



Obesity management in primary care: Are we adequately preparing the next generation of Canadian family physicians?

Helena Piccinini-Vallis^{a,*}, Vlad Evdaev^a, Joseph Asaminew^b, Therese McCurdy^c, Mark Rogers^a, Michael Vallis^a

^a Department of Family Medicine, Dalhousie University, 1465 Brenton Street, Suite 402, Halifax, NS, B3J 3T4, Canada

^b Department of Family Medicine, University of Manitoba, S100, 750 Bannatyne Avenue, Winnipeg, MB, R33 0W2, Canada

^c Faculty of Medicine, Dalhousie University, 1459 Oxford St, Halifax, Nova Scotia, B3H 4R2, Canada

ARTICLE INFO

Keywords:

Medical education
Obesity
Evidence-based practice
Post-graduate education

ABSTRACT

Background: Obesity is a chronic disease that affects a large proportion of the population. We examined the preparation of Canadian medical learners for obesity management through three cross-sectional studies exploring the: 1) knowledge of evidence-based obesity management among medical students; 2) perspectives of family medicine residents on the adequacy of obesity management training in their residency programs; and 3) intentions of family medicine residents regarding obesity management when they enter practice.

Methods: An online survey instrument was developed for each study. For Study 1, the survey was developed by HP, VE and JA; the questions mapped onto the ten domains outlined in the 2020 Canadian Clinical Practice Guidelines on the Management of Obesity in Adults. For Study 2, the survey was developed by HP and TMC; the questions aligned with competencies in the management of other chronic diseases. For Study 3, the survey was developed by MR, HP and MV; the Capability, Opportunity, and Motivation (COM-B) model was used as a framework for the questions. All three surveys met the criterion for face validity and the survey for Study 3 met criteria for content and criterion validity.

Results: Study 1 enrolled 26 first-year and 22 fourth-year students. Total correct scores were below 50 % for both groups, and patient-centeredness scores differed significantly between the groups. Study 2 enrolled 494 family medicine residents; less than 25 % thought there was sufficient time devoted to training in obesity management during residency and approximately 75 % experienced inconsistent messaging about obesity management from their preceptors. Study 3 enrolled 150 family medicine residents. Few participants believed that they had been well trained or had a clear plan for managing obesity, but most believed that obesity management will form part of their practice and that they will have the time and resources for obesity management.

Conclusion: Current medical education does not reflect the requisite knowledge for contemporary obesity management. Further, family medicine residents identified gaps in mentorship of contemporary principles of obesity management. These findings support the revision of the medical curriculum in Canada to better reflect the science of obesity and its management.

1. Background

The medical management of obesity has undergone significant changes over the past decade. Traditionally, physicians adopted the attitude that weight was solely under behavioural control [1]. Their mindset was that an individual could achieve a specific weight goal by

eating less, moving more, using willpower. As such, all the responsibility was placed on the individual [1], promoting obesity stigma [2]. However, recent research has exposed this perspective as a false narrative, with the evidence indicating that excess adipose tissue can become metabolically toxic and therefore mediate chronic disease (adiposopathy) [3]. Further, the neurobiological imperative to maintain one's

Abbreviations: CFPC, College of Family Physicians of Canada; PwO, persons with obesity; ACTION, Awareness, Care, and Treatment in Obesity management; Canadian CPGs, Canadian Clinical Practice Guidelines for the Management of Obesity in Adults; OMAE, Obesity Management Awareness Evaluation; PGY1, PGY2, Post-Graduate Year 1 or 2; COM: B, Capability, Opportunity, and Motivation leading to Behaviour Model; 5As, Ask, Assess, Advise, Agree, Assist.

* Corresponding author. Department of Family Medicine, Dalhousie University, 1465 Brenton Street, Suite 402, Halifax, NS, B3J 3T4, Canada.

E-mail address: helena.piccinini@dal.ca (H. Piccinini-Vallis).

<https://doi.org/10.1016/j.obpill.2024.100151>

Received 2 October 2024; Received in revised form 12 November 2024; Accepted 14 November 2024

Available online 16 November 2024

2667-3681/© 2024 The Authors. Published by Elsevier Inc. on behalf of Obesity Medicine Association. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

highest weight [4,5] has shifted the focus of obesity management from weight loss to health gains [6].

Given the prevalence and chronicity associated with obesity it will fall to family medicine physicians to actively screen, diagnose and manage this chronic disease (in office and via referral). Although the management of obesity is listed as a “priority topic” in the College of Family Physicians of Canada’s (CFPC) *Assessment Objectives in Certification in Family Medicine* [7] a gap exists between acknowledgement of the problem of obesity and engagement in evidence-based obesity medicine practice.

A recent series of survey-based studies have been conducted examining the attitudes of physicians and persons with obesity (PwO) toward obesity and its care. The ACTION studies, Awareness, Care, and Treatment in Obesity management, were conducted in the US [8], in Canada [1], in 11 countries including Australia, Mexico, Chile, Israel, Italy, Japan, Saudi Arabia, South Korea, Spain, the UAE and the UK (ACTION IO [9]) and in nine Asia-Pacific Countries (ACTION AP [10]), and assessed attitudes of 5,687 physicians and 29,939 PwO. Amongst the major findings across such a broad sampling of physicians and PwO, is the fact that both PwO and healthcare providers (HCPs) agreed that weight management was primarily driven by the PwO eating less and moving more (a scientifically false narrative). Further, PwO did not see a role for HCPs in obesity management, as they believed that it is their responsibility and that they know how to succeed. Importantly, HCPs perceived PwO as lacking motivation, where PwO reported being motivated to lose weight [1,8–10]. These data justify re-education of physicians to the more evidence-based model of adiposopathy. Further, given that PwO do not see HCPs as playing a major role in obesity management, it will fall to HCPs to raise the issue of obesity as a chronic disease and address any stigma related experiences that PwO have had with HCPs in the past [11].

The 2020 Canadian Clinical Practice Guidelines for the Management of Obesity in Adults [6] (Canadian CPGs) were developed to promote a compassionate, evidence-based approach to managing obesity as a chronic disease. Given the evidence suggesting that PwO in Canada delay seeking help from a HCP for about 11 years after they begin struggling with obesity [1], effective uptake of these guidelines will most likely require the HCP to initiate a reconsideration of the eat less, move more false narrative with their patients.

Literature on the preparation of licensed family physicians to provide bariatric care shows that obesity is poorly represented in undergraduate medical education [12–14]. A similar problem has been noted in postgraduate family medicine training, with family medicine residents reporting feeling inadequately prepared to support patients with obesity and believing that they require better training in order to provide effective care [15–18]. Further, family medicine residents report feeling underprepared to counsel patients on obesity management, nutrition and physical activity [19]; and also report having both knowledge deficits related to obesity guidelines and negative attitudes towards providing nutrition and physical activity counselling to their patients [16,20].

With the recent introduction of revised Canadian CPGs it will be important to assess how well Canadian physician learners are being educated on contemporary principles of managing obesity as a chronic disease. The present paper is based on a series of three studies that examined the preparation of the next generation of medical learners in obesity management in Canada. The first study explored the association between level of undergraduate medical training and knowledge of evidence-based obesity management at a single academic institution. The second study examined the perspectives of Canadian family medicine residents on the adequacy of obesity management training in their residency programs. The third study explored the intentions of family medicine residents across Canada regarding obesity management when they enter practice and compared those intentions between first- and second-year family medicine residents.

2. Methods

This paper reports the results of three survey-based studies of physician learners. Each study obtained institutional REB approval: Studies 1 and 2 from Dalhousie University Health Sciences Research Ethics Board (file # 2021–5810; file # 1028155, respectively) and Study 3 from the Nova Scotia Health Research Ethics Board (file # 1029249).

2.1. Study 1

This study compared knowledge and perceptions of contemporary evidence-based obesity management between first- and fourth-year medical students at Dalhousie University, Halifax Canada. As no assessment tool had previously been developed to assess knowledge based on the recent Canadian CPGs, one was designed for this study. The Obesity Management Awareness Evaluation (OMAE; Supplemental file) involves 50 multiple-choice questions assessing knowledge about obesity and its management across ten domains: patient centered care; epidemiology; etiology; pathogenesis; assessment; diagnosis; comorbidities; lifestyle; pharmacotherapy; and surgery. Content validity of the questions was supported by linking test items directly to guideline content. The OMAE items were developed by MR, HP and MV (HP and MV were authors on the 2020 Canadian CPGs; MV sat on the Executive of the development team for these guidelines).

Participants also reported whether they had obtained additional training in obesity management beyond their core curriculum, and rated their confidence, perceived competence, and perceived importance of obesity management knowledge using a 5-point Likert scale (“not at all”, “somewhat”, “moderately”, “very”, “extremely”).

Participants were recruited via email and social media between January and May 2022. There were no exclusion criteria. Participants completed the OMAE online (using Opinio, an online survey platform) and data analyses were conducted using SPSS28. Since there are no norms for the OMAE, the percentage correct score for each subscale and total was calculated. T-tests were used to compare test scores between first and fourth-year students on all variables.

2.2. Study 2

This study examined the perspectives of Canadian family medicine residents on the adequacy of obesity management training in their residency programs. An online survey was distributed through the CFPC to all postgraduate year 1 and 2 (PGY1, PGY2) family medicine residents across Canada. There were no exclusion criteria for recruitment. In order to maintain anonymity, the only personal information collected was residency year and university affiliation.

The survey consisted of 13 questions. The first six questions had the following response options: “strongly disagree”, “disagree”, “neutral”, “agree”, and “strongly agree”:

- Education about obesity management is important to family medicine residency training
- Prior to the start of residency, I was comfortable managing obesity
- My preceptors provide consistent teaching/messaging about obesity management
- There is sufficient time devoted to training in obesity management in my residency program’s curriculum¹
- Moving into practice, I feel confident about managing obesity in patients
- Ongoing education is important to managing obesity in my future family medicine practice

¹ Given that 2nd year residents had an additional 12 months of training, we did not compare 1st and 2nd year residents on this item.

Response options for the remaining questions were: “very difficult”, “difficult”, “neutral”, “easy”, “very easy”:

- Initiating health discussions about obesity management with patients is ...
- Identifying root causes of obesity is ...
- Implementing nutrition-related approaches to obesity management is ...
- Implementing exercise-related approaches to obesity management is ...
- Implementing psychological-related approaches to obesity management is ...
- Implementing medical-related approaches to obesity management is ...
- Implementing surgical-related approaches to obesity management is ...

The responses to the first six questions were subsequently recoded to reflect either “disagree” (“strongly disagree” and “disagree” combined), “neutral”, and “agree” (“agree” and “strongly agree” combined). Similarly, the responses to the remaining seven questions were recoded to reflect either “difficult” (“very difficult” and “difficult” combined) and “easy” (“easy” and “very easy” combined). The data were analyzed using chi-square analyses comparing the distribution of responses between PGY1 and PGY2 family medicine residents.

2.3. Study 3

Using the Capability, Opportunity, and Motivation (COM-B) model [21] as a framework, this study examined the intentions of family medicine residents across Canada regarding obesity management when they enter practice. Twenty questions were constructed to explore the capabilities, opportunities, and motivations of family medicine residents regarding obesity management in their future practice. Each item was rated on a 5-point Likert scale (“strongly disagree”, “disagree”, “neutral”, “agree”, “strongly agree”). Participant recruitment involved engaging family medicine research directors and family medicine program directors across Canada to send invitations to their residents. Survey completion was through the Research Electronic Data Capture (REDCap) platform. The maximum number of potential participants was estimated using the number of English-speaking family medicine residency spots in Canada from the 2022 Canadian Resident Matching Service results website, subtracting the number of seats that are in French programs, and doubling the number to include PGY-1 and PGY-2 residents. Although this number was approximately 2100 residents, the number of residents who actually received an invitation to participate is unknown.

Since there are no norms for this scale item responses were recoded and reported as “disagree” (“strongly disagree” or “disagree”), “neutral”, and “agree” (“strongly agree” or “agree”). PGY1 and PGY2 responses were compared using chi-square analyses.

3. Results

3.1. Study 1

Twenty-six first year students and 22 fourth year students completed the OMAE. Two first year (7.7 %) and three fourth year students (13.6 %) reported having received additional obesity training apart from the medical curriculum (ns). Item response distributions were examined to detect any items that were highly skewed, indicating the items was either too easy (almost all correct responses) or too difficult (almost all incorrect responses). No items were eliminated because they were too easy or too difficult.

The mean scores for the OMAE show that medical students were not highly informed regarding the evidence-based principles of obesity

management, even at the end of their medical training (Table 1). Total correct scores were below 50 % for both first year and fourth year respondents; scores for the subscales of etiology and epidemiology were also below 50 % for both groups, as were scores for assessment, comorbidities, lifestyle and surgical interventions. Scores for pathogenesis, diagnosis and pharmacotherapy were higher but no score exceeded 60 % except for patient -centered care by first year students (65.4 %). There was a significant difference in patient centered care scores between the groups ($p = 0.016$), with first years students scoring higher than fourth year students. None of the other scales showed differences between the groups.

Table 1 also shows the respondents’ attitudes towards obesity management. Ratings of confidence and competence were low, and ratings of importance were high, with no difference between first- and fourth-year students (ns).

3.2. Study 2

A total of 494 Family Medicine residents across Canada responded to the CFPC invitation to participate; 259 (52.4 %) PGY1 residents and 235 (47.6 %) PGY2s. A total of 17 University residency programs were included; 24.5 % from western Canada (University of British Columbia, University of Alberta, University of Calgary, University of Manitoba, University of Saskatchewan), 38.7 % from Ontario (Northern Ontario School of Medicine, Western University, McMaster University, University of Toronto, Queen’s University, University of Ottawa), 23.9 % from Quebec (Université Laval, McGill University, Université de Sherbrooke, Université de Montreal), and 12.8 % from Atlantic Canada (Dalhousie University and Memorial University of Newfoundland).

Participants were asked how often they encounter PwO in their residency (see Table 2). There were no differences between PGY1s and PGY2s; collectively, 45.7 % of respondents reported daily encounters and a further 34.2 % reported having encounters with PwO several times per week, confirming how common obesity management is to practicing family medicine.

Regarding the importance of obesity management education, 91.9 % of PGY1s and 86.0 % of PGY2s agreed that it was important (ns, Table 2). Fewer than 10 % of residents disagreed with this statement.

Participants’ experience of obesity management education during residency is presented in Table 2. Very few residents (<15 %) had felt comfortable managing obesity prior to residency. Less than 25 % of

Table 1
Means and standard deviations for each domain and overall score.

	1st Year Mean (sd) ^a N = 26	4th Year Mean (sd) N = 22	p value
OMAE Scale (% correct)			
Patient Centered Care	65.4 (20.8)	50.0 (24.5)	0.016
Epidemiology	36.9 (18.5)	45.4 (20.6)	ns
Etiology	43.8 (18.8)	52.7 (20.0)	ns
Pathogenesis	53.1 (22.6)	59.1 (22.6)	ns
Assessment	47.7 (24.7)	48.2 (20.2)	ns
Diagnosis	51.5 (26.6)	53.6 (24.2)	ns
Comorbidities	33.8 (25.2)	36.4 (24.4)	ns
Lifestyle Treatment	38.5 (26.5)	48.2 (19.2)	ns
Pharmacotherapy Treatment	49.2 (29.5)	51.8 (24.4)	ns
Surgery Treatment	39.2 (20.0)	38.2 (20.4)	ns
Total Score	45.9 (12.0)	48.4 (9.5)	ns
Ratings (1–5) ^b			
Confidence managing obesity	1.92 (0.84)	1.86 (0.71)	ns
Competence in guideline care	2.00 (0.75)	1.82 (0.50)	ns
Importance of Guidelines	4.23 (0.82)	4.00 (0.76)	ns

^a Means and standard deviations for individual domains are based percent correct responses. Tests for normalcy indicated non-normal distributions for all measure. Given small sample size, nonparametric tests were used to compare the two groups.

^b Ratings were compared using the nonparametric Mann-Whitney *U* Test.

Table 2
Family medicine residents' experience of obesity management education during residency.

	PGY1	PGY2	PGY1	PGY2	PGY1	PGY2	p value
	Daily		Several/Week		Weekly or Less		
On average, how often do you encounter patients with obesity?	41.7 %	50.2 %	35.1 %	33.2 %	23.2 %	16.6 %	ns
	Disagree		Neutral		Agree		
Education about obesity management is important to family medicine residency training	4.3 %	6.8 %	3.9 %	7.2 %	91.9 %	86.0 %	ns
Prior to the start of residency, I was comfortable managing obesity	49.2 %	53.6 %	36.8 %	33.6 %	14.0 %	12.8 %	ns
There is sufficient time devoted to training in obesity management in my residency program's curriculum	50.0 %	35.1 %	29.9 %	47.5 %	20.1 %	17.6 %	< 0.001
My preceptors provide consistent teaching/messaging about obesity management	32.0 %	42.1 %	42.9 %	30.6 %	25.1 %	27.2 %	0.015
Moving into practice, I feel confident about managing obesity in patients	33.6 %	30.2 %	43.6 %	35.7 %	22.8 %	34.0 %	0.019
	Difficult		Neutral		Easy		
Initiating health discussion about obesity with patients is ...	54.1 %	53.2 %	22.8 %	22.6 %	23.2 %	24.3 %	ns
Identifying root causes of obesity is ...	54.8 %	50.0 %	26.3 %	25.9 %	18.9 %	24.1 %	ns
Implementing exercise-related approaches for obesity management is ...	49.8 %	41.0 %	25.5 %	22.6 %	24.7 %	36.3 %	0.019
Implementing nutrition-related approaches for obesity management is ...	48.6 %	41.5 %	28.8 %	31.6 %	22.6 %	26.9 %	ns
Implementing psychological-related approaches for obesity management is ...	70.2 %	67.1 %	23.3 %	23.9 %	6.6 %	9.-%	ns
Implementing medical-related approaches for obesity management is ...	39.0 %	37.2 %	32.8 %	31.2 %	28.2 %	31.6 %	ns
Implementing surgical-related approaches for obesity management is ...	47.5 %	46.1 %	35.1 %	37.1 %	17.4 %	16.89 %	ns

residents thought there was sufficient time devoted to training in obesity management during residency. Approximately one quarter of participants experienced consistent messaging about obesity management from their preceptors, with PGY2s being more likely to disagree with

this than PGY1s ($p = 0.015$). Similarly, approximately one quarter of residents anticipated that they would feel confident about managing obesity post-residency, with more PGY2s feeling confident ($p = 0.019$).

Most participants reported that specific obesity management

Table 3
Family medicine residents' attitudes toward obesity management using the COM-B Model.

		Disagree		Neutral		Agree		p value
		PGY1	PGY2	PGY1	PGY2	PGY1	PGY2	
Capability	I know how to deliver obesity management to patients	8.9 %	3.4 %	28.9 %	33.9 %	62.2 %	62.7 %	ns
	The objectives of obesity are clearly defined for me	14.4 %	18.6 %	40.0 %	35.6 %	45.6 %	45.8 %	ns
	I have been well trained in delivering obesity management	45.6 %	35.6 %	37.8 %	42.4 %	16.7 %	22.0 %	ns
	I have the skills to deliver obesity management	16.7 %	6.8 %	40.0 %	27.1 %	43.3 %	66.1 %	0.019
	I have experience managing obesity	35.6 %	5.1 %	28.9 %	22.0 %	35.6 %	72.9 %	<0.001
	I have a clear plan for how I will deliver obesity management in my practice	33.3 %	27.1 %	40.0 %	33.9 %	26.7 %	39.0 %	ns
Opportunity	Delivering obesity management will be part of my work as a family physician	1.1 %	5.1 %	11.1 %	3.4 %	87.8 %	91.5 %	ns
	Physicians with whom I am training deliver obesity management	12.2 %	18.6 %	28.9 %	2.1 %	58.9 %	54.2 %	ns
	Most of my mentors think that I should deliver obesity management to my patients	11.1 %	6.8 %	36.7 %	28.8 %	52.2 %	64.4 %	ns
	I expect to have the necessary resources available to deliver obesity management	13.3 %	16.9 %	15.6 %	11.9 %	71.1 %	71.2 %	ns
	I expect to have the time available to deliver obesity management in my practice	21.1 %	23.7 %	18.9 %	15.3 %	60.0 %	61.0 %	ns
	The management of the health organization I work in is helpful with delivering obesity management	12.2 %	15.3 %	44.4 %	35.6 %	43.3 %	49.2 %	ns
Motivation	For me, delivering obesity management is rewarding	6.7 %	10.2 %	16.7 %	25.4 %	76.7 %	64.4 %	ns
	For me, delivering obesity management is very interesting	12.2 %	20.3 %	22.2 %	22.0 %	65.6 %	57.6 %	ns
	Delivering obesity management is something I do automatically	31.1 %	27.1 %	24.4 %	28.8 %	44.4 %	44.1 %	ns
	If I deliver obesity management to my patients in my practice, I will feel satisfied	2.2 %	8.5 %	20.0 %	25.4 %	77.8 %	66.1 %	ns
	If I deliver obesity management my patients will appreciate this	3.3 %	8.5 %	24.4 %	22.0 %	72.2 %	69.5 %	ns
	I intend to be aware of my obesity management skills in my family practice	1.1 %	0.0 %	4.4 %	6.8 %	94.4 %	93.2 %	ns
	I intend to deliver obesity management care when I enter practice.	0.0 %	0.0 %	7.8 %	8.5 %	92.2 %	91.5 %	ns

practices were challenging, as shown in Table 2. Initiating discussions about obesity and identifying root causes of obesity was perceived as being difficult for over 50 % of the participants, with no differences between PGY1s and PGY2s (all ns). Additionally, discussing nutrition-related, exercise-related or psychological-related approaches with patients was perceived as being challenging for most participants. Finally, even the implementation of medical and surgical approaches in obesity management were perceived as being difficult for a substantial number of participants (up to 47 %, with no differences between PGY1s and PGY2s).

3.3. Study 3

A total of 150 residents completed the online survey, with the results shown in Table 3. Regarding perceptions of Capability, approximately two-thirds of both PGY1 and PGY2 participants believed that they know how to deliver obesity management. Predictably, significantly more PGY2s than PGY1s believed that they have the skills and experience necessary for obesity management. Few participants, either PGY1s or PGY2s, believed that they have been well trained or have a clear plan for managing obesity.

In terms of Opportunity factors regarding obesity management there were no differences in opinions between PGY1 and PGY2 residents. Most participants believed that obesity management will form part of their practice and that they will have the time and resources for obesity management. Approximately half of the participants believed that their colleagues treat obesity and approximately two-thirds believed that their mentors support delivery of obesity management services. However, less than half of the participants anticipated organizational (management) support for obesity management.

Finally, regarding motivation, almost all residents intended to stay aware of obesity management skills and to deliver obesity care when they enter practice. Further, most residents found obesity management rewarding and interesting and anticipated obesity management as a satisfying experience. At the same time most residents did not find obesity management an automatic behaviour yet. There were no differences between PGY1 and PGY2 residents regarding motivation.

4. Discussion

The prevalence of obesity is rising worldwide, and obesity has been declared a chronic disease in many jurisdictions. As with other chronic diseases, a fundamental knowledge of obesity management should be a core topic in the medical education of all future physicians. For Canadian family physicians specifically, who due to the comprehensive, continuous and longitudinal nature of their work are strategically poised to support their patients in managing obesity, this knowledge is particularly relevant, as is competence and confidence in raising the issue with PwO, conducting appropriate assessments and organizing comprehensive longitudinal care. It is thus imperative that Canadian undergraduate medical curricula and family medicine residency programs incorporate evidence-informed teaching on obesity management, reflecting the changing nature of the demographics and complexity of the population. However, the three studies described in this paper suggest that physician learners are not receiving contemporary education. Study 1 showed no change in knowledge on obesity management between first- and fourth-year medical students; if anything, elements of patient-centredness declined from first to fourth year. This is an alarming finding in light of the fact that few PwO see medical providers as a source of help for obesity management. So, without prepared physicians who can initiate discussions and educate on evidence-based treatment, integration of obesity management into chronic disease management is not likely to happen. Consistent with our findings in the undergraduate context, study 2 demonstrated that family medicine residents do not believe that their training programs are preparing them adequately for obesity management. Consistent with this, the majority

of residents find it difficult to initiate discussion about obesity, identify root causes, and address psychological, behavioural, nutrition, or activity-based interventions. Although the family medicine residents in Study 3 agreed that they were poorly prepared for obesity management, they were optimistic about incorporating obesity management in their future practices. Importantly, these residents view obesity management as an important component of their future work role, and they believe that their colleagues also consider obesity management an important activity. From an attitudinal perspective, family medicine residents appear open to obesity management. Our data suggests that this interest is in spite of inadequate preparation for obesity management during undergraduate training as well as residency.

These results support the revision of the obesity curriculum in the preparation of physicians and, in particular, family medicine physicians. The traditional view of obesity as a behavioural failure along with the notion that obesity might be a risk factor at best, requires revision. Recent scientific evidence validates that obesity meets the criteria for a chronic disease and may be the precursor to many other chronic diseases, including hyperglycemia, hyperlipidemia, hypercholesterolemia, hypertension, sleep apnea, chronic back and knee pain, etc. With improved pharmacotherapies to address the complex homeostatic, hedonic and executive systems interplay in the development of obesity [22] management becomes a more realistic goal. Family physicians can play a critical role in diagnosis, education and treatment of obesity. Family physicians have a unique perspective on individuals presenting with medical conditions. They manage the health of the whole person and are aware of the biopsychosocial context of the person. As well, given the longitudinal model of care, family physicians can organize care in such a way to integrate the three pillars of obesity management: psychological and behavioural interventions, medical interventions, and surgical interventions. The evidence collected in these three small-scale studies thus suggests that it is time to reconsider the obesity curriculum in the training of undergraduate medical students and family medicine residents in Canada. At the very least, the domains covered in the CPGs (i.e., patient centered care; epidemiology; etiology; pathogenesis; assessment; diagnosis; comorbidities; lifestyle; pharmacotherapy; and surgery) should be added to the undergraduate curriculum. Further, the principles of managing obesity as a chronic disease (i.e., using the 5 As (Ask, Assess, Advise, Agree, Assist [23]) to empower individuals to collaborate in evidence-based treatments administered over the long term) could be emphasized during family medicine residency training.

Promoting the role of the family physician is important for several reasons. First, many people with obesity do not see a strong role for HCPs in obesity management. The ACTION studies [1,8–10] showed that PwO wait years before they raise the issue with their provider. As such family physicians will play a significant role in raising the issue of obesity as a chronic disease, provide education on adiposopathy and guide the patient to a comprehensive longitudinal intervention plan. To fulfil this role well physician training needs to provide the robust knowledge about the disease and how to support PwO committing to a treatment plan that runs counter to the messages sent to PwO in the media, as well as from physicians in the past. Obesity is both a social construct and a chronic disease and it will require prepared family physicians to contribute to a future in which obesity is more effectively managed. As well, in light of the stigma surrounding obesity experienced by those living with obesity [24,25] discussing the issue is likely to be sensitive for the person. Family physicians have a mandate to adopt a wholistic perspective on their patients, meaning that they are likely to form a therapeutic alliance that aids in the discussion of sensitive materials.

4.1. Limitations

There are several limitations to all three studies, including low response rates and the potential respondent bias inherent therein. There are no data from which to compare respondents and nonrespondents so

representativeness cannot be determined. However, it is likely that the residents and medical students who participated in the studies had an interest in the topic of obesity management, so the results we described likely constitute a best-case scenario. An additional limitation is the multiple statistical testing carried out in relatively small samples. The issue of compounding error rates might impact the data and their interpretation.

4.2. Conclusions

This paper reports on three small-scale survey studies of medical learners, including undergraduate students as well as family medicine residents, regarding their knowledge and attitudes toward obesity management using contemporary understandings of obesity as a chronic disease. Unfortunately, undergraduate medical education, as assessed in a single major Canadian University, does not appear to be preparing physicians to develop the requisite knowledge for contemporary obesity management. Further, a national survey of family medicine residents also points to gaps in mentorship of contemporary principles of obesity management. Fortunately, family medicine residents hold optimistic views toward incorporating contemporary obesity management principles into their practice. These findings support the revision of the undergraduate medical curriculum in Canada to better reflect the science of obesity and its management.

4.3. Take-aways

- Lack of awareness of obesity as a chronic condition by those affected will mean that physicians will need to raise the issue with persons affected
- While contemporary research has led to a revision in how obesity is evaluated and treated this research has not been incorporated into the training of family physicians in Canada
- Revision of the medical school curriculum is needed to prepare family medicine physicians to manage the prevalence and comorbidities associated with adiposopathy

CRedit author statement

Helena Piccinini-Vallis: Conceptualization, Methodology, Validation, Investigation, Resources, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualization, Supervision, Project administration. Vlad Evdaev: Investigation, Writing – Review & Editing. Joseph Asaminew: Investigation, Writing – Review & Editing. Therese McCurdy: Investigation, Writing – Review & Editing. Mark Rogers: Investigation, Writing – Review & Editing. Michael Vallis: Conceptualization, Methodology, Validation, Investigation, Resources, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualization, Supervision.

Disclosures

HP, VE, JA, TM, and MR have no disclosures. MV declares Advisory Board activity and Consultation fees from Abbvie, Abbott, Bausch Health, Boehringer Ingelheim, Lifescan, Lyceum, Novo Nordisk, Roche, Sanofi; speaking fees from Abbott, Abbvie, Bausch Health, Lifescan, Lilly, Merck, Novo Nordisk, Pfizer, Roche, Sanofi; and investigator driven research funding from Abbott, Bausch Health, Novo Nordisk.

Ethical adherence

All three studies were reviewed by institutional Research Ethics Boards. Studies 1 and 2 were approved by Dalhousie University Health Sciences Research Ethics Board (file # 2021–5810; file # 1028155, respectively) and Study 3 from the Nova Scotia Health Research Ethics Board (file # 1029249).

Use of artificial intelligence

There was no use of Artificial Intelligence in the conduct of preparation of this manuscript.

Funding

The Dalhousie University provides funding to undergraduate medical students to complete their Research in Medicine (RIM) projects.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Michael Vallis reports a relationship with Bausch and Lomb Canada Inc that includes: consulting or advisory, funding grants, speaking and lecture fees, and travel reimbursement. Michael Vallis reports a relationship with Novo Nordisk that includes: consulting or advisory, funding grants, speaking and lecture fees, and travel reimbursement. Michael Vallis reports a relationship with Boehringer Ingelheim GmbH that includes: speaking and lecture fees and travel reimbursement. Michael Vallis reports a relationship with Eli Lilly Canada Inc that includes: speaking and lecture fees. Member, Executive Committee, 2020 Canadian Clinical Practice Guidelines for the Management of Obesity in Canada - Michael Vallis Author, chapter in 2020 Canadian Clinical Practice Guidelines for the Management of Obesity in Canada - Helena Piccinini & Michael Vallis If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The work for Study 3 had additional contributions from Drs. Lucy Federico, Éloïse Dumas, and Amy Vine on behalf of the CFPC's Section of Residents Council (2021–2023). Special acknowledgements also go to Dr. Ivy Oandasan, Mahsa Haghighi, and Tanya Czyzewski from the CFPC Education Department, who offered administrative and research support.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.obpill.2024.100151>.

References

- [1] Sharma AM, Bélanger A, Carson V, et al. Perceptions of barriers to effective obesity management in Canada: results from the ACTION study. *Clin Obes* 2019;9(5). <https://doi.org/10.1111/cob.12329>.
- [2] Puhl RM, Heuer CA. The stigma of obesity: a review and update. *Obesity* 2009;17(5):941–64. <https://doi.org/10.1038/oby.2008.636>.
- [3] He B, Jm GC, Rr H, et al. Is adiposopathy (sick fat) an endocrine disease? *Int J Clin Pract* 2008;62(10). <https://doi.org/10.1111/j.1742-1241.2008.01848.x>.
- [4] Fothergill E, Guo J, Howard L, et al. Persistent metabolic adaptation 6 years after "The Biggest Loser" competition. *Obesity* 2016;24(8):1612–9. <https://doi.org/10.1002/oby.21538>.
- [5] Hall KD, Kahan S. Maintenance of lost weight and long-term management of obesity. *Med Clin* 2018;102(1):183–97. <https://doi.org/10.1016/j.mcna.2017.08.012>.
- [6] Wharton S, Lau DCW, Vallis M, et al. Obesity in adults: a clinical practice guideline. *CMAJ (Can Med Assoc J)* 2020;192(31):E875–91. <https://doi.org/10.1503/cmaj.191707>.
- [7] Group on the Certification Process W. Defining competence for the purposes of certification by the College of family physicians of Canada. 2020. Published online.
- [8] Kaplan LM, Golden A, Jinnett K, et al. Perceptions of barriers to effective obesity care: results from the national ACTION study. *Obesity* 2018;26(1):61–9. <https://doi.org/10.1002/oby.22054>.
- [9] Caterson ID, Alfadda AA, Auerbach P, et al. Gaps to bridge: misalignment between perception, reality and actions in obesity. *Diabetes Obes Metabol* 2019;21(8):1914–24. <https://doi.org/10.1111/dom.13752>.

- [10] Tham KW, Ahmed A, Boonyavarakul A, et al. Action APAC: understanding perceptions, attitudes and behaviours in obesity and its management across south and Southeast Asia. *Clin Obes* 2024;14(3). <https://doi.org/10.1111/cob.12644>.
- [11] Rand K, Vallis M, Aston M, et al. "It is not the diet; it is the mental part we need help with." A multilevel analysis of psychological, emotional, and social well-being in obesity. *Int J Qual Stud Health Well-Being* 2017;12(1). <https://doi.org/10.1080/17482631.2017.1306421>.
- [12] Stanford FC, Johnson ED, Claridy MD, Earle RL, Kaplan LM. The role of obesity training in medical school and residency on bariatric surgery knowledge in primary care physicians. *Int J Family Med* 2015;2015. <https://doi.org/10.1155/2015/841249>.
- [13] Holman H, Dey S, Drobish I, et al. Obesity education in the family medicine clerkship: a US and Canadian survey of clerkship directors' beliefs, barriers, and curriculum content. *BMC Med Educ* 2019;19(1). <https://doi.org/10.1186/s12909-019-1614-y>.
- [14] Martins C, Norsett-Carr A. Obesity knowledge among final-year medical students in Norway. *Obes Facts* 2018;10(6). <https://doi.org/10.1159/000481351>.
- [15] Orjuela-Grimm M, Butsch WS, Bhatt-Carreño S, Smolarz BG, Rao G. Benchmarking of provider competencies and current training for prevention and management of obesity among family medicine residency programs: a cross-sectional survey. *BMC Fam Pract* 2021;22(1). <https://doi.org/10.1186/s12875-021-01484-y>.
- [16] Antognoli EL, Seeholzer EL, Gullett H, Jackson B, Smith S, Flocke SA. Primary care resident training for obesity, nutrition, and physical activity counseling: a mixed-methods study. *Health Promot Pract* 2017;18(5):672–80. <https://doi.org/10.1177/1524839916658025>.
- [17] Luig T, Wicklum S, Heatherington M, et al. Improving obesity management training in family medicine: multi-methods evaluation of the 5AsT-MD pilot course. *BMC Med Educ* 2020;20(1). <https://doi.org/10.1186/s12909-019-1908-0>.
- [18] Mastrocola MR, Roque SS, Benning LV, Stanford FC. Obesity education in medical schools, residencies, and fellowships throughout the world: a systematic review. *Int J Obes* 2020;44(2). <https://doi.org/10.1038/s41366-019-0453-6>.
- [19] Smith S, Seeholzer EL, Gullett H, et al. Primary care residents' knowledge, attitudes, self-efficacy, and perceived professional norms regarding obesity, nutrition, and physical activity counseling. *J Grad Med Educ* 2015;7(3). <https://doi.org/10.4300/JGME-D-14-00710.1>.
- [20] Khandalavala B, Koran-Scholl J, Geske J. Comprehensive obesity education for family medicine residents. *PRIMER* 2020;4. <https://doi.org/10.22454/primer.2020.525629>.
- [21] Timkova V, Minarikova D, Fabryova L, et al. Facilitators and barriers to behavior change in overweight and obesity management using the COM-B model. *Front Psychol* 2024;15. <https://doi.org/10.3389/fpsyg.2024.1280071>.
- [22] Pederson S, Majoo P, Wharton S. Pharmacotherapy for obesity management. Canadian adult obesity clinical practice guidelines. <https://obesitycanada.ca/guidelines/pharmacotherapy>; 2022.
- [23] Vallis M, Piccinini-Vallis H, Sharma AM, Freedhoff Y. Clinical review: modified 5 As: minimal intervention for obesity counseling in primary care. *Can Fam Physician* 2013;59(1):27–31. <http://www.ncbi.nlm.nih.gov/pubmed/23341653>.
- [24] Puhl RM, Heuer CA. Obesity stigma: important considerations for public health. *Am J Publ Health* 2010;100(6):1019–28. <https://doi.org/10.2105/AJPH.2009.159491>.
- [25] Puhl RM, Heuer CA. The stigma of obesity: a review and update. *Obesity* (Silver Spring) 2009;17(5):941–64. <https://doi.org/10.1038/oby.2008.636>.