AMI COHORT—UTILIZATION RESULTS

Comparison of Use of Procedures and Length of Stay in VA Patients with AMI[1]

National Trends in Utilization in VA Patients with AMI

National trends in utilization over time. Adjusted use of procedures and average lengths of stay are shown in Table B1. Since 1994 the percentage of patients with an AMI who had a cardiac catheterization or CABG within 30 days has remained essentially constant, while the percent receiving PCI (including those with stents) increased. Length of stay has decreased.

Table B1
Adjusted Procedure Utilization and Length of Stay for VA Patients with an AMI, all cohort years

	Cohort				Statistically[a] Significant Trend?
	FY 1994 (n=8677)	FY 1997 (n=8135)	FY 1998 (n=8353)	FY 1999 (n=8664)	
Catheterization within 30 days (%)	45.4	47.9	48.7	49.6	No
PCI within 30 days (%)	11.6	15.3	16.8	18.4	Yes
% of PCI procedures using stents	NA	56.2	72.0	83.7	Yes
CABG within 30 days (%)	8.2	8.0	8.0	8.0	No
Revascularization (either PCI or CABG) within 30 days (%)	20.0	24.1	25.7	27.3	Yes
Length of stay (Days)	13.8	11.6	10.9	10.2	Yes

[a] at the 10% level

Adjusted utilization by demographic subgroups. Odds ratios (catheterization, PCI, percent of PCI with stent, CABG, revascularization) and absolute differences (length of stay) comparing male to female veterans and comparing African American and Hispanic veterans to

[1] All of the data presented in this section represent *adjusted* values to account for possible differences in disease severity across cohort years, demographic subgroups, and VISNs. However, in Tables AB1 and AB2 of the Appendix, unadjusted values are presented for completeness.

white veterans[2] are reported in Table B2. As indicated earlier, these values were obtained from hierarchical regression models. Pooling data across all fiscal years (1994, 1997-1999), male veterans were significantly more likely to undergo catheterization and CABG within 30 days compared to female veterans. African Americans were significantly less likely to undergo all procedures (catheterization, PCI, CABG) and had shorter lengths of stay compared to white patients. Among patients undergoing PCI, African American veterans were also less likely to receive a stent compared to white veterans. Hispanic patients were significantly less likely to undergo catheterization, CABG[3], and revascularization (PCI or CABG) procedures within 30 days and had shorter lengths of stay compared to white patients.

[2] Race data were not available for approximately 2 to 4% of the veterans in each cohort and there were a small number of veterans representing other racial groups. We included these patients in the regression models, but because of difficulty in the interpretation of results for patients with missing race data and small numbers of patients in other racial categories, we only present comparisons of white, African American, and Hispanic patients.
[3] Statistically significant at the 10% but not the 5% level.

Table B2
Adjusted Odds-Ratios and Absolute Differences Comparing Utilization in Demographic Subgroups (Combining data across cohorts)

	Gender	Race	
	Males vs Females	African American vs White	Hispanic vs White
Catheterization within 30 Days			
Odds ratio	**1.25**	**0.78**	**0.88**
90% CI	**(1.06, 1.46)**	**(0.74, 0.83)**	**(0.80,0.98)**
PCI within 30 Days			
Odds ratio	0.93	**0.77**	0.92
90% CI	(0.76, 1.14)	**(0.71, 0.83)**	(0.80,1.05)
% of PCI Procedures with stent			
Odds ratio	1.09	**0.79**	1.12
90% CI	(0.68, 1.70)	**(0.65, 0.95)**	(0.82, 1.56)
CABG within 30 Days			
Odds ratio	**2.06**	**0.64**	**0.84**[a]
90% CI	**(1.46, 2.94)**	**(0.56, 0.72)**	**(0.71, 1.00)**
Revascularization within 30 Days			
Odds ratio	1.19	**0.70**	**0.86**
90% CI	(0.99, 1.43)	**(0.65, 0.75)**	**(0.76, 0.96)**
Length of Stay			
Difference	0.39	**-0.43**	**-0.66**
90% CI	(-0.42, 1.85)	**(-0.73, -0.13)**	**(-1.16, -0.17)**

Bolded numbers represent significant differences at a 10% level
[a] Not significant at 5% confidence level

Variation in Utilization in VA Patients with AMI Across Networks

There was substantive variation across networks (VISNs) in use of procedures and lengths of stay (Table B3). For example, the percentage of patients undergoing catheterization within 30 days of their AMI differed by 33 percentage points—from a low of 32% to a high of 65%. VISN 5 had the lowest percentage of patients undergoing catheterization and CABG within 30 days and the lowest percentage of PCI patients receiving stents. VISN 2 had the lowest percentage of patients undergoing PCI and the lowest percentage of patients undergoing any revascularization procedure within 30 days of their AMI. Specific data on each utilization variable is described next.

Table B3
Variation in Procedure Utilization and Length of Stay Across VISNs: 1999

	National Average (% or days)	Lowest VISN		Highest VISN		Difference (% or days)
		VISN	Utilization (% or days)	VISN	Utilization (% or days)	
Catheterization within 30 days (%)	49.6	**5**	**31.7**	**7**	**64.5**	32.8
PCI within 30 days (%)	18.4	**2**	**7.5**	**19**	**29.4**	21.9
% of PCI procedures using stents	83.7	**5**	**43.2**	**13**	**94.4**	51.2
CABG within 30 days (%)	8.0	**5**	**4.3**	**1**	**12.1**	7.8
Revascularization (either PCI or CABG) within 30 days (%)	27.3	**2**	**12.9**	**19**	**39.1**	26.2
Length of stay (Days)	10.2	**15**	**8.5**	**3**	**12.1**	3.6

Bolded numbers represent VISNs with significantly lower or higher utilization of procedures or length stay compared to the national average at a 10% level.

Adjusted receipt of catheterization within 30 days by VISN. In 1999 about 50% of the AMI cohort had a cardiac catheterization within 30 days of their AMI; this is represented by the solid line in Figure B1a. Receipt of catheterization ranged from a low of about 32% in VISN 5 to a high of about 65% in VISN 7 (Figure B1a). VISNs with higher use than average were VISNs 6, 7, 10, 11, 12, 14, 18, 19 and 22 (the 90% confidence interval associated with point estimate for each of these VISNs does not cross the solid "average" line in Figure B1a). VISNs with lower use than average were VISNs 2, 4, 5, 8, 17 and 21 (point estimates and 90% confidence intervals are below the solid line in Figure B1a). Figure B1b displays the estimated rate of change per year in the percentage of patients with AMI who received catheterization within 30 days (on the log-odds scale). The solid line represents no change in the use of catheterization from FY 1994 to 1999. Over the time period FY 1994 to 1999, receipt of catheterization within 30 days increased in VISNs 1, 6, 7, 11, 13, 14, and 18 (the point estimate and 90% confidence limits for these VISNS are above zero), and decreased in VISN 5 (the point estimates and 90% confidence limits are below zero). Time trends by VISN are shown in the Appendix (Figure AB1).

Adjusted receipt of CABG within 30 days by VISN (Figure B2). In 1999 about 8% of the AMI cohort had a coronary artery bypass graft (CABG) within 30 days of their AMI. Receipt of CABG ranged from a low of about 4% in VISN 5 to a high of about 12% in VISN 10. VISNs with higher use than average were VISNs 1, 6, 7, 10, 18, 20, 21, and 22. VISNs with lower use than average were 2, 5, 15, 16, and 17. Over the time period 1994 to 1999, receipt of CABG remained relatively stable, increasing over time only in VISN 4 and decreasing in time only in VISNs 12 and 15. Time trends by VISN are shown in the Appendix (Figure AB2).

Adjusted receipt of PCI within 30-days by VISN (Figure B3). In 1999 about 18% of the AMI cohort had PCI within 30 days of their AMI, including the first day (i.e., primary PCI). Receipt of PCI ranged from a low of about 8% in VISN 2 to a high of about 29% in VISN 19. VISNs with higher use than average were VISNs 7, 11, 12,13, 15, 16, 18, and 19. VISNs with lower use than average were 2, 4, 5, 8, 20, and 21. Over the time period 1994 to 1999, receipt of PCI within 30 days increased in most of the VISNs; receipt of PCI did not increase over time only in VISNs 2, 4, 5,10, 20, and 22. Time trends by VISN are shown in the Appendix (Figure AB3).

Adjusted percent of PCIs performed with stents by VISN (Figure B4). In 1999 about 84% of the PCI procedures performed within 30 days of the AMI were performed *with a stent*. These percentages ranged from a low of about 43% in VISN 5 to a high of about 94% in VISN 13. VISNs with higher use than average were VISNs 3, 11, 12 and 13. VISNs with lower use than average were 4, 5, 15, 17, and 20. Over the time period 1997 to 1999, the percentage of PCIs performed with a stent increased in nearly *all* VISNs, except 5. Time trends by VISN are shown in the Appendix (Figure AB4).

Adjusted receipt of revascularization (CABG and/or PCI) within 30 days by VISN (Figure B5). In 1999 about 27% of the AMI cohort had a revascularization procedure (CABG and/or PCI) within 30 days of their AMI. Receipt of a revascularization procedure ranged from a low of about 13% in VISN 2 to a high of about 39% in VISN 19. VISNs with higher use than average were VISNs 1, 7, 10, 11, 12, 13, 18, and 19. VISNs with lower use than average were 2, 3, 4, 5, 8, 17, and 21. Over the time period 1994 to 1999, receipt of a revascularization procedure within 30 days increased in most VISNs; only in VISNs 2, 5, 12, 15, 17 and 20 did the percentage of patients undergoing revascularization *not* increase. Time trends by VISN are shown in the Appendix (Figure AB5).

Adjusted length of stay (LOS) by VISN (Figure B6). In 1999 the average length of stay was 10 days. Lengths of stay were higher than average in VISNs 1, 3, 6, and 7 and lower than average in VISNs 11, 13, 15 and 20. Over time, the average length of stay decreased in all VISNs. Time trends by VISN are shown in the Appendix (Figure AB6).

Time trends for utilization by VISN (Appendix B, Figures AB1-AB6). In each graph the ordinate represents the indicated measure (in percent or number of days) and the abscissa the year. The solid line represents the national trend for all VISNs over this time period; as indicated earlier, this line was obtained from hierarchical regression models. The "x" values represent the unadjusted value for the variable in question and the "O" values represent the estimates obtained from the hierarchical analysis. 90% confidence limits are placed around each point. The dotted lines represent the trends over time for each individual VISN. As with the national trend line, this line was obtained from a hierarchical regression model.

Figure B1a

Adjusted 30 Day Catherization Rates, 1999

Rates by VISN

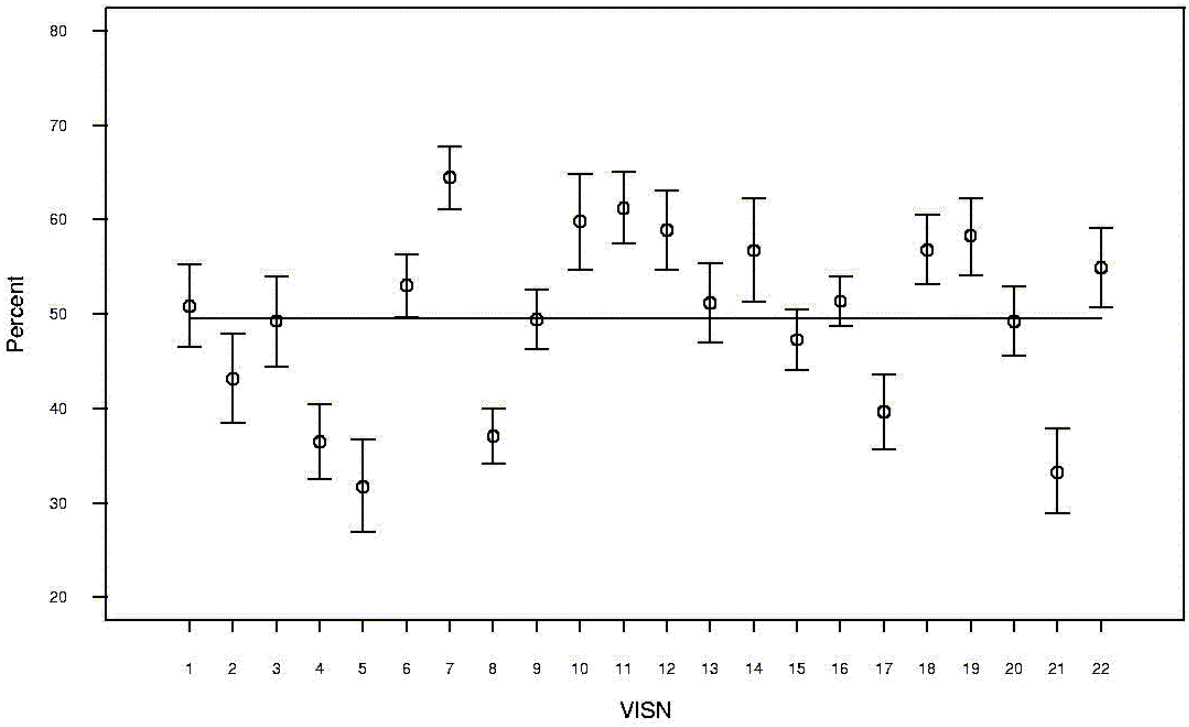


Figure B1b

Time Trend, Adjusted 30 Day Catherization Rates, 1994 - 1999, by VISN

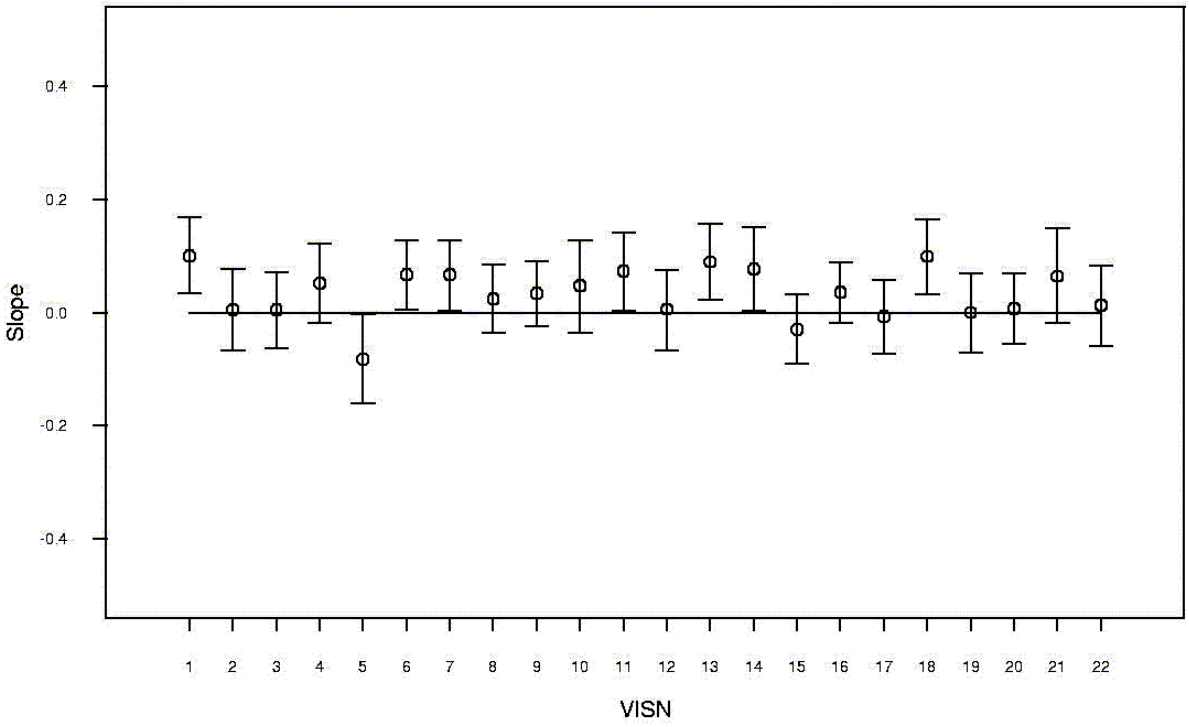


Figure B2a

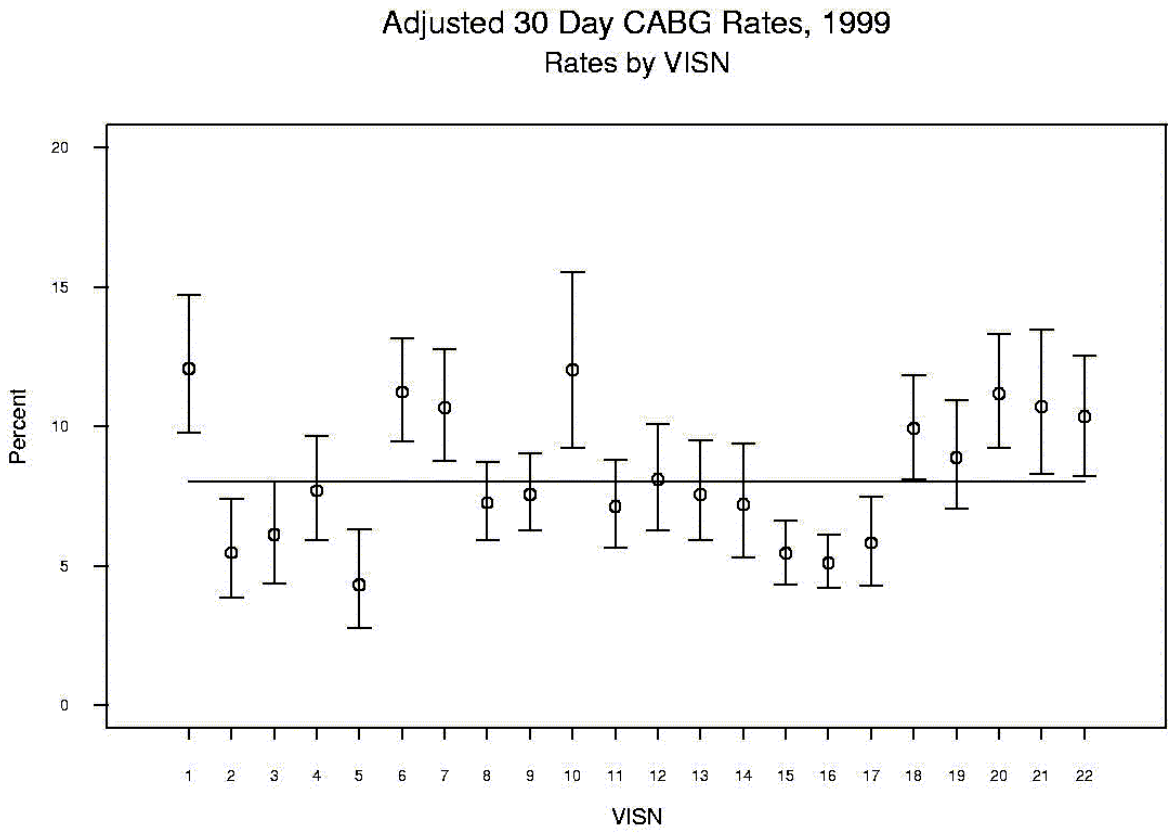


Figure B2b

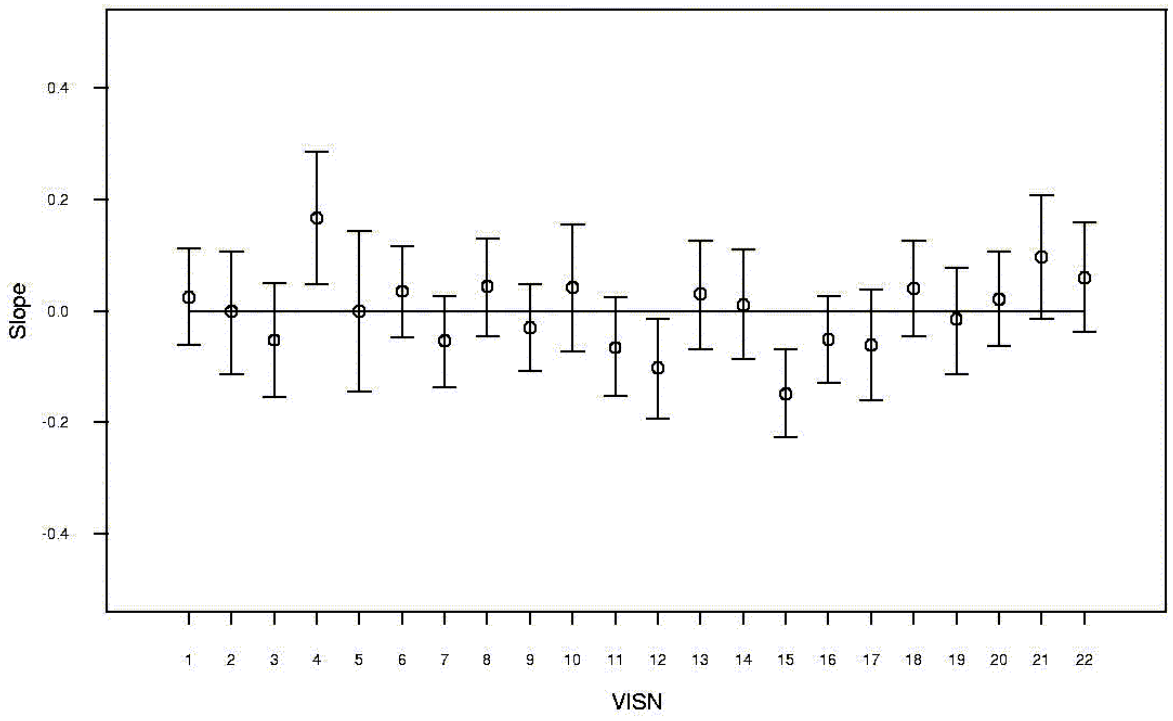


Figure B3a

Adjusted 30 Day PCI Rates, 1999

Rates by VISN

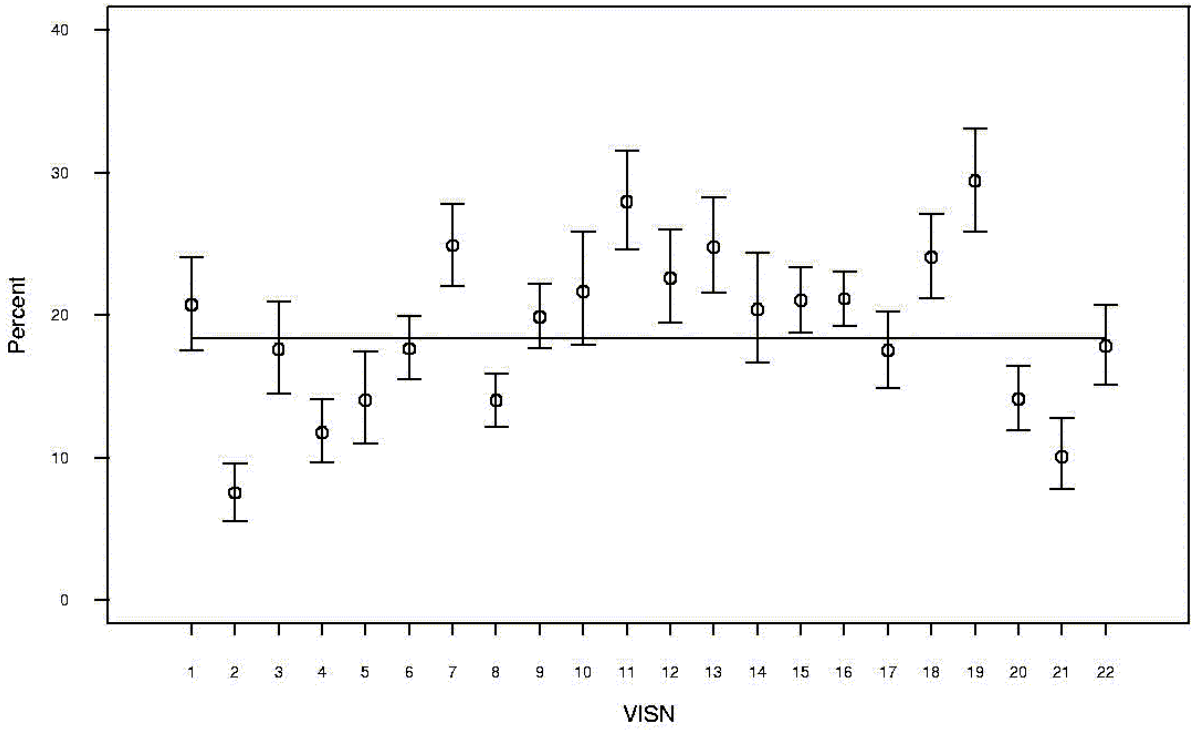


Figure B3b

Time Trend, Adjusted 30 Day PCI Rates, 1994 - 1999, by VISN

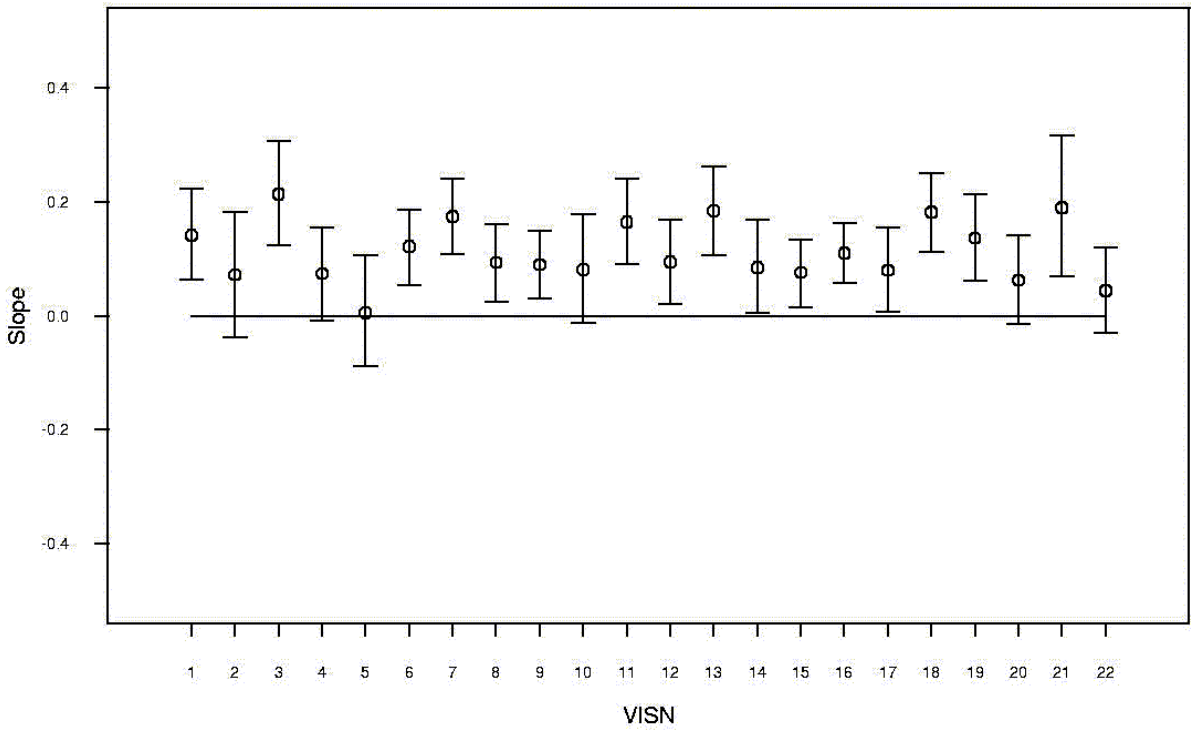


Figure B4a

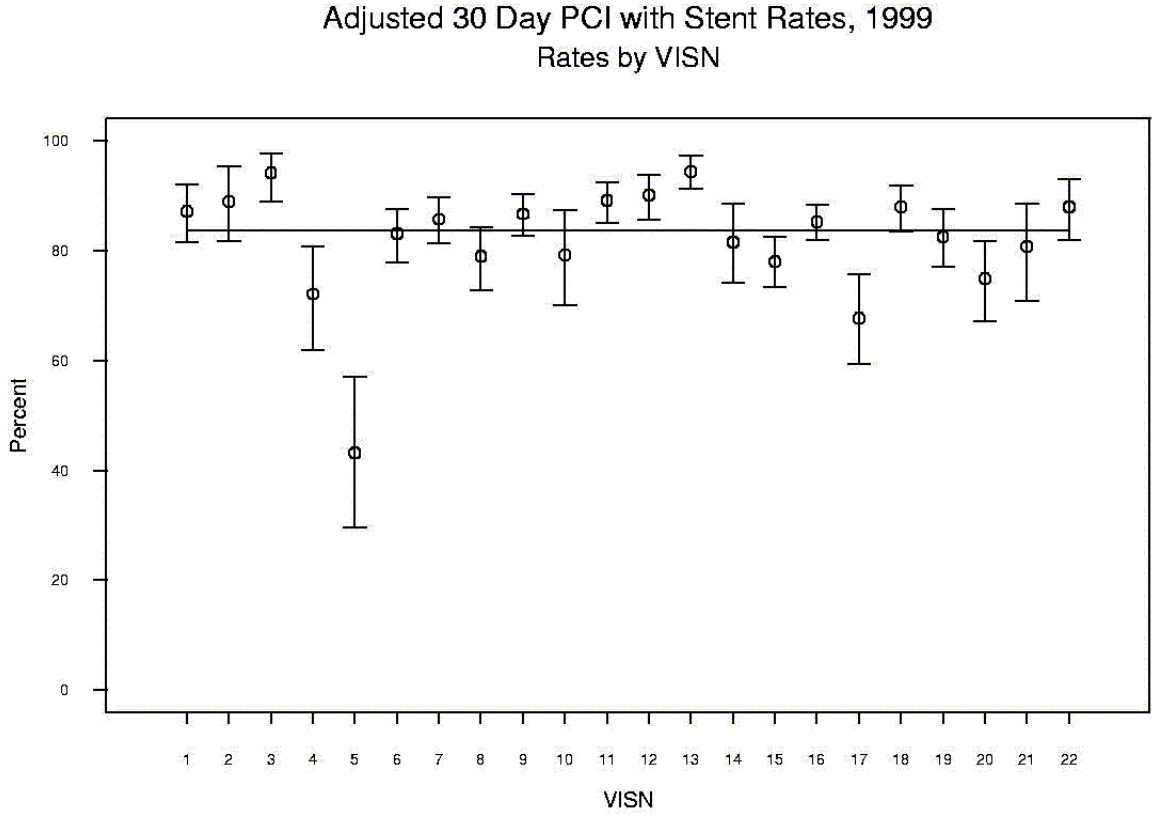


Figure B4b

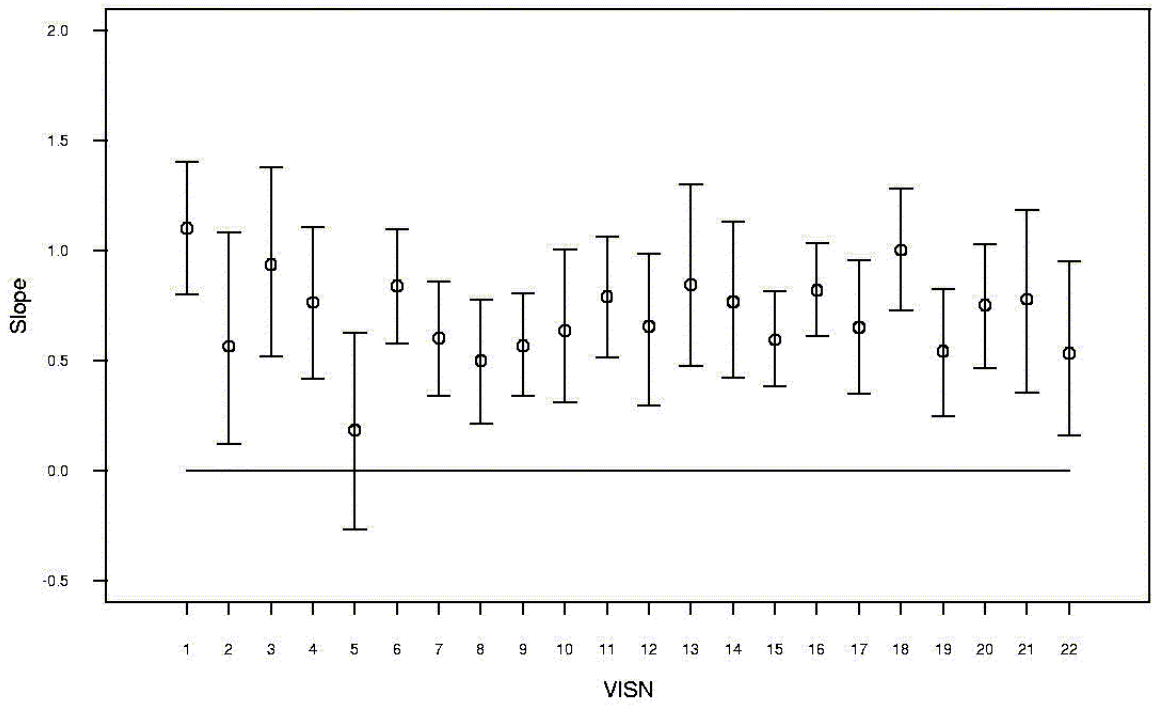


Figure B5a
Adjusted 30 Day Revaşcularzation Rates, 1999
Rates by VISN

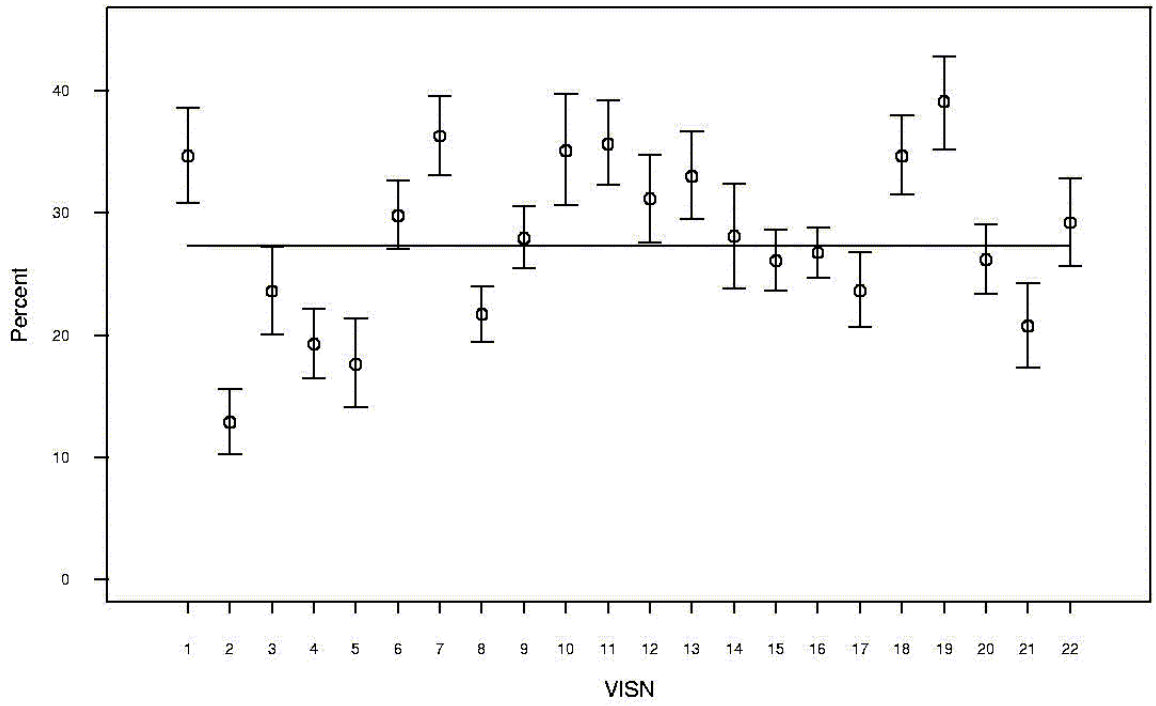


Figure B5b
Time Trend, Adjusted 30 Day Revascularzation Rates, 1994 - 1999, by VISN

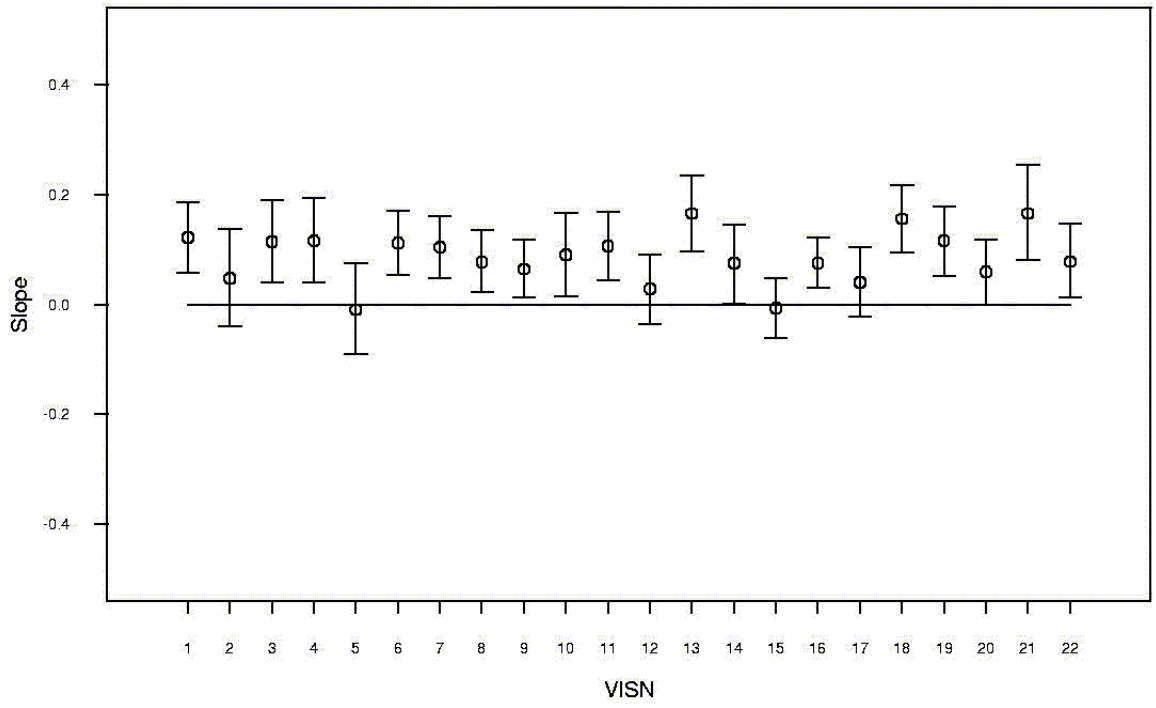


Figure B6a
Adjusted Length of Stay, 1999
Days by VISN

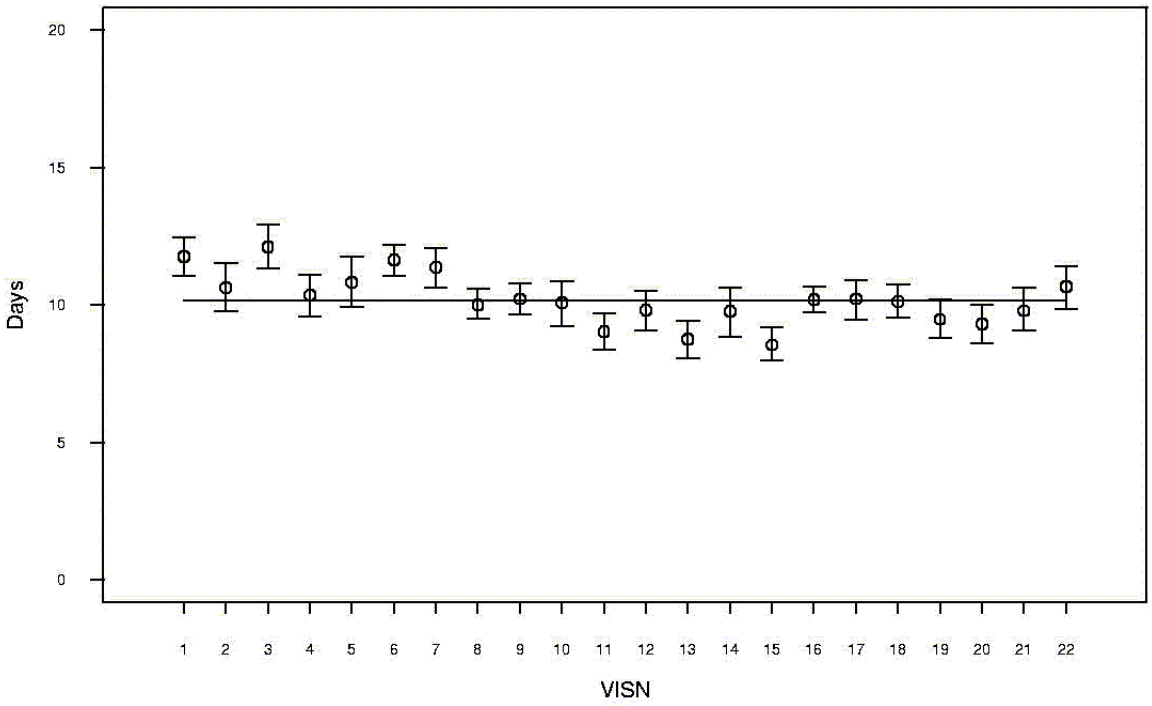
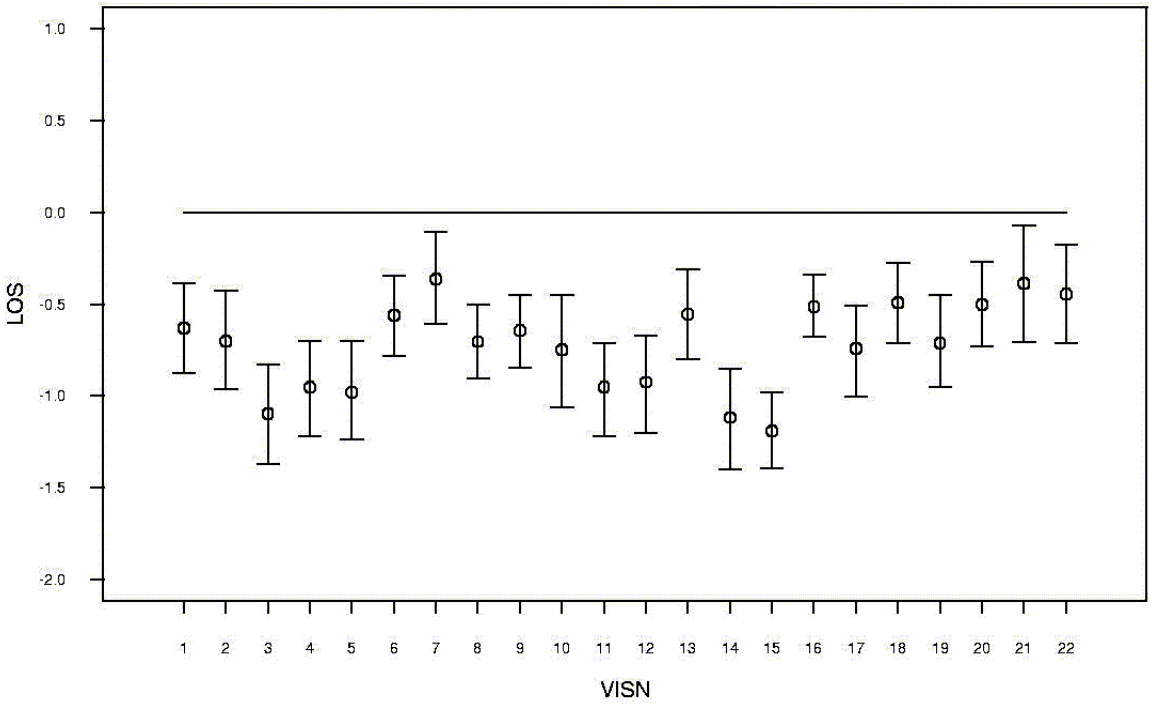


Figure B6b
Time Trend, Adjusted Length of Stay, 1994 - 1999, by VISN



Comparison of Procedure Rates and Length of Stay for VA-Medicare Matched Cohorts

National Trends in Utilization in the Matched Cohorts

Utilization rates for catheterization, CABG, PCI and revascularization within 30 days were all significantly higher for Medicare patients with an AMI than for VA patients for all three matched cohorts (FY 1997, 1998, 1999), (Table B4), (P< 0.10). The percentage of PCIs performed with stents was the same in the two groups in 1997 and 1998, but lower among VA patients in 1998.

Table B4
Utilization in Matched Cohorts: Males age 65 and older, 1997-1999

	FY 1997			FY 1998			FY 1999		
	VA (n=3992)	MED (n=3992)	p-value	VA (n=4277)	MED (n=4277)	p-value	VA (n=4502)	MED (n=4502)	p-value
Catheterization w/in 30 days (%)	**40.6**	**62.3**	**<.001**	**38.9**	**63.4**	**<.001**	**40.0**	**63.1**	**<.001**
CABG w/in 30 days (%)	**9.1**	**19.2**	**<.001**	**7.9**	**18.4**	**<.001**	**7.6**	**17.7**	**<.001**
PCI w/in 30 days (%)	**12.8**	**26.0**	**<.001**	**13.1**	**28.9**	**<.001**	**14.5**	**30.3**	**<.001**
Revascularization w/in 30 days (%)	**21.4**	**44.1**	**<.001**	**20.7**	**46.0**	**<.001**	**22.0**	**46.8**	**<.001**
% of PCI procedures using stents	54.3 (n=510)	53.6 (n=1038)	0.78	**69.6 (n=562)**	**76.1 (n=1239)**	**0.004**	82.9 (n=655)	85.2 (n=1365)	0.19
Length of stay (Days)	**11.9**	**9.3**	**<.001**	**11.2**	**9.0**	**<.001**	**11.1**	**8.8**	**<.001**

Bolded numbers represent significant differences at a 10% level

Within VISN Comparisons Between Elderly VA and Medicare Patients

Within service networks, use of procedures for elderly VA patients was generally lower than for matched Medicare patients (Figures B7-B12). Often, but not always, these differences were statistically significant. For example, the percentage of VA patients undergoing catheterization within 30 days was significantly lower compared to matched Medicare patients at all three time points in VISNs 4, 5, 6, 8, 9, 13, 15, 16, 17, 18, 19, 20 and 21 (Figure B7). In addition, the percentage of VA patients undergoing any revascularization procedure was significantly lower compared to matched Medicare patients at all three time points in VISNs 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 15, 16, 17, 18, 19, 20, 21, and 22 (Figure B11). There was no VISN in which the percentage of VA patients undergoing catheterization, CABG, PCI, or any revascularization procedure was significantly higher at any time point compared to matched Medicare patients. Within service networks, the percentage of PCIs performed with stents in VA patients was the same as that of Medicare patients, with the exception of VISNs 5 in which the percentage of PCIs performed with stents was significantly lower in VA patients compared to matched Medicare patients in FY 1998 and 1999 (Figure B10).

Figure B7

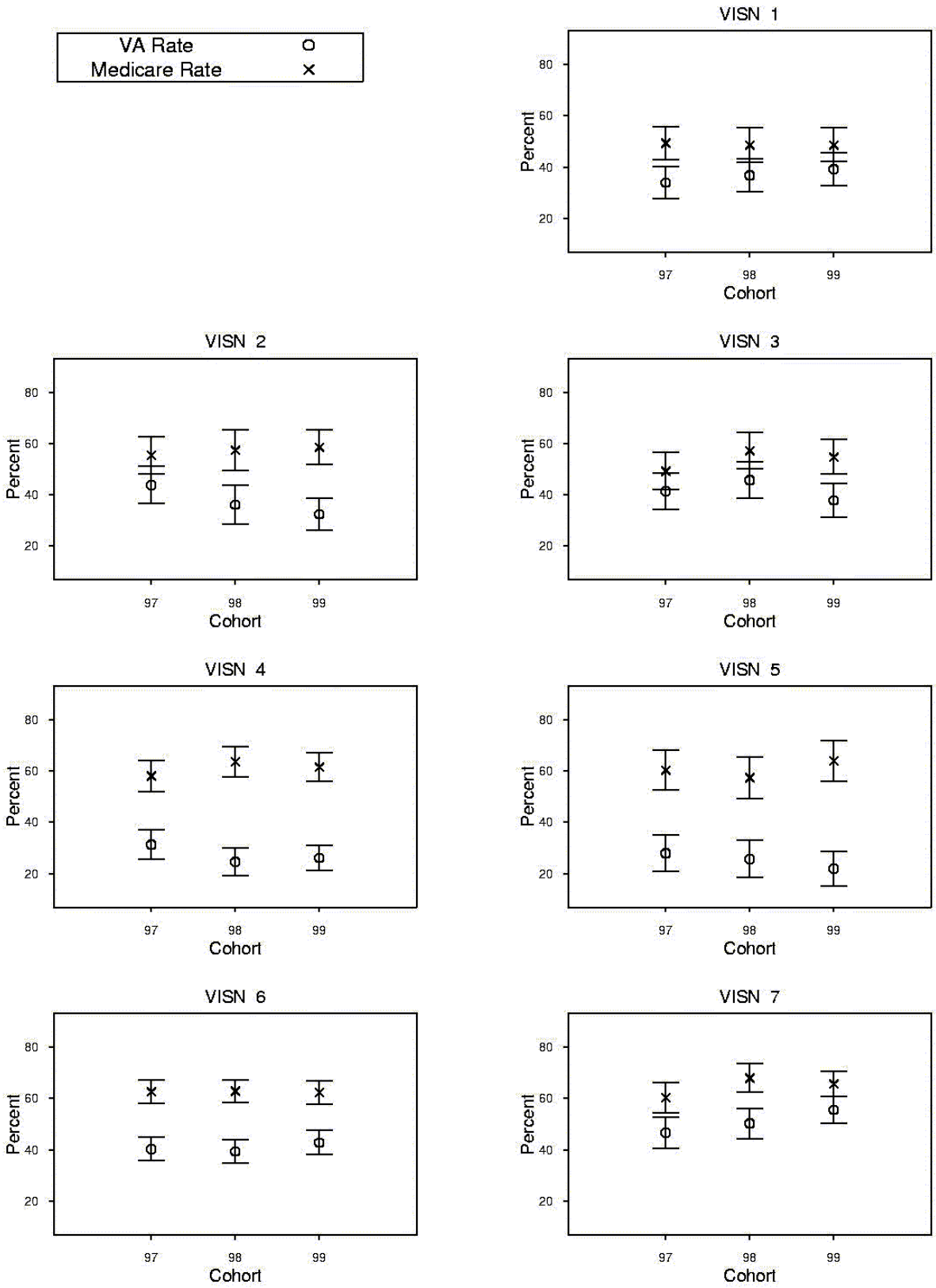

30 Day Catherization Rates, Matched AMI Cohort
VA Rate
Medicare Rate
VISN 1
VISN 2
VISN 3
VISN 4
VISN 5
VISN 6
VISN 7
Percent
Cohort
97
98
99
20
40
60
80

Figure B7

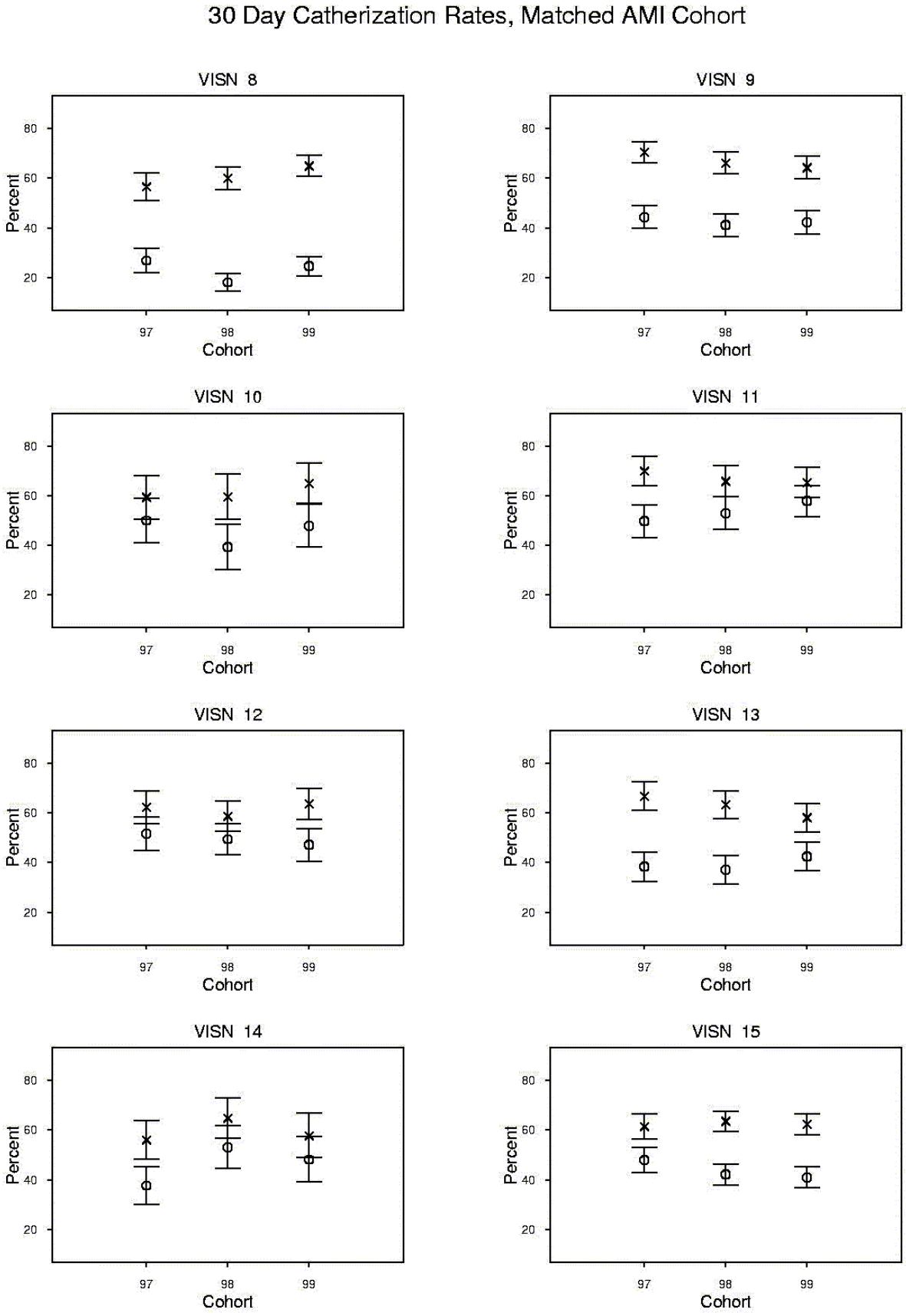

30 Day Catherization Rates, Matched AMI Cohort
VISN 8
VISN 9
VISN 10
VISN 11
VISN 12
VISN 13
VISN 14
VISN 15
Percent
80
60
40
20
97
98
99
Cohort

Figure B7

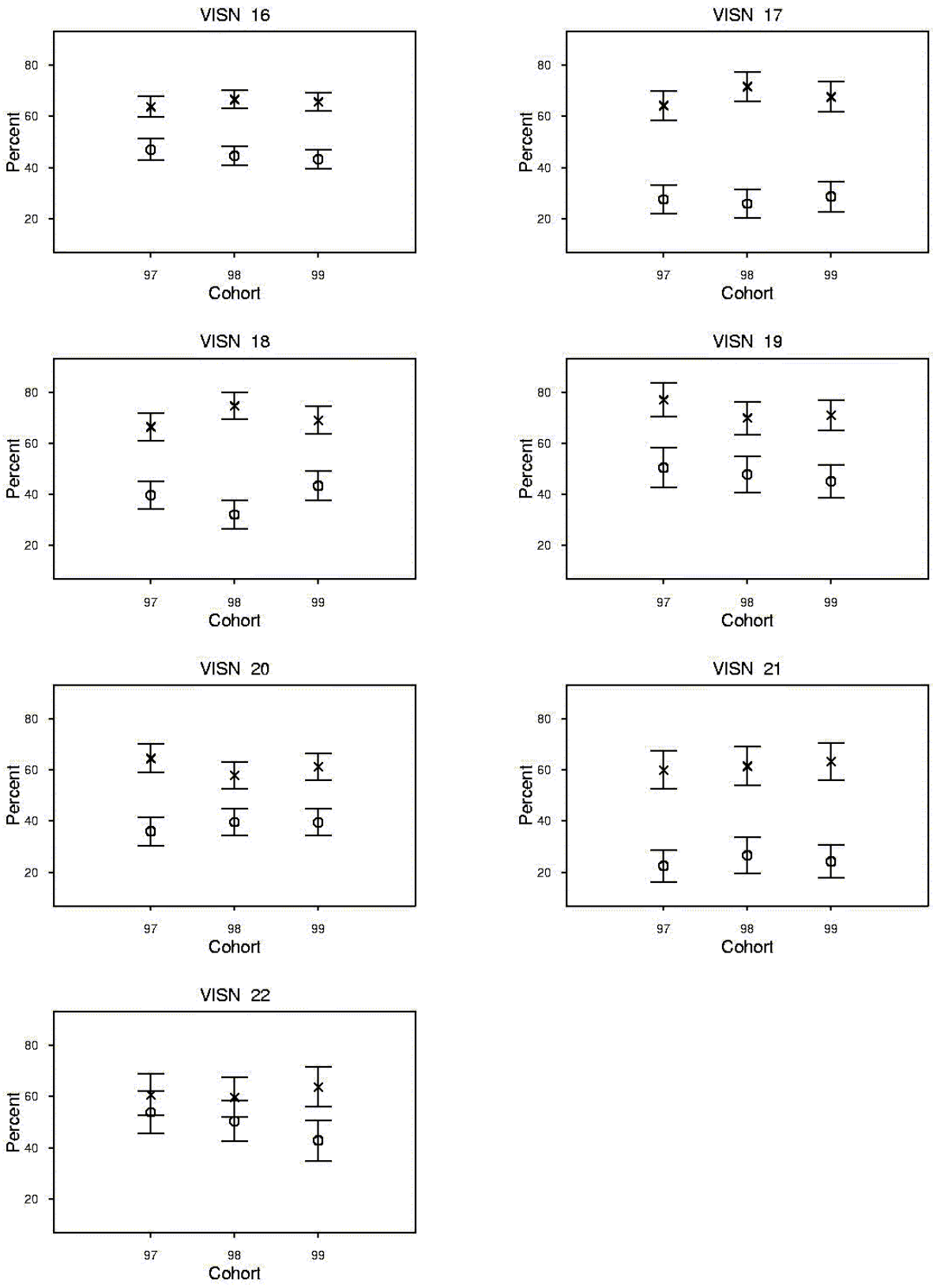

30 Day Catherization Rates, Matched AMI Cohort
VISN 16
VISN 17
VISN 18
VISN 19
VISN 20
VISN 21
VISN 22
Percent
80
60
40
20
97
98
99
Cohort

Figure B8

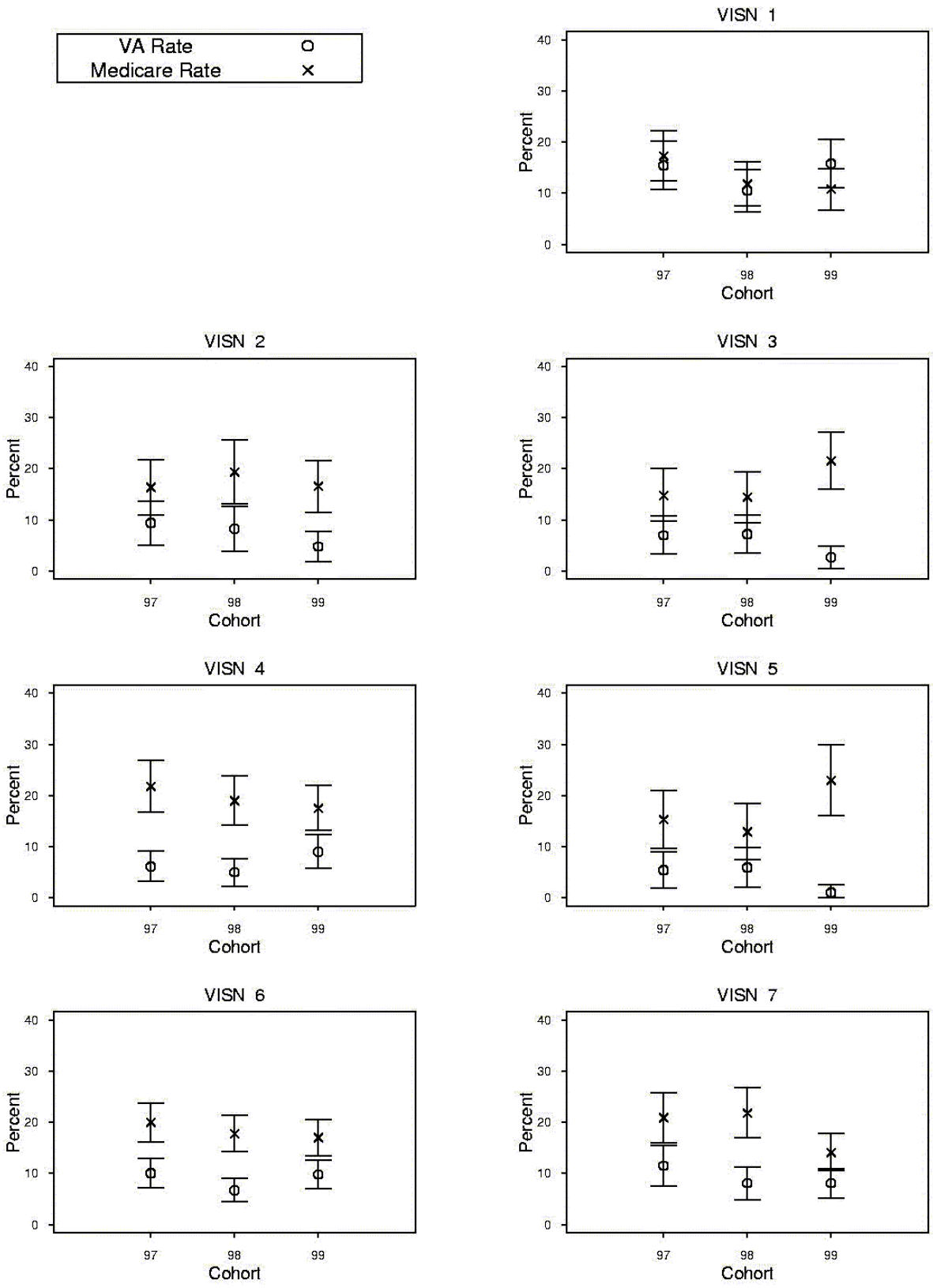

30 Day CABG Rates, Matched AMI Cohort
VA Rate
Medicare Rate
VISN 1
VISN 2
VISN 3
VISN 4
VISN 5
VISN 6
VISN 7
Percent
Cohort
0
10
20
30
40
97
98
99

Figure B8

30 Day CABG Rates, Matched AMI Cohort

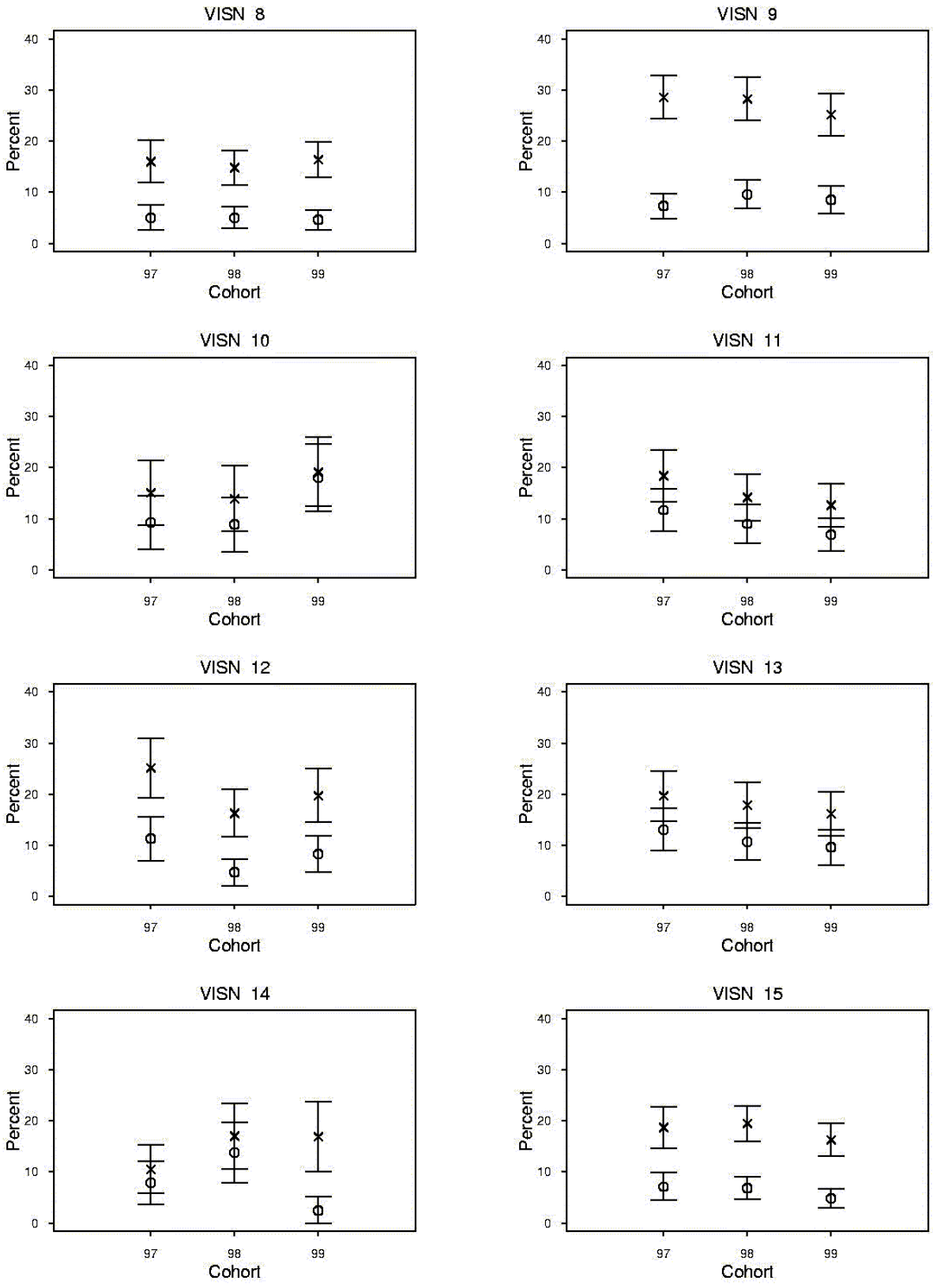


Figure B8

30 Day CABG Rates, Matched AMI Cohort

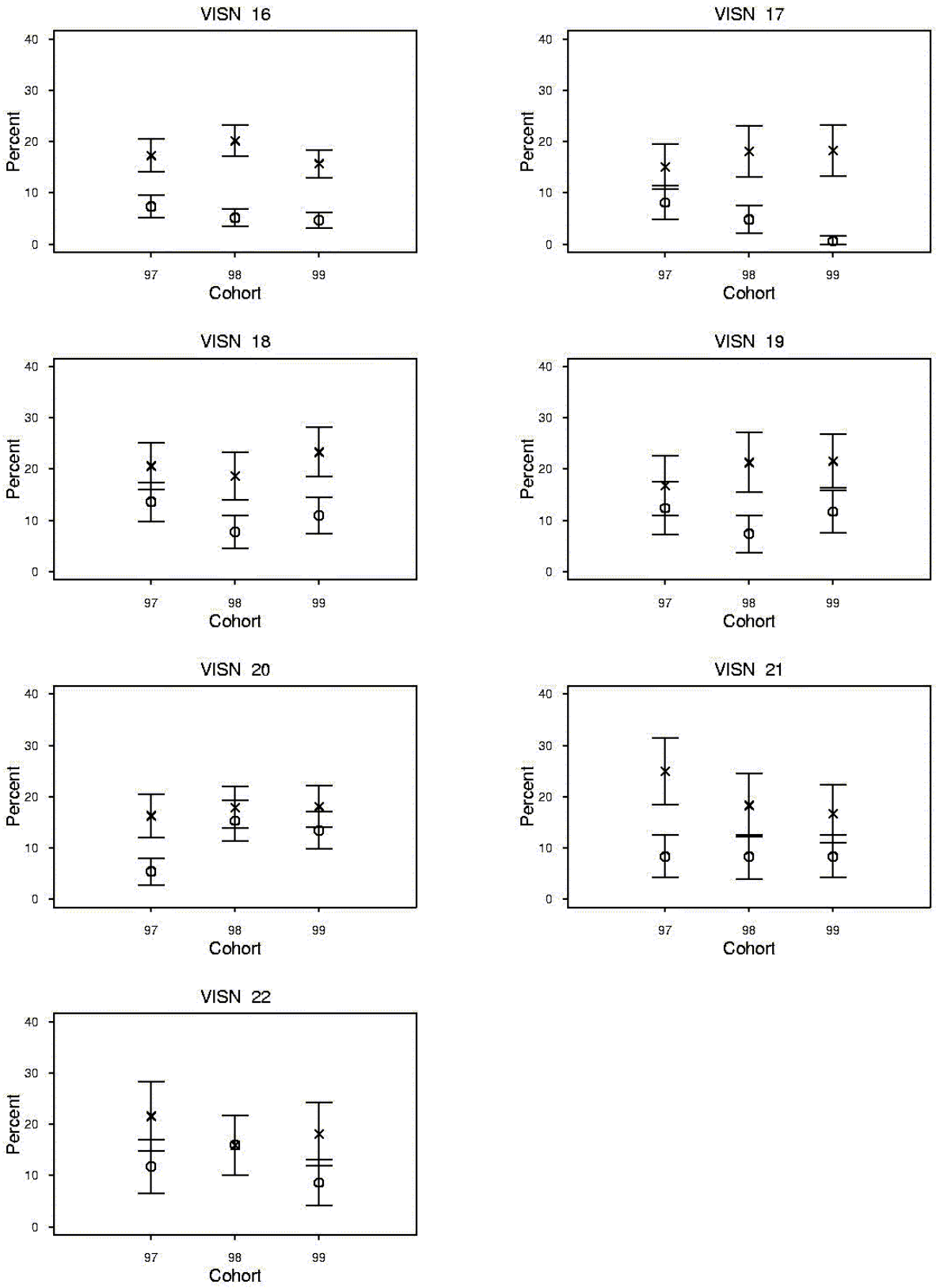


Figure B9

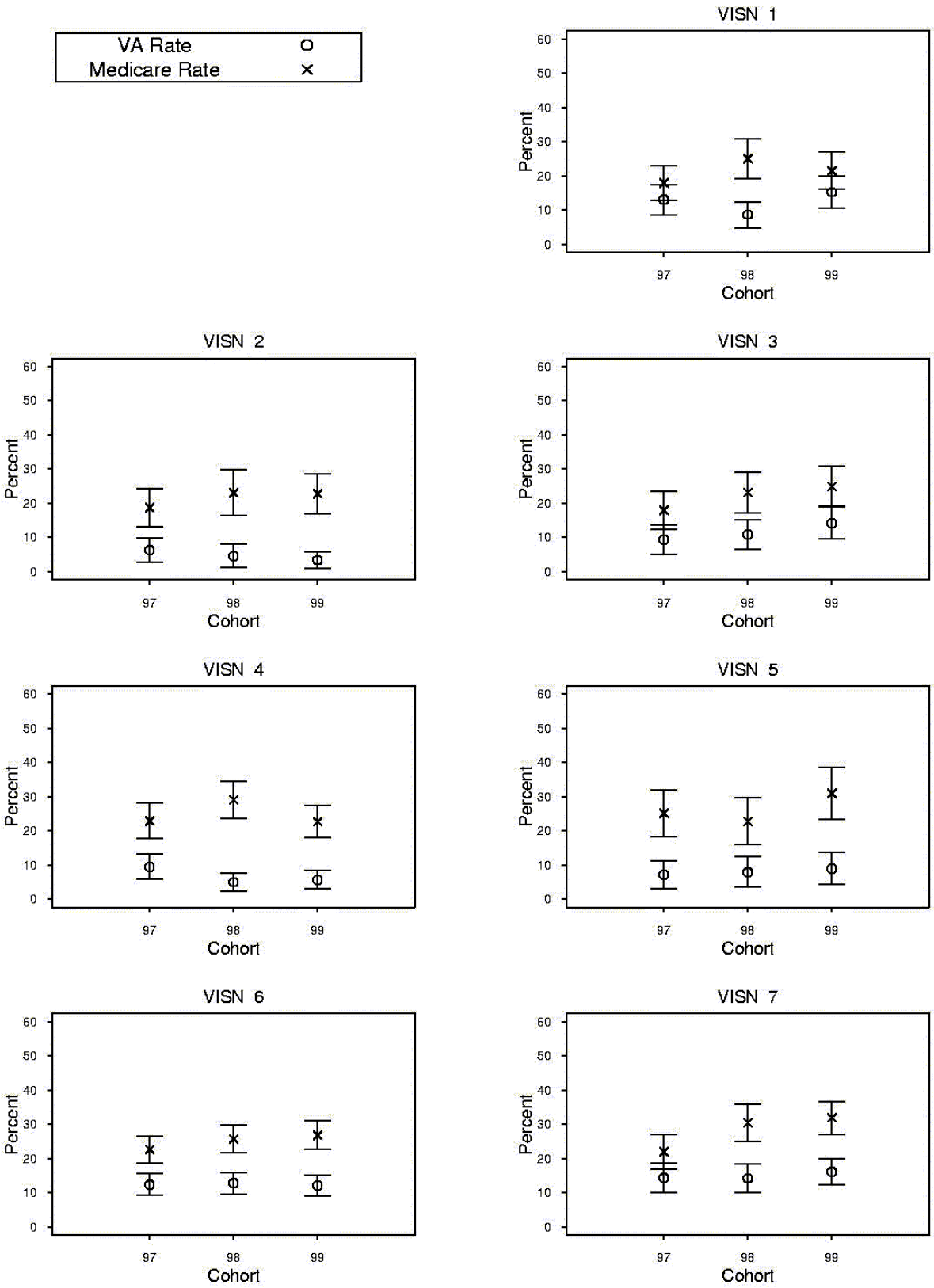

30 Day PCI Rates, Matched AMI Cohort
VA Rate
Medicare Rate
VISN 1
VISN 2
VISN 3
VISN 4
VISN 5
VISN 6
VISN 7
Percent
Cohort
0
10
20
30
40
50
60
97
98
99

Figure B9

30 Day PCI Rates, Matched AMI Cohort

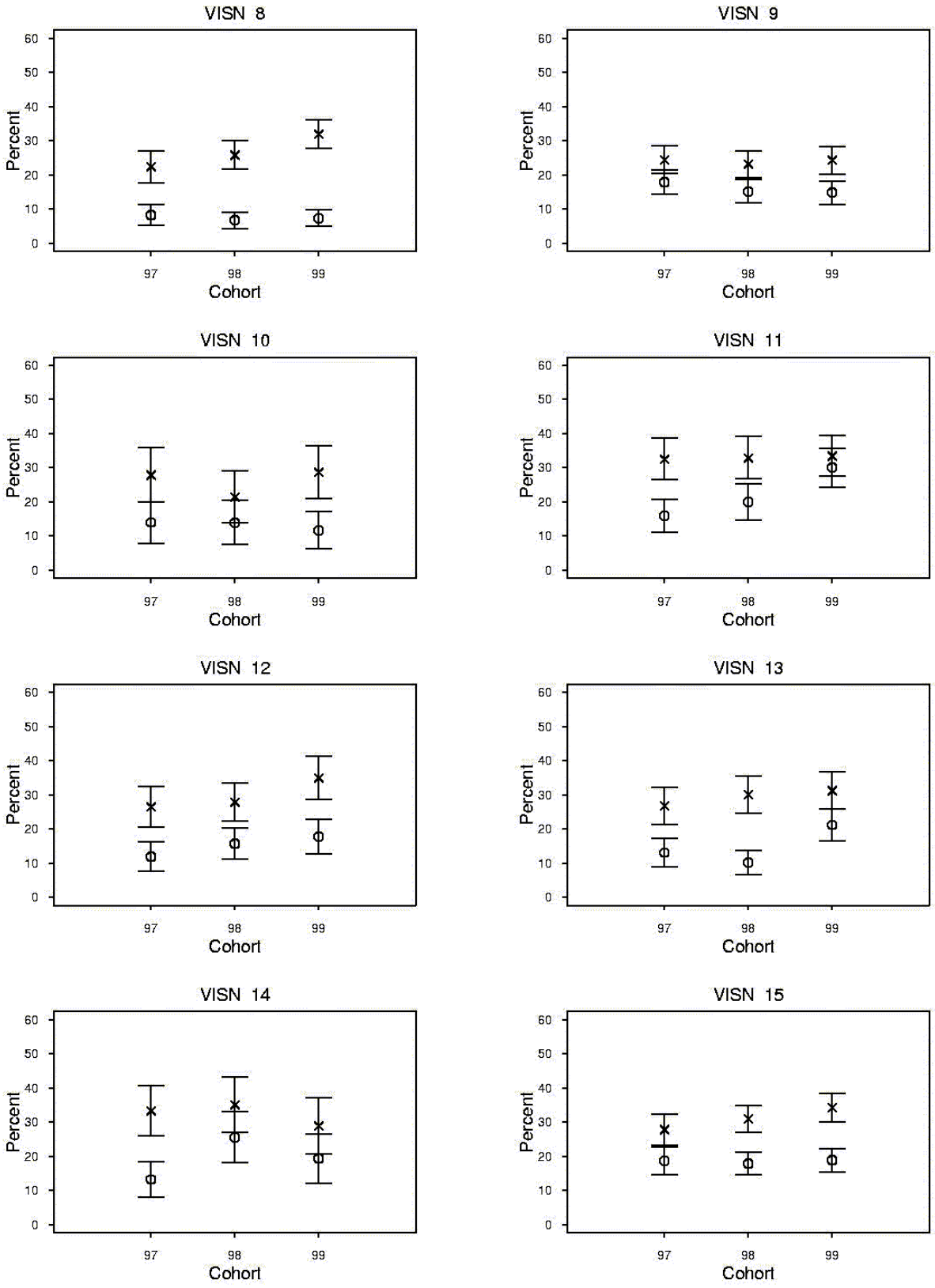


Figure B9

30 Day PCI Rates, Matched AMI Cohort

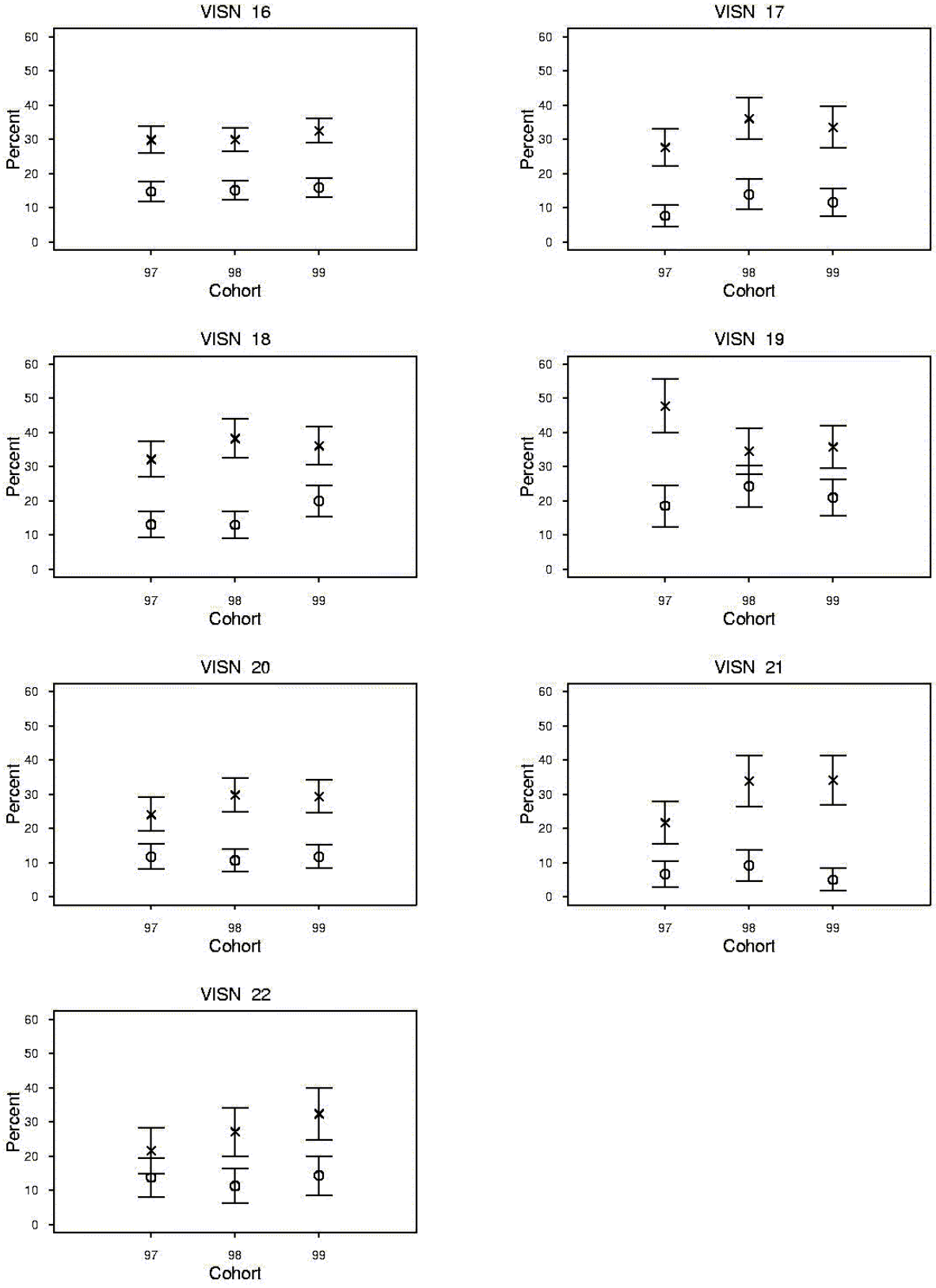


Figure B10

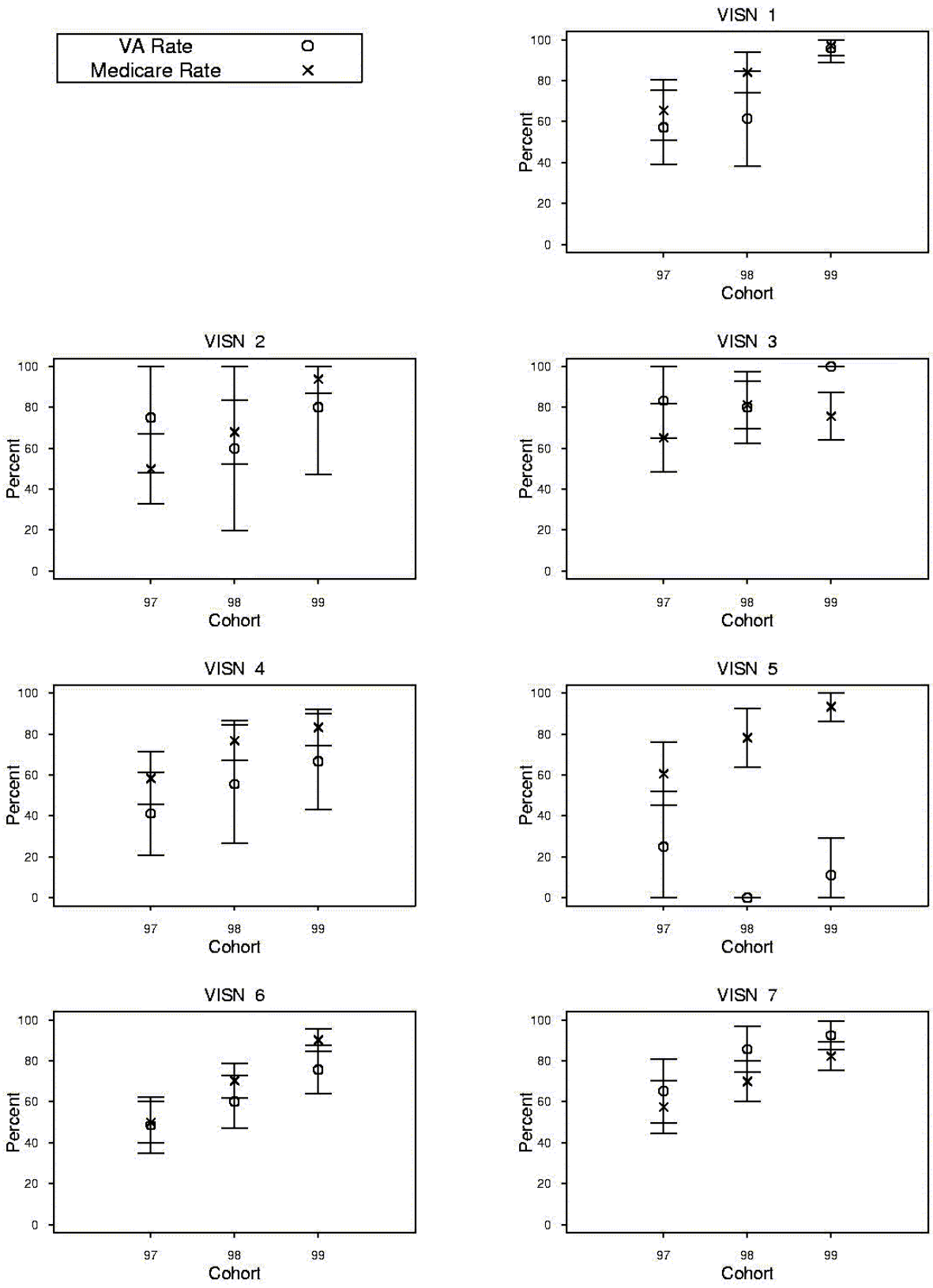

30 Day PCI With Stent Rates, Matched AMI Cohort
VA Rate
Medicare Rate
VISN 1
VISN 2
VISN 3
VISN 4
VISN 5
VISN 6
VISN 7
Percent
Cohort
0
20
40
60
80
100
97
98
99

Figure B10

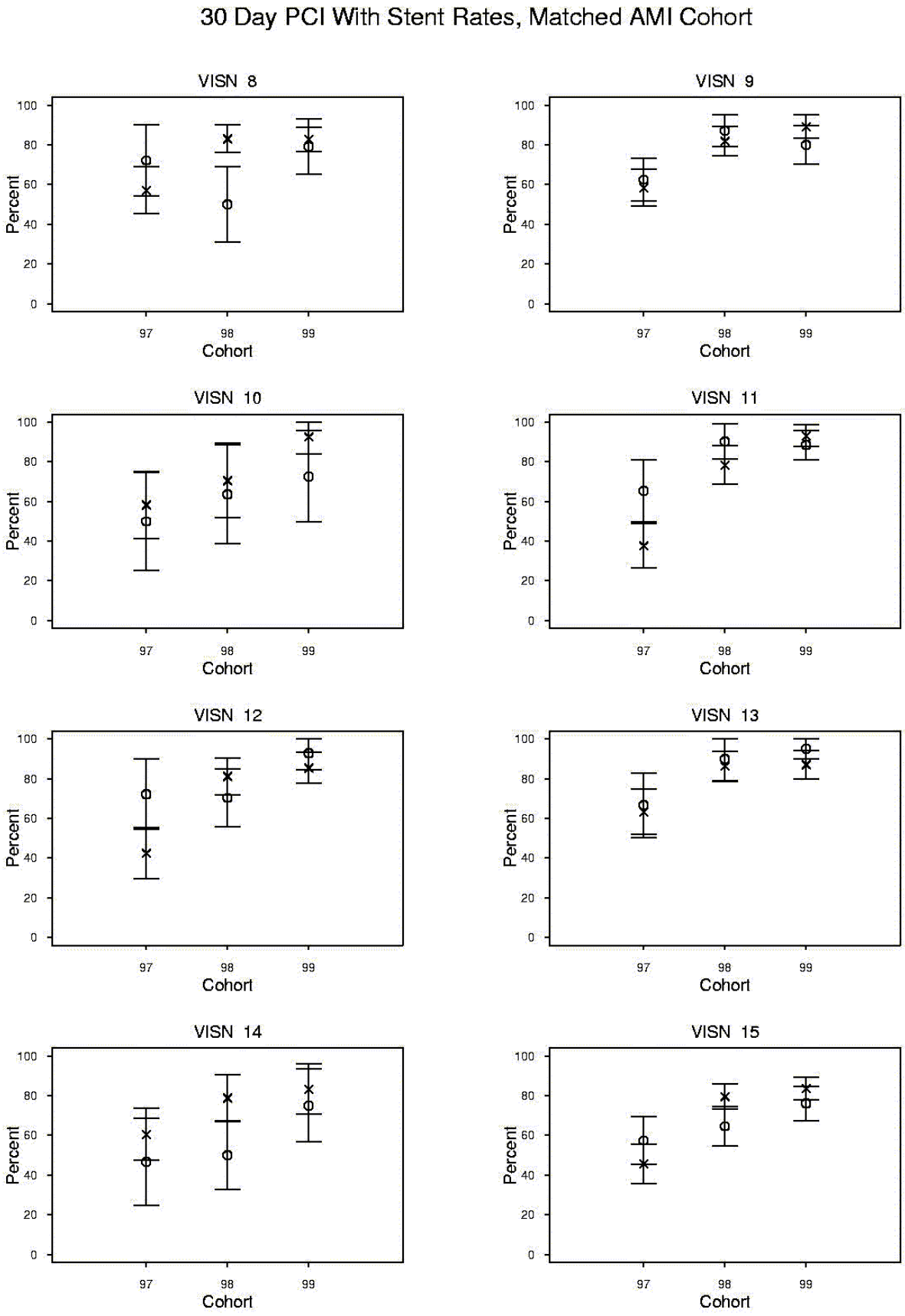

30 Day PCI With Stent Rates, Matched AMI Cohort
VISN 8
VISN 9
VISN 10
VISN 11
VISN 12
VISN 13
VISN 14
VISN 15
Percent
Cohort
97
98
99
0
20
40
60
80
100

Figure B10

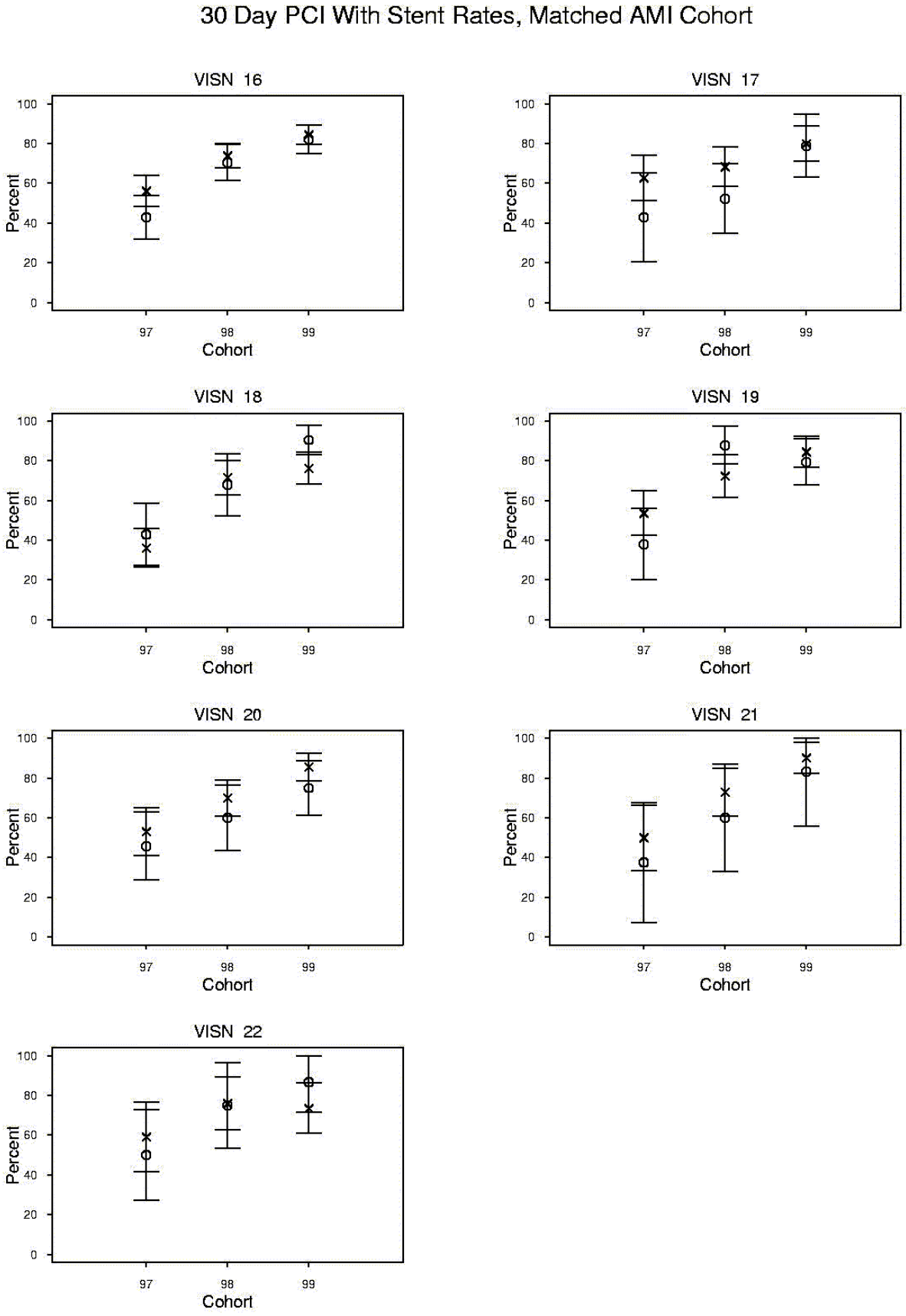

30 Day PCI With Stent Rates, Matched AMI Cohort
VISN 16
VISN 17
VISN 18
VISN 19
VISN 20
VISN 21
VISN 22
Percent
Cohort
0
20
40
60
80
100
97
98
99

Figure B11

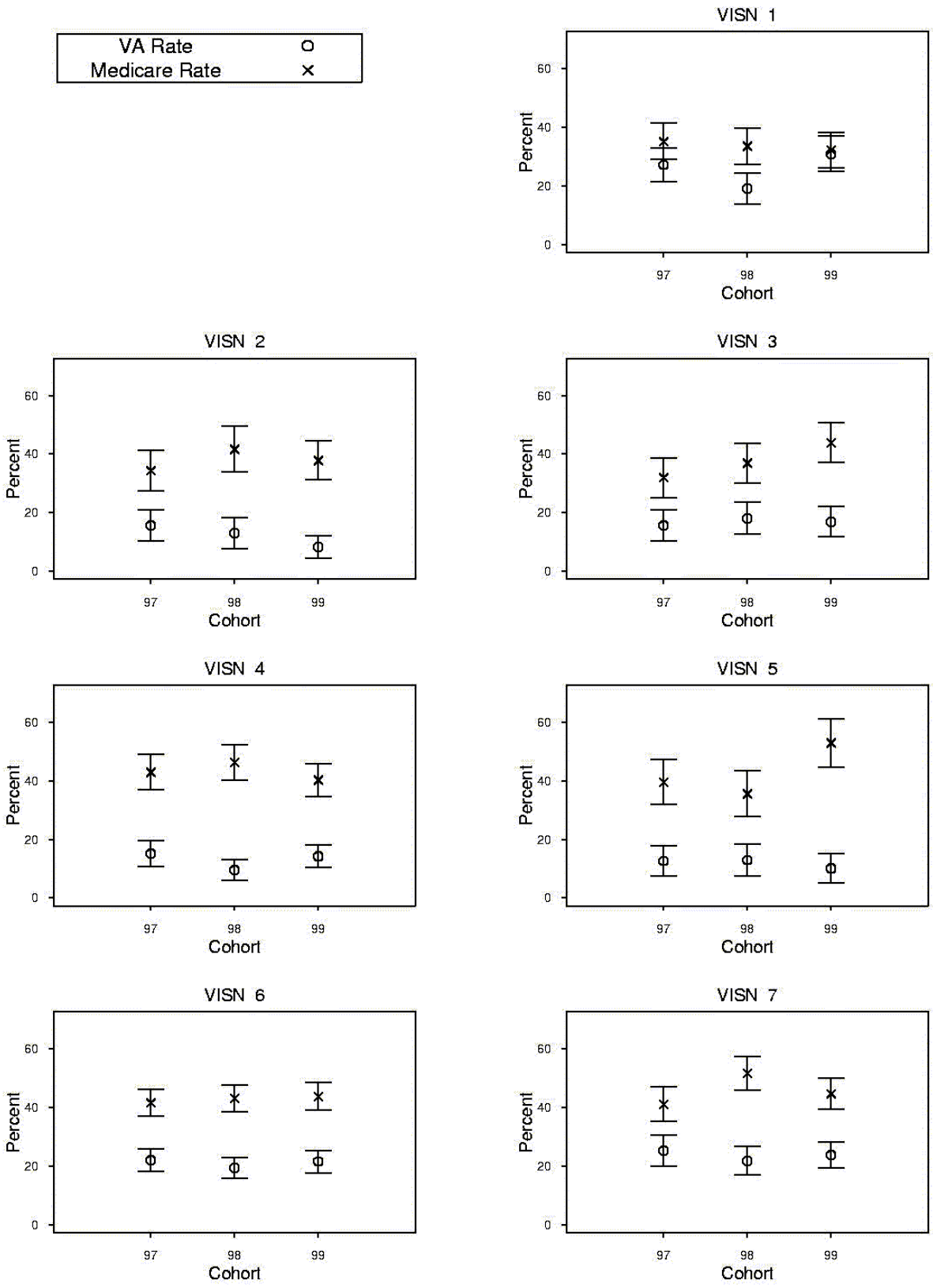

30 Day Revascularzation Rates, Matched AMI Cohort
VA Rate
Medicare Rate
VISN 1
VISN 2
VISN 3
VISN 4
VISN 5
VISN 6
VISN 7
Percent
Cohort
0
20
40
60
97
98
99

Figure B11

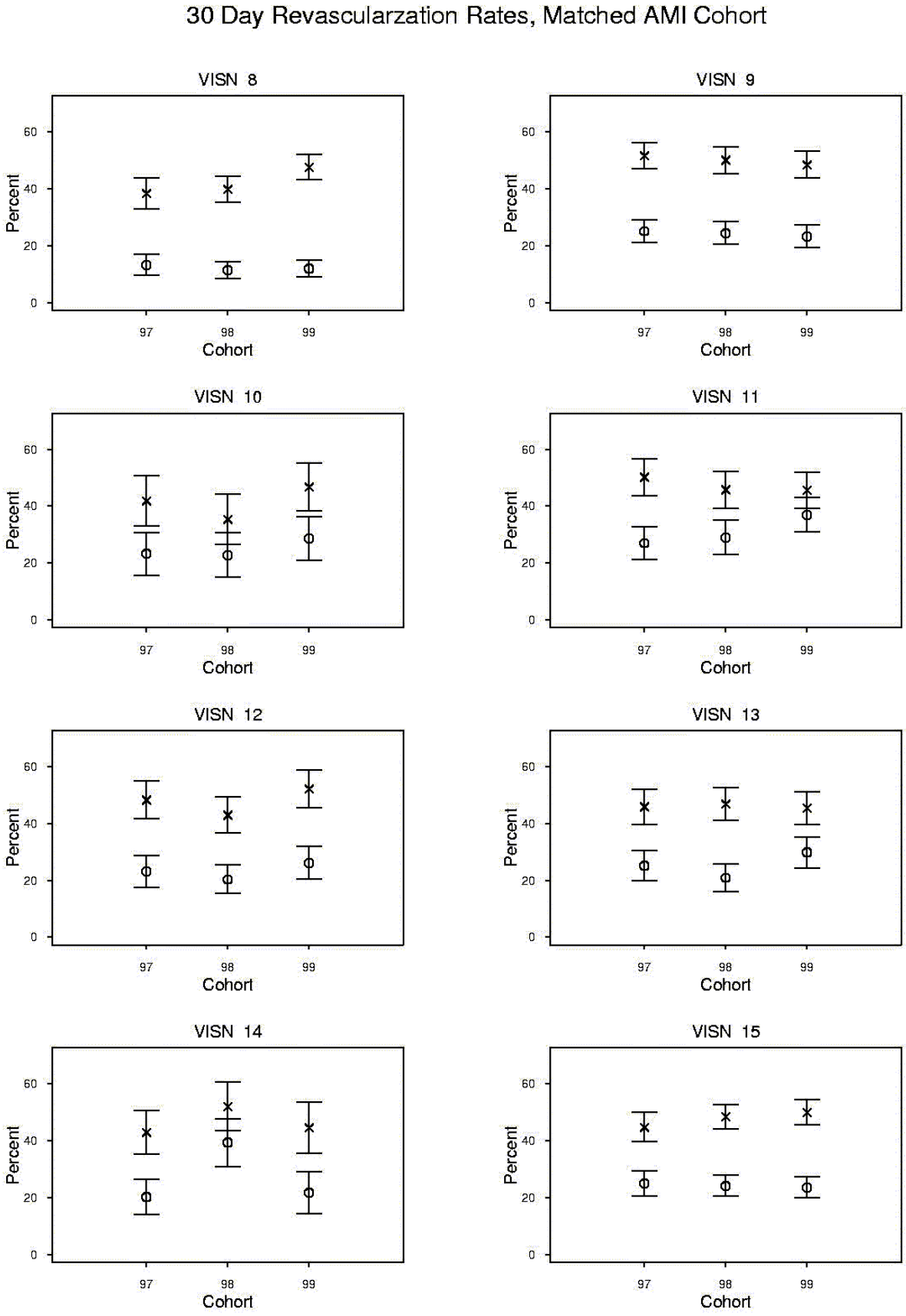

30 Day Revascularzation Rates, Matched AMI Cohort
VISN 8
VISN 9
VISN 10
VISN 11
VISN 12
VISN 13
VISN 14
VISN 15
Percent
0
20
40
60
97
98
99
Cohort

Figure B11

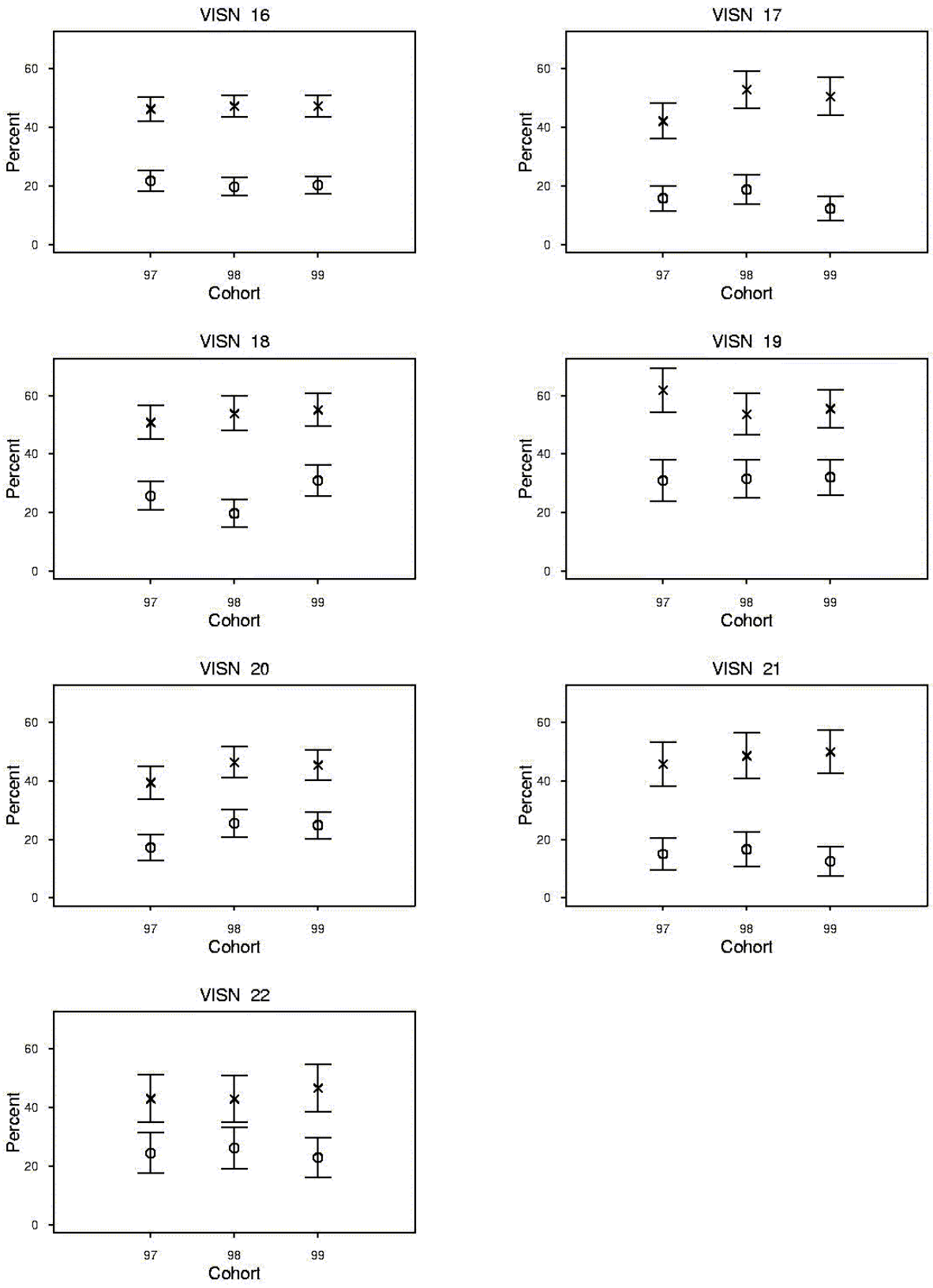

30 Day Revascularzation Rates, Matched AMI Cohort
VISN 16
VISN 17
VISN 18
VISN 19
VISN 20
VISN 21
VISN 22
Percent
0
20
40
60
97
98
99
Cohort

Figure B12

Length of Stay, Matched AMI Cohort

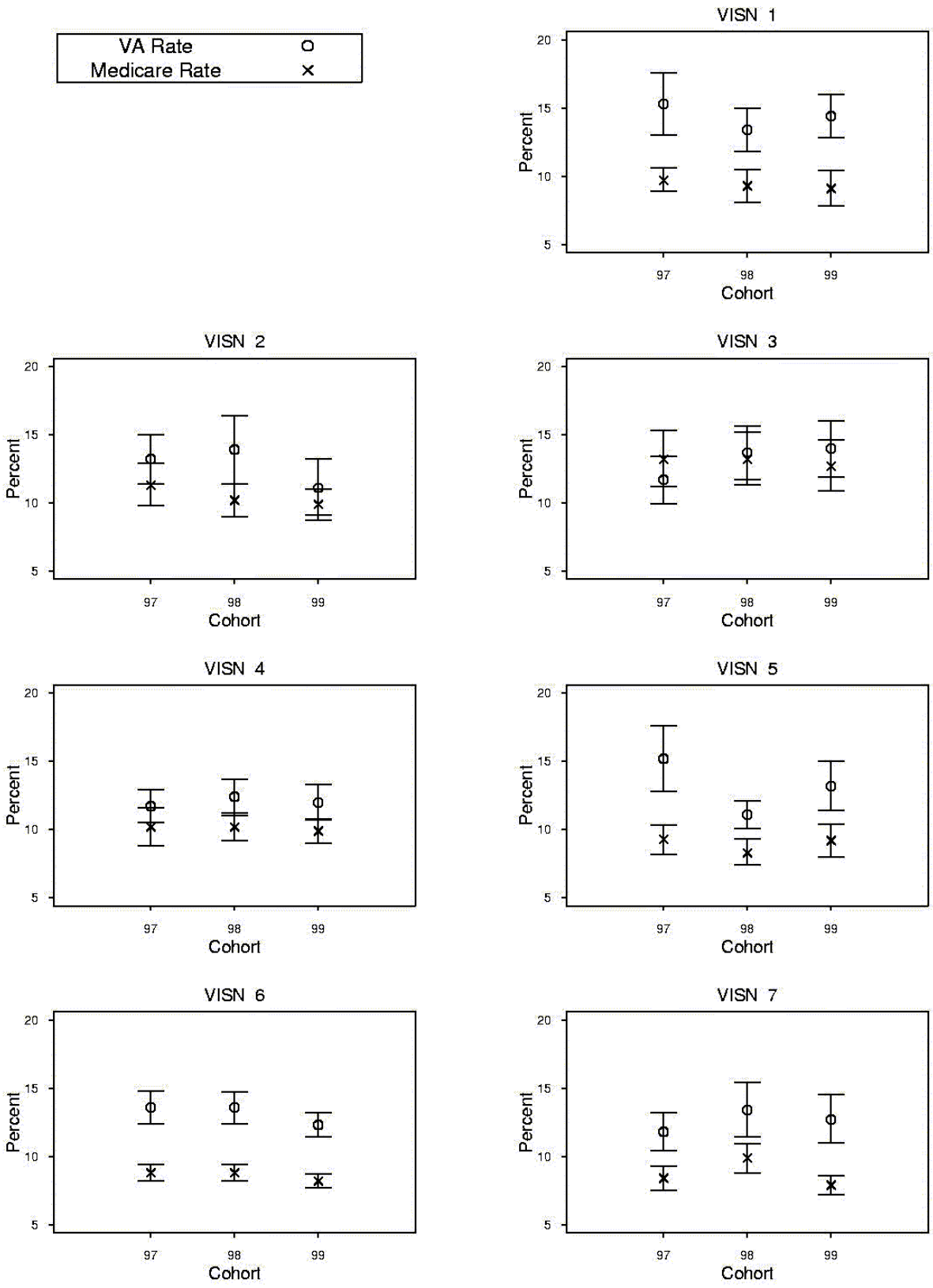


Figure B12

Length of Stay, Matched AMI Cohort

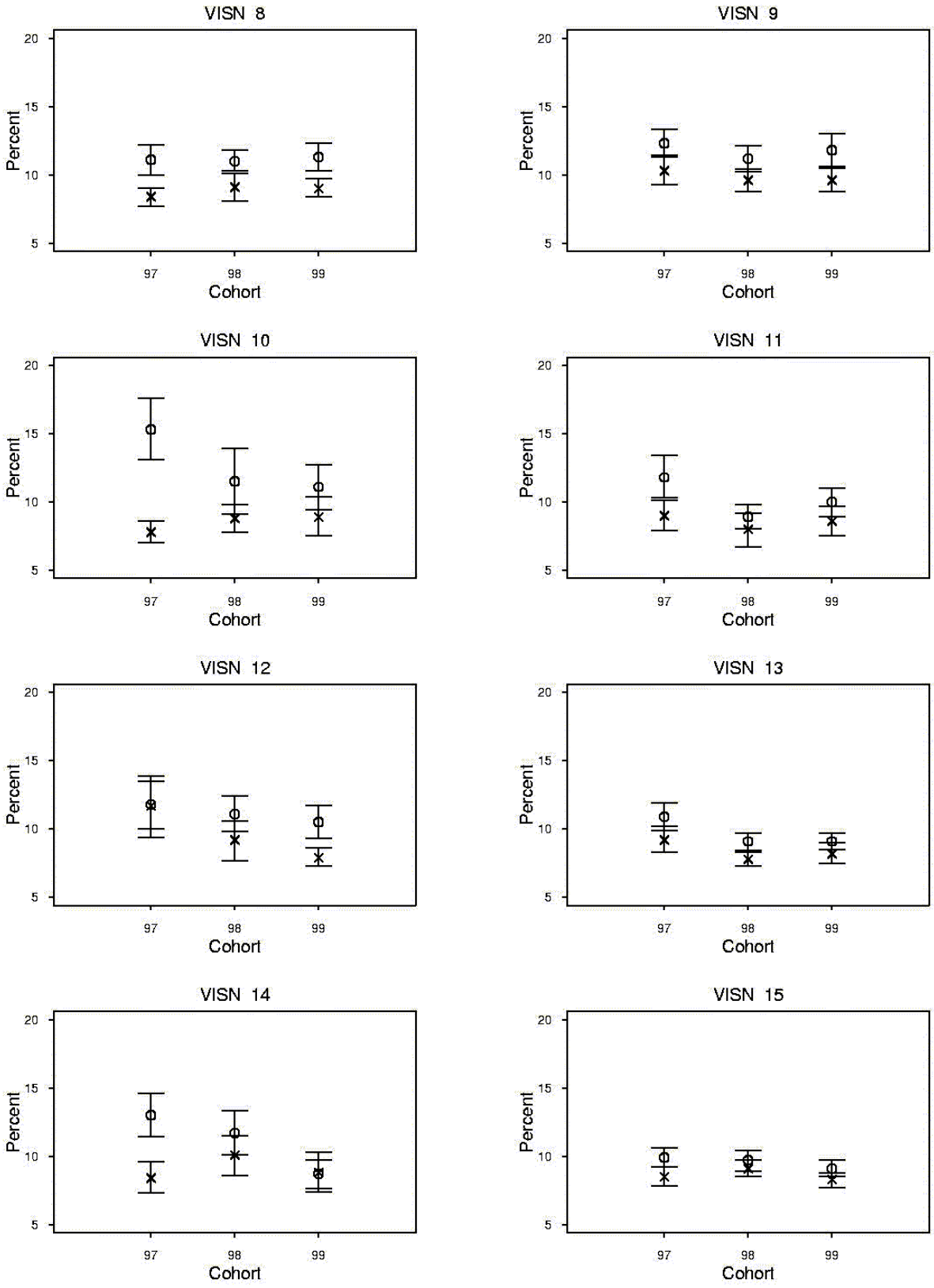


Figure B12

Length of Stay, Matched AMI Cohort