

Supplementary Materials

Included in this document:

- List of ICD-10 trauma primary diagnosis codes used
- Potentially Preventable Readmission (PPR) diagnoses
- Non-PPR diagnoses
- Patient insurance status stratified by >65 & <65
- Sensitivity Analysis for multivariable logistic regression with excluding non-PPR readmissions
- Sensitivity Analysis for multivariable logistic regression at 30-days readmissions
- Sensitivity Analysis for multivariable logistic regression with the two alternative definitions of PPR

ICD-10 trauma primary diagnosis codes used:

Note: Adapted from [NTDS Data Dictionary 2021](#)

International Classification of Diseases, Tenth Revision (ICD-10-CM):

- S00-S99 with 7th character modifiers of A, B, or C ONLY. (Injuries to specific body parts—initial encounter)
- T07 (unspecified multiple injuries)
- T14 (injury of unspecified body region)
- T79.A1-T79.A9 with 7th character modifier of A ONLY (Traumatic Compartment Syndrome—initial encounter)

EXCLUDING the following isolated injuries (ICD-10-CM):

- S00 (Superficial injuries of the head)
- S10 (Superficial injuries of the neck)
- S20 (Superficial injuries of the thorax)
- S30 (Superficial injuries of the abdomen, pelvis, lower back and external genitals)
- S40 (Superficial injuries of shoulder and upper arm)
- S50 (Superficial injuries of elbow and forearm)
- S60 (Superficial injuries of wrist, hand and fingers)
- S70 (Superficial injuries of hip and thigh)
- S80 (Superficial injuries of knee and lower leg)
- S90 (Superficial injuries of ankle, foot and toes)

Potentially Preventable Readmission (PPR) diagnoses for trauma care:

Top 15 Diagnosis Codes for 90-Day Readmissions

Primary Diagnosis for Readmission	Readmissions, (%)
Sepsis, unspecified organism	9.4
Infection following a procedure, initial encounter	3.1
Urinary tract infection, site not specified	2.8
Acute kidney failure, unspecified	2.6
Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease	2.2
Pneumonia, unspecified organism	2.1
Hypertensive heart disease with heart failure	1.9
Pneumonitis due to inhalation of food and vomit	1.5
Other pulmonary embolism without acute cor pulmonale	1.5
Chronic obstructive pulmonary disease with (acute) exacerbation	1.2
Chronic obstructive pulmonary disease with acute lower respiratory infection	1.0
Non-ST elevation (NSTEMI) myocardial infarction	1.0
Gastrointestinal hemorrhage, unspecified	0.9
Acute respiratory failure with hypoxia	0.8
Sepsis due to Escherichia coli	0.8

*Bolded entries represent codes defined as Ambulatory Care Sensitive Conditions (ACSCs)

Non- PPR diagnoses for trauma care:

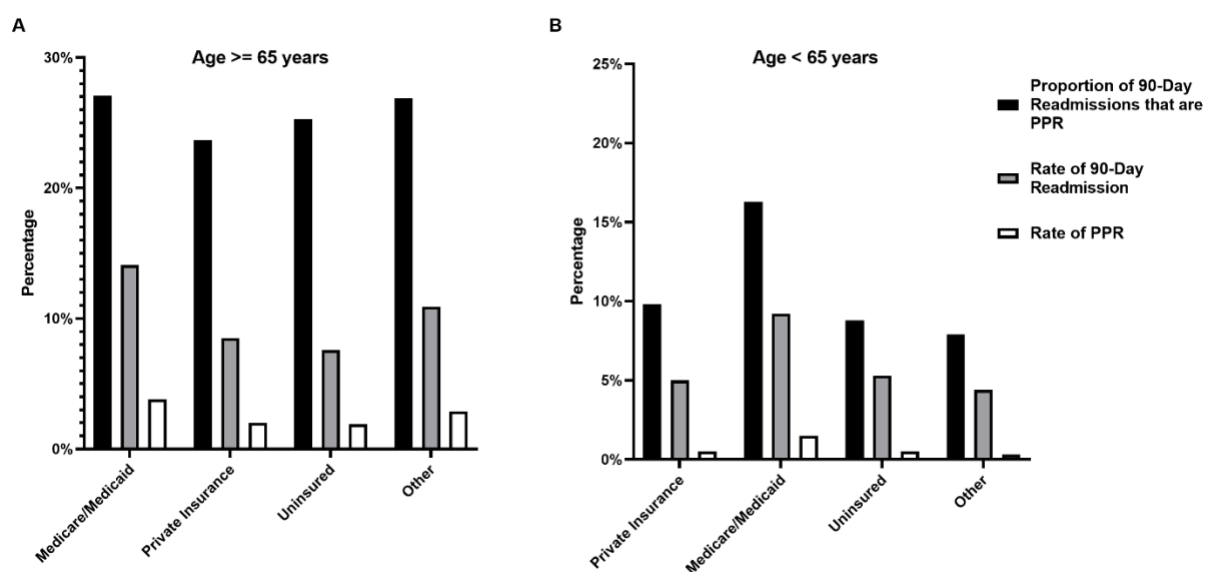
Top 15 Diagnosis Codes for 90-Day Non-PPR Readmissions

Primary Diagnosis for Readmission	Readmissions, (%)
Sepsis, unspecified organism	11.9
Infection following a procedure, initial encounter	3.9
Other pulmonary embolism without acute cor pulmonale	1.9
Non-ST elevation (NSTEMI) myocardial infarction	1.2
Gastrointestinal hemorrhage, unspecified	1.1
Acute respiratory failure with hypoxia	1.0
Sepsis due to Escherichia coli	1.0
Infection and inflammatory reaction due to indwelling urethral catheter, initial encounter	1.0
Cerebral infarction, unspecified	1.0

Cellulitis of left lower limb	0.9
Hyponatremia	0.8
Acute and chronic respiratory failure with hypoxia	0.8
alcohol dependence with withdrawal, unspecified	0.8
Cellulitis of right lower limb	0.8
Enterocolitis due to Clostridium difficile	0.8

*Bolded entries represent codes defined as Ambulatory Care Sensitive Conditions (ACSCs)

Patient insurance status stratified by >65 & <65:



Sensitivity Analysis for multivariable logistic regression with excluding non-PPR readmissions:

Multivariable Logistic Regression Model for Potentially Preventable Readmissions

Characteristic	aOR	95% CI	P value
Age, per additional decade	1.29	1.27-1.31	<0.001
Female	0.97	0.93-1.00	0.061
Insurance Status*			
For age <65 years			
Private Insurance	REF	REF	
Medicare/Medicaid	2.87	2.59-3.18	<0.001

Uninsured	1.33	1.11-1.60	0.002
Other	0.82	0.67-1.02	0.073
For age ≥ 65 years			
Medicare/Medicaid	REF	REF	
Private Insurance	0.75	0.69-0.83	<0.001
Uninsured	0.45	0.27-0.73	0.001
Other	0.84	0.70-1.00	0.046
Hospital Metropolitan-Teaching Status			
Metropolitan Non-teaching	REF	REF	
Metropolitan Teaching	0.82	0.77-0.86	<0.001
Non-metropolitan	0.97	0.74-0.85	0.512
Hospital Size			
Small	REF	REF	
Medium	0.91	0.85-0.98	0.012
Large	0.79	0.74-0.85	<0.001
Median Household Income Quartile of Patient Zip Code			
<25%	REF	REF	
25-50%	0.89	0.85-0.94	<0.001
50-75%	0.86	0.81-0.90	<0.001
>75%	0.83	0.77-0.88	<0.001
Injury Severity Score			
<8	REF	REF	
8-15	0.96	0.92-0.99	0.024
16-24	0.97	0.91-1.03	0.328
25+	0.12	0.10-0.14	<0.001
Comorbidities			
Acute Myocardial Infarction	1.06	0.99-1.12	0.080
Congestive Heart Failure	3.01	2.89-3.13	<0.001
Peripheral Vascular Disease	1.14	1.08-1.21	<0.001
Cerebrovascular Disease	1.07	1.00-1.15	0.067
Dementia	1.23	1.18-1.28	<0.001
Chronic Obstructive Pulmonary Disease	1.89	1.81-1.96	<0.001
Rheumatoid Disease	1.09	1.00-1.20	0.480
Peptic Ulcer Disease	1.47	1.21-1.77	<0.001
Mild Liver Disease	1.34	1.21-1.48	<0.001
Diabetes	1.60	1.52-1.68	<0.001
Diabetes with Complications	1.89	1.80-1.99	<0.001
Hemiplegia or Paraplegia	1.14	0.96-1.34	0.127
Chronic Kidney Disease	1.76	1.68-1.84	<0.001
Cancer	1.35	1.23-1.48	<0.001
Moderate to Severe Liver Disease	1.67	1.38-2.03	<0.001
Metastatic Cancer	1.54	1.32-1.79	<0.001

Acquired Immunodeficiency Syndrome	1.66	1.19-2.32	0.003
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*Effect of primary payer stratified by age < or ≥ 65 years was estimated with a single model including an interaction term between the covariate for primary payer and a categorical variable for age ≥ 65 years
Abbreviations: aOR, Adjusted Odds Ratio; CI, Confidence Interval

Sensitivity Analysis for multivariable logistic regression at 30-days readmissions:

Multivariable Model - 30 Day Readmissions

Characteristic	aOR	95% CI	P value
Age, per additional decade	1.30	1.27-1.33	<0.001
Female	0.92	0.96-1.02	0.005
Insurance Status*			
For age <65 years			
Private Insurance	REF	REF	
Medicare/Medicaid	2.78	2.39-3.24	<0.001
Uninsured	1.39	1.04-1.85	0.024
Other	0.84	0.62-1.13	0.260
For age ≥ 65 years			
Medicare/Medicaid	REF	REF	
Private Insurance	0.83	0.72-0.95	0.008
Uninsured	0.53	0.28-1.01	0.054
Other	0.96	0.75-1.22	0.731
Hospital Metropolitan-Teaching Status			
Metropolitan Non-teaching	REF	REF	
Metropolitan Teaching	0.84	0.79-0.90	<0.001
Non-metropolitan	1.08	0.96-1.20	0.204
Hospital Size			
Small	REF	REF	
Medium	0.91	0.83-1.00	0.045
Large	0.78	0.72-0.85	<0.001
Median Household Income Quartile of Patient Zip Code			
<25%	REF	REF	
25-50%	0.94	0.88-1.01	0.110
50-75%	0.91	0.85-0.98	0.013
>75%	0.88	0.81-0.96	0.003
Injury Severity Score			
<8	REF	REF	
8-15	1.02	0.96-1.08	0.539

16-24	0.99	0.91-1.09	0.902
24-35	0.84	0.68-1.03	0.100
35+	0.01	0.01-0.03	<0.001
Transfer to Rehab	0.87	0.60-1.25	0.445
Comorbidities			
Acute Myocardial Infarction	1.02	0.94-1.12	0.583
Congestive Heart Failure	2.69	2.54-2.86	<0.001
Peripheral Vascular Disease	1.07	0.98-1.17	0.151
Cerebrovascular Disease	0.96	0.86-1.08	0.513
Dementia	1.20	1.13-1.27	<0.001
Chronic Obstructive Pulmonary Disease	1.80	1.70-1.90	<0.001
Rheumatoid Disease	1.01	0.88-1.16	0.841
Peptic Ulcer Disease	1.43	1.09-1.89	0.011
Mild Liver Disease	1.19	1.01-1.40	0.038
Diabetes	1.49	1.38-1.59	<0.001
Diabetes with Complications	1.61	1.49-1.75	<0.001
Hemiplegia or Paraplegia	1.04	0.84-1.29	0.722
Chronic Kidney Disease	1.67	1.56-1.79	<0.001
Cancer	1.24	1.06-1.46	0.008
Moderate to Severe Liver Disease	1.40	1.03-1.89	0.030
Metastatic Cancer	1.36	1.09-1.70	0.006
Acquired Immunodeficiency Syndrome	0.97	0.47-1.99	0.934

*Effect of primary payer stratified by age < or $\geq$ 65 years was estimated with a single model including an interaction term between the covariate for primary payer and a categorical variable for age $\geq$ 65 years
Abbreviations: aOR, Adjusted Odds Ratio; CI, Confidence Interval

Sensitivity Analysis for multivariable logistic regression with the two alternative definitions of PPR:

ACSCs Only

Multivariable Model - ACSC Only

Characteristic	aOR	95% CI	P value
Age, per additional decade	1.27	1.25-1.29	<0.001
Female	1.11	1.06-1.16	<0.001
Insurance Status*			
For age <65 years			
Private Insurance	REF	REF	
Medicare/Medicaid	2.82	2.54-3.15	<0.001

Uninsured	1.39	1.14-1.70	0.001
Other	0.84	0.66-1.06	0.141
For age ≥ 65 years			
Medicare/Medicaid	REF	REF	
Private Insurance	0.74	0.67-0.83	<0.001
Uninsured	0.45	0.25-0.82	0.009
Other	0.75	0.61-0.93	0.008
Hospital Metropolitan-Teaching Status			
Metropolitan Non-teaching	REF	REF	
Metropolitan Teaching	0.81	0.76-0.86	<0.001
Non-metropolitan	0.99	0.89-1.09	0.772
Hospital Size			
Small	REF	REF	
Medium	0.91	0.84-0.98	0.018
Large	0.80	0.74-0.86	<0.001
Median Household Income Quartile of Patient Zip Code			
<25%	REF	REF	
25-50%	0.90	0.86-0.96	<0.001
50-75%	0.85	0.81-0.91	<0.001
>75%	0.82	0.76-0.88	<0.001
Injury Severity Score			
<8	REF	REF	
8-15	0.96	0.92-1.00	0.064
16-24	0.92	0.86-0.98	0.016
25+	0.11	0.09-0.13	<0.001
Comorbidities			
Acute Myocardial Infarction	1.07	1.00-1.14	0.050
Congestive Heart Failure	3.47	3.32-3.63	<0.001
Peripheral Vascular Disease	1.22	1.15-1.30	<0.001
Cerebrovascular Disease	0.99	0.92-1.07	0.819
Dementia	1.10	1.05-1.15	<0.001
Chronic Obstructive Pulmonary Disease	2.03	1.95-2.12	<0.001
Rheumatoid Disease	1.06	0.96-1.18	0.232
Peptic Ulcer Disease	1.27	1.02-1.60	0.036
Mild Liver Disease	1.29	1.15-1.46	<0.001
Diabetes	1.63	1.54-1.72	<0.001
Diabetes with Complications	1.98	1.87-2.10	<0.001
Hemiplegia or Paraplegia	1.05	0.85-1.28	0.667
Chronic Kidney Disease	1.57	1.49-1.66	<0.001
Cancer	1.29	1.15-1.43	<0.001
Moderate to Severe Liver Disease	1.42	1.13-1.77	0.002
Metastatic Cancer	1.22	1.02-1.46	0.032

Acquired Immunodeficiency Syndrome	1.47	0.99-2.19	0.059
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*Effect of primary payer stratified by age < or ≥ 65 years was estimated with a single model including an interaction term between the covariate for primary payer and a categorical variable for age ≥ 65 years
Abbreviations: aOR, Adjusted Odds Ratio; CI, Confidence Interval

LOS ≤2 days:

Multivariable Model - LOS ≤ 2 Days

Characteristic	aOR	95% CI	P value
Age, per additional decade	1.11	1.10-1.13	<0.001
Female	1.03	1.00-1.06	0.076
Insurance Status*			
For age <65 years			
Private Insurance	REF	REF	
Medicare/Medicaid	1.65	1.56-1.75	<0.001
Uninsured	0.95	0.86-1.05	0.316
Other	1.02	0.93-1.12	0.674
For age ≥ 65 years			
Medicare/Medicaid	REF	REF	
Private Insurance	0.77	0.71-0.84	<0.001
Uninsured	0.70	0.47-1.03	0.071
Other	0.91	0.79-1.05	0.199
Hospital Metropolitan-Teaching Status			
Metropolitan Non-teaching	REF	REF	
Metropolitan Teaching	0.86	0.79-0.93	<0.001
Non-metropolitan	0.84	0.77-0.92	<0.001
Hospital Size			
Small	REF	REF	
Medium	0.86	0.79-0.93	<0.001
Large	0.76	0.71-0.81	<0.001
Median Household Income Quartile of Patient Zip Code			
<25%	REF	REF	
25-50%	0.99	0.95-1.04	0.729
50-75%	1.01	0.96-1.06	0.673
>75%	1.01	0.96-1.07	0.619
Injury Severity Score			
<8	REF	REF	
8-15	0.98	0.95-1.02	0.401
16-24	1.09	1.03-1.15	0.002

24-35	6.77	6.4-7.15	<0.001
Comorbidities			
Acute Myocardial Infarction	1.21	1.16-1.29	<0.001
Congestive Heart Failure	1.66	1.60-1.73	<0.001
Peripheral Vascular Disease	1.14	1.08-1.20	<0.001
Cerebrovascular Disease	1.15	1.09-1.22	<0.001
Dementia	0.93	0.89-0.97	<0.001
Chronic Obstructive Pulmonary Disease	1.47	1.42-1.52	<0.001
Rheumatoid Disease	1.23	1.14-1.32	<0.001
Peptic Ulcer Disease	1.23	1.06-1.44	0.007
Mild Liver Disease	1.47	1.36-1.59	<0.001
Diabetes	1.33	1.28-1.38	<0.001
Diabetes with Complications	1.42	1.35-1.48	<0.001
Hemiplegia or Paraplegia	0.73	0.67-0.81	<0.001
Chronic Kidney Disease	1.37	1.32-1.43	<0.001
Cancer	1.39	1.29-1.51	<0.001
Moderate to Severe Liver Disease	2.06	1.81-2.35	<0.001
Metastatic Cancer	1.62	1.44-1.83	<0.001
Acquired Immunodeficiency Syndrome	1.63	1.25-2.12	<0.001

*Effect of primary payer stratified by age < or $\geq$ 65 years was estimated with a single model including an interaction term between the covariate for primary payer and a categorical variable for age $\geq$ 65 years
Abbreviations: aOR, Adjusted Odds Ratio; CI, Confidence Interval