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Affording to Wait: Medicare Initiation and the Use of Health Care

Abstract
Delays in receipt of necessary diagnostic and therapeutic medical procedures related to the timing of Medicare initiation at age 65 years have potentially broad welfare implications. We use 2005–2007 data from Florida and North Carolina to estimate the effect of initiation of Medicare benefits on healthcare utilization across procedures that differ in urgency and coverage. In particular, we study trends in the use of elective procedures covered by Medicare to treat conditions that vary in symptoms; these are compared with elective surgical procedures not eligible for Medicare reimbursement, and to a set of urgent and emergent procedures. We find large discontinuities in health services utilization at age 65 years concentrated among low urgency, Medicare-reimbursable procedures, most pronounced among screening interventions and treatments for minimally symptomatic disease.

Keywords
insurance, medicare initiation

Disciplines
Insurance | Other Public Health

AFFORDING TO WAIT: MEDICARE INITIATION AND THE USE OF HEALTH CARE

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SUMMARY

Delays in receipt of necessary diagnostic and therapeutic medical procedures related to the timing of Medicare initiation at age 65 have potentially broad welfare implications. We use 2005-2007 data from Florida and North Carolina to estimate the effect of initiation of Medicare benefits on health care utilization across procedures that differ in urgency and coverage. In particular, we study trends in use of elective procedures covered by Medicare to treat conditions that vary in symptoms; these are compared to elective surgical procedures not eligible for Medicare reimbursement, as well as to a set of urgent and emergent procedures. We find large discontinuities in health services utilization at age 65 concentrated among low-urgency, Medicare-reimbursable procedures, most pronounced among screening interventions and treatments for minimally symptomatic disease.

INTRODUCTION

Enrollment in Medicare extends health insurance coverage to millions of older Americans. This coverage is particularly valuable to near-elderly individuals who were previously uninsured or underinsured. These individuals often have lower incomes, are outside or transitioning out of the labor force, face high premiums due to health problems and age, and report forgoing needed care for chronic conditions (Powell-Griner et al., 1999; Ayanian et al., 2000). McWilliams et al. (2003) found that Medicare enrollment helps close the gap between previously-insured and previously-uninsured enrollees with regard to utilization of screening procedures, such as mammography and cholesterol measurement.

The impact of Medicare enrollment on health and utilization represents an area of active inquiry (Card et al., 2008; Lichtenberg, 2002; McWilliams et al, 2003; Polsky et al, 2009); however, the extent to which the expectation of Medicare coverage at age 65 may lead to postponement of needed care among individuals approaching eligibility is incompletely understood.[1] Indeed, if the timing of Medicare enrollment influences health care utilization, such an influence is likely non-uniform across procedure categories, with potential implications for public health and health policy. Specifically, treatments for low-urgency conditions, particularly those without immediately painful or life-threatening symptoms, may be more prone to delays compared to higher-urgency treatments. As a result, delays in delivery of health services related to Medicare initiation may serve to discourage timely receipt of preventative care, or care for conditions whose initial symptoms may be subtle or painless. Despite being of lower medical urgency than care for acute conditions, the cumulative public health burden of delays in elective procedures may be profound. For example, delays in timely receipt of colon cancer screening via colonoscopy contribute to the status of colorectal cancer the second leading cause of cancer death in

[1] Lichtenberg (2002) argues that reaching age 65 raises the consumption of hospital services due mostly to postponement of hospitalization in the prior two years.

the United States. Similarly, delays in screening and treatment for visual impairment among the elderly may lead to increased falls, with related injury and functional disability. Lastly, while an increase in insurance coverage would represent the most evident explanation for an increase in the utilization of specific health services at age 65, alternate potential explanations may exist. Incident medical conditions are likely to increase with age. Further, retirement decreases time demands from employment and allows for the time required to undergo and recover from medical care.

To estimate the effect of initiation of Medicare benefits on health care utilization across procedures that differ in urgency, symptoms, and coverage, we first examine changes in utilization of elective, non-urgent procedures: screening colonoscopy, and lens and cataract surgery. Additionally, we examine rates of treatment of femoral and inguinal hernia, two conditions that, while potentially urgent, are most often treated on an elective basis. We next compared utilization of elective, non-urgent procedures to the utilization of high-urgency procedures we posited would be unlikely to be delayed due to the timing of Medicare benefit initiation. These included groups of procedures likely to manifest severe or painful symptoms: acute vascular procedures, including treatment for ruptured abdominal/thoracic aneurysms and intracranial hemorrhage, and treatment for fractures of the upper or lower extremities. As these procedures typically manifest marked symptoms, they would be unlikely to be detected via other screening or diagnostic procedures. As a result, discontinuities in these procedures would not stem from discontinuities in utilization of prior diagnostic procedures related to Medicare initiation.

Lastly, we compared the utilization of low-urgency, elective procedures eligible for Medicare coverage (colonoscopy, cataract/lens procedures, and hernia repair) with a set of elective cosmetic surgical procedures (liposuction, panniculectomy, and breast augmentation). As these cosmetic procedures are not covered by Medicare, any change in their utilization at age 65 would be unlikely to

be explained by the initiation of Medicare benefits, and argue for other influences, such as increasing leisure time, on the volume of care consumed.

DATA

The study is based on claims data gathered between 2005 and 2007 by the Florida Agency for Health Care Administration and the North Carolina Division of Health Services. Data was collected from all hospitals and ambulatory surgical centers in the two states. We focus on claims for patients between the age 50 and age 75 undergoing outpatient screening colonoscopy, outpatient cataract or lens surgery, inpatient or outpatient femoral or inguinal hernia repair, inpatient vascular procedures , (including ruptured abdominal/thoracic aneurysms and intracranial hemorrhage procedures), treatment of acute upper and lower extremity fractures, and selected cosmetic procedures (including liposuction, breast augmentation, and panniculectomy). The full list of ICD-9 and CPT codes for the procedures under study is presented in Appendix A.

Figure 1 plots patient volume by age, state, and procedure type. State trends were rescaled to capture differences in population size across the two states.[2] The Y-axis on the left (right) hand-side corresponds to patient volume for Florida (North Carolina). The left panel describes volume trends by age for non-urgent procedures. Lens and cataract procedures increased with age, screening colonoscopy generally decreases with age, and hernia repairs is fairly stable with age. At age 65, the volume increased sharply for all three procedures. The volume of lens and cataract grew by 64% in Florida and by 43% in North Carolina between the age of 64 and 65. Similarly, the number of colonoscopy procedures in both states increased by one-third between the age of 64 and 65, and the number of hernia repairs increased by 29% in Florida and 16% in North Carolina between the age of 64 and 65. On

[2] The population between the ages of 50 and 75 in Florida is 2.68 times greater than in North Carolina.

the other hand, there is a decrease in volume with no apparent discontinuity for emergent vascular procedures, fracture-related procedures, or cosmetic surgery between ages 64 and 65 in both states.

METHODS

The models we estimate are of the following form:

$$(1) \qquad Vol_{p,a,s,t} = \beta_p \cdot P_p + \beta_a \cdot A_a + \beta_s \cdot FL + \beta_t \cdot T_t + \gamma_{p,a} \cdot \left(P_p \cdot A_a\right) + \mu \cdot F_{p,a,s,t} + \varepsilon_{p,a,s,t}$$

where *Vol* is the patient volume for procedure *p*, age group *a*, state *s*, and year-quarter *t*. Dependent variables include procedure, age, state, and quarter-year fixed-effects, interaction terms between procedures and age groups and the share of females for each procedure, age, state, year-quarter.[3]

To compare the relative changes in volume across procedure categories we use linear regressions of procedure volumes with robust standard errors. Each regression uses a pair of procedure groups and therefore includes 1,248 observations (2 procedure groups x 2 states x 26 age groups x 12 year-quarter dummies).[4] The main coefficient of interest is $\gamma_{p,65}$, the interaction between the indicator variable for procedure *p* and the indicator for age 65.

RESULTS

The results from estimating equation (1) across different procedure pairs are reported in Tables 1 and 2. Table 1 focuses on comparing the volume of non-urgent procedures (i.e. colonoscopy, hernia, and lens procedures) to cosmetic procedures (first column), emergent vascular (second column), and treatment of acute fractures (third column). The table reports interaction terms between the screening

[3] Due to a high number of missing values, no control for race was included in the analysis.

[4] Similar results were obtained from a fully interacted model using all procedure groups.

colonoscopy indicator and seven age categories (between age 62 and 68). This allows us to study the effect not only at age 65, but also to compare it to three younger and three older age cohorts. We find coefficient estimate for the interaction between non-urgent procedures and age 65 to be positive and statistically significant for all pairs of urgent and non-urgent procedures. On the other hand, for the most part, the coefficient estimate for other procedure-age interactions were negative and not statistically significant, especially for age 64, indicating postponement of care.[5]

Table 2, reports the results from 15 regressions looking across pairs of procedures to elicit the effects of initiation of Medicare benefits. The coefficient estimate for interactions of the age 65 indicator and the procedure indicator are reported along with the baseline effect of both age 65 and the relevant procedure. As expected, when comparing colonoscopy and lens volume, the interaction term suggests a small, positive, not statistically significant effect. On the other hand, when comparing either colonoscopy or lens volume to hernia volume we find a small effect consistent with the notion that there are greater barriers for delaying the treatment of hernia, which is symptomatic and in some cases requires timely intervention. This suggests that lack of insurance induces greater delays for asymptomatic and diagnostic procedures. This finding is consistent with Lichtenberg (2002). All comparisons between non-urgent and urgent procedures yield similar results to the ones reported in Table 1. When comparing cosmetic procedures to either treatment of fracture or vascular procedures, the interaction term is small, positive, and statistically significant, suggesting that even when a procedure is not covered by Medicare, there may be other factors that lead to delayed care, such as leisure.

[5] The nonlinear shape of the continued increase in lens volume is responsible for the persistent positive and significant effects for ages 66, 67 and 68.

DISCUSSION

Our examination of data from Florida and North Carolina finds an abrupt increase in utilization of colonoscopy and lens and cataract procedures at age 65, not observed for any other age threshold between 50 and 75. We find this increase to be attributable almost entirely to the initiation of Medicare benefits at this age. Not surprisingly, a comparable discontinuity does not occur for procedures that are not typically covered by Medicare, such as elective cosmetic surgery, or are required for treatment of a set of life-threatening emergencies or a set of acutely painful conditions.

While we examine a range of procedures, including cataract/lens surgery and gastrointenstinal endoscopy, the two most frequent outpatient procedures, by volume, delivered in the U.S. each year, our findings may not be generalizable to other procedures. Moreover, the comparison procedures we examine here were selected as being representative of procedures likely to differ markedly in terms of urgency and eligibility for Medicare reimbursement.[6]

Our findings have important policy implications. These findings support an argument that uninsurance or underinsurance among adults younger than age 65 may result in potentially harmful delays in receipt of necessary diagnostic and therapeutic procedures. However, our work further argues that taxpayer-funded insurance programs may effectively finance procedures that could have been performed at a younger age, but instead have been delayed until after age 65. We urge further research to evaluate the potential costs of such delays in care on both individual health outcomes and the costs borne by taxpayer-funded healthcare in the U.S.

[6] For example, coronary artery bypass grafting (CABG) for ischemic heart disease, while potentially emergent, may be delayed with temporizing medical therapies; similarly, cosmetic surgery of the face is reimbursed by Medicare when intended for reconstructive purposes following trauma. In both cases the role of insurance may be non-trivial.

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FIGURE 1: Patient Volume by Age, State, and Procedure, 2005-2007

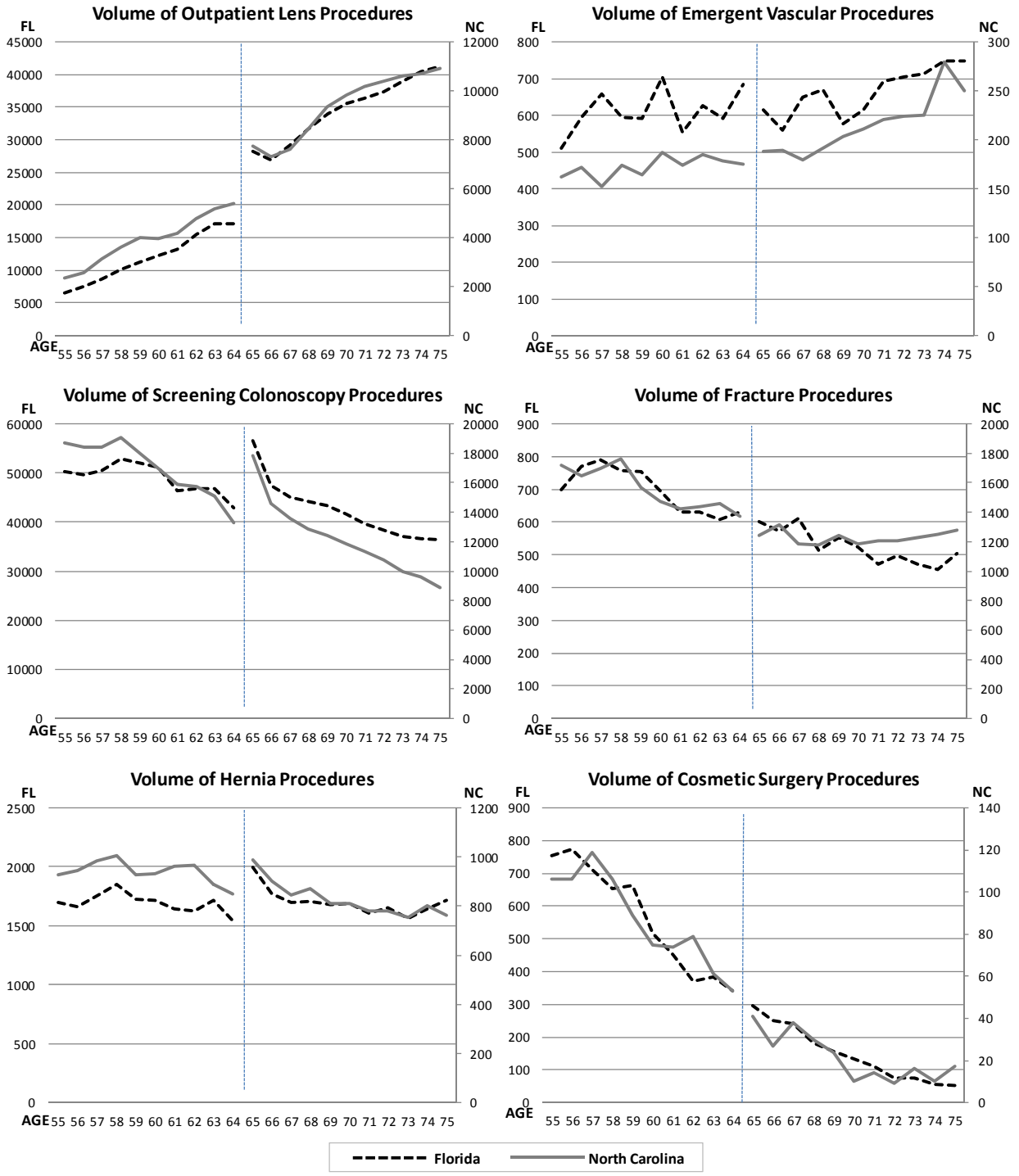

TABLE 1: Interaction Terms between Age Indicators and Colonoscopy Volume by Procedure

		Vs. Cosmetic	Vs. Vascular	Vs. Fracture
Colonoscopy	Age 62 x Colonoscopy	-24.29	-30.61	-205.72*
		(199.53)	(201.69)	(115.65)
	Age 63 x Colonoscopy	-54.76	-59.45	-132.84
		(202.52)	(205.01)	(121.25)
	Age 64 x Colonoscopy	-291.02	-300.53	-357.61***
		(194.14)	(196.33)	(93.95)
	Age 65 x Colonoscopy	**475.99***	**463.59***	**347.20****
		(251.50)	**(253.41)**	**(148.97)**
	Age 66 x Colonoscopy	-43.90	-58.45	-89.54
		(208.56)	(210.26)	(108.47)
	Age 67 x Colonoscopy	-182.41	-198.16	-146.40
		(200.02)	(201.66)	(114.67)
	Age 68 x Colonoscopy	-248.61	-269.24	-222.12*
		(198.95)	(200.01)	(118.57)
	Observations	1248	1248	1248
	R-squared	0.812	0.802	0.930
Hernia	Age 62 x Hernia	7.14**	-2.58	3.37
		(3.57)	(3.77)	(10.38)
	Age 63 x Hernia	8.84**	3.13	3.96
		(3.81)	(4.26)	(11.30)
	Age 64 x Hernia	2.93	-7.18**	-1.84
		(3.66)	(3.36)	(9.97)
	Age 65 x Hernia	**29.50*****	**14.47****	**29.04****
		(4.49)	**(4.64)**	**(11.29)**
	Age 66 x Hernia	20.60***	5.59	14.37
		(4.57)	(4.10)	(11.10)
	Age 67 x Hernia	16.13***	1.98	12.83
		(4.11)	(4.23)	(9.97)
	Age 68 x Hernia	20.56***	-0.28	18.62*
		(3.83)	(3.39)	(10.06)
	Observations	1248	1248	1248
	R-squared	0.900	0.876	0.133
Lens and Cataract	Age 62 x Lens	-153.01*	-160.58**	-217.48***
		(79.42)	(81.21)	(60.61)
	Age 63 x Lens	-71.37	-75.08	-100.02*
		(84.21)	(85.99)	(60.34)
	Age 64 x Lens	-62.97	-70.58	-86.90
		(85.18)	(86.42)	(55.24)
	Age 65 x Lens	**501.79*****	**487.80*****	**456.90*****
		(138.17)	**(140.22)**	**(104.80)**
	Age 66 x Lens	434.99**	421.38**	416.32***
		(134.37)	(136.21)	(100.11)
	Age 67 x Lens	537.49***	525.38***	550.43***
		(147.33)	(148.85)	(114.56)
	Age 68 x Lens	681.35***	657.92***	686.62***
		(158.05)	(159.74)	(124.76)
	Observations	1248	1248	1248
	R-squared	0.637	0.631	0.650

Notes: Data are from 2005-2007 and the sample is restricted to ages 55 to 75. The entries for each model are the coefficient from linear regressions with robust standard errors in parentheses. Regressions include controls for 26 age dummies, procedure, state, and year-quarter fixed effects, age-procedure interactions, and the share of females within each state, procedure, year-quarter, and age groups. * Significant at 10%. ** Significant at 5%. *** Significant at 1%.

TABLE 2: Procedure Volume, as a Function of Variables Shown

		Vs. Hernia	Vs. Lens	Vs. Fracture	Vs. Vascular	Vs. Cosmetic
Colonoscopy	Age 65 x Colonoscopy	372.35**	64.39	393.52**	500.25**	509.79**
		-145.03	-159.37	-147.76	-251.46	-249.62
	Colonoscopy	1470.37***	1544.27***	1436.54***	2543.37***	2578.20***
		-31.67	-44.62	-32.73	-42.34	-41.6
	Age 65	-545.40***	302.24	-572.51***	-681.25**	-704.49***
		-131.38	-203.85	-132.7	-214.09	-210.49
	Observations	1248	1248	1248	1248	1248
	R-squared	0.931	0.734	0.929	0.802	0.812
Hernia	Age 65 x Hernia		-386.05***	26.99**	14.45**	26.45***
			-99.29	-11.19	-4.61	-4.42
	Hernia		-654.05***	20.39***	15.41***	69.63***
			-30.42	-2.13	-0.91	-0.86
	Age 65		854.73***	-17.24**	2.58	-28.93***
			-123.17	-8.13	-2.49	-4.65
	Observations		1248	1248	1248	1248
	R-squared		0.648	0.129	0.875	0.897
Lens and Cataract	Age 65 x Lens			407.22***	435.86**	447.13**
				-102.05	-138.17	-136.06
	Lens			620.23***	999.10***	1035.62***
				-31.72	-31.83	-32.05
	Age 65			441.57***	554.76***	523.72***
				-95.13	-101.49	-101.96
	Observations			1248	1248	1248
	R-squared			0.638	0.621	0.626
Fracture	Age 65 x Fracture				-6.72**	5.38**
					-2.64	-2.58
	Fracture				49.23***	103.58***
					-1.67	-1.66
	Age 65				-3.36	-35.01***
					-3.3	-4.32
	Observations				1248	1248
	R-squared				0.668	0.832
Vascular	Age 65 x Vascular					9.95**
						-3.1
	Vascular					35.23***
						-1.22
	Age 65					-27.46***
						-27.46***
	Observations					1248
	R-squared					0.528

Notes: Data are from 2005-2007 and the sample is restricted to ages 55 to 75. The entries for each model are the coefficient from linear regressions with robust standard errors in parentheses. Regressions include controls for 26 age dummies, procedure, state, and year-quarter fixed effects, age-procedure interactions, and the share of females within each state, procedure, year-quarter, and age groups. * Significant at 10%. ** Significant at 5%. *** Significant at 1%.

Appendix A. CPT and IDC-9 Codes

Procedure	CPT Codes
Fracture Treatment	24620, 24650, 24655, 24670, 24675, 25500, 25505, 25520, 25530, 25535, 25560, 25565, 25600, 25605, 27232, 27502, 27503, 27510, 27240, 27238, 27530, 27532, 27750, 27752, 27780, 27781, 27786, 27788, 27825, 27538, 27762, 27810, 27818, 27830, 27831, 28400, 28405, 28435, 28450, 28455, 28470, 28475, 25611, 25651, 25650, 27235, 28406, 28436, 28456, 28476, 24635, 24665, 24666, 24685, 25515, 25526, 25545, 25620, 27254, 27511, 27513, 27514, 27535, 27536, 27540, 27784, 27792, 27829, 28415, 28420, 28445, 28465, 28485, 24586, 24587, 24635, 24665, 24666, 24685, 25515, 25525, 25526, 25545, 25574, 25620, 27236, 27244, 27245, 27246, 27248, 27254, 27506, 27507, 27511, 27513, 27514, 27524, 27535, 27536, 27540, 27758, 27759, 27784, 27792, 27826, 27827, 27828, 27829, 29850, 29851, 29855, 29856, 27814, 27823, 27766, 27822, 28415, 28420, 28445, 28465, 28485, 11010, 11011, 11012, 24600, 24605, 24620, 25660, 25671, 25675, 25680, 25690, 26650, 27250, 27252, 27256, 27257, 27265, 27266, 27222, 27550, 27552, 27560, 27562, 27840, 27842, 28576, 28540, 28545, 28546, 28570, 28575, 28576, 24586, 24587, 24615, 24635, 25526, 25670, 25676, 25685, 25695, 27147, 27156, 27253, 27254, 27258, 27259, 27556, 27557, 27558, 27566, 27846, 27848
Hernia Repair	49505, 49507, 49520, 49521, 49525, 49650, 49651, 49550, 49553, 49555, 49557
Lens and cataracts	65920, 66820, 66821, 66825, 66830, 66840, 66850, 66852, 66920, 66930, 66940, 66982, 66983, 66984, 66985, 66986
Screening colonoscopy	0066T, 0067T, 44388, 44389, 44391, 44392, 44393, 44394, 44397, 45355, 45378, 45380, 45381, 45382, 45383, 45384, 45385, 45386, 45387, 45388, 45389, 45390, 45391, 45392, 45500, 45501, 45502, 45503, 45504, 45505
Selected cosmetic procedures: Breast augmentation Panniculectomy Liposuction	 19316, 19324, 19325 15831, 15830, 15847 15876, 15877, 15878, 15879

Procedure	ICD-9 Codes
Emergent vascular care: Aortic aneurysm and dissection Intracranial hemorrhage	 441.1, 441.3, 441.5, 441.6 430, 431, 432.9
Fracture Treatment	79.02, 79.05, 79.06, 79.07, 79.12, 79.15, 79.16, 79.17, 79.22, 79.25, 79.26, 79.27, 79.32, 79.35, 79.36, 79.37, 79.62, 79.65, 79.66, 79.67, 79.68, 79.72, 79.73, 79.75, 79.76, 79.77, 79.78, 79.82, 79.83, 79.85, 79.86, 79.87
Hernia Repair	53.00, 53.01, 53.02, 53.03, 53.04, 53.05, 53.10, 53.11, 53.12, 53.13, 53.14, 53.15, 53.16, 53.17, 53.21, 53.29, 53.31, 53.39