



**camh** Centre for Addiction  
and Mental Health

# **The role of mental health and addiction among high-cost patients: a population-based study**

Claire de Oliveira, M.A. PhD

## + Background

- small proportion of patients account for disproportionately large share of costs → high-cost patients
- increasing interest by policy makers: reduce costs and improve patients' health and care experiences → “triple aim”
- however, policy panacea challenged by fact that patient profiles, needs and utilization patterns likely vary between sub-populations → one model of care does **not** “fit all”
- to optimize investments, need to understand which patients (or groups) can be targeted through interventions and which interventions

## + Background

- previous work: mental health and addictions (MHA) high cost patients incur over 30% more costs than other high cost patients
- but did not examine role of MHA or related care among other high-cost patients, or patient heterogeneity in general

### Objective

- examine role of MHA-related care on health care costs of high-cost patients in Ontario, Canada, for 2012 → focus on other high cost patients
  - discuss implications, provide recommendations on how to address heterogeneous needs of patients

# + Methods

## Data

- administrative health care data housed at ICES
- patients (18+) with at least one encounter with health care system from April 2012 to March 2013
  - high-cost patients → 90<sup>th</sup> percentile of cost distribution
- defined **3** patient groups (but focused on latter 2):
  - (1) MHA high-cost patients: costs related to MHA care **≥ 50%** total costs → covered elsewhere
    - See de Oliveira et al. (2016) Health Affairs
  - (2) Non-MHA high-cost patients with some MHA care: costs related to MHA care **< 50%** total costs;
  - (3) Non-MHA high-cost patients with no MHA care: costs related to MHA care **0%** total costs

## + Methods

### Data

- used cost estimation algorithm to estimate all health care costs incurred by patients and borne by third-party payer (the ministry of health)
- MHA-related costs: costs associated with psychiatric hospitalizations, ED visits for MHA and self-harm, prescription drugs to treat psychiatric disorders, MHA-related physician and outpatient services, and home care psychology services
- Non-MHA-related costs: remaining costs

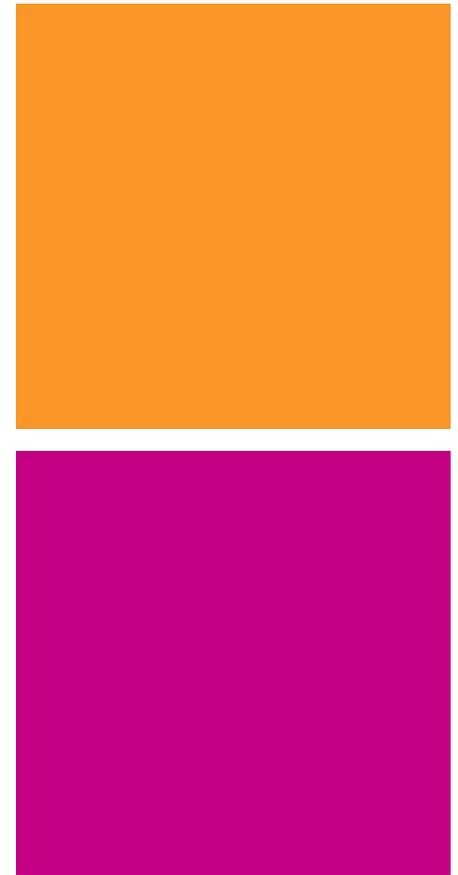
# + Analysis

## Patient descriptives

- socio-demographic characteristics and # of comorbidities
- average costs for major categories: hospitalizations, physician services, ED visits, prescription drugs, home care, long-term care and other care

## Regression analysis

- 2 regression models
  - sample of high-cost patients excluding those with majority MHA costs (see sensitivity analysis)
  - dependent variable: total cost
- GLM with Poisson distribution and log link
  - modified Park test



# + Analysis

## Regression analysis

### Model 1

- main independent variable: dummy on whether patient had any MHA-related care

### Model 2

- main independent variables: dummy dx (hosp.) variables indicating cancer; diabetes; ischemic heart diseases; heart failure; stroke; COPD; renal failure; schizophrenia or other psychoses; mood disorders; dementia; substance abuse
- control variables (both models): sex, age, age<sup>2</sup>, neighbourhood income quintile, immigration /refugee status, # of comorbidities, long-term care indicator, rurality indicator, LHIN

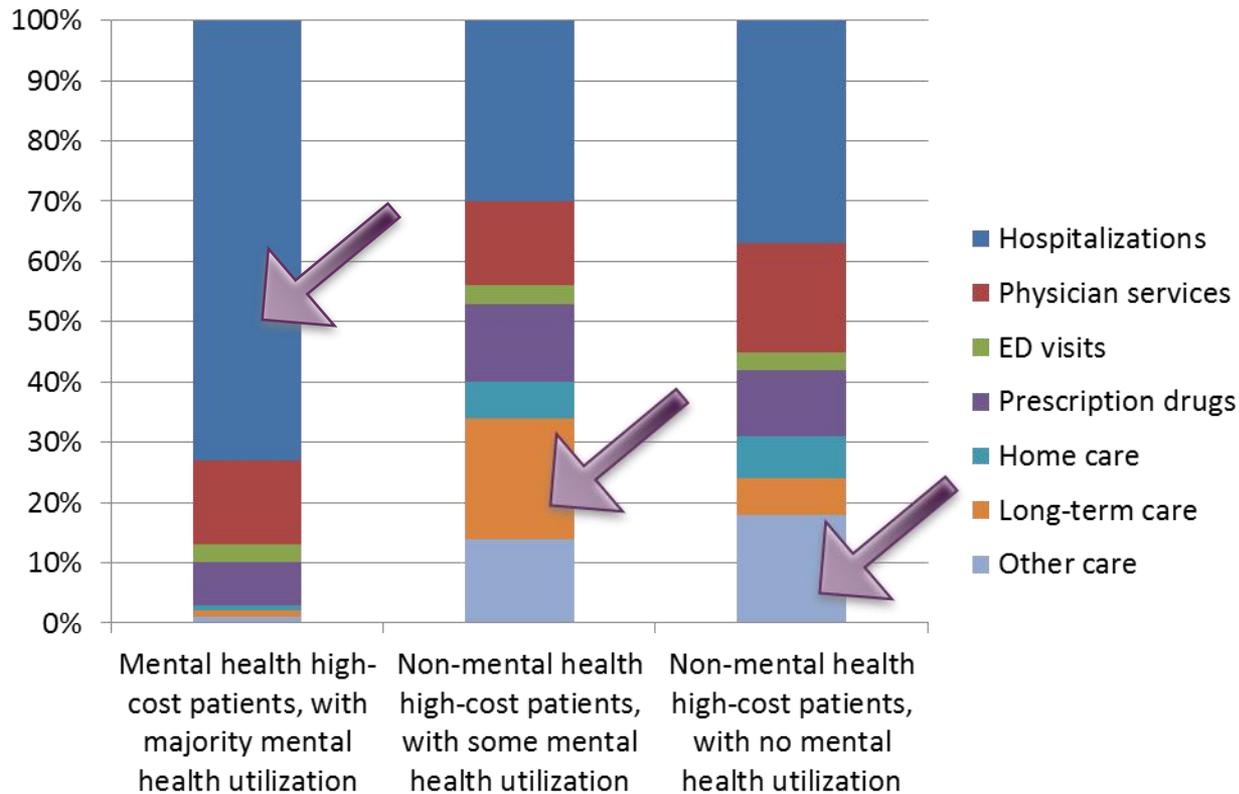
# + Results

## Patient descriptives

- all patients: \$24,094; \$23.8 billion
- majority MHA care: \$31,611, 5%; \$1.6 billion (7%)
  - median age 46, 51% female, 29% low income quintile, 33% 10+ ADGs, 2.6% LTC residence
- some MHA care: \$27,883, 46%; \$12.7 bil. (53%)
  - median age 70, 62% female, 25% low income quintile, 47% 10+ ADGs, 17.4% LTC residence
- no MHA care: \$19,702, 49%; \$9.5 billion (40%)
  - median age 63, 55% female, 20% low income quintile, 28% 10+ ADGs, 4.0% LTC residence
- ≈ \$8,000 cost difference; ≠ patient characteristics

# + Results

## Cost distribution across major health services by high-cost patient groups in Ontario, 2012



# + Results

**Regression analysis:** conditional marginal effect of sociodemographic and clinical variables on costs among patients with some or no MHA care

Variable	Conditional Marginal Effect	Standard Error	p-value
Any mental health use	2,691.783	63.070	0.000
Male	3,254.076	59.605	0.000
Age	668.062	10.322	0.000
Age <sup>2</sup>	-4.225	0.082	0.000
Neighbourhood income quintile 2	69.441	84.773	0.413
Neighbourhood income quintile 3	-412.711	85.929	0.000
Neighbourhood income quintile 4	-659.338	85.891	0.000
Neighbourhood income quintile 5	-817.532	88.086	0.000
Immigrant	-1,021.654	120.361	0.000
Refugee	-1,837.878	241.045	0.000
Number of comorbidities	539.648	7.909	0.000
Long-term care residence	17,311.570	64.360	0.000
Urban residence	977.038	83.555	0.000
LHIN effects	Yes		

## + Results

**Regression analysis:** conditional marginal effect of sociodemographic, clinical and diagnostic variables among patients with some or no MHA care

Variable	Conditional Marginal Effect	Standard Error	p-value
Schizophrenia and other psychoses	<b>11,479.32</b>	1168.543	0.000
Mood (affective) disorders	10,315.87	661.660	0.000
Dementia	7,714.71	364.317	0.000
Substance abuse	4,155.31	592.797	0.000
Cancer	<b>14,568.11</b>	97.644	0.000
Diabetes	<b>16,073.29</b>	247.738	0.000
Ischemic heart diseases	8,315.84	111.974	0.000
Heart failure	10,361.46	160.155	0.000
Stroke	<b>12,435.48</b>	193.860	0.000
COPD	6,547.08	153.385	0.000
Renal failure	<b>13,113.00</b>	247.673	0.000

# + Results

## Sensitivity analyses

- inclusion majority MHA high-cost patients in Model 2 → change in MHA dx-related coefficients
  - in particular, psychosis-related coefficient more than doubled in value (**\$24,851**; SE = 258), became largest predictor (in magnitude) of costs
- results largely unchanged with exclusion of drug costs for patients < 65 covered under public provincial drug plan

# + Discussion

## Summary

- considerable patient heterogeneity
- patients who require MHA care incur higher mean costs, even after controlling for relevant variables
- having hospitalization for psychosis or mood disorders comparable, from cost perspective, to hospitalization for stroke or heart failure
- policies/interventions designed to address quality of care and high spending in general will likely **not** apply to all patient subgroups

## Recommendations (interventions)

- majority MHA care patients: address high readmissions and low post-discharge physician visits (de Oliveira et al., 2016)

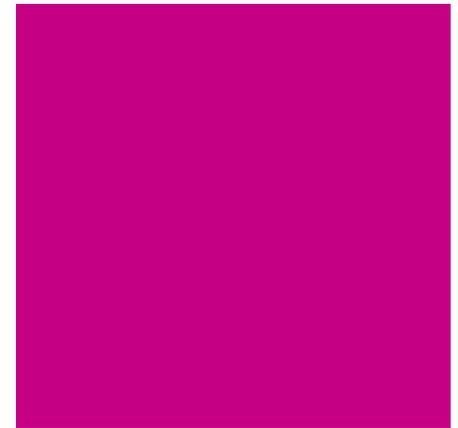
# + Discussion

## Recommendations

- non MHA care patients: care coordination and disease management models
- some MHA care patients: timely access to MHA care + integration of MHA services into broader care coordination and disease management models

## Limitations

- did not examine children/youth
- missing cost data:
  - community-based addiction care
  - drugs not covered under public provincial drug plan  
→ patient misclassification?





## Research Team

- Claire de Oliveira
- Joyce Cheng
- Jürgen Rehm
- Paul Kurdyak

### **Contact information:**

Claire de Oliveira, M.A., PhD  
[claire.deoliveira@camh.ca](mailto:claire.deoliveira@camh.ca)

