

Supplementary Online Content

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eAppendix 1. ICD-10 Codes – Selected Causes of Death Groups

eAppendix 2. Diseases and ICD-9-CM Codes included in Elixhauser Comorbidity Index

eTable. All causes and selected causes of crude mortality rates and standardized mortality ratios for adult Medicaid patients during the first year following a nonfatal opioid overdose by low or moderate to high Elixhauser comorbidity score

This supplementary material has been provided by the authors to give readers additional information about their work.

eAppendix 1 - ICD-10 Codes – Selected Causes of Death Groups	
External causes ^A	X60-X84, Y87.0, X85-Y09, Y87.1, V01-X39, X46-X59, Y85-Y86
Suicide	X60-X84, Y87.0
Homicide	X85-Y09, Y87.1
Accidents	V01-X39, X46-X59, Y85-Y86
Substance-related ^B	F11.0-F11.5, F11.7-F11.9, F12.0-F12.5, F12.7-F12.9, F13.0-F13.5, F13.7-F13.9, F14.0-F14.4, F14.7-F14.9, F15.0-F15.5, F15.7-F15.9, F16.0-F16.5, F16.7-F16.9, F17.0, F17.3-F17.5, F17.7-F17.9, F18.0-F18.5, F18.7-F18.9, F19.0-F19.5, F19.7-F19.9, X40–X44, Y10–Y14, F10, G31.2, G62.1, I42.6, K29.2, K70, R78.0, X45, Y15
Drug-related	F11.0-F11.5, F11.7-F11.9, F12.0-F12.5, F12.7-F12.9, F13.0-F13.5, F13.7-F13.9, F14.0- F14.4, F14.7-F14.9, F15.0-F15.5, F15.7-F15.9, F16.0-F16.5, F16.7-F16.9, F17.0, F17.3-F17.5, F17.7-F17.9, F18.0-F18.5, F18.7-F18.9, F19.0-F19.5, F19.7-F19.9, X40–X44, Y10–Y14
Alcohol-related	F10, G31.2, G62.1, I42.6, K29.2, K70, R78.0, X45, Y15
Infectious	A00-B99
Viral hepatitis	B15-B19
HIV	B20-B24
Circulatory system	I00-I99
Respiratory system	J00-J98
Influenza & pneumonia	J09-J18
Chronic respiratory disease	J40-J47
Digestive system	K00-K92
Cirrhosis & alcoholic liver disease	K73-74, K70
Cancers	C00-D48
Note: ^A Excluding substance-related causes; ^B Excluding suicide and homicide related-causes.	

eAppendix 2. Diseases and ICD-9-CM Codes included in Elixhauser Comorbidity Index	
Diseases	ICD-9-CM Codes
Congestive heart failure	398.91, 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 425.4, 425.5, 425.7, 425.8, 425.9, 428.
Cardiac Arrhythmia	426.0, 426.13, 426.7, 426.9, 426.10, 426.12, 4270, 4271, 4272, 4273, 4274, 4276, 4278, 4279, 7850, 99601, 99604, V450, V533
Valvular Disease	093.2, 394, 395, 396, 397, 424, 746.3, 746.4, 746.5, 746.6, V42.2, V43.3
Pulmonary Circulation Disorders	415.0, 415.1, 416, 417.0, 417.8, 417.9
Peripheral Vascular Disorders	093.0, 437.3, 440, 441, 443.1, 443.2, 443.8, 443.9, 447.1, 557.1, 557.9, V434
Hypertension Uncomplicated	401
Hypertension Complicated	402, 403, 404, 405
Paralysis	334.1, 342, 343, 344.0, 344.1, 344.2, 344.3, 344.4, 344.5, 344.6, 344.9
Other Neurological Disorders	331.9, 332.0, 332.1, 333.4, 333.5, 333.92, 334, 335, 336.2, 340, 341, 345, 348.1, 348.3, 780.3, 784.3
Chronic Pulmonary Disease	416.8, 416.9, 490, 491, 492, 493, 494, 495, 496, 500, 501, 502, 503, 504, 505, 506.4, 508.1, 508.8
Diabetes Uncomplicated	250.0, 250.1, 250.2, 250.3
Diabetes Complicated	250.4, 250.5, 250.6, 250.7, 250.8, 250.9
Hypothyroidism	240.9, 243, 244, 246.1, 246.8
Renal Failure	403.01, 403.11, 403.91, 404.02, 404.03, 404.12, 404.13, 404.92, 404.93, 585, 586, 588.0, V42.0, V45.1, V56
Liver Disease	070.22, 070.23, 070.32, 070.33, 070.44, 070.54, 070.6, 070.9, 456.0, 456.1, 456.2, 570, 571, 572.2, 572.3, 572.4, 572.8, 573.3, 573.4, 573.8, 573.9, V42.7
Peptic Ulcer Disease excluding bleeding	531.7, 531.9, 532.7, 532.9, 533.7, 533.9, 534.7, 534.9
AIDS/HIV	042, 043, 044
Lymphoma	200, 201, 202, 203.0, 238.6
Metastatic Cancer	196, 197, 198, 199
Solid Tumor without Metastasis	140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195
Rheumatoid Arthritis/collagen	446, 701.0, 710.0, 710.1, 710.2, 710.3, 710.4, 710.8, 710.9, 711.2, 714, 719.3, 720, 725, 728.5, 728.89, 729.30
Coagulopathy	286, 287.1, 287.3, 287.4, 287.5
Obesity	2780
Weight Loss	260, 261, 262, 263, 783.2, 799.4
Fluid and Electrolyte Disorders	253.6, 276
Blood Loss Anemia	280.0
Deficiency Anemia	280.1, 280.8, 280.9, 281
Alcohol Abuse	265.2, 291.1, 291.2, 291.3, 291.5, 291.8, 291.9, 303.0, 303.9, 305.0, 357.5, 425.5, 535.3, 571.0, 571.1, 571.2, 571.3, 980, V11.3
Drug Abuse	292, 304, 305.2, 305.3, 305.4, 305.5, 305.6, 305.7, 305.8, 305.9, V65.42
Psychoses	293.8, 295, 296.04, 296.14, 296.44, 296.54, 297, 298
Depression	296.2, 296.3, 296.5, 300.4, 309, 311
From (16).	

eTable. All causes and selected causes of crude mortality rates and standardized mortality ratios for adult Medicaid patients during the first year following a nonfatal opioid overdose by low or moderate to high Elixhauser comorbidity score

Cause of death	Low Elixhauser Score			Moderate to High Elixhauser Score		
	Observed Deaths (n)	Crude Mortality Rate per 10,000 person-years	Standardized Mortality Rate Ratio ^A	Observed Deaths (n)	Crude Mortality Rate per 10,000 person-years	Standardized Mortality Rate Ratio ^A
All causes	569 (100)	416.8	21.4 (19.7-23.2)	4625 (100)	871.2	31.2 (30.3-32.1)
External causes	55 (9.7)	40.3	9.9 (7.5-12.8)	293 (6.3)	55.2	17.7 (15.8-19.8)
Suicide	34 (6.0)	24.9	21.6 (15.2-29.8)	181 (3.9)	34.1	119.2 (102.8-137.6)
Homicide	4 (0.7)	2.9	4.3 (1.4-10.4)	20 (4.3)	3.8	6.2 (3.9-9.4)
Accidents	17 (3.0)	12.5	5.6 (3.4-8.8)	92 (2.0)	17.3	7.8 (6.3-9.5)
Substance-related	254 (44.6)	186.1	94.4 (83.3-106.5)	1109 (24.0)	208.9	84.6 (79.7-89.7)
Drug-related	246 (43.2)	180.2	137.8 (121.4-155.9)	1054 (22.8)	198.5	134.0 (126.1-142.0)
Alcohol-related	8 (1.4)	5.9	8.8 (4.1-16.7)	55 (1.2)	10.4	10.5 (8.0-13.6)
Infectious	14 (2.5)	10.3	8.0 (4.6-13.1)	300 (6.5)	56.5	29.5 (26.3-33.0)
Viral hepatitis	3 (0.5)	2.2	13.7 (3.5-37.3)	46 (9.9)	8.7	33.7 (25.0-44.6)
HIV	7 (1.2)	5.1	10.7(4.7-21.2)	172 (3.7)	32.4	53.8 (46.2-62.3)
Circulatory system	68 (12.0)	49.8	9.5 (7.4-12.0)	621 (13.4)	117	13.2 (12.2-14.3)
Respiratory system	26 (4.6)	19	20.2 (13.5-29.2)	295 (6.4)	55.6	33.9 (30.2-37.9)
Influenza & pneumonia	7 (1.2)	5.1	23.6 (10.3-46.7)	46 (1.0)	8.7	24.2 (17.9-32.0)
Chronic respiratory disease	16 (2.8)	11.7	25.0 (14.8-39.7)	206 (4.5)	38.8	44.4 (38.6-50.8)
Digestive system	12 (2.1)	8.8	7.4 (4.0-12.6)	175 (3.8)	33	17.4 (15.0-20.1)
Cirrhosis & alcoholic liver disease	5 (0.9)	3.7	5.6 (2.1-12.4)	96 (2.1)	18.1	17.5 (14.2-21.3)
Cancers	13 (2.3)	9.5	1.7 (0.9-2.8)	523 (11.3)	98.5	10.0 (9.2-10.9)

^A CDC WONDER data age, sex, race/ethnicity standardized to nonfatal opioid overdose cohort.