Concordance Of Serious Mental Illness Diagnosis Between Primary Care And Hospital Records

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Background

- People with serious mental illnesses (bipolar disorder, schizophrenia, severe depression) die 10-25 years sooner than those without these conditions

- Cardiovascular disease and neoplasms – conditions for which prevention is a key primary care activity – are the most substantial contributors to mortality

Hayes 2017, Gatov 2014, De Hert 2011

- Many challenges exist in caring for these patients, including those related to coordination between general and mental health services
- In order to address the high mortality associated with these conditions, it is necessary to be able to identify these patients and recognize they are at higher risk

Health Databank Collaborative

- Linked primary-secondary care database between North York General Hospital (NYGH) and the North York Family Health Team (NYFHT) in Toronto, Ontario, Canada

- All hospital and primary care data including emergency department and inpatient admissions are linked to primary care EMR data

- NYGH operates at Healthcare Information and Management Systems Society Level 6 and won the Davies Enterprise award in 2016 for outstanding use of IT to improve outcomes and value
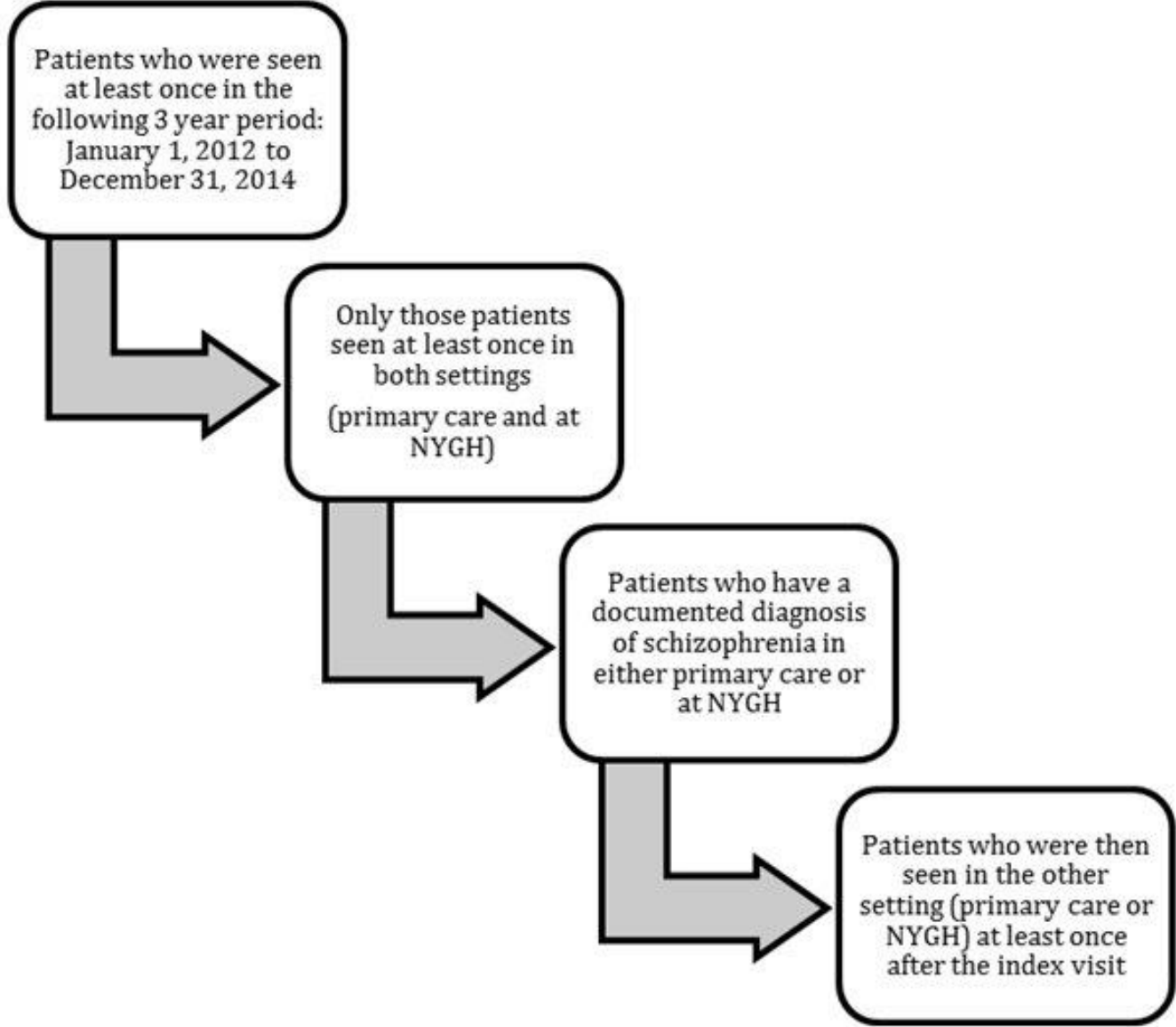
- NYFHT physicians are part of UTOPIAN, the University of Toronto Practice-Based Research Network

- 77 family physicians provide data to the HDC, with 103577 patients >16 yo in the database

- One study already completed, on agreement of diagnoses of COPD and heart failure between hospital and primary care records (Greiver 2018)

Research questions

What is the concordance between primary care and hospital diagnosis of bipolar disorder and schizophrenia?

What factors are related to concordant labelling?

What is the total size of the population of people with these conditions in the HDC database?

Patients who were seen at least once in the following 3 year period: January 1, 2012 to December 31, 2014

Only those patients seen at least once in both settings (primary care and at NYGH)

Patients who have a documented diagnosis of schizophrenia in either primary care or at NYGH

Patients who were then seen in the other setting (primary care or NYGH) at least once after the index visit

Cohort generation

| Schizophrenia		Bipolar disorder	
Primary care	Hospital	Primary care	Hospital
ICD-9 295 (Schizophrenia), 298 (Psychosis NOS), Free text %psycho% or %schizo%	ICD-10 F20 (Schizophrenia), F25, F29 (Psychosis NOS)	ICD-9 296 (Bipolar disorder) Free text "bipolar"	ICD-10 F31 (Bipolar disorder)

Schizophrenia

168 patients in the database

86 identified only in NYFHT data (51.2%)

43 identified only in NYGH data (25.6%)

39 patients had concordant labelling between the two settings (23.2%)

Schizophrenia

NYFHT   NYGH

86   39   43
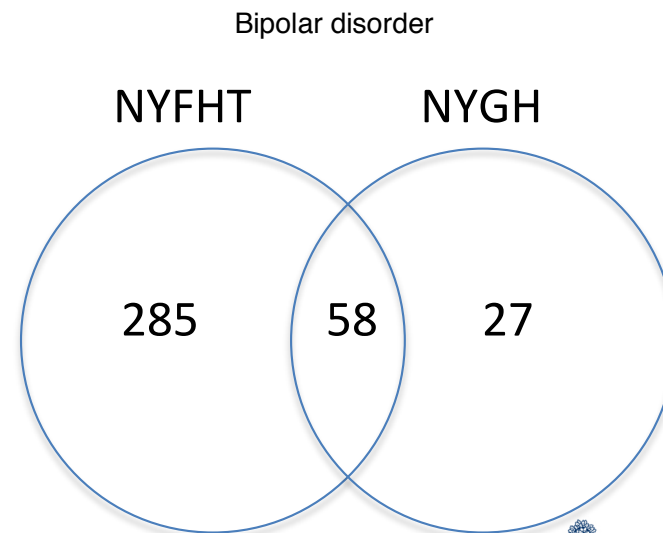
NYFHT   NYGH
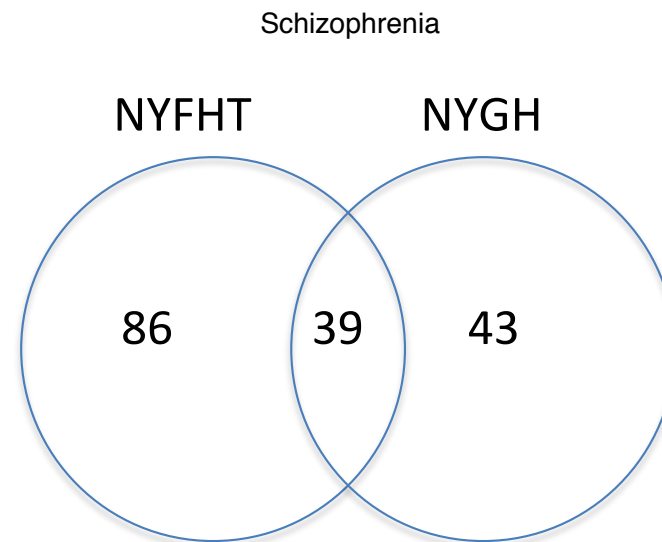
Bipolar

370 patients in the database

285 identified only in NYFHT data (77.0%)

27 identified only in NYGH data (7.3%)

58 patients had concordant labelling between the two settings (15.4%)

Bipolar disorder

NYFHT   NYGH

285   58   27

Diagnostic concordance

Effect	Index Group	Reference Group	Schizophrenia			Bipolar disorder		
			Odds ratio	95% confidence interval		Odds ratio	95% confidence interval	
Age range (years)	41 - 60	16 - 40	2.25	0.68	7.47	0.60	0.26	1.41
	61+	16 - 40	0.72	0.18	2.92	0.58	0.22	1.54
Gender	F	M	0.90	0.34	2.42	0.61	0.29	1.29
Income quintiles	2	1	0.83	0.17	4.03	1.24	0.42	3.64
	3	1	0.54	0.13	2.23	0.66	0.22	1.97
	4	1	0.80	0.22	2.92	0.76	0.25	2.31
	5	1	0.34	0.09	1.31	0.68	0.26	1.76
Number of co-morbidities	2+	0-1	0.64	0.20	2.06	1.40	0.62	3.16
Number of ED visits	1	0	0.35	0.08	1.51	1.19	0.46	3.03
	2+	0	0.89	0.26	3.03	1.51	0.63	3.66
Number of inpatient visits	1	0	3.04	0.78	11.78	**3.99**	**1.64**	**9.68**
	2+	0	2.42	0.64	9.20	**8.38**	**3.16**	**22.22**
Number of primary care visits	11-20	1-10	**0.20**	**0.06**	**0.68**	1.39	0.59	3.25
	21+	1-10	0.32	0.10	1.09	0.81	0.33	1.97
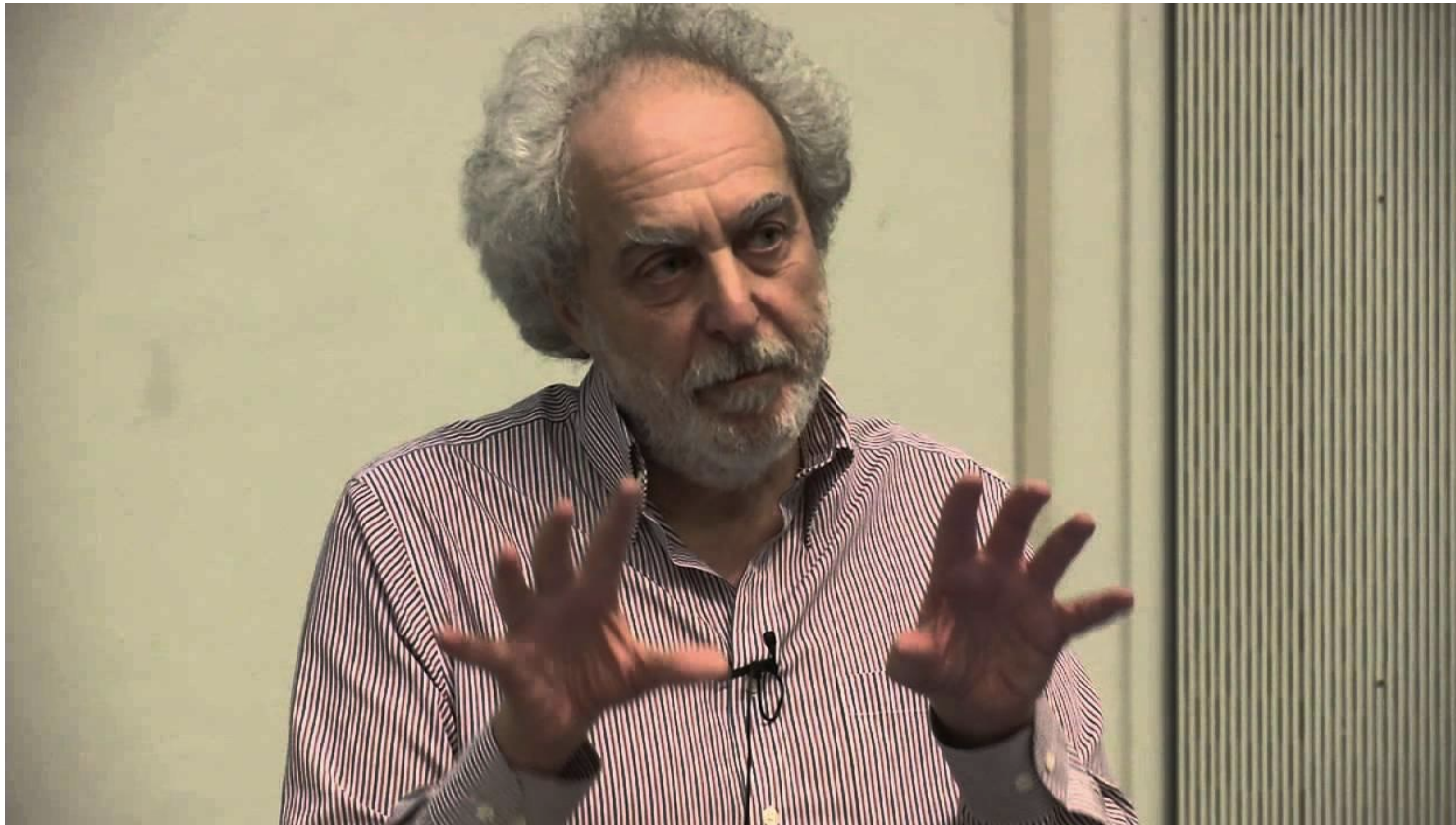
Doug Altman, 1948-2018

Capture-recapture modelling

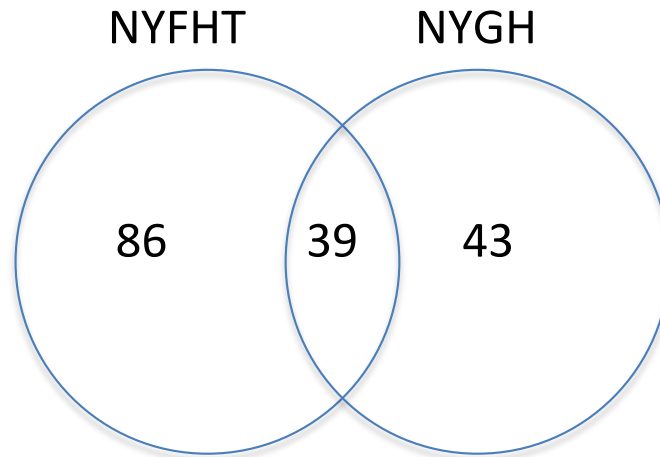Estimating the number of patients with each condition in the database who are unlabeled in either setting

$$p_o = \frac{1}{\left(1 + \frac{p_3}{p_1}\right) * \left(1 + \frac{p_3}{p_2}\right)}$$

(1) the probability of patients being looked after in the hospital (p_1); these were patients with a diagnostic label recorded in the hospital

(2) the probability of patients being looked after in primary care (p_2); these were patients with a diagnostic label recorded in primary care

(3) the probability of patients being looked after in both settings (p_3); these were patients with a diagnostic label recorded in both settings

(4) The probability that patients had a condition of interest, were seen in both settings and had their diagnostic label missed by both (p_o).
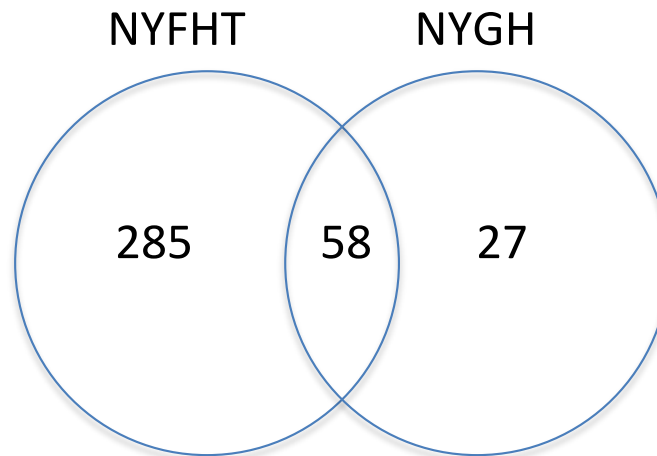
Capture-recapture modelling

- Schizophrenia: 36.1% (95% CI 25.4 – 46.7), suggesting a total population of 263 (prevalence 254/100000; 95% CI 225-315)

- Bipolar: 26.4% (95% CI 17.4 – 35.4), suggesting a total population of 503 (prevalence 486/100000; 95% CI 448-572)

Schizophrenia

NYFHT   NYGH

NYFHT   NYGH
86   39   43

86   39   43

95

NYFHT   NYGH

Bipolar disorder

NYFHT   NYGH
285   58   27

285   58   27

133

Limitations

- Unable to establish 'gold standard' for determining diagnostic accuracy

- Conditions may not be identified in ED records (may have presented for minor illnesses)

- Some discordant labelling may be due to improved diagnosis - patients may have been diagnosed differently at first (e.g. substance use disorder), then reclassified as SMI afterwards

Conclusions

- Overall agreement is low between hospital and primary care records for diagnosis of SMI

- >30% of patients with these conditions are likely being 'missed' in both settings

- Efforts are necessary to improve labeling of these conditions across settings in order to provide appropriate preventive and secondary care

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More on capture-recapture modelling

Assumptions:

(1) the capture probabilities of the two sources (i.e. list of patients in each setting) are independent

(2) the probability of being captured from each source is assumed to be the same for every subject

In order to relax the importance of these assumptions, we attempted to stratify population estimates by patient characteristics (age, sex, SES).

However due to low sample sizes it was not possible to do this.