.

Control group

Providers from the control group were not consented as only de-identified, routinely collected data was used from this group. The control group received standard training in the 5As, as well as other obesity training from the regional health authority, as part of their orientation and development through their employer. They did not receive the 5AsT intervention program; we expected them to continue their standard practice. As they practice in geographically dispersed locations from the intervention team members, contamination was minimized.

5AsT intervention

The content of the 5AsT intervention was derived by asking primary care practitioners (n = 29) attending the 3-h kick-off session with an introductory teaching session on the 5As of Obesity Management™, followed by

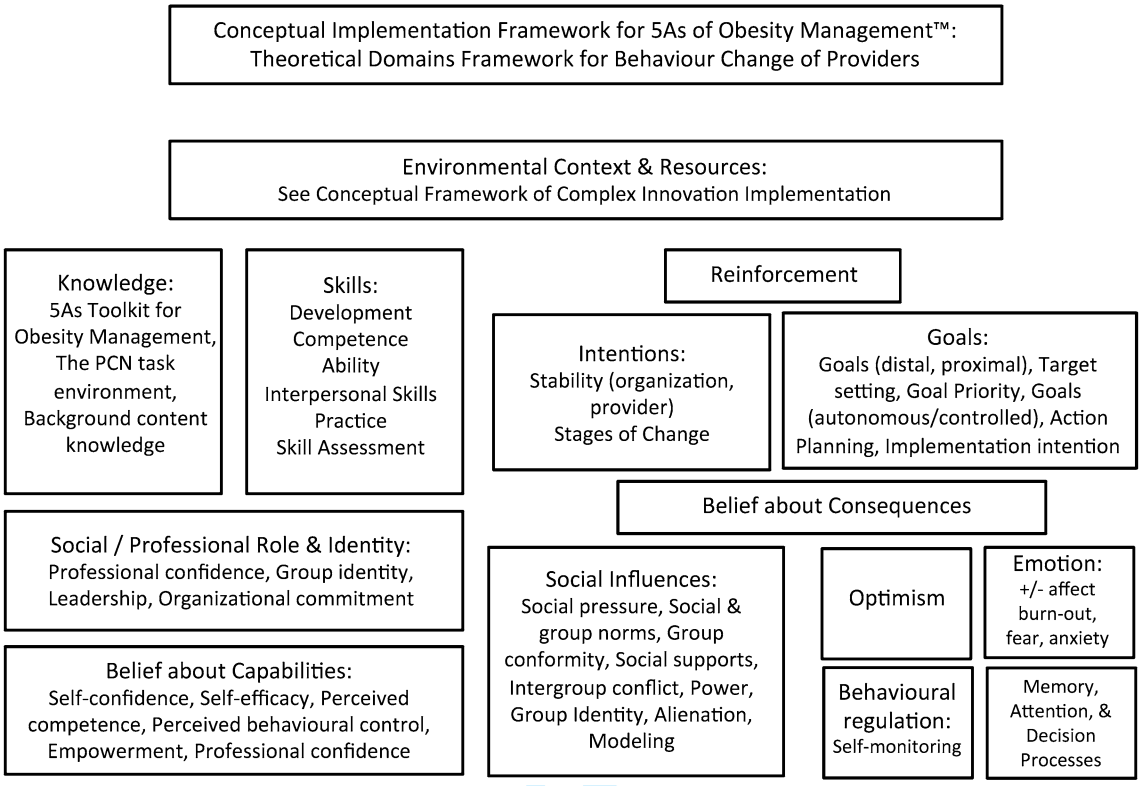

Fig. 2 Theoretical domains framework for behaviour change of the provider (adapted from [12])

an interactive workshop to determine the content for the intervention. The providers were asked the following question: "What do you think would help in your patient care around weight management?"

Providers identified topics, which were related to themes around obesity assessment, prevention, and management from which they felt the need for further education and training. The 5AsT members then categorized the materials into intervention sessions from the topics [two members (DCS and AAO) initially did the categorization of the topics, which was debated and approved by other team members]. The team, with strong prior relationships with the obesity community, then coordinated with regional experts and resources to find speakers to support each of the 12 intervention sessions.

In the 5AsT intervention sessions an invited speaker presented for about 1 h. They were encouraged to be interactive and to bring useful tools and resources on the topic. The presentation was then followed by a learning collaborative session for an hour, as described below.

As it was expected that not all providers could make each session, eleven sessions were videotaped and posted to You Tube (with presenters' written consent) immediately after each session. The purpose was to allow for providers to watch the talk if they were not able to make the session. The twelfth sessions was an interactive team communications session for the PCN, so was not videotaped.

Table 1 provides an overview of the intervention content based on the users' needs assessment, providers/speakers, their expertise and the summaries of the session content. The attendance at each session, by discipline is provided. The intervention materials have been compiled into learning modules and are available at http://www.obesitynetwork.ca/5As_Team.

Learning collaborations

The advantages of learning collaboration in primary care practice have been highlighted previously [13–15]. Briefly, learning collaboration is a learning process centered on sharing among participants. In other words it is a shared learning process in which participants are responsible for their own learning as well as for one another [16]. It can be a good strategy to leverage resources [17], and also, an important advantage of collaborative learning is to facilitate group learning in order to achieve a particular goal.

The providers were divided into two groups for the learning collaborative, with colleagues working in the same clinic teams grouped together. The learning

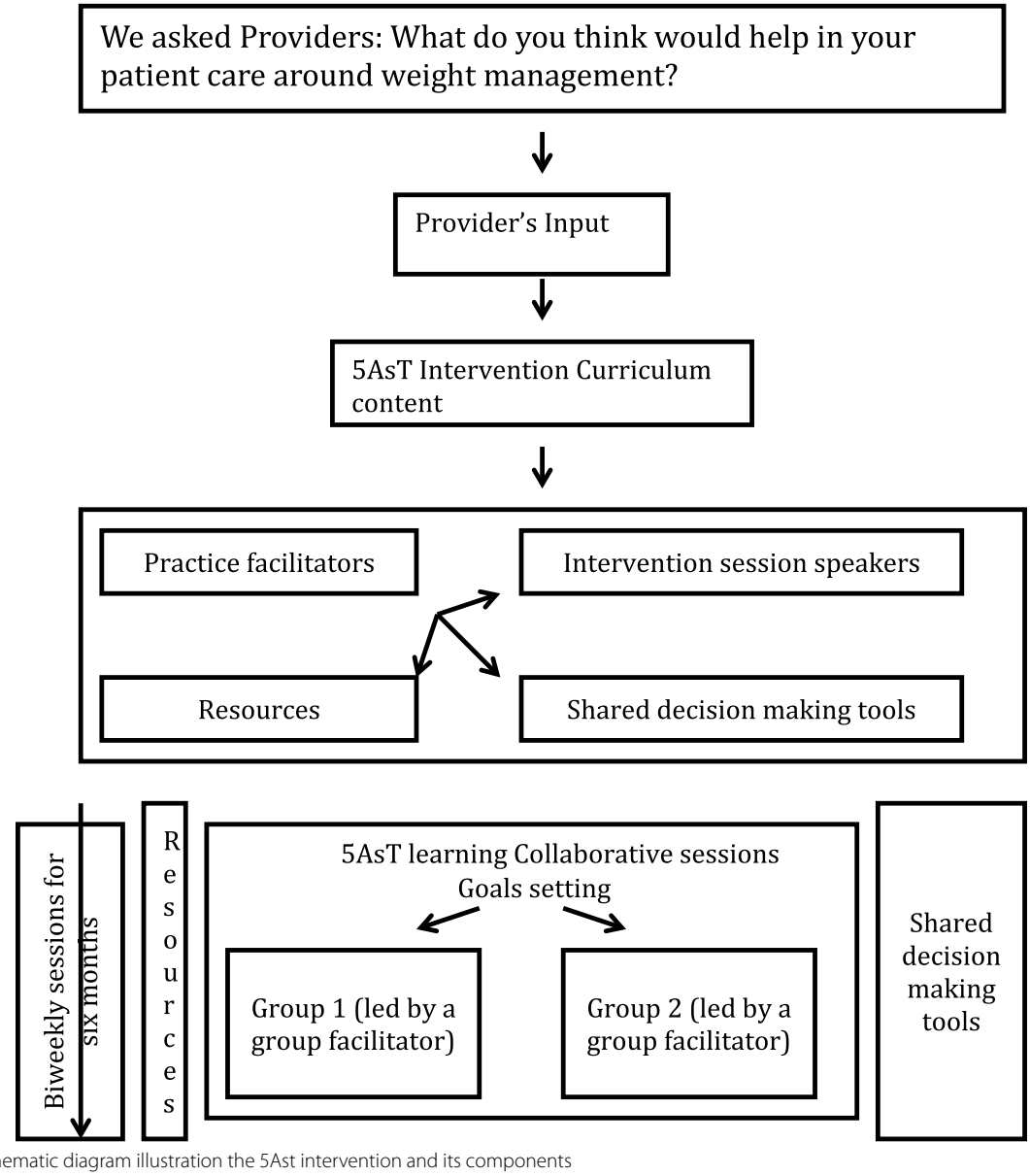

Fig. 3 Schematic diagram illustration the 5Ast intervention and its components

collaboratives had facilitated discussion of the presentation content of the day, tools and materials shared with them prior to the session, and reflection from their practice experience. At the goal setting element of the session, providers also had the chance to share with the rest of their group the goals they set for themselves and the resources they found useful in their practices.

Some elements of our collaborative learning include: learning about newer research knowledge, practices on weight management and patient goal setting sessions, team-driven small tests of change, collaborative resource sharing among providers, experience sharing teach-backs, and the sessions being led by an experienced facilitator.

Practice and group facilitators

It is important also to note that we employ the use of practice facilitators and group facilitators in the 5AsT intervention. The use of practice facilitators has been previously described as an effective strategy to improve primary care processes, outcomes, and the delivery of services [18]. Two kinds of practice facilitation were employed in the study: internal (clinical champion) and external practice facilitators. The internal practice

facilitator, or clinical champion as informed by the complex innovations framework, was the person designated by the PCN 1 day per week to support the intervention. This was a trusted clinical colleague (dietician) and leader who was able to support the providers in their context, and liaise with the research team to support creating space, climate, and time for the intervention. The external practice facilitators in the 5AsT study acted as a link between providers and evidence or resources that may be used to facilitate weight management encounter with patients as illustrated in Fig. 3. They identified and liaised with speakers, and implemented the planning and execution of the intervention and evaluation session.

Following each session, the external practice facilitators compiled a summary of the materials, and circulated them to the members of the group. In addition, each time a participant identified that it would be useful to have a tool or resource, the external practice facilitators identified one and provided it. Where none existed, they were created with the assistance of a graphic design team, and iteratively reviewed with the participants. This has been described in detail elsewhere, and the tools compiled are available for use [19].

In addition to the practice facilitators, the learning collaboratives had facilitated discussions by the internal practice facilitator, and another trusted internal PCN expert. The group learning collaborative facilitator's roles was to prompt the conversation among providers and to lead the goal setting sessions. The two group facilitators were rotated on two occasions during the early aspect of the intervention to improve discussion and sharing among providers in the separate groups. This modification was deemed necessary so that the two goal setting groups would experience both group facilitators with their different personal attributes.

Evaluation of the 5AsT Intervention

The evaluation of the 5AsT intervention was done in three ways: (1) real time monitoring with field notes as described above; (2) individual semi-structured interviews with all participants and (3) questionnaires presented to the participants following the 6-month intervention at the evaluation session.

For the qualitative portion, three researchers took field notes during all sessions. Semi-structured interviews were conducted with all intervention participants (N = 29). The field notes and interviews focused on key aspects of: Theoretical Domains Framework (knowledge, skill, beliefs about capabilities, goals, beliefs about consequences, intentions, emotion, optimism, and role identity) [12], Complex Innovations Implementation (CII) [11], a framework developed to locate and build upon factors that may influence intervention success, and questions pertaining to their views of the intervention, the 5AsT approach and their work environment. We used a thematic analysis approach to determine themes from within the qualitative data [20, 21]. Transcripts were inductively coded line by line according to subject. Data was managed using NVIVO 10 software (QSR International, Burlington, Mass.) Research team members and an independent third party cross-checked all analysis and key findings were shared with participants after the intervention, at which point an opportunity for comment was provided. This paper presents only the results relevant to the evaluation of the intervention.

For the quantitative evaluation we used an intervention specific questionnaire to evaluate the sessions, and a Likert scale to rate each of the intervention sessions and exact data from the providers regarding the intervention. The questionnaire reports a 7-item Likert scale (1-Excellent, 2-very good, 3- good, 4-satisfactory, 5-poor, 6-very poor and 7- unable to comment), at the evaluation session on May 8, 2014. Quantitative data was managed in Microsoft Excel and analyzed in SPSS software.

This study is approved by the University of Alberta ethics committee and was registered at Trials.gov (NCT01967797). It is funded by an Alberta Innovates Health Solutions grant, with significant in kind support from the Edmonton Southside Primary Care Network.

Results

Providers identified 43 topics that they thought would be helpful in their patient conversations about weight management at the kick-off session ("Appendix 1"). These topics were grouped into 13 themes, which facilitated the choice of 5AsT intervention speakers and the content of the 12 sessions Table 1). The topics for the 12 sessions ("Appendix 2") are related obesity assessment and weight management in which practitioners felt the need for further education and training. These included issues related to cultural identity and body image, emotional and mental health, motivation, setting goals, managing expectations, weight-bias, caregiver fatigue, clinic dynamics and team-based care. Participants also identified a need for greater understanding of physiology and the use of a systematic framework for obesity assessment (the "4Ms" of obesity).

The attendance sheet was used as a proxy to measure adherence of the participants to the intervention. Detailed attendance by session is reported in Table 1. Fifteen providers attended ≥10 sessions of the intervention, including five who attended all sessions. Nine providers attended 5–9 sessions. Five providers attended fewer than 5 sessions including: one who withdrew from the study at the beginning (no data), two mental health workers did not attend the any sessions, and two who only attended a few sessions. All providers contributed to the interviews.

Table 1 Intervention sessions, speaker's designation and a session summaries of the content

Speakers	Topics	Sessions summaries	Date	Physical attendance~	Breakdown by provider A: RN/NP[a] B: Dietician C: Mental Health	Evaluation proportion (N = 23) that rated the session 1–3 (n) on 7-point Likert
Bariatric rehabilitation specialist	Weight bias	Explanation of weight bias. Providers should be polite to patients and they should create conducive atmosphere for them in their practice	Nov 7, 2013	23/27	A: 14/14 B: 5/6 C: 4/7	96 % (22)
PCN Dietitian	Emotional eating	Session highlights include: types of hunger drives, reward and stress hunger. Introducing tools that help realign hunger and balance eating Factors that distort hunger cues, inactivity and depression	Nov 21, 2013	20/27	A: 11/14 B: 5/6 C: 4/7	96 % (22)
Registered nurse from Weight Clinic	Clinical assessment of obesity related risk	Speaker mentioned to providers how to assess the readiness to change in patients and the use of checklist for this assessment. And that BMI is a risk assessment index and should not be used for managing the patients or setting goals	Dec 5, 2013	17/27	A: 10/14 B: 4/6 C: 3/7	91 % (21)
Human nutritionist	Pregnancy, post-partum, obesity	Talk was based on promoting healthy weights in pregnancy and strategies to promote healthy eating in pregnant women	Dec 19, 2013	20/28[a]	A: 12/14 B: 6/7[a] C: 2/7	78 % (18)
Physical activity and exercise specialist	Exercise and weight management	Debunking myth around PA/exercise and the relationship between weight loss, fat mass and fat free mass	Jan 16, 2014	20/28	A: 11/14 B: 6/7 C: 3/7	74 %(17)
Anthropologist	Culture and the body, culture and food —perspectives on obesity	Talk emphasized the important of the cultural perspective of the patient in their dietary intake, weight gain and weight loss	Jan 30, 2014	22/28	A: 11/14 B: 7/7 C:4/7	82 %(18)
Department of Medicine	5As of obesity management	The idea of weight loss plateauing' was introduced to providers. Strategies on using the 5As of obesity management and critical conversation were highlighted to providers, followed by a providers' role-play of the 5As card game	Feb 13, 2014	19/28	A: 11/14 B: 6/7 C: 2/7	87 % (20)
Family doctor	Weight gain prevention	The different evidence-based obesity prevention interventions that were available in the literature were shared with providers in this session	Feb 27, 2013	17/28	A: 11/14 B: 5/7 C: 1/7	83 % (19)
Psychologist	How to sustain the change	Providers were told that the goal of obesity management should be about continuous balanced healthy lifestyle and should be focused on sustainable goals. The transtheoretical model (with 5 stages of change) was also highlighted	Mar 13, 2014	20/28	A: 12/14 B: 5/7 C: 3/7	74 % (17)
Psychiatrist	Depression anxiety and obesity	Speaker talked about weight gain following the use of antidepressants. Speaker also encouraged the use of biological, psychological and social evaluation of depression in primary care	Mar 27, 2014	20/28	A: 12/14 B: 5/7 C: 3/7	76 %(16)

Table 1 continued

Speakers	Topics	Sessions summaries	Date	Physical attendance~	Breakdown by provider A: RN/NP[a] B: Dietician C: Mental Health	Evaluation proportion (N = 23) that rated the session 1–3 (n) on 7-point Likert
Provincial Bariatric Resource Team	Critical conversations	This session was on the importance of common messaging among providers and a focus on tools that can help with key conversations among providers & between providers and patients	April 10, 2014	18/28	A: 11/14 B: 4/7 C: 3/7	60 % (12)
PCN Nurse practitioner and Dietitian	Communication process	The focus was on the ESPCN procedures. The different effective communication strategies, internal process and ideas that improve teamwork among providers were also discussed in this session	April 24, 2014	17/28	A: 9/14 B: 5/7 C: 3/7	50 % (10)

[a] New dietician joined the PCN in an intervention clinic and commenced 19/12/2013

One nurse withdrew from the study post-randomization

2 mental health workers could not physically attend sessions as scheduled when they were off; 1 mental health worker discontinued due to personal leave from work

~All sessions' content was asynchronously accessible by video for when they could not physically attend. Summaries and resources were emailed to all participants following every session. Hence, providers evaluated sessions whether they participated physically or viewed the video

At the final evaluation session on May 8, 2014, 21 providers (9 = RN, 3 = NP, 2 = MHP, 7 = RD) were present on the day and two addition providers filled the questionnaire and returned it on a subsequent date.

On the 7-item Likert scale, 83 % of respondents rate the intervention as either very good or excellent, with the remaining 17 % rating it as good. Overall, 86 % of the providers responding also said they were either strongly comfortable or somewhat comfortable with the 5As of Obesity Management™ [5] following the 5AsT intervention, and 91 % reported they felt more comfortable discussing weight issues with their patients as a result of the intervention. Of the 23 respondents, 21 reported they would recommend the intervention to others, and 2 respondents felt they were not able to comment.

In terms of the structure of the intervention, overall, 18 of the 23 respondents (82 %) felt that biweekly (once in 2 weeks) learning collaboration format was suitable for them. Table 1 provides the proportion of the 23 respondents that scored each session excellent, very good, or good (1–3) on the Likert scale.

In terms of the learning collaborative groups, 73 % (16) of the respondents rated them as excellent/very good/good. Of the respondents, 64 % felt the goal setting in the learning collaborative sessions was helpful, with 39 % reporting that they often/always met their goals.

The Youtube videos were used by 64 % of respondents, and among those who viewed them 87 % rated the videos as very good or good. The main challenge was the sound quality of the videos.

Overall, the intervention was very well received, Interview and field note data reveal strong intervention values fit and self-reported behavior change. Table 2 provides some representative quotes of positive views of the intervention, while Table 3 provides some examples of challenges from provider views of the intervention. The overall results are summarized below.

Table 2 Examples of representative positive provider views on the intervention

"I like the way that is set up, I like the tools, I like, I do like the, actually it's all been good. I mean I've really, I've enjoyed the presentations, you know I've, I've gotten, I've taken something back from each of them, there's no question and I think it's unrealistic to expect that you can put out a kind of an itemized sort of what do you call it? Like a flow for sort of how you're going to, it's not going to work the same in every clinic, not going to work the same right so I think that's unrealistic expectation. I think what you're, how the way you're approaching it is much better, here's the concept, here's, you know here's a variety of tools you know but the general idea is this, you know take it and mold it to work in your clinic or mold it; yeah I think that's the best approach because it has to be flexible, it has to be"
A4, nurse
"I thought it was very good. I especially enjoyed today. I think it gives us new ways to look at things and I think we need each other's ideas because lots of times there's just one little thing that somebody else does that you never thought of and if we, if we work in isolation, you know if we never have meetings then and we always do the same thing with patients, we don't get any new ideas and I think that's important in learning, you know trying different things. Maybe it won't work but at least you've tried or, or it gives you another idea… Yeah I like that a lot. I like some sort of formal presentation. I, I, I need, I think we need a bit of structure and so the first part is structured, the next part is not and I, I kind of like, actually like the idea of smaller groups. I think people are not as willing to, to open up in a large group and I'm sure we'll find that, you know myself included"
A5, nurse
"Yeah, really good and I've been at all of them and I found they all, were all really good. I find some of it repetitive, like some of it is I find might be a little bit more like it's kind of the same things over and over again but it's good, it's good. It gets you thinking and it, and I think it's good that it's ongoing 'cause otherwise you take a course and you're good for a week and then you kind of go yeah I kind of forget about that you know more as time goes on whereas this is kind of reinforcing it, instead it's becoming more a part of your practice if you weren't already doing that to start off"
A9, nurse
"Yeah, yeah, they're really good. The only thing I'd change maybe is it's tough for Thursday mornings, sometimes I'm busy at the clinic and it's tough to get that time off 'cause I'm used a lot on the spot here so sometimes I'll have a bunch of appointments and sometimes I won't but I'm always just kind of pulled onto the floor and so it's tough to get that time away so I don't know what else we could really do but especially for people that have clinics way all over… I, I like the breakout afterwards and then we can kind of discuss it as a smaller group 'cause then it makes it a little bit easier for people to talk I think as well to facilitate that. Yeah 'cause when bigger groups, it's harder to… I like that you guys ask us what our needs are and, and, and that kind of helps bring in what, what's relevant to us"
A11, nurse
"I find the sessions are really helpful. I really like the speakers, I like having the variety of the types of topics that they're talking about and that's really important and having the group discussion from a variety of different health professionals is really interesting because it's easy to just get your dietician perspective so it's nice to get it from a nursing or from a mental health perspective or by anything like that so… I think it's, it's interesting because it gives you enough time to sort of reflect on what you've been talking about that for that session. I'm not sure, I, I really just find that the presentations are really nice because that I find that we just don't get enough of that type of thing so and especially for someone like me who's relatively new in my practice, I find that it is really helpful to kind of get that type of educational piece"
B1, dietician
"The ones, like I said I missed the two but the ones that I went to I found are really useful. I think it's an area that being mental health it's not something you always get educated in school so the things that I've learnt so far I think have been really useful … I'm excited about some of it so yeah it's been interesting. I missed the pregnancy one and that's the one I think I have to, there's a link on …we should watch the YouTube video. It's really interesting stuff so so far everything I've learned I think has been applicable"
C6, mental health worker

Table 3 Examples of challenges from provider views of the intervention

"I think it's good. It's really good. I just find it's a little bit long and it pulls us away from our clinics quite a bit and I know that's a contentious issue with Dr. X that I'm not there as often… and that I'm part-time so I have to find a way to give that time, I find maybe if it was condensed maybe a little more, it might be a little more applicable. I, I don't know" A2, nurse
"Well I'm really excited about it. I mean I, I live the experience of being overweight myself and what a struggle it is, you know but I get the sense that it's allowing us to explore and really putting out there, it's giving us a framework to work within even if we're dealing with our own things and that allows us to, to be better when we're looking at our clients This week has, has gone so quick and yeah, I mean I guess my only, the only regret is that time away from the clinic but knowing that in the end of it all or though the process of it all, as I acquire more, more knowledge about myself and the program, I will be able to bring that value back to the clinic" A3 nurse
"I've been really enjoying them. Some things I find are really new. Other things are refreshers but refreshers are always good. Just collaborating at the end, having an open discussion, getting perspectives from different health care professionals is always good too and like even for today, we identified gaps in terms of the classes that we were offering for nutrition so it brought to light something like change right that can happen so it's good. I've, I've really enjoyed it… I mean it's definitely time consuming and normally that's not a big issue is just because it's taking time away from clinic so to me it's not a problem. The only problem that had come up was because it's always the same time slot, like the two Thursdays every month, it, it affects the same clinic each and every time so this particular clinic is actually _____ and I'm only there two days a month so this takes out half a day twice a month so then I got a call a few weeks ago saying a patient really wanted to see me, it was kind of like an urgent issue but I wasn't available until like February so because it affected the same clinic each and every time, it presented an issue but normally I wouldn't have said that it would have been a problem at all… I really like that you know we kind of get like an education session and then a chance to kind of brainstorm, discuss afterwards" B4, dietician
"Definitely an interest. I mean some of the speakers that we've had have been really great and I mean I am learning things from that perspective. How much is applicable, again people aren't coming to see me specifically for weight management…I wouldn't say I've had a hard time because the clinics are very accommodating and I've just booked it out of my schedule, however that, for me that is probably on a Thursday every two weeks, that's probably anywhere from five to six patients that I could have been seeing right 'cause, 'cause I see on average about 10 or 12 a day so it, it, just in, in that respect. Nobody has, nobody has said anything or complained about it but I, I feel it" C3, mental health worker
[Regarding the learning collaborative prior to the re-organization] "I think the [group] facilitator should rotate or I don't think you're going, I think the group altogether is too big so I think they should try to rematch the groups a bit because there's certain, like the group I'm in is a very quiet group … and you know I'm not going to, I could pipe up a lot but I'm not going to do that right so whereas the other group has a lot of really talkative verbal people so I think they need to either remix it or maybe alternate facilitators. That might be an option" A10, nurse
[Initial skepticism of the front-line providers, highlights importance of monitoring internally and provider-centred intervention] "I think it's great. I think I've said that enough. I initially thought what am I, what have I been pushed into, what are we going to do here and I think a lot of us had that feeling actually because we did discuss it, we're thinking what are put up, what are we going to do but as it is going on, I think it's great… [Regarding the learning collaborative prior to the reorganization] "No I think what I take away from these meetings is a lot. Apart from the actual when we divide into groups [learning collaboratives], I don't find that beneficial at all except for the last one we did was better but I don't know, I was having a very difficult time and even realizing while we were sitting in that group and that's why I had asked can we sit together as one big group 'cause it seems like when we, every time we'd come back in the room, they [the other learning collaborative group] had this amazing conversation going on about what's, what they're supposed to be doing and it felt like we weren't getting that and I thought then why are we here if we can't get the full picture and the full education" A15, nurse
"No, so far I'm really enjoying it. There's been a, like maybe one of the talks where they used terms like what was it? I don't think I'd want to put it wrong but almost like taking that parenting role with the patient, that really does not fit well with my approach and sort of is against the grain. I, I mean I understand what was meant but I think putting it in those terms perhaps isn't the best way of explaining it. You, you definitely don't want to take that approach on patients. I wouldn't go over well at all or at least not from my experience. Other than that, that's kind of the only thing that I went "oh" about. I really enjoyed it a lot more than I thought I would enjoy it and I think for the most part it has been, even in a lot of the mental health tools and things that I have, these are much more looking at that whole biopsychosocial perspective for patients, not focusing on calories, not focusing on numbers, that kind of thing and even the tools that I have still sort of reference that so" C8, mental health worker

Positive themes that stood out included: variety, it was collaborative, multidisciplinary, long-term and sustainable in that it leveraged the internal practice facilitator as a change agent with the task of ongoing training of new staff in the organization. Comments included appreciating the insights of multidisciplinary teams, hearing their "clinical peers", sharing ideas, hearing from diverse speakers, and collaboratively discussing issues. One nurse suggested the intervention provides options of where to start the conversation and has changed how in general she thinks about weight management. The format was generally considered positively; providers stated that the recurrent sessions helped the information sink in and gave them time to adapt it to their practice. Participants felt this lead to increase in confidence and comfort with the material. A provider also, suggested that the format of the sessions allowed for self-reflection, with another stating that the structure of the sessions allowed new information to become part of the practice.

Some providers, however, felt that either the sessions were too long, or that it was difficult to get the time away from their clinical practice. The perceived usefulness of the learning collaborative was mixed, many participants feeling that it was both useful to have space to share their clinical experience with peers while also stating that at times the conversation was difficult. However, the structure did lead to increased collaboration between multidisciplinary team members. Active monitoring of the field notes of the intervention meant that the research team was aware of the concerns for the imbalance between the two learning collaborative groups, with one group with more quiet individuals. This was then purposefully reviewed with the group and solutions were obtained from the participants. This led to a rebalancing of the teams between the groups to have more balance, as well as periodic rotation of facilitators.

Discussion

Through the 5AsT study we were able to identify obesity management related topics and learning that may help providers change behavior, improve their practices and refine obesity encounter for patients. Here we highlight the 5AsT method and intervention content. The intervention sessions, video links and the tools co-created with providers are available on the web (http://www.obesitynetwork.ca/5As_Team). The purpose of these modules is to create a living repository of tools and resources to support primary care teams in the community who would like to improve obesity management in their context. From a research perspective, they serve as a record of the content of the intervention, supporting transparency of reporting [7–9]. Our overarching aim is not only to improve the quantity of obesity management in primary care setting, but also to improve its encounter quality. Through the kick-off of the 5AsT intervention, we identified primary care providers' barriers and knowledge gaps to weight management in their practices. We envisage that a participatory provider engagement, such as 5AsT intervention, may increase the frequency, quality of weight management encounters in family practices and the quality of life of the patients.

Interventions aimed at changing provider behavior in the real world are best informed by the active engagement of the end-user to ensure applicability and context-appropriateness [10], as was amply observed in this study. The engagement with the end users resulted in many pragmatic solutions to challenges in implementation, which proved crucial. Both the complex innovation framework [11] and the theoretical domains framework informed this intervention [12], with core elements such as practice facilitation (internal [11], and external [18]), proving crucial, and learning collaboratives [13–15] proving more mixed. Overall, the intervention proved positive for the majority of the participants, resulting in self-reported practice change. Challenges frequently revolved around scheduling and time constraints, which were partly mitigated by providing an asynchronous video option for catching up on missed material.

Previous studies suggest that providers experience barriers in obesity management [22, 23] and lack adequate weight management knowledge [24, 25]. We also know the frequency of obesity management in the PCN is low (Unpublished data from routine continuous administrative monitoring), leading to the premise that if we reduce the knowledge gaps in providers we may improve the quality and frequency of obesity management visits by patients and also improve weight management consultations.

Most behavioral weight loss interventions have failed to demonstrate long-term effectiveness and sustainability of weight management. It may therefore be important to encourage more emphasis on other non-weight related outcomes of obesity management intervention as this unrealistic concentration on weight loss by providers, was a key learning point in the course of our intervention. Providers may need to look beyond the anthropometric changes following an intervention and mindful on the quality of life of the patient as well [26]. A key finding was the providers' choice of topics around caregiver fatigue, relapse prevention, emotional eating, and mental health concerns; daily challenges in their practice.

There are several limitations to this study. The 5AsT intervention can be generalized to other similar populations to a certain extent. Similar to the finding of other studies [23, 27, 28], the knowledge gaps highlighted by the providers involved in this study are common. However, one challenge in our context was it was not possible to include fee for service busy family physicians in the intensive intervention. We were able to have two family physicians participate on the research team. Our future research will focus on interventions on family physicians, and on other aspects of provider's consultations that may indirectly affect weight management. A primary care system, with a multidisciplinary team, similar to that of 5AsT study is likely to share the same issues as our practitioners have highlighted. However, given the diversity of contexts in which primary care is practiced, future work will need to consider how the intervention may need to be modified for different settings. A rich description of the intervention is a necessary first starting point in synthesizing what works in diverse settings.

Conclusion

Primary care practitioners perceive important knowledge gaps across a wide range of topics relevant to obesity

assessment and management. The 5AsT intervention was designed to respond to the identified needs of front line providers in terms of content, and the structure promoted interaction and collaboration, emphasizing practice opportunities and innovation.

Further work should focus on how these knowledge gaps can be addressed and whether increased knowledge and competencies in these areas will translate into better health outcomes for overweight/obese clients. Furthermore, 5AsT intervention's goal is improved weight management by improving provider's knowledge and patients experience. Ultimately, the 5AsT intervention is a promising primary care-based approach co-created with end users to achieve better management of obesity. The 5AsT web resources can support community primary care teams in practice-based learning to improve obesity management.

Abbreviations

5As: ask, assess, advice, agree, and assist; 5AsT: 5As team; PCN: primary care network; Equation 5D: European quality of life- 5 dimensions; BMI: body mass index; FTE: full-time equivalent; 4Ms of obesity: mental, mechanical, metabolic, and monetary; CON-RCO: Canadian Obesity Network—Réseau canadien en obésité.

Authors' contributions

AAO drafted the initial manuscript and JA wrote the qualitative/theory part in the methods session. All authors (AAO, AO, JA, JJ, AC, AMS, DLC-S) contributed to study design, manuscript revisions. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

Appendix 1: Identified topics from the 5AsT intervention kick-off session

- Medication, side effect i.e. weight gain excuses
- Conversations with physicians
- How to get patients to buy in/stay engaged (even after programs)
- How to deflect from a weight goal to a health outcome goal
- Cultural aspect/diet/body image
- Mental health and obesity
- Handling patients emotional issues
- Clinic processes and team based care
- Patients follow-up
- Cultural and identity (in relation to food and body)
- Weight bias
- Caregiver fatigue
- Body image
- Emotional eating
- Behavior change for patient
- Eating disorders
- Sharing stories of success (provider and patient experiences)
- Behavior change smart goals
- Motivational interviewing
- Resources for patient education/where to send
- Resources around physiology (obesity)
- Messaging regarding being proactive
- Establishing collaborating framework/rules
- How to deal with emotional stress/issues
- Caregiver fatigue
- Success stories
- Setting goals on behaviors
- Motivation interviewing
- Recognizing mental health issues
- Body image
- How to use the 4 'M' frame work
- Guideline of questions-how to change practices
- How to keep patients sustaining goals over the long terms
- Appropriate referrals
- How to work with emotional eating
- How to involve families/support/saboteurs
- Patient education on weight loss expectations
- Operationalizing the assessment piece of the 5A to avoid patients and provider fatigue, provider tools, assessment brought up too many issues
- Child and adolescent-an approach to parenting/pregnancy
- Group dynamics
- Prevention/predicting weight gain
- Patients types: active gainer/stable/post weight loss/yoyo: broad group assessment that this needs different approach

Appendix 2: The 13 themes derived from the topics Identified by providers in the study

5As of obesity management
Pregnancy and post-partum obesity prevention and management
Emotional eating
Clinical assessment of obesity related risk
Weight bias
Cultural identity and body image
Goal setting and managing expectations
Caregiver's fatigue
Clinical dynamics and team-based care
Critical conversations
Weight gain prevention
Depression, anxiety and obesity
How to sustain the change.

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