

Appendix for Suicidal ideation and suicidal behavior in psychotic disorders - 1

APPENDIX 1 – SENSITIVITY ANALYSES INCLUDING VISITS BY PATIENTS WITH ANY PSYCHOTIC DISORDER DIAGNOSIS IN PAST 5 YEARS

Appendix Table 1a – Baseline characteristics of sampled visits according to response to PHQ9 item 9 (including visits by people with any diagnosis of psychotic disorder in prior 5 years).

	Not at all (n=69,576)	Several days (n=15,317)	More than half the days (n=6445)	Nearly every day (n=5768)	Total (n=97,106)
Age at visit*					
18 to 29	12,626 (18%)	3078 (20%)	1125 (18%)	1039 (18%)	17,868 (18%)
30 to 44	13,943 (20%)	3163 (21%)	1382 (21%)	1354 (24%)	19,842 (20%)
45 to 64	27,904 (40%)	6238 (41%)	2889 (45%)	2445 (42%)	39,476 (41%)
65 or older	15,103 (22%)	2838 (19%)	1049 (16%)	930 (16%)	19,920 (20%)
Female*	40,772 (59%)	8906 (58%)	4130 (64%)	3779 (66%)	57,587 (59%)
Race*					
White	52,901 (76%)	11,676 (76%)	4862 (75%)	4140 (72%)	73,579 (76%)
Black	6013 (9%)	1191 (8%)	617 (10%)	677 (12%)	8498 (9%)
Asian	3224 (5%)	738 (5%)	275 (4%)	186 (3%)	4423 (5%)
Native American/Alaskan Native	1303 (2%)	277 (2%)	145 (2%)	137 (2%)	1862 (2%)
Native Hawaiian/Pacific Islander	1149 (2%)	312 (2%)	146 (2%)	213 (4%)	1820 (2%)
Other or Unknown	3985 (7%)	1123 (7%)	400 (6%)	415 (7%)	6923 (7%)
Hispanic Ethnicity*	3817 (6%)	993 (6%)	429 (7%)	402 (7%)	5641 (6%)
Service Use in Past Year					
Mental Health Hospitalization*	24,485 (32%)	5499 (36%)	2516 (39%)	2661 (46%)	33,161 (34%)
Mental Health ED Visit*	27,318 (39%)	6688 (44%)	2822 (44%)	2889 (52%)	39,817 (41%)
Diagnosed Self-Harm*	3072 (4%)	1136 (7%)	671 (10%)	695 (12%)	5574 (6%)
Total PHQ9 Score at Visit*					
0 to 9	47,775 (69%)	4530 (30%)	733 (11%)	560 (10%)	53,598 (55%)
10 to 14	12,142 (18%)	4355 (28%)	906 (14%)	281 (5%)	17,684 (18%)
15 to 19	6764 (10%)	3991 (26%)	2231 (35%)	906 (16%)	13,892 (14%)
20 or higher	2895 (4%)	2441 (16%)	2575 (40%)	4021 (70%)	11,932 (12%)

* - p<.001 for all comparisons by Chi-square test for heterogeneity across PHQ9 groups

Appendix for Suicidal ideation and suicidal behavior in psychotic disorders - 2

Appendix Table 2a – Suicide attempts and suicide deaths over 30 and 90 days following index visit according to response to PHQ9 item 9 at index visit (including visits by people with any diagnosis of psychotic disorder in prior 5 years).

Item 9 Response at Index Visit	Total (n=97,106)	Not at all (n=69,576)	Several days (n=15,317)	More than half the days (n=6445)	Nearly every day (n=5768)	Test Statistic (df=3)
Any Suicide Attempt						
Within 90 days	1479 (1.5%)	690 (1.0%)	305 (2.0%)	216 (3.4%)	268 (4.7%)	$X^2=674$, $p<.001$
Within 30 days	679 (0.7%)	304 (0.4%)	139 (0.9%)	88 (1.4%)	148 (2.6%)	$X^2= 410$, $p<.001$
	Total (n=87,173)	Not at all (n=62,398)	Several days (n=13,768)	More than half the days (n=5813)	Nearly every day (n=5194)	
Any Suicide Death						
Within 90 days	41 (0.05%)	26 (0.04%)	8 (0.06%)	4 (0.07%)	3 (0.06%)	$X^2=1.46$, $p=.69$
Within 30 days	20 (0.02%)	10 (0.02%)	5 (0.04%)	4 (0.07%)	1 (0.02%)	$X^2= 7.7$, $p=.052$
Maximum Item 9 Response in Last year	Total (n=97,106)	Not at all (n=55,744)	Several days (n=20,127)	More than half the days (n=9971)	Nearly every day (n=11,264)	
Any Suicide Attempt						
Within 90 days	1479 (1.5%)	474 (0.9%)	293 (1.5%)	244 (2.5%)	468 (4.2%)	$X^2= 745$, $p<.001$
Within 30 days	679 (0.7%)	202 (0.4%)	141 (0.7%)	109 (1.1%)	227 (2.0%)	$X^2= 393$, $p<.001$
	Total (n=87,173)	Not at all (n=48,833)	Several days (n=18,726)	More than half the days (n=9182)	Nearly every day (n=10,432)	
Any Suicide Death						
Within 90 days	41 (0.05%)	18 (0.04%)	13 (0.07%)	2 (0.02%)	8 (0.08%)	$X^2=6.90$, $p=.075$
Within 30 days	20 (0.02%)	5 (0.01%)	10 (0.05%)	1 (0.01%)	4 (0.04%)	$X^2=13.48$, $p=.004$

Appendix for Suicidal ideation and suicidal behavior in psychotic disorders - 4

Appendix Table 3a – Logistic regression models predicting likelihood of suicide attempt over 90 days following index visit (including visits by people with any diagnosis of psychotic disorder in prior 5 years).

	Model 1: Item 9 response only	Model 2: Item 9 response and recent utilization	Model 3: Item 9 response, recent utilization, and Item 9 response in past year
Item 9 Score at Index Visit	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Not at all	1	1	1
Several days	2.03 (1.60 – 2.56)	1.72 (1.38 – 2.16)	1.34 (1.06 – 1.70)
More than half	3.46 (2.60 – 4.61)	2.66 (2.04 – 3.47)	1.80 (1.40 – 2.30)
Nearly every day	4.88 (3.51 – 6.78)	3.33 (2.48 – 4.47)	1.88 (1.35 – 2.61)
Service Use in Past Year			
Mental Health Hospitalization		1.83 (1.40 – 2.39)	1.80 (1.38 – 2.36)
Mental Health ED Visit		1.67 (1.28 – 2.17)	1.63 (1.25 – 2.12)
Diagnosed Self-Harm		5.21 (3.76 – 7.21)	5.04 (3.63 – 6.99)
Maximum Item 9 Score in last year			
Not at all			1
Several days			1.28 (0.97 – 1.68)
More than half			1.52 (1.09 – 2.12)
Nearly every day			1.99 (1.47 – 2.69)

APPENDIX 2 – SUPPLEMENTARY DATA SUPPORTING USE OF ICD9 E950 AND E980 CODES FOR IDENTIFYING PROBABLE SUICIDE ATTEMPTS.

CONSISTENCY OF ICD9 E-CODE USE IN PARTICIPATING HEALTH SYSTEMS

In the ICD9 coding system, diagnoses of self-inflicted injury/poisoning or injury/poisoning of undetermined intent require the recording of a separate E-code in addition to the primary injury or poisoning diagnosis. If this additional code is not recorded, it is not possible to classify an injury or poisoning event as self-inflicted, accidental, by assault, or having undetermined intent. As we have previously published (Liu et al, *Pharmacoepidemiology and Drug Safety*, 2014; 23:218), recording of E-codes varied widely across health systems in our Mental Health Research Network between 2000 and 2010. Mindful of this variation, health systems participating in this risk prediction modeling project were selected because of high rates of E-code use in 2010-2011. The table below shows the proportion of all injury and poisoning diagnoses in inpatient and emergency department settings during that period that were accompanied by any E-code diagnosis (accidental, assault, self-inflicted, or undetermined). These rates suggest that capture or ascertainment of self-inflicted injury/poisoning during the study period was incomplete, but the rate of incomplete ascertainment (false negative) due to failure to record E-code diagnoses was relatively low.

	KP Washington	KP Northwest	KP Hawaii	KP So. California	KP Colorado	Henry Ford	Health Partners
Inpatient	81%	75%	61%	77%	63%	90%	80%
ED	76%	67%	64%	91%	66%	63%	87%

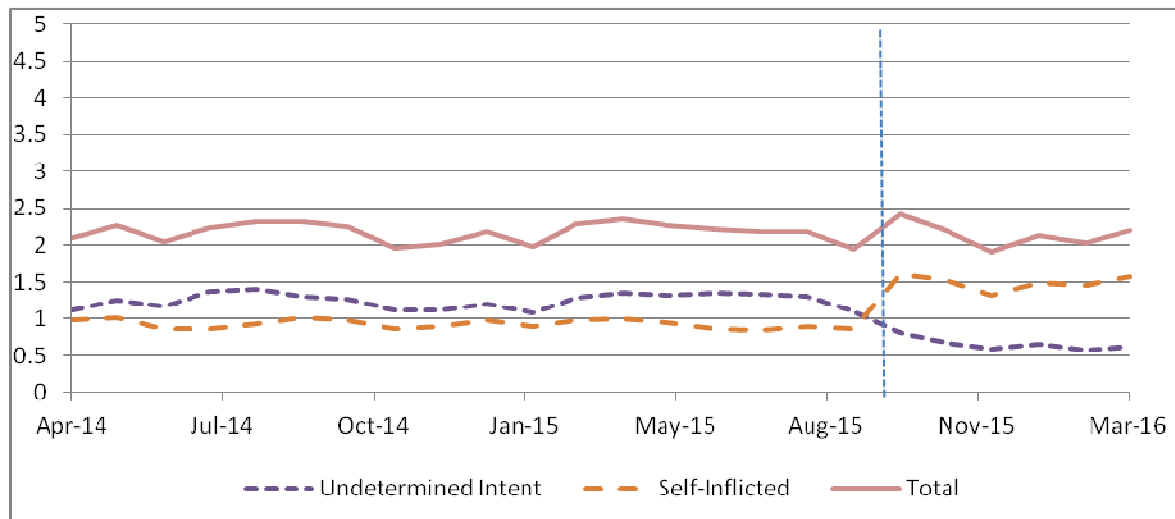
VALIDITY OF E-CODE DIAGNOSES OF DEFINITE AND UNDETERMINED SELF-INFLICTED INJURY IN PARTICIPATING HEALTH SYSTEMS

Some previous research suggests that accuracy of E-code diagnoses of self-inflicted injury/poisoning is poor in some health care systems or settings. Given that concern, we reviewed full-text electronic medical records for a sample of encounters from participating health systems in 2012 and 2013 receiving E-code diagnoses of definite self-inflicted injury/poisoning or injury/poisoning of undetermined intent. Trained chart reviewers determined whether text of provider notes clearly documented intentional self-inflicted injury or poisoning (e.g. “cut self”, “took overdose”). Results are shown in the table below. In the full sample the rate of confirmation for encounters coded as self-inflicted was 79%, and the confirmation rate for encounters coded as undetermined intent was 71%. When the sample was limited to encounters by patients with recent mental health diagnosis or treatment (the criteria for inclusion in this risk prediction study), confirmation rates were 91% for events coded as self-inflicted and 80% for events coded as undetermined intent. In many events coded as undetermined intent, full text notes clearly described self-inflicted injury or poisoning, but expressed doubt regarding actual intent to die. These findings suggest relatively low false-positive rates in these health systems during the study period when including both self-inflicted and “undetermined” intent events as probable suicide attempts.

E-Code Diagnosis	Total			With Recent Mental Health Diagnosis or Treatment		
	Number Reviewed	Number Confirmed	Rate (95% CI)	Number Reviewed	Number Confirmed	Rate (95% CI)
Self-inflicted	300	238	79% (74% to 83%)	229	208	91% (86% to 94%)
Undetermined	150	106	71% (63% to 77%)	123	98	80% (71% to 86%)

CHANGES IN CODING OF SELF-INFLICTED INJURY WITH TRANSITION FROM ICD9 TO ICD10

Coding of intent for injuries and poisonings changed significantly from the ICD9 to the ICD10 diagnostic system. Rather than using separate E-codes, the ICD10 system requires specific coding of intent within the primary diagnosis. One of our recent publications (Stewart et al, *Psychiatric Services*, 2017; 68:215) describes changes in recording of intent for injury/poisoning encounters across this transition in health systems participating in this risk prediction study. The figure from that publication is reproduced below. With the transition to ICD10 coding, the population rate of injury/poisoning encounters coded as undetermined intent decreased by more than half while the rate of injury/poisoning encounters coded as definitely self-inflicted increased by more than half. The total of those two rates was stable. We interpret this as evidence that many of the injury/poisoning events coded as having undetermined intent under the ICD9 E-code system were actually self-inflicted injuries or poisonings – and are now more accurately captured under the ICD10 system. We believe this argues strongly for use of the broader definition (including “undetermined” diagnoses) for our primary analyses.



This finding also provides additional support for the sensitivity of our outcome definition. The switch from use of separate E-codes (which could be omitted) in ICD9 to mandatory coding of intent in ICD10 had no effect on the total rate of injuries and poisonings coded as either self-inflicted or having undetermined intent. Stability of the overall rate implies that failure to record E-code diagnoses did not result in significant under-counting of self-harm during the study period.