

# **SUPPLEMENTAL MATERIAL**

**Table S1. Diagnosis codes used to define patients with psychiatric disorders.**

<b>Diagnosis codes used to define patients with psychiatric disorders</b>	
Minor psychiatric disorders	ICD-10: F10–F19, F40-F99 ICD-8: 291, 294.30, 299-304, 305-308, 310-315
Severe mental illness	ICD-10: F20-39 ICD-8: 295-298, 300
<b>Diagnosis codes excluded from the definition of patients with psychiatric disorders</b>	
Dementia and mental organic disorder	ICD-10: F00-F09 ICD-8: 290-294
Acute substance intoxication	ICD-10: F100, F110, F120, F130, F140, F150, F160, F170, F180, F190 ICD-8: 303.90

**Table S2. List of psychotropic drugs used to identify patients with psychiatric disorders.**

<i>Psychotropic drug</i>	<i>ATC code</i>
<b>Antidepressants</b>	
<b>Tricyclic antidepressants (TCA)</b>	
Imipramin	N06AA02
Clomipramin	N06AA04
Opipramol	N06AA05
Trimipramin	N06AA06
Amitriptylin	N06AA09
Nortriptylin	N06AA10
Doxepin	N06AA12
Dosulepin	N06AA16
Amoxapin	N06AA17
Maprotilin	N06AA21
<b>SSRI</b>	
Fluoxetin	N06AB03
Citalopram	N06AB04
Paroxetin	N06AB05
Sertralin	N06AB06
Fluvoxamin	N06AB08
Escitalopram	N06AB10
<b>NASSA</b>	
Mianserin	N06AX03
Mirtazapin	N06AX11
<b>SNRI</b>	
Venlafaxin	N06AX16
Duloxetin	N06AX21
<b>Other antidepressants</b>	
Isocarboxazid	N06AF01
Moclobemid	N06AG02
Reboxetin	N06AX18
Agomelatin	N06AX22
<b>Antipsychotics</b>	
<b>Typical antipsychotics</b>	
Chlorpromazin	N05AA01
Levomepromazin	N05AA02
Perphenazin	N05AB03
Prochlorperazin	N05AB04
Haloperidol	N05AD01
Flupentixol	N05AF01
Chlorprothixen	N05AF03
Zuclopenthixol	N05AF05
Pimozid	N05AG02
Sulpirid	N05AL01

Other atypical	
- Acepromazin	N05AA04
- Fluphenazin	N05AB02
- Periciazin	N05AC01
- Pipamperon	N05AD05
- Bromperidol	N05AD06
<b>Atypical antipsychotics</b>	
Ziprasidon	N05AE04
Clozapin	N05AH02
Olanzapin	N05AH03
Quetiapin	N05AH04
Risperidon	N05AX08
Aripiprazol	N05AX12
Other typical	
- Melperon	N05AD03
- Sertindol	N05AE03
- Asenapin	N05AH05
- Amisulprid	N05AL05
- Paliperidon	N05AX13
<b>Lithium</b>	N05AN01

**Table S3. Diagnosis codes used to define cardiovascular procedures.**

<b>Diagnosis codes used to define cardiovascular procedures</b>		
<i>Coronary angiography</i>	UXAC40, UXAC85, UXAC90, UXUC85-87, UFYA20	
<i>Coronary revascularization</i>	Percutaneous coronary intervention	KFNG
	Coronary artery bypass graft	KFNA, KFNB, KFNC, KFND, KFNE, KFNF
<i>ICD implantation</i>	BFCB0, BFCB00, BFCB01, BFCB02, BFCB03 KFPG10, KFPG20	

**Table S4. Subgroups of patients with psychiatric disorders.**

<b>Characteristic</b>	<b>Patients who redeemed psychotropic drugs (%)</b>	<b>Patients with minor psychiatric disorders (%)</b>	<b>Patients with severe mental illness (%)</b>
<b>Total patients</b>	631 (38.0) *	498 (30.0) *	532 (32.0) *
<b>Median age (IQR), y</b>	73 (65-81)	59 (49-68)	66 (55-76)
<b>Men</b>	359 (56.9)	351 (70.5)	287 (53.9)
<b>Charlson score</b>			
0	147 (23.3)	179 (35.9)	157 (29.5)
1	133 (21.1)	123 (24.7)	110 (20.7)
≥ 2	351 (55.6)	196 (39.4)	265 (49.8)
<b>Antipsychotics</b>	115 (18.2)	72 (14.5)	197 (37.0)
<b>Antidepressants</b>	579 (91.8)	155 (31.1)	329 (61.8)
<b>Anxiolytics</b>	128 (20.3)	92 (18.5)	134 (25.2)
<b>Living alone – yes, no. (%)</b>	233 (37.0)	274 (55.4)	316 (59.4)
<b>SES</b>			
Low tertile, no. (%)	246 (39.0)	243 (48.8)	268 (50.4)
Medium tertile, no. (%)	235 (37.2)	162 (32.5)	183 (34.4)
High tertile, no. (%)	150 (23.8)	93 (18.7)	81 (15.2)
<b>OHCA-factors</b>			
Arrest in private home, n (%)	406 (70.1)	286 (62.7)	320 (66.3)
Bystander-witnessed arrest, n (%)	434 (71.5)	322 (69.0)	347 (67.2)
Bystander CPR, n (%)	346 (57.0)	257 (54.8)	287 (55.5)
Bystander defibrillation, n (%)	26 (4.5)	19 (4.4)	18 (3.8)
Median time interval from recognition of OHCA to EMS arrival, min (IQR)	10 (6-14)	10 (6-15)	9 (5-14)
Initial shockable rhythm, n (%)	247 (41.3)	200 (41.9)	168 (33.2)
ROSC at hospital arrival, n (%)	398 (69.2)	309 (71.7)	319 (68.5)

<b>Outcome</b>				
30-day survival, n (%)	149 (23.6)	167 (33.5)	137 (25.8)	
1-year survival, n (%)	120 (19.0)	143 (28.7)	119 (22.4)	*
<b>In-hospital procedure</b>				
CAG	150 (23.8)	164 (32.9)	124 (23.3)	Perce
Acute CAG †	126 (20.0)	136 (27.3)	108 (20.3)	ntage
Subacute CAG §	24 (3.8)	28 (5.6)	16 (3.0)	of the

total psychiatric population (1661 patients)

† ≤24 h from OHCA

§ During the index-hospitalization from > 24h (i.e. day 2) up to day 30 following OHCA

IQR, interquartile range; SES, socioeconomic status; OHCA, out-of-hospital cardiac arrest; CPR, cardiopulmonary resuscitation; EMS, emergency medical system; ROSC, return of spontaneous circulation; CAG, coronary angiography. Note: in the calculation of percentages, we only included observations with data for the covariate involved.

**Table S5. Number of patients with AMI as cause of cardiac arrest in our cohort stratified by psychiatric status.**

	<b>Patients without psychiatric disorders (5627)</b>	<b>Patients with psychiatric disorders (1661)</b>
<b>Total AMI</b>	2249 (40.0%)	476 (28.7%)
STEMI	609 (10.8%)	110 (6.6%)
NSTEMI	259 (4.7%)	40 (2.4%)
Unspecified AMI	1381 (24.5%)	326 (19.6%)

Percentages are expressed AMI, acute myocardial infarction; STEMI, ST-Elevation Myocardial Infarction; NSTEMI, non-ST segment elevation myocardial infarction.



**Table S6. Hazard ratio with 95% confidence interval (CI) for coronary angiography, coronary revascularization and ICD-implantation in patients with and without psychiatric disorders.**

	<b>Hazard ratio (95% CI)</b>
<b>Coronary angiography</b>	
Reference: patients without psychiatric disorders	
Patients with any psychiatric disorders	0.65 (0.58-0.72)
<b>Subgroups</b>	
Patients who redeemed psychotropic drugs	0.65 (0.55-0.77)
Patients with minor psychiatric disorders	0.70 (0.60-0.83)
Patients with severe mental illness	0.59 (0.49-0.70)
<b>Coronary revascularization</b>	
Reference: patients without psychiatric disorders	
Patients with any psychiatric disorders	1.05 (0.91-1.21)
<b>Subgroups</b>	
Patients who redeemed psychotropic drugs	0.96 (0.76-1.21)
Patients with minor psychiatric disorders	1.10 (0.88-1.37)
Patients with severe mental illness	1.18 (1.02-1.40)
<b>ICD implantation</b>	
Reference: patients without psychiatric disorders	
Patients with any psychiatric disorders	0.65 (0.48-0.88)

Models are adjusted for age, sex, Charlson score, socioeconomic status, year of OHCA and OHCA-factors (location of arrest, witnessed status, initial cardiac rhythm, bystander CPR and ROSC upon hospital arrival). ICD, implantable cardioverter defibrillator.

**Table S7. Patients who received acute CAG and still alive at day 2.**

<b>Characteristics</b>	<b>Patients without psychiatric disorders (%)</b>	<b>Patients with psychiatric disorders (%)</b>	<b>Total missing (%) *</b>
<b>Total patients</b>	1888 (90.9) †	330 (89.2) §	0
<b>Median age (IQR), y</b>	63 (54-71)	60 (52-69)	0 (0.0)
<b>Men</b>	1575 (83.4)	237 (71.8)	0 (0.0)
<b>Charlson score</b>			
0	1168 (61.9)	141 (42.7)	0 (0.0)
1	350 (18.5)	73 (22.1)	
≥ 2	370 (19.6)	116 (35.2)	
<b>Antipsychotics</b>	0 (0.0)	48 (14.6)	0 (0.0)
<b>Antidepressants</b>	0 (0.0)	194 (58.8)	0 (0.0)
<b>Anxiolytics</b>	51 (2.7)	52 (15.8)	0 (0.0)
<b>Living alone – yes, no. (%)</b>	461 (24.6)	128 (38.8)	14 (0.6)
<b>SES</b>			
Low tertile, no. (%)	338 (17.9)	105 (31.8)	0 (0.0)
Medium tertile, no. (%)	581 (30.8)	122 (37.0)	
High tertile, no. (%)	969 (51.3)	103 (31.2)	
<b>OHCA-factors</b>			
Arrest in private home, n (%)	936 (52.3)	200 (64.7)	120 (5.4)
Bystander-witnessed arrest, n (%)	1534 (83.7)	249 (77.8)	65 (2.9)
Bystander CPR, n (%)	1367 (74.6)	228 (71.3)	65 (2.9)
Bystander defibrillation, n (%)	228 (13.1)	26 (8.6)	180 (8.1)
Median time interval from recognition of OHCA to EMS arrival, min (IQR)	9 (6-13)	9 (6-13)	310 (14.0)
Initial shockable rhythm, n (%)	1637 (89.3)	236 (74.9)	69 (3.1)
ROSC at hospital arrival, n (%)	1586 (89.6)	280 (94.0)	229 (10.3)
<b>Outcome</b>			

30-day survival, n (%)	1392 (73.7)	197 (59.7)	0 (0.0)
1-year survival, n (%)	1327 (70.3)	181 (54.8)	0 (0.0)
<b>In-hospital procedure</b>			
Coronary revascularization ¶	1181 (62.6)	185 (56.1)	0 (0.0)

\*Expressed as percentage of the total population who received acute CAG and still alive at day 2 (2218 OHCA-patients)

† Percentage of patients without psychiatric disorders who received an acute CAG (2076 patients)

§ Percentage of patients with psychiatric disorders who received an acute CAG (370 patients)

¶ During the index-hospitalization up to day 30 following OHCA

IQR, interquartile range; SES, socioeconomic status; OHCA, out-of-hospital cardiac arrest; CPR, cardiopulmonary resuscitation; EMS, emergency medical system; ROSC, return of spontaneous circulation. Note: in the calculation of percentages, we only included observations with data for the covariate involved.

**Table S8. Patients who received acute CAG and still alive at day 2 stratified by severity of the psychiatric disorders.**

<b>Characteristic</b>	<b>Patients who redeemed psychotropic drugs</b>	<b>Patients with minor psychiatric disorders</b>	<b>Patients with severe mental illness</b>
<b>Total patients</b>	109 (33.0) *	125 (37.9) *	96 (29.1) *
<b>Median age (IQR), y</b>	66 (58-73)	56 (49-63)	61 (51-71)
<b>Men</b>	71 (65.1)	97 (77.6)	69 (71.9)
<b>Charlson score</b>			
0	41 (37.6)	57 (45.6)	49 (51.0)
1	24 (22.0)	33 (26.4)	16 (16.7)
≥ 2	44 (40.4)	35 (28.0)	31 (32.3)
<b>Antipsychotics</b>	15 (13.8)	13 (10.4)	25 (26.0)
<b>Antidepressants</b>	105 (97.2)	39 (31.2)	49 (51.0)
<b>Anxiolytics</b>	17 (15.6)	17 (13.6)	18 (18.8)
<b>Living alone – yes, no. (%)</b>	21 (19.3)	64 (51.2)	43 (44.8)
<b>SES</b>			
Low tertile, no. (%)	19 (17.4)	49 (39.2)	37 (38.5)
Medium tertile, no. (%)	43 (39.4)	42 (33.6)	37 (38.5)
High tertile, no. (%)	47 (43.1)	34 (27.2)	22 (22.9)
<b>OHCA-factors</b>			
Arrest in private home, n (%)	74 (70.5)	66 (57.9)	60 (66.7)
Bystander-witnessed arrest, n (%)	83 (78.3)	95 (78.5)	71 (76.3)
Bystander CPR, n (%)	81 (76.4)	77 (63.6)	70 (75.3)
Bystander defibrillation, n (%)	10 (9.9)	8 (7.0)	8 (9.0)
Median time interval from recognition of OHCA to EMS arrival, min (IQR)	9 (7-13)	9 (6-13)	9 (5-13)
Initial shockable rhythm, n (%)	79 (75.2)	89 (74.2)	68 (75.6)
ROSC at hospital arrival, n (%)	91 (91.9)	108 (94.7)	81 (96.4)
<b>Outcome</b>			
30-day survival, n (%)	65 (59.6)	74 (59.2)	58 (60.4)
1-year survival, n (%)	62 (56.9)	66 (52.8)	53 (55.2)

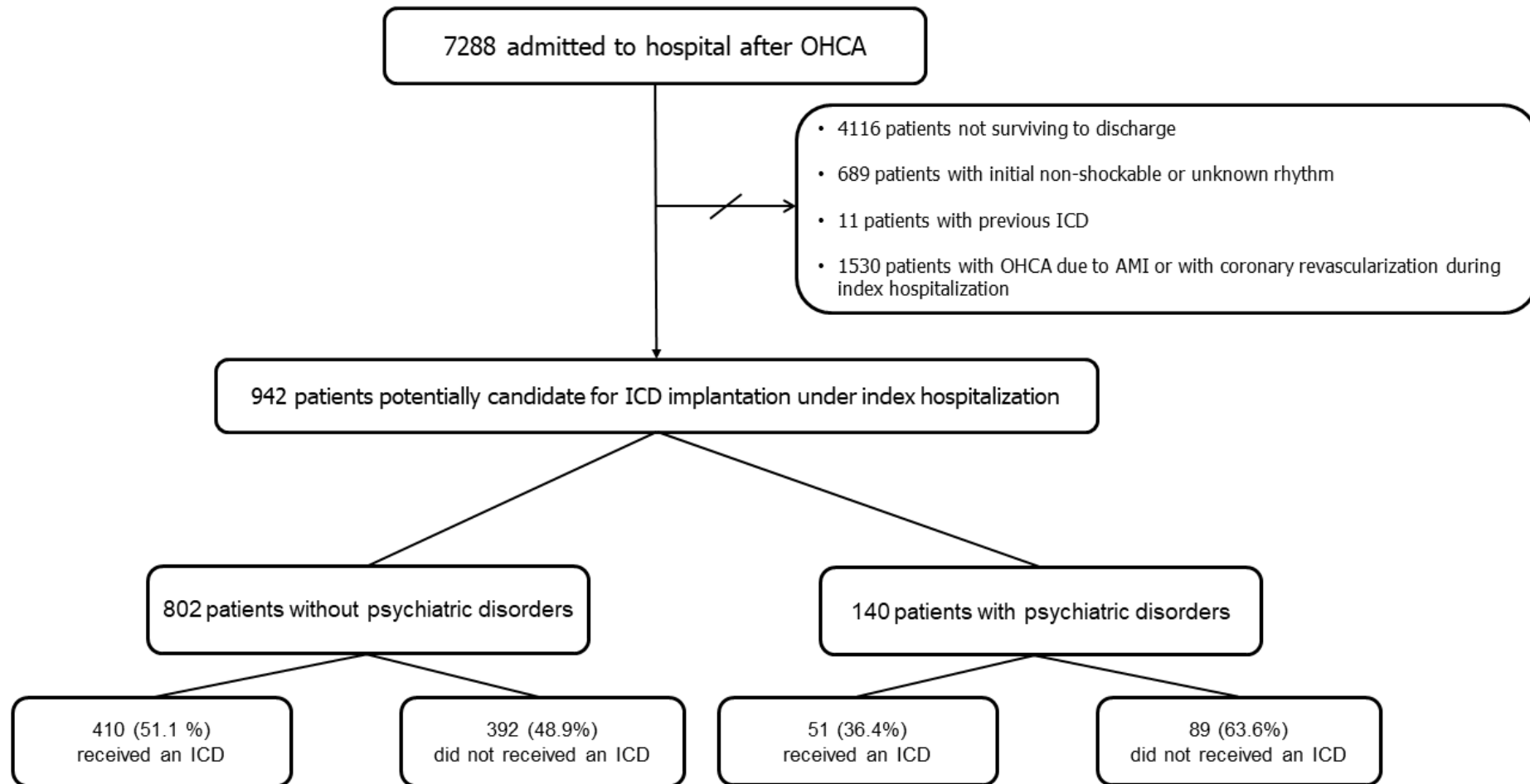
<b>In-hospital procedure</b>			
Coronary revascularization †	60 (55.1)	69 (55.2)	56 (58.3)

\* Percentage of patients with psychiatric disorders who received an acute CAG and still alive at day 2 (330 patients)

† During the index-hospitalization up to day 30 following OHCA

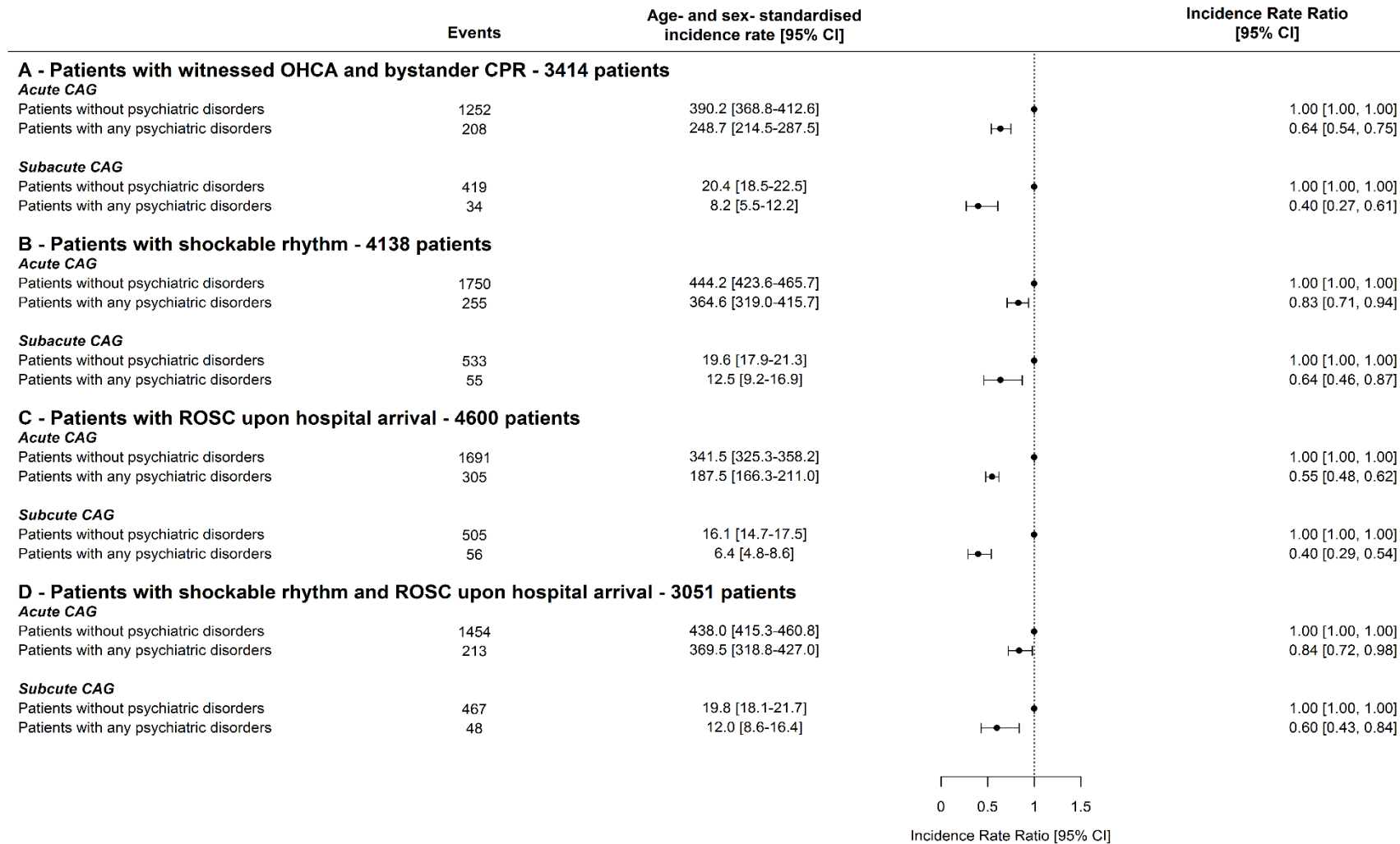
IQR, interquartile range; SES, socioeconomic status; OHCA, out-of-hospital cardiac arrest; CPR, cardiopulmonary resuscitation; EMS, emergency medical system; ROSC, return of spontaneous circulation.

**Figure S1. Flow chart for patients potentially eligible to ICD-implantation during index-hospitalization.**



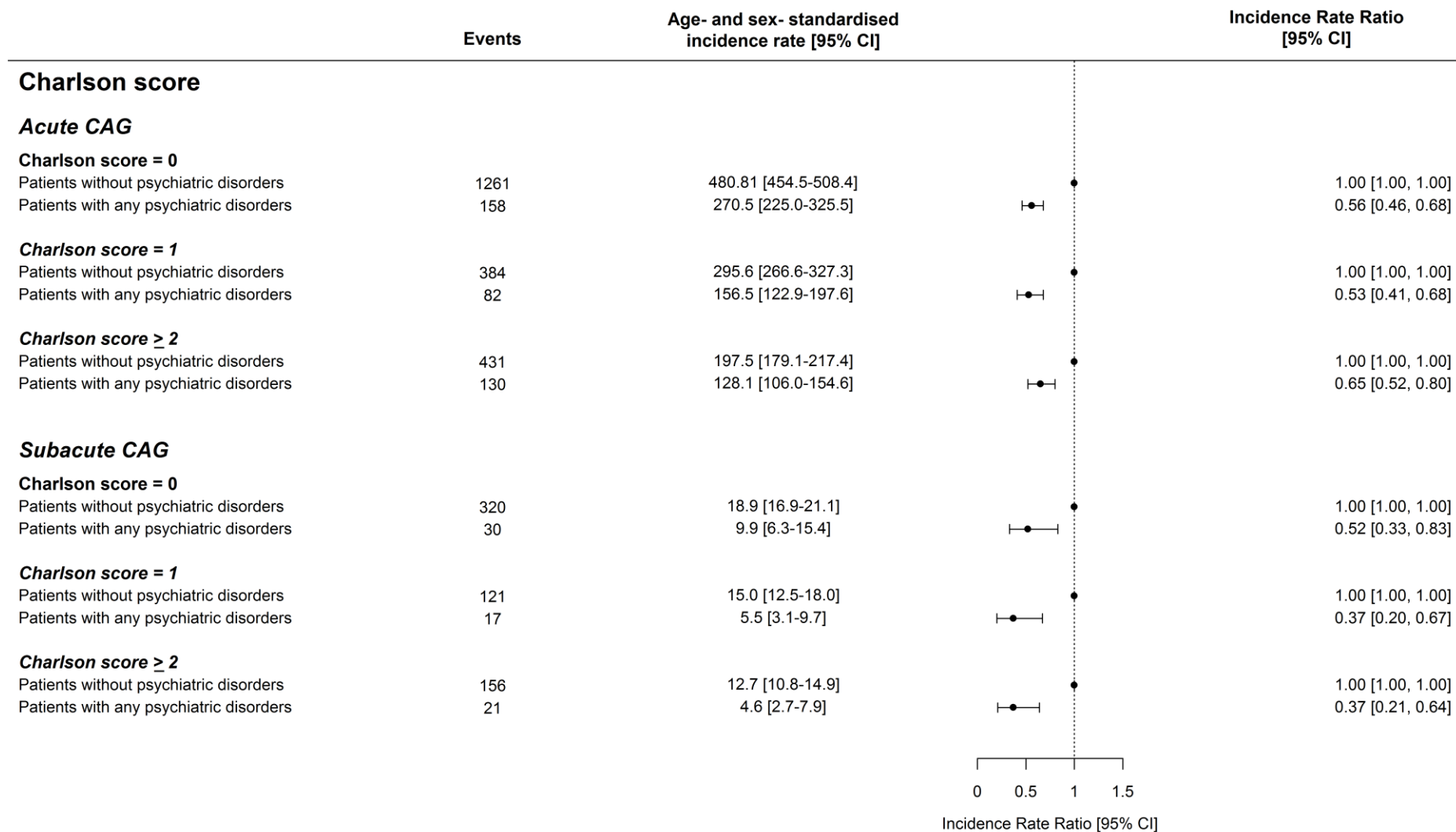
OHCA: out-of-hospital cardiac arrest; ICD, implantable cardioverter defibrillator; AMI, acute myocardial infarction

**Figure S2. Number of events, age- and sex-standardized incidence rates and incidence rate ratio for acute and subacute coronary angiography in patients with and without psychiatric disorders amongst subsets of individuals who were identified by the presence of selected pre-hospital OHCA-characteristics: A) witnessed OHCA who received bystander CPR, B) OHCA with shockable rhythm, C) OHCA who achieved ROSC upon hospital arrival, and D) OHCA with shockable rhythm who achieved ROSC upon hospital arrival.**



Unit: number of CAGs per 100 in hospital person-days. OHCA, out-of-hospital cardiac arrest; CPR, cardiopulmonary resuscitation; CAG, coronary angiography; ROSC, return of spontaneous circulation.

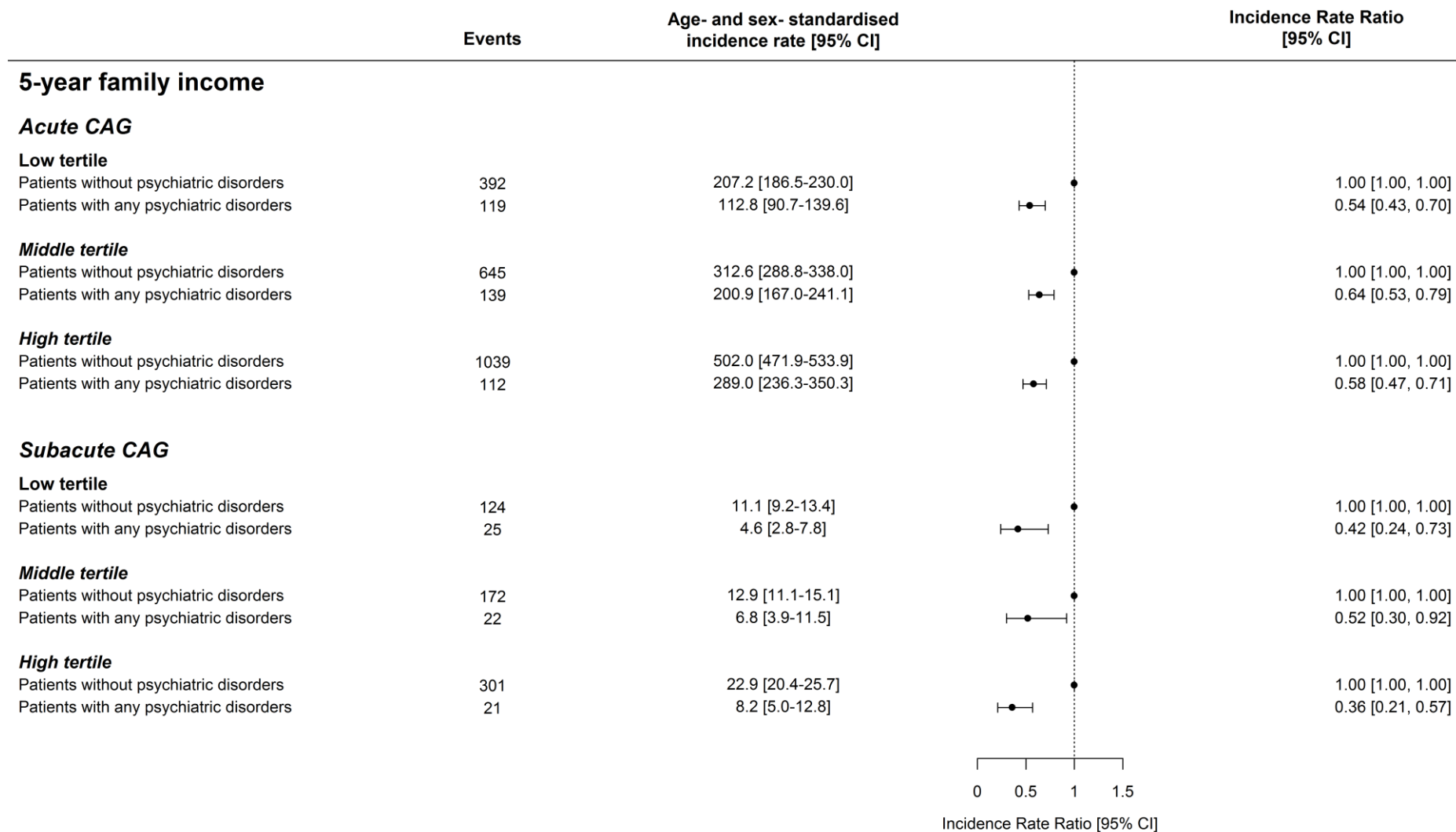
**Figure S3. Number of events, age- and sex-standardized incidence rates and incidence rate ratio for acute and subacute coronary angiography in patients with and without psychiatric disorders according to the Charlson score (Charlson=0 3210 patients, Charlson=1 1494, Charlson  $\geq$  2 2584).**



Unit: number of CAGs per 100 in hospital person-days. CAG, coronary angiography.

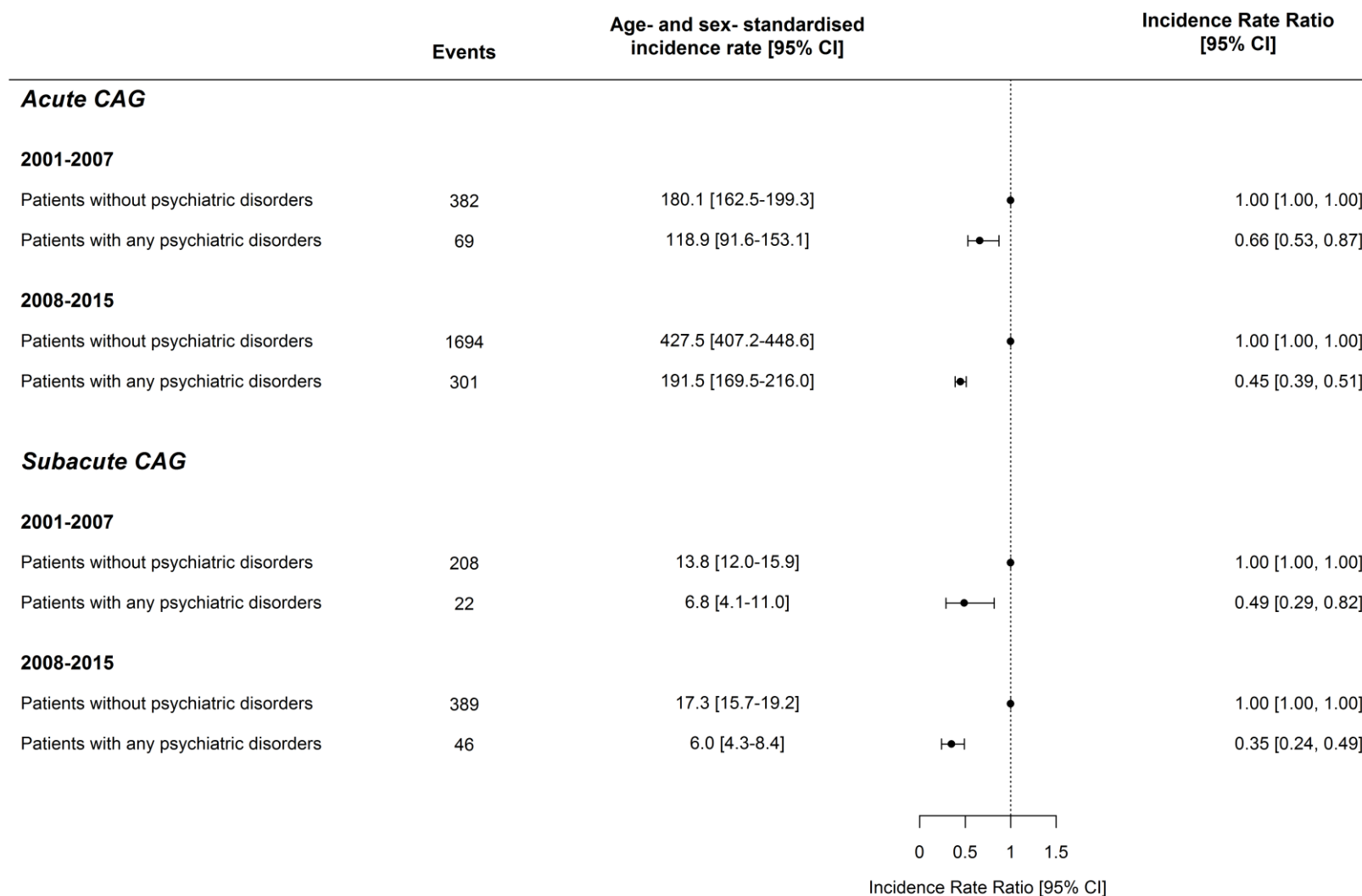


**Figure S4. Number of events, age- and sex-standardized incidence rates and incidence rate ratio for acute and subacute coronary angiography in patients with and without psychiatric disorders according to the socioeconomic status (low tertile: 2429 patients, middle tertile: 2430 patients, high tertile: 2429 patients).**



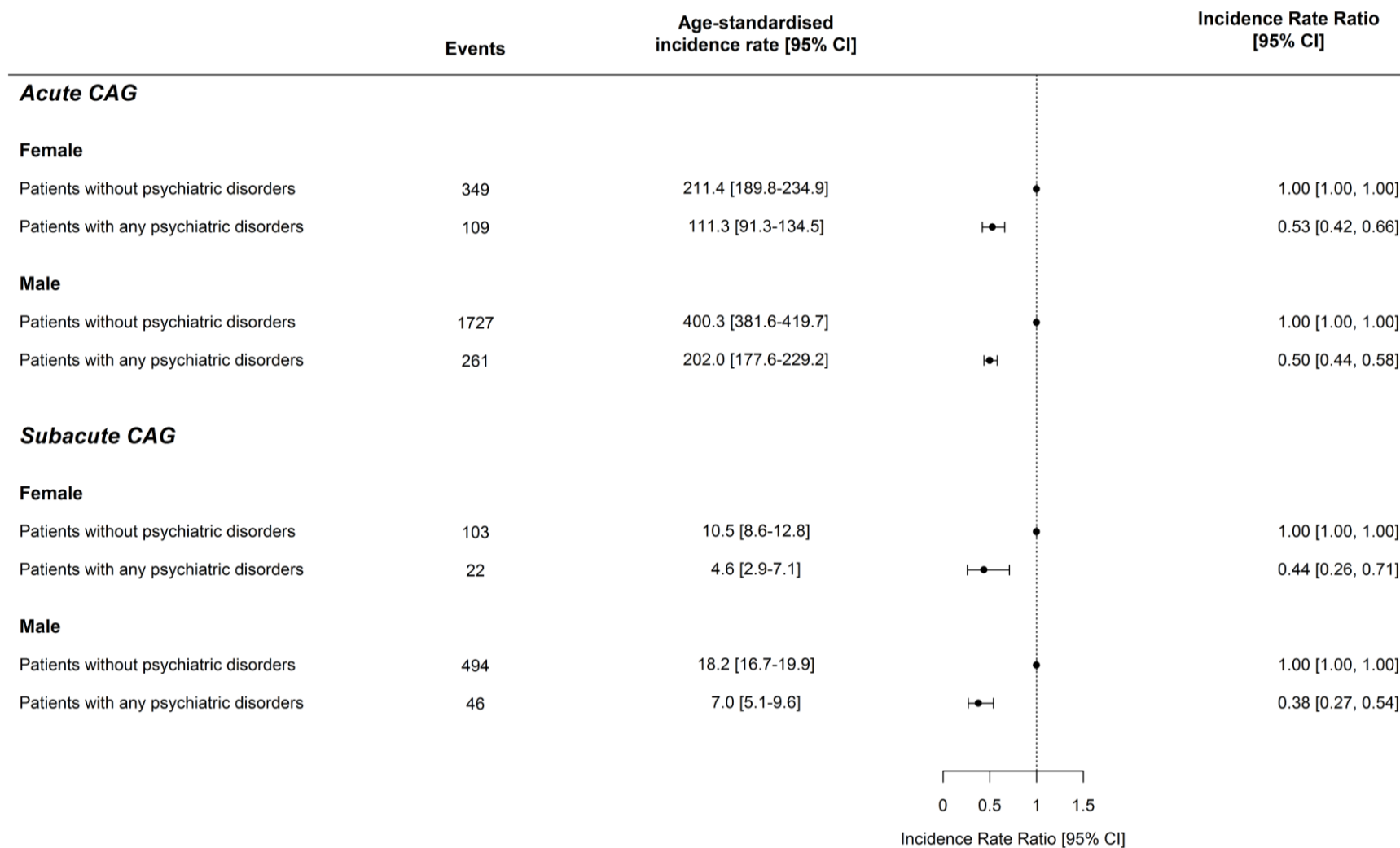
Unit: number of CAGs per 100 in hospital person-days. CAG, coronary angiography.

**Figure S5. Number of events, age- and sex-standardized incidence rates and incidence rate ratio for acute and subacute coronary angiography in patients with and without psychiatric disorders stratified by the calendar year of cardiac arrest (2001-2007: 2385 patients; 2008-2015: 4903 patients).**



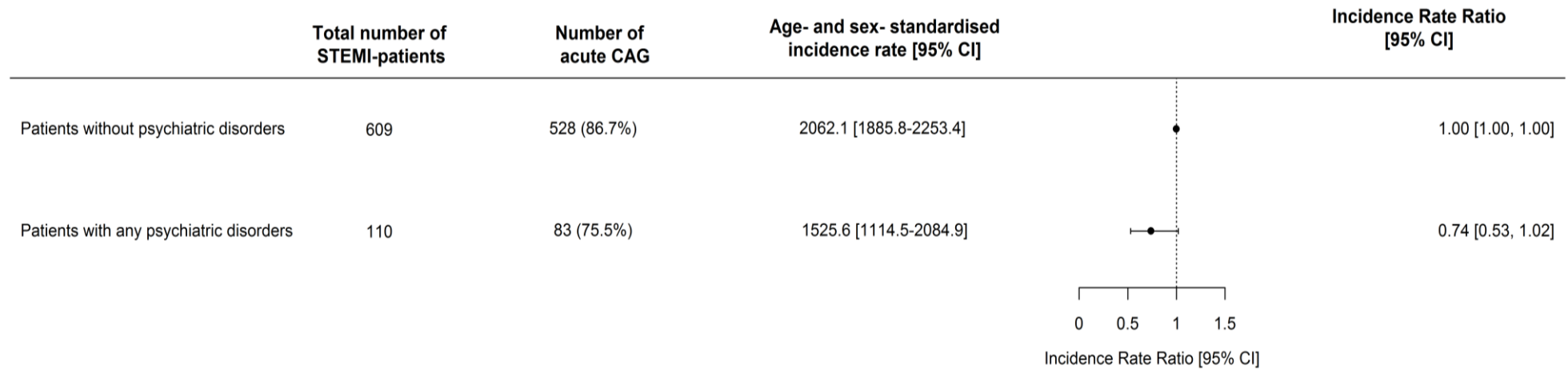
Unit: number of CAGs per 100 in hospital person-days. CAG, coronary angiography.

**Figure S6. Age-standardized incidence rates and incidence rate ratio for acute and subacute coronary angiography in patients with and without psychiatric disorders stratified by sex (male: 5308 patients, female: 1980 patients).**



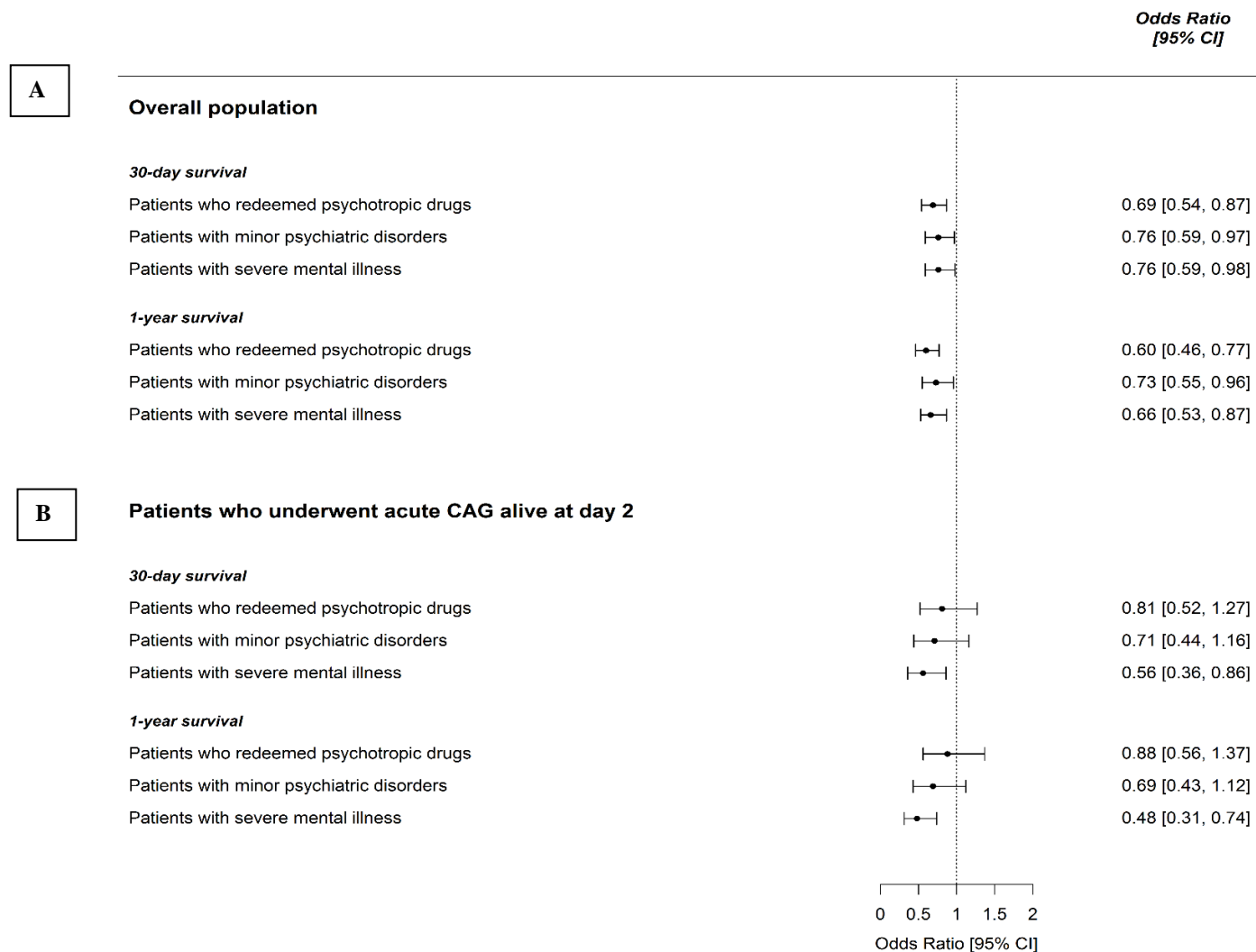
Unit: number of CAGs per 100 in hospital person-days. CAG, coronary angiography.

**Figure S7. Number of patients, events, age- and sex-standardized incidence rates and incidence rate ratio for acute coronary angiography ( $\leq 1$  day post-OHCA) in STEMI-patients with and without psychiatric disorders.**



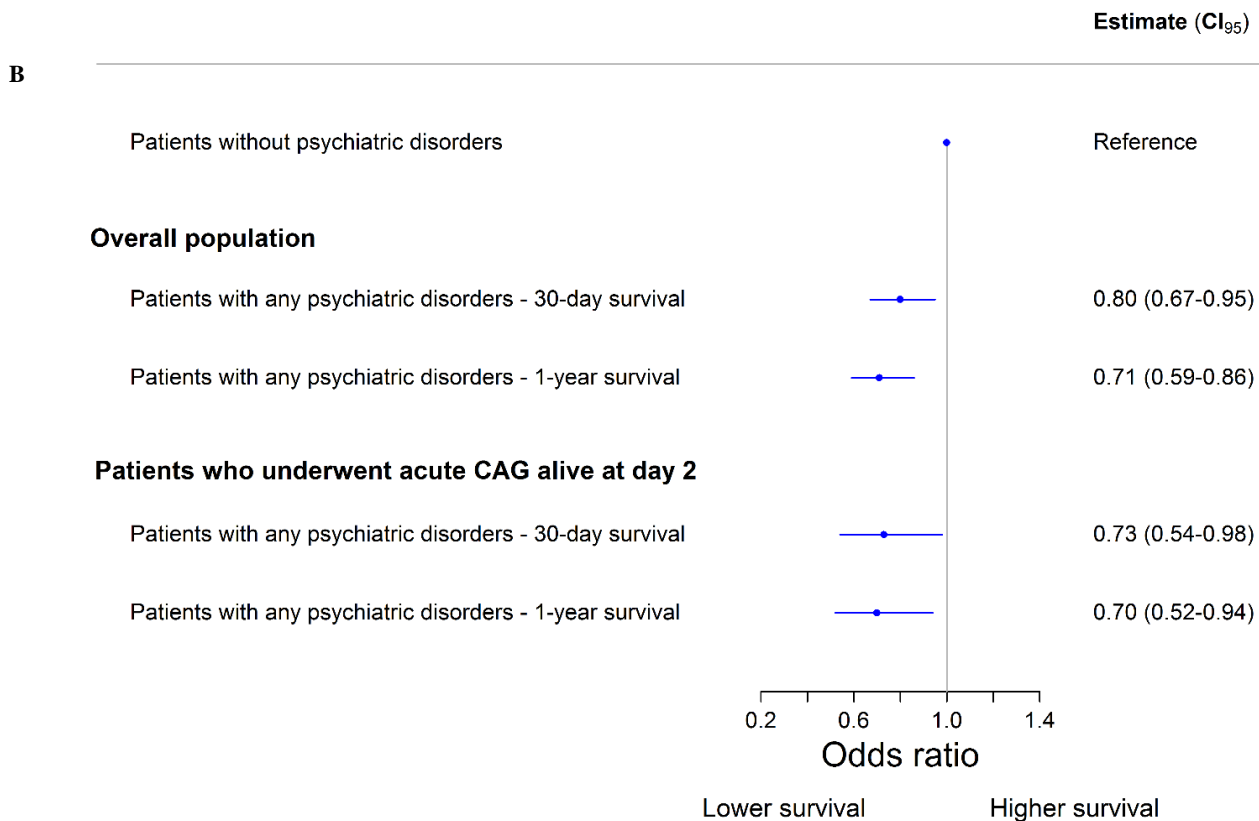
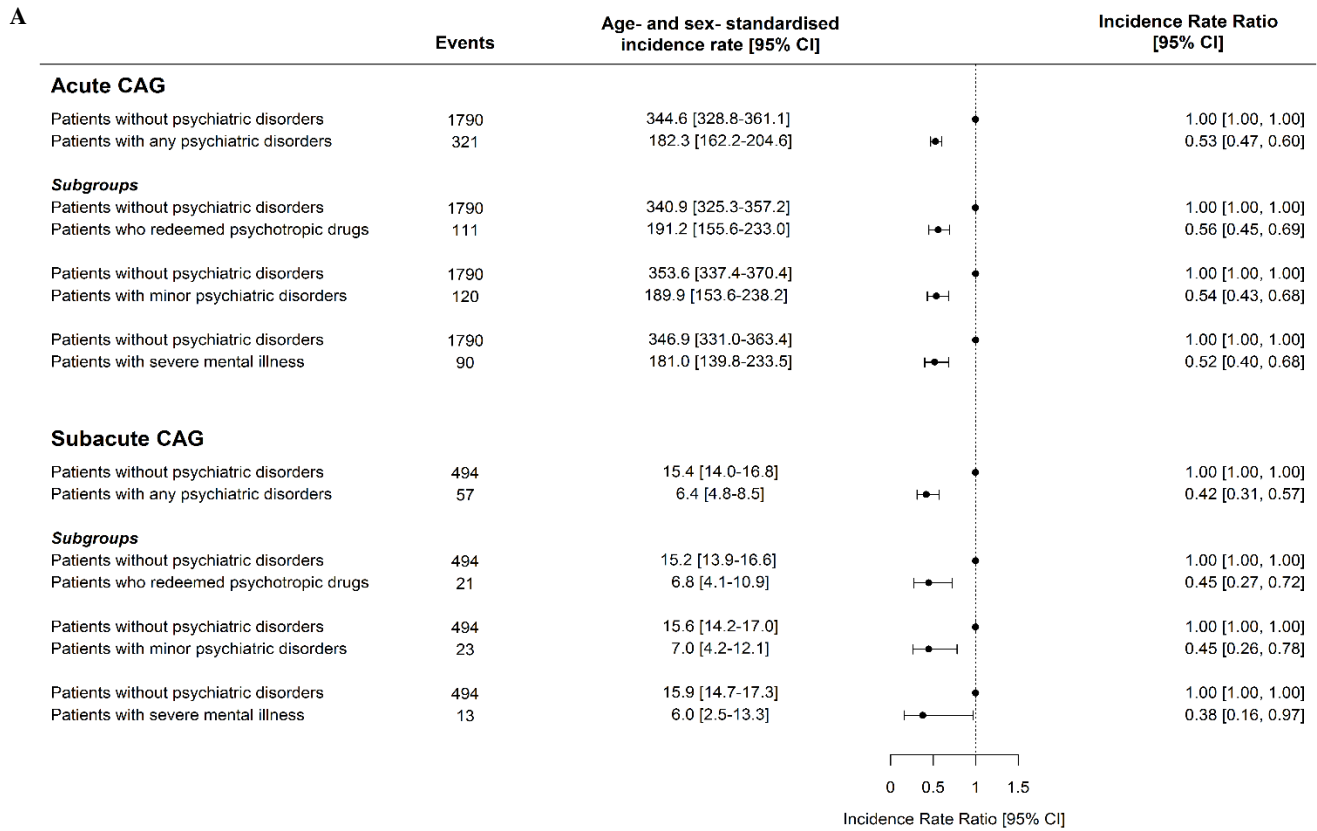
Unit: number of CAGs per 100 in hospital person-days. STEMI, ST-Elevation Myocardial Infarction; CAG, coronary angiography.

**Figure S8. Odds ratio for 30-day and 1-year survival in patients with psychiatric disorders stratified by severity of the disorder compared to patients without psychiatric disorders: A) overall population and B) patients who received acute CAG still alive at day 2.**



The models are adjusted for sex, age, Charlson score, socioeconomic status, year of arrest and pre-hospital OHCA-characteristics (location of arrest, witnessed status, initial cardiac rhythm, bystander CPR and ROSC upon hospital arrival). CAG, coronary angiography; OHCA: out-of-hospital cardiac arrest; CPR, cardiopulmonary resuscitation; ROSC, return of spontaneous circulation.

**Figure S9. A) Number of events, age- and sex-standardized incidence rates and incidence rate ratio for acute and subacute CAG in patients with and without psychiatric disorders. Unit: number of CAGs per 100 person-days in hospital. B) Odds ratio for 30-day and 1-year survival in patients with any psychiatric disorders compared to patients without psychiatric disorders in overall population and among patients who received acute CAG still alive at day 2.**



The models are adjusted for sex, age, Charlson score, socioeconomic status, year of arrest and pre-hospital OHCA-characteristics (location of arrest, witnessed status, initial cardiac rhythm, bystander CPR and ROSC upon hospital arrival). Reference: patients without psychiatric disorders. Complete case analyses of 6324 OHCA patients. CAG, coronary angiography.