

APPENDIX

Table 1. List of General Surgical Procedures on Which Black and White Patients Were Exact Matched

Procedure Code	Procedure Name
PPX 062	Unilateral thyroid lobectomy
PPX 0631	Excision of lesion of thyroid
PPX 0639	Other partial thyroidectomy
PPX 064	Complete thyroidectomy
PPX 0650	Substernal thyroidectomy, not otherwise specified
PPX 0651	Partial substernal thyroidectomy
PPX 0652	Complete substernal thyroidectomy
PPX 0681	Complete parathyroidectomy
PPX 0689	Other parathyroidectomy
PPX 0722	Unilateral adrenalectomy
PPX 1711	Laparoscopic repair of direct inguinal hernia with graft or prosthesis
PPX 1712	Laparoscopic repair of indirect inguinal hernia with graft or prosthesis
PPX 1713	Laparoscopic repair of inguinal hernia with graft or prosthesis, not otherwise specified
PPX 1721	Laparoscopic bilateral repair of direct inguinal hernia with graft or prosthesis
PPX 1722	Laparoscopic bilateral repair of indirect inguinal hernia with graft or prosthesis
PPX 1723	Laparoscopic bilateral repair of inguinal hernia, one direct and one indirect, with graft or prosthesis
PPX 1724	Laparoscopic bilateral repair of inguinal hernia with graft or prosthesis, not otherwise specified
PPX 1731	Laparoscopic multiple segmental resection of large intestine
PPX 1732	Laparoscopic cecectomy
PPX 1733	Laparoscopic right hemicolectomy
PPX 1734	Laparoscopic resection of transverse colon
PPX 1735	Laparoscopic left hemicolectomy
PPX 1736	Laparoscopic sigmoidectomy
PPX 1739	Other laparoscopic partial excision of large intestine
PPX 415	Total splenectomy
PPX 4240	Esophagectomy, not otherwise specified
PPX 4241	Partial esophagectomy
PPX 4242	Total esophagectomy
PPX 427	Esophagomyotomy
PPX 4342	Local excision of other lesion or tissue of stomach
PPX 435	Partial gastrectomy with anastomosis to esophagus
PPX 436	Partial gastrectomy with anastomosis to duodenum
PPX 437	Partial gastrectomy with anastomosis to jejunum
PPX 4389	Open and other partial gastrectomy
PPX 4399	Other total gastrectomy
PPX 4429	Other pyloroplasty
PPX 4438	Laparoscopic gastroenterostomy
PPX 4439	Other gastroenterostomy without gastrectomy
PPX 4441	Suture of gastric ulcer site
PPX 4442	Suture of duodenal ulcer site
PPX 4466	Other procedures for creation of esophagogastric sphincteric competence

PPX 4467	Laparoscopic procedures for creation of esophagogastric sphincteric competence
PPX 4469	Other repair of stomach
PPX 4561	Multiple segmental resection of small intestine
PPX 4562	Other partial resection of small intestine
PPX 4563	Total removal of small intestine
PPX 4571	Open and other multiple segmental resection of large intestine
PPX 4572	Open and other cecectomy
PPX 4573	Open and other right hemicolectomy
PPX 4574	Open and other resection of transverse colon
PPX 4575	Open and other left hemicolectomy
PPX 4576	Open and other sigmoidectomy
PPX 4579	Other and unspecified partial excision of large intestine
PPX 458	Other and unspecified partial excision of large intestine
PPX 4581	Laparoscopic total intra-abdominal colectomy
PPX 4582	Open total intra-abdominal colectomy
PPX 4583	Other and unspecified total intra-abdominal colectomy
PPX 4590	Intestinal anastomosis, not otherwise specified
PPX 4591	Small-to-small intestinal anastomosis
PPX 4592	Anastomosis of small intestine to rectal stump
PPX 4593	Other small-to-large intestinal anastomosis
PPX 4594	Large-to-large intestinal anastomosis
PPX 4595	Anastomosis to anus
PPX 4601	Exteriorization of small intestine
PPX 4603	Exteriorization of large intestine
PPX 4610	Colostomy, not otherwise specified
PPX 4611	Temporary colostomy
PPX 4613	Permanent colostomy
PPX 4620	Ileostomy, not otherwise specified
PPX 4621	Temporary ileostomy
PPX 4622	Continent ileostomy
PPX 4623	Other permanent ileostomy
PPX 4639	Other enterostomy
PPX 4642	Repair of pericostomy hernia
PPX 4651	Closure of stoma of small intestine
PPX 4652	Closure of stoma of large intestine
PPX 4673	Suture of laceration of small intestine, except duodenum
PPX 4674	Closure of fistula of small intestine, except duodenum
PPX 4675	Suture of laceration of large intestine
PPX 4679	Other repair of intestine
PPX 4701	Laparoscopic appendectomy
PPX 4709	Other appendectomy
PPX 4849	Other pull-through resection of rectum
PPX 485	Other pull-through resection of rectum
PPX 4850	Abdominoperineal resection of the rectum, not otherwise specified
PPX 4851	Laparoscopic abdominoperineal resection of the rectum
PPX 4852	Open abdominoperineal resection of the rectum
PPX 4862	Anterior resection of rectum with synchronous colostomy
PPX 4863	Other anterior resection of rectum
PPX 4869	Other resection of rectum

PPX 4875	Abdominal proctopexy
PPX 4876	Other proctopexy
PPX 5022	Partial hepatectomy
PPX 5029	Other destruction of lesion of liver
PPX 503	Lobectomy of liver
PPX 5122	Cholecystectomy
PPX 5123	Laparoscopic cholecystectomy
PPX 5124	Laparoscopic partial cholecystectomy
PPX 5132	Anastomosis of gallbladder to intestine
PPX 5136	Choledochoenterostomy
PPX 5137	Anastomosis of hepatic duct to gastrointestinal tract
PPX 5141	Common duct exploration for removal of calculus
PPX 5151	Exploration of common duct
PPX 5252	Distal pancreatectomy
PPX 5259	Other partial pancreatectomy
PPX 526	Total pancreatectomy
PPX 527	Radical pancreaticoduodenectomy
PPX 5300	Unilateral repair of inguinal hernia, not otherwise specified
PPX 5301	Other and open repair of direct inguinal hernia
PPX 5302	Other and open repair of indirect inguinal hernia
PPX 5303	Other and open repair of direct inguinal hernia with graft or prosthesis
PPX 5304	Other and open repair of indirect inguinal hernia with graft or prosthesis
PPX 5305	Repair of inguinal hernia with graft or prosthesis, not otherwise specified
PPX 5310	Bilateral repair of inguinal hernia, not otherwise specified
PPX 5311	Other and open bilateral repair of direct inguinal hernia
PPX 5313	Other and open bilateral repair of inguinal hernia, one direct and one indirect
PPX 5314	Other and open bilateral repair of direct inguinal hernia with graft or prosthesis
PPX 5315	Other and open bilateral repair of indirect inguinal hernia with graft or prosthesis
PPX 5316	Other and open bilateral repair of inguinal hernia, one direct and one indirect, with graft or prosthesis
PPX 5317	Bilateral inguinal hernia repair with graft or prosthesis, not otherwise specified
PPX 5321	Unilateral repair of femoral hernia with graft or prosthesis
PPX 5329	Other unilateral femoral herniorrhaphy
PPX 5341	Other and open repair of umbilical hernia with graft or prosthesis
PPX 5349	Other open umbilical herniorrhaphy
PPX 5351	Incisional hernia repair
PPX 5359	Repair of other hernia of anterior abdominal wall
PPX 5361	Other open incisional hernia repair with graft or prosthesis
PPX 5369	Other and open repair of other hernia of anterior abdominal wall with graft or prosthesis
PPX 537	Other and open repair of other hernia of anterior abdominal wall with graft or prosthesis
PPX 5372	Other and open repair of diaphragmatic hernia, abdominal approach
PPX 5451	Laparoscopic lysis of peritoneal adhesions
PPX 5459	Other lysis of peritoneal adhesions
PPX 5493	Creation of cutaneous peritoneal fistula
PPX 7072	Repair of colovaginal fistula
PPX 7073	Repair of rectovaginal fistula
PPX 7074	Repair of other vaginoenteric fistula

Appendix 2. Risk Model for Defining Probability of 30-day Death

To balance case and control patients on their risk profile, logistic regression models were used to predict each patient's 30-day risk of death. For general surgery patients a model was fit to an external dataset of Medicare claims. The external dataset was created by taking a 10% random sample of Medicare patients in California, Florida, New Jersey, and Pennsylvania for the years 2013-2015 (for the Recent Era) and 2004-2006 (for the Early Era). Patients in this external dataset were not used for matching. Coefficients for each of the variables were then applied to patients in the matching dataset to assign each patient's risk of 30-day death. The resulting risk scores were then used as a matching variable.

Table 2a. General Surgery Probability of Death Model, Early Era (2004 – 2006)

Variable	Estimate	Standard Error	Z	P-value
Model Intercept	-10.6767	1.1413	-9.3552	<0.0001
California	0.0109	0.1179	0.0925	0.9263
New Jersey	0.1057	0.1249	0.8459	0.3976
Florida	0.0242	0.1077	0.2249	0.8221
Pennsylvania (reference)	--	--	--	--
Matched in year 2004	0.0068	0.1119	0.0604	0.9518
Matched in year 2005	0.0865	0.0917	0.9439	0.3452
Matched in year 2006 (reference)	--	--	--	--
Sex (male)	0.1616	0.0860	1.8797	0.0601
Age	0.0641	0.0059	10.7924	<0.0001
CHF	0.4098	0.0921	4.4479	<0.0001
Stroke	0.2380	0.1220	1.9517	0.0510
Seizure	0.0450	0.3142	0.1434	0.8860
Dementia	0.3773	0.1029	3.6677	0.0002
History of Alcoholism	0.4503	0.2395	1.8802	0.0601
History of Drug Abuse	0.1532	0.5311	0.2884	0.7731
Past Myocardial Infarction	0.0569	0.1263	0.4505	0.6524
Past Arrhythmia	0.0391	0.0900	0.4345	0.6639
Unstable Angina	-0.0142	0.1883	-0.0752	0.9401
Angina	-0.0150	0.1417	-0.1055	0.9160
Hypertension	-0.5268	0.1019	-5.1726	<0.0001
Valvular Disease	0.1125	0.0868	1.2966	0.1948
Chronic Lung Disease	0.3044	0.0848	3.5886	0.0003
Asthma	-0.2342	0.1468	-1.5947	0.1108
Liver Disease	0.2035	0.1129	1.8030	0.0714
Renal Dysfunction	1.2255	0.0971	12.6197	<0.0001
Renal Failure	0.2284	0.1242	1.8400	0.0658
Diabetes	0.0158	0.0895	0.1759	0.8603
Paraplegia	0.2181	0.2282	0.9561	0.3390
Collagen Vascular Disease	0.2112	0.1649	1.2806	0.2003
Coagulopathy	-0.1163	0.5253	-0.2215	0.8247
Thrombocytopenia	-0.1908	0.2429	-0.7856	0.4321
Other Coagulopathy	0.5029	0.1313	3.8284	0.0001
Smoking History	-0.0286	0.1583	-0.1807	0.8566
Post-Inflammatory Pulmonary Fibrosis	0.2132	0.1633	1.3058	0.1916
Cushings' Disease	0.0084	1.1029	0.0076	0.9939
Graves' Disease	-1.1096	1.0342	-1.0730	0.2833
Cancer	0.0279	0.0915	0.3048	0.7605
Abdominal Cancer	0.4383	0.1706	2.5692	0.0102
Hypothyroidism	-0.0826	0.0994	-0.8313	0.4058
Chronic Peptic Ulcer	-0.2788	0.5092	-0.5477	0.5839
Weight loss	0.4583	0.0920	4.9833	<0.0001
Major Secondary Procedure	0.0107	0.0903	0.1187	0.9055
Emergency admission	0.5653	0.0878	6.4353	<0.0001
Transfer-in status	-0.6881	0.4320	-1.5929	0.1112

Variable	Estimate	Standard Error	Z	P-value
Procedure group A	-0.6929	1.4362	-0.4825	0.6295
PPX 062 Unilateral thyroid lobectomy				
PPX 0631 Excision of lesion of thyroid				
PPX 0639 Other partial thyroidectomy				
PPX 0651 Partial substernal thyroidectomy				
PPX 0652 Complete substernal thyroidectomy				
PPX 0689 Other parathyroidectomy				
Procedure group B	1.5421	1.1639	1.3250	0.1852
PPX 5251 Proximal pancreatectomy				
PPX 526 Total pancreatectomy				
PPX 527 Radical pancreaticoduodenectomy				
Procedure group C	1.1142	1.1878	0.9381	0.3482
PPX 4651 Closure of stoma of small intestine				
PPX 4652 Closure of stoma of large intestine				
PPX 4674 Closure of fistula of small intestine, except duodenum				
PPX 7072 Repair of colovaginal fistula				
PPX 7073 Repair of rectovaginal fistula				
PPX 7074 Repair of other vaginoenteric fistula				
Procedure group D	0.3963	1.4401	0.2752	0.7832
PPX 064 Complete thyroidectomy				
PPX 0681 Complete parathyroidectomy				
Procedure group E	2.0174	1.4668	1.3754	0.1690
PPX 0722 Unilateral adrenalectomy				
PPX 0729 Other partial adrenalectomy				
PPX 073 Bilateral adrenalectomy				
Procedure group F	1.1859	1.4621	0.8111	0.4173
PPX 4240 Esophagectomy, not otherwise specified				
PPX 4241 Partial esophagectomy				
PPX 4242 Total esophagectomy				
PPX 427 Esophagomyotomy				
Procedure group G	2.6137	1.0715	2.4393	0.0147
PPX 435 Partial gastrectomy with anastomosis to esophagus				
PPX 4389 Open and other partial gastrectomy				
PPX 4438 Laparoscopic gastroenterostomy				
PPX 4466 Other procedures for creation of esophagogastric sphincteric competence				
PPX 4467 Laparoscopic procedures for creation of esophagogastric sphincteric competence				
Procedure group H	2.2571	1.0522	2.1450	0.0320
PPX 4561 Multiple segmental resection of small intestine				
PPX 4563 Total removal of small intestine				
PPX 4571 Open and other multiple segmental resection of large intestine				
PPX 4590 Intestinal anastomosis, not otherwise specified				
PPX 4591 Small-to-small intestinal anastomosis				
PPX 4592 Anastomosis of small intestine to rectal stump				
PPX 4594 Large-to-large intestinal anastomosis				
PPX 4595 Anastomosis to anus				
PPX 4601 Exteriorization of small intestine				
PPX 4679 Other repair of intestine				

Variable	Estimate	Standard Error	Z	P-value
PPX 485 Other pull-through resection of rectum				
PPX 4862 Anterior resection of rectum with synchronous colostomy				
PPX 4869 Other resection of rectum				
PPX 4875 Abdominal proctopexy				
PPX 4879 Other repair of rectum				
Procedure group I	3.5759	1.2358	2.8936	0.0038
PPX 4620 Ileostomy, not otherwise specified				
PPX 4621 Temporary ileostomy				
PPX 4623 Other permanent ileostomy				
Procedure group J	1.3203	1.0591	1.2466	0.2126
PPX 4642 Repair of pericostomy hernia				
PPX 5300 Unilateral repair of inguinal hernia, not otherwise specified				
PPX 5301 Other and open repair of direct inguinal hernia				
PPX 5302 Other and open repair of indirect inguinal hernia				
PPX 5311 Other and open bilateral repair of direct inguinal hernia				
PPX 5314 Other and open bilateral repair of direct inguinal hernia with graft or prosthesis				
PPX 5315 Other and open bilateral repair of indirect inguinal hernia with graft or prosthesis				
PPX 5316 Other and open bilateral repair of inguinal hernia, one direct and one indirect, with graft or prosthesis				
PPX 5317 Bilateral inguinal hernia repair with graft or prosthesis, not otherwise specified				
PPX 5329 Other unilateral femoral herniorrhaphy				
PPX 5341 Other and open repair of umbilical hernia with graft or prosthesis				
PPX 5349 Other open umbilical herniorrhaphy				
PPX 5351 Incisional hernia repair				
PPX 5369 Other and open repair of other hernia of anterior abdominal wall with graft or prosthesis				
PPX 537 Other and open repair of other hernia of anterior abdominal wall with graft or prosthesis				
Procedure group K	1.8689	1.2033	1.5531	0.1204
PPX 5022 Partial hepatectomy				
PPX 5124 Laparoscopic partial cholecystectomy				
PPX 5137 Anastomosis of hepatic duct to gastrointestinal tract				
PPX 5141 Common duct exploration for removal of calculus				
PPX 415 Total splenectomy	3.0118	1.0722	2.8090	0.0050
PPX 4342 Local excision of other lesion or tissue of stomach	2.4438	1.2119	2.0165	0.0437
PPX 436 Partial gastrectomy with anastomosis to duodenum	2.3693	1.4710	1.6107	0.1072
PPX 437 Partial gastrectomy with anastomosis to jejunum	2.2606	1.1008	2.0536	0.0400
PPX 4399 Other total gastrectomy	2.6834	1.1471	2.3393	0.0193
PPX 4429 Other pyloroplasty	2.6902	1.2242	2.1975	0.0280

Variable	Estimate	Standard Error	Z	P-value
PPX 4439 Other gastroenterostomy without gastrectomy	2.7507	1.0853	2.5346	0.0113
PPX 4441 Suture of gastric ulcer site	3.5811	1.0790	3.3191	0.0009
PPX 4442 Suture of duodenal ulcer site	3.1592	1.0644	2.9681	0.0030
PPX 4469 Other repair of stomach	3.0948	1.1845	2.6126	0.0090
PPX 4562 Other partial resection of small intestine	2.7129	1.0359	2.6188	0.0088
PPX 4572 Open and other cecectomy	2.3825	1.0941	2.1777	0.0294
PPX 4573 Open and other right hemicolectomy	2.0967	1.0337	2.0284	0.0425
PPX 4574 Open and other resection of transverse colon	1.8192	1.1066	1.6440	0.1002
PPX 4575 Open and other left hemicolectomy	2.4348	1.0443	2.3315	0.0197
PPX 4576 Open and other sigmoidectomy	2.4521	1.0374	2.3637	0.0181
PPX 4579 Other and unspecified partial excision of large intestine	2.5249	1.0575	2.3876	0.0170
PPX 458 Other and unspecified partial excision of large intestine	3.1493	1.0638	2.9604	0.0031
PPX 4593 Other small-to-large intestinal anastomosis	3.4830	1.1638	2.9929	0.0028
PPX 4603 Exteriorization of large intestine	2.4709	1.0840	2.2795	0.0226
PPX 4610 Colostomy, not otherwise specified	2.1506	1.1349	1.8949	0.0581
PPX 4611 Temporary colostomy	3.0832	1.2425	2.4815	0.0131
PPX 4613 Permanent colostomy	2.8517	1.1870	2.4025	0.0163
PPX 4639 Other enterostomy	3.2038	1.1024	2.9061	0.0037
PPX 4673 Suture of laceration of small intestine, except duodenum	1.4675	1.2663	1.1589	0.2465
PPX 4675 Suture of laceration of large intestine	1.9698	1.2860	1.5317	0.1256
PPX 4701 Laparoscopic appendectomy	0.5288	1.1877	0.4452	0.6562
PPX 4709 Other appendectomy	1.6253	1.0809	1.5037	0.1327
PPX 4849 Other pull-through resection of rectum	1.4432	1.4532	0.9931	0.3207
PPX 4863 Other anterior resection of rectum	1.5437	1.1008	1.4024	0.1608
PPX 4876 Other proctopexy	1.1848	1.4548	0.8144	0.4154
PPX 5029 Other destruction of lesion of liver	2.0090	1.2073	1.6641	0.0961
PPX 503 Lobectomy of liver	2.5060	1.3016	1.9253	0.0542
PPX 5122 Cholecystectomy	1.7448	1.0406	1.6766	0.0936
PPX 5123 Laparoscopic cholecystectomy	0.7542	1.0378	0.7268	0.4674
PPX 5132 Anastomosis of gallbladder to intestine	3.0358	1.3247	2.2917	0.0219
PPX 5136 Choledochenterostomy	1.9538	1.1765	1.6607	0.0968
PPX 5151 Exploration of common duct	2.9166	1.6234	1.7966	0.0724
PPX 5252 Distal pancreatectomy	1.3841	1.4575	0.9497	0.3423
PPX 5259 Other partial pancreatectomy	3.4507	1.3349	2.5850	0.0097
PPX 5303 Other and open repair of direct inguinal hernia with graft or prosthesis	1.1392	1.1517	0.9892	0.3226
PPX 5304 Other and open repair of indirect inguinal hernia with graft or prosthesis	1.5932	1.1176	1.4255	0.1540
PPX 5305 Repair of inguinal hernia with graft or prosthesis, not otherwise specified	1.2178	1.1193	1.0880	0.2766
PPX 5321 Unilateral repair of femoral hernia with graft or prosthesis	1.0102	1.4631	0.6905	0.4899
PPX 5359 Repair of other hernia of anterior abdominal wall	2.5971	1.1292	2.3000	0.0214
PPX 5361 Other open incisional hernia repair with graft or prosthesis	0.4602	1.1820	0.3893	0.6970
PPX 5451 Laparoscopic lysis of peritoneal adhesions	2.0369	1.0993	1.8530	0.0639
PPX 5459 Other lysis of peritoneal adhesions	2.0646	1.0401	1.9850	0.0471
PPX 5493 Creation of cutaneousperitoneal fistula (reference)	--	--	--	--

Appendix 2b. General Surgery Probability of Death Model, Recent Era (2013 – 2015)

Variable	Estimate	Standard Error	Z	P-value
Model Intercept	-7.7623	0.8017	-9.6828	<0.0001
California	0.3315	0.1497	2.2139	0.0268
New Jersey	-0.1393	0.1756	-0.7933	0.4276
Florida	0.1251	0.1441	0.8681	0.3854
Pennsylvania (reference)	--	--	--	--
Matched in year 2013	0.1045	0.1399	0.7471	0.4550
Matched in year 2014	0.0721	0.1185	0.6089	0.5426
Matched in year 2015 (reference)	--	--	--	--
Sex (male)	-0.0090	0.1104	-0.0814	0.9351
Age	0.0416	0.0072	5.7736	<0.0001
CHF	0.2393	0.1219	1.9622	0.0497
Stroke	-0.0126	0.1395	-0.0906	0.9278
Seizure	-0.0154	0.2886	-0.0535	0.9573
Dementia	0.4284	0.1287	3.3272	0.0009
History of Alcoholism	-0.1263	0.2953	-0.4278	0.6688
History of Drug Abuse	-0.0203	0.3839	-0.0529	0.9578
Past Myocardial Infarction	0.0107	0.1495	0.0716	0.9429
Past Arrhythmia	0.0830	0.1118	0.7426	0.4577
Unstable Angina	0.2467	0.3129	0.7883	0.4305
Angina	-0.5536	0.2582	-2.1440	0.0320
Hypertension	-0.0763	0.1818	-0.4198	0.6746
Valvular Disease	0.1184	0.1120	1.0578	0.2901
Chronic Lung Disease	0.4589	0.1106	4.1506	<0.0001
Asthma	-0.1091	0.1590	-0.6860	0.4927
Liver Disease	0.5820	0.1194	4.8736	<0.0001
Renal Dysfunction	1.1303	0.1150	9.8244	<0.0001
Renal Failure	0.1711	0.1590	1.0755	0.2821
Diabetes	0.1249	0.1093	1.1428	0.2531
Paraplegia	0.0670	0.2688	0.2494	0.8030
Collagen Vascular Disease	0.2492	0.1744	1.4292	0.1530
Coagulopathy	-0.1183	0.4831	-0.2448	0.8066
Thrombocytopenia	0.0510	0.2180	0.2338	0.8151
Other Coagulopathy	0.7014	0.1542	4.5493	<0.0001
Smoking History	0.0218	0.1156	0.1886	0.8504
Post-Inflammatory Pulmonary Fibrosis	0.0723	0.2204	0.3282	0.7428
Cushings' Disease	0.3809	0.8855	0.4301	0.6671
Graves' Disease	0.0801	0.8185	0.0979	0.9220
Cancer	-0.0656	0.1134	-0.5786	0.5629
Abdominal Cancer	0.9023	0.2241	4.0261	<0.0001
Hypothyroidism	-0.0225	0.1144	-0.1963	0.8444
Chronic Peptic Ulcer	0.1119	0.6082	0.1841	0.8540
HIV and AIDS	-0.8002	1.1514	-0.6950	0.4871
Weight loss	0.4314	0.1102	3.9142	<0.0001
Major Secondary Procedure	0.0619	0.1198	0.5169	0.6052
Emergency admission	0.6757	0.1238	5.4589	<0.0001
Transfer-in status	0.3007	0.3961	0.7590	0.4479
Procedure group A	-0.2747	1.1573	-0.2374	0.8123
PPX 062 Unilateral thyroid lobectomy				
PPX 0631 Excision of lesion of thyroid				
PPX 0639 Other partial thyroidectomy				
PPX 0651 Partial substernal thyroidectomy				
PPX 0652 Complete substernal thyroidectomy				
Procedure group B	-2.3159	1.1410	-2.0297	0.0424
PPX 4642 Repair of pericostomy hernia				

Variable	Estimate	Standard Error	Z	P-value
PPX 5301 Other and open repair of direct inguinal hernia				
PPX 5302 Other and open repair of indirect inguinal hernia				
PPX 5303 Other and open repair of direct inguinal hernia with graft or prosthesis				
PPX 5310 Bilateral repair of inguinal hernia, not otherwise specified				
PPX 5314 Other and open bilateral repair of direct inguinal hernia with graft or prosthesis				
PPX 5315 Other and open bilateral repair of indirect inguinal hernia with graft or prosthesis				
PPX 5316 Other and open bilateral repair of inguinal hernia, one direct and one indirect, with graft or prosthesis				
PPX 5317 Bilateral inguinal hernia repair with graft or prosthesis, not otherwise specified				
PPX 5372 Other and open repair of diaphragmatic hernia, abdominal approach				
PPX 5375 Repair of diaphragmatic hernia, abdominal approach, not otherwise specified				
Procedure group C	-1.6660	1.1601	-1.4360	0.1510
PPX 4849 Other pull-through resection of rectum				
PPX 4850 Abdominoperineal resection of the rectum, not otherwise specified				
PPX 4851 Laparoscopic abdominoperineal resection of the rectum				
PPX 4852 Open abdominoperineal resection of the rectum				
PPX 4859 Other abdominoperineal resection of the rectum				
PPX 4875 Abdominal proctopexy				
PPX 4879 Other repair of rectum				
Procedure group D	-0.9970	1.2005	-0.8305	0.4063
PPX 5029 Other destruction of lesion of liver				
PPX 503 Lobectomy of liver				
Procedure group E	0.2661	0.9691	0.2745	0.7837
PPX 5132 Anastomosis of gallbladder to intestine				
PPX 5136 Choledochoenterostomy				
PPX 5137 Anastomosis of hepatic duct to gastrointestinal tract				
PPX 5141 Common duct exploration for removal of calculus				
PPX 5151 Exploration of common duct				
Procedure group F	-1.0675	0.9243	-1.1550	0.2481
PPX 5252 Distal pancreatectomy				
PPX 5253 Radical subtotal pancreatectomy				
PPX 5259 Other partial pancreatectomy				
PPX 526 Total pancreatectomy				
Procedure group G	0.2143	0.8537	0.2511	0.8018
PPX 4674 Closure of fistula of small intestine, except duodenum				
PPX 7072 Repair of colovaginal fistula				
PPX 7073 Repair of rectovaginal fistula				
Procedure group H	-1.1694	1.1822	-0.9892	0.3226

Variable	Estimate	Standard Error	Z	P-value
PPX 0681 Complete parathyroidectomy				
PPX 0689 Other parathyroidectomy				
Procedure group I	0.0563	1.1676	0.0482	0.9616
PPX 0722 Unilateral adrenalectomy				
PPX 073 Bilateral adrenalectomy				
Procedure group J	-0.5525	0.9042	-0.6110	0.5412
PPX 1711 Laparoscopic repair of direct inguinal hernia with graft or prosthesis				
PPX 1712 Laparoscopic repair of indirect inguinal hernia with graft or prosthesis				
PPX 1713 Laparoscopic repair of inguinal hernia with graft or prosthesis, not otherwise specified				
PPX 1722 Laparoscopic bilateral repair of indirect inguinal hernia with graft or prosthesis				
PPX 1723 Laparoscopic bilateral repair of inguinal hernia, one direct and one indirect, with graft or prosthesis				
PPX 1724 Laparoscopic bilateral repair of inguinal hernia with graft or prosthesis, not otherwise specified				
Procedure group K	-0.6918	0.9045	-0.7648	0.4444
PPX 1731 Laparoscopic multiple segmental resection of large intestine				
PPX 1732 Laparoscopic cecectomy				
PPX 1734 Laparoscopic resection of transverse colon				
PPX 1739 Other laparoscopic partial excision of large intestine				
Procedure group L	0.1235	0.7115	0.1736	0.8622
PPX 4240 Esophagectomy, not otherwise specified				
PPX 4241 Partial esophagectomy				
PPX 4242 Total esophagectomy				
PPX 427 Esophagomyotomy				
PPX 437 Partial gastrectomy with anastomosis to jejunum				
Procedure group M	-0.1994	0.6657	-0.2995	0.7646
PPX 4342 Local excision of other lesion or tissue of stomach				
PPX 435 Partial gastrectomy with anastomosis to esophagus				
PPX 436 Partial gastrectomy with anastomosis to duodenum				
PPX 4439 Other gastroenterostomy without gastrectomy				
PPX 4466 Other procedures for creation of esophagogastric sphincteric competence				
PPX 4467 Laparoscopic procedures for creation of esophagogastric sphincteric competence				
PPX 4469 Other repair of stomach				
Procedure group N	-1.1856	0.9060	-1.3087	0.1906
PPX 4561 Multiple segmental resection of small intestine				
PPX 4563 Total removal of small intestine				
PPX 4590 Intestinal anastomosis, not otherwise specified				

Variable	Estimate	Standard Error	Z	P-value
PPX 4592 Anastomosis of small intestine to rectal stump				
PPX 4594 Large-to-large intestinal anastomosis				
PPX 4595 Anastomosis to anus				
PPX 4675 Suture of laceration of large intestine				
PPX 4679 Other repair of intestine				
Procedure group O	-1.0196	0.8944	-1.1399	0.2543
PPX 4611 Temporary colostomy				
PPX 4613 Permanent colostomy				
PPX 4623 Other permanent ileostomy				
PPX 4651 Closure of stoma of small intestine				
PPX 064 Complete thyroidectomy	-0.5763	1.1630	-0.4955	0.6202
PPX 1733 Laparoscopic right hemicolectomy	-1.1528	0.6754	-1.7069	0.0878
PPX 1735 Laparoscopic left hemicolectomy	0.6794	0.7159	0.9490	0.3426
PPX 1736 Laparoscopic sigmoidectomy	-0.9619	0.8042	-1.1961	0.2317
PPX 415 Total splenectomy	0.8942	0.6826	1.3099	0.1902
PPX 4389 Open and other partial gastrectomy	0.6574	0.7550	0.8708	0.3839
PPX 4399 Other total gastrectomy	1.0261	0.8420	1.2187	0.2229
PPX 4429 Other pyloroplasty	1.5076	0.9525	1.5828	0.1135
PPX 4438 Laparoscopic gastroenterostomy	-0.6614	1.1515	-0.5744	0.5657
PPX 4441 Suture of gastric ulcer site	0.9163	0.6697	1.3681	0.1713
PPX 4442 Suture of duodenal ulcer site	0.8538	0.6309	1.3533	0.1760
PPX 4562 Other partial resection of small intestine	0.4726	0.5455	0.8664	0.3863
PPX 4571 Open and other multiple segmental resection of large intestine	0.0111	1.2477	0.0089	0.9929
PPX 4572 Open and other cecectomy	0.7480	0.6868	1.0891	0.2761
PPX 4573 Open and other right hemicolectomy	0.1113	0.5510	0.2021	0.8399
PPX 4574 Open and other resection of transverse colon	0.7098	0.6710	1.0578	0.2901
PPX 4575 Open and other left hemicolectomy	1.0367	0.5819	1.7817	0.0748
PPX 4576 Open and other sigmoidectomy	0.4278	0.5561	0.7694	0.4417
PPX 4579 Other and unspecified partial excision of large intestine	0.8866	0.6292	1.4090	0.1588
PPX 4581 Laparoscopic total intra-abdominal colectomy	1.1386	0.9732	1.1701	0.2420
PPX 4582 Open total intra-abdominal colectomy	1.0919	0.6580	1.6596	0.0970
PPX 4583 Other and unspecified total intra-abdominal colectomy	0.7183	1.0545	0.6812	0.4958
PPX 4591 Small-to-small intestinal anastomosis	1.2047	0.9894	1.2176	0.2234
PPX 4593 Other small-to-large intestinal anastomosis	0.0224	0.8288	0.0270	0.9784
PPX 4601 Exteriorization of small intestine	1.1925	0.8477	1.4067	0.1595
PPX 4603 Exteriorization of large intestine	0.3678	0.6649	0.5532	0.5801
PPX 4610 Colostomy, not otherwise specified	0.5630	0.6561	0.8581	0.3908
PPX 4620 Ileostomy, not otherwise specified	0.9933	1.0229	0.9710	0.3315
PPX 4639 Other enterostomy	0.1309	0.8126	0.1611	0.8720
PPX 4652 Closure of stoma of large intestine	-0.9321	0.8942	-1.0424	0.2972
PPX 4673 Suture of laceration of small intestine, except duodenum	1.7739	0.9402	1.8868	0.0592
PPX 4701 Laparoscopic appendectomy	-1.3858	0.6984	-1.9841	0.0472
PPX 4709 Other appendectomy	-0.7078	0.8033	-0.8811	0.3783
PPX 4862 Anterior resection of rectum with synchronous colostomy	0.7268	0.7917	0.9180	0.3586
PPX 4863 Other anterior resection of rectum	0.4889	0.7076	0.6908	0.4897
PPX 4869 Other resection of rectum	-0.0869	0.8376	-0.1037	0.9174
PPX 4876 Other proctopexy	-0.0503	0.9261	-0.0543	0.9567
PPX 5022 Partial hepatectomy	-1.3673	1.1679	-1.1707	0.2417

Variable	Estimate	Standard Error	Z	P-value
PPX 5122 Cholecystectomy	-0.4858	0.5824	-0.8342	0.4042
PPX 5123 Laparoscopic cholecystectomy	-1.3210	0.5504	-2.4000	0.0164
PPX 5124 Laparoscopic partial cholecystectomy	1.1650	1.3361	0.8720	0.3832
PPX 527 Radical pancreaticoduodenectomy	-1.5958	0.8241	-1.9365	0.0528
PPX 5300 Unilateral repair of inguinal hernia, not otherwise specified	-0.5208	0.9271	-0.5617	0.5743
PPX 5304 Other and open repair of indirect inguinal hernia with graft or prosthesis	-1.6579	1.1455	-1.4473	0.1478
PPX 5305 Repair of inguinal hernia with graft or prosthesis, not otherwise specified	-1.2153	0.8939	-1.3596	0.1740
PPX 5321 Unilateral repair of femoral hernia with graft or prosthesis	0.9374	0.7410	1.2650	0.2059
PPX 5329 Other unilateral femoral herniorrhaphy	-0.3655	0.9201	-0.3972	0.6912
PPX 5341 Other and open repair of umbilical hernia with graft or prosthesis	-0.9571	1.1569	-0.8273	0.4081
PPX 5349 Other open umbilical herniorrhaphy	-0.1153	0.8207	-0.1405	0.8883
PPX 5351 Incisional hernia repair	-0.4205	0.7563	-0.5560	0.5782
PPX 5359 Repair of other hernia of anterior abdominal wall	-0.2605	0.9126	-0.2855	0.7753
PPX 5361 Other open incisional hernia repair with graft or prosthesis	-1.1610	0.7296	-1.5913	0.1115
PPX 5369 Other and open repair of other hernia of anterior abdominal wall with graft or prosthesis	-0.3512	0.8141	-0.4314	0.6662
PPX 5451 Laparoscopic lysis of peritoneal adhesions	-0.7093	0.7074	-1.0027	0.3160
PPX 5459 Other lysis of peritoneal adhesions	-0.2415	0.5658	-0.4268	0.6695
PPX 5493 Creation of cutaneoperitoneal fistula (reference)	--	--	--	--

Table 3. Complete balance table for Early Era (2003-2005)

Variable	Black Patients	Tapered Matches			White Patients (unmatched)
		Presentation + Procedure + Demographics	Procedure + Demographics	Demographics	
N	6,752	6,752	6,752	6,752	107,001
Age	75.99	75.84	75.98	75.99	77.48
Year of match	2005.12	2005.10	2005.12	2005.12	2005.12
Age 65-69 (%)	0.25	0.23	0.25	0.25	0.18
Age 70-74 (%)	0.24	0.25	0.25	0.24	0.21
Age 75-79 (%)	0.21	0.24	0.21	0.21	0.24
Age 80-84 (%)	0.16	0.17	0.16	0.16	0.21
Age 85 plus (%)	0.13	0.11	0.13	0.13	0.17
State- California (%)	0.23	0.23	0.23	0.23	0.25
State- New Jersey (%)	0.24	0.27	0.23	0.24	0.16
State- Florida (%)	0.34	0.34	0.34	0.34	0.35
State- Pennsylvania (%)	0.19	0.16	0.19	0.19	0.24
State- NJ/PA (%)	0.43	0.43	0.43	0.43	0.40
Male (%)	0.39	0.39	0.39	0.39	0.43
Year of match- 2004 (%)	0.22	0.23	0.22	0.22	0.22
Year of match- 2005 (%)	0.44	0.45	0.44	0.44	0.45
Year of match- 2006 (%)	0.34	0.32	0.34	0.34	0.33
Open and other cecectomy	0.01	0.01	0.01	0.01	0.01
Laparoscopic cholecystectomy	0.16	0.16	0.16	0.21	0.20
Open and other right hemicolectomy	0.14	0.14	0.14	0.11	0.12
Other anterior resection of rectum	0.01	0.01	0.01	0.02	0.02
Cholecystectomy	0.06	0.06	0.06	0.05	0.05
Open and other sigmoidectomy	0.05	0.05	0.05	0.06	0.07
Other and open repair of other hernia of anterior abdominal wall with graft or prosthesis	0.00	0.00	0.00	0.01	0.01
Radical pancreaticoduodenectomy	0.01	0.01	0.01	0.01	0.01
Other partial resection of small intestine	0.06	0.06	0.06	0.05	0.05
Other lysis of peritoneal adhesions	0.06	0.06	0.06	0.05	0.05
Other resection of rectum	0.00	0.00	0.00	0.00	0.01
Other and open repair of indirect inguinal hernia with graft or prosthesis	0.01	0.01	0.01	0.01	0.01
Distal pancreatectomy	0.00	0.00	0.00	0.00	0.00

Closure of stoma of small intestine	0.00	0.00	0.00	0.00	0.00
Other unilateral femoral herniorrhaphy	NR	NR	NR	0.00	0.00
Open and other left hemicolectomy	0.04	0.04	0.04	0.03	0.03
Other and unspecified partial excision of large intestine	0.01	0.01	0.01	0.01	0.01
Unilateral adrenalectomy	0.00	0.00	0.00	0.00	0.00
Abdominal proctopexy	NR	NR	NR	NR	0.00
Other gastroenterostomy without gastrectomy	0.01	0.01	0.01	0.01	0.01
Exteriorization of large intestine	0.01	0.01	0.01	0.01	0.01
Anterior resection of rectum with synchronous colostomy	0.00	0.00	0.00	0.00	0.00
Total splenectomy	0.00	0.00	0.00	0.01	0.01
Other procedures for creation of esophagogastric sphincteric competence	NR	NR	NR	0.00	0.00
Other total gastrectomy	0.01	0.01	0.01	0.00	0.00
Other and unspecified partial excision of large intestine	0.02	0.02	0.02	0.02	0.02
Other pull-through resection of rectum	0.01	0.01	0.01	0.01	0.01
Other open umbilical herniorrhaphy	0.01	0.01	0.01	0.00	0.00
Laparoscopic appendectomy	0.01	0.01	0.01	0.02	0.02
Complete parathyroidectomy	0.00	0.00	0.00	NR	0.00
Incisional hernia repair	0.01	0.01	0.01	0.01	0.01
Temporary colostomy	0.00	0.00	0.00	NR	0.00
Repair of rectovaginal fistula	NR	NR	NR	NR	0.00
Other pull-through resection of rectum	NR	NR	NR	NR	0.00
Other destruction of lesion of liver	0.00	0.00	0.00	0.00	0.00
Small-to-small intestinal anastomosis	0.00	0.00	0.00	NR	0.00
Other open incisional hernia repair with graft or prosthesis	0.02	0.02	0.02	0.03	0.03
Partial esophagectomy	NR	NR	NR	0.00	0.00
Laparoscopic gastroenterostomy	0.00	0.00	0.00	0.00	0.00

Open and other resection of transverse colon	0.01	0.01	0.01	0.01	0.01
Exteriorization of small intestine	0.00	0.00	0.00	0.00	0.00
Other enterostomy	0.01	0.01	0.01	0.00	0.00
Unilateral thyroid lobectomy	0.02	0.02	0.02	0.01	0.01
Complete thyroidectomy	0.02	0.02	0.02	0.01	0.01
Partial gastrectomy with anastomosis to duodenum	0.00	0.00	0.00	NR	0.00
Other and open repair of direct inguinal hernia with graft or prosthesis	0.01	0.01	0.01	0.01	0.01
Other parathyroidectomy	0.02	0.02	0.02	0.01	0.01
Laparoscopic lysis of peritoneal adhesions	0.01	0.01	0.01	0.01	0.01
Lobectomy of liver	0.00	0.00	0.00	NR	0.00
Anastomosis of hepatic duct to gastrointestinal tract	NR	NR	NR	NR	0.00
Suture of laceration of large intestine	NR	NR	NR	NR	0.00
Repair of pericostomy hernia	NR	NR	NR	0.00	0.00
Common duct exploration for removal of calculus	NR	NR	NR	NR	0.00
Total esophagectomy	NR	NR	NR	NR	0.00
Open and other partial gastrectomy	0.01	0.01	0.01	0.00	0.00
Partial hepatectomy	0.00	0.00	0.00	0.00	0.00
Esophagectomy, not otherwise specified	NR	NR	NR	0.00	0.00
Other and open repair of other hernia of anterior abdominal wall with graft or prosthesis	0.01	0.01	0.01	0.01	0.01
Laparoscopic procedures for creation of esophagogastric sphincteric competence	NR	NR	NR	0.01	0.01
Closure of stoma of large intestine	0.00	0.00	0.00	0.01	0.01
Resection of vessel with replacement, other vessels of head and neck	0.00	0.00	0.00	0.00	0.00
Other repair of intestine	0.00	0.00	0.00	NR	0.00
Bilateral inguinal hernia repair with graft or prosthesis, not otherwise specified	NR	NR	NR	NR	0.00

Esophagomyotomy	0.00	0.00	0.00	NR	0.00
Other appendectomy	0.01	0.01	0.01	0.02	0.02
Local excision of other lesion or tissue of stomach	0.00	0.00	0.00	NR	0.00
Unilateral repair of femoral hernia with graft or prosthesis	0.00	0.00	0.00	0.00	0.00
Ileostomy, not otherwise specified	NR	NR	NR	NR	0.00
Partial gastrectomy with anastomosis to jejunum	0.02	0.02	0.02	0.01	0.01
Other small-to-large intestinal anastomosis	0.00	0.00	0.00	NR	0.00
Other and open repair of indirect inguinal hernia	0.00	0.00	0.00	0.00	0.00
Repair of other hernia of anterior abdominal wall	0.01	0.01	0.01	0.00	0.00
Repair of inguinal hernia with graft or prosthesis, not otherwise specified	0.01	0.01	0.01	0.01	0.01
Large-to-large intestinal anastomosis	0.00	0.00	0.00	0.00	0.00
Suture of duodenal ulcer site	0.01	0.01	0.01	0.01	0.01
Colostomy, not otherwise specified	0.00	0.00	0.00	0.00	0.00
Creation of cutaneoperitoneal fistula	0.00	0.00	0.00	0.00	0.00
Open and other multiple segmental resection of large intestine	NR	NR	NR	NR	0.00
Closure of fistula of small intestine, except duodenum	NR	NR	NR	0.00	0.00
Multiple segmental resection of small intestine	0.00	0.00	0.00	0.00	0.00
Other and open bilateral repair of indirect inguinal hernia with graft or prosthesis	NR	NR	NR	NR	0.00
Permanent colostomy	0.00	0.00	0.00	NR	0.00
Suture of gastric ulcer site	0.00	0.00	0.00	0.00	0.00
Excision of lesion of thyroid	NR	NR	NR	NR	0.00
Anastomosis of gallbladder to intestine	NR	NR	NR	NR	0.00
Other and open repair of umbilical hernia with graft or prosthesis	0.00	0.00	0.00	0.00	0.00
Complete substernal thyroidectomy	0.00	0.00	0.00	NR	0.00

Exploration of common duct	NR	NR	NR	0.00	0.00
Other partial thyroidectomy	0.01	0.01	0.01	0.00	0.00
Suture of laceration of small intestine, except duodenum	0.01	0.01	0.01	0.01	0.00
Repair of colovaginal fistula	NR	NR	NR	NR	0.00
Other and open bilateral repair of direct inguinal hernia with graft or prosthesis	NR	NR	NR	NR	0.00
Other proctopexy	NR	NR	NR	0.00	0.00
Unilateral repair of inguinal hernia, not otherwise specified	0.00	0.00	0.00	0.00	0.00
Other and open repair of direct inguinal hernia	0.00	0.00	0.00	0.00	0.00
Other permanent ileostomy	NR	NR	NR	0.00	0.00
Other pyloroplasty	NR	NR	NR	NR	0.00
Partial gastrectomy with anastomosis to esophagus	NR	NR	NR	NR	0.00
Total pancreatectomy	NR	NR	NR	NR	0.00
Choledochoenterostomy	0.00	0.00	0.00	0.00	0.00
Other partial pancreatectomy	NR	NR	NR	0.00	0.00
Bilateral repair of inguinal hernia, not otherwise specified	NR	NR	NR	0.00	NR
Other and open bilateral repair of inguinal hernia, one direct and one indirect, with graft or prosthesis	NR	NR	NR	NR	0.00
Partial substernal thyroidectomy	NR	NR	NR	NR	0.00
Other and open bilateral repair of direct inguinal hernia	NR	NR	NR	NR	0.00
Other repair of stomach	0.00	0.00	0.00	NR	0.00
Temporary ileostomy	NR	NR	NR	NR	0.00
Intestinal anastomosis, not otherwise specified	NR	NR	NR	0.00	NR
Other and open bilateral repair of inguinal hernia, one direct and one indirect	NR	NR	NR	NR	0.00
Anastomosis of small intestine to rectal stump	0.00	0.00	0.00	0.00	NR
Anastomosis to anus	NR	NR	NR	NR	0.00

Repair of other vaginoenteric fistula	NR	NR	NR	0.00	NR
Number of Comorbidities	5.81	5.67	5.27	5.14	5.27
Number of Comorbidities in Near Fine balance list of variables	0.38	0.33	0.48	0.46	0.46
Anesthesia Score	147.95	143.90	142.36	140.55	141.21
More than six comorbidities (%)	0.49	0.49	0.41	0.39	0.41
Congestive Heart Failure	0.26	0.26	0.22	0.20	0.22
Stroke	0.15	0.15	0.09	0.08	0.10
Seizure	0.02	0.02	0.01	0.01	0.01
Dementia	0.15	0.15	0.09	0.09	0.10
Alcohol abuse	0.03	0.03	0.02	0.02	0.02
Drug abuse	0.01	0.01	0.01	0.00	0.00
Past MI	0.09	0.08	0.09	0.10	0.10
Past Arrhythmia	0.25	0.25	0.29	0.28	0.30
Unstable Angina	0.05	0.03	0.04	0.04	0.04
Angina	0.08	0.06	0.08	0.08	0.08
Hypertension	0.90	0.90	0.78	0.79	0.79
Valvular Heart Disease	0.27	0.29	0.28	0.27	0.29
Chronic Lung Disease	0.27	0.27	0.30	0.29	0.30
Asthma	0.11	0.12	0.10	0.09	0.09
Liver Disease	0.16	0.15	0.14	0.13	0.13
Renal Dialysis	0.23	0.23	0.13	0.12	0.13
Renal Failure	0.16	0.15	0.08	0.07	0.08
Diabetes	0.47	0.46	0.29	0.29	0.29
Paraplegia	0.05	0.04	0.02	0.02	0.02
Collagen Vascular Disease	0.05	0.05	0.06	0.06	0.06
Coagulation disorders	0.00	NR	0.00	0.00	0.00
Thrombocytopenia	0.02	0.01	0.02	0.03	0.02
Congenital Coagulation disorder	0.06	0.05	0.06	0.06	0.06
Smoking History	0.07	0.05	0.09	0.09	0.09
Post Pulmonary Fibrosis	0.03	0.02	0.04	0.04	0.04
Cushing's disease	NR	NR	NR	NR	0.00
Graves' disease	0.01	0.01	0.01	0.01	0.01
Cancer	0.47	0.47	0.51	0.48	0.50
Abdominal Cancer	0.06	0.06	0.06	0.05	0.05
Hypothyroidism	0.15	0.12	0.23	0.22	0.22
Chronic Peptic Ulcer	0.01	0.01	0.01	0.00	0.00
AIDS	0.00	NR	NR	NR	0.00
Weight Loss	0.20	0.18	0.14	0.13	0.14
Sickle Cell Anemia	NR	NR	NR	NR	0.00

Any Comorbidity	0.99	0.99	0.98	0.98	0.98
Cardiac with CHF	0.56	0.56	0.55	0.54	0.56
Cardiac without CHF	0.49	0.49	0.51	0.50	0.52
Stroke/Paraplegia	0.16	0.16	0.10	0.09	0.10
Any Angina	0.12	0.08	0.11	0.11	0.11
Cancer/Abdominal Cancer	0.47	0.47	0.51	0.48	0.50
Chronic Lung/Asthma	0.32	0.32	0.34	0.33	0.33
Emergency type admission (%)	0.47	0.52	0.37	0.39	0.38
Transfer-in (%)	0.01	0.01	0.01	0.01	0.01

Note. NR, Not Reportable N<11

Table 4. Complete balance table for Recent Era (2013-2015)

Variable	Black Patients	Tapered Matches			White Patients (unmatched)
		Presentation + Procedure + Demographics	Procedure + Demographics	Demographics	
N	4,964	4,964	4,964	4,964	74,108
Age	75.46	75.01	75.45	75.46	77.03
Year of match	2014.10	2014.10	2014.10	2014.10	2014.10
Age 65-69 (%)	0.27	0.28	0.27	0.27	0.22
Age 70-74 (%)	0.25	0.28	0.26	0.25	0.23
Age 75-79 (%)	0.21	0.19	0.20	0.21	0.20
Age 80-84 (%)	0.14	0.14	0.15	0.14	0.17
Age 85 plus (%)	0.12	0.11	0.12	0.12	0.18
State- California (%)	0.24	0.24	0.24	0.24	0.28
State- New Jersey (%)	0.23	0.24	0.22	0.23	0.15
State- Florida (%)	0.34	0.34	0.34	0.34	0.35
State- Pennsylvania (%)	0.19	0.17	0.19	0.19	0.21
State- NJ/PA (%)	0.42	0.42	0.42	0.42	0.37
Male (%)	0.39	0.39	0.39	0.39	0.45
Year of match- 2013 (%)	0.23	0.23	0.23	0.23	0.23
Year of match- 2014 (%)	0.44	0.44	0.44	0.44	0.45
Year of match- 2015 (%)	0.33	0.33	0.33	0.33	0.33
Procedure type (%)					
Open and other cecectomy	0.01	0.01	0.01	0.00	0.00
Laparoscopic cholecystectomy	0.19	0.19	0.19	0.21	0.22
Open and other right hemicolectomy	0.08	0.08	0.08	0.06	0.07
Other anterior resection of rectum	0.01	0.01	0.01	0.02	0.02
Cholecystectomy	0.03	0.03	0.03	0.03	0.03
Open and other sigmoidectomy	0.03	0.03	0.03	0.05	0.05
Radical pancreaticoduodenectomy	0.01	0.01	0.01	0.01	0.01
Other partial resection of small intestine	0.07	0.07	0.07	0.06	0.06
Other lysis of peritoneal adhesions	0.05	0.05	0.05	0.04	0.04
Other resection of rectum	0.00	0.00	0.00	0.01	0.01
Other and open repair of indirect inguinal hernia with graft or prosthesis	0.01	0.01	0.01	0.01	0.01
Distal pancreatectomy	0.00	0.00	0.00	0.01	0.01
Closure of stoma of small intestine	0.01	0.01	0.01	0.01	0.01

Other unilateral femoral herniorrhaphy	NR	NR	NR	0.00	0.00
Open and other left hemicolectomy	0.02	0.02	0.02	0.02	0.02
Unilateral adrenalectomy	0.01	0.01	0.01	0.00	0.00
Abdominal proctopexy	NR	NR	NR	0.00	0.00
Other gastroenterostomy without gastrectomy	0.01	0.01	0.01	0.00	0.00
Exteriorization of large intestine	0.01	0.01	0.01	0.01	0.01
Anterior resection of rectum with synchronous colostomy	0.00	0.00	0.00	0.00	0.00
Total splenectomy	0.00	0.00	0.00	0.01	0.01
Other procedures for creation of esophagogastric sphincteric competence	NR	NR	NR	NR	0.00
Other total gastrectomy	0.00	0.00	0.00	NR	0.00
Other and unspecified partial excision of large intestine	0.01	0.01	0.01	0.01	0.01
Other open umbilical herniorrhaphy	0.00	0.00	0.00	0.00	0.00
Laparoscopic appendectomy	0.03	0.03	0.03	0.04	0.04
Complete parathyroidectomy	NR	NR	NR	NR	0.00
Incisional hernia repair	0.01	0.01	0.01	0.01	0.01
Temporary colostomy	NR	NR	NR	NR	0.00
Repair of rectovaginal fistula	NR	NR	NR	NR	0.00
Other pull-through resection of rectum	NR	NR	NR	NR	0.00
Other destruction of lesion of liver	0.00	0.00	0.00	NR	0.00
Small-to-small intestinal anastomosis	NR	NR	NR	NR	0.00
Other open incisional hernia repair with graft or prosthesis	0.02	0.02	0.02	0.03	0.03
Partial esophagectomy	NR	NR	NR	0.00	0.00
Laparoscopic gastroenterostomy	0.01	0.01	0.01	0.01	0.01
Open and other resection of transverse colon	0.01	0.01	0.01	0.01	0.01
Exteriorization of small intestine	0.00	0.00	0.00	0.00	0.00
Other enterostomy	0.00	0.00	0.00	NR	0.00

Unilateral thyroid lobectomy	0.01	0.01	0.01	0.00	0.00
Complete thyroidectomy	0.02	0.02	0.02	0.01	0.01
Partial gastrectomy with anastomosis to duodenum	NR	NR	NR	NR	0.00
Other and open repair of direct inguinal hernia with graft or prosthesis	0.01	0.01	0.01	0.01	0.01
Other parathyroidectomy	0.01	0.01	0.01	0.00	0.00
Laparoscopic lysis of peritoneal adhesions	0.02	0.02	0.02	0.01	0.02
Lobectomy of liver	NR	NR	NR	0.00	0.00
Anastomosis of hepatic duct to gastrointestinal tract	NR	NR	NR	NR	0.00
Suture of laceration of large intestine	NR	NR	NR	NR	0.00
Repair of pericostomy hernia	0.00	0.00	0.00	0.00	0.00
Common duct exploration for removal of calculus	NR	NR	NR	NR	0.00
Total esophagectomy	NR	NR	NR	NR	0.00
Open and other partial gastrectomy	0.01	0.01	0.01	0.00	0.00
Partial hepatectomy	0.00	0.00	0.00	0.00	0.01
Esophagectomy, not otherwise specified	NR	NR	NR	NR	0.00
Other and open repair of other hernia of anterior abdominal wall with graft or prosthesis	0.01	0.01	0.01	0.01	0.01
Laparoscopic procedures for creation of esophagogastric sphincteric competence	0.00	0.00	0.00	0.02	0.01
Closure of stoma of large intestine	0.01	0.01	0.01	0.01	0.01
Other repair of intestine	NR	NR	NR	NR	0.00
Bilateral inguinal hernia repair with graft or prosthesis, not otherwise specified	NR	NR	NR	NR	0.00
Esophagomyotomy	0.00	0.00	0.00	0.00	0.00
Other appendectomy	0.01	0.01	0.01	0.01	0.01
Local excision of other lesion or tissue of stomach	0.01	0.01	0.01	0.00	0.00
Unilateral repair of femoral hernia with graft or prosthesis	NR	NR	NR	0.00	0.00

Ileostomy, not otherwise specified	NR	NR	NR	NR	0.00
Partial gastrectomy with anastomosis to jejunum	0.01	0.01	0.01	0.01	0.01
Other small-to-large intestinal anastomosis	0.00	0.00	0.00	0.00	0.00
Other and open repair of indirect inguinal hernia	NR	NR	NR	NR	0.00
Repair of other hernia of anterior abdominal wall	0.01	0.01	0.01	0.01	0.01
Repair of inguinal hernia with graft or prosthesis, not otherwise specified	0.01	0.01	0.01	0.01	0.01
Large-to-large intestinal anastomosis	NR	NR	NR	NR	0.00
Laparoscopic sigmoidectomy	0.02	0.02	0.02	0.03	0.02
Suture of duodenal ulcer site	0.01	0.01	0.01	0.01	0.01
Laparoscopic cecectomy	0.01	0.01	0.01	0.00	0.00
Open total intra-abdominal colectomy	0.01	0.01	0.01	0.00	0.01
Laparoscopic abdominoperineal resection of the rectum	NR	NR	NR	NR	0.00
Colostomy, not otherwise specified	0.01	0.01	0.01	0.01	0.01
Creation of cutaneoperitoneal fistula	0.01	0.01	0.01	0.00	0.00
Laparoscopic total intra-abdominal colectomy	NR	NR	NR	NR	0.00
Laparoscopic right hemicolectomy	0.05	0.05	0.05	0.04	0.04
Open and other multiple segmental resection of large intestine	NR	NR	NR	NR	0.00
Open abdominoperineal resection of the rectum	0.00	0.00	0.00	0.00	0.00
Closure of fistula of small intestine, except duodenum	NR	NR	NR	NR	0.00
Multiple segmental resection of small intestine	0.00	0.00	0.00	NR	0.00
Other and open bilateral repair of indirect inguinal hernia with graft or prosthesis	NR	NR	NR	NR	0.00
Internal fixation of bone without fracture reduction, tibia and fibula	0.00	0.00	0.00	0.00	0.00
Permanent colostomy	NR	NR	NR	NR	0.00

Suture of gastric ulcer site	0.01	0.01	0.01	0.01	0.00
Total removal of small intestine	NR	NR	NR	NR	0.00
Anastomosis of gallbladder to intestine	NR	NR	NR	NR	NR
Other and open repair of umbilical hernia with graft or prosthesis	0.00	0.00	0.00	0.00	0.00
Complete substernal thyroidectomy	NR	NR	NR	NR	0.00
Exploration of common duct	NR	NR	NR	0.00	NR
Other partial thyroidectomy	0.00	0.00	0.00	NR	0.00
Suture of laceration of small intestine, except duodenum	NR	NR	NR	NR	0.00
Repair of colovaginal fistula	NR	NR	NR	NR	0.00
Other proctopexy	NR	NR	NR	0.00	0.00
Unilateral repair of inguinal hernia, not otherwise specified	0.00	0.00	0.00	0.00	0.00
Other and open repair of direct inguinal hernia	NR	NR	NR	NR	0.00
Laparoscopic resection of transverse colon	0.00	0.00	0.00	0.00	0.00
Laparoscopic left hemicolectomy	0.01	0.01	0.01	0.01	0.01
Other laparoscopic partial excision of large intestine	0.00	0.00	0.00	0.00	0.00
Other permanent ileostomy	NR	NR	NR	NR	0.00
Other pyloroplasty	NR	NR	NR	NR	0.00
Partial gastrectomy with anastomosis to esophagus	NR	NR	NR	NR	0.00
Total pancreatectomy	NR	NR	NR	NR	0.00
Choledochoenterostomy	NR	NR	NR	NR	0.00
Other and open repair of diaphragmatic hernia, abdominal approach	NR	NR	NR	0.00	0.00
Abdominoperineal resection of the rectum, not otherwise specified	NR	NR	NR	NR	0.00
Other partial pancreatectomy	NR	NR	NR	NR	0.00
Other and open bilateral repair of inguinal hernia, one direct and one indirect, with graft or prosthesis	NR	NR	NR	0.00	0.00

Laparoscopic partial cholecystectomy	NR	NR	NR	NR	0.00
Laparoscopic bilateral repair of direct inguinal hernia with graft or prosthesis	NR	NR	NR	0.00	0.00
Partial substernal thyroidectomy	NR	NR	NR	NR	0.00
Laparoscopic bilateral repair of inguinal hernia with graft or prosthesis, not otherwise specified	NR	NR	NR	0.00	0.00
Laparoscopic multiple segmental resection of large intestine	NR	NR	NR	NR	0.00
Other and unspecified total intra-abdominal colectomy	NR	NR	NR	NR	0.00
Laparoscopic repair of direct inguinal hernia with graft or prosthesis	NR	NR	NR	NR	0.00
Laparoscopic bilateral repair of inguinal hernia, one direct and one indirect, with graft or prosthesis	NR	NR	NR	NR	0.00
Other repair of stomach	NR	NR	NR	NR	0.00
Intestinal anastomosis, not otherwise specified	NR	NR	NR	NR	0.00
Laparoscopic repair of indirect inguinal hernia with graft or prosthesis	NR	NR	NR	NR	0.00
Other and open bilateral repair of inguinal hernia, one direct and one indirect	0.00	0.00	0.00	0.00	NR
Anastomosis to anus	NR	NR	NR	NR	0.00
Continent ileostomy	0.00	0.00	0.00	0.00	NR
Laparoscopic repair of inguinal hernia with graft or prosthesis, not otherwise specified	NR	NR	NR	NR	0.00
Laparoscopic bilateral repair of indirect inguinal hernia with graft or prosthesis	NR	NR	NR	NR	0.00
Substernal thyroidectomy, not otherwise specified	0.00	0.00	0.00	0.00	NR
Number of Comorbidities	6.63	6.51	5.96	5.85	6.00
Number of Comorbidities in Near Fine balance list of variables	0.63	0.62	0.76	0.76	0.76
Anesthesia Score	155.01	150.37	150.15	151.78	150.71

More than six comorbidities (%)	0.61	0.61	0.51	0.51	0.53
Congestive Heart Failure	0.26	0.26	0.18	0.18	0.19
Stroke	0.21	0.21	0.13	0.13	0.14
Seizure	0.05	0.03	0.03	0.02	0.02
Dementia	0.17	0.16	0.11	0.10	0.12
Alcohol abuse	0.03	0.03	0.03	0.03	0.03
Drug abuse	0.03	0.03	0.02	0.02	0.02
Past MI	0.11	0.10	0.10	0.10	0.11
Past Arrhythmia	0.32	0.31	0.32	0.32	0.35
Unstable Angina	0.03	0.02	0.02	0.02	0.02
Angina	0.06	0.05	0.05	0.05	0.05
Hypertension	0.93	0.93	0.85	0.85	0.85
Valvular Heart Disease	0.26	0.27	0.28	0.27	0.28
Chronic Lung Disease	0.27	0.27	0.28	0.27	0.28
Asthma	0.14	0.14	0.12	0.11	0.11
Liver Disease	0.21	0.20	0.20	0.20	0.20
Renal Dialysis	0.42	0.42	0.27	0.26	0.28
Renal Failure	0.14	0.13	0.07	0.05	0.06
Diabetes	0.51	0.51	0.34	0.33	0.33
Paraplegia	0.06	0.04	0.02	0.02	0.02
Collagen Vascular Disease	0.07	0.07	0.08	0.08	0.08
Coagulation disorders	0.00	0.00	0.01	0.01	0.01
Thrombocytopenia	0.04	0.03	0.04	0.03	0.04
Congenital Coagulation disorder	0.06	0.06	0.06	0.06	0.06
Smoking History	0.23	0.23	0.28	0.28	0.28
Post Pulmonary Fibrosis	0.03	0.02	0.03	0.03	0.03
Cushing's disease	NR	NR	NR	NR	0.00
Graves' disease	0.01	0.01	0.01	0.00	0.00

Note. NR, Not Reportable N<11

Table 5. Readmission Outcomes for Black Study Population and 3 Matched White Populations: Early Era (2003-2005), Recent Era (2013, 2015), and the Difference between the Eras to Evaluate whether the Black-White Difference is Different in the Two Eras

		Black Patients	Tapered Matches of White Controls		
			Presentation + Procedure + Demographics	Procedure + Demographics	Demographics
Early Era (2003-2005)	30-day readmission (or death)	24.53	23.58	20.19***	19.12***
Recent Era (2013-2015)	30-day readmission (or death)	21.70	21.68	18.19***	18.39***
Difference in Difference (Recent - Early)	30-day readmission (or death)	—	-0.93%	-0.83%	-2.10%

Notes. Black-White difference between eras is defined by the Black-White difference in Recent Era minus the Black-White difference in Early Era. Significance tests for binary variables used McNemar test (* <0.05, ** <0.01, ***<0.001). For the difference in difference across eras, Gart's test for binary outcomes was used (+ < 0.05, ++ < 0.01, +++ < 0.001). The symbols were marked in the later era if the difference in difference was significant.

Table 6. Effect of race and hospital nursing characteristics on odds of 30-day Readmission or Death, after matching patients on demographics, procedure, and presentation variables

Variables in the Model	Model 1	Model 2	Model 3	Model 4
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Black	1.04 (0.97-1.11)	1.05 (0.98-1.12)	1.00 (0.91-1.09)	0.99 (0.90-1.09)
Nursing Resources (High vs Low)	---	0.86 * (0.75-1.00)	0.86 * (0.75-1.00)	0.87 (0.74-1.01)
Nursing Resources (Middle vs Low)	---	0.93 (0.83-1.05)	0.93 (0.82-1.04)	0.93 (0.82-1.05)
Black*Nursing Resources (High vs Low) Interaction	---	---	0.93 (0.85-1.03)	0.94 (0.85-1.03)
Black*Nursing Resources (Middle vs Low) Interaction	---	---	0.95 (0.85-1.05)	0.95 (0.86-1.06)
Major Teaching Hospital	---	---	---	1.05 (0.90-1.22)
Minor Teaching Hospital	---	---	---	1.00 (0.89-1.13)
Large Size (>250 beds)	---	---	---	0.93 (0.83-1.05)
High Technology Hospital	---	---	---	1.07 (0.96-1.19)
General Surgery Volume	---	---	---	0.99 (0.98-1.01)
Test for improvement in fit with greater model complexity				
Chi-square	---	4.09	2.23	5.06
Degrees of Freedom	---	2	2	5
p-value	---	0.1295	0.3280	0.4085

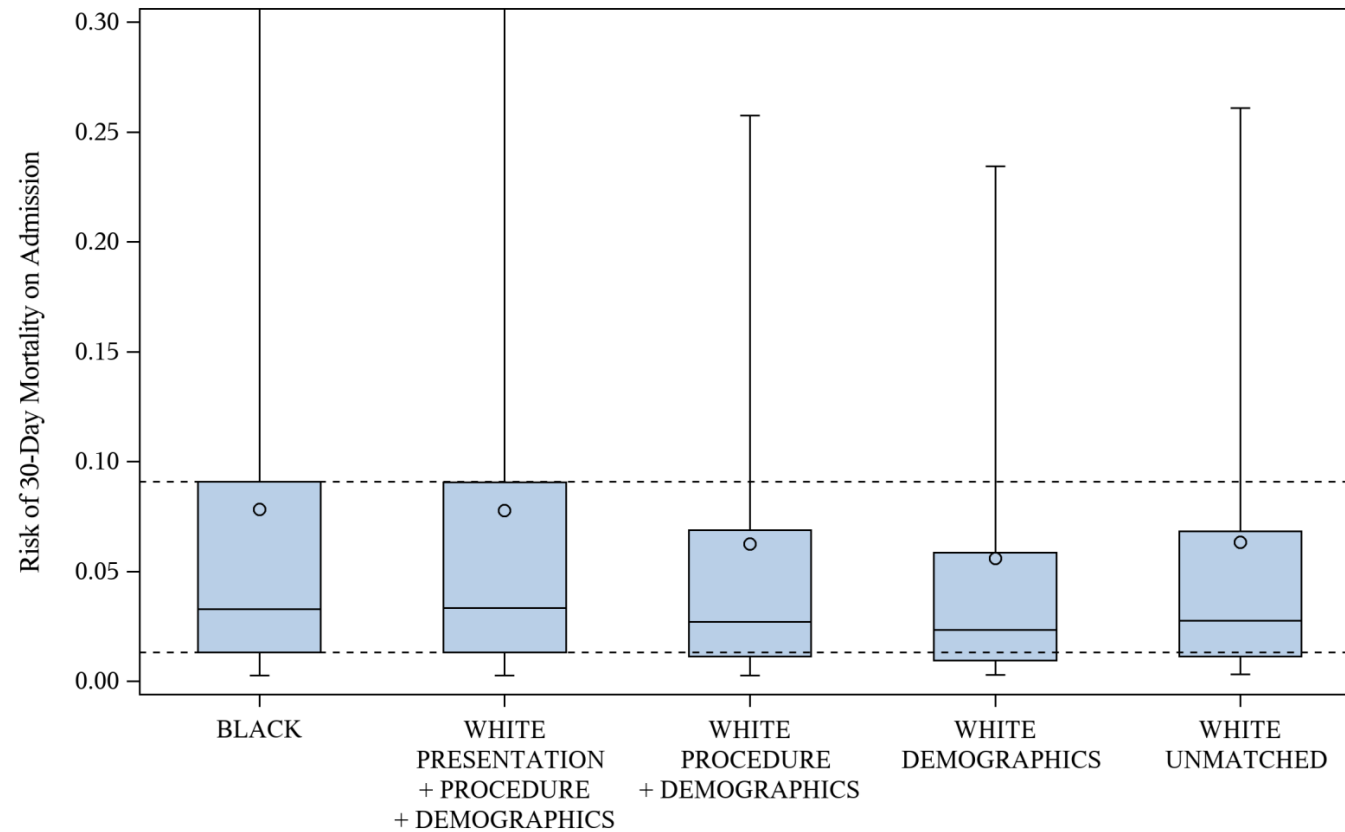
Table 7. Quality of Matches for Selected* Variables, Early Era (2003-2005)

Variable	Black Patients (n = 6,752)	Tapered Matches			White Patients (unmatched) (n = 107,001)
		Presentation + Procedure + Demographics (n = 6,752)	Procedure + Demographics (n = 6,752)	Demographics (n = 6,752)	
State (%)					
California	23.2	23.2	23.2	23.2	24.9^c
Florida	34.0	34.0	34.0	34.0	35.5^a
New Jersey / Pennsylvania	42.8	42.8	42.8	42.8	39.6^c
Year of Procedure (%)					
2004	21.7	22.7	21.7	21.7	21.6
2005	44.5	44.9	44.5	44.5	45.1
2006	33.8	32.4	33.8	33.8	33.3
Age at Procedure	76.0	75.8	76.0	76.0	77.5^c
% Male	38.6	38.6	38.6	38.6	43.1^c
Procedures (%)					
Laparoscopic cholecystectomy (5123)	15.8	15.8	15.8	21.0^c	19.9^c
Open right hemicolectomy (4573)	13.6	13.6	13.6	11.3^c	12.1^c
Lysis of peritoneal adhesion (5459)	6.2	6.2	6.2	4.6^c	4.6^c
Partial resection of small intestine (4562)	5.7	5.7	5.7	4.6^b	4.9^b
Open cholecystectomy (5122)	5.6	5.6	5.6	5.5	5.4
Selected Comorbidities (%)					
Hypertension	89.8	90.0	78.3^c	79.3^c	79.5^c
Diabetes	46.5	46.5	28.5^c	29.3^c	28.5^c
Congestive heart failure	25.8	25.7	21.6^c	20.3^c	21.6^c
Renal dialysis	23.2	23.0	13.1^c	12.4^c	13.4^c
Renal failure	15.6	15.4	7.7^c	7.1^c	7.7^c
Paraplegia	4.8	3.6^c	1.8^c	1.7^c	1.9^c
Mortality Risk Score (prob)	0.078	0.078	0.062^c	0.056^c	0.063^c
Emergency admission (%)	47.3	51.6^c	37.5^c	38.6^c	37.9^c
Transfer status (%)	0.9	1.0	0.9	0.6^a	0.7
Anesthesia time (minutes)	148	144^c	142^c	141^c	141^c
Dual-eligible (%)	38.8	12.0^c	10.0^c	9.7^c	9.3^c
Neighborhood median household income (\$)	23,658	31,844^c	32,359^c	32,182^c	31,729^c
Neighborhood high school graduate (%)	82.2	88.6^c	88.9^c	88.9^c	88.7^c
Neighborhood college graduate (%)	32.2	39.7^c	40.0^c	40.0^c	39.6^c

Notes. Bolded numbers represent significant differences ^a<0.005; ^b<0.01; ^c<0.001. *Complete balance tables with all variables are available in Appendix Table 2 for Early Era (2003-2005) patient matches. Dual-eligible is a beneficiary of both Medicare and Medicaid. Measures of patient socioeconomic status were obtained through the American Community Survey and are based on

neighborhood-level characteristics: median household income, percentage of high school graduates and percentage of college graduates.

Figure 1. Distribution of Mortality Risk Score for the Black Study Population, the Total White Study Population, and 3 Matched White Populations, Early Era (2003-2005)



Note. The tails of each box plot represent the lower 5% and upper 95% of the distribution. The mortality risk estimates presented here are based on risk at the time of admission.

Table 8. Exterior Match to Compare Mortality Differences in White Control Groups

		Black Patients	Tapered Matches of White Controls		
			Presentation + Procedure + Demographics	Procedure + Demographics	Demographics
Early Era (2003-2005)	1-year mortality	21.45%	20.51%	17.54%***	15.52%***
	30-day mortality	6.71%	7.81%**	6.47%	5.60%**
	Exterior match	Pvalue			
	Demo vs. Proc 1-year	0.0009		x	x
	Proc vs. Pres 1-year	< 0.0001	x	x	
	Demo vs. Pres 1-year	< 0.0001	x		x
	Demo vs. Proc 30-day	0.0261		x	x
	Proc vs. Pres 30-day	0.0012	x	x	
	Demo vs. Pres 30-day	< 0.0001	x		x
Recent Era (2013-2015)	1-year mortality	15.87%	16.16%	12.99%***	12.29%***
	30-day mortality	5.70%	7.88%***	5.74%	5.42%
	Exterior match	Pvalue			
	Demo vs. Proc 1-year	0.2752		x	x
	Proc vs. Pres 1-year	< 0.0001	x	x	
	Demo vs. Pres 1-year	< 0.0001	x		x
	Demo vs. Proc 30-day	0.4615		x	x
	Proc vs. Pres 30-day	< 0.0001	x	x	
	Demo vs. Pres 30-day	< 0.0001	x		x
Difference between Eras (Recent - Early)	1-year mortality	--	-1.23%	-1.03%	-2.35%
	30-day mortality	--	-1.08%	-0.28%	-0.83%

Note. The two White control groups being compared are marked with an 'x'. P-values test the equality of the mortality in the two White controls groups being compared. Summary: The White control groups are significantly different in all cases except the Demographics vs Demographics+Procedure groups in the Recent Era for both 1-year and 30-day mortality. This suggests that Black patients were having higher risk procedures than White patients in the Early Era, but not the Recent Era.