

Excess Healthcare Resource Utilization in Obesity Pharmacotherapy Candidates in Canada

Tahir Feroz¹, Katia Charland², Sarah Heembrock², Richard Borrelli², Rasmus Skovgaard¹
 1 NovoNordisk Canada Inc. Canada
 2 IMS Brogan Canada

Background

In 2011-2012, 1 in 4 Canadian adults were identified as obese, representing an increase in obesity prevalence of approximately 17.5% since 2003¹. The continued rise in prevalence and societal burden of obesity calls into question the effectiveness of traditional weight loss approaches. Although diet and exercise regimes remain the mainstay of weight loss interventions, several longitudinal studies have demonstrated that while individuals may experience an initial weight loss, long-term weight regain is typical and often surpasses the baseline weight²⁻⁶. Complementary interventions, such as pharmacotherapy, show promise in sustaining weight loss⁷ and may be an effective complement to traditional approaches.

Objectives

To evaluate the incremental Healthcare Resource Utilization (HRU) associated with pharmacotherapy candidates and examine the relationship between obesity and HRU in an Ontario (Canada) population.

Methods

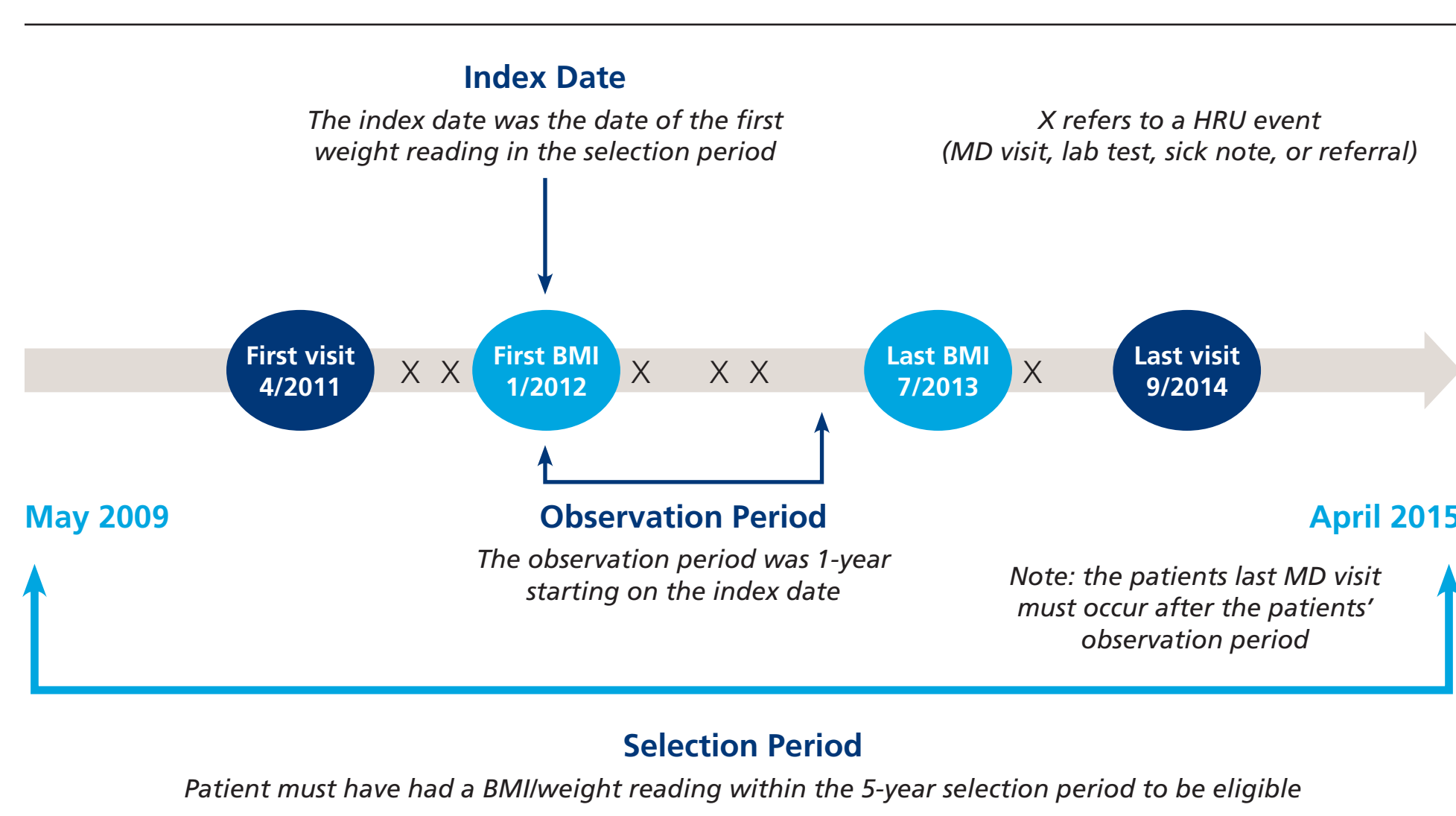
Data

- IMS Evidence360 electronic medical records database containing de-identified longitudinal records for over 900,000 patients in an outpatient setting in Ontario, Canada.
- Available data fields include: age, sex, diagnoses, prescriptions (including DIN, dosing, refills), lab test results, specialist referrals, billing fees, sick notes and patient vitals.

Study Design

- Retrospective cohort study assessing HRU rates and obesity-related comorbidity risk in people with obesity who are potential pharmacotherapy candidates, relative to normal weight patients.
- Patients were categorized by BMI and presence of obesity-related comorbidities (Figure 1).

Figure 1 Example of patient timeline.



- Selection period:** A 5-year period from May 1, 2009 to April 30, 2014, used to identify and select patients for the study.
- Index date:** The date of patient's first weight reading in the selection period.
- Observation period:** 1-year period commencing on the index date during which rates of HRU were studied.
- Look-back period:** All historical data used to identify co-morbidities (Table 1).

Patient Inclusion Criteria

- 18 to 64 years old
- ≥1 weight reading in selection period
- ≥1 height reading after the age of 17yrs
- ≥1 physician visits following observation period

Patient Cohorts

- Reference Cohort:
 - 18.5≤BMI<25

- Obesity Pharmacotherapy Candidate Cohort:
 - BMI≥30 and ≥1 obesity-related co-morbidity (Table 1)
- BMI Category Cohorts:
 - 25≤BMI<30
 - 30≤BMI<35
 - 35≤BMI<40
 - BMI≥40

Table 1 Obesity Related Comorbidity definitions based on diagnostic codes and ATC Class.

Comorbidity	Case definition (ICD-9/OHIP code/ATC Class)
Hip or Knee Replacement	934-936
Pre-Diabetes*	Not Diabetes AND 249 OR HBA1c test >7.0
Diabetes	250 + ATC A10
Stroke	436
Myocardial Infarction	410
Angina	413
Asthma	493 + ATC R03 (Excluding LAMA Medications)
Cancer - Colon, Breast, Endometrial	153, 174, 175, 179, 217
Hypertension	401 + ATC C01-C03 and ATC C06 - C09
Dyslipidemia	272 + ATC C10

* excluded pre-diabetic patients that became diabetic during the study period.

Statistical Analysis

Significant differences in risk of comorbidities and rates of HRU were identified in (i) the pharmacotherapy candidate cohort relative to the reference cohort and (ii) the elevated BMI cohorts, relative to the reference cohort.

- Logistic regression model was used to estimate risk of co-morbidities, controlling for age and sex.
- Negative binomial regression model was used to estimate HRU rates, controlling for age and sex.
- The independent variable of interest was cohort membership, i.e. pharmacotherapy candidate cohort versus reference cohort or BMI cohort versus reference cohort.

Results

- 7,349 pharmacotherapy candidate patients and 19,926 reference patients were included in the study.
- The reference cohort had an average age of 35 years and 35% of patients were male. The pharmacotherapy candidate cohort had an average age of 46 years and was 49% male.
- The BMI cohorts had an average age between 41 to 43 years. The % of male patients decreased from 55% to 35% as the BMI category increased from 25≤BMI<30 to BMI≥40.

Comorbidities:

- Pharmacotherapy cohort patients had significantly increased risk for all comorbidities relative to reference (Table 2).
- Risk tended to increase with increasing BMI up to 35≤ BMI<40 (Table 2).

Table 2 Number and percentage of patient cohorts with comorbidity and p-values from logistic regression assessing cohort differences in risk of comorbidities.

Comorbidity	Reference 18.5≤BMI<25 N=19,926	Pharma- co-therapy Candidate BMI≥30 + >1 obesity-relat- ed co-mor- bidity N=7,349	Overweight I 25≤ BMI<30 N=16,233	Obese I 30≤ BMI<35 N=7,568	Obese II 35≤ BMI<40 N=2,925	Obese III BMI≥40 N=1,852
Pre-Diabetes	6 (0.03%)	43 (0.60%)	22 (0.14%)	19 (0.25%)	14 (0.50%)	10 (0.50%)
Diabetes	702 (3.5%)	2,255 (30%)	1,365 (9%)	1,140 (15%)	601 (21%)	494 (27%)
Stroke	33 (0.16%)	51 (0.70%)	41 (0.25%)	30 (0.40%)	15 (0.51%)	6 (0.32%)
Myocardial Infarction	32 (0.16%)	44 (0.60%)	49 (0.30%)	25 (0.33%)	14 (0.48%)	5 (0.27%)
Angina	66 (0.33%)	114 (1.50%)	117 (0.72%)	63 (0.83%)	33 (1.13%)	17 (0.92%)
Asthma	2,228 (11%)	1,977 (27%)	1,903 (12%)	1,071 (14%)	503 (17%)	381 (21%)
Cancer - Colon, Breast, Endometrial	694 (3.5%)	303 (4%)	412 (2.5%)	170 (2.3%)	78 (2.7%)	50 (2.7%)
Hypertension	2,013 (10%)	4,466 (60%)	3,535 (22%)	2,463 (33%)	1,129 (39%)	844 (46%)
Dyslipidemia	2,138 (11%)	3,642 (49%)	3,818 (24%)	2,233 (30%)	857 (29%)	526 (28%)

Note: Hip and knee replacement was examined in the study but the sample size was too small for analysis.

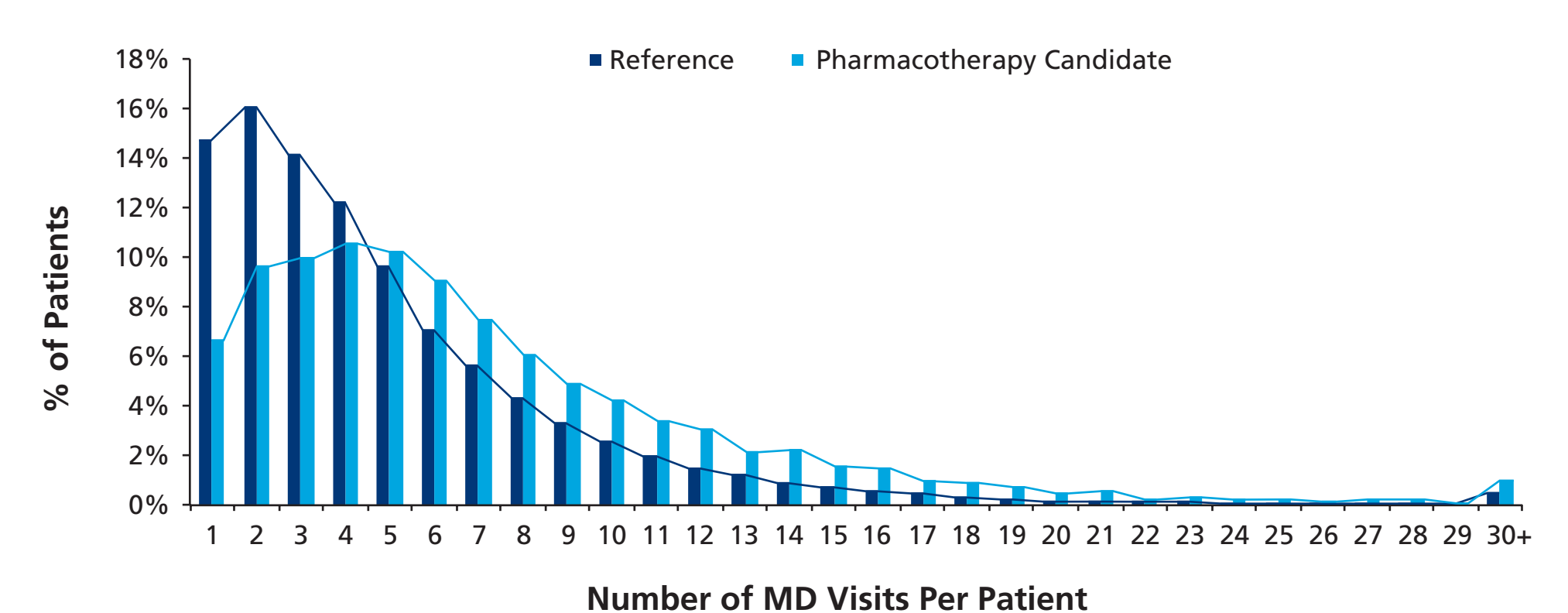
Statistically Significant Not Statistically Significant

Note: p-value<0.05 was considered statistically significant

Healthcare Resource Utilization:

- Pharmacotherapy cohort patients had significantly greater HRU; +34% physician visits, +87% sick notes, +16% lab test visits and +34% referrals (Table 3).
- Compared to the reference cohort's distribution of MD visits, which peaked at a value of 2 visits, the distribution of MD visits for the cohort of pharmacotherapy candidates had a heavier right tail with a peak at 4 visits (Figure 2).

Figure 2 Distribution of number of physician visits per patient for pharmacotherapy candidates and reference cohort patients.



- With the exception of lab test visits, HRU tended to increase with increasing BMI (Table 3).
- Females and older people also tended to have greater HRU use for all categories.

Table 3 Health resource utilization age- and sex-adjusted rate ratio.

HRU Subtype	Reference 18.5≤BMI<25 N=19,926	Pharma- co-therapy Candidate BMI≥30 + >1 obesity-relat- ed co-mor- bidity N=7,349	Overweight I 25≤ BMI<30 N=16,233	Obese I 30≤ BMI<35 N=7,568	Obese II 35≤ BMI<40 N=2,925	Obese III BMI≥40 N=1,852
Physician Visits	-	1.34	1.05	1.14	1.17	1.26
Sick Notes	-	1.87	1.14	1.42	1.88	2.16
Lab Test Visits	-	1.16	1.04	1.04	0.99	0.99
Referrals	-	1.34	1.03	1.14	1.18	1.28

Statistically Significant Not Statistically Significant

References

- Navaneelan, T and Janz T. Adjusting the scales: Obesity in the Canadian population after correcting for respondent bias. *Health at a Glance*. May 2014; Statistics Canada Catalogue no. 82-624-X.
- Macpherson-Sánchez AE. Integrating Fundamental Concepts of Obesity and Eating Disorders: Implications for the Obesity Epidemic. *American Journal of Public Health*. April 2015; 105(4), e71-e85.
- Pietiläinen KH, Saarni SE, Kaprio J and Rissanen A. Does dieting make you fat? A twin study. *International Journal of Obesity*. March 2012; 36, 456-464.
- Wu T, Gao X, Chen M, van Dam RM. Long-term effectiveness of diet-plus-exercise interventions vs. diet-only interventions for weight loss: a meta-analysis. *Obesity Reviews*. 2009; 10(3), 313-23.
- Savage JS, Hoffman L, Birch LL. Dieting, restraint, and disinhibition predict women's weight change over 6y. *American Journal of Clinical Nutrition*. 2009; 90(1), 33-40.
- French SA, Jeffery RW, Murray D. Is dieting good for you?: prevalence, duration and associated weight and behaviour changes for specific weight loss strategies over four years in US adults. *International Journal of Obesity and Related Metabolic Disorders*. 1999; 23(3), 320-327.
- Padwal R, Li SK, Lau DC. Long-term pharmacotherapy for obesity and overweight. *Cochrane Database Systematic Reviews*. 2004; 3:CD004094.

Conclusions

As an individual's BMI increased there was a parallel increase in the observed number of co-morbidities, physician visits, sick notes and referrals. Similarly, greater healthcare resource utilization and risk of co-morbidities were observed for individuals fitting the pharmacotherapy candidate profile. As a result, this study demonstrates a significant increase in the burden to the healthcare system from people with obesity compared to people without obesity.

The authors take full responsibility for the content of the poster but are grateful to IMS Brogan Canada (supported by Novo Nordisk) for writing assistance. Presented at the 13th International Conference on Obesity, May 1-4, 2016, Vancouver, Canada.

