Lower-Extremity Endovascular Interventions for Medicare Beneficiaries: Comparative Effectiveness as a Function of Provider Specialty

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ABSTRACT

Purpose: Lower-extremity endovascular interventions are increasingly being performed by vascular surgeons (VSs) and interventional cardiologists (ICs) in addition to interventional radiologists (IRs). Regardless of specialty, well trained, experienced, and dedicated operators are expected to offer the best outcomes. To examine specialty-specific trends, outcomes of percutaneous lower-extremity revascularizations in Medicare beneficiaries were compared according to physician specialty types providing the service.

Materials and Methods: Medicare Standard Analytical Files that contain longitudinal data of all services (physician, inpatient, outpatient) provided to a 5% sample of Medicare beneficiaries were studied. All claims for percutaneous angioplasty, atherectomy, and stent implantation of lower-extremity arteries during the years 2005–2007 were extracted, and the following outcomes were assessed: mortality, transfusion, intensive care unit (ICU) use, length of stay, and subsequent revascularization or amputation. Outcomes were compared by using regression models adjusted for age, sex, race, emergency department admission, and comorbid conditions.

Results: Most outcomes were significantly worse if the service was provided by VSs compared with other vascular specialists. The in-hospital mortality rate for procedures performed by VSs was 19% higher than for those performed by others, but this difference was not significant ($P = .351$). Adjusted average 1-year procedure costs were significantly lower for IRs ($17,640) than for VSs ($19,012) or ICs ($19,096).

Conclusions: Medicare data show that endovascular lower-extremity revascularization by vascular surgeons results in more transfusion and ICU use, longer hospital stay, more repeat revascularization procedures or amputations, and higher costs compared with procedures performed by interventional radiologists.

ABBREVIATIONS

CPT = Current Procedural Terminology, ELER = endovascular lower-extremity revascularization, IC = interventional cardiologist, ICU = intensive care unit, IR = interventional radiologist, SAF = Standard Analytical File, VS = vascular surgeon

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During the past two decades, there has been a paradigm shift in revascularization of peripheral lower-extremity arterial disease in favor of endovascular interventions, and there has been rapid growth in volumes of these procedures (1,2). Although there has been growth among interventional radiologists (IRs), who are the traditional providers of these services, most of the growth is attributable to their provision by vascular surgeons (VSs) and interventional cardiologists (ICs) during the past 10 years (1,3,4). A variety of factors such as technical improvements, patient preference, and minimal invasiveness have motivated this growth, but perhaps none are as important as economic drivers. As noted by the president of the Society for Vascular Surgery, in the 1990s, ". . .[r]eimbursement for minimally invasive procedures became more favorable than traditional surgery. . ." (5).

During the 1990s, leading VSs and ICs advocated performance of endovascular procedures, and used professional organizations to increase their specialties' roles in delivering these services (6,7). These efforts were successful, with substantial increases in these specialists providing endovascular revascularization procedures (1,4,8); 5-year growth rates as high as 398% and 181% have been reported for VSs and ICs, respectively, since then (1).

However, many non-IRs who obtained privileges to perform endovascular interventions during that time period did not have formal training in endovascular interventional procedures in training programs accredited by the Accreditation Council for Graduate Medical Education. Many of those who provided the interventional training also lacked such training. The skills of those who were trained in informal settings, ie, those who were self-taught, or taught by trainers without credentials, have been questioned (4,9,10).

The goal of the present study was to compare the outcomes and costs of lower-extremity revascularization procedures performed between 2005 and 2007 for Medicare beneficiaries, examining outcome differences according to the specialty type of the physician providing the service.

MATERIALS AND METHODS

We used the Medicare 5% Standard Analytical Files (SAFs) for years 2005, 2006, 2007 to identify index procedures, and 2008 to allow 1 year of longitudinal data for all index procedures. These files are available from the Centers for Medicare and Medicaid Services and contain longitudinal data of claims for all services (physician, outpatient, and inpatient) of a random 5% sample of all Medicare beneficiaries (11). An encrypted unique beneficiary identifier allows linkage of services across different settings and different time periods, making within-beneficiary longitudinal follow-up possible. The physician SAF contains a variable reporting the self-designated specialty code of the physician performing the index procedure. We used this variable to define four groups of physicians: "interventional radiology" (specialty codes 30 and 94), "interventional cardiology" (specialty codes 06, 11, and 76), "vascular surgery" (specialty codes 02, 33, 77, and 78), and "other" (all other specialty codes).

We extracted claims submitted by the specialists of interest for endovascular lower extremity revascularization (ELER) index procedures using Current Procedural Terminology (CPT) codes (**Table 1**) during the years 2005 through 2007, and recorded the unique IDs of patients (N = 15,455) who underwent these procedures and for whom an inpatient or outpatient claim corresponding to the index procedure claim was available. Only the calendar quarter is provided in SAF, so data from patients (n = 2) who underwent more than one index procedure within the same quarter by different specialties were discarded. Similarly, patients who underwent an endovascular and an open revascularization procedure during their index quarter were excluded to account for the possibility of hybrid procedures. This was a small number (n = 670 of 15,453; 4.3%). Of the remaining 14,783 patients, acute thrombotic cases (n = 175; 1%) were excluded by filtering out all patients who underwent thrombolysis procedures (see codes in **Table 1**) in the same year as the index procedure. The final sample of 14,608 patients was analyzed for outcomes.

We studied outcomes of the index procedures during the same quarter as the index procedure and during the subsequent four quarters. The following outcomes were examined: length of hospital stay, use of intensive care unit (ICU) services, transfusions, in-hospital mortality, and repeat intervention. Repeat intervention (**Table 2**) was defined as any ELER, open lower-extremity revascularization, or amputation of the lower extremity. We also examined inpatient claims with International Classification of Diseases–9 codes 39.50 (angioplasty or atherectomy of other noncoronary vessel[s]) or 39.90 (insertion of non–drug-eluting peripheral vessel stent[s]) during the same period. We used provider-level Medicare Impact files to compute the inpatient and outpatient cost; the actual amount paid for physician claims was added to estimate total cost of the procedure reimbursed by Medicare.

We built risk-adjusted logistic regression models by using maximum-likelihood estimates to compare various patient outcomes across different specialties. A linear regression model employing ordinary least squares was used to analyze length of stay. For cost analysis, a linear regression model was built based on the least-square means approach. All models were adjusted for age, sex, race, admission type (emergency or ambulatory), and other comorbidities by using Elixhauser comorbidities software, available from the Agency for Healthcare Research and Quality (12,13). Other regression models that included the International Classification of Diseases–9 code for disease severity were also developed but were less predictive and had low R^2 values. As regression analysis does not require any assumptions about data distribution, no assumptions were made about the distribution of variables in the models.

Table 1. CPT Codes Used to Select the Study Sample

Code	Description
Index procedure (inclusion criteria)	
35473	Transluminal balloon angioplasty, percutaneous; iliac
35474	Transluminal balloon angioplasty, percutaneous: femoral–popliteal
35470	Transluminal balloon angioplasty, percutaneous; tibioperoneal trunk or branches, each vessel
35492	Transluminal peripheral atherectomy, percutaneous; iliac
35493	Transluminal peripheral atherectomy, percutaneous; femoral-popliteal
35495	Transluminal peripheral atherectomy, percutaneous; tibioperoneal trunk and branches
37205*	Transcatheter placement of an intravascular stent(s), except coronary, carotid, and vertebral vessel, percutaneous; initial vessel
37206*	Transcatheter placement of an intravascular stent(s), except coronary, carotid, and vertebral vessel, percutaneous; each additional vessel
Thrombolysis procedure (exclusion criteria)	
37201	Transcatheter therapy, infusion for thrombolysis other than coronary
37184	Primary percutaneous transluminal mechanical thrombectomy, noncoronary, arterial or arterial bypass graft, including fluoroscopic guidance and intraprocedural pharmacologic thrombolytic injection(s); initial vessel
37185	Primary percutaneous transluminal mechanical thrombectomy, noncoronary, arterial or arterial bypass graft, including fluoroscopic guidance and intraprocedural pharmacologic thrombolytic injection(s); second and all subsequent vessel(s) within the same vascular family
37186	Secondary percutaneous transluminal thrombectomy (eg, nonprimary mechanical, snare basket, suction technique), noncoronary, arterial, or arterial bypass graft, including fluoroscopic guidance and intraprocedural pharmacologic thrombolytic injections, provided in conjunction with another percutaneous intervention other than primary mechanical thrombectomy

Note.—CPT = Current Procedural Terminology.
* Considered an index procedure if one of the following International Classification of Diseases–9 codes included in claim: 443.9; 440.20; 440.22; 440.23; 440.24; 440.29; 440.39; and not a "renal" or "mesenteric" CPT code (35471; 75966; 75722; 75724; 75726).

Logistic regression models were assessed with Hosmer–Lemeshow goodness-of-fit tests at 99% confidence level; adjusted coefficient of determination (ie, adjusted R^2) was used in case of linear regression models. All analyses were performed by using SAS software (version 9.1; SAS, Cary, North Carolina). A P value of lower than .05 was considered significant except when indicated otherwise. Detailed output of each model is provided in the **Appendix** (available online at *www.jvir.org*). The study was approved by the committee for the protection of human subjects at Rhode Island Hospital.

RESULTS

We analyzed data from a total of 14,608 patients undergoing ELER from 2005 though 2007 in the 5% files. Of these, 3,565 index procedures were performed by IRs, 5,489 by ICs, 5,358 by VSs, and 196 by other specialists. The baseline characteristics of the study sample are presented in **Table 3**. All logistic regression models passed the goodness-of-fit test at the 99% confidence level, with the c-statistics ranging from 0.626 to 0.867 (**Table 4**). Linear regression models were also found to be satisfactory at the same level (**Table 4**).

Compared with VSs, outcomes were consistently better when the procedure was performed by an IR or IC (**Table 4**). IRs had a 32% lower likelihood of ICU use ($P < .001$) and a 37% lower likelihood of repeat lower-extremity revascularization or amputation ($P < .001$) compared with VSs ($P < .001$). Although statistical significance was not reached, both transfusion use and in-hospital mortality were 19% less likely after IRs performed procedures compared with VSs ($P = .113$ and $P = .351$, respectively). ICs performed similarly to IRs (**Table 4**) with respect to in-hospital mortality, transfusion, repeat intervention rates, and ICU use.

VSs were the only specialists with post–index procedure length of stay exceeding 3 days; significantly shorter lengths of stay were observed for other specialtists. Adjusted average 1-year costs per index procedure were 9% higher for VSs compared with IRs ($19,012 vs $17,640; **Table 4**).

DISCUSSION

There is tremendous interest in our society in physician performance. This interest is reflected in such initiatives as pay for performance (14), National Physician Data Banks for reporting malpractice (15), and the Institute of Medicine's report on medical errors (16). Clearly, invasive procedures should be done by only those with adequate training and experience who can ensure the best outcomes possible (4,10). The data reported here show that, compared

Table 2. CPT Codes Used to Identify Repeat Intervention

Code	Description
Open revascularization	
35454	Transluminal balloon angioplasty, open; iliac
35456	Transluminal balloon angioplasty, open; femoral–popliteal
35459	Transluminal balloon angioplasty, open; tibioperoneal trunk and branches
35482	Transluminal peripheral atherectomy, open; iliac
35483	Transluminal peripheral atherectomy, open; femoral–popliteal
35485	Transluminal peripheral atherectomy, open; tibioperoneal trunk and branches
37207	Transcatheter placement of an intravascular stent(s) (noncoronary vessel), open; initial vessel
37208	Transcatheter placement of an intravascular stent(s) (noncoronary vessel), open; each additional vessel
Bypass	
35521	Bypass graft, with vein; axillary–femoral
35533	Bypass graft, with vein; axillary–femoral–femoral
35546	Bypass graft, with vein; aortofemoral or bifemoral
35548	Bypass graft, with vein; aortoiliofemoral, unilateral
35549	Bypass graft, with vein; aortoiliofemoral, bilateral
35551	Bypass graft, with vein; aortofemoral–popliteal
35556	Bypass graft, with vein; femoral-popliteal
35558	Bypass graft, with vein; femoral-femoral
35563	Bypass graft, with vein; ilioiliac
35565	Bypass graft, with vein; iliofemoral
35566	Bypass graft, with vein; femoral-anterior tibial, posterior tibial, peroneal artery or other distal vessels
35571	Bypass graft, with vein; popliteal-tibial, -peroneal artery, or other distal vessels
35583	In situ vein bypass; femoral-popliteal
35585	In situ vein bypass; femoral-anterior tibial, posterior tibial, or peroneal artery
35587	In situ vein bypass; popliteal–tibial, peroneal
35621	Bypass graft, with other than vein; axillary–femoral
35623	Bypass graft, with other than vein; axillary–popliteal or –tibial
35641	Bypass graft, with other than vein; aortoiliac or biiliac
35646	Bypass graft, with other than vein; aortobifemoral
35647	Bypass graft, with other than vein; aortofemoral
35651	Bypass graft, with other than vein; aortofemoral–popliteal
35654	Bypass graft, with other than vein; axillary–femoral–femoral
35656	Bypass graft, with other than vein; femoral–popliteal
35661	Bypass graft, with other than vein; femoral–femoral
35663	Bypass graft, with other than vein; ilioiliac
35665	Bypass graft, with other than vein; iliofemoral
35666	Bypass graft, with other than vein; femoral–anterior tibial, posterior tibial, or peroneal artery
35671	Bypass graft, with other than vein; popliteal–tibial or –peroneal artery
35681	Bypass graft; composite, prosthetic and vein
35682	Bypass graft; autogenous composite, two segments of veins from two locations
35683	Bypass graft; autogenous composite, three or more segments of vein from two or more locations
Endarterectomy	
35351	Thromboendarterectomy, including patch graft, if performed; iliac
35355	Thromboendarterectomy, including patch graft, if performed; iliofemoral
35361	Thromboendarterectomy, including patch graft, if performed; combined aortoiliac
35363	Thromboendarterectomy, including patch graft, if performed; combined aortoiliofemoral
35371	Thromboendarterectomy, including patch graft, if performed; common femoral
35372	Thromboendarterectomy, including patch graft, if performed; deep (profunda) femoral
Amputation	
27295	Disarticulation of hip
27590	Amputation, thigh, through femur, any level;
27591	Amputation, thigh, through femur, any level; immediate fitting technique including first cast

(Continued)

Table 2. Continued

Code	Description
27592	Amputation, thigh, through femur, any level; open, circular (guillotine)
27598	Disarticulation at knee
27880	Amputation, leg, through tibia and fibula
27881	Amputation, leg, through tibia and fibula; with immediate fitting technique including application of first cast
27882	Amputation, leg, through tibia and fibula; open, circular (guillotine)
27888	Amputation, ankle, through malleoli of tibia and fibula (eg, Syme, Pirogoff-type procedures), with plastic closure and resection of nerves
27889	Ankle disarticulation
28800	Amputation, foot; midtarsal (eg, Chopart-type procedure)
28805	Amputation, foot; transmetatarsal

Note.—Percutaneous revascularization codes are the same as index procedure codes (**Table 1**). CPT = Current Procedural Terminology.

Table 3. Baseline Characteristics of the Study Sample

Characteristic	Value
Sex	
Male	7,418 (50.8)
Female	7,190 (49.2)
Age (y)	
< 65	2,369 (16.2)
65–69	2,532 (17.3)
70–74	2,880 (19.7)
75–79	2,964 (20.3)
80–84	2,267 (15.5)
≥ 85	1,596 (10.9)
Race/ethnicity	
White	11,686 (80.0)
Black	2,275 (15.6)
Asian	100 (0.7)
Hispanic	327 (2.2)
Native American	97 (0.7)
Other	123 (0.8)
Total	14,608 (100)

to VSs, on average, IRs and ICs have delivered better outcomes to Medicare patients for lower-extremity endovascular revascularization procedures. IR- and IC-treated patients had a significantly lower rate of subsequent revascularization or amputation than patients treated by VSs. The reasons for worse outcomes among VSs are not known, but may be related to insufficient training in catheter-based interventions or dilution of experience as a result of the extensive time learning and practicing open surgical procedures compared with IRs and ICs, whose focus is catheter-based interventions.

Observed specialty-specific outcomes differ from those published by Eslami et al (17), who compared outcomes of ELER across different specialties by using National Inpatient Sample data from 1998–2005, and reported significantly higher odds (odds ratio, 1.62; $P < .001$) of periprocedural mortality for patients of IRs compared with those of VSs (17). However, the National Inpatient Sample database is limited in many ways for this analysis; most importantly insofar as (i) it is an inpatient-only sample representing only 3% of total interventions (18,19), (ii) the sample is nonrandom and therefore potentially subject to bias, and (iii) it contains neither a physician specialty identifier nor a unique patient identifier. The authors used algorithms to identify physician specialty based on procedures performed (17,20), but specialty designation could not be determined in approximately one fourth of cases, a sizeable fraction of the total, which undermines the credibility of the study methods (17–19). Our data have the advantage of including physician specialty type directly, and therefore no assumptions needed to be made to refer the specialty type. Our sample was also obtained at random; both these characteristics of our database minimize the likelihood of systematically biasing the results.

One possible limitation of the present study is the inability to determine laterality of the revascularization service or amputation, which is not coded in the database. Although laterality of the procedure could not be determined from the database used in this study, given the large sample size, the fact that comorbid conditions were adjusted, and the lack of any rationale for a correlation of bilateral symptoms with a specific specialty type, it is reasonable to infer that bilateral symptom distribution was similar across specialties, which would minimize any potential bias in the overall analysis. In the same vein, anatomic site of intervention within the lower extremity was not considered during the analysis because that information could not be extracted from generic stent codes. There might be specialty specific differences in outcomes across the anatomic site of intervention. However, systematic bias in referral to different specialties based on the anatomic location of disease is not expected.

Another important observation is that each procedure performed by an IR saved Medicare an average $1,372 compared with a procedure performed by a VS and an

Table 4. Adjusted Comparison of Treatment Parameters among Specialties

Parameter	IR	IC	Other	VS (base)
Length of stay (d)				
Mean	2.9	2.6	2.1	3.4
95% CI	2.7–3.1	2.4–2.8	1.3–2.9	—
Model statistics	Adjusted R^2 = 0.211, F = 94.3 ($P < .001$)			
Mortality at discharge				
Incidence	139 (1%)			
OR	0.81	0.81	0.84	1.00
95% CI	0.53–1.26	0.53–1.24	0.19–3.70	—
Model statistics	C-statistic = 0.867, χ^2 = 7.1 (P = .531)*			
ICU use				
Incidence	n = 1,158 (8%)			
OR	0.68	0.96	1.18	1.00
95% CI	0.57–0.81	0.83–1.10	0.73–1.92	–
Model statistics	Adjusted R^2 = 0.687, χ^2 = 8.6 (P = .380)*			
Transfusion				
Incidence	n = 389 (3%)			
OR	0.81	0.69	0.59	1.00
95% CI	0.62–1.05	0.54–0.88	0.21–1.63	—
Model statistics	Adjusted R^2 = 0.743, χ^2 = 17.8 (P = .023)*			
Repeat intervention (endovascular, open, or amputation; Table 2)				
Incidence	n = 4,582 (31%)			
OR	0.63	0.41	0.97	1.00
95% CI	0.57–0.67	0.37–0.45	0.71–1.34	—
Model statistics	Adjusted R^2 = 0.655, χ^2 = 12.0 (P = .150)*			
Average 1-y cost per patient ($)				
Mean	17,640	19,096	20,344	19,012
95% CI	16,928–18,352	18,529–19,664	17,404–23,285	18,450–19,575
Model statistics	Adjusted R^2 = 0.082, F = 30.98 ($P < .001$)*			

Note.—Logistic regression models (linear regression model for length of stay and 1-year cost) adjusted for age, sex, race, emergency admission, and Elixhauser comorbidities (12,13). IC = interventional cardiologist, ICU = intensive care unit, IR = interventional radiologist, OR = odds ratio, VS = vascular surgeon.
* Hosmer–Lemeshow goodness-of-fit test.

average of $1,456 compared with a procedure performed by an IC. Although we did not develop predictive models, if these observations are correct, extrapolating these findings to the more than 183,534 ELER procedures performed in Medicare beneficiaries in year 2006 (3,21) shows potential savings of $210 million for Medicare in the year 2006 alone, had all the specialists matched the cost efficiency of the lowest-cost provider. As baby boomers enter the Medicare population in an era of economic turmoil, cost effectiveness will be increasingly important.

During the decade from 1996 to 2006, ELER utilization in Medicare beneficiaries almost tripled. The growth was almost exclusively among ICs (from 29 to 170 ELER procedures per 100,000 beneficiaries) and VSs (from 12 to 162 ELER procedures per 100,000 beneficiaries). Although there was also a decrease in open lower-extremity revascularization, the increase in ELER exceeded that decrease by a three-to-one ratio (3).

The practice model of VSs offering endovascular and open revascularization procedures sets up a potential conflict of interest: when evaluating a patient for open or endovascular revascularization, there may be a bias toward "endovascular first" even in poorly selected candidates for whom the probability of a durable and clinically effective result is small, as it allows the VS to capture more revenue per patient. That is, if the endovascular procedure fails or is short-lived, the VS can generate more revenue by repeating the original procedure or offering an open surgical revascularization procedure. While few VSs would acknowledge being influenced by such considerations, it is known that economic interests affect decision-making even unintentionally (22,23). In terms of selecting the appropriate revascularization procedure for a given patient, this practice model has more potential for conflicts of interest than a more traditional one whereby interventionalists provide endovascular procedures and surgeons provide open surgical procedures. The questions that these data raise are whether patients' or payors' interests are served by the practice model of a single specialty providing both endovascular and open revascularization services, or whether outcomes are better and costs lower when these services are provided by different specialties.

In conclusion, Medicare data indicate that patients who need lower-extremity endovascular revascularization services experience shorter hospital stays, require less transfusion and ICU services, have lower in-hospital mortality rates, and have much less chance of a subsequent revascularization or amputation within 1 year if treated by an IR rather than a VS. ICs also had better outcomes than VSs except in terms of ICU use and average 1-year cost of the procedure.

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APPENDIX

The REG Procedure
Model: MODEL1
Dependent Variable: LOS

Number of Observations Read	14608
Number of Observations Used	14608

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	42	142533	3393.63913	94.25	<.0001
Error	14565	524429	36.00613		
Corrected total	14607	666962			

Root MSE	6.00051	R-Square	0.2137
Dependent mean	3.35248	Adj R-Sq	0.2114
Coeff var	178.98732		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	3.45585	0.20384	16.95	<.0001
Radiology		1	−0.47238	0.13311	−3.55	0.0004
CardIntrPeriph		1	−0.72140	0.11730	−6.15	<.0001
OtherSpe		1	−1.24246	0.43846	−2.83	0.0046
AGEGRundr65		1	−0.18819	0.17605	−1.07	0.2851
AGEGR70_74		1	0.05256	0.16389	0.32	0.7484
AGEGR75_79		1	−0.05202	0.16327	−0.32	0.7500
AGEGR80_84		1	0.09472	0.17565	0.54	0.5897
AGEGRover85		1	0.17307	0.19582	0.88	0.3768
Female		1	0.18878	0.10199	1.85	0.0642
Black		1	0.25819	0.14471	1.78	0.0744
Emrg_Adm		1	12.15527	1.23378	9.85	<.0001
ELX_GRP_1	Congestive heart failure	1	2.39288	0.16131	14.83	<.0001
ELX_GRP_2	Cardiac arrhythmia	1	1.31539	0.15197	8.66	<.0001
ELX_GRP_3	Valvular disease	1	0.93004	0.22753	4.09	<.0001
ELX_GRP_4	Pulmonary circulation disorders	1	0.42086	0.52459	0.80	0.4224
ELX_GRP_5	Peripheral vascular disorders	1	−1.18320	0.14691	−8.05	<.0001
ELX_GRP_6	Hypertension uncomplicated	1	−0.82609	0.11744	−7.03	<.0001
ELX_GRP_7	Hypertension complicated	1	0.06890	0.20005	0.34	0.7306
ELX_GRP_8	Paralysis	1	4.18556	1.06443	3.93	<.0001
ELX_GRP_9	Other neurological disorders	1	1.59087	0.36878	4.31	<.0001
ELX_GRP_10	Chronic pulmonary disease	1	0.76386	0.14112	5.41	<.0001
ELX_GRP_11	Diabetes uncomplicated	1	−0.36543	0.11889	−3.07	0.0021
ELX_GRP_12	Diabetes complicated	1	3.90813	0.18658	20.95	<.0001
ELX_GRP_13	Hypothyroidism	1	−0.32906	0.22743	−1.45	0.1480
ELX_GRP_14	Renal failure	1	0.24322	0.19666	1.24	0.2162
ELX_GRP_15	Liver disease	1	2.70473	0.76227	3.55	0.0004
ELX_GRP_16	Peptic ulcer disease excluding bleeding	1	−0.09108	0.82757	−0.11	0.9124
ELX_GRP_17	AIDS/HIV	1	−1.44051	2.01102	−0.72	0.4738
ELX_GRP_18	Lymphoma	1	0.44524	1.08181	0.41	0.6807
ELX_GRP_19	Metastatic cancer	1	0.06660	0.93905	0.07	0.9435
ELX_GRP_20	Solid tumor without metastasis	1	1.81343	0.56048	3.24	0.0012
ELX_GRP_21	Rheumatoid arthritis/collagen	1	0.43316	0.41357	1.05	0.2949

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
ELX_GRP_22	Coagulopathy	1	3.62184	0.54645	6.63	<.0001
ELX_GRP_23	Obesity	1	−0.40353	0.32903	−1.23	0.2201
ELX_GRP_24	Weight loss	1	10.89991	0.53231	20.48	<.0001
ELX_GRP_25	Fluid and electrolyte disorders	1	5.61424	0.23594	23.80	<.0001
ELX_GRP_26	Blood loss anemia	1	5.37991	0.72895	7.38	<.0001
ELX_GRP_27	Deficiency anemia	1	0.90518	0.65855	1.37	0.1693
ELX_GRP_28	Alcohol abuse	1	0.95150	0.69479	1.37	0.1709
ELX_GRP_29	Drug abuse	1	4.51993	0.91200	4.96	<.0001
ELX_GRP_30	Psychoses	1	4.89924	1.05098	4.66	<.0001
ELX_GRP_31	Depression	1	0.09198	0.34115	0.27	0.7875

The LOGISTIC Procedure

Model Information

Data set	DA07.MODRANT
Response variable	died
Number of response levels	2
Model	Binary logit
Optimization technique	Fisher's scoring

Number of observations read	14608
Number of observations used	14608

Response Profile

Ordered Value	Died	Total Frequency
1	1	139
2	0	14469

Probability modeled is died=1.

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	1572.722	1319.434
SC	1580.311	1539.524
-2 Log L	1570.722	1261.434

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood ratio	309.2878	28	<.0001
Score	583.8703	28	<.0001
Wald	310.7686	28	<.0001

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	−5.0356	0.2476	413.7823	<.0001
Radiology	1	−0.2071	0.2220	0.8696	0.3511
CardIntrPeriph	1	−0.2059	0.2161	0.9083	0.3406

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
OtherSpe	1	−0.1742	0.7562	0.0531	0.8178
AGEGR75_79	1	0.2502	0.2371	1.1140	0.2912
AGEGR80_84	1	0.1153	0.2672	0.1860	0.6663
AGEGRover85	1	0.4938	0.2534	3.7982	0.0513
Female	1	0.3249	0.1810	3.2241	0.0726
Black	1	−0.5936	0.2861	4.3031	0.0380
ELX_GRP_1	1	0.6296	0.2084	9.1284	0.0025
ELX_GRP_2	1	1.0422	0.1983	27.6330	<.0001
ELX_GRP_6	1	−1.6036	0.3102	26.7157	<.0001
ELX_GRP_7	1	−0.6459	0.2592	6.2099	0.0127
ELX_GRP_8	1	1.5211	1.0509	2.0951	0.1478
ELX_GRP_9	1	1.2780	0.3350	14.5520	0.0001
ELX_GRP_10	1	−0.1178	0.2315	0.2592	0.6107
ELX_GRP_11	1	−0.7979	0.2936	7.3841	0.0066
ELX_GRP_12	1	−0.3903	0.2927	1.7776	0.1824
ELX_GRP_13	1	−0.5947	0.5941	1.0019	0.3168
ELX_GRP_14	1	0.9512	0.2487	14.6267	0.0001
ELX_GRP_15	1	1.4319	0.5309	7.2757	0.0070
ELX_GRP_19	1	0.7024	0.8917	0.6205	0.4309
ELX_GRP_20	1	0.6276	0.7067	0.7888	0.3745
ELX_GRP_22	1	1.3984	0.3971	12.4050	0.0004
ELX_GRP_24	1	1.7833	0.3151	32.0227	<.0001
ELX_GRP_25	1	0.9243	0.2227	17.2287	<.0001
ELX_GRP_26	1	0.4067	0.6982	0.3394	0.5602
ELX_GRP_30	1	2.2169	0.8063	7.5591	0.0060
ELX_GRP_31	1	−0.8492	1.0239	0.6880	0.4069

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Radiology	0.813	0.526	1.256
CardIntrPeriph	0.814	0.533	1.243
OtherSpe	0.840	0.191	3.698
AGEGR75_79	1.284	0.807	2.044
AGEGR80_84	1.122	0.665	1.895
AGEGRover85	1.638	0.997	2.692
Female	1.384	0.971	1.973
Black	0.552	0.315	0.968
ELX_GRP_1	1.877	1.248	2.824
ELX_GRP_2	2.835	1.922	4.182
ELX_GRP_6	0.201	0.110	0.370
ELX_GRP_7	0.524	0.315	0.871
ELX_GRP_8	4.577	0.584	35.905
ELX_GRP_9	3.589	1.861	6.921
ELX_GRP_10	0.889	0.565	1.399
ELX_GRP_11	0.450	0.253	0.801
ELX_GRP_12	0.677	0.381	1.201
ELX_GRP_13	0.552	0.172	1.768
ELX_GRP_14	2.589	1.590	4.215
ELX_GRP_15	4.187	1.479	11.851
ELX_GRP_19	2.019	0.352	11.590
ELX_GRP_20	1.873	0.469	7.483
ELX_GRP_22	4.049	1.859	8.817

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
ELX_GRP_24	5.949	3.208	11.033
ELX_GRP_25	2.520	1.629	3.899
ELX_GRP_26	1.502	0.382	5.901
ELX_GRP_30	9.179	1.890	44.581
ELX_GRP_31	0.428	0.058	3.182

Association of Predicted Probabilities and Observed Responses

Percent concordant	84.9	Somers' D	0.735
Percent discordant	11.4	Gamma	0.764
Percent tied	3.8	Tau-a	0.014
Pairs	2011191	c	0.867

Partition for the Hosmer and Lemeshow Test

		Died = 1		Died=0	
Group	**Total**	**Observed**	**Expected**	**Observed**	**Expected**
1	1459	0	0.74	1459	1458.26
2	1463	1	1.35	1462	1461.65
3	1489	1	2.07	1488	1486.93
4	1463	2	2.98	1461	1460.02
5	1461	1	4.78	1460	1456.22
6	1461	7	7.19	1454	1453.81
7	1464	13	9.58	1451	1454.42
8	1461	12	12.29	1449	1448.71
9	1463	16	18.94	1447	1444.06
10	1424	86	79.08	1338	1344.92

Hosmer and Lemeshow Goodness-of-Fit Test

Chi-square	DF	Pr > ChiSq
7.0549	8	0.5307

The LOGISTIC Procedure

Model Information

Data set	DA07.MODRANT
Response variable	ICUpat
Number of response levels	2
Model	Binary logit
Optimization technique	Fisher's scoring

Number of observations read	14608
Number of observations used	14608

Response Profile

Ordered Value	ICUpat	Total Frequency
1	1	1158
2	0	13450

Probability modeled is ICUpat=1.

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	8094.447	7596.541
SC	8102.037	7922.882
-2 Log L	8092.447	7510.541

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood ratio	581.9059	42	<.0001
Score	800.4509	42	<.0001
Wald	618.4640	42	<.0001

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	−2.4175	0.1249	374.8558	<.0001
Radiology	1	−0.3825	0.0882	18.8329	<.0001
CardIntrPeriph	1	−0.0443	0.0732	0.3658	0.5453
OtherSpe	1	0.1666	0.2479	0.4518	0.5015
AGEGRundr65	1	−0.1877	0.1148	2.6745	0.1020
AGEGR70_74	1	−0.0268	0.1055	0.0644	0.7997
AGEGR75_79	1	−0.0614	0.1049	0.3422	0.5585
AGEGR80_84	1	0.0357	0.1094	0.1066	0.7441
AGEGRover85	1	−0.1567	0.1244	1.5867	0.2078
Female	1	0.1344	0.0650	4.2786	0.0386
Black	1	−0.1761	0.0955	3.4005	0.0652
Emrg_Adm	1	0.2924	0.5491	0.2836	0.5943
ELX_GRP_1	1	0.4438	0.0844	27.6681	<.0001
ELX_GRP_2	1	0.5109	0.0812	39.6312	<.0001
ELX_GRP_3	1	0.0914	0.1244	0.5402	0.4623
ELX_GRP_4	1	0.0378	0.2645	0.0205	0.8862
ELX_GRP_5	1	−0.3996	0.0845	22.3575	<.0001
ELX_GRP_6	1	−0.1056	0.0758	1.9424	0.1634
ELX_GRP_7	1	0.1466	0.1207	1.4740	0.2247
ELX_GRP_8	1	1.7843	0.4072	19.1984	<.0001
ELX_GRP_9	1	0.5774	0.1746	10.9341	0.0009
ELX_GRP_10	1	0.4057	0.0785	26.7220	<.0001
ELX_GRP_11	1	−0.0697	0.0780	0.7979	0.3717
ELX_GRP_12	1	0.1856	0.1056	3.0872	0.0789
ELX_GRP_13	1	0.0539	0.1407	0.1468	0.7016
ELX_GRP_14	1	−0.1648	0.1208	1.8613	0.1725
ELX_GRP_15	1	0.4037	0.3601	1.2567	0.2623
ELX_GRP_16	1	0.2328	0.4530	0.2641	0.6073
ELX_GRP_17	1	−11.0804	220.6	0.0025	0.9599
ELX_GRP_18	1	0.3278	0.5681	0.3328	0.5640
ELX_GRP_19	1	0.2622	0.4451	0.3470	0.5558
ELX_GRP_20	1	0.6223	0.2701	5.3064	0.0212
ELX_GRP_21	1	−0.1288	0.2575	0.2502	0.6170
ELX_GRP_22	1	1.4080	0.2113	44.4202	<.0001
ELX_GRP_23	1	−0.1528	0.2279	0.4496	0.5025
ELX_GRP_24	1	0.7323	0.2236	10.7285	0.0011
ELX_GRP_25	1	1.1473	0.1003	130.8548	<.0001
ELX_GRP_26	1	1.2330	0.2794	19.4736	<.0001

Analysis of Maximum Likelihood Estimates					
Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
ELX_GRP_27	1	−0.0202	0.3861	0.0027	0.9584
ELX_GRP_28	1	−0.1807	0.3948	0.2095	0.6472
ELX_GRP_29	1	1.2948	0.3695	12.2813	0.0005
ELX_GRP_30	1	−0.0237	0.6270	0.0014	0.9698
ELX_GRP_31	1	0.4295	0.1851	5.3852	0.0203

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
Radiology	0.682	0.574	0.811
CardIntrPeriph	0.957	0.829	1.104
OtherSpe	1.181	0.727	1.920
AGEGRundr65	0.829	0.662	1.038
AGEGR70_74	0.974	0.792	1.197
AGEGR75_79	0.940	0.766	1.155
AGEGR80_84	1.036	0.836	1.284
AGEGRover85	0.855	0.670	1.091
Female	1.144	1.007	1.299
Black	0.839	0.695	1.011
Emrg_Adm	1.340	0.457	3.930
ELX_GRP_1	1.559	1.321	1.839
ELX_GRP_2	1.667	1.422	1.954
ELX_GRP_3	1.096	0.859	1.398
ELX_GRP_4	1.039	0.618	1.744
ELX_GRP_5	0.671	0.568	0.791
ELX_GRP_6	0.900	0.776	1.044
ELX_GRP_7	1.158	0.914	1.467
ELX_GRP_8	5.956	2.681	13.230
ELX_GRP_9	1.781	1.265	2.508
ELX_GRP_10	1.500	1.286	1.750
ELX_GRP_11	0.933	0.800	1.087
ELX_GRP_12	1.204	0.979	1.481
ELX_GRP_13	1.055	0.801	1.390
ELX_GRP_14	0.848	0.669	1.075
ELX_GRP_15	1.497	0.739	3.033
ELX_GRP_16	1.262	0.519	3.067
ELX_GRP_17	<0.001	<0.001	>999.999
ELX_GRP_18	1.388	0.456	4.226
ELX_GRP_19	1.300	0.543	3.110
ELX_GRP_20	1.863	1.097	3.164
ELX_GRP_21	0.879	0.531	1.456
ELX_GRP_22	4.088	2.702	6.185
ELX_GRP_23	0.858	0.549	1.342
ELX_GRP_24	2.080	1.342	3.223
ELX_GRP_25	3.150	2.588	3.834
ELX_GRP_26	3.431	1.984	5.933
ELX_GRP_27	0.980	0.460	2.089
ELX_GRP_28	0.835	0.385	1.809
ELX_GRP_29	3.650	1.769	7.530
ELX_GRP_30	0.977	0.286	3.337
ELX_GRP_31	1.537	1.069	2.209

Association of Predicted Probabilities and Observed Responses

Percent concordant	67.8	Somers' D	0.374
Percent discordant	30.3	Gamma	0.382
Percent tied	1.9	Tau-a	0.055
Pairs	15575100	c	0.687

Partition for the Hosmer and Lemeshow Test

		ICUpat = 1		ICUpat=0	
Group	**Total**	**Observed**	**Expected**	**Observed**	**Expected**
1	1450	43	50.88	1407	1399.12
2	1439	61	61.69	1378	1377.31
3	1432	73	68.14	1359	1363.86
4	1463	75	75.80	1388	1387.20
5	1479	70	82.50	1409	1396.50
6	1463	85	89.99	1378	1373.01
7	1461	91	103.53	1370	1357.47
8	1461	135	120.85	1326	1340.15
9	1461	168	157.04	1293	1303.96
10	1499	357	347.58	1142	1151.42

Hosmer and Lemeshow Goodness-of-Fit Test

Chi-Square	DF	Pr > ChiSq
8.5718	8	0.3797

The LOGISTIC Procedure

Model Information

Data set	DA07.MODRANT
Response variable	Transf
Number of response levels	2
Model	Binary logit
Optimization technique	Fisher's scoring

Number of observations read	14608
Number of observations used	14608

Response Profile

Ordered Value	Transf	Total Frequency
1	1	389
2	0	14219

Probability modeled is Transf=1.
Model Convergence Status
Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	3590.378	3339.718
SC	3597.967	3552.219
-2 Log L	3588.378	3283.718

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood ratio	304.6598	27	<.0001
Score	506.9298	27	<.0001
Wald	362.8643	27	<.0001

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	−4.2468	0.1704	621.0691	<.0001
Radiology	1	−0.2104	0.1326	2.5169	0.1126
CardIntrPeriph	1	−0.3760	0.1270	8.7662	0.0031
OtherSpe	1	−0.5355	0.5212	1.0559	0.3042
AGEGRundr65	1	−0.1246	0.1901	0.4298	0.5121
AGEGR70_74	1	−0.0313	0.1863	0.0283	0.8664
AGEGR75_79	1	−0.0255	0.1827	0.0194	0.8891
AGEGR80_84	1	0.2134	0.1835	1.3529	0.2448
AGEGRover85	1	0.2068	0.1966	1.1060	0.2929
Female	1	0.3596	0.1081	11.0608	0.0009
Black	1	0.1388	0.1395	0.9901	0.3197
ELX_GRP_1	1	0.3720	0.1354	7.5492	0.0060
ELX_GRP_2	1	0.2516	0.1382	3.3129	0.0687
ELX_GRP_3	1	0.3760	0.1893	3.9470	0.0470
ELX_GRP_9	1	0.7515	0.2510	8.9629	0.0028
ELX_GRP_10	1	0.0724	0.1364	0.2819	0.5955
ELX_GRP_12	1	0.6423	0.1423	20.3750	<.0001
ELX_GRP_14	1	0.2702	0.1243	4.7294	0.0297
ELX_GRP_15	1	0.4439	0.5392	0.6777	0.4104
ELX_GRP_20	1	0.5997	0.4033	2.2110	0.1370
ELX_GRP_22	1	1.2029	0.3100	15.0570	0.0001
ELX_GRP_23	1	0.2598	0.3337	0.6062	0.4362
ELX_GRP_24	1	0.8046	0.2893	7.7337	0.0054
ELX_GRP_25	1	1.2890	0.1401	84.6221	<.0001
ELX_GRP_26	1	1.6012	0.3298	23.5708	<.0001
ELX_GRP_27	1	1.4216	0.3547	16.0612	<.0001

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
ELX_GRP_29	1	0.5422	0.6294	0.7421	0.3890
ELX_GRP_30	1	1.0547	0.6242	2.8552	0.0911

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Radiology	0.810	0.625	1.051
CardIntrPeriph	0.687	0.535	0.881
OtherSpe	0.585	0.211	1.626
AGEGRundr65	0.883	0.608	1.281
AGEGR70_74	0.969	0.673	1.396
AGEGR75_79	0.975	0.681	1.395
AGEGR80_84	1.238	0.864	1.774
AGEGRover85	1.230	0.836	1.808
Female	1.433	1.159	1.771
Black	1.149	0.874	1.510
ELX_GRP_1	1.451	1.113	1.891
ELX_GRP_2	1.286	0.981	1.686
ELX_GRP_3	1.456	1.005	2.111
ELX_GRP_9	2.120	1.296	3.468
ELX_GRP_10	1.075	0.823	1.405
ELX_GRP_12	1.901	1.438	2.512
ELX_GRP_14	1.310	1.027	1.672
ELX_GRP_15	1.559	0.542	4.485
ELX_GRP_20	1.822	0.826	4.015
ELX_GRP_22	3.330	1.814	6.113
ELX_GRP_23	1.297	0.674	2.494
ELX_GRP_24	2.236	1.268	3.942
ELX_GRP_25	3.629	2.758	4.776
ELX_GRP_26	4.959	2.598	9.465
ELX_GRP_27	4.144	2.068	8.305
ELX_GRP_29	1.720	0.501	5.906
ELX_GRP_30	2.871	0.845	9.759

Association of Predicted Probabilities and Observed Responses

Percent concordant	72.2	Somers' D	0.486
Percent discordant	23.6	Gamma	0.508
Percent tied	4.2	Tau-a	0.025
Pairs	5531191	c	0.743

Partition for the Hosmer and Lemeshow Test

		Transf = 1		Transf=0	
Group	Total	Observed	Expected	Observed	Expected
1	1453	7	13.96	1446	1439.04
2	1468	9	17.54	1459	1450.46
3	1452	15	19.82	1437	1432.18
4	1401	24	20.84	1377	1380.16
5	1466	24	24.75	1442	1441.25
6	1502	29	28.49	1473	1473.51
7	1461	22	31.23	1439	1429.77
8	1468	50	37.33	1418	1430.67
9	1463	57	51.20	1406	1411.80
10	1474	152	143.84	1322	1330.16

Hosmer and Lemeshow Goodness-of-Fit Test

Chi-Square	DF	Pr > ChiSq
17.8109	8	0.0227

The LOGISTIC Procedure

Model Information

Data set	DA07.MODRANT
Response variable	AnySbsq
Number of response levels	2
Model	Binary logit
Optimization technique	Fisher's scoring

Number of observations read	14608
Number of observations used	14608

Response Profile

Ordered Value	AnySbsq	Total Frequency
1	1	3479
2	0	11129

Probability modeled is AnySbsq=1.

Model Convergence Status

Convergence criterion (GCONV=1E-8) satisfied.

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	16040.018	15279.889
SC	16047.608	15606.230
-2 Log L	16038.018	15193.889

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood ratio	844.1298	42	<.0001
Score	864.5936	42	<.0001
Wald	788.8859	42	<.0001

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	−1.3851	0.0837	273.9247	<.0001
Radiology	1	−0.4615	0.0519	79.0045	<.0001
CardIntrPeriph	1	−0.8926	0.0482	342.7810	<.0001
OtherSpe	1	−0.0287	0.1633	0.0309	0.8605
AGEGRundr65	1	0.0681	0.0700	0.9460	0.3307
AGEGR70_74	1	0.1020	0.0657	2.4127	0.1204
AGEGR75_79	1	−0.00253	0.0663	0.0015	0.9695
AGEGR80_84	1	−0.0384	0.0714	0.2888	0.5910
AGEGRover85	1	−0.1562	0.0808	3.7318	0.0534
Female	1	−0.0145	0.0411	0.1249	0.7237
Black	1	0.2622	0.0558	22.1073	<.0001
Emrg_Adm	1	1.0716	0.4479	5.7242	0.0167
ELX_GRP_1	1	0.2703	0.0618	19.1387	<.0001
ELX_GRP_2	1	0.1056	0.0606	3.0314	0.0817
ELX_GRP_3	1	−0.0689	0.0946	0.5305	0.4664
ELX_GRP_4	1	−0.0718	0.2161	0.1105	0.7396
ELX_GRP_5	1	0.5117	0.0616	68.9411	<.0001
ELX_GRP_6	1	−0.1048	0.0475	4.8709	0.0273
ELX_GRP_7	1	−0.1155	0.0806	2.0561	0.1516
ELX_GRP_8	1	0.1433	0.4067	0.1242	0.7246
ELX_GRP_9	1	0.1067	0.1416	0.5676	0.4512
ELX_GRP_10	1	0.0738	0.0559	1.7433	0.1867
ELX_GRP_11	1	0.1953	0.0475	16.8991	<.0001
ELX_GRP_12	1	0.8550	0.0662	166.5533	<.0001
ELX_GRP_13	1	−0.2138	0.0976	4.7981	0.0285
ELX_GRP_14	1	0.1081	0.0790	1.8707	0.1714
ELX_GRP_15	1	−0.5776	0.3470	2.7711	0.0960
ELX_GRP_16	1	−0.0486	0.3372	0.0208	0.8854
ELX_GRP_17	1	−11.1888	177.7	0.0040	0.9498
ELX_GRP_18	1	−0.4403	0.5436	0.6561	0.4179
ELX_GRP_19	1	−0.6443	0.4661	1.9111	0.1668
ELX_GRP_20	1	−0.1747	0.2417	0.5225	0.4698
ELX_GRP_21	1	−0.1651	0.1729	0.9114	0.3397
ELX_GRP_22	1	−0.0676	0.2197	0.0946	0.7584
ELX_GRP_23	1	−0.1973	0.1407	1.9670	0.1608
ELX_GRP_24	1	0.4160	0.1918	4.7022	0.0301
ELX_GRP_25	1	0.2241	0.0894	6.2871	0.0122
ELX_GRP_26	1	0.9328	0.2577	13.0988	0.0003
ELX_GRP_27	1	0.3430	0.2488	1.9006	0.1680
ELX_GRP_28	1	0.5618	0.2500	5.0500	0.0246
ELX_GRP_29	1	−0.2195	0.3536	0.3854	0.5347
ELX_GRP_30	1	0.2365	0.3889	0.3698	0.5431
ELX_GRP_31	1	−0.1519	0.1419	1.1464	0.2843

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
Radiology	0.630	0.569	0.698
CardIntrPeriph	0.410	0.373	0.450
OtherSpe	0.972	0.706	1.338
AGEGRundr65	1.070	0.933	1.228
AGEGR70_74	1.107	0.974	1.259
AGEGR75_79	0.997	0.876	1.136

Odds Ratio Estimates			
Effect	Point Estimate	95% Wald Confidence Limits	
AGEGR80_84	0.962	0.837	1.107
AGEGRover85	0.855	0.730	1.002
Female	0.986	0.909	1.068
Black	1.300	1.165	1.450
Emrg_Adm	2.920	1.214	7.025
ELX_GRP_1	1.310	1.161	1.479
ELX_GRP_2	1.111	0.987	1.252
ELX_GRP_3	0.933	0.775	1.124
ELX_GRP_4	0.931	0.609	1.421
ELX_GRP_5	1.668	1.478	1.882
ELX_GRP_6	0.901	0.821	0.988
ELX_GRP_7	0.891	0.761	1.043
ELX_GRP_8	1.154	0.520	2.561
ELX_GRP_9	1.113	0.843	1.468
ELX_GRP_10	1.077	0.965	1.201
ELX_GRP_11	1.216	1.108	1.334
ELX_GRP_12	2.351	2.065	2.677
ELX_GRP_13	0.808	0.667	0.978
ELX_GRP_14	1.114	0.954	1.301
ELX_GRP_15	0.561	0.284	1.108
ELX_GRP_16	0.953	0.492	1.845
ELX_GRP_17	$<$0.001	$<$0.001	$>$999.999
ELX_GRP_18	0.644	0.222	1.868
ELX_GRP_19	0.525	0.211	1.309
ELX_GRP_20	0.840	0.523	1.349
ELX_GRP_21	0.848	0.604	1.190
ELX_GRP_22	0.935	0.608	1.438
ELX_GRP_23	0.821	0.623	1.082
ELX_GRP_24	1.516	1.041	2.208
ELX_GRP_25	1.251	1.050	1.491
ELX_GRP_26	2.542	1.534	4.212
ELX_GRP_27	1.409	0.865	2.295
ELX_GRP_28	1.754	1.074	2.862
ELX_GRP_29	0.803	0.401	1.606
ELX_GRP_30	1.267	0.591	2.715
ELX_GRP_31	0.859	0.650	1.134

Association of Predicted Probabilities and Observed Responses			
Percent concordant	65.1	Somers' D	0.309
Percent discordant	34.2	Gamma	0.312
Percent tied	0.7	Tau-a	0.112
Pairs	38717791	c	0.655

Partition for the Hosmer and Lemeshow Test

		AnySbsq = 1		AnySbsq=0	
Group	**Total**	**Observed**	**Expected**	**Observed**	**Expected**
1	1484	200	169.65	1284	1314.35
2	1479	202	207.28	1277	1271.72
3	1454	220	226.45	1234	1227.55
4	1461	240	257.95	1221	1203.05
5	1460	280	293.25	1180	1166.75
6	1462	352	337.64	1110	1124.36
7	1461	379	394.49	1082	1066.51
8	1461	427	437.33	1034	1023.67
9	1461	497	493.94	964	967.06
10	1425	682	661.02	743	763.98

Hosmer and Lemeshow Goodness-of-Fit Test

Chi-Square	DF	Pr > ChiSq
12.0166	8	0.1505

The GLM Procedure
Class Level Information

Class	Levels	Values
SPEGR	4	1 Radiologists 2 Medicine 3 Other 4 Surgeons

Number of observations read	14608
Number of observations used	14608

The GLM Procedure

Dependent Variable: Tot1YCost

Source	Sum of DF	Squares	Mean Square	F Value	Pr> F
Model	42	569061497507	13549083274	30.98	<.0001
Error	14565	6.3709096E12	437412261.46		
Corrected total	14607	6.9399711E12			

R-Square	CoeffVar	Root MSE	Tot1YCost Mean
0.081998	111.6804	20914.40	18727.02

Source	DF	Type I SS	Mean Square	F Value	Pr> F
SPEGR	3	4209935665.6	1403311888.5	3.21	0.0221
AGEGRundr65	1	17208706028	17208706028	39.34	<.0001
AGEGR70_74	1	404331082.71	404331082.71	0.92	0.3363
AGEGR75_79	1	734544450.86	734544450.86	1.68	0.1950
AGEGR80_84	1	420434818.99	420434818.99	0.96	0.3269
AGEGRover85	1	374362573.95	374362573.95	0.86	0.3549
Female	1	3530443415.1	3530443415.1	8.07	0.0045
Black	1	11714422303	11714422303	26.78	<.0001
Emrg_Adm	1	27514770744	27514770744	62.90	<.0001
ELX_GRP_1	1	145675704561	145675704561	333.04	<.0001
ELX_GRP_2	1	26065035137	26065035137	59.59	<.0001
ELX_GRP_3	1	5647262738.2	5647262738.2	12.91	0.0003
ELX_GRP_4	1	112885309.84	112885309.84	0.26	0.6115
ELX_GRP_5	1	4616361301.6	4616361301.6	10.55	0.0012
ELX_GRP_6	1	21514087720	21514087720	49.18	<.0001
ELX_GRP_7	1	26474870067	26474870067	60.53	<.0001

Source	DF	Type I SS	Mean Square	F Value	Pr> F
ELX_GRP_8	1	1877824364.2	1877824364.2	4.29	0.0383
ELX_GRP_9	1	5222235117.3	5222235117.3	11.94	0.0006
ELX_GRP_10	1	6737461242.3	6737461242.3	15.40	<.0001
ELX_GRP_11	1	2011310259.8	2011310259.8	4.60	0.0320
ELX_GRP_12	1	106670326880	106670326880	243.87	<.0001
ELX_GRP_13	1	2211185289.9	2211185289.9	5.06	0.0246
ELX_GRP_14	1	2915980442.3	2915980442.3	6.67	0.0098
ELX_GRP_15	1	5058519634.9	5058519634.9	11.56	0.0007
ELX_GRP_16	1	307684711.43	307684711.43	0.70	0.4017
ELX_GRP_17	1	330451245.28	330451245.28	0.76	0.3848
ELX_GRP_18	1	192461.84766	192461.84766	0.00	0.9833
ELX_GRP_19	1	5645834.0303	5645834.0303	0.01	0.9095
ELX_GRP_20	1	1412988135.1	1412988135.1	3.23	0.0723
ELX_GRP_21	1	149021519.86	149021519.86	0.34	0.5594
ELX_GRP_22	1	15542955173	15542955173	35.53	<.0001
ELX_GRP_23	1	2072494907.5	2072494907.5	4.74	0.0295
ELX_GRP_24	1	42235083134	42235083134	96.56	<.0001
ELX_GRP_25	1	58878461414	58878461414	134.61	<.0001
ELX_GRP_26	1	13644694776	13644694776	31.19	<.0001
ELX_GRP_27	1	440521468.87	440521468.87	1.01	0.3156
ELX_GRP_28	1	1801878388.5	1801878388.5	4.12	0.0424
ELX_GRP_29	1	2767085915.4	2767085915.4	6.33	0.0119
ELX_GRP_30	1	538504678.55	538504678.55	1.23	0.2672
ELX_GRP_31	1	10832596.051	10832596.051	0.02	0.8750

Source	DF	Type III SS	Mean Square	F Value	Pr> F
SPEGR	3	5438816349	1812938783	4.14	0.0060
AGEGRundr65	1	327475782	327475782	0.75	0.3869
AGEGR70_74	1	131213250	131213250	0.30	0.5839
AGEGR75_79	1	2351652406	2351652406	5.38	0.0204
AGEGR80_84	1	2670885196	2670885196	6.11	0.0135
AGEGRover85	1	3171586446	3171586446	7.25	0.0071
Female	1	4396834755	4396834755	10.05	0.0015
Black	1	2874057734	2874057734	6.57	0.0104
Emrg_Adm	1	12292976536	12292976536	28.10	<.0001
ELX_GRP_1	1	41488470061	41488470061	94.85	<.0001
ELX_GRP_2	1	16250382762	16250382762	37.15	<.0001
ELX_GRP_3	1	4258213502	4258213502	9.74	0.0018
ELX_GRP_4	1	643297943	643297943	1.47	0.2253
ELX_GRP_5	1	1062985	1062985	0.00	0.9607
ELX_GRP_6	1	3642717469	3642717469	8.33	0.0039
ELX_GRP_7	1	1638546816	1638546816	3.75	0.0530
ELX_GRP_8	1	2108610608	2108610608	4.82	0.0281
ELX_GRP_9	1	2077285159	2077285159	4.75	0.0293
ELX_GRP_10	1	4378130060	4378130060	10.01	0.0016
ELX_GRP_11	1	716068950	716068950	1.64	0.2008
ELX_GRP_12	1	88162357751	88162357751	201.55	<.0001
ELX_GRP_13	1	1906414463	1906414463	4.36	0.0368
ELX_GRP_14	1	1268974024	1268974024	2.90	0.0885
ELX_GRP_15	1	2195866179	2195866179	5.02	0.0251
ELX_GRP_16	1	103368671	103368671	0.24	0.6269
ELX_GRP_17	1	485425951	485425951	1.11	0.2921
ELX_GRP_18	1	7452963	7452963	0.02	0.8961
ELX_GRP_19	1	1321867747	1321867747	3.02	0.0822
ELX_GRP_20	1	1103360155	1103360155	2.52	0.1123

Source	DF	Type III SS	Mean Square	F Value	Pr> F
ELX_GRP_21	1	79405985	79405985	0.18	0.6701
ELX_GRP_22	1	12082208627	12082208627	27.62	<.0001
ELX_GRP_23	1	1702688151	1702688151	3.89	0.0485
ELX_GRP_24	1	31386298827	31386298827	71.75	<.0001
ELX_GRP_25	1	54158344916	54158344916	123.82	<.0001
ELX_GRP_26	1	13813712339	13813712339	31.58	<.0001
ELX_GRP_27	1	409076050	409076050	0.94	0.3335
ELX_GRP_28	1	1665951708	1665951708	3.81	0.0510
ELX_GRP_29	1	2781392910	2781392910	6.36	0.0117
ELX_GRP_30	1	543763789	543763789	1.24	0.2649
ELX_GRP_31	1	10832596	10832596	0.02	0.8750

The GLM Procedure

Least Squares Means

SPEGR	Tot1YCost LSMEAN
1 Radiologists	17640.3743
2 Medicine	19096.4798
3 Other	20344.3910
4 Surgeons	19012.3761

SPEGR	Tot1YCost LSMEAN	95% Confidence Limits	
1 Radiologists	17640	16928	18352
2 Medicine	19096	18529	19664
3 Other	20344	17404	23285
4 Surgeons	19012	18450	19575