



Yes Big Data is a Big Deal!

The Importance of Primary Care Data in a Learning Health System

Richard Birtwhistle MD MSc FCFP

CPCSSN



RCSSSP

Canadian Primary Care Sentinel Surveillance Network
Réseau canadien de surveillance sentinelle en soins primaires

**I have received research funding for CPCSSN
from CIHR, PHAC, Canadian Frailty Network, CIMVHR,
Calian Canada, Shire Canada, Eli Lilly Canada,
Merck Canada and Pfizer Canada**

- 1. Understand that data is fundamental to a learning health system.**
- 2. Provide an overview of the CPCSSN.**
- 3. Examples of CPCSSN data use for practice quality improvement, research and surveillance and health system use.**

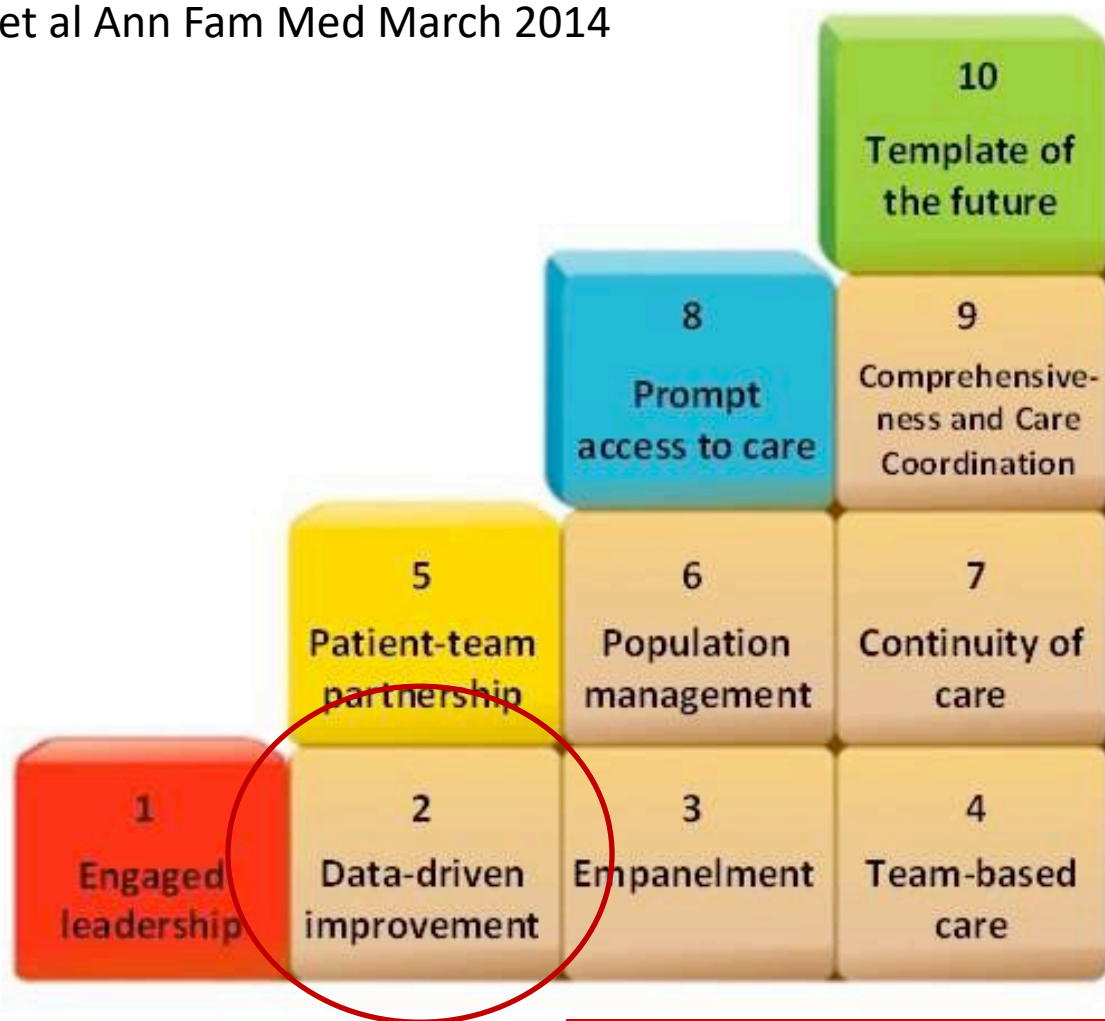
2012 IOM Recommendations

1. Digital Infrastructure
2. Data Utility
3. Clinical Decision Aids



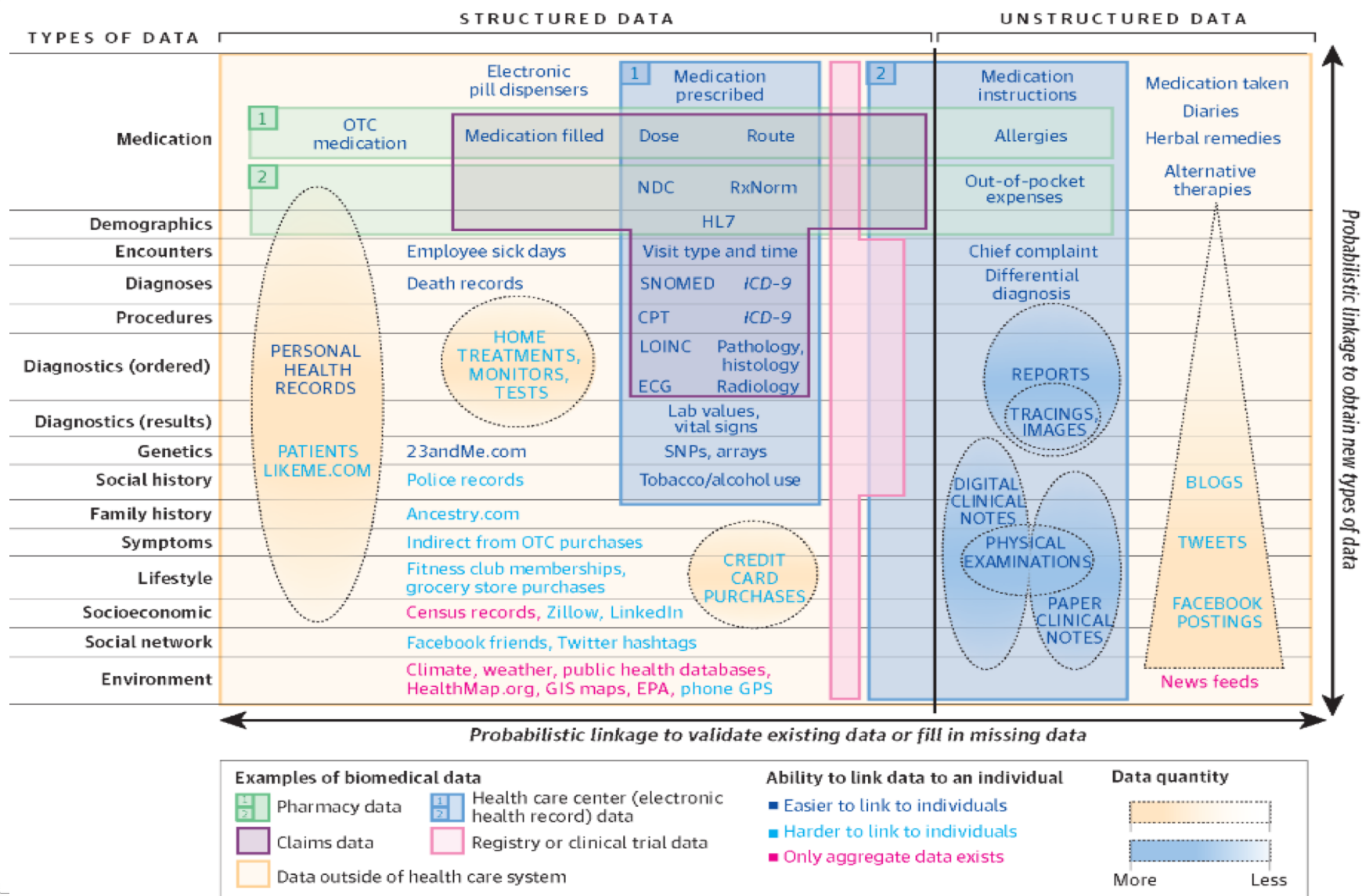
10 Building Blocks of High-Performing Primary Care

T Bodenheimer et al Ann Fam Med March 2014



Finding the Missing Link for Big Biomedical Data

Weber GM, Mandl KD and Kohane IS, JAMA.2014;311(24):2479-2480




The Canadian Primary Care Sentinel Surveillance Network:

- 1.8 million Canadian patients
- 1300 practices
- 12 PBRNs in 7 provinces, 1 territory
- Some EMR data back to 2003
- Started in 2008
- \$12.5M funding from PHAC
- Strong partnerships with College of Family Physicians of Canada, Queen's and other Universities



B.C. (BCPCReN), Alberta (SAPCReN, NAPCReN), NWT, Manitoba (MaPCReN), Ontario (DELPHI, UTOPIAN, EON, MUSIC,), Quebec (RRSPUM), Nova Scotia/New Brunswick (MaRNet), Newfoundland (APBRN)

- 
- Provider profile
 - Patient socio-demographics
 - Disease/ health condition
 - Encounter data
 - Risk factor data
 - Examination data
 - Medications
 - Laboratory data
 - Referral data
 - Procedure data

Research





Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Canadian Journal of Diabetes

journal homepage:
www.canadianjournalofdiabetes.com

**DIABETES
CANADA**



Original Research

The Prevalence and Risk for Herpes Zoster Infection in Adult Patients With Diabetes Mellitus in the Canadian Primary Care Sentinel Surveillance Network

John A. Queenan PhD, MSc^{a,*}; Pendar Farahani MD, MSc, FRCPC, DABIM, FACP, FACE^b;
Behrouz Ehsani-Moghadam PhD^a; Richard V. Birtwhistle MD, MSc^a

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^b Programs for Assessment of Technology in Health (PATH), McMaster University, Hamilton, Ontario, Canada

Risk Ratios for VZV by select disease status

Variable	With Zoster (n)	Without Zoster (n)	Unadjusted 95% CI			Age-sex adjusted 95% CI		
			RR	Lower	Upper	RR	Lower	Upper
No indication of diagnoses of interest*	3343	470407	Reference			Reference		
With Diabetes	1210	60950	2.73	2.55	2.92	1.27	1.19	1.37
With COPD	521	22546	2.87	2.57	3.21	1.24	1.10	1.39
With any Neoplasm	1454	73947	3.57	3.29	3.86	1.60	1.47	1.74
With HIV/AIDS	48	1418	6.13	4.16	9.01	4.34	2.95	6.38

Patients who have no indication of Diabetes, COPD, Hypertension, Depression, Osteoarthritis, Dementia, Epilepsy, Parkinsonism, any Neoplasm, or HIV/AIDS.

Open Access

Research

BMJ Open Association between neighbourhood walkability and metabolic risk factors influenced by physical activity: a cross-sectional study of adults in Toronto, Canada

C K Jennifer Loo,¹ Michelle Greiver,^{2,3} Babak Aliarzadeh,^{2,3} Daniel Lewis⁴

Key findings: neighbourhood walkability and metabolic risk factors

We observed an association between higher neighbourhood walkability and objectively measured metabolic risk factors. The magnitude of differences observed for BMI across all age groups and for blood pressure in middle-aged adults was clinically significant and relevant for population health.

Data Linkage



CMAJ OPEN

Research

Hospital admission rates and emergency department use in relation to glycated hemoglobin in people with diabetes mellitus: a linkage study using electronic medical record and administrative data in Ontario

Richard Birtwhistle MD MSc, Michael E. Green MD MPH, Eliot Frymire BEd MA,
Simone Dahrouge PhD, Marlo Whitehead MSc, Shahriar Khan MSc, Michelle Greiver MD MSc,
Richard H. Glazier MD MPH

Level of HbA1c and hospital and emergency room utilization

Variable	A1c level	<7	7-8	>8	Missing	P value
N		5526	2662	1814	2356	
Age (yr)	Mean	65.7	64.7	58.1	61.0	<.001
Female	%	50.1	47	45.4	50.3	<.001
Any acute complication	%	1.9	3.1	6.0	-	<.001
Any chronic complication	%	2.1	3.3	3.8	-	<.001
ER visits	Mean	0.63	0.67	0.95	-	<.001
Inpatient episodes	Mean	0.18	0.22	0.26	-	<.001
ADGs		6.39	6.15	5.98	6.35	<.001

Data Analytics



Frailty



Post Traumatic Stress Disorder



Identification of Patients with Rare Disease in Electronic Medical Records

Mucopolysaccharidosis Type II Detection by Naïve Bayes Classifier: an Example of Patient Classification for a Rare Disease Using Electronic Medical Records

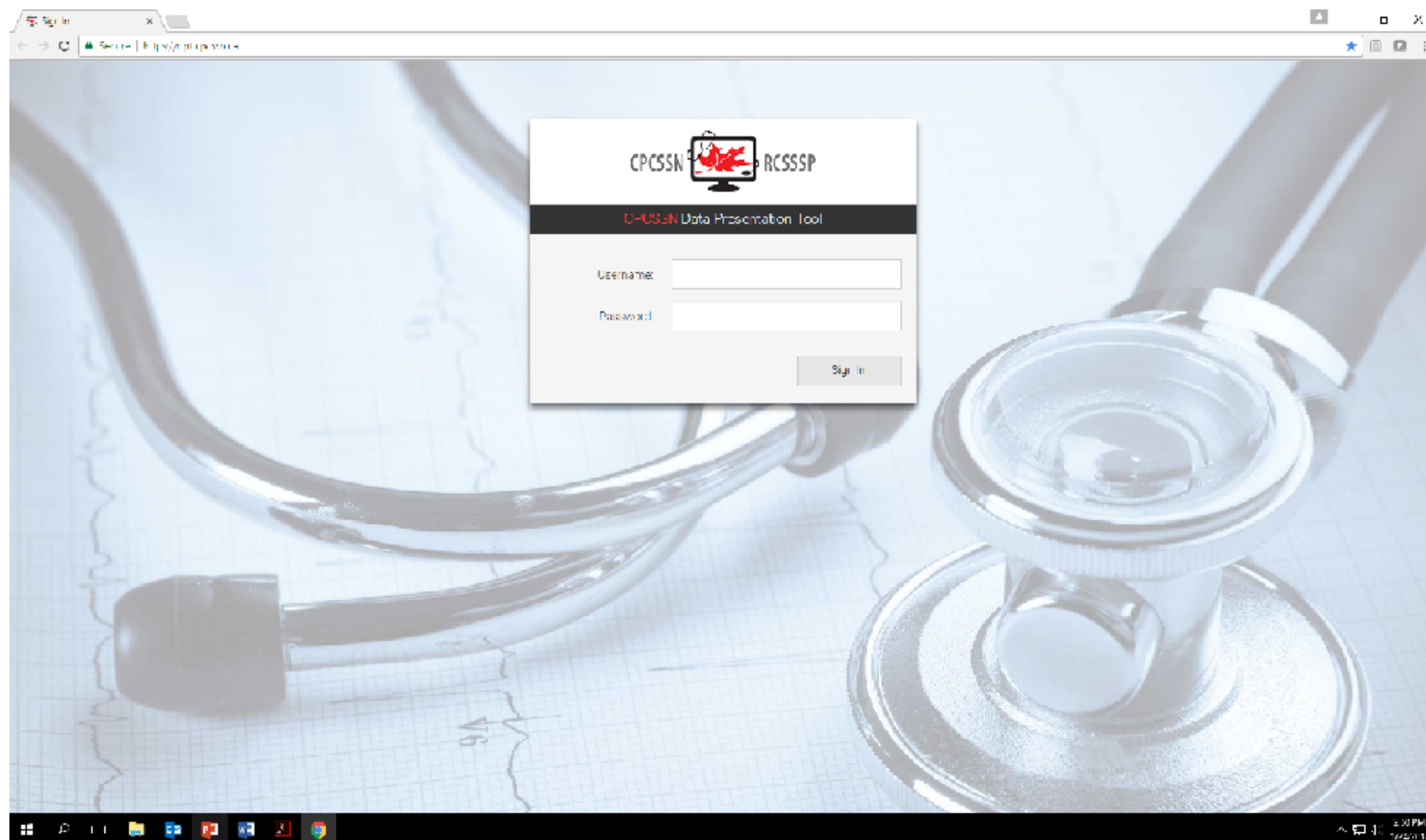
Authors

Behrouz Ehsani-Moghaddam (PhD) ¹, John A. Queenan (PhD) ¹, Jennifer MacKenzie (MD)², Richard V. Birtwhistle (MD, MSc) ¹

Practice Quality Improvement



CPCSSN Data Presentation Tool



10 SENTINELS

49,813 PATIENTS

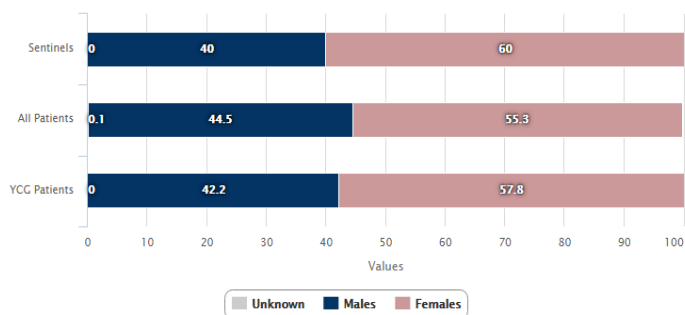
Entire Network

All Patients: 49,813
YCG Patients: 25,754

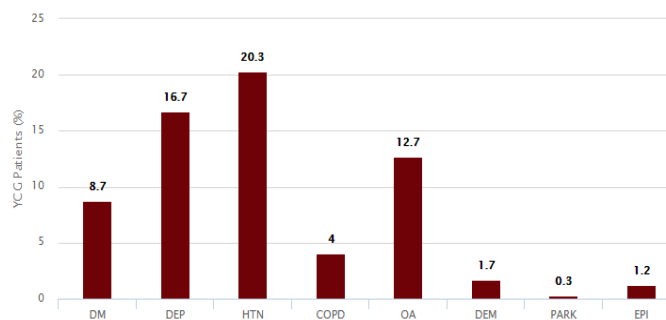
Total Active Sentinels: 10
(Ave Age: 44.2)
(Ave Age: 43.8)

Pts Per Sentinel: 4,981
Pts Per Sentinel: 2,575

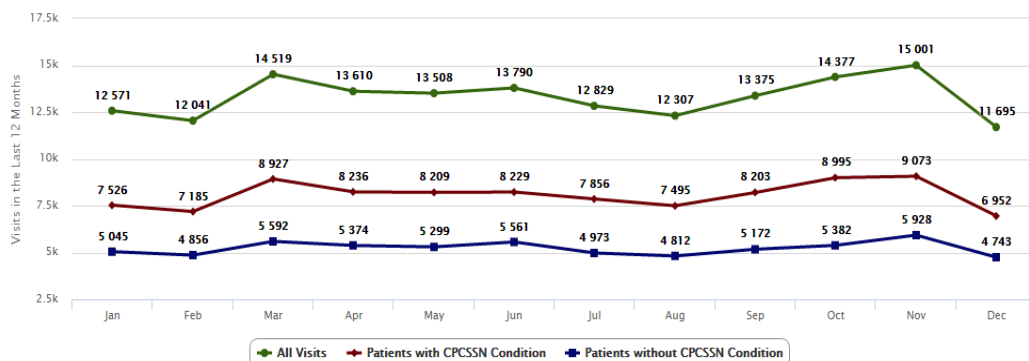
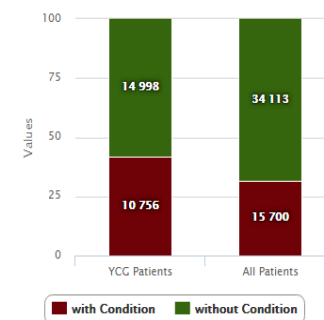
Gender Distribution (%)



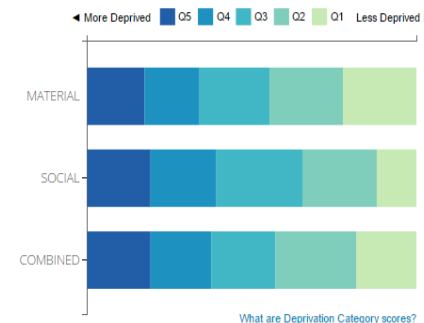
Condition Proportion (%) - YCG



Condition Ratio



Deprivation Scores



Name:

Urge, urgency incontinence, overactive bladder

FIND

VIEW CASES

UPDATE DISEASECASE TABLE

NEW

DELETE

PDF

General Patient Rules:

Gender: Female

Age Range: 18 -































Time Since Last Visit:

Export Definition

Import Definition

Findings Log

+ Clinical Criteria (Each line represents an OR search)

Criteria Set Name:	HC Texts - Overactive Bladder; Urge; Frequency	1	+		
Criteria Set Name:	Billing Texts - Overactive Bladder; Urge; Frequency	2	+		
Criteria Set Name:	Encounter Texts - Overactive Bladder; Urge;	3	+		
Criteria Set Name:	HC Texts - Nocturia, Polyuria, Other	4	+		
Criteria Set Name:	Billing Texts - Nocturia, Polyuria, Other	5	+		
Criteria Set Name:	Encounter Texts - Nocturia, Polyuria, Other	6	+		
Criteria Set Name:	HC ICD9 Codes - 596 variations	7	+		
Criteria Set Name:	Billing ICD9 Codes - 596 variations	8	+		
Criteria Set Name:	Encounter ICD9 Codes - 596 variations	9	+		
Criteria Set Name:	HC ICD9 Codes - 788 variations	10	+		
Criteria Set Name:	Billing ICD9 Codes - 788 variations	11	+		
Criteria Set Name:	Encounter ICD9 Codes - 788 variations	12	+		
Criteria Set Name:	Medications - ATC Codes G04BD04	13	+		
Criteria Set Name:	Medications - ATC Codes G04BD07	14	+		
Criteria Set Name:	Medications - ATC Codes G04BD11	15	+		

Select Denominator: Patient - Females > 17

Denominator - Total Pts: 4,496

Total Processing Time:

.2 min

Algorithm Results - Total Pts: 31

Prevalence: 0.69%

Encounter ICD9 Codes - 788 variations (Each line represents an AND search)

Table:	EncounterDiagnosis	Search Type:	Text	Field Type:	Both
Description:	788.3 or 788.4 or 788.6 or 788.9			AND Type:	Is
Search Text(s):	788.3;788.4;788.6;788.9				

Table Criteria/Rules: +

Table:		Count:	
Exception Table:		Count:	

Other Case Definitions

Chronic Non-Cancer Pain

Fecal Incontinence

IHD

Mechanical Valve

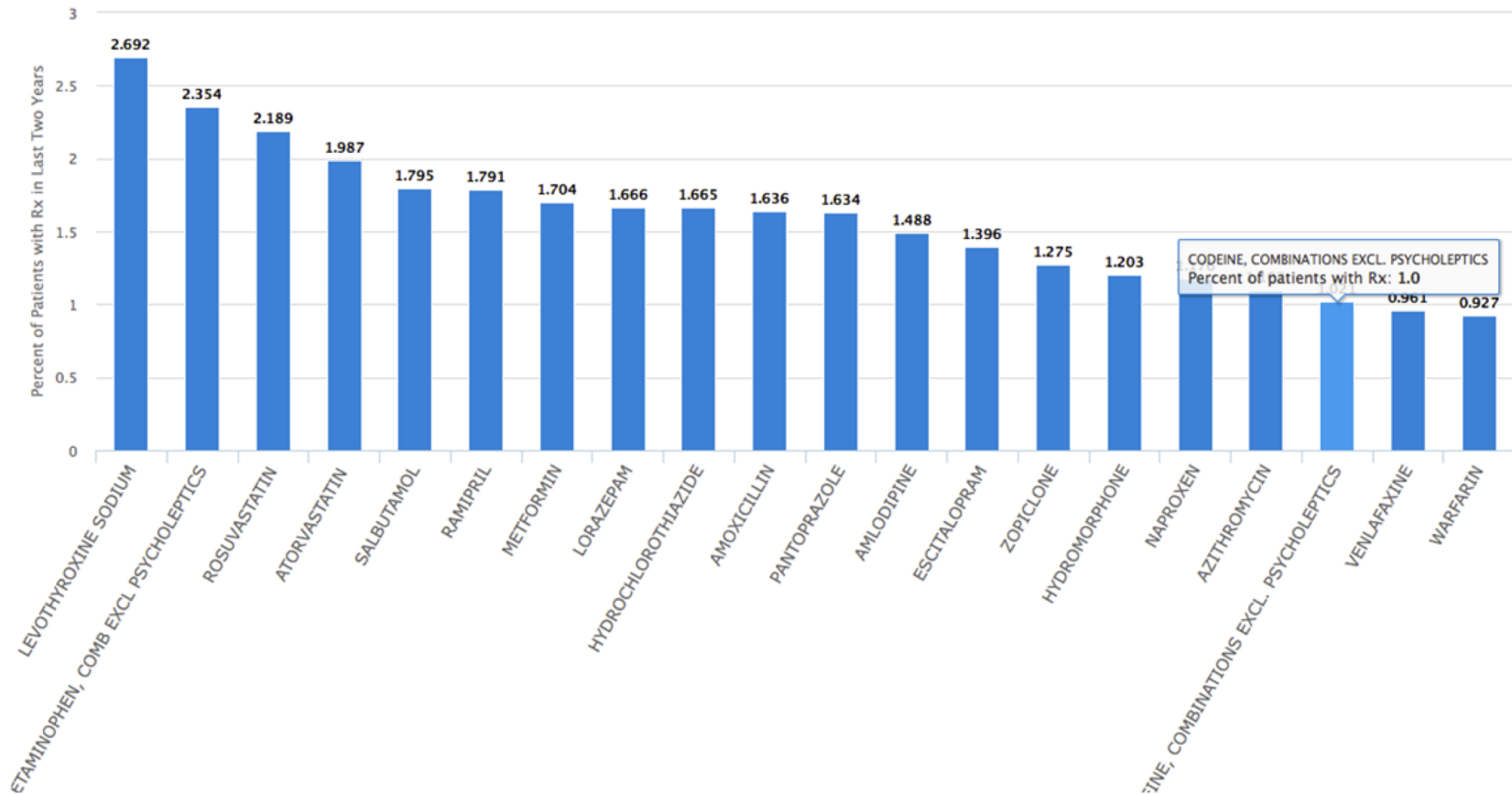
Other PFD

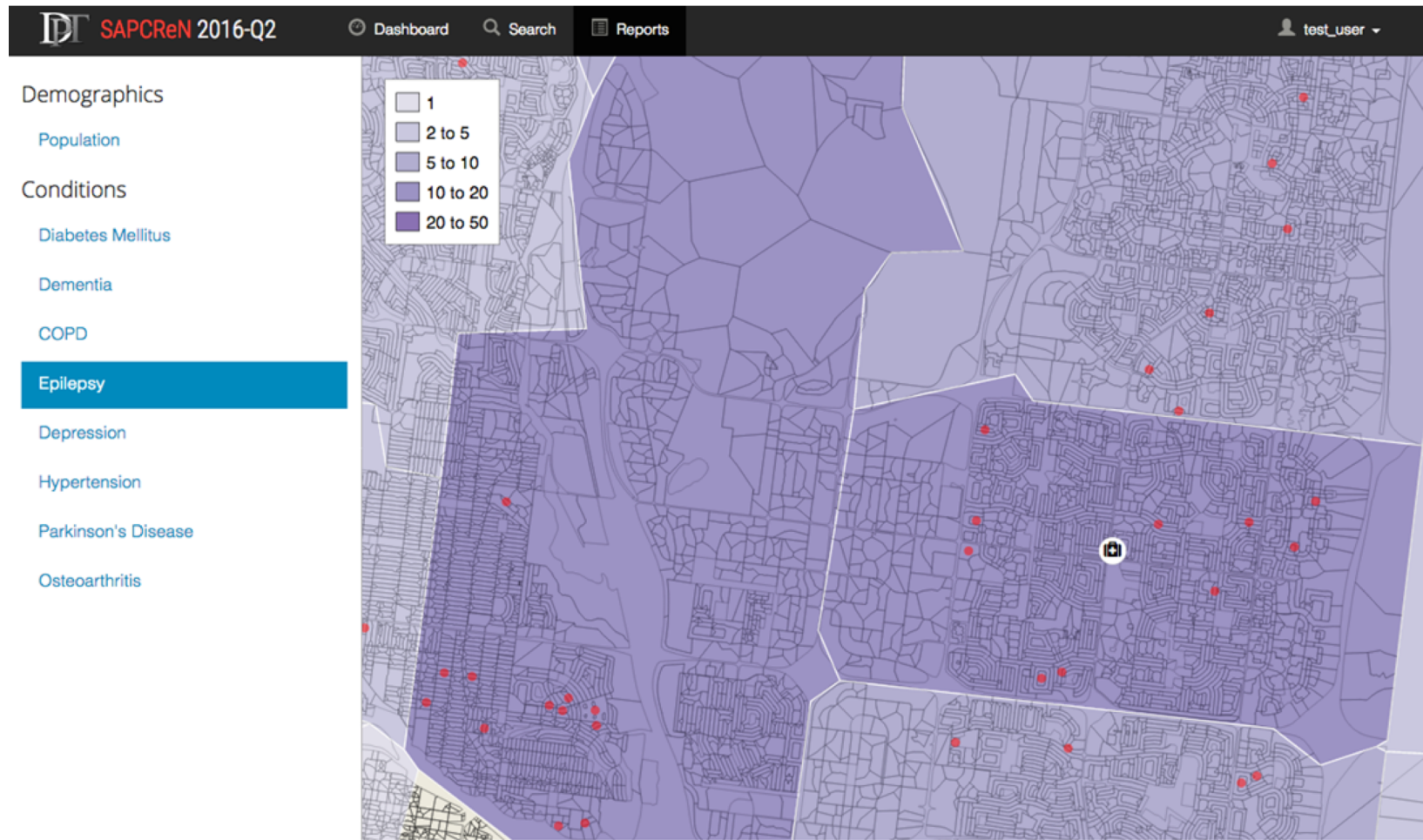
Speech Disorders: Aphasia

Stress Urinary Incontinence

Top 20 Medications

By Unique Patients and Based on ATC Coding







- EMR data is difficult to work with
- Need for continuous quality monitoring
- Cost of data access
- Data Privacy



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Réseau canadien de surveillance sentinelle en soins primaires

CPCSSN Partner Universities



a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA





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<http://www.cpcssn.ca>