Adult Obesity Management:
Knowledge, Attitudes, and Practices of Alberta Family Physicians

by

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Abstract

Background: Obesity is a national and global issue. Primary care is an important area in the prevention and treatment of obesity. There are numerous potential barriers physicians face in delivering effective practices in obesity management. Identifying major barriers will aid health care systems, medical practices, and primary care physicians in the improvement of counseling obese patients to lose weight and maintain their weight loss for the long term.

Objective: The purpose of the study was to examine the relationship of physician attitudes, knowledge, and practice environment on their practice behaviours in delivering obesity management to adults in primary care.

Methods: Physicians were assessed using a survey instrument, developed on the basis of four previously validated surveys. A database from the College of Physicians and Surgeons of Alberta was used to identify Alberta family physicians to invite to participate and gather data from.

Results: One hundred twenty nine (129) physicians participated (62 male and 67 female) in the study through completion of the survey. The results of the study did not indicate that physicians' attitudes towards obese patients explain for their behaviour in delivering obesity management in primary practice. The findings provide support for a relationship between physician knowledge and preparedness in counseling, physicians' feelings of responsibility to provide obesity management, and medical practice environment all play a role in explaining physicians practice behaviours in obesity management.

Conclusion: Physician knowledge, responsibility, and practice environment only modestly explain physician behaviours with respect to how they manage adults with obesity. Further efforts in identifying the determinants of physician behaviours in obesity management are needed.

Preface

This thesis is an original work by Hilary Short. The research project, of which this thesis is a part, received research ethics approval from the University of Alberta Research Ethics Board, Project Name "Adult Obesity Management: Knowledge, Attitudes, and Practices of Alberta Family Physicians", No. 44341, 11/12/2013. No part of this thesis has been previously published.

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Finally, I want to express my great appreciation to my parents for their ongoing encouragement and words of wisdom throughout my university pursuits. I will always remember that “the main thing is to keep the main thing the main thing”.

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List of Abbreviations

AHS: Alberta Health Services

ANOVA: Analysis of Variance

BMI: Body Mass Index

CCHS: Canadian Community Health Survey

EOSS: Edmonton Obesity Staging System

GP: General Practitioner

HDL: High-density lipoprotein

HREB: Health Research Ethics Board

LDL: Low-density lipoprotein

OLS: Ordinary Least Squares

PCN: Primary Care Network

PCP: Primary care physician

R^2: Coefficient of Determination

SPSS: Statistical Package for the Social Sciences

TTM: Transtheoretical Model

US: The United States

WHO: World Health Organization

Chapter 1

Introduction and Background

I. Obesity: A Public Health Concern and the Role of Primary Care Physicians

Obesity has long been recognized as a public health problem, typically described as an "obesity epidemic" due to dramatic increases in prevalence over the past 30 years within Canada and throughout the globe. Only until recently has the American Medical Association recognized obesity as a disease (Frellick, 2013). The Canadian Medical Association stated that it does not officially label obesity as a disease, but the medical community recognizes it as such. Recognizing obesity as a disease could result in physicians taking the problem more seriously by providing comprehensive obesity care in clinical practice. Despite the already high and increasing prevalence of obesity across the globe, many primary care providers (PCPs) fail to consult their patients on obesity and other health promotion interventions. Evidence suggests that physicians are more comfortable managing illness than promoting health (Peckham et al., 2011) and are ill-equipped to adequately provide long-term obesity management. The rapid increase in the prevalence of obesity is more so a result of environmental and cultural influences rather than genetic factors. Progressive improvements in the standard of living in developed and developing countries, overnutrition and sedentary lifestyle replacing physical labour and regular physical activity has resulted in a cumulative positive energy balance and excess weight gains. Obesity is a multifaceted complex problem that cannot be fixed with one solution. Achieving population lifestyle changes such as eating habits and exercise behaviours is challenging. Health services alone cannot achieve such change, but health care does serve a purpose in preventing people

from becoming obese and in helping those who become obese to improve their health (Gunther et al., 2012). Historically, primary care has been considered a department for acute care. However, with our epidemiological shift from acute and contagious diseases to more and more chronic and lifestyle diseases, our healthcare systems require a significant transformation in order to provide its populations with the proper health care that it needs. From a public health perspective, primary care occupies a position to provide both medical care and promote health and wellbeing (Peckham et al., 2011). Family physicians and general practitioners are in a good position to influence population levels of obesity since they have access to most members of the population and they often have contact with their patients over an extended period of time, which provides opportunities for assessing lifestyle risk factors (Laws et al., 2008). Although lifestyle interventions remain the cornerstone of the treatment of obesity, adherence is poor and long-term success is modest because of significant barriers both on the part of affected individuals and health care professionals responsible for treatment (Lau et al., 2007). Despite the wide body of evidence that maintains that primary care serves as a useful outlet for health promotion and preventive care, there is an equal amount of evidence that suggests that prevention and treatment of obesity is lacking in the primary care setting.

II. Obesity Defined

The World Health Organization (WHO) defines overweight and obesity as abnormal or excessive fat accumulation that may impair health. Adults are considered overweight or obese when their body mass index (BMI), a measurement of body fat based on height and weight, exceeds 25 or 30 kg/m^2, respectively (WHO, 2013). Excess fat accumulation occurs as a result of a positive energy balance, meaning the amount of calories consumed is greater than the calories

expended. While our genetic makeup does influence our body weight, most cases of obesity are as a result of excessive food energy intake and/or physical inactivity. However, the social and environmental factors that influence a positive energy balance are enormous, making obesity a very complex and multifaceted problem.

III. Prevalence in Canada

From a self-reported survey in 2011, Statistics Canada found that 18.3% of Canadians aged 18 or older were classified as obese (BMI ≥ 30). When those who were overweight (BMI ≥ 25) were included, 60.1% of Canadian men and 44.2% of women were reported (Statistics Canada, 2013). The overweight rates (BMI 25-29) have remained relatively unchanged since 2003 but the obesity rates (BMI ≥ 30) have risen by almost 4% in men and 2% in women.

Some variation exists in obesity prevalence across provinces and territories. From the 2007/2008 Canadian Community Health Survey (CCHS) of Canadian adults (ages 18 years and older), British Columbia scored the lowest obesity prevalence at 12.8%, where Newfoundland and Labrador scored the highest obesity prevalence at 25.4% (PHAC, 2012). Alberta scored a prevalence of 19.0%, which increased almost 3% from 2005. Given that there is almost twice the prevalence of obesity in Newfoundland and Labrador compared to British Columbia, there may be an association between region and obesity. Studies have indicated that the prevalence of obesity tends to be lower in more urban regions (Shields & Tremblay, 2002, Vanasse et al., 2005). Vanasse et al. (2005) found that obesity was significantly below the national average in Montreal, Toronto, and Vancouver on the basis of 2003 CCHS estimates. Moreover, among both

adults and youth, the proportion of overweight tends to be higher in rural areas than in metropolitan areas (Mitura & Bollman, 2004, 2003).

IV. Health implications

Being overweight or obese can have a serious impact on health. The risk of health problems may start when someone is only slightly overweight and the likelihood of problems increases as someone becomes more and more overweight (WHO, 2013). The health risks of being overweight and being obese can be divided into increased risks for mortality and morbidity.

Mortality

Excess body fat is recognized as a factor for disease and early death. Life-insurance studies were the first to suggest that life expectancy was diminished in obese individuals (Pi-Sunyer, 1991). Epidemiologic studies subsequently confirmed the link between obesity and an increased risk of death (Katzmarzyk et al., 2003, Pi-Sunyer, 1991, Zheng et al., 2013). A number of large scale prospective studies have demonstrated a 'J-shaped' association between BMI and risk of death, with obese and underweight individuals having a greater risk of death than individuals of a healthy weight (Adams et al., 2006, Katzmarzyk et al., 2003, Wong et al., 2011, Zajacova & Burgard, 2012, Zheng et al., 2013). Adams et al. (2006) conducted a large prospective study and concluded that obesity was strongly associated with the risk of death in both men and women in all racial and ethnic groups and at all ages. Despite advances in the management of obesity-related chronic diseases in the past few decades, their findings suggest

that adiposity, including overweight, is associated with an increased risk of death (Adams et al., 2006).

Morbidity

The impact of obesity has a large number of medical consequences affecting almost every bodily system. The WHO (2000) has categorized the more life-threatening chronic health problems associated with obesity into four main areas: cardiovascular problems, including hypertension, stroke, and coronary heart disease; conditions associated with insulin resistance (i.e. diabetes mellitus); certain types of cancer, especially the hormonally related and large-bowel cancer; and gallbladder disease. These adverse health consequences of obesity are influenced to a greater or lesser extent by body weight, the location of body fat, the magnitude of weight gain during adulthood, and a sedentary lifestyle (WHO, 2000).

The distribution of body fat is directly related to many of the mentioned health risks. Upper body, or abdominal obesity, is more dangerous than lower body, or gluteal-femoral obesity (Jensen, 2008). Fat accumulation in the upper body is largely intra-abdominal or visceral fat, whereas fat accumulated in the lower body is subcutaneous (Harvard Health Publications, 2007). Visceral fat is considered more of a health threat than subcutaneous fat. Visceral fat accumulates within the abdominal cavity, surrounding the organs, where subcutaneous fat lies beneath the surface of the skin. Research is still deciphering the physiological reasoning for the increased danger of visceral fat, but evidence has linked visceral fat to metabolic disturbances and increased risk for cardiovascular disease and type 2 diabetes (Despres, 2012, Jensen, 2008). The distribution of fat can be difficult to assess, but at any given BMI value, an elevated waist circumference is predictive of increased levels of non-abdominal, abdominal subcutaneous, and

visceral fat (Janssen et al., 2002), indicating that routine measurements of BMI and waist circumference should be a priority for health care practitioners in assessing patients' cardiovascular and metabolic health.

There are other non-fatal but debilitating health problems associated with obesity including respiratory difficulties (eg. asthma and sleep apnea), chronic musculoskeletal problems (eg. arthritis and back pain), skin problems, and infertility (WHO, 2000). It is also important to note the mental health consequences of obesity, which can stem from low self-esteem and stigmatization of obese people (Crawford, 2010).

V. Economic implications

The negative health consequences of obesity place a substantial economic burden on the Canadian health care systems and society. As previously mentioned, obesity is associated with poorer health status, resulting in more frequent use of health care services, and increased health care costs (Tran et al., 2013). Moreover, healthy life-years and losses of productivity due to absenteeism, co-morbidities, disability, and premature mortality as a result of obesity are substantial indirect costs placed on individuals, their families, and society (Tran et al., 2013). The economic implications of obesity are very difficult to accurately determine because of the direct and indirect costs. Direct health care costs as a result of obesity include increased hospital care, pharmaceuticals, physician care and institutional care; whereas indirect costs can be attributed to costs to productivity, such as the value of economic output lost as a result of premature death and short- and long-term disability (PHAC, 2011).

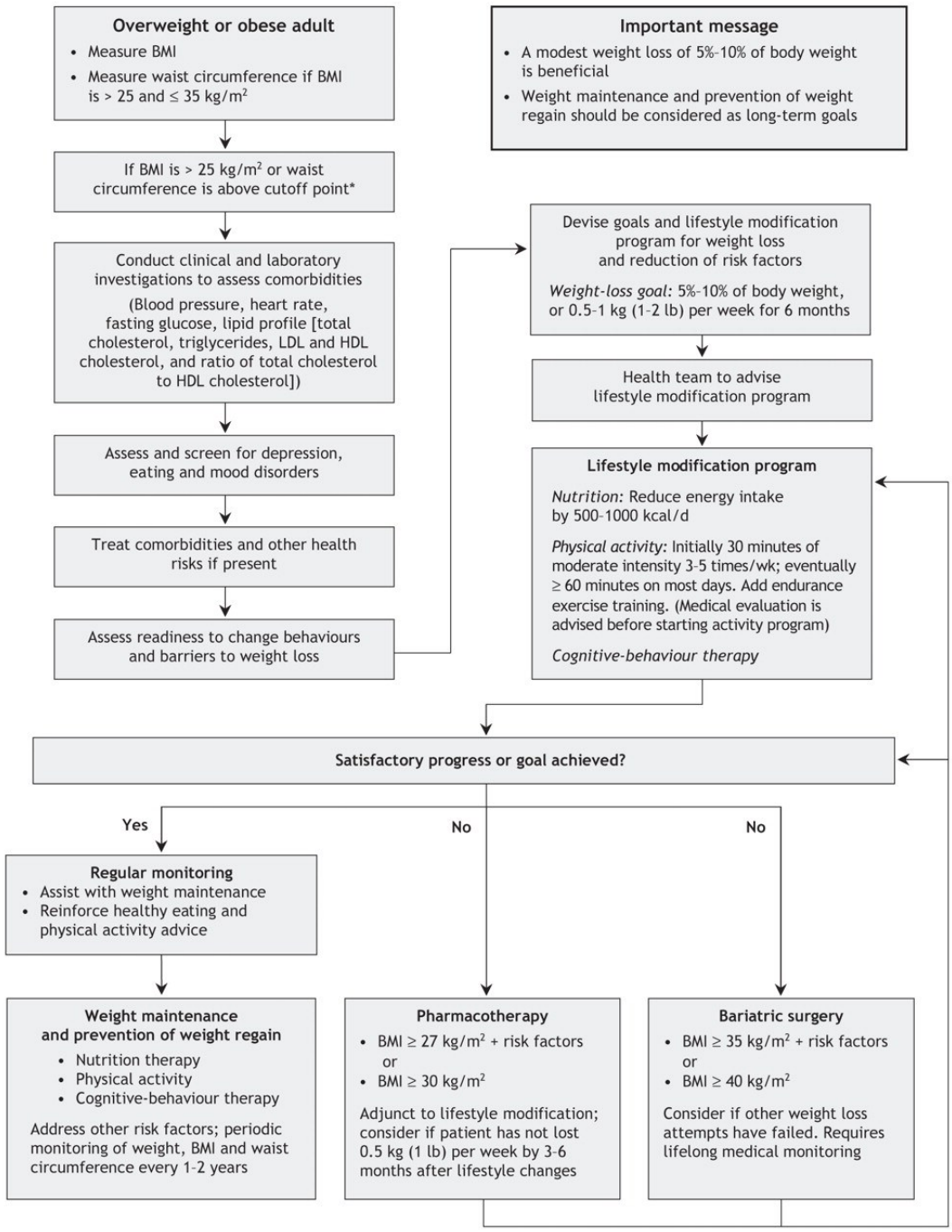
According to Alberta Health Services (2011), obesity is estimated to cost the health care system in Alberta $1.4 billion annually in direct and indirect costs (AHS, 2011). Tran et al.,

(2013) estimated total health care costs attributed to overweight and obesity in Canada to be as high as 12% of total health care expenditure. The Obesity in Canada report, released in 2011 in partnership between the Public Health Agency of Canada and the Canadian Institute for Health Information, estimated that the economic costs of obesity in Canada were $4.6 billion in 2008, a 19% increase from 2000, solely based on costs associated with eight chronic diseases most commonly linked to obesity. The economic burden of obesity is substantial in Canada and public health action is necessary. These calculations demonstrate that obesity prevention programs are likely cost effective, despite high costs for obesity treatment.

VI. What is Obesity Management?: Current Practice Guidelines

A number of clinical practice guidelines on the assessment and management of adult obesity have been published in the past and some provinces have published their own set of guidelines for primary care providers. These have been largely based on consensus statements by expert panels. Moreover, most of these guidelines focus on individuals rather than on communities and the population as a whole. The Canadian Obesity Network developed an evidence-based approach to setting new obesity guidelines by identifying major gaps in knowledge regarding obesity treatment and prevention and published the latest set of recommendations for Canadian clinical practice in 2006, which can be found in condensed form in figure 1. Each recommendation was developed based on evidence from systematic reviews and includes a level of evidence and an evidence grade (Lau et al., 2007). The level of evidence informs the practitioner about the strength of evidence in favour of the intervention (Lau et al., 2007).

Figure 1. Algorithm for the assessment and stepwise management of the overweight or obese adult



Source: (Lau et al., 2007) "2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children"

Patient Assessment

Prior to devising treatment options, Canadian obesity clinical practice guidelines for adults advise physicians measure BMI and waist circumference in all adults and subsequent clinical and laboratory investigations of overweight and obese patients to assess obesity-related comorbidities (Lau et al., 2007). Obese patients are at higher risk for diabetes, dyslipidemia, liver disease, and impaired renal function. Measurement of laboratory parameters fasting blood glucose level, total cholesterol, LDL cholesterol, HDL cholesterol, triglycerides, ratio of total cholesterol to HDL cholesterol, liver enzyme levels and urinalysis will conclude whether or not these comorbidities exist and require immediate treatment. Screenings for depression and other eating and mood disorders are advised as these conditions are more common in obese patients and may adversely affect adherence to weight management interventions (Lau et al., 2007). Assessment of patient readiness to change behaviours and other barriers to weight loss is also suggested prior to individual weight control plans are implemented (Lau et al., 2007).

Lifestyle Interventions

Treatments for obesity include diet and exercise interventions, psychological interventions, weight loss programs, medications, and surgery. The main treatment for obesity consists of dieting and exercise. If successful, lifestyle interventions that alter patients' health behaviours are the most effective long-term obesity treatments. The Canadian guidelines recommend that a comprehensive lifestyle intervention be implemented to all obese adults, combining behaviour modification techniques, cognitive behavioural therapy, activity enhancement and dietary counselling (Lau et al., 2007). Physicians are suggested to recommend high-protein or low-fat diets as reasonable short-term treatment dietary treatment option as part

of a weight-loss program and an optimal dietary plan be developed, preferably by a registered dietician (Lau et al., 2007). The guidelines also suggest physicians prescribe 30 minutes of physical activity of moderate intensity per day, increasing to 60 minutes per day as part of an overall weight-loss program that should be sustainable and tailored to the individual (Lau et al., 2012). Guidelines indicate that patients should be referred to an exercise health professional as required. Patients with psychiatric conditions should be provided with appropriate behaviour modification techniques or cognitive-behavioural therapy by a clinical psychologist or psychiatrist.

Pharmacotherapy and Surgery

Pharmacologic treatments are recommended by Canadian guidelines for patients who do not respond to lifestyle interventions. Orlistat, a gastrointestinal and pancreatic lipase inhibitor that blocks the absorption of 30% of ingested fat (Coulston and Boushey, 2008), is the only available long-term drug therapy for obesity in Canada (Kirkey, 2012). Orlistat is approved for long-term use, however any subsequent weight loss is modest and its use is associated with high rates of gastrointestinal side effects (Rucker et al., 2007). Surgical intervention is an option for adult patients with clinically severe obesity (BMI $\geq$ 40kg/m^2 or BMI $\geq$ 35kg/m^2 with comorbid conditions) who have been unsuccessful in losing weight with other methods. Surgery for severe obesity is associated with long-term weight loss and decreased overall mortality, however, surgery only remains an option if lifestyle interventions are inadequate to achieve healthy weight goals as complications from weight loss surgery are frequent (Encinosa et al., 2006).

VII. Intervention Approaches

Lifestyle intervention remains the most common obesity and weight management approach in primary care. The Canadian clinical practice guidelines recommend physicians prescribe a comprehensive lifestyle intervention for obese patients, however it fails to provide physicians with an approach to intervention. Although the clinical practice guidelines do not document it, there are multiple intervention approaches physicians can employ.

The Modified 5 As Approach

The 5 As model (ask, assess, advise, agree, and assist) developed for smoking cessation, can be adapted for obesity counseling and provides primary care providers a manageable evidence-based behavioural intervention strategy (Vallis et al., 2013). The 5 As are rooted in behaviour change theory as obesity outcomes depend more on patient behaviour than on physician recommendations and education (Vallis et al., 2013). The 5 As model, outlined below in figure 2, guides physicians through the process of counseling a patient about behaviour change with minimal intervention strategies (Vallis et al., 2013). The effectiveness of the 5 As model was concluded in a study conducted by Jay et al. (2010) that physicians' use of the 5 As is associated with higher odds of patient motivation to lose weight, intention to eat healthier, and intention to exercise.

Figure 2. The 5 As for obesity counseling

Source: (Vallis et al., 2013) "Modified 5 As: Minimal intervention for obesity counseling in primary care."

The Transtheoretical Model of Behaviour Change

The transtheoretical model (TTM) or "The Stages of Change model" was first constructed by Prochaska and DiClemente in 1977 (Prochaska and DiClemente, 2005). The model was inspired by smoking cessation studies and is based on the use of various psychotherapy theories (Prochaska and Norcross, 2010). Application of the TTM allows for assessment of the level of readiness in the process of behaviour change. The TTM can be applied to primary care to manage various chronic conditions, including weight management. Education and treatment should be tailored to reflect the current stage of change the individual is in. The model consists of four core constructs: 1) stages of change, 2) processes of change, 3) decisional balance and 4) self-efficacy (Prochaska and Velicer, 1997). The first construct, stages of change, represents a process involving progress through a series of six stages, containing the following (Prochaska and Velicer, 1997):

1) *Pre-contemplation:* No intention of taking action within the next six months; individual is not aware of any problems with the performance of his/her health or do not associate health related issues to their personal management style.

2) *Contemplation:* Intention to take action within the next six months; individual sees performance and motivation linked to health promotion activities, but cannot decide how best to react.

3) *Preparation:* Intention to take action within the next thirty days and has taken some behavioural steps in this direction; individual starts learning about different health management styles and begin to make decisions about what might work for them through the development of health management skills.

4) *Action:* Change in behaviour for less than six months; individual looks for situations to develop their new health management behaviours with improved health performances.

5) *Maintenance:* Change in behaviour for more than six months; individual seeks feedback about the value of their improved health activities.

6) *Termination:* Permanent healthy behaviour change; individuals in this stage have no temptation and 100% self-efficacy that they will not return to their old unhealthy habit.

The second construct, processes of change, are the activities people use to progress through the stages of change. There are 10 processes of change including: 1) consciousness raising, 2) dramatic relief, 3) self-reevaluation, 4) environmental reevaluation, 5) self-liberation, 6) social liberation, 7) counterconditioning, 8) stimulus control, 9) contingency management and 10) helping relationships (Prochaska and Velicer, 1997). These processes provide important guides for intervention programs, as individuals need to apply these processes in order to move from stage to stage (Prochaska et al., 2008). The third construct, decisional balance reflects the individual's relative weighing of the pros and cons of changing (Prochaska and Velicer, 1997). The balance between pros and cons varies depending on what stage of change the individual is in, though pros should be higher than the cons for the individual to move into the action stage (Prochaska et al., 2008). The fourth construct, self-efficacy, is the situation-specific confidence people have that they can cope with high risk situations without relapsing to their unhealthy or high risk habit (Prochaska and Velicer, 1997).

The TTM is a model for providing stage-matched, tailored interventions to fit individuals and the stage of change that they are in. Alberta Health Services has adapted the TTM as a guide

for nurses, physicians, and other health professionals in providing adult weight management, represented by figure 3.

Figure 3. General guidelines for applying stages and processes of change to the adoption of healthful behaviours.

Readiness to Change	Stage	Identification	Strategies
Not Ready ↕ Ready	Pre-contemplation	Not intending to change behaviour.	Provide information. Build awareness.
	Contemplation	Intending to change behaviour in the next 6 months.	Address ambivalence. Build confidence and support.
	Preparation	Intending to change behaviour in the immediate future.	Develop specific action plan. Reinforce small changes.
	Action	Changes in behaviour have been made within the past 6 months.	Improve self management skills. Provide self-help, not information-only materials.
	Maintenance	Behaviour established for 6 months or more. Attempting to avoid relapse but less actively engaged in the change process.	Problem solving and support. Recommend more challenging changes, if motivated. Develop plan for relapse prevention.

Source: Alberta Health Services (2012). Nutrition Guideline: Adult Weight Management. Retrieved from http://www.albertahealthservices.ca/hp/if-hp-ed-cdm-ns-5-6-1-adult-weight-management.pdf

The Edmonton Obesity Staging System (EOSS)

The Edmonton Obesity Staging System (EOSS) is a framework developed by Sharma (2009) that ranks severity of obesity based on clinical assessment of weight-related health problems, mental health and quality of life, rather than solely using BMI (Sharma & Kushner, 2009). Sharma & Kushner (2009) recognize the limitations of BMI and waist circumference; these measurements are an indication of an individual's size, but not necessarily their health. BMI and waist circumference have been critiqued to lack sensitivity and specificity with regard to identifying the presence or risk of obesity-related risk factors, co-morbidities,

psychopathology, global functioning or quality of life (Sharma & Kushner, 2009). Using BMI and/or waist circumference as a sole means of identifying obesity and subsequent management techniques poses a problem for patients who have no apparent co-morbidites, functional limitations, or reduced well-being to lose weight may be counterproductive in that it can introduce and reinforce body image dissatisfaction and lead to unhealthy behaviours focusing on weight loss. Sharma & Kushner (2009) claim that for practical purposes, it is important to move beyond defining who requires obesity treatment simply based on BMI and waist circumference to a more clinically meaningful system. Based on the EOSS, not all obese patients require intervention. EOSS helps physicians determine a patient's overall health and to grade obesity based on criteria obtained from medical history, physical examination and standard diagnostic tests (Sharma & Kushner, 2009). The EOSS stage is meant to demonstrate correlation to morbidity and mortality (Padwal et al., 2011). It is a tool to assist health care professionals with assessment of obesity-related health risk and guide clinical decisions for treatment, demonstrated by figure 4.

Figure 4. Proposed clinical and functional staging of obesity

Stage	*Description*	*Management*
0	No apparent obesity-related risk factors (e.g., blood pressure, serum lipids, fasting glucose, etc. within normal range), no physical symptoms, no psychopathology, no functional limitations and/or impairment of well being	Identification of factors contributing to increased body weight. Counseling to prevent further weight gain through lifestyle measures including healthy eating and increased physical activity.
1	Presence of obesity-related subclinical risk factors (e.g., borderline hypertension, impaired fasting glucose, elevated liver enzymes, etc.), mild physical symptoms (e.g., dyspnea on moderate exertion, occasional aches and pains, fatigue, etc.), mild psychopathology, mild functional limitations and/or mild impairment of well being	Investigation for other (non-weight related) contributors to risk factors. More intense lifestyle interventions, including diet and exercise to prevent further weight gain. Monitoring of risk factors and health status.
2	Presence of established obesity-related chronic disease (e.g., hypertension, type 2 diabetes, sleep apnea, osteoarthritis, reflux disease, polycystic ovary syndrome, anxiety disorder, etc.), moderate limitations in activities of daily living and/or well being	Initiation of obesity treatments including considerations of all behavioral, pharmacological and surgical treatment options. Close monitoring and management of comorbidities as indicated.
3	Established end-organ damage such as myocardial infarction, heart failure, diabetic complications, incapacitating osteoarthritis, significant psychopathology, significant functional limitations and/or impairment of well being	More intensive obesity treatment including consideration of all behavioral, pharmacological and surgical treatment options. Aggressive management of comorbidities as indicated.
4	Severe (potentially end-stage) disabilities from obesity-related chronic diseases, severe disabling psychopathology, severe functional limitations and/or severe impairment of well being	Aggressive obesity management as deemed feasible. Palliative measures including pain management, occupational therapy and psychosocial support.

Source: Sharma, A. M. and Kushner, R. F. (2009). A proposed clinical staging system for obesity. *International Journal of Obesity.* 33, 289-295.

VIII. Clinical Practice Guidelines in Other Jurisdictions

Australia

The Australian clinical practice guidelines for the management of overweight and obesity in primary care utilize a variation of the 5As approach to clinical guidance which can be found in condensed form in Figure 5. These guidelines were developed on the basis of the Scottish Intercollegiate Guideline Network (SIGN) Management of obesity: a national clinical guideline (2010) (National Health and Medical Research Council, 2013). A systematic literature review was also conducted to examine areas that were relevant for Australian practice (National Health and Medical Research Council, 2013). Most recommendations were developed based on the evaluation of systematic reviews and randomized controlled trials, although others were developed by a consensus-based process by the Obesity Guidelines Development Committee (National Health and Medical Research Council, 2013). The key messages from the recommendations for adults include the following:

<u>Ask and Assess</u>

1. Measure waist circumference in addition to calculating BMI
2. Discuss readiness to change lifestyle behaviours

<u>Advise</u>

3. Convey the message that even small amounts of weight loss improve health and wellbeing

<u>Assist</u>

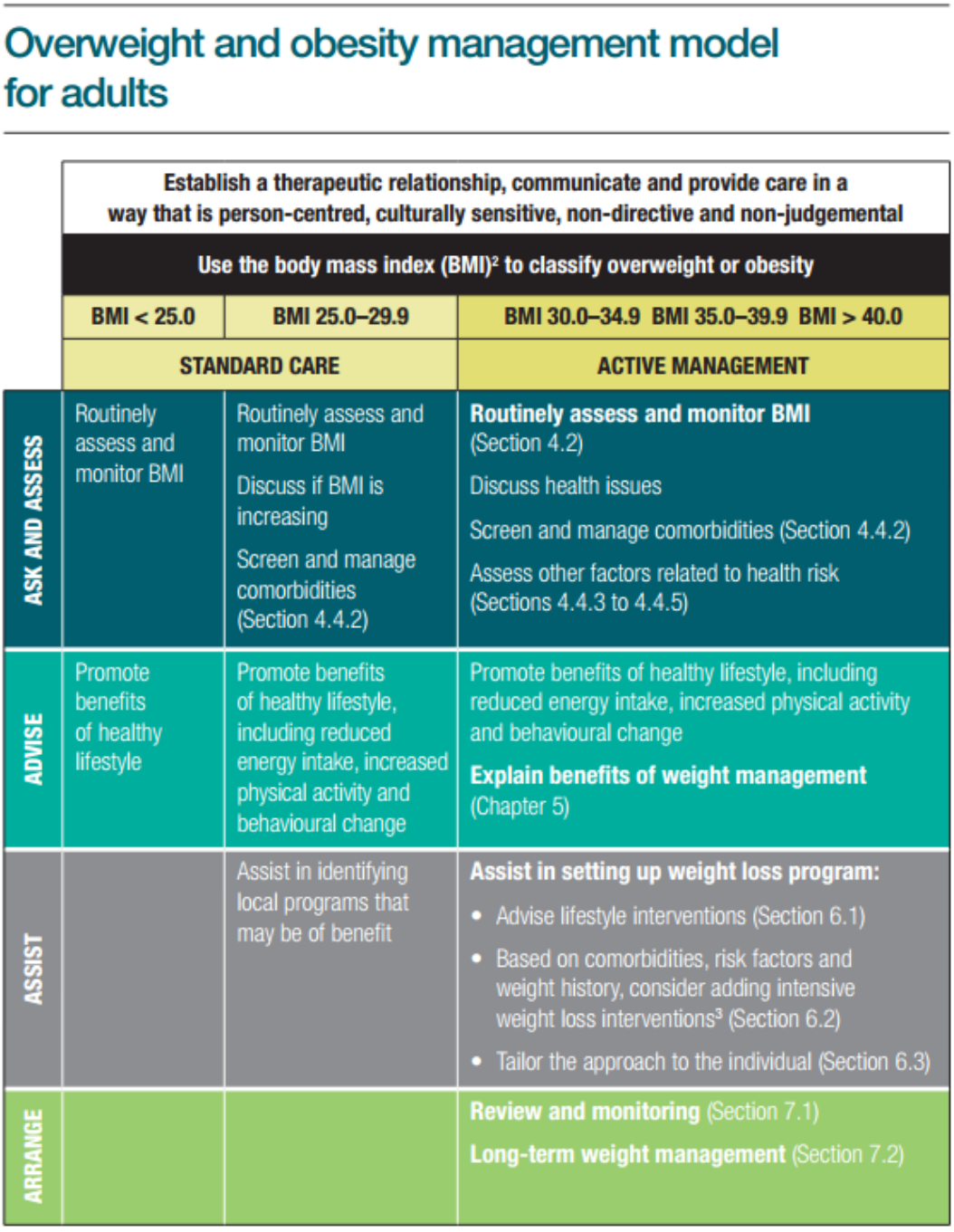
4. Use multicomponent approaches — these work better than single interventions
5. Refer appropriately to assist people to make lifestyle changes or for further intervention

<u>Arrange</u>

6. Support a self-management approach and provide ongoing monitoring

(National Health and Medical Research Council, 2013)

Figure 5. Australian Clinical Practice Guideline for Overweight and Obese Adults



Overweight and obesity management model for adults

	Establish a therapeutic relationship, communicate and provide care in a way that is person-centred, culturally sensitive, non-directive and non-judgemental		
	Use the body mass index (BMI)[2] to classify overweight or obesity		
	BMI < 25.0	**BMI 25.0–29.9**	**BMI 30.0–34.9 BMI 35.0–39.9 BMI > 40.0**
	STANDARD CARE		**ACTIVE MANAGEMENT**
ASK AND ASSESS	Routinely assess and monitor BMI	Routinely assess and monitor BMI Discuss if BMI is increasing Screen and manage comorbidities (Section 4.4.2)	**Routinely assess and monitor BMI** (Section 4.2) Discuss health issues Screen and manage comorbidities (Section 4.4.2) Assess other factors related to health risk (Sections 4.4.3 to 4.4.5)
ADVISE	Promote benefits of healthy lifestyle	Promote benefits of healthy lifestyle, including reduced energy intake, increased physical activity and behavioural change	Promote benefits of healthy lifestyle, including reduced energy intake, increased physical activity and behavioural change **Explain benefits of weight management** (Chapter 5)
ASSIST		Assist in identifying local programs that may be of benefit	**Assist in setting up weight loss program:** • Advise lifestyle interventions (Section 6.1) • Based on comorbidities, risk factors and weight history, consider adding intensive weight loss interventions[3] (Section 6.2) • Tailor the approach to the individual (Section 6.3)
ARRANGE			**Review and monitoring** (Section 7.1) **Long-term weight management** (Section 7.2)

[2] A BMI of 25.0–29.9 is classified as overweight and a BMI > 30.0 is classified as obese. Calculation of BMI is discussed in Section 4.2 of the Obesity Guidelines.

[3] Intensive interventions include very low-energy diets, weight loss medications and bariatric surgery.

Note: Section entries refer to the corresponding section in the Obesity Guidelines.

Source: National Health and Medical Research Council, 2013. "Summary Guide for the Management of Overweight and Obesity in Primary Care"

Europe

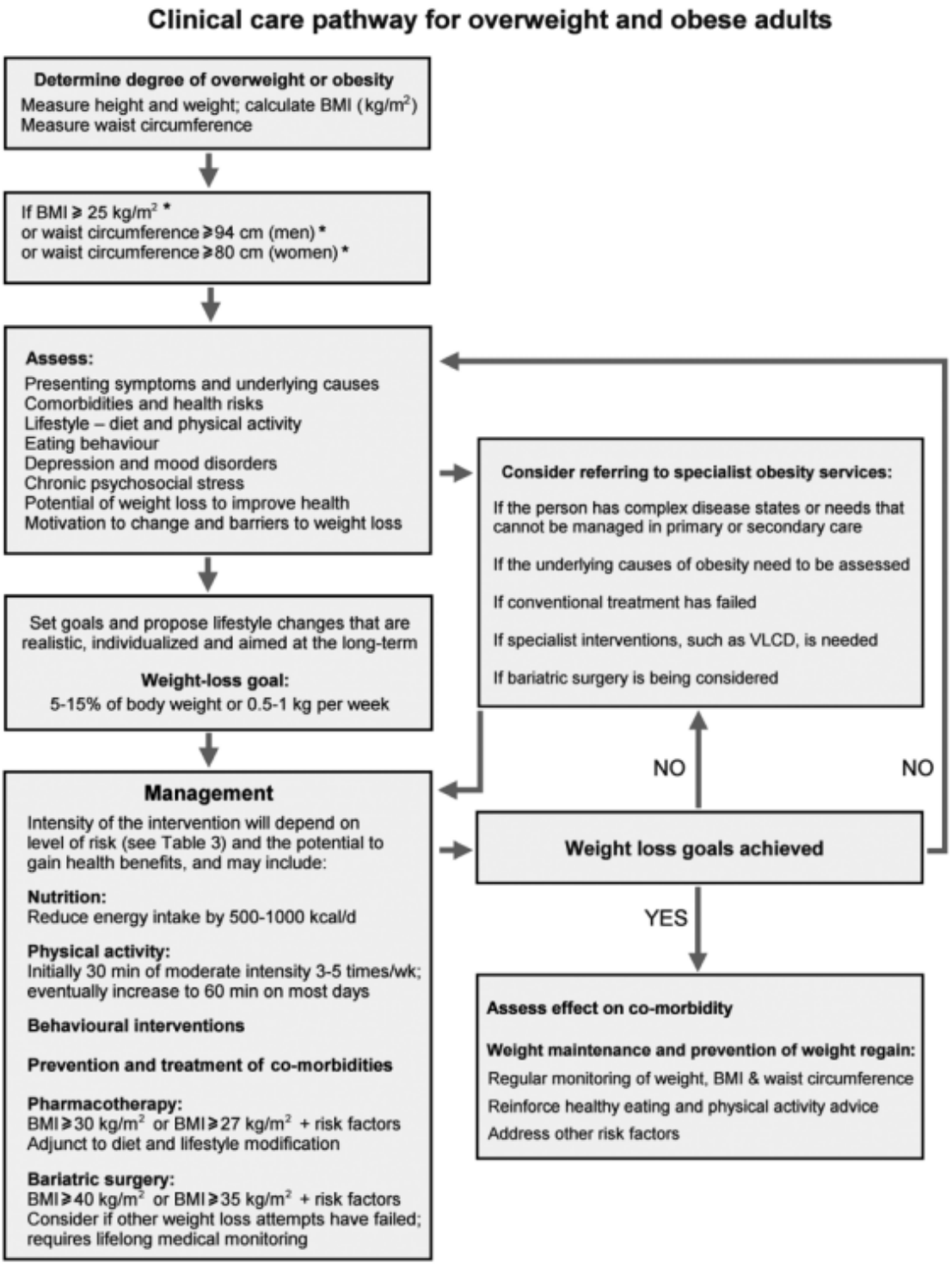
The European Obesity Management Task Force of the European Assoication for the Study of Obesity developed European guidelines of the management of obesity in adults, which can be found in condensed form in Figure 6. This working group composed of experts, representing various key disciplines in comprehensive obesity management and reflected European geographical and ethnic diversity (Tsigos et al., 2008). The Task Force adopted a rigorous, evidence-based approach in the development of practice recommendations, where each recommendation includes a level of evidence grade (Tsigos et al., 2008). These evidence-based recommendations for the management of obesity at the individual level were developed to establish a basis for a more uniform approach in obesity management across Europe (Tsigos et al., 2008). These guidelines include the following main components:

1. Examination of Obese Patient
    - Comprehensive history relevant to the patient's obesity (i.e. family history, ethnicity, dietary habits, presence of mood disorders, physical activity, other determinants)
    - Physical examination (i.e. BMI, co-morbidities)
    - Laboratory examinations (i.e. fasting blood glucose, serum lipid profile, uric acid, thyroid and liver function)
    - Body composition analysis (i.e. WC, bioelectrical impedance, dual X-ray absorptiometry)
2. Comprehensive Obesity Management
    - Management and treatment of obesity
        - Diet advice
        - Cognitive behavioural approaches
        - Physical activity
        - Psychological support
        - Pharmacological treatment

    - Surgery
    - Alternative therapies (i.e. herbal medicines, dietary supplements, homeopathy)
- Prevention of further weight gain
- Failure to lose and maintain weight
- Follow-up
- Development of a health-care team for a weight management programme

(Tsigos et al., 2008)

Figure 6. European algorithm for the assessment and stepwise management of overweight and obese adults



Source: Tsigos et al., 2008. "Management of Obesity in Adults: European Clinical Practice Guidelines

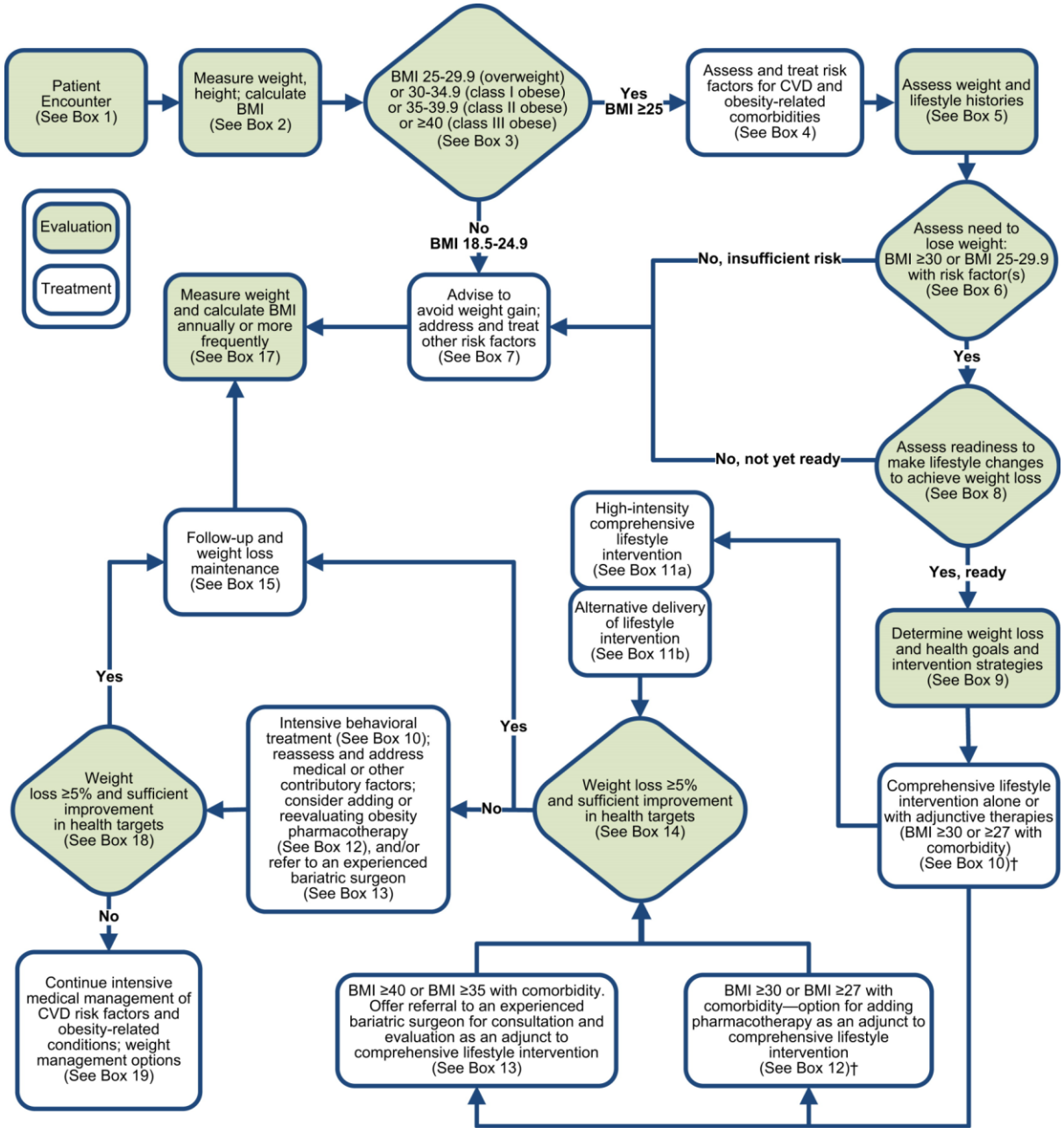
The United States

The American College of Cardiology (ACC) and the American Heart Association (AHA) collaborated with the National Heart, Lung, and Blood Institute (NHLBI) and stakeholder and professional organizations to develop clinical practice guidelines for the management of overweight and obesity in adults (Jensen et al., 2014). This expert panel developed evidence-based guidelines, which can be summarized into 19 steps, demonstrated by figure 7. Systematic evidence reviews for each topic in obesity management were conducted by expert panels to interpret the evidence and craft recommendations (Jensen et al., 2014). Recommendations were developed from randomized controlled trials, meta-analyses, and observational studies (Jensen et al., 2014).The expert panel's approach to guideline development was to systematically develop evidence statements and recommendations for 5 critical questions to assist clinicians in primary care (Jensen et al., 2014). Evidence statements provide a grade on the strength of the recommendation based on the level of evidence. The 5 critical questions to assist clinicians in adult obesity management pertain to:

1. Identifying paitent who need to lose weight
2. Matching treatment benefits with risk profiles
3. Diets for weight loss
4. Lifestyle intervention and counseling (comprehensive lifestyle intervention)
5. Selecting patients for bariatric surgical treatment for obesity

However, since the 5 critical questions did not cover the entire scope of evaluation, prevention, and management of overweight/obesity, the panelists also provided advice based on other guidelines and expert opinion (Jensen et al., 2014).

Figure 7. Treatment Algorithm for Primary Care of Patients with Overweight and Obesity in the United States



Source: Jensen et al., 2014. "2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults

IX. Effectiveness of Obesity Interventions

In general, weight loss interventions for the treatment or prevention of overweight or obesity involves a regimen of diet and exercise. Identifying interventions that can demonstrate positive lifestyle changes to help adults achieve and maintain a healthy weight remains a challenge. Systematic reviews on the effectiveness of various obesity interventions conclude that interventions vary in their degrees of effectiveness (Hardeman et al., 2000, Lemmens et al., 2008, Glenny et al., 1997).

Interventions should focus on diet and physical activity rather than modifying diet or physical activity alone. Jeffery et al. (1993) and Wing et al. (1996) both found that provision of food to participants produced significant weight loss; however weight regain occurred in one year post-intervention. Very restrictive diets are not recommended as they may be nutritionally incomplete and unsustainable. The intervention should focus on a dietary change that is sustainable. Evidence suggests that interventions focusing on diet and exercise together are more likely to be effective for weight loss outcomes than single-component approaches (Amorim et al., 2007, Shaw et al., 2006). The physical activity component of interventions are more effective when they focus on activities that fit easily into people's everyday lives, such as walking, cycling, or dance, and are tailored to people's individual preferences and circumstances (National Obesity Obeservstory, 2010). Interventions should also include weight loss maintenance strategies. Evidence indicates that in order to maintain weight and avoid weight regain, individuals should maintain physical activity for 60-90 minutes per day (NICE, 2014).

Weight manangement interventions that also include behaviour change strategies to increase people's physical activity levels and/or decrease inactivity, improve eating behaviour

and the quality of the person's diet, and reduce energy intake, have demonstrated greater effectiveness (Shaw et al., 2005). Interventions that aim to improve people's belief in their ability to change are more effective (National Obesity Observatory, 2010, Shaw et al., 2005). Behaviour change strategies could include various strategies including: self monitroing, stimulus control, goal setting, slow rate of eating, social support, thought modification (cognitive restructuring), problem solving, relapse prevention, reinforcement of changes, and strategies dealing with weight gain (National Obesity Observatory, 2010, Shaw et al., 2005). In general, both behaviour therapy and cognitive-behaviour therapy have been found to be effective in leading to more weight loss than interventions without behaviour or cognitive-behaviour therapy (Shaw et al., 2005). Many studies examining the effectiveness of obesity interventions demonstrate weight regain post-intervention. Maintenance strategies need to be built into weight loss programmes (Glenny et al., 1997). One study analyzing a programme consisting of behavioural therapy and continued therapist contact produced weight loss maintenace throughout the 12 month follow-up period (Perri et al., 1984), indicating the importance of behavioural support in the maintenance period.

A systematic review conducted by Hardeman et al. (2000) suggested that the effectiveness of interventions are greater among older, male and high-income participants, and lower among low-income participants, school students, and smokers. These findings suggest that intervention strategies may not be accounting for social determinants of health and some population groups may require specific tailored interventions.

Many studies examining intervention strategies provided little detail on the underlying theoretical model of the intervention and study methods. Underlying models and methods of behaviour change are necessary for systematic reviews to identifty which interventions and

theoreticals models are most effective (Lemmens et al., 2008, Hardeman et al., 2000). Given the methological quality of assessing these interventions, further research is still required on determining best practice in obesity management.

X. The significance of improving obesity care in primary practice

Obesity is a multifaceted complex problem that cannot be fixed solely within the context of primary care. Health services alone cannot achieve population lifestyle changes and health care practitioners cannot cure obesity any more than they can diabetes or hypertension. However, health care does serve a purpose in preventing people from becoming obese and in helping those who become obese to improve their health (Gunther et al., 2012). Primary care providers can help patients recognize that obesity is a chronic disorder that requires long-term care. From a public health perspective, primary care occupies a position to provide both medical care and promote health and wellbeing (Peckham et al., 2011). PCPs have access to most members of the population and often have contact with their patients over an extended period of time, putting them in a good position to influence population levels of obesity with multiple opportunities for assessing lifestyle risk factors (Laws et al., 2008). PCP advice on lifestyle behavior change has shown to have a population impact on smoking patients (Lawlor et al., 1999) which would suggest that physician advice would have the same impact related to patient weight loss efforts. Evidence supports that patients, who are advised by their physicians on their weight-related health status, are more motivated and more likely to lose weight relative to those who are not advised by their physicians (Bleich et al., 2011, Kraschnewski et al., 2013). According to Simkin-Silverman et al. (2008), the relationship between physician advice and

making a weight loss attempt is even stronger in those who are overweight compared to obese patients, highlighting the importance of the physician role in preventing weight gain and obesity among patients who are overweight.

Chapter 2

Literature Review

I. (Physician) Barriers in Obesity Management

Primary care has historically been considered a department for acute care. However, the epidemiological transition has resulted in the replacement of infectious diseases by chronic and lifestyle diseases. In order to properly provide the population with the health care it needs, the health care systems require a significant transformation. Although there is a wide body of evidence to support that primary care serves as a useful outlet for health promotion and preventive care, with increased rates of attempted weight loss among overweight and obese patients from physician intervention, there is an equal amount of evidence that suggests that screening and counseling for obesity is not a regular practice in the primary care setting. Many factors hinder physicians from delivering obesity management practices: attitudinal barriers, cognitive-behavioural barriers, professional barriers, patient barriers, lack of support or resources, and system barriers (Cochrane et al., 2007).

The process of obesity management covers a spectrum ranging from prevention to treatment of obesity and its related conditions (Story et al., 2002). It is speculated that improvements in the health care system can facilitate physician delivery of obesity management. The question rescinds in what processes and factors need to be changed in order to facilitate physicians' delivery of obesity care. Finding associations between physician barriers and health care processes and factors in preventive care could provide important information in providing better obesity care in the primary care setting.

Since evidence indicates that physician intervention on overweight and obese patients can increase the rates of attempted weight loss among these people, it is important to understand the factors that hinder physicians from delivering obesity management practices in primary care. (Physician) Barriers to providing obesity management services in clinical practice can be categorized into three broad categories: personal and professional factors, patient factors, and system factors.

II. Personal and Professional Factors

Physician knowledge and competence

Poor education on the proper management of overweight and obese patients can have the negative result of physicians simply not feeling competent enough to implement it in their practice. Obesity management involves a special set of skills that managing other chronic diseases may not involve. The sensitivity of the topic may deter physicians from addressing it, especially if patients do not bear any weight-related co-morbidities. Physicians require education in appropriately managing their overweight and obese adult patients, though the literature indicates that many physicians fail to receive proper training and feel inadequately prepared. A study conducted by Forman-Hoffman et al. (2006) found that the barrier most strongly related to physicians providing diet and exercise counseling was poor obesity education during medical school and residency training, indicating that more than two thirds of participants did not learn good obesity management practices. Jay et al. (2009) also reported that 45% of physicians in their study did not feel qualified to treat obesity. Physicians who receive good training on obesity screening and counseling during their residency training are more likely to report that they

always discuss diet and exercise with their obese patients (Forman-Hoffman et al., 2006). Correspondingly, lack of obesity training during medical school and residency has been associated with significantly lower rates of discussing diet and exercise with obese patients (Rurik et al., 2013). Not only are physicians more likely to provide obesity management in practice with adequate education and training, physicians are also more likely to believe in the success of their therapy (Grief & Talamayan., 2008). These findings underline the meaningfulness of further education for primary health care providers who deal with overweight and obese patients.

Inadequate education in obesity may cause physicians to hold negative attitudes and opinions toward overweight and obese patients. Bocquier et al. (2005) found that PCPs who subscribed to medical journals were less likely to think that obese people tend to be lazier than normal weight people, likely because they were more aware of environmental obesity risk factors, not controllable by patients and other social determinants of health. This finding demonstrates that appropriate information on obesity may improve PCPs' attitudes toward obese patients and the management of these patients. In addition to the potential lack of obesity education during medical school, some practices may not internalize clinical guidelines, causing physicians to also be unaware or unfamiliar with obesity clinical guidelines. Physicians have also expressed the difficulties in following overweight and obesity clinical guidelines and doubt in their effectiveness of weight loss counselling are significant barriers to effective management of overweight and obesity (Huang et al., 2004).

Physicians' own health habits

Physicians' overall health and health habits can have a significant impact on the likelihood of physicians to consult their patients in managing body weight. Physicians themselves can have unhealthy lifestyles or practice unhealthy behaviours. Personal lifestyle characteristics can potentially predict positive or negative attitudes toward obesity management and other health promotion interventions. Some studies have suggested that physicians own body weight may affect their attitudes toward obesity. A Hungarian study found that 94% of doctors in the normal BMI range agreed that family physicians should be an example in body weight, while only 80% of obese doctors agreed with this sentiment (Rurik et al., 2013). Physicians who try to exercise more and maintain a healthy diet are significantly more likely to discuss exercise and weight with their patients and report greater confidence in their abilities to counsel (Jay et al., 2009). Abramson et al. (2000) found that physicians who perform aerobic exercise and strength training are more likely to counsel their patients on the benefits of exercise. Bocquier et al. (2005) reported that physicians who successfully lost weight themselves are more likely to have positive attitudes and greater feelings of PCPs' effectiveness in obesity management. Physicians who deliver preventive measures in clinical practice are likely to better understand the value in living a healthy lifestyle and educate their patients in this area. Correspondingly, physicians that recommend preventive measures less often or with less conviction are less likely to practice preventive measures themselves (Walter et al., 2010). As physicians gain more insight into their own health and health habits, advice to patients can become consistent and effective.

Overweight and obesity diagnosis

The 2006 Canadian Clinical Practice Guidelines on the Management and Prevention of Obesity in Adults and Children first recommend an obesity assessment (i.e. diagnosis) by measuring patients' BMI and subsequently measuring patients' waist circumference if BMI is greater than 25 kg/m^2. Despite the worldwide recognition that BMI is an effective, reliable, and simple measure for overweight and obesity (Lemay et al., 2003), the literature demonstrates that obesity goes largely undiagnosed in primary care. Lack of diagnosis and documentation of obesity is associated with an absence of counseling patients about weight loss and the health risks of obesity (Waring et al., 2009). A nationally representative U.S. study conducted by Ma et al. (2009) found that 70% of clinically obese patients do not receive a diagnosis of obesity and 63% do not receive counseling from their physician. The most probable reasons for physicians not diagnosing obesity are concerns related to the sensitivity of the topic and effectiveness of obesity treatment (Lemay et al., 2003). Presence of co-morbidities results in a higher likelihood of obesity diagnosis and counseling (Scott et al., 2004, Waring et al., 2009), which indicates that physicians are unlikely to consider obesity as a separate disease and manage it as an independent medical condition (Ferguson et al., 2010). However, one of the largest predictors of weight-related counseling or formulation of an obesity management plan was receipt of an obesity diagnosis (Bleich et al., 2011, Bardia et al., 2007). According to Bardia et al. (2007), obese patients who had a diagnosis of obesity documented, had approximately a 2.5 times higher chance of an obesity management plan being designed compared with those without a documented obesity diagnosis. Physicians who document obesity diagnoses are more likely to provide obesity management interventions to those diagnosed patients. Meaning, the low rates of

overweight and obesity diagnosis corresponds with the low rates of obesity management interventions in primary care (Walsh & Fahy, 2011).

III. Patient Factors

Physician attitudes toward overweight and obese patients

Society can hold an unforgiving and stigmatizing view of overweight and obese individuals. Active discrimination against overweight and obesity is prevalent and the perception of personal responsibility for controlling one's weight is strongly held in society (Kirk & Penney, 2013). Weight loss is considered achievable with strong will and motivation which perpetuates the view that obesity is entirely under control of the individual. Health care practitioners are not excluded from holding these views. However, with increasing recognition that obesity is a complex, multifaceted disorder, attitudes toward obesity appear to be changing, giving new empathy for overweight and obese individuals and the goals of obesity treatment (Anderson et al., 1999). Physician attitudes towards overweight and obesity is an important factor to explore since attitudes are an indication of behaviour, meaning an unfavorable attitude toward overweight and obesity may pertain to physicians' lack of obesity management in primary care practice (Warner et al., 2008). Physicians with a more positive approach to public health have been shown to not only perform more health promotion and ill-health preventive activities but also have greater success in doing so (Peckham et al., 2011).

Physicians' willingness to raise the agenda of weight status to patients may be influenced by their own negative stereotypical views toward obesity (Foster et al., 2003). A significant obstacle in PCP delivery of weight management interventions is the view that patients are not

motivated to change their lifestyle behaviours. Physicians' perceptions of patients' unwillingness to change unhealthy lifestyles lead many physicians to avoid preventive care, especially if the initiative were to only come from the physician (Walter et al., 2010). Multiple studies have found physicians hold stereotypical and negative opinions toward obese patients, with documented views that obese patients are lazier, noncompliant, and more self-indulgent than normal weight patients (Bocquier et al., 2005, Harvey & Hill, 2001, Thuan & Avignon, 2005, Foster et al., 2003). Physicians with stigmatizing attitudes toward obese patients are less likely to have positive physician-patient interactions, causing not only a lower probability of prescription of weight-related treatments but also other preventive screenings such as those for colorectal, cervical, and breast cancers (Ferguson et al., 2010). A study conducted in France found 30% of PCPs held stereotypical and negative attitudes toward overweight and obese patients and this figure increases as patient BMI increases (Bocquier et al., 2005), indicating that the more obese a patient is, the more likely a PCP is to hold a stereotype or negative attitude toward that patient. Furthermore, Hebl & Xu (2001), reported that physicians predicted that heavier patients would be less likely to comply with medical advice and therefore less likely to benefit from counseling. This finding demonstrates that physicians hold beliefs that heavier patients are unmotivated to change their behaviours. The persistence of these negative attitudes is likely to adversely affect physicians' interest in treating obesity (Foster et al., 2003). Physicians who do not hold stereotypical views toward overweight and obese patients are more likely to consider obesity as an independent disease and counsel obese patients in a positive context (Forman-Hoffman et al., 2006).

In a study conducted in Australia, PCPs were found to hold strong positive views about their roles and responsibilities in the area of obesity management and prevention (Campbell et

al., 2000). Over 75% of physicians agreed that overweight adults should be offered treatment; more than 70% felt that not only the obese should be offered treatment; and almost 90% thought patients in the healthy weight range should be encouraged to maintain their weight (Campbell et al., 2000). Although there is a large segment of physicians that believe that obesity management and prevention is part of their responsibilities, holding this view does not always result in providing this kind of care. Despite the acknowledgement in PCPs importance in monitoring patients' weight and prescription of weight loss accordingly, approximately half of the PCPs held the view that relatively few people can lose weight and maintain the loss (Campbell et al., 2000). Meaning, physicians' lack of lifestyle-related counseling can be explained by the perception of heavier patients being less likely to comply with medical advice and benefiting from counseling (Sonntag et al., 2010).

Other times, PCPs are concerned that initiating the topic of weight may negatively affect their relationship with their patients. This sentiment is heightened when lifestyle advice is unrelated to the patient's current visitation reason (Lawlor et al., 2000). According to Lawlor et al. (2000), PCPs feel more comfortable providing lifestyle advice when it is directly relevant to a patient's medical condition. Since obesity management often involves lifestyle interventions, some PCPs have indicated that they felt it would be inappropriate for practitioners to interfere with individuals' rights to choose how to live their lives.

IV. Medical Practice and Health Care System Factors

Support and Resource Barriers

A common documented barrier physicians face in delivering obesity management is lack of time during consultation visits. Multiple studies have demonstrated that on average, consultation visits have increased over time; however, weight management counseling has decreased over time (Kraschnewski et al., 2003, Davis et al., 2009, McAlpine & Wilson, 2007). Abbo et al. (2008) found this was because primary care physicians appear to be addressing more clinical care items during visits, thereby decreasing the amount of available time per item. Physicians have a responsibility to provide care for ongoing and immediate medical problems. Balancing this responsibility with that of preventive and management measures for obesity in the limited amount of time they have with patients can be a significant challenge. Patients' current medical problems usually take precedence over screening and counseling. According to Yarnall et al. (2003), nutritional counseling is estimated to require 8.2 minutes and physical activity counseling, 4 minutes. In order for physicians to deliver sufficient obesity prevention and treatment regimens, longer or separate consultations are required (Bocquier et al., 2005).

Different remuneration schemes can influence physicians' behaviour and allocation of time to various work activities. In Canada, traditional methods of remunerating physicians consist of fee-for-service, salary, and capitation paid by provincial health ministries (Devlin & Sarma, 2008). Under a salary scheme, the supply of medical services is independent of physicians' income. The unit for payment is time; therefore, if there is an increase in demand for medical services, the net effect under salary payments would be an increase in the waiting time for patients (Devlin & Sarma, 2008). The capitation system is an alternative salary scheme in

which physicians are paid a salary to provide care to a defined group of patients. Under a fee-for-service payment scheme, physicians are paid for every item of care provided. Physicians' supply of medical services under this payment scheme depends upon own hours worked and the corresponding number of patients treated (Devlin & Sarma, 2008). Only one treatment per patient visit is required for fee-for-service practicing physicians, predicting that fee-for-service physicians would practice less comprehensively in comparison to salaried physicians (Devlin & Sarma, 2008). Due to lack of reimbursement for time spent providing preventive and counseling services, fee-for-service physicians would result in a loss of income by delivering these services by taking time away from seeing other patients (Ayres & Griffith, 2007). Meaning, fee-for-service physicians would have shorter consultation visits and higher patient volume, leaving little time or incentive for these physicians to deliver obesity management services such as screenings and counseling. Gosden et al. (2004) concluded that salary payments are associated with fewer procedures per patient, longer consultations and more preventive care compared with fee-for-service alone. Adding to this evidence, Sarma et al. (2010) found physicians remunerated by schemes other than fee-for-service devoted more hours to direct patient care in settings other than the clinic and to indirect patient care relative to fee-for-service counterparts, indicating delivery of more comprehensive care.

It is evident that physician practice patterns are influenced by the remuneration system (Kristiansen & Mooney, 1993), with likely salaried physicians providing more obesity management services than physicians paid under fee-for-service. A fee-for-service system that focuses primarily on the volume of patients seen may likely under-provide important primary prevention and obesity management services.

In addition to workload and remuneration barriers, lack of internalized clinical practice guidelines on the management and assessment of obesity can also play a role in preventing physicians from delivering this kind of care. As previously mentioned, current practice guidelines and recommended strategies are established in Canada, however it is up to physicians to implement them in their practices. Guidelines are solely recommendations and are not automatically adopted into clinical practice. Failing to internalize guidelines into clinician practice has been identified as a barrier to guideline implementation, and clinicians may not be aware of specific services they should be providing to overweight and obese patients (Ayres & Griffith, 2007). Despite the availability of these evidence-based guidelines, managing obesity in primary care remains an unmet goal in most clinical practices (Plourde & Prud'homme, 2012). Plourde & Prud'homme (2012) suggest that current guidelines are too difficult for physicians to follow and there is a need to find simple, effective strategies for improving weight-loss counseling in clinical practice. Furthermore, to appropriately follow these guidelines, physicians require access to a multidisciplinary health team which could be problematic depending on the region or practice-type of the physician. Prescribing diets and exercise programs as suggested by the guidelines in clinical practice may be challenging if physicians do not have the time, expertise or referral resources to provide patients with appropriate weight loss advice (Plourde & Prud'homme, 2012). Physicians' inability to follow or doubt in the effectiveness of obesity clinical guidelines are significant barriers to effective management of overweight and obesity (Huang et al., 2004).

In 2003, the Alberta government, the Alberta Medical Association, and Alberta Health Services established the Primary Care Initiative to improve access to family physicians and other health care professionals in Alberta (AHS, n.d.). As a result, there are presently 42 medical

practices classified as “Primary Care Networks” (PCN) in Alberta, where family physicians are linked to a broad range of other health care professionals and programs to provide patients with comprehensive care (AHS, n.d.). Each PCN is unique to focus on the needs of the patient population within the given region. One of the main objectives of PCNs is to “increase the emphasis on health promotion, disease and injury prevention, and care of patients with complex problems or chronic disease” (AHS, n.d.). Although there is currently no evidence to support that PCNs provide more comprehensive care for obese patients than other practice types.

Organizational Barriers

Continuous obesity care is best conducted by a multidisciplinary team of healthcare providers. Physicians’ underuse of dietitians and other auxiliary health professionals may result in inadequate counseling on diet, physical activity and weight loss. A study conducted by Huang et al. (2004) documented a dietary referral rate of 63% in overweight and obese outpatients; however, referral was initiated primarily for dietary therapy for type 2 diabetes mellitus and dyslipidemia rather than for weight control. Results revealed that physicians rarely relied on the dietitian for weight management and primarily utilized dietitians for managing comorbidities. Facilitating work cooperation between PCPs and medical auxiliaries might improve prevention and management of weight problems (Bocquier et al., 2005). There is evidence to support that collaborative obesity treatment that incorporates auxiliary health providers as lifestyle coaches is more effective than PCP counseling alone in treating obesity in primary care settings (Carvajal et al., 2013). Other professionals, particularly registered dietitians already possess the knowledge and skills required to provide effective behavioural counseling and can do so at a substantially

lower cost than physicians (Carvajal et al., 2013). Hiring registered dietitians and other lifestyle interventionists to counsel obese patients would appear to make more economic sense for primary care practices, integrating health systems rather than deploying physicians in this effort (Carvajal et al., 2013).

Our fragmented health care system and lack of cooperation among health care providers in the field of prevention and health promotion interfere with the delivering of effective and comprehensive obesity management (Walter et al., 2010). Health professionals need to be socialized to other professional groups with whom they may work within the context of primary prevention, which is not yet the norm within health professional education (Kirk & Penney, 2013).With the current emphasis of our health system on disease treatment and medical management, primary prevention or the broader domain of public health has limited investment in primary care offices (Kirk & Penney, 2013). Enhancing cooperation and teamwork among various health care providers most likely would require a reconfiguration of our existing health care system.

Effectiveness of Clinical Practice Guidelines

Implementation of clinical practice guidelines (CPGs) can be used to help change clinical practice by improving quality of care by decreasing inappropriate variation of care (Cabana et al., 1999). However, CPG adoption and use is not automatic and may depend to a great extent on how they are developed and implemented (Grimshaw et al., 1995). Evidence suggests that guidelines have had limited effect on changing physician behaviour in primary practice (Hayward, 1997, Lomas et al., 1989, Woolf, 1993) and physician adherence to guidelines may be explained by multiple factors. Many guidelines on various conditions have been developed for

PCPs, but little is known about the effects of most of them on clinical care outcomes (Worrall et al., 1997). A systematic review conducted by Worrall et al. (1997) examining the effects of clinical practice guidelines on patient outcomes determined that there is little evidence that CPGs are effective in improving patient outcomes in primary care. CPGs vary in their format, methodological rigour and generalizability to specific practice settings (Marshall, 2000). Appraisal of CPG quality and critical interpretation of recommendations is left up to the physicians (Marshall, 2000).

In addition to CPG clinical effectiveness, problems also exist in the effectiveness of guideline dissemination. Cabana et al. (1999) conducted a systematic review of the literature identifying barriers to guideline adherence. The results of the review identified ten barriers to adherence including: lack of awareness, lack of familiarity, lack of agreement, lack of self-efficacy, lack of outcome expectancy, inertia of previous practice, external barriers, guideline-related barriers, patient-related barriers, and environmental-related barriers. Guidelines that recommend elimination of an established behaviour may be more difficult to follow than guidelines that recommend adding a new behaviour (Cabana et al., 1999). Grilli and Lomas (1994) also found that guidelines that were relatively uncomplicated and could be observed or tried by the clinician were more effectively adopted. Successful CPG dissemination would more likely be accomplished if they recognize and engage actively with the real world in which clinicians operate (Koutsavlis, 2001).

There is evidence that suggests that significant changes in the process of care can result from proposed guidelines (Grimshaw and Russell, 1993). However, the successful implementation of CPGs needs to be further researched and developed. Grol (2001) suggests that different groups of PCPs may experience different problems with use of guidelines, meaning

well-designed programs with different strategies addressing different factors at different levels may be required for successful and effective CPG implementation.

V. Hypothesis Development

Based on the literature review, attitudes, knowledge, and practice factors appear to have a strong impact on physician behaviour. Physician practice behaviour in obesity management will be examined in association to four primary factors: physician knowledge factors, attitudinal factors in responsibility, attitudinal factors of patients, and medical practice factors. The hypotheses below were developed after data collection and primary analysis. General research questions were used as a guide to find structure in the data. Working hypotheses were then developed to work to disprove.

Research questions

1. How do attitudes, knowledge, and practices differ between physicians who are more highly engaged in obesity management to physicians who are less engaged?
2. Which factors are significant in explaining physician practice behaviours in obesity management?

Hypotheses

1. All factors are simultaneously present, each contributing to physician practice behaviours in obesity management.
2. Each factor will be positively associated to physician practice behaviours in obesity management.

3. No individual factor contributes more to physician practice behaviours in obesity management than any other factor.

The research will draw on quantitative results to identify the determinants of physician practice behaviours in obesity management. By establishing what factors drive physicians to deliver obesity management in primary care, health care systems and medical practices can determine how to best foster this type of care.

Chapter 3

Methods

I. The Sampling Design

The research design used for this study was a cross-sectional survey methodology to assess Albertan family physicians' attitudes, knowledge, and practices, their interactions and find barriers with other factors that influence physicians' behaviours in managing their adult patients with obesity. This study is based on 129 responses to the mail-out survey and is an all family physician study. An Albertan physician database was obtained from the College of Physicians and Surgeons of Alberta, which included 9,002 members. The database was scoured for only physicians indicated to practice family medicine. Every fourth family physician was selected to be included in the sample until 750 physicians were selected. Out of the 750 physicians, we received 129 completed surveys and 46 dropped by the study due to return as undeliverable, providing a response rate of 18%. Data collection was completed in June, 2014.

II. Measures: Creation of the Survey Instrument

Data was collected using a mail-out questionnaire that consisted of 71 questions (Appendix A). The survey instrument consisted of basic adult obesity management components and employed closed ended questions structured on a 5 or 3-point Likert-type scale. The questions were related to the major barriers, identified by previous research, that prevent or hinder physicians from delivering effective obesity management in clinical practice. The questionnaire was developed on the basis of four similar research studies in Australia (Campbell

et al., 2000), France (Bocquier et al., 2005), Hungary (Rurik et al., 2013) and the United States (Foster et al., 2003), that also employed survey methodology to analyze physician preparedness to manage adult obese patients. To ensure validity of the survey instrument, many of the same questions were pulled from these four studies. Questions were grouped by broader factors.

The Australian study (Campbell et al., 2000) developed two questionnaires for mail-out to members of the Royal Australian College of General Practitioners. Two questionnaires were developed in an effort to reduce respondent burden. One questionnaire focused on general practitioners (GP) attitudes to managing and preventing overweight and obesity (attitudes-focused) and the other examined GPs' practices regarding the management and prevention of overweight and obesity (practice-focused). Both surveys included a demographic profile of participants, capturing age, sex, location of practice, description of practice, current work status, number of patients seen each week, and types of allied health professionals working as part of the practice. The attitudes-focused questionnaire captured three broad categories of data: views on weight management, definitions of success (importance of specific outcomes), and views regarding the use of drugs. The practice-focused questionnaire also captured three broad categories of data: approaches to weight management, strategies recommended for weight management, and problems and frustrations, which was an open-ended section. The study sample was divided into two equal groups where one half of the sample received one version of the survey and the other half received the other version to reduce respondent burden. Three weeks after the initial mailing, non-respondents were mailed a reminder letter. The 5-point Likert-type scale used in this study to assess physician attitudes was directly utilized in the development of our survey.

The French study (Bocquier et al., 2005) administered a questionnaire to general practitioners by telephone interview, which collected four categories of data: personal and professional characteristics, attitudes and opinions about overweight and obesity, knowledge and training in the field of overweight and obesity management, and practices in the management of weight problems. Personal and professional characteristics collected included billing sector, practice type, subscription to medical journals, guidelines use, involvement in a health network, postgraduate degrees, BMI, personal experience of dieting, and behavior related to food intake, physical activity, and tobacco consumption. Many of the same statements used in questioning physician attitudes were directly used in the developed of our survey.

The Hungarian study (Rurik et al., 2013) delivered anonymous questionnaires to general practitioners and family medicine residents, which collected data in three main domains: knowledge, attitude, and professional practice. Participant characteristics were also captured such as gender, age, working domicile, board specifications, practice characteristics, demography, and number of enrolled patients.

The U.S. study (Foster et al., 2003) surveyed two geographically representative, national random samples of members of the American Medical Association who specialized in family practice. Both samples received the same survey except they differed in their definition of obesity (BMI of 30-40 kg/m^2 vs. BMI >40 kg/m^2), in order to examine if the degree of obesity had any effect on physician's attitudes. The survey was mailed to physicians and contained five categories concerning physicians' attitudes toward obesity and its treatment: beliefs about the causes of obesity, attitudes about personal characteristics of obese individuals, beliefs about treatment, attitudes regarding weight loss outcomes, and relative efficacy of obesity treatment.

All four studies pertained to adult obesity management. The main domains and specific questions of these studies were utilized in the development of our questionnaire. The first twelve questions were related to physicians' general attitudes toward obesity. Physicians were asked to agree or disagree with the values that may characterize their general opinions and attitudes of managing obese patients. The following three sections of the survey also addressed physician attitudes, but specifically to patient factors, medical practice factors, and health system factors. Physicians were asked to agree or disagree with the extent to which these factors impact their delivery of effective management of obesity. The next set of questions measured physician knowledge in the area of patient counseling by addressing the preparedness of physicians to counsel their patients in various areas of health promotion practices. Next, physician behaviours were addressed by measuring the frequency in which physicians provide lifestyle and referral advice to their obese patients. The next and final set of attitudinal factors measured were aspects related to physicians' beliefs that obesity management is part of their occupational responsibility. The final set of questions included the control variables, which identified characteristics of the physician and their medical practice. These control variables included: the type of medical practice, the geographical location of the medical practice, the overall patient load, the overweight and obese patient load, the type of remuneration, certificate in family medicine, and physician gender and age.

III. Procedures: Mail-out Survey

The Dillman Total Design Survey Method (Dillman et al., 2008) was employed as much as possible within the resources and time constraints of the study. The survey instrument was distributed to sample participants through the mailing system. Mailing addresses were provided

through the College of Physicians and Surgeons of Alberta. Subjects were invited to participate through an introductory letter describing the premise and details of the study and their subsequent involvement. The letter indicated that completion and submission of the survey indicates that the subject gives their consent to participate in the study. Self-addressed and stamped return-envelopes were included for convenience of the physicians to participate. A second wave of reminder surveys were sent to subjects who did not respond after 5 weeks. Ethics approval was obtained from the Health Research Ethics Board (HREB).

IV. Inclusion Criteria

The inclusion criteria for participation in the study are that subjects must practice family medicine, must currently be practicing (i.e. not retired), and must be practicing in Alberta, Canada. All participating physicians were licensed family practitioners. Participation was voluntary without any incentives.

V. Piloting the Instrument

The survey instrument was pre-tested on 3 resident physicians, prior to distributing the final survey. The physicians were asked to comment on various aspects of the survey including readability, clarity, ease of completion, and comprehensiveness. One question was removed after pre-testing due to indication of redundancy. The pre-testing also identified that the length of the survey might be too long, but ultimately was not shortened to retain comprehensiveness of the survey.

VI. Privacy and Confidentiality

Each survey and mailing label was numbered to identify who returned a survey. This was done as a cost-saving measure in that physicians who returned a survey did not receive a reminder mail-out to participate. Physicians were made aware that questionnaires were coded for identification purposes only in the invitation letter and that information collected would be made strictly confidential. Any public presentation of the data will never include any physician identifying information. Only aggregated data will be used in printed format.

Returned surveys were kept in a locked filing cabinet at the University of Alberta. Survey results were subsequently entered into IBM SPSS Statistics software. Paper and electronic data will remain locked in a filing cabinet at the University of Alberta for five years at minimum. Those with access to this information include the research student, Hilary Short and the thesis advisor, Dr. Kent Rondeau.

VII. Strengths and Weaknesses of Method Design

Survey methodology was employed for various reasons. Since physicians' attitudes and behaviours were being assessed, anonymity of surveys allows respondents to answer with more honest and valid answers. Mail survey does not allow for personal contact with participants, there is little chance for respondents to give answers they think the administrator wants to hear. Surveys can be distributed over a broader population, capturing characteristics of a large population, thereby reducing geographical dependence. Numerous questions can be asked in a survey, allowing for a broad range of data to be collected and flexibility in data analysis. As

previously mentioned, other studies utilized validated survey methods for similar research allowing surveys to be easily developed and relatively free from various types of error.

Limitations of this methodology included potential for mono-method bias and non-response bias. Since a single method approach was employed, this could potentially threat construct validity. However, the survey method was developed on the basis of previously validated surveys, thereby reducing this bias. In addition, since the response rate was relatively low at 18% this may indicate a potential for bias in the results if there are substantial differences between the responses coming from those who responded to the survey and the way non-responders would have responded had they taken the survey. In an effort to assess this bias, completed surveys were coded for responders from initial mail-out (early responders) and responders from reminder mail-out (late responders), allowing comparisons to be made between the two groups. Participants from the second wave are similar to non-responders, demonstrated in the subsequent section (Data Analysis); thereby inferences can be drawn on non-responders.

VIII. Data Analysis

In order to test the research hypotheses, a survey methodology was employed to collect data, using Albertan family physicians as the unit of analysis. Data was analyzed using SPSS (Statistical Package for the Social Sciences) version 21. The questionnaires were checked for qualification of inclusion criteria and coded before data entry. Data analysis consisted of descriptive analyses, bivariate correlation analyses and multivariable modeling. Means, standard deviations, frequencies, and percentages were used for describing the characteristics of the sample. Responders from the first wave of the survey were compared to responders from the

second wave of the survey on each of the measurements. Multivariable modeling was used to determine variables associated with physician behaviours on obesity management.

Crude relationships between variables were analyzed with Pearson correlation coefficients for continuous variables. A correlation matrix was constructed to examine the strength and significance of continuous study variables. Five variables, physician behaviours (i.e. practice behaviours in obesity management), knowledge factors, responsibility factors, practice factors, and patient factors, were scaled by taking the sum and mean of all the questions from sections F, E, G, C, and B, respectively, of the mail-out survey. The Cronbach's alpha scale reliability for these variables were 0.66, 0.87, 0.75, 0.84, and 0.66, respectively. General attitudes about obesity (section A) and health system factors (section D) could not be scaled due to poor scale reliability scores.

T-tests and analysis of variance (ANOVA) were employed for assessing associations between continuous outcome and categorical explanatory variables. T-tests were used to compare means of two physician groups (high and low engagement of counseling behaviours) among all the study variables. Physicians in the high engagement group were equal to or above the mean (2.3133) of physician behaviours (n=59). Physicians in the low engagement group were below the mean of physician behaviours (n=70). Due to multiple comparisons, a higher significance threshold (α=0.01) was employed for individual comparisons to compensate for the number of inferences being made.

Multiple linear regression was employed to analyze physician behaviours on the management of obesity and four factors of interest (knowledge factors, responsibility factors, patient factors, and practice factors). The explanatory variables included five independent

variables: physician age, physician gender, practice location, patient workload, and obesity quotient (ratio of patients who are obese). A series of variables entered in the model as control variables, selected because of prior knowledge and their potential to impact physician behaviours. However, some explanatory variables, such as compensation type and medical practice type, were omitted from the model in order to not overload the model with too many variables. Too many unrelated variables in the model might lead to a Type II error, as the number of variables in the model affects the likelihood of rejecting the null hypothesis. The explanatory variables selected for inclusion in the model were: physician age (in years); physician gender (1=male and 0=female); practice location {(1=rural, 2= town (less than 10,000 residents), 3= small city (10,000 to 99,000 residents), 4= mid-sized city (100,000 to 499,000 residents), and 5= large city (more than 500,000 residents)}; overall patient workload (within an 8 hour workday); and obesity quotient (ratio of obese patients seen in an 8 hour workday).

Harman's one-factor test was employed to check for the presence of common method bias (Podsakoff and Organ, 1986). The four scaled factors of interest (knowledge, responsibility, patient, and practice factors) were entered into an exploratory factor analysis of which, patient factors accounted for 49%. All other factors were 25% or less. Because all the factors were less than 50%, a single factor did not occur and no factor accounted for most of the variance. Therefore, a substantial amount of common method variance is not present and the single method of data collection was an acceptable risk.

Early respondents were compared to late respondents in order to address non-response bias. Significant differences did not exist between early and late responders on demographic characteristics such as, age ($p=0.428$) and gender ($p=0.364$). Significant differences in physician

practice behaviours in obesity management also did not exist between early and late responders ($p=0.121$). Late responders are used as a proxy for assessing non-responders. Since a statistically significant difference did not exist in physician behaviours between early and late responders, this dismisses non-response bias.

Chapter 4

Results

The purpose of this study was to examine the relationship of physician attitudes, knowledge, and practice environment on their practice behaviours in delivering obesity management to adults in primary care. The hypotheses include:

1. All factors are simultaneously present, each contributing to physician practice behaviours in obesity management.
2. Each factor will be positively associated to physician practice behaviours in obesity management.
3. No individual factor contributes more to physician practice behaviours in obesity management than any other factor.

The results of the study will aim to reject or do not reject these hypotheses.

I. Uni-variate Analysis

Participant Characteristics

Of the physicians who participated in the study, most (81%) practiced in a group family practice, compensated by fee-for-service (88%), and almost half (46%) were a member of a Primary Care Network (PCN). About two-third of physicians (66%) practiced in a large city, characterized by a population of 500,000 or greater. The average (±standard deviation) number

of patients treated by the physicians in an 8-hour workday was 26 (±9), and of those, 8 (±5) were overweight or obese. The participants were almost evenly split in gender, with 48% of the participants being male and 52% female, with an average age of 46 (±11) years old. Detailed physician characteristics can be found in Table 1.

Table 1. Physician Characteristics (n=129)

Variable	n (%) or mean ± SD
Age in years	46 ± 11
Gender	
Male	62 (48.1)
Female	67 (51.9)
Certificate in Family Medicine (CCFP)	129 (100)
Practice type	
Solo family practice	11 (8.5)
Group Family practice	104 (80.6)
Walk-in clinic	19 (14.7)
Community Health Centre	10 (7.8)
Capitated Practice	1 (0.8)
Primary Care Network Member	59 (45.7)
Practice Location	
Large city (pop. >500K)	85 (65.9)
Mid-sized city (pop. 100K-499K)	4 (3.1)
Small city (pop. 10K-99K)	27 (20.9)
Town (pop. <10K)	11 (8.5)
Rural	2 (1.6)
Workload	
# of patients seen in 8 hour workday	26 ± 9
# of overweight or obese patients seen in 8 hour workday	8 ± 5
Compensation type	
Fee-for-service	113 (87.6)
Salary	3 (2.3)
Combined Salary/Fee-for-service	10 (7.8)
Contractual	4 (3.1)
Sessional (or other)	2 (1.6)

Physicians' General Attitudes about Obesity

As demonstrated in Table 2, most physicians regarded obesity as a clinical disease (81%) and also a social illness (72%). The majority agreed that their role is to counsel overweight patients on the health risks of obesity (92%) and those overweight patients should be treated for weight loss (73%). Over half (55%) disagreed that they are too busy to help obese patients

manage their conditions. There was large disagreement (60%) that the family doctor's role is to refer obese patients to other health professionals rather than attempt to treat them themselves. However, about one-third (37%) felt they are well prepared to manage their overweight patients and less than half (43%) stay up-to-date on best practices for managing obesity. In addition, only 43% find treating obese patients professionally gratifying.

Table 2. General Attitudes about Obesity (n=129)

Statement	%				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Normal weight is important for health	0.8	2.3	7.8	24.0	65.1
Most obese patients are stigmatized by society	0.8	1.6	14.0	45.0	38.8
Obesity is a clinical disease	3.1	3.9	11.6	36.4	45.0
Family doctors should be role models and maintain normal weight	0.8	3.1	17.8	41.1	37.2
Most overweight patients should be treated for weight loss	0	5.4	20.2	43.4	29.5
Obesity is a social illness	0.8	4.7	22.5	49.6	22.5
I stay up-to-date on best practices for managing obesity	3.9	17.8	34.9	36.4	6.2
Treating obese patients is professional gratifying	3.1	27.1	27.1	28.7	14.0
I feel well prepared to manage my obese patients	1.6	24.0	37.2	31.8	5.4
I am too busy to help my obese patients manage their conditions	18.6	36.4	30.2	12.4	2.3
The family doctor's role is to refer obese patients to other health professionals rather than attempt to treat them themselves	20.9	38.8	33.3	5.4	0.8
It is not my job to counsel overweight patients on the health risks of obesity	62.0	29.5	3.9	0.8	3.9

Patient Factors in Managing Obesity

Indicated by Table 3, nearly half of physicians were in agreement that most obese patients lack the motivation to successfully change their lifestyles themselves (47%) and that most obese patients deny their lifestyle habits (47%). Over half (58%) agreed that most obese patients do not comply with strategies aimed at changing their lifestyles. The majority agreed that most obese patients have underlying emotional or psychological issues (54%) and lack the confidence needed to pursue lifestyle change strategies (59%). Almost half (48%) felt that most obese patients lack the knowledge needed to pursue lifestyle change strategies.

Physicians' perceptions of their patients can have important implications in the delivery, or lack thereof, of obesity-related services. The results demonstrate that a large proportion of the physicians surveyed hold unfavorable or stereotypical attitudes towards their obese patients, which may suggest their practice behaviours and deliver less obesity management in primary practice.

A large proportion of the surveyed physicians hold unfavourable attitudes toward their obese patients. Physicians who lack the confidence in their patients to carry out the necessary behaviour changes to lose weight may result in the negative consequences of physicians choosing not to deliver obesity management practices to these patients.

Table 3. Patient Factors in Managing Obesity (n=129)

Statement	%				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Most obese patients do not comply with strategies aimed at changing their lifestyles	0	12.4	28.7	42.6	15.5
Most obese patients have underlying emotional or psychological issues	0.8	7.8	37.2	38.0	16.3
Most obese patients lack the confidence needed to pursue lifestyle change strategies	0	7.8	32.6	50.4	8.5
Most obese patients are not helped by family and friends to help them change their lifestyles	0	11.6	42.6	38.8	7.0
Most obese patients lack the motivation to successfully change their lifestyles them themselves	3.1	22.5	26.4	32.6	14.7
Most obese patients deny their lifestyle habits	3.9	20.2	27.9	35.7	11.6
Most obese patients lack the knowledge needed to pursue lifestyle change strategies	2.3	22.5	27.1	38.8	9.3
Most obese patients have other co-morbidities that require more attention	4.7	22.5	34.9	27.1	10.9
Most obese patients lack the financial resources needed to pursue lifestyle change strategies	1.6	27.9	40.3	23.3	7.0

Practice Factors in Managing Obesity

Most physicians (84%) reported that their medical practice has a fully functional patient electronic medical record. Over half reported that their medical practice has excellent linkages with community agencies and programs (56%) and uses multi-disciplinary teams of professionals to help obese patients (64%). However, only 26% agreed that their practice has excellent access to medical specialists that help obese patients manage their obesity. Less than one-third of physicians agreed that their medical practice has excellent educational resources for obese

patients (30%) and just over one third (39%) uses the most up-to-date information and evidence in obesity management. Only 38% reported that their medical practice creates action plans to help obese patients and only 37% reported that their medical practice places a high priority on helping patients manage their obesity. In addition, less than half (41%) reported that there is access to obesity guidelines at their medical practice. Table 4 provides a summary of these results.

A very small proportion of physicians reported that they 'strongly agree' that their medical practice supports and promotes obesity management practices. Medical practice environments have the capacity to foster the delivery of obesity management practices in primary care. Access to resources within the medical practice to adequately deliver obesity management can have a significant impact on physician practices.

Table 4. Practice Factors in Managing Obesity (n=129)

Statement	%				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
My medical practice has a fully functional patient electronic medical record	4.7	3.9	6.2	17.1	66.7
My medical practice uses multi-disciplinary teams of professionals to help patients manage their obesity	5.4	10.9	18.6	34.9	28.7
My medical practice has excellent linkages with community agencies and programs that help patients manage their obesity	2.3	15.5	24.0	41.1	14.7
My medical practice uses the most up-to-date information and evidence to help patients manage their obesity	4.7	15.9	39.7	34.9	3.9
My medical practice places a high priority on helping patients manage their obesity	3.1	17.1	42.6	27.9	9.3
There is access to obesity guidelines at my medical practice	8.5	24.8	24.8	32.6	8.5
My medical practice has excellent educational resources to help patients manage their obesity	5.4	25.6	38.8	22.5	7.8
My medical practice creates action plans to help patients manage their obesity	11.6	29.5	20.2	30.2	7.8
My medical practice has excellent access to medical specialists that help patients manage their obesity	14.0	24.8	34.1	21.7	4.7

Health System Factors in Managing Obesity

Almost half of the physicians (45%) agreed that there is a lack of proven clinical practice guidelines available for treating patients with obesity. 41% felt that obese patients have difficulty in accessing community-based programs and services for treating obesity in their practice area and 37% felt there is a general lack of these types of programs and services. 40% agreed that, in their area of practice, organizations that offer programs and services for treating obesity do not

communicate well with each other. Over one third agreed that they are not sufficiently financially compensated to properly manage their obese patients (36%) and that effectively treating all of their obese patients would leave them no time to do anything else (35%). Table 5 provides complete details of these results.

With the current emphasis of disease treatment and medical management, primary prevention remains of less significance within our current health care systems. One reason for this is that prevention is a long term endeavor, which requires significant investment of time and resources (Kirk & Penney, 2013). An investment in prevention and chronic care programs to lessen the growing prevalence of obesity are necessary for a sustainable health care system.

Table 5. Health System Factors in Managing Obesity (n=129)

Statement	%				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
There is a lack of proven clinical practice guidelines available for treating patients with obesity	3.1	15.5	34.9	40.3	4.7
In my area, organizations that offer programs and services for treating obesity do not communicate well with each other	3.1	14.7	38.0	33.3	7.0
In my area, obese patients have great difficulty in accessing community-based programs and services	4.7	31.0	22.5	30.2	10.9
I am not sufficiently financially compensated to properly manage my obese patients	9.3	24.0	29.5	21.7	14.0
In my area, there is a lack of community-based programs and services for treating obesity	7.0	33.3	23.3	23.3	13.2
Effectively treating all of the patients I see who have obesity would leave me no time to do anything else	10.9	22.5	31.8	24.0	10.9
I treat obesity only after I have treated other acute care conditions	15.5	37.2	24.8	18.6	3.1
The family practice setting is an inappropriate place to engage in most interventions for treating obesity	25.6	40.3	19.4	9.3	5.4

Knowledge and Practice in Patient Counseling

Table 6 demonstrates that physicians felt most prepared when counseling patients in smoking cessation (92%). 78% felt prepared when counseling patients in healthy eating and 89% in exercise and physical fitness. However, just over half (56%) reported that they felt prepared when counseling patients in weight control. 86% felt prepared when counseling patients in depression and 64% in stress coping. Physicians felt less prepared when counseling patients in family and domestic violence (37%), accident risk reduction (47%), and alcohol abuse (65%).

Physicians are more likely to provide adult obesity management in primary practice with adequate education and training (Grief & Talamayan, 2008). In general, physicians reported that they feel adequately prepared with the knowledge in patient counseling in exercise and healthy diet, two important components of obesity management. However, physicians reported that they feel less prepared in counseling patients on weight control, indicating that the surveyed physicians in general, may not have comprehensive knowledge in obesity management counseling.

Table 6. Knowledge and Practice in Patient Counseling (n=129)

How well-prepared do you feel when counseling patients in the following areas?	%				
	Very unprepared	Unprepared	Neutral	Prepared	Very Prepared
Smoking cessation	0	0.8	7.0	49.6	42.6
Exercise and physical fitness	0.8	1.6	8.5	51.2	38.0
Depression	0.8	1.6	11.6	58.1	27.9
Healthy diet	0	2.3	20.2	49.6	27.9
Alcohol abuse	0.8	7.8	26.4	48.1	17.1
Stress coping	0	4.7	31.0	51.9	12.4
Weight control	0	7.8	36.4	43.4	12.4
Accident risk reduction	0	12.4	40.3	37.2	9.3
Family and domestic violence	3.1	20.9	38.8	32.6	4.7

Responsibility for the Management of Obesity

As indicated by Table 7, nearly all the physicians (97%) agreed that it is their responsibility to educate obese patients about health risk factors. 85% agreed that they felt it is their responsibility to be a role model for obese patients by maintaining normal weight. Most reported that they felt it was their responsibility to encourage obese patients to talk about personal life issues (82%) and provide emotional support to these patients (80%). The majority agreed it is their responsibility to educate obese patients about proper diet and nutrition (86%) and available community resources (93%). Although, only 34% felt it was their responsibility to make referrals to commercial weight loss programs.

How professional roles and responsibilities are defined and enacted can impact obesity management and prevention efforts (Kirk & Penney, 2013). The primary care physician is not the sole member responsible for all aspects of obesity management. The roles of other health professionals, such as dietitians and exercise specialists, may mitigate primary care physicians' feelings of responsibility for providing obesity management. A willingness to refer patients to an inter-disciplinary team of other health professionals is part of good clinical practice in obesity management, however, timely access to these professionals can be an issue, and it is important that primary care physicians are still prioritizing obesity management as part of their job responsibilities.

Table 7. Responsibility for the Management of Obesity (n=129)

To what degree do you feel it is your responsibility to:	%				
	Definitely no	No	Neutral	Yes	Definitely yes
Educate obese patients about health risk factors	0.8	0	2.3	36.4	60.5
Educate obese patients about available community resources	0.8	0.8	5.4	41.4	51.9
Educate obese patients about proper diet and nutrition	0.8	2.3	10.9	41.9	44.2
Be a role model for my obese patients by maintaining normal weight	0.8	5.4	9.3	39.5	45.0
Encourage your obese patients to talk about personal life issues and problems	0.8	2.3	14.7	43.4	38.8
Provide emotional support to obese patients	1.6	0.8	17.8	42.6	37.2
Make referrals to commercial weight loss programs for obese patients	16.3	23.3	26.4	19.4	14.7

Frequency of Advice to Obese Patients

Table 8 provides a summary of the frequency of physicians' behaviours in the area of obesity management. The majority reported that they always or often give their obese patients advice in doing more exercise (89%), eating more fruits and vegetables (78%), eating less in general (60%), and consulting a dietician (54%). When making other referrals only 10% reported that they always or often refer patients for behavioural therapy, 9% always or often refer for mental health services, and 16% always or often refer to an exercise specialist. When giving advice in keeping a weight diary, 42% reported that they rarely or never give this advice, and only 40% reported that they always or often give advice in keeping a food diary.

Each of the behavioural components physicians were scored on pertained to obesity management practices. Where some components were highly reported that physicians "always or often" give advice on, many of the components were not, indicating that physicians may not be providing comprehensive obesity management.

Table 8. Frequency of Advice to Obese Patients (Behaviours) (n=129)

How often do you give the following advice to your obese patients?	%		
	Rarely/Never	Sometimes	Always/Often
Take more exercise	1.6	9.3	89.1
Do more exercise	1.6	8.5	89.1
Eat more fruits and vegetables	6.2	14.7	78.3
Consult a dietician	3.9	41.9	54.3
Eat less in general	14.0	24.8	59.7
Keep food diary	17.1	42.6	39.5
Consult an exercise specialist	26.4	55.8	16.3
Refer for mental health services	20.2	70.5	8.5
Refer for behavioural therapy	27.9	60.5	10.1
Keep weight diary	41.9	33.3	22.5

II. Bivariate Correlational Analysis

A correlation matrix was constructed to examine the strength and significance of continuous study variables. Table 9 provides a summary of the continuous variables used in the correlation matrix.

Table 9. Summary Statistics for Continuous Variables (n=129)

Scaled Variable	# of variables scaled	Range (min-max)	Mean (SD)	Internal consistency (α)
Physician behaviours	10	1-3	2.3 (0.3)	0.66
Knowledge factors	9	1-5	3.8 (0.6)	0.87
Responsibility factors	7	1-5	4.1 (0.6)	0.75
Practice factors	9	1-5	3.3 (0.7)	0.84
Patient factors	9	1-5	3.4 (0.5)	0.66

The analysis of the correlation matrix, found in table 10, indicates that the most significant correlates, although still modest, to physician behaviours were: knowledge factors ($r=.33$, $p<0.01$), responsibility factors ($r=.36$, $p<0.01$), and practice factors ($r=.36$, $p<0.01$). This means that physicians who are more knowledgeable in patient counseling are more likely to counsel their obese patients. Likewise, physicians who feel it is their responsibility to provide obesity management in practice are more likely to counsel obese patients. Also, medical practice factors that promote obesity management are more likely to positively influence physician behaviours. The strongest correlation was between physician knowledge and physician responsibility ($r=.53$,

p<0.01). Meaning, knowledge in obesity management is associated to feeling responsible for providing this care to obese patients. Knowledge factors and responsibility factors were both correlated to practice factors (r=.48, p<0.01 and r=.46, p<0.01, respectively), indicating that practice factors play a role in physicians' knowledge in patient counseling and feelings of responsibility to provide obesity management. There is little or no correlation between physician behaviours and the remaining variables. All other inter-correlations of variables were weak and non-statistically significant.

Table 10. Inter-correlation of continuous variables

	Pearson's Correlation (r)							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1. Physician behaviours	1.00	.33*	.36*	.36*	.12	.16	.10	-.08
2. Knowledge factors		1.00	.53*	.48*	-.14	.01	.12	.09
3. Responsibility factors			1.00	.46*	.05	.109	.13	.01
4. Practice factors				1.00	-.14	.16	.11	-.05
5. Patient factors					1.00	-.02	.14	-.08
6. Physician age						1.00	.03	-.12
7. Overall patient workload							1.00	-.15
8. Obesity quotient								1.00

*p<.01

Associations between physician behaviours and categorical control variables (gender, compensation type, practice type, location, and response time) were examined using t-tests and ANOVA. Statistical significance did not exist between physician behaviours, and gender

(p=0.065), compensation type (p=0.745), or practice type (p=0.592). There was a borderline statistical significance between physician behaviours and location (p=0.011). However, post-hoc Bonferroni test indicated no statistically significant differences in physician behaviours existed between physicians practicing across locations.

Bivariate analysis concluded that physician characteristics and medical practice characteristics (control variables) had little or no association to physician counseling behaviours of obese patients. Knowledge in patient counseling, feelings of responsibility for managing obese patients, and practice factors that promote obesity management were the strongest correlates to frequency of counseling of obese patients.

III. Comparison of Means by High & Low Behavioural Engagement

To determine if significant differences existed between physicians who delivered more counseling services to their patients than physicians who were less likely to deliver counseling, physicians were categorized into high and low engagement groups. Physicians in the high engagement group were equal to or above the mean (2.3133) in the physician behaviours variable; physicians in the low engagement group were below the mean in the physician behaviours variable. Table 11 reports the mean and standard deviation of all the study variables in comparison to physicians who were highly engaged in delivering counseling to those who were less engaged.

Physicians in the high engagement group had more favorable general attitudes about obesity. It was statistically significant that highly engaged physicians agreed more that they stay up-to-date on best practices for managing obesity and that they felt well-prepared to manage their

obese patients than those of low engagement physicians. It seems reasonable to draw the inference that by staying up-to-date on best practices for managing obesity, physicians would thereby feel well-prepared to manage their obese patients. Consequently, an interaction between these two variables may exist. High engagement physicians also disagreed to a greater extent that they are too busy to help their obese patients manage their conditions than low engagement physicians, indicating that physicians' perceptions of business may play a role in their practice behaviours.

Unexpectedly, physicians who had less favorable attitudes about their obese patients in most of the elements were more likely to be a high engagement physician. Meaning, physicians who held stronger attitudes that obese patients are non-compliant and lack motivation, confidence, and knowledge to change their lifestyle behaviours, were more likely to be a high engagement physician. However, statistically significant differences did not exist between the two groups in any of the patient factors.

High engagement physicians reported higher agreement in all variables of medical practice factors than low engagement physicians. It was statistically significant that high engagement physicians scored higher agreement that their medical practice uses the most up-to-date information and evidence and places a high priority on helping patients manage their obesity than low engagement physicians.

Physicians who reported higher feelings of knowledge and preparedness for counseling on various conditions were more likely to be in the high engagement group. It was statistically significant that high engagement physicians felt more knowledgeable and prepared to counseling patients in the areas of smoking cessation, healthy diet, and weight control. Counseling in healthy

diet and weight control are directly related to obesity management. Demonstrated in the literature review, the 5 A's model for obesity counseling is modified from the smoking cessation model. Therefore, knowledge in counseling for smoking cessation may be associated to obesity counseling due to the similarities of the interventions.

High engagement physicians reported higher agreement in all the variables related to responsibility. A statistically significant difference existed between the two groups on feeling responsible to educate obese patients about proper diet and nutrition. Meaning, physicians who are more highly engaged in obesity management practices feel more strongly that it is part of their responsibility as a physician to educate obese patients about diet and nutrition.

A theme was more difficult to ascertain within health system factors between the two physician groups. However, no statistically significant differences existed between the two physician groups in regards to health system factors. Additionally, statistically significant differences did not exist between the two groups among any of the control variables.

Table 11. Comparison of Means by Physician Behavioural Engagement

Statement	Mean (SD) High Engagement (n= 59)	Mean (SD) Low Engagement (n=70)	p-value
Physician General Attitudes about Obesity[a]			
Normal weight is important for health	4.6 (0.8)	4.4 (0.8)	NS
Obesity is a clinical disease	4.2 (1.0)	4.1 (1.0)	NS
Most obese patients are overly-stigmatized by society	4.2 (0.9)	4.2 (0.7)	NS
Family doctors should be role models and maintain normal weight	4.2 (0.8)	4.0 (0.9)	NS
Most overweight patients should be treated for weight loss	4.2 (0.9)	3.8 (0.8)	NS
Obesity is a social disease	3.9 (0.9)	3.9 (0.8)	NS
I stay up-to-date on best practices for managing obesity	3.6 (0.8)	3.0 (1.0)	<.001
I feel well-prepared to manage my obese patients	3.4 (0.9)	2.9 (0.9)	<.01
Treating obese patients is professionally gratifying	3.3 (1.2)	3.1 (1.0)	NS
The family doctor's role is to refer obese patients to other health professionals rather than attempt to treat them themselves	2.2 (0.9)	2.3 (0.9)	NS
I am too busy to help my obese patients manage their conditions	2.2 (1.0)	2.7 (1.0)	<.01
It is not my job to counsel overweight patients on the health risks of obesity	1.5 (0.9)	1.6 (0.9)	NS
Patient Factors in Managing Obesity[a]			
Most obese patients have underlying emotional or psychological issues	3.8 (0.8)	3.5 (0.9)	NS
Most obese patients lack the confidence needed to pursue lifestyle change strategies	3.7 (0.7)	3.5 (0.8)	NS
Most obese patients do not comply with strategies aimed at changing their lifestyles	3.7 (0.9)	3.6 (0.9)	NS
Most obese people are not helped by family and friends to help them change their lifestyles	3.4 (0.7)	3.4 (0.8)	NS
Most obese patients lack the motivation to successfully change their lifestyles	3.4 (1.1)	3.3 (1.1)	NS
Most obese patients lack the knowledge needed to pursue lifestyle change strategies	3.3 (1.0)	3.3 (1.0)	NS
Most obese patients have other co-morbidities that require more attention	3.3 (1.1)	3.1 (1.0)	NS
Most obese patients deny their lifestyle habits	3.3 (1.1)	3.4 (1.0)	NS
Most obese patients lack the financial resources needed to pursue lifestyle change strategies	3.0 (0.9)	3.1 (0.9)	NS

[a]coded by 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree NS: Not significant

Statement	Mean (SD) High Engagement (n= 59)	Mean (SD) Low Engagement (n=70)	p-value
Medical Practice Factors in Managing Obesity[a]			
My medical practice has a fully functional patient electronic medical record	4.4 (1.2)	4.4 (1.0)	NS
My medical practice uses multi-disciplinary teams of professionals to help patients manage their obesity	3.8 (1.2)	3.6 (1.2)	NS
My medical practice has excellent linkages with community agencies and programs that help patients manage their obesity	3.7 (0.9)	3.4 (1.1)	NS
My medical practice places a high priority on helping patients manage their obesity	3.6 (0.8)	3.0 (1.0)	p<.001
My medical practice uses the most up-to-date information and evidence to help patients manage their obesity	3.5 (0.8)	3.0 (1.0)	p<.01
There is access to obesity guidelines at my medical practice	3.4 (1.0)	2.8 (1.2)	NS
My medical practice creates action plans to help patients manage their obesity	3.2 (1.1)	2.7 (1.2)	NS
My medical practice has excellent educational resources to help patients manage their obesity	3.2 (0.9)	2.9 (1.1)	NS
My medical practice has excellent access to medical specialists that help patients manage their obesity	3.0 (1.0)	2.6 (1.1)	NS
Health System Factors in Managing Obesity[a]			
In my area, organizations that offer programs and services for treating obesity do not communicate well with each other	3.4 (0.9)	3.2 (0.9)	NS
Effectively treating all of the patients I see who have obesity would leave me no time to do anything else	3.1 (1.3)	2.9 (1.1)	NS
There is a lack of proven clinical practice guidelines available for treating patients with obesity	3.0 (0.9)	3.5 (0.9)	NS
In my area, there is a lack of community-based programs and services for treating obesity	3.0 (1.2)	3.0 (1.2)	NS
In my area, obese patients have great difficulty in accessing community-based programs and services	3.0 (1.1)	3.2 (1.1)	NS
I am not sufficiently financially compensated to properly manage my obese patients	3.0 (1.2)	3.1 (1.2)	NS
I treat obesity only after I have treated other acute care conditions	2.6 (1.1)	2.5 (1.0)	NS
The family practice setting is an inappropriate place to engage in most interventions for treating obesity	2.2 (1.1)	2.3 (1.1)	NS

[a]coded by 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree
NS: Not significant

Statement	Mean (SD) High Engagement (n= 59)	Mean (SD) Low Engagement (n=70)	p-value
Knowledge and Practice in Patient Counseling[b]			
Smoking cessation	4.5 (0.6)	4.2 (0.7)	p<.01
Exercise and physical fitness	4.3 (0.8)	4.2 (0.7)	NS
Healthy Diet	4.2 (0.7)	3.9 (0.8)	p<.01
Depression	4.1 (0.8)	4.1 (0.7)	NS
Alcohol abuse	3.9 (0.8)	3.6 (0.9)	NS
Stress coping	3.9 (0.7)	3.6 (0.8)	NS
Weight control	3.9 (0.7)	3.4 (0.8)	p<.001
Accident risk reduction	3.6 (0.8)	3.3 (0.8)	NS
Family and domestic violence	3.4 (0.9)	3.0 (0.9)	NS
Responsibility for the Management of Obesity[c]			
Educate obese patients about health risk factors	4.6 (0.5)	4.5 (0.7)	NS
Educate obese patients about available community resources	4.5 (0.6)	4.4 (0.8)	NS
Educate obese patients about proper diet and nutrition	4.5 (0.7)	4.1 (0.9)	p<.01
Be a role model for my obese patients by maintaining normal weight	4.4 (0.8)	4.1 (0.9)	NS
Encourage your obese patients to talk about personal life issues and problems	4.3 (0.7)	4.1 (0.9)	NS
Provide emotional support to obese patients	4.3 (0.7)	4.0 (0.9)	NS
Make referrals to commercial weight loss programs for obese patients	3.1 (1.3)	2.8 (1.3)	NS

[b]coded by 1=very unprepared, 2=unprepared, 3=neutral, 4=prepared, 5=very prepared
[c]coded by 1=definitely no, 2=no, 3=neutral, 4=yes, 5=definitely yes
NS: Not significant

Medical Practice and Physician Characteristics	% or Mean (SD)		
	High Engagement (n= 59)	Low Engagement (n=70)	p-value
Medical Practice type			
Solo family practice	8.6	8.8	NS
Group family practice	81.0	80.9	NS
Walk-in clinic	19.0	10.3	NS
Community Health Centre	6.9	7.0	NS
Capitated Practice	0.0	1.5	NS
Primary Care Network Member	48.3	45.6	NS
Practice location			
Rural	0.0	2.9	NS
Town	3.4	12.9	NS
Small city	23.7	18.6	NS
Mid-sized city	5.1	1.4	NS
Large city	67.8	64.3	NS
Patient Volume:			
Overall patient workload	28 (9)	24 (9)	NS
Obesity Quotient	0.3 (0.2)	0.3 (0.2)	NS
Compensation type			
Fee-for-service	86.2	91.2	NS
Salary	1.7	2.9	NS
Combined Salary/Fee-for-service	8.6	4.4	NS
Contractual	5.2	1.5	NS
Sessional	1.7	1.5	NS
Physician Gender			
Male	39.0	55.7	NS
Female	61.0	44.3	NS
Physician Age (years)	48 (12)	45 (11)	NS

NS: Not Significant

IV. Multivariable Analysis: Ordinary Least Squares (OLS) Linear Regression

In order to further examine relationships between study variables on physician practice behaviours in obesity management, multivariable analysis was employed. Ordinary least squares (OLS) linear regression was utilized to estimate the effect of a variable on another, while simultaneously controlling for the influence of other variables. Regression analysis provides two important coefficients. R^2 is the proportion of variance explained by the independent variables, with the closer the value to 1.00, the more the independent variables explain changes in the dependent variable. The multiple linear regression coefficient, represented by unstandardized "B", shows the direction and size of the effect of each independent variable on the dependent variable.

The results of the OLS linear regression analyses are presented in table 12. The contribution of the explanatory variables physician gender, practice location, patient workload, and obesity quotient is minor, explaining for only 5.2% of the variance in physician behaviours. Knowledge and responsibility factors both individually explained 9.7% of the variance in the model, after adjusting for the explanatory variables. Patient factors explained for 0.3% of the variance and practice factors explained 8.4% of the variance, after adjusting for the explanatory variables. With the exception of patient factors (model C), the contribution of each of the models on the dependent variable although are small, are positive and statistically significant. All five control variables employed in the regression were not statistically significant in any of the four models. These results indicate that physicians' attitudes towards their obese patients do not explain their practice behaviours. Knowledge, responsibility, and practice factors explain for a small proportion of variance in physician practice behaviours in obesity management.

Table 12. OLS Linear Regressions Results for Outcome Variable, Physician Practice Behaviours

	Regression Coefficient B (Std. Error)				
	Base Model	**Model A** (Physician knowledge factors)	**Model B** (Physician responsibility factors)	**Model C** (Patient factors)	**Model D** (Practice factors)
Physician and Practice Characteristics					
Physician age	.005 (.002)	.005 (.002)	.004 (.002)	.005 (.002)	.004 (.002)
Physician gender[a]	-.121 (.055)	-.115 (.053)	-.105 (.053)	-.115 (.056)	-.098 (.053)
Practice location[b]	.036 (.040)	.013 (.038)	.016 (.038)	.041 (.040)	.030 (.038)
Overall patient workload	.005 (.003)	.003 (.003)	.003 (.003)	.004 (.003)	.003 (.003)
Obesity quotient	-.084 (.174)	-.160 (.166)	-.113 (.165)	-.073 (.174)	-.074 (.166)
Behavioural Engagement Factors					
A. Physician knowledge factors		.177*** (.046)			
B. Physician responsibility factors			.176*** (.046)		
C. Patient factors				.063 (.055)	
D. Practice factors					.129*** (.036)
Constant	1.952*** (.188)	1.407*** (.228)	1.370*** (.234)	1.732*** (.269)	1.625*** (.201)
Adjusted R-square	.052	.149	.149	.055	.136
ΔR^2		.097	.097	.003	.084
F statistic	2.379	4.642***	4.650***	2.205	4.287**

[a]coded as 1=male, 0=female [b]coded as 1=rural or town, 2=small city, 3=mid-sized city or large city

*p<.01 **p<.005 ***p<.001

Chapter 5

Discussion

The three hypotheses were tested and rejected:

Hypothesis 1: All factors are simultaneously present, each contributing to physician practice behaviours in obesity management.

As per the results of this study, the first hypothesis is rejected. The findings suggest that physicians' attitudes towards obese patients do not contribute to their practice behaviours in obesity management. Whether physicians hold positive or negative attitudes towards obese patients, it is not indicative either way of providing obesity-related care.

Hypothesis 2: Each factor will be positively associated to physician practice behaviours in obesity management.

Hypothesis 2 is also rejected because as previously mentioned, patient factors are not significant enough to have an association with physicians' behaviours. However, the remaining three factors have a positive, significant relationship to physician behaviours.

Hypothesis 3: No individual factor contributes more to physician practice behaviours in obesity management than any other factor.

Since the findings demonstrate that knowledge, responsibility and practice factors all contribute to physician behaviours and patient factors do not, hypothesis 3 is also rejected. Knowledge and responsibility factors contribute the same amount to physician behaviours and practice factors contribute to a slightly lesser degree.

Similar studies have explored this topic; however, have mostly been descriptive in nature, generally reporting frequencies on questionnaire variables and Canadian physicians have not been assessed. This study represents an advance over previous studies by assessing the statistical relationship between physician attitudes, knowledge and working environment on practice behaviours in obesity management in family physicians practicing throughout Alberta, Canada. Similar trends have been shown in international research, although cannot be generalized to primary care physicians practicing in Canada. Health care systems differ across countries, and in the case of Canada, can differ across provinces. Likewise, rates of obesity vary across regions. Physician practices will vary by region and context.

The results from this study demonstrate that physicians who are more engaged in the delivery of obesity management practices, hold more favourable general attitudes toward obesity, have greater support from their medical practice, and feel more knowledgeable and responsible for providing obesity management in primary care practice.

Contradictory to physicians' general attitudes towards obesity, in general, high engagement physicians held more negative patient attitudes than those of low engagement physicians, indicating that physicians' attitudes towards obese patients do not influence their obesity management practices. This inference was substantiated with confirmation from the linear regression results that patient factors do not contribute to physicians' behaviours. Other studies also indicate that physicians in general hold negative attitudes toward their obese patients (Campbell et al., 2000, Foster et al., 2003, Rurik et al., 2013). The findings from this study also indicate that physicians hold negative attitudes toward their obese patients including that they are unmotivated, non-compliant, or deny their obesity. However, interestingly, the findings also demonstrated that holding these negative attitudes does not indicate that it prevents physicians

from delivering obesity management to obese patients. Foster et al. (2003) suggested that the persistence of negative attitudes is likely to adversely affect physicians' interest in treating obesity. The findings from this study are contradictory to this inference. This is an important new finding because based on the results of this study, physicians do generally hold negative attitudes towards obese patients; however, obesity management delivery or lack thereof is not explained by their negative attitudes.

The results from this study have important implications for primary care physicians. Although modest, it provides empirical support that physicians who are more knowledgeable in the area of obesity management are more likely to provide this kind of care. This finding supports the current body of literature that indicates that physicians are more likely to provide obesity management in primary practice with adequate education and training (Grief and Talamayan, 2008, Forman-Hoffman et al., 2006, Rurik et al., 2013). Whether physicians require more education in the area of obesity management in medical school or increased preservation on best practices is unclear. The study sample was an older physician population, with the average age being 46. An analysis of younger to older physicians in the area of physician knowledge may provide further insights. Although, physician age demonstrated a very weak association to physician knowledge factors in the regression results. Additionally, physicians who feel that obesity management is part of their responsibility are also more likely to provide this kind of care. However, physician knowledge and preparedness may be linked to attitudes of responsibility. Further exploration on the interaction between these two factors may be of merit.

Bocquier et al. (2005) found that over 50% of physicians underestimated the prevalence of overweight in the French adult population. A similar finding was found in this study, where physicians estimated on average, of the 25 patients they see in an 8 hour workday, 8 of those

patients are overweight or obese, providing an obesity quotient of 32%. However, in Canada, over half of the adult population is overweight or obese (Statistics Canada, 2013), indicating that physicians underestimate how many overweight or obese patients they see. Additionally, as per the regression results, the strength of effect of obesity quotient on physician behaviours in obesity management was negative, weak and not statistically significant. This indicates that seeing more overweight or obese patients does not result in physicians providing more obesity management in primary practice. As Bocquier et al. (2005) indicated, this finding suggests that physicians may rely mainly on a therapeutic rather than preventive approach to weight problems.

Over half of the study sample (54%) agreed or strongly agreed that most of their obese patients have underlying emotional or psychological issues. Foster et al. (2003) found a similar result in the U.S., suggesting that obesity will be seen as a matter of behavioural management or psychological treatment. PCPs have greater training in the biological basis of disease rather than on principles of behavioural science, indicating physicians may be ill-equipped to address behavioural issues (Foster et al., 2003). It is essential for physicians to play a role in obesity management in primary care in order for patients to manage their conditions in a safe and healthy manner and prevent further health complications. Effective obesity management can have a meaningful impact on population health and over-burdened health care systems. However, primary care physicians are ineffective at taking on the entire responsibility themselves. The study findings also have important implications for medical practices and the health care system. It affirms the importance of medical practices to support physicians and provide the resources for physicians to effectively deliver obesity management. Where successful weight loss entails comprehensive behavioural changes, treating patients directly for weight loss or the prevention of weight gain may be an inefficient and ineffective use of PCPs. Documentation of patient history

and the provision of prescriptive advice are likely to be more familiar to PCPs than is the use of cognitive-behavioral therapies (Campbell et al., 2000). PCPs can be an effective first-point of contact for individuals where physicians can assess patients' weight and health related to their weight status and act as a liaison between other resources for managing obesity. Developing more multidisciplinary teams for managing obesity and linking PCPs to a broader range of other health care professionals and programs would likely improve obesity management practices in primary care. Medical practices are part of a broader health care system. Transformations in the health care system are likely required to see changes within medical practices that promote cooperation between various health care professionals to support optimal obesity management practices.

The results have identified determinants of physician practice behaviours in obesity management. Physician knowledge, physician attitudes of responsibility, and medical practice factors are some of the components that explain the variance in physicians' obesity management practices. However, these three elements only contribute to a relatively small proportion of the variance in physician practices. Further research is required to explain the other determinants of physician practices in obesity management and the interaction of barriers is required to get a broader idea of what determines physicians' practice behaviours in this area. Additionally another area for further required research is to identify the most appropriate use of PCPs time and resources in the area of obesity management.

Chapter 6

Conclusion

I. Strengths and Limitations of the Study

As previously mentioned in the methods chapter, survey methodology was a good tool to collect data on physicians' attitudes and behaviours to allow for anonymity of respondents to answer with more honest and valid answers. Mail-out survey may have provided less biased data than other methods, as there is little chance for respondents to give answers they think the administrator wants to hear. The physician database included family physicians practicing all over Alberta. Surveys allowed for distribution over the entire province, capturing characteristics of a large population, thereby reducing geographical dependence. Other studies utilized validated survey methods for similar research, allowing survey development to be easily designed and relatively free from various types of error.

One of the most considerable limitations of this study was the low response rate. Given that physicians have competing demands on their time, a likely reason for the low response rate is that the sampling population has limited time to respond to surveys. However, our sample selection was likely not biased since statistically significant differences did not exist between early responders and late responders in regards to physicians' practice behaviours, dismissing the potential for non-response bias. Due to time and resource constraints, only one reminder letter was sent to physicians requesting their participation in the study, which did not allow for a large

sample size. Effects are harder to detect in smaller samples, with more modest statistical power. Additionally, since multiple comparisons were made, a more conservative significance criterion was employed (α=0.01), thereby decreasing the study power. Employing a more conservative significance criterion reduces the risk of a Type I error (obtaining a statistically significant result when the null hypothesis is not false), but it increases the risk of a Type II error (failing to reject the null hypothesis when an effect exists). Due to modest study power, the results cannot be generalized to the entire family physician community in Alberta. Additionally, we cannot be sure that the study sample is representative of all family physicians practicing in Alberta. While most of the survey was assessing physicians' attitudes and opinions, physicians' behaviour scores were based on what the participants claim to be doing, which may be different than what they are actually doing. Therefore since the data was based on self-report, it suffers from the potential for personal biases and distortions. Physicians may report their answers based on what they think is social desirability, thereby potentially biasing the data. Lastly, these findings emerged from a cross-sectional design, limiting presumption of causality that would be better demonstrated through longitudinal studies.

II. Implications and Directions for Future Research

Obesity is a national and global issue. Primary care is an important area in the prevention and treatment of obesity. There are numerous potential barriers physicians face in delivering effective practices in obesity management. Identifying major barriers will aid health care systems, medical practices, and primary care physicians in the improvement of counseling obese

patients to lose weight and maintain their weight loss for the long term. Further research needs to be conducted on other determinants of physician practices in obesity management. This study chose important factors related to the delivery of obesity management identified by other similar studies to test, however other indicators may need to be considered. Another area that requires further investigation is the question of how to effectively combat the identified barriers.

Future testing of models should incorporate the interaction and interdependence of study variables. The presence of interaction effects implies that the effect of one independent variable on the dependent variable varies as a function of another independent variable. Exploration of interactions could yield important findings.

Future studies using physician behaviour as the dependent variable should utilize a valid and reliable measure for examination. Measures of actual performance of physicians would be best incorporated into future studies to reduce personal bias and increase validity.

Improving the effectiveness and overall delivery of obesity management in primary care is a multifaceted endeavour. This particular study examined four factors in the relationship to physicians' delivery of obesity management, where three of the four were significant. It is likely that a range of factors influences physicians' delivery of obesity management rather than a select few, making the solution more complex and heterogeneous.

To conclude, the results of this study disproved that physicians' attitudes towards obese patients influence their practice behaviours. Physician knowledge in obesity management, attitudes of obesity management being part of their job responsibility, and sufficient medical practice support are all indicative of physicians' providing obesity management in clinical practice, although other factors remain unidentified.

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Appendices

January 15, 2014

Dear Family Physician,

We are writing today to invite you to consider participating in a study whose objective is to examine how adult patients with obesity are being managed by Alberta family physicians. Family practice physicians are increasingly seeing and treating adult obese and overweight patients with a variety of chronic medical conditions. In order to remain effective, physicians and their group practice organizations must successfully assist these patients to better manage their weight on a continuing basis. Yet a variety of factors can conspire to make patient management of chronic obesity highly problematic. The goal of this study is to examine the preparedness of family and general practitioners to manage their adult patients with obesity.

This survey has been approved by the research ethics board of the University of Alberta. We can assure you that all information collected will be strictly confidential. Nor is anyone required to complete a questionnaire if they do not wish to be included in this study. Participants can refuse to answer any question that they choose. Returning the questionnaire implies consent to participate. Your decision to participate will not in any way affect your standing with the College of Physicians and Surgeons of Alberta. The information you provide will be kept for at least five years after the study is done. The information will be kept in a secure area (i.e. locked filing cabinet). The information gathered for this study may be examined again in the future to help us answer other study questions. If so, the ethics board may review the study to ensure the information is used ethically.

The survey should take no more than 20 minutes to complete. The study findings can be made available to participating physicians in July 2014. If at any time you have any questions regarding the study, please feel free to call or write the study researcher, Hilary Short (780-270-7768; heshort@ualberta.ca.). If you would like a copy of the study findings, please email your request to Ms. Short. Thank you in advance for your participation.

Sincerely,

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ADULT OBESITY MANAGEMENT: KNOWLEDGE, ATTITUDES AND PRACTICES OF ALBERTA FAMILY PHYSICIANS

Directions: **Please respond to the following questions in a way that you believe best describes your attitudes and activities in your medical group practice. Please be assured that your responses are voluntary and will remain confidential.**

A. General Attitudes about Obesity

We are interested in learning about your attitudes about obesity. **Please indicate the extent to which you agree with the following statements**.

1. Obesity is a clinical disease

1	2	3	4	5
Strongly disagree				Strongly agree

2. Normal weight is important for health.

1	2	3	4	5
Strongly disagree				Strongly agree

3. I am too busy to help my obese patients manage their condition.

1	2	3	4	5
Strongly disagree				Strongly agree

4. Most overweight patients should be treated for weight loss.

1	2	3	4	5
Strongly disagree				Strongly agree

5. I feel well-prepared to manage my obese patients.

1	2	3	4	5
Strongly disagree				Strongly agree

6. I stay up-to-date on best practices for managing obesity

1	2	3	4	5
Strongly disagree				Strongly agree

7. Most obese patients are stigmatized by society.

1	2	3	4	5
Strongly disagree				Strongly agree

8. Family doctors should be role models and maintain normal weight.

1	2	3	4	5
Strongly disagree				Strongly agree

9. It is not my job to counsel overweight patients on the health risks of obesity.

1	2	3	4	5
Strongly disagree				Strongly agree

10. Treating obese patients is professionally gratifying.

1	2	3	4	5
Strongly disagree				Strongly agree

11. The family doctor's role is to refer obese patients to other health professionals rather than attempt to treat them themselves.

1	2	3	4	5
Strongly disagree				Strongly agree

12. Obesity is a social illness.

1	2	3	4	5
Strongly disagree				Strongly agree

B. Patient Factors in Managing Obesity

We are interested in learning more about patient factors that impact the effective management of

obesity. **To what extent do you agree or disagree with the following statements**.

1. Most obese patients lack the motivation to successfully change their lifestyles.

1	2	3	4	5

Strongly disagree Strongly agree

2. Most obese patients do not comply with strategies aimed at changing their lifestyles.

1	2	3	4	5

Strongly disagree Strongly agree

3. Most obese patients deny their lifestyle habits.

1	2	3	4	5

Strongly disagree Strongly agree

4. Most obese patients have underlying emotional or psychological issues.

1	2	3	4	5

Strongly disagree Strongly agree

5. Most obese people are not helped by family and friends to help them change their lifestyles.

1	2	3	4	5

Strongly disagree Strongly agree

6. Most obese patients lack the confidence needed to pursue lifestyle change strategies.

1	2	3	4	5

Strongly disagree Strongly agree

7. Most obese patients lack the financial resources needed to pursue lifestyle change strategies.

1	2	3	4	5

Strongly disagree Strongly agree

8. Most obese patients lack the knowledge needed to pursue lifestyle change strategies.

1	2	3	4	5

Strongly disagree Strongly agree

9. Most obese patients have other co-morbidities that require more attention.

1	2	3	4	5

Strongly disagree Strongly agree

C. Medical Practice Factors in Managing Obesity

We are interested in learning more about your medical practice factors that impact the effective management of obesity. **To what extent do you agree or disagree with the following statements.**

1. My medical practice uses the most up-to-date information and evidence to help patients manage their obesity.

1	2	3	4	5

Strongly disagree Strongly agree

2. My medical practice has excellent linkages with community agencies and programs that help patients manage their obesity.

1	2	3	4	5

Strongly disagree Strongly agree

3. My medical practice has excellent access to medical specialists that help patients manage their obesity.

1	2	3	4	5

Strongly disagree Strongly agree

4. My medical practice places a high priority on helping patients manage their obesity.

1	2	3	4	5

Strongly disagree Strongly agree

5. My medical practice has excellent educational resources to help patients manage their obesity.

1	2	3	4	5

Strongly disagree Strongly agree

6. There is access to obesity guidelines at my medical practice.

1	2	3	4	5

Strongly disagree Strongly agree

7. My medical practice creates action plans to help patients manage their obesity.

1	2	3	4	5

Strongly disagree Strongly agree

8. My medical practice has a fully functional patient electronic medical record.

1	2	3	4	5

Strongly disagree Strongly agree

9. My medical practice uses multi-disciplinary teams of professionals to help patients manage their obesity.

1	2	3	4	5

Strongly disagree Strongly agree

D. Health System Factors in Managing Obesity

We are interested in learning more about health system factors that impact the effective management of obesity. **To what extent do you agree or disagree with the following statements.**

1. There is a lack of proven clinical practice guidelines available for treating patients with obesity.

1	2	3	4	5

Strongly disagree Strongly agree

2. In my area, there is a lack of community-based programs and services for treating obesity.

1	2	3	4	5

Strongly disagree Strongly agree

3. In my area, obese patients have great difficulty in accessing community-based programs and services.

1	2	3	4	5

Strongly disagree Strongly agree

4. I am not sufficiently financially compensated to properly manage my obese patients.

1	2	3	4	5

Strongly disagree Strongly agree

5. In my area, organizations that offer programs and services for treating obesity do not communicate well with each other.

1	2	3	4	5

Strongly disagree Strongly agree

6. The family practice setting is an inappropriate place to engage in most interventions for treating obesity.

1	2	3	4	5

Strongly disagree Strongly agree

7. Effectively treating all of the patients I see who have obesity would leave me no time to do anything else.

1	2	3	4	5

Strongly disagree Strongly agree

8. I treat obesity only <u>after</u> I have treated other acute care conditions.

1	2	3	4	5

Strongly disagree Strongly agree

E. Knowledge and Practice in Patient Counseling

Physicians vary in their knowledge with respect to counseling patients on various health promotion practices. **How well-prepared do you feel when counseling patients in each of these areas?**

1. Smoking cessation:

1	2	3	4	5

Very unprepared Very prepared

2. Alcohol abuse:

1	2	3	4	5

Very unprepared Very prepared

3. Healthy diet:

1	2	3	4	5

Very unprepared Very prepared

4. Exercise and physical fitness:

1	2	3	4	5

Very unprepared Very prepared

5. Stress coping:

1	2	3	4	5

Very unprepared Very prepared

6. Depression:

1	2	3	4	5

Very unprepared Very prepared

7. Family and domestic violence:

1	2	3	4	5

Very unprepared Very prepared

8. Accident risk reduction:

1	2	3	4	5

Very unprepared Very prepared

9. Weight control:

1	2	3	4	5

Very unprepared Very prepared

F. Frequency of Advice to Obese Patients

Physicians vary in the frequency they provide advice to their obese patients. **How often do you give the following advice to your obese patients?**

		Always/ often	**Some-times**	**Rarely/ never**
1.	Eat less in general	[]	[]	[]
2.	Take more exercise	[]	[]	[]
3.	Keep food diary	[]	[]	[]
4.	Keep weight diary	[]	[]	[]
5.	Consult a dietician	[]	[]	[]
6.	Do more exercise	[]	[]	[]
7.	Refer for behavioural therapy	[]	[]	[]
8.	Refer for mental health services	[]	[]	[]
9.	Eat more fruits and vegetables	[]	[]	[]
10.	Consult an exercise specialist	[]	[]	[]

G. Responsibility for the Management of Obesity

We are interested in learning more about your felt level of responsibility in relation to your duties as physician for your obese patients. **To what degree do you believe that it is your responsibility to:**

1. Encourage your obese patients to talk about personal life issues and problems.

1	2	3	4	5

Definitely no Definitely yes

2. Educate obese patients about health risk factors.

1	2	3	4	5

Definitely no Definitely yes

3. Provide emotional support to obese patients.

1	2	3	4	5

Definitely no Definitely yes

4. Educate obese patients about available community resources.

1	2	3	4	5

Definitely no Definitely yes

5. Educate obese patients about proper diet and nutrition.

1	2	3	4	5

Definitely no Definitely yes

6. Make referrals to commercial weight loss programs for obese patients.

1	2	3	4	5

Definitely no Definitely yes

7. Be a role model for my obese patients by maintaining normal weight.

1	2	3	4	5
Definitely no				Definitely yes

H. Medical Practice and Physician Characteristics

How would you characterize your family medicine practice?

1. The type of medical practice that I spend the majority of my time: (Check as many as apply)

a) Solo Family Practice: ____
b) Group Family Practice: ____
c) Walk-in Clinic: ____
d) Community Health Centre: ____
e) Capitated Practice: ____
f) Primary Care Network Member: ____

2. Where is your medical practice located?

a) Large city (population >500K) ____
b) Mid-sized city (population 100K-499K) ____
c) Small city (population 10K-99K) ____
d) Town (population <10K) ____
e) Rural ____

3. In a typical work day in your practice, please estimate the number of patients you would normally see in a standard 8-hour workday:

_____ patient visits / day

4. In a typical work day in your practice, please estimate the number of overweight and obese patients you would normally see in a standard 8-hour workday:

_____ patient visits / day

5. How are you compensated for work you perform in your medical practice? (Check all that apply)

a) Fee-for-Service: _____
b) Salary: _____
c) Combined Salary/Fee-for-Service: _____
d) Contractual: _____
e) Sessional (or other): _____

What about you?

1. Your Gender: Male: _____ Female: _____

2. Your age: _____ years

3. Certificate in Family Medicine (CCFP)?

Yes: _____ No: _____

Thank you for completing this survey. Your responses will remain anonymous and confidential at all times.