

Supplementary Online Content

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eFigure. Study Population

eTable 1. Characteristics of Patients Missing Procedure Urinalysis Results compared to Analyzed Procedures

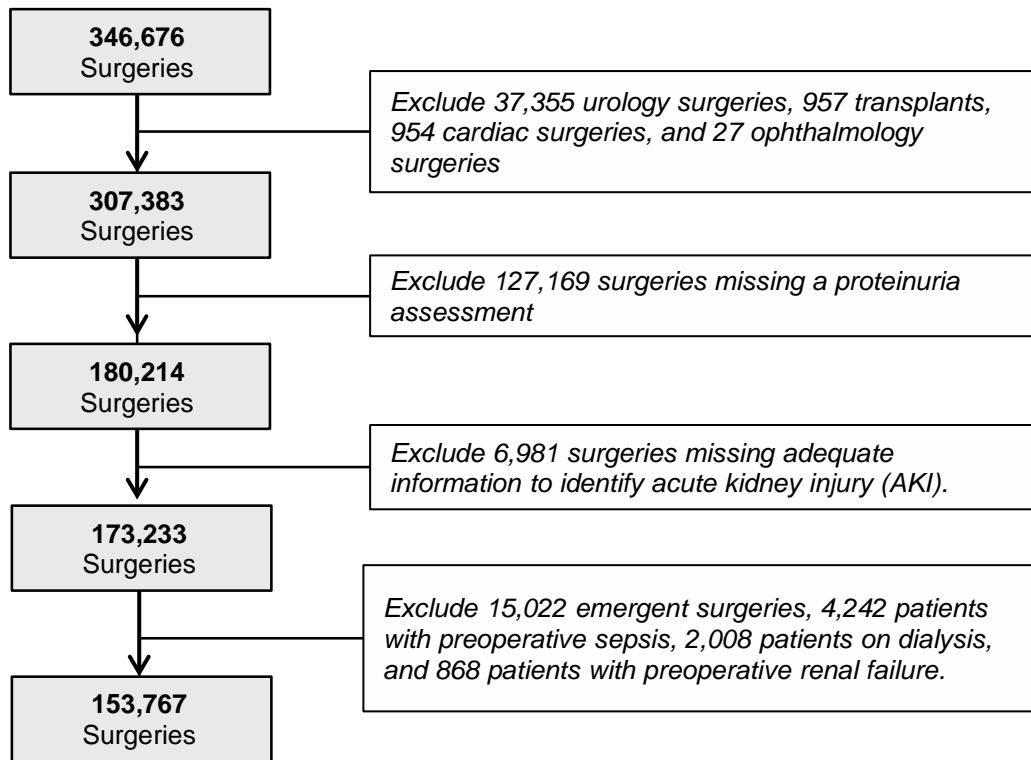
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This supplementary material has been provided by the authors to give readers additional information about their work.

eFigure. Study Population



eTable 1. Characteristics of Patients Missing Procedure Urinalysis Results compared to Analyzed Procedures					
	Excluded		Analyzed		P-Value
	N / Mean	(%) / (SD)	N / Mean	(%) / (SD)	
OVERALL	114,486	(42.7)	153,767	(57.3)	
<i>Outcomes</i>					
Acute Kidney Injury, Cr increase of 0.3mg/dl, n (%)	11,032	(9.6)	17,209	(11.2)	<.001
Any 30-Day Unplanned Readmission, n (%)	10,904	(9.5)	16,665	(10.8)	<.001
<i>Demographics and Prior Healthcare Utilization</i>					
Age	62.6	(11.3)	63.7	(11.3)	<.001
Male Gender, n (%)	105,699	(92.3)	143,288	(93.2)	<.001
Race, n (%)					<.001
White	89,524	(81.1)	118,761	(80.6)	
Black	18,895	(17.1)	25,730	(17.5)	
Other	1,921	(1.7)	2,850	(1.9)	
BMI	28.8	(6.7)	28.9	(14.6)	0.78
Marital Status, n (%)					<.001
Single	12,102	(10.6)	15,907	(10.4)	
Married	54,023	(47.3)	71,712	(46.7)	
Divorced/Separated/Widowed	48,204	(42.2)	66,038	(43.0)	
Functional Health Status, n (%)					<.001
Independent	106,805	(93.3)	139,469	(90.7)	
Partially Dependent	6,863	(6.0)	12,155	(7.9)	
Totally Dependent	790	(0.7)	2,103	(1.4)	
Number of Prior ER Visits within 6 Months	0.6	(1.3)	1.0	(1.9)	<.001
Number of Prior Inpatient Admissions within 6 Months	0.5	(1.6)	0.90	(2.3)	<.001
<i>Preoperative Comorbidities</i>					
Chronic Kidney Disease	2,604	(2.3)	6,962	(4.5)	<.001
ASA Classification, n (%)					<.001
1-2	22,962	(20.1)	27,280	(17.8)	
3	81,582	(71.3)	107,623	(70.0)	
4-5	9,917	(9.0)	18,824	(12.0)	
Bleeding Disorders, n (%)	6,854	(6.0)	9,205	(6.0)	1.00
Diabetes Mellitus With Oral Agents Or Insulin, n (%)					<.001
None	89,071	(77.8)	112,066	(72.9)	
Oral	15,339	(13.4)	22,798	(14.8)	
Insulin	10,076	(8.8)	18,903	(12.3)	
Dyspnea, n (%)					<.001
No Dyspnea	99,655	(87.1)	132,889	(86.4)	
Minimal Exertion	13,825	(12.1)	19,318	(12.6)	
At Rest	1,005	(0.9)	1,558	(1.0)	
DNR Status, n (%)	934	(0.8)	2,406	(1.6)	<.001
Etoh > 2 Drinks/Day, n (%)	9,279	(8.1)	12,440	(8.1)	0.89
Hemiplegia, n (%)	2,516	(2.2)	3,862	(2.5)	<.001
Congestive Heart Failure, n (%)	583	(0.5)	1,336	(0.9)	<.001
History of Transient Ischemic Attacks, n (%)	4,092	(3.6)	5,845	(3.8)	0.002
Current Smoker Within One Year, n (%)	41,096	(35.9)	51,385	(33.4)	<.001
Steroid Use For Chronic Condition, n (%)	2,191	(1.9)	3,822	(2.5)	<.001
Hypertension Requiring Medication, n (%)	76,787	(67.1)	108,289	(70.4)	<.001
History of MI, n (%)	359	(0.3)	834	(0.5)	<.001
History of Revascularization/Amputation for	8,112	(7.1)	12,394	(8.1)	<.001

PVD, n (%)					
Previous PTCA Procedure, n (%)	10,112	(8.8)	14,117	(9.2)	0.002
Previous Cardiac Surgery, n (%)	9,350	(8.2)	14,386	(9.4)	<.001

N=114,486 reflects procedures missing pre-operative urinalysis, excluding inadequate information to identify acute kidney injury, emergent surgeries, pre-operative sepsis, pre-operative dialysis and renal failure. SD = Standard Deviation; BMI = Body Mass Index; ED = Emergency Department; ASA = American Society of Anesthesiologists; DNR = Do Not Resuscitate; MI = Myocardial Infarction; PVD = Peripheral Vascular Disease; PTCA = Percutaneous Transluminal Coronary Angioplasty

eTable 2. Perioperative Medication Administrations Associated with Preoperative Proteinuria and Outcomes													
		Overall		Negative	Trace	1+	2+	3+	p-value	Acute Kidney Injury		Unplanned Readmission	
		N	(%)	%	%	%	%	%		%	p-value	%	p-value
Overall N / %		153,767		86,571	31,676	24,603	8,457	2,460		11.2%		10.8%	
Antibiotics, n (%)													
	Pre-Admission	33,309	(22.0)	20.4	24.1	24.4	24.2	22.8	<.001	12.5	<0.01	11.8	<0.01
	Pre-Op	11,261	(7.5)	5.5	8.0	11.6	12.4	11.3	<.001	13.4	<0.01	15.1	<0.01
	Post-Op	545	(0.4)	0.4	0.4	0.4	0.3	0.1	0.08	14.1	0.04	13.2	0.08
Anti-inflammatory (NSAID) n (%)													
	Pre-Admission	8,272	(5.5)	6.4	5.1	4.1	3.0	1.8	<.001	6.4	<0.01	8.8	<0.01
	Pre-Op	1,040	(0.7)	0.6	0.8	0.8	0.7	0.3	0.003	8.8	0.01	14.1	<0.01
	Post-Op	529	(0.4)	0.4	0.3	0.2	0.2	0.1	<.001	7.4	<0.01	8.5	0.08
Anti-hypertensive, n (%)													
	Pre-Admission	29,188	(19.3)	18.2	19.0	20.5	24.6	31.2	<.001	13.2	<0.01	10.7	0.32
	Pre-Op	7,600	(5.0)	3.4	6.1	7.4	9.5	11.9	<.001	16.7	<0.01	15.5	<0.01
	Post-Op	1,331	(0.9)	0.9	0.8	0.9	1.0	1.4	0.02	9.5	0.04	10.9	1.00
Diuretic, n (%)													
	Pre-Admission	10,553	(7.0)	7.3	6.8	6.4	6.2	6.8	<.001	10.3	<0.01	9.7	<0.01
	Pre-Op	1,844	(1.2)	0.9	1.6	1.5	2.0	1.7	<.001	14.4	<0.01	14.8	<0.01
	Post-Op	401	(0.3)	0.3	0.2	0.2	0.2	0.3	0.29	7.0	0.01	9.0	0.22
Contrast, n (%)													
	Pre-Admission	94	(0.1)	0.1	0.1	0.1	0.1	0.1	0.02	17.0	0.08	18.1	0.03
	Pre-Op	229	(0.2)	0.1	0.2	0.3	0.3	0.1	<.001	19.7	<0.01	15.7	0.02
	Post-Op	5	(0.0)	0.0	0.0	0.0	0.0	0.0	0.38	20.0	0.54	20.0	0.51
Vasopressors, n (%)													
	Pre-Admission	233	(0.2)	0.2	0.1	0.2	0.1	0.1	0.02	8.6	0.19	12.0	0.58
	Pre-Op	26	(0.0)	0.0	0.0	0.1	0.0	0.0	0.01	23.1	0.06	19.2	0.17
	Post-Op	6	(0.0)	0.0	0.0	0.0	0.0	0.0	0.06	16.7	0.68	0.0	0.39
Blood Derivatives, n (%)													
	Pre-Admission	124	(0.1)	0.1	0.1	0.1	0.1	0.1	0.29	18.6	0.01	18.6	0.01
	Pre-Op	29	(0.0)	0.0	0.0	0.0	0.0	0.0	0.58	13.8	0.67	34.5	<0.01
	Post-Op	29	(0.0)	0.0	0.0	0.0	0.0	0.0	0.83	20.7	0.11	20.7	0.09
IV Fluid, n (%)													
	Pre-Admission	35,924	(23.8)	23.9	23.8	24.3	22.0	20.2	<.001	10.3	<0.01	11.3	0.003
	Pre-Op	14,109	(9.3)	7.1	10.1	13.6	15.1	14.5	<.001	13.5	<0.01	15.2	<0.01
	Post-Op	2,921	(1.9)	1.9	2.0	2.1	1.7	1.4	0.12	11.9	0.27	12.2	0.03
TPN, n (%)													
	Pre-Admission	267	(0.2)	0.1	0.2	0.3	0.4	0.1	<.001	18.7	<0.01	19.5	<0.01
	Pre-Op	66	(0.0)	0.0	0.0	0.1	0.1	0.0	0.18	7.6	0.34	22.7	<0.01
	Post-Op	8	(0.0)	0.0	0.0	0.0	0.0	0.0	0.91	0.0	0.31	12.5	0.88

IV = Intravenous; TPN = Total Parenteral Nutrition

eTable 3. Readmission Reason by Preoperative Proteinuria							
<i>N</i> = 16,665	Overall	Proteinuria					P-Value
		Negative	Trace	1+	2+	3+	
Wound-Related Codes							
Any	22.9%	23.9%	22.7%	21.3%	21.6%	23.9%	0.03
Postoperative Abscess/Septicemia	12.3%	13.4%	12.4%	10.3%	10.7%	10.5%	<0.01
Acute Abscess / Diffuse Cellulitis / Lymphangitis	7.5%	8.1%	7.0%	6.9%	6.1%	7.3%	0.04
Wound Disruption/Dehiscence/Rupture	6.2%	6.2%	6.6%	5.8%	5.7%	6.1%	0.60
Amputation Stump Infection	1.4%	1.0%	1.5%	1.8%	2.5%	2.4%	<0.01
Amputation Stump Non-infectious Complication	0.7%	0.6%	0.6%	0.9%	0.9%	2.2%	<0.01
Infected postoperative seroma	0.6%	0.7%	0.5%	0.3%	0.5%	0.5%	0.10
Peritoneal Abscess	1.5%	1.5%	1.2%	2.0%	1.5%	1.2%	0.10
Injury - Posttraumatic Wound Infection	0.2%	0.2%	0.3%	0.1%	0.3%	0.0%	0.35
Gastrointestinal-Related Codes							
Any	14.8%	15.2%	14.3%	15.2%	13.4%	12.7%	0.20
Intestinal Obstruction	6.5%	6.8%	6.4%	6.5%	5.1%	4.4%	0.09
Constipation	4.0%	4.2%	3.9%	3.6%	3.9%	3.4%	0.58
Nausea	3.4%	3.5%	2.9%	3.6%	3.1%	2.9%	0.41
Vomiting	3.0%	3.0%	2.5%	3.5%	3.0%	2.9%	0.22
Ostomy Care / Complications	0.9%	0.9%	0.8%	1.3%	0.5%	1.5%	0.04
Acute Pancreatitis	0.9%	0.8%	0.9%	1.0%	1.1%	1.5%	0.63
Ulcers or Gastritis	0.8%	0.7%	1.0%	0.8%	0.9%	0.2%	0.40
Gastroenteritis	0.2%	0.2%	0.0%	0.3%	0.2%	0.0%	0.05
Diverticulosis	0.1%	0.1%	0.0%	0.1%	0.1%	0.2%	0.60
Diverticulitis	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.66
Device Complications							
Any	7.6%	8.4%	7.8%	6.8%	4.6%	4.2%	<0.01
Other Device Complications	7.4%	8.2%	7.5%	6.6%	4.3%	4.2%	<0.01
Catheter-related bloodstream infection	0.2%	0.2%	0.4%	0.2%	0.3%	0.0%	0.31
Catheter-Associated Urinary Tract Infection	0.3%	0.2%	0.3%	0.4%	0.3%	0.2%	0.29
Renal Failure and Electrolyte Disorders							
Any	22.1%	19.9%	21.0%	25.9%	27.3%	28.1%	<0.01
Other Fluid and Electrolyte Disorders	16.8%	15.7%	16.1%	19.7%	18.5%	18.3%	<0.01
Acute Renal Failure	10.6%	8.5%	10.5%	13.5%	14.8%	18.3%	<0.01
Dehydration	7.5%	6.9%	7.8%	9.0%	7.2%	5.9%	<0.01
Mental Health Codes							
Any	22.2%	22.4%	23.5%	21.3%	20.3%	18.1%	0.02
Other Mental Health Disorders	14.7%	14.6%	15.9%	14.6%	13.2%	10.7%	0.02
Delirium and Other Psychoses	8.1%	7.2%	8.6%	9.9%	7.7%	7.1%	<0.01
Alteration of Consciousness	5.8%	6.1%	6.2%	4.9%	5.2%	5.6%	0.07
Alcoholism	3.7%	3.8%	4.1%	3.6%	2.5%	3.7%	0.12
Substance Abuse	2.1%	2.2%	2.2%	1.9%	2.1%	0.2%	0.09

Bleeding							
Any	19.7%	19.2%	19.8%	19.8%	21.6%	24.6%	0.03
Hemorrhage or Hematoma	7.6%	7.7%	7.7%	7.2%	7.7%	6.8%	0.89
Hematuria	1.0%	0.8%	1.0%	1.2%	1.5%	1.2%	0.11
Anemia	14.6%	14.0%	14.5%	14.8%	16.0%	20.5%	<0.01
Other							
Pain-related	14.0%	15.5%	13.6%	12.5%	10.8%	10.0%	<0.01
Cardiac Arrhythmia	9.1%	7.9%	9.3%	10.2%	12.1%	11.2%	<0.01
Urinary Tract Infection	7.3%	6.0%	7.5%	8.8%	10.6%	9.5%	<0.01
Congestive Heart Failure	7.0%	5.2%	6.2%	8.9%	13.4%	12.4%	<0.01
Peripheral Vascular Disease	6.9%	6.3%	6.8%	7.7%	8.7%	10.0%	<0.01
Bacterial Pneumonia	6.6%	6.0%	6.3%	8.3%	7.2%	6.1%	<0.01
Postoperative Sepsis	4.6%	4.1%	4.8%	5.4%	4.5%	5.1%	0.03
Cardiac Complications & Chest Pain	4.3%	4.2%	4.2%	4.5%	4.2%	5.9%	0.52
Postoperative Pulmonary Embolism or Deep Vein Thrombosis	4.0%	4.5%	3.8%	3.6%	3.3%	2.7%	0.04
C-Difficile Infection	2.1%	1.8%	2.1%	2.6%	3.1%	1.5%	0.01
Seizures	1.8%	1.7%	2.0%	1.8%	1.9%	1.5%	0.84
Strokes	1.3%	1.3%	1.3%	1.5%	1.5%	1.0%	0.77
Injury - Fracture	1.1%	1.1%	1.0%	1.0%	1.3%	1.0%	0.94
Injury - Dislocation	0.4%	0.4%	0.3%	0.3%	0.3%	0.0%	0.43
Injury - Open Wound	0.6%	0.7%	0.6%	0.4%	0.6%	0.0%	0.34
Injury - Poisoning/Overdose	0.5%	0.5%	0.7%	0.4%	0.5%	0.2%	0.48
Injury - Other Non-Surgical Injury	0.4%	0.4%	0.5%	0.3%	0.5%	0.7%	0.63

eTable 4. Correlates of Preoperative Proteinuria Ranked by Importance

Any Proteinuria				Proteinuria of 1+ OR more			
Effect	X ² -df	Rank	p-value	Effect	X ² -df	Rank	p-value
Diabetes Mellitus	1,627.7	1	<0.01	Diabetes Mellitus	2,092.1	1	<0.01
Race	1,031.2	2	<0.01	Chronic Kidney Disease	1,222.5	2	<0.01
Chronic Kidney Disease	789.0	3	<0.01	ASA Classification	648.0	3	<0.01
Functional Status	775.4	4	<0.01	Race	471.2	4	<0.01
ASA Classification	532.0	5	<0.01	Functional Status	337.6	5	<0.01
Prior ED Visits	312.1	6	<0.01	Prior ED Visits	294.6	6	<0.01
Bleeding Disorders	108.2	7	<0.01	Age	103.0	7	<0.01
Age	99.6	8	<0.01	Body Mass Index	79.1	8	<0.01
Prior Inpatient Admissions	88.3	9	<0.01	Current Smoker within 1 Year	53.2	9	<0.01
Body Mass Index	76.7	10	<0.01	Bleeding Disorders	32.4	10	<0.01
Hypertension Requiring Medications	60.4	11	<0.01	Current Pneumonia	31.9	11	<0.01
Disseminated Cancer	46.1	12	<0.01	History of CHF	31.7	12	<0.01
History of COPD	43.1	13	<0.01	Hypertension Requiring Medications	28.9	13	<0.01
Current Smoker within 1 Year	37.5	14	<0.01	Disseminated Cancer	26.0	14	<0.01
Current Pneumonia	33.0	15	<0.01	Prior Inpatient Admissions	21.9	15	<0.01
History of CHF	30.6	16	<0.01	Chemotherapy for Malignancy	21.3	16	<0.01
Chemotherapy for Malignancy	27.2	17	<0.01	Gender	14.3	17	<0.01
Ascites	18.9	18	<0.01	Ascites	13.7	18	<0.01
Previous Cardiac Surgery	17.9	19	<0.01	Previous PTCA Procedure	11.2	19	<0.01
Impaired Sensorium	13.2	20	<0.01	Hemiplegia	11.2	20	<0.01
Dyspnea	9.0	21	<0.01	History of COPD	9.2	21	<0.01
Previous PTCA Procedure	7.8	22	<0.01	Esophageal Varices	8.3	22	<0.01
Esophageal Varices	7.2	23	<0.01	DNR Status	7.7	23	<0.01
History of Bipolar Disorder	5.1	24	0.01	History of Depression	6.8	24	0.01
				History of Revascularization for PVD	6.7	25	0.01
				History of Bipolar Disorder	6.7	26	0.01
				Dyspnea	4.5	27	0.04
				Previous Cardiac Surgery	4.1	28	0.02
				History of MI within 6 Months	3.5	29	0.03
				Impaired Sensorium	2.9	30	0.05

df = degrees of freedom; ASA = American Society of Anesthesiology; ED = Emergency Department; CHF = Congestive Heart Failure; COPD = Chronic Obstructive Pulmonary Disease; DNR = Do Not Resuscitate; MI = Myocardial Infarction; PVD = Peripheral Vascular Disease; PTCA = Percutaneous Transluminal Coronary Angioplasty

P-values represent Type 3 p-value for the term in the multivariate model