

Program Evaluation of Cardiac Care Programs in the VHA

AMI COHORT—READMISSIONS AND SUMMARY OF UTILIZATION AND OUTCOMES ACROSS VISNS

Comparison of Readmissions After AMI for VA Patients¹

National Trends in Readmissions in VA Patients with AMI

National trends in readmissions over time. Adjusted percentages of patients readmitted following their index admission are shown in Table D1. Since 1994 the percentage of patients with an AMI readmitted for CHF within 30 days and 6 months, for IHD within 30 days and 6 months, for AMI within 6 months, and for any of these cardiac diseases within 6 months has remained essentially constant.

**Table D1
Adjusted Percentages of VA Patients with an AMI Readmitted
all cohort years**

	Cohort				Statistically ^a Significant Trend?
	FY 1994 (n=8677)	FY 1997 (n=8135)	FY 1998 (n=8353)	FY 1999 (n=8664)	
Readmission for CHF within 30 days (%)	1.1	1.3	1.3	1.4	N
Readmission for CHF within 6 months (%)	5.9	5.4	5.3	5.2	N
Readmission for IHD within 30 days (%)	5.8	6.0	6.1	6.2	N
Readmission for AMI within 6 months (%)	6.6	6.9	7.0	7.2	N
Readmission for IHD within 6 months (%)	18.6	17.0	16.5	16.1	N
Readmission for cardiac disease within 6 months (%)	27.7	26.0	25.5	25.0	N

^a at the 10% level

Adjusted readmissions by demographic subgroups. Odds ratios comparing the likelihood of being readmitted between male and female veterans and between African Americans and

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.

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Hispanics and white veterans² are reported in Table D2. As indicated earlier, these values were obtained from hierarchical regression models. Pooling data across all years (FY 1994, 1997-1999), female veterans were significantly³ more likely to be readmitted for IHD within 30 days of admission for their index AMI compared to males veterans. African Americans were significantly less likely to be readmitted for an AMI within 6 months of their index AMI, for IHD within 30 days and 6 months and for any cardiac diagnosis both within 30 days and 6 months compared to white patients.

Table D2
Adjusted Odds-Ratios Comparing Readmissions in Demographic Subgroups
(Combining data across cohorts)

	Gender	Race	
	Males compared to Females	African Americans compared to Whites	Hispanics compared to Whites
Readmission for CHF w/in 30 Days			
Odds ratio (all years)	0.84	0.89	1.06
90% CI	(0.48, 1.54)	(0.70, 1.13)	(0.73, 1.53)
Readmission for CHF w/in 6 months			
Odds ratio (all years)	0.84	1.05	1.15
90% CI	(0.62, 1.15)	(0.93, 1.19)	(0.95, 1.40)
Readmission for AMI w/in 6 months			
Odds ratio (all years)	1.28	0.86	0.97
90% CI	(0.92, 1.83)	(0.76, 0.97)	(0.80, 1.17)
Readmission for IHD w/in 30 Days			
Odds ratio (all years)	1.42^a	0.83	1.01
90% CI	(1.00, 2.03)	(0.73, 0.94)	(0.84, 1.19)
Readmission for IHD w/in 6 months Days			
Odds ratio (all years)	1.03	0.85	0.96
90% CI	(0.82, 1.29)	(0.78, 0.92)	(0.84, 1.09)
Readmission for Cardiac Disease w/in 6 months Days			
Odds ratio (all years)	1.06	0.89	1.00
90% CI	(0.88, 1.28)	(0.83, 0.95)	(0.89, 1.11)

Bolded numbers represent significant differences at a 10% level

^a Not significant at 5% level.

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 This differences was significant at the 10% level but not at the 5% level.

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Variation in Readmissions in VA AMI Patients Across Networks

There was variation across networks in the percentage of patients readmitted following their index admission (Table D3). For example, the percentage of patients readmitted for cardiac disease (CHF, IHD or AMI) within 6 months of their AMI differed by 10 percentage points—from a low of 19% in VISN 1 to a high of 29% in VISN 21. VISN 1 had the lowest percentage of patients readmitted for CHF within 30 days and 6 months and for any cardiac disease within 6 months. VISN 21 had the highest percentage of patients readmitted for AMI, IHD or any cardiac disease within 6 months. Specific data on each readmission variable are described next.

Table D3
Variation in Adjusted Percentage of VA Patients with an AMI Readmitted
Across VISNs: 1999

	National Average (%)	Lowest VISN		Highest VISN		Difference
		VISN	Readmission (%)	VISN	Readmission (%)	
Readmission for CHF within 30 days (%)	1.4	1	0.9	18	2.0	1.1
Readmission for CHF within 6 months (%)	5.2	1	3.7	17	6.3	2.6
Readmission for AMI within 6 months (%)	7.2	2	4.5	21	10.4	5.9
Readmission for IHD within 30 days (%)	6.2	14	4.3	2	7.9	3.6
Readmission for IHD within 6 months (%)	16.1	7	12.9	21	19.6	6.7
Readmission for cardiac disease within 6 months (%)	25.0	1	19.1	21	29.4	10.3

Bolded numbers represent VISNs with significantly lower or higher percentage of patients readmitted than the national average at a 10% level.

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Adjusted readmissions for CHF, AMI, or IHD. In FY 1999 1.4% of patients were readmitted for CHF within 30 days of their AMI (Table D1). With the exception of VISN 1 this percentage was constant across VISNs (Figure D1a). VISN 1 had a lower percentage of patient readmitted in 1999 compared to national average. Over the period FY 1994 to 1999, the percentage of patients readmitted for CHF within 30 days of their index AMI decreased in VISN 1 and increased in VISNs 4, 11, and 18 (Figure D1b).⁴ Within 6 months the percentage of patients readmitted for CHF was up to 5.2% (Table D2). With the exception of VISN 1 this percentage was constant across VISNs and did not change over time (Figure D2a and D2b).⁵ VISN 1 had a lower percentage of patient readmitted in FY 1999 compared to national average, and this percentage had decreased since FY 1994.

In FY 1999 7.2% of patients were readmitted for AMI within 6 months of the index event (Table D1). The percentage of patients readmitted for AMI was higher than average in VISNs 19 and 21 and lower than average in VISNs 1 and 2 (Figure D3a). These percentages were generally stable over time except for VISN 21, which had an *increasing* percentage (Figure D3b).⁶

In FY 1999 approximately 6.2% of patients were readmitted for IHD within 30 days of their initial AMI (Table D1). The percentage of patients readmitted within 30 days for IHD was lower than average in VISNs 6 and 14 (Figure D4a). The percent of patients readmitted for IHD increased over the time period FY 1994 to 1999 in VISNs 9 and 12 (Figure D4b).⁷ By 6 months the percent of patients readmitted for IHD was up to 16.1%. The percent of patients readmitted for IHD within 6 months was higher than average in VISNs 8, 11 and 21 and lower than average

⁴ The Appendix shows by VISN time trends from 1994 to 1999 (Appendix-Figure AD1)

⁵ The Appendix shows by VISN time trends from 1994 to 1999 (Appendix-Figure AD2)

⁶ The Appendix shows by VISN time trends from 1994 to 1999. (Appendix-Figure AD3)

⁷ The Appendix shows by VISN time trends from 1994 to 1999. (Appendix-Figure AD4)

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in VISN 7 (Figure D5a). These percentages were generally stable over time except for VISNs 5, 6, 14 and 16 whose percentages decreased (Figure D5b).⁸

In FY 1999 25.0% of patients were readmitted for at least one of these cardiac diagnoses (Table D1). The percent of patients readmitted for cardiac disease was higher than average in VISNs 19 and 21 and lower than average in VISNs 1 and 7 (Figure D6a). These percentages were generally stable over time except for VISNs 1, 2, 6 and 7 whose percentages decreased (Figure D6b).⁹

⁸ The Appendix shows by VISN time trends from 1994 to 1999. (Appendix-Figure AD5)

⁹ The Appendix shows by VISN time trends from 1994 to 1999. (Appendix-Figure AD6)

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Figure D1a

Adjusted 30 Day CHF Readmission Rates, 1999
Rates by VISN

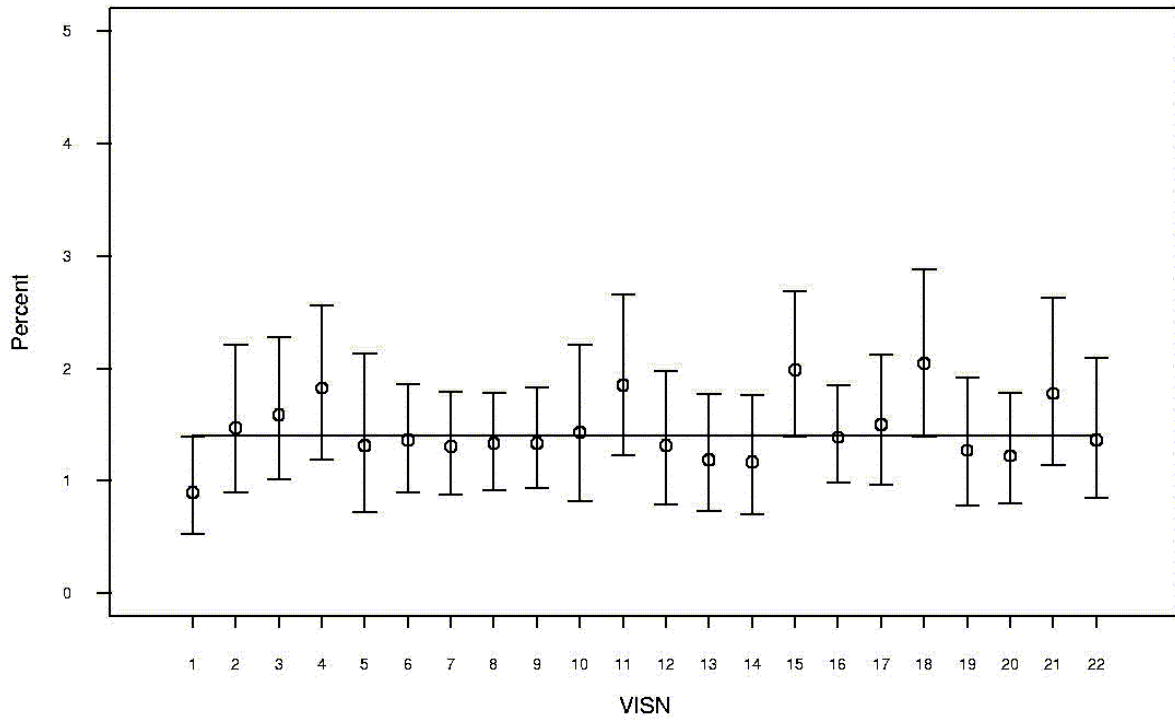
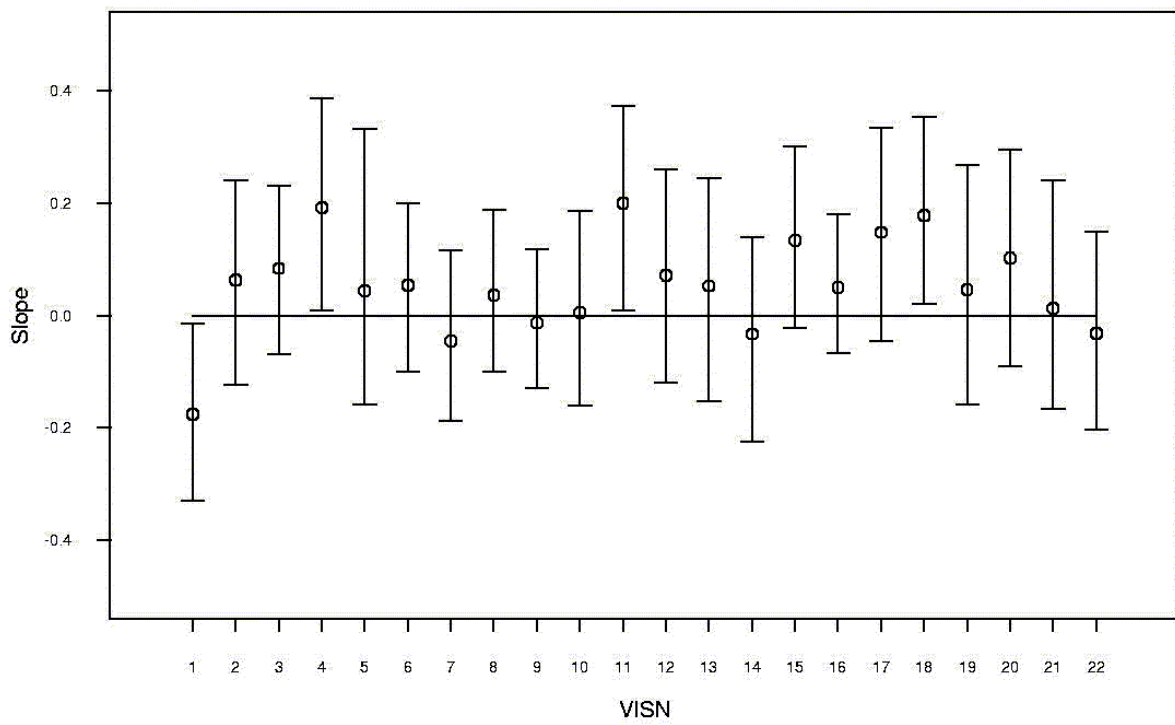


Figure D1b

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



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Figure D2a

Adjusted 6 Month CHF Readmission Rates, 1999
Rates by VISN

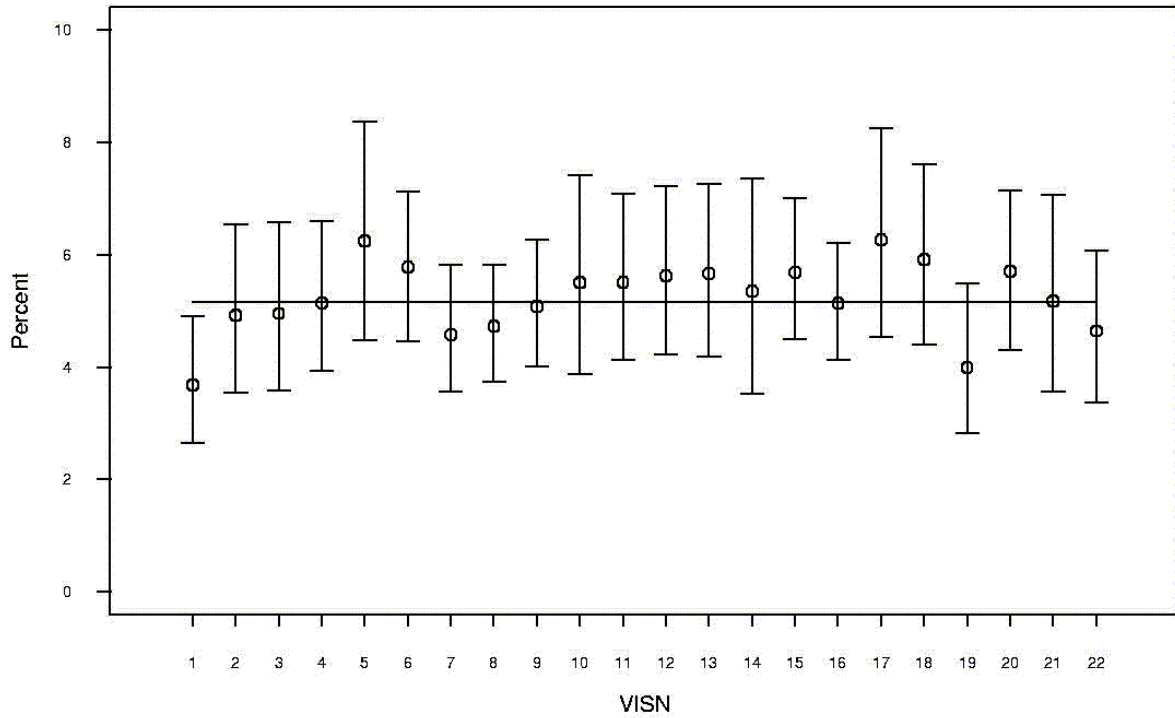
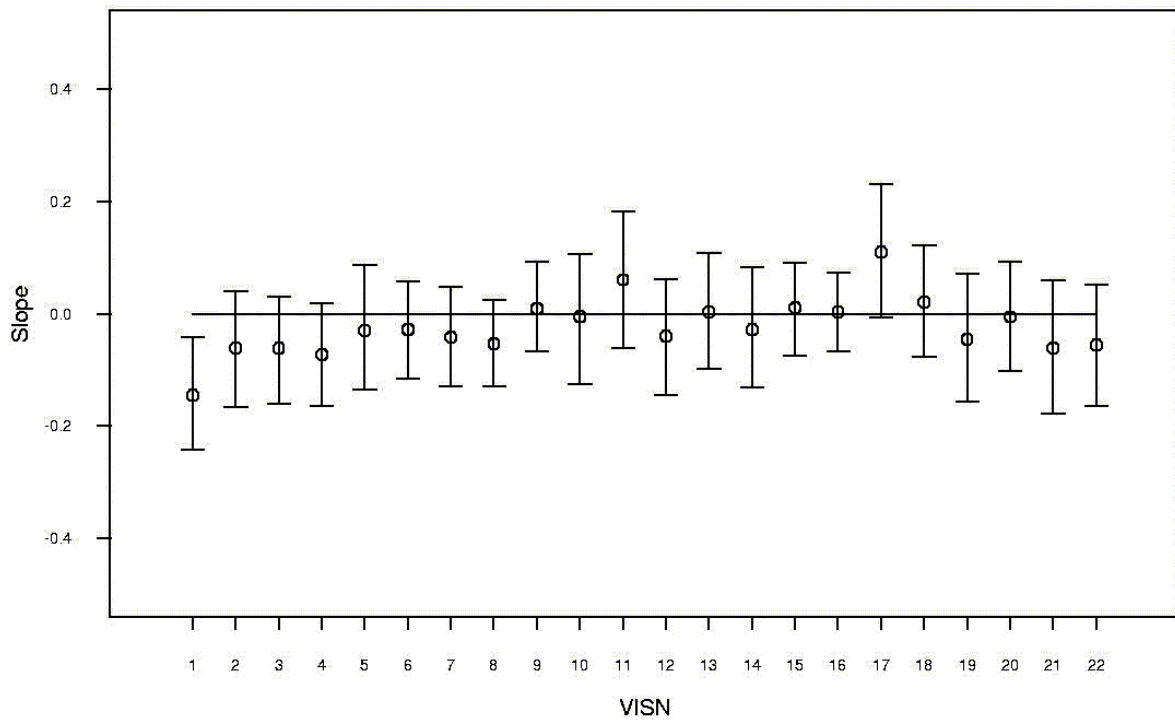


Figure D2b

Time Trend, Adjusted 6 Month CHF Readmission Rates, 1994 - 1999, by VISN



Program Evaluation of Cardiac Care Programs in the VHA

Figure D3a

Adjusted 6 Month AMI Readmission Rates, 1999
Rates by VISN

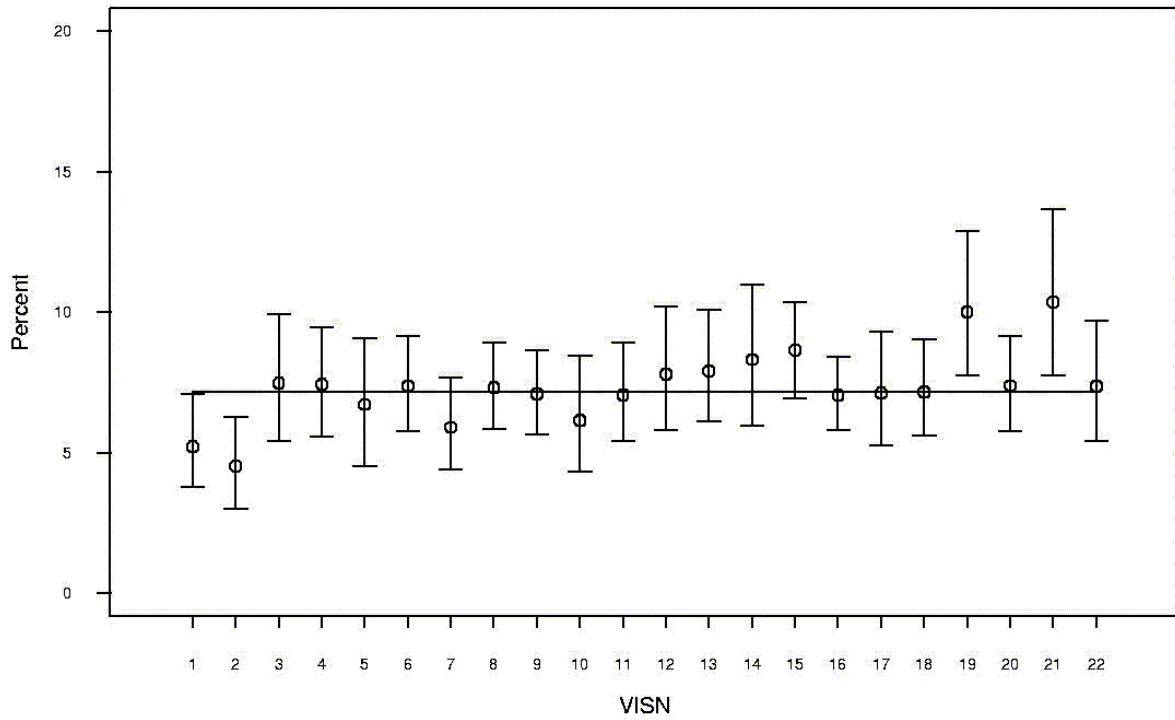
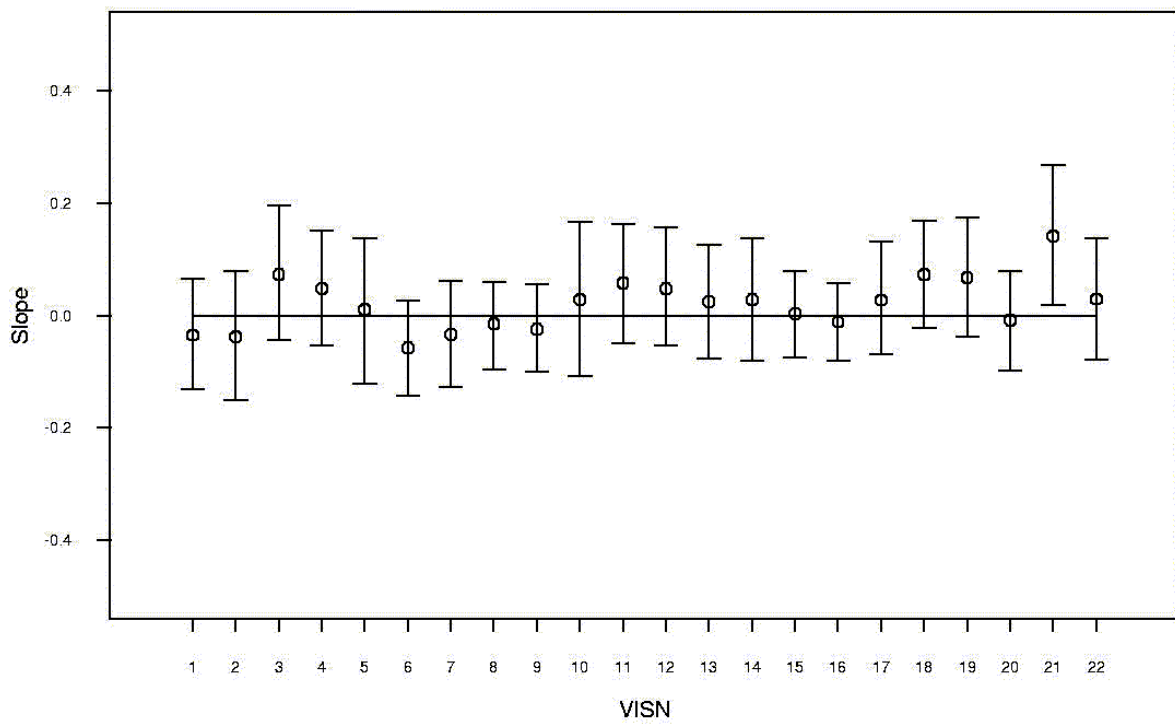


Figure D3b

Time Trend, Adjusted 6 Month AMI Readmission Rates, 1994 - 1999, by VISN



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Figure D4a

Adjusted 30 Day IHD Readmission Rates, 1999
Rates by VISN

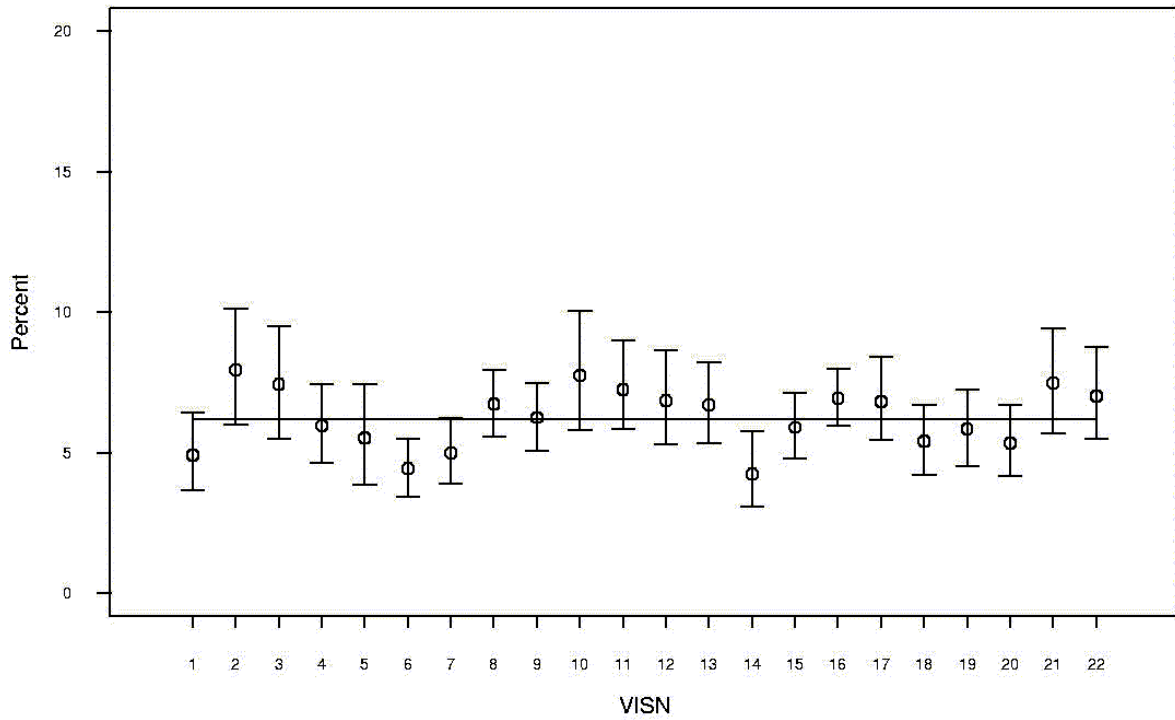
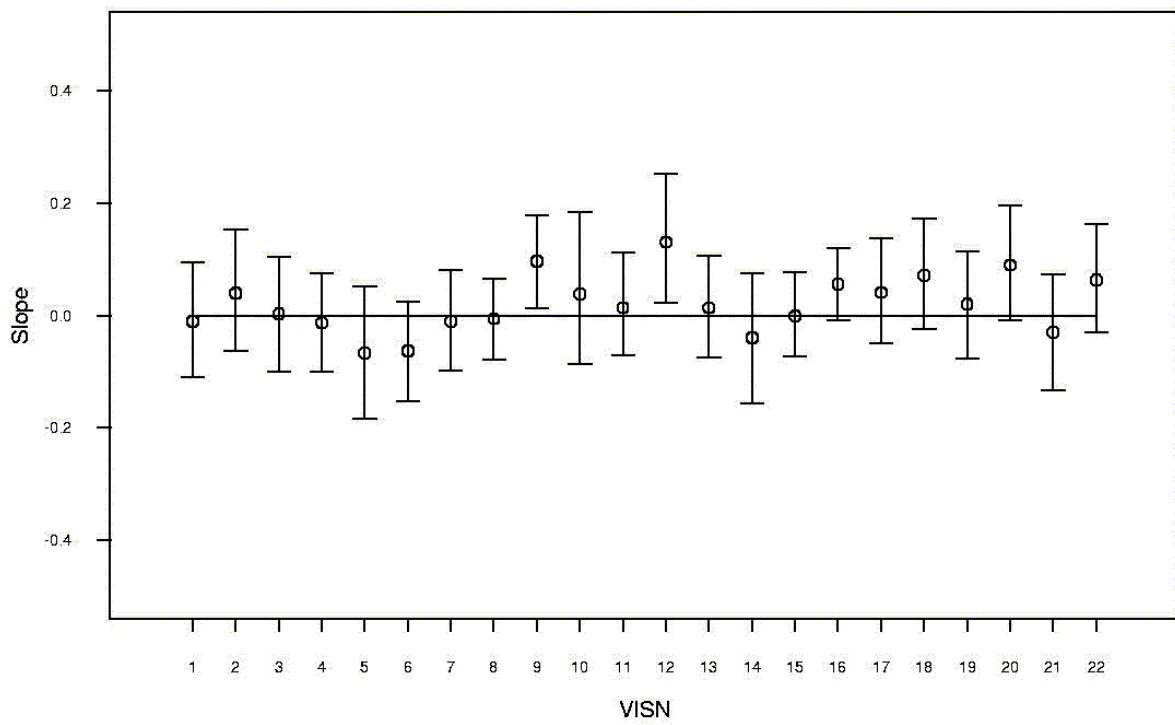


Figure D4b

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



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Figure D5a

Adjusted 6 Month IHD Readmission Rates, 1999
Rates by VISN

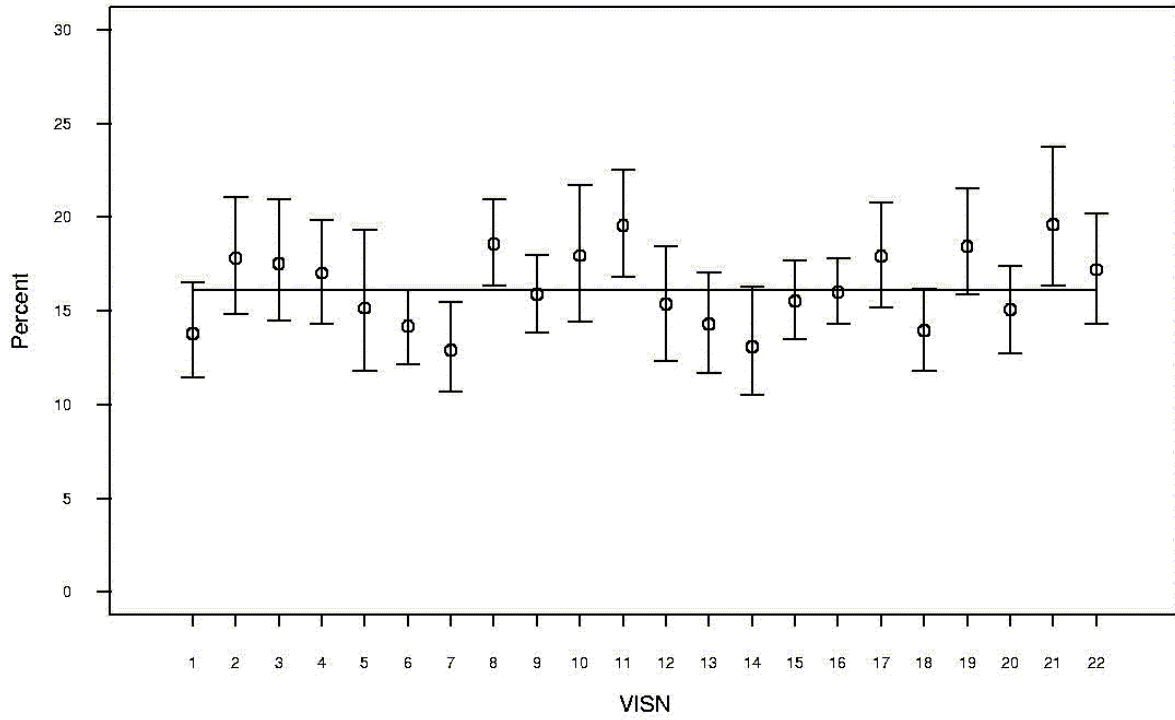
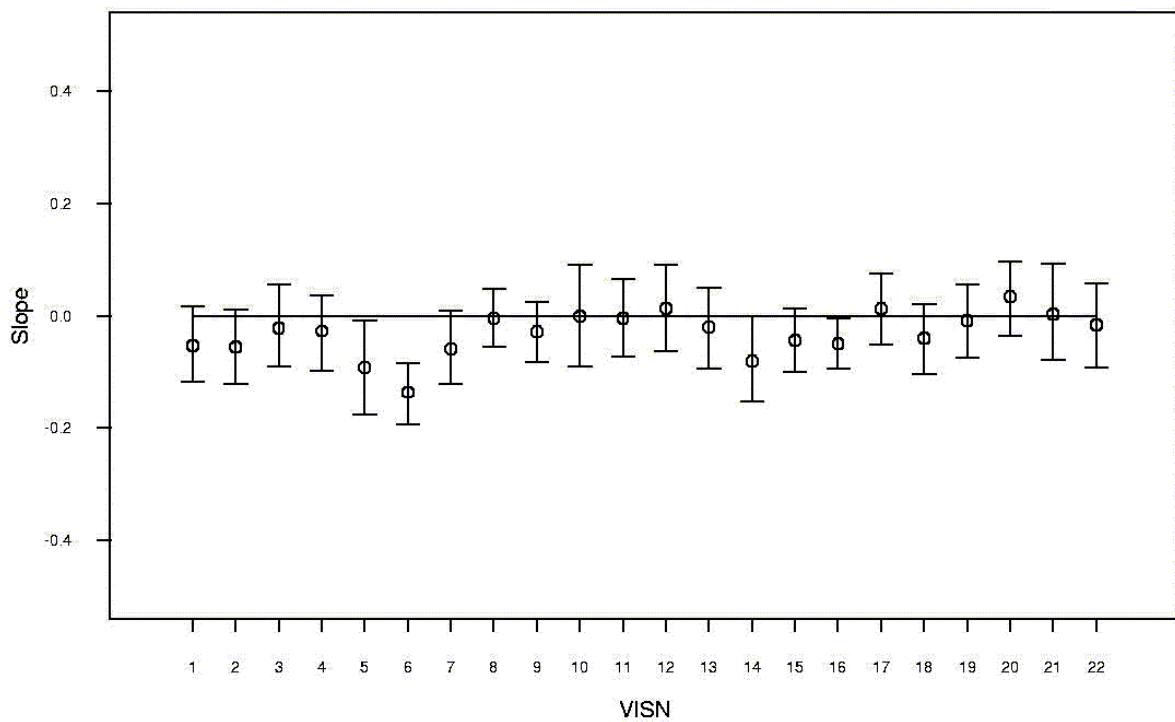


Figure D5b

Time Trend, Adjusted 6 Month IHD Readmission Rates, 1994 - 1999, by VISN



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Figure D6a

Adjusted 6 Month Readmission Rates, All Causes, 1999
Rates by VISN

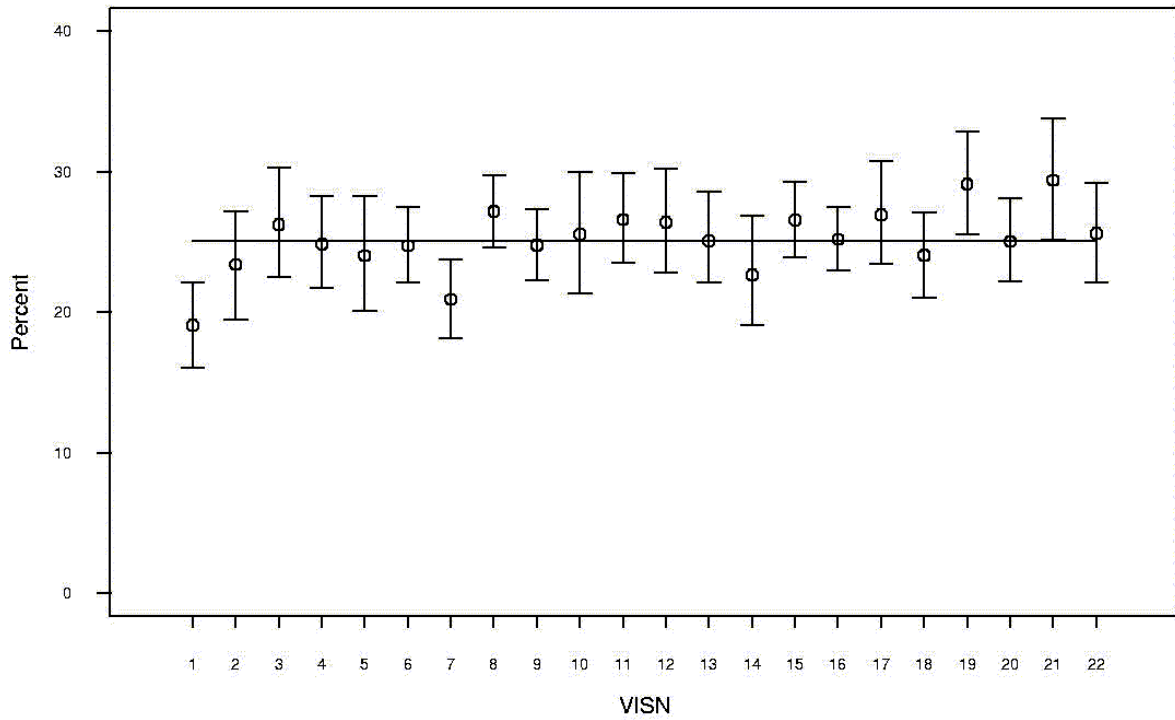
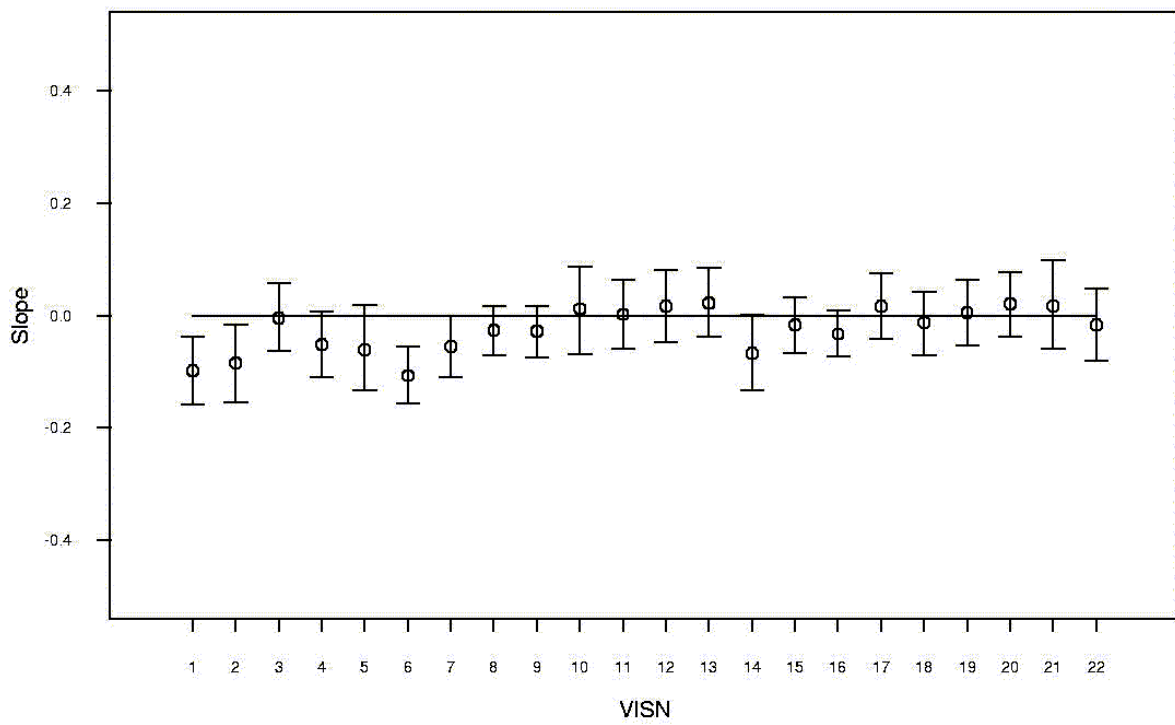


Figure D6b

Time Trend, Adjusted 6 Month Readmission Rates, All Causes, 1994 - 1999, by VISN



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Summaries of Utilization and Outcomes Across Networks

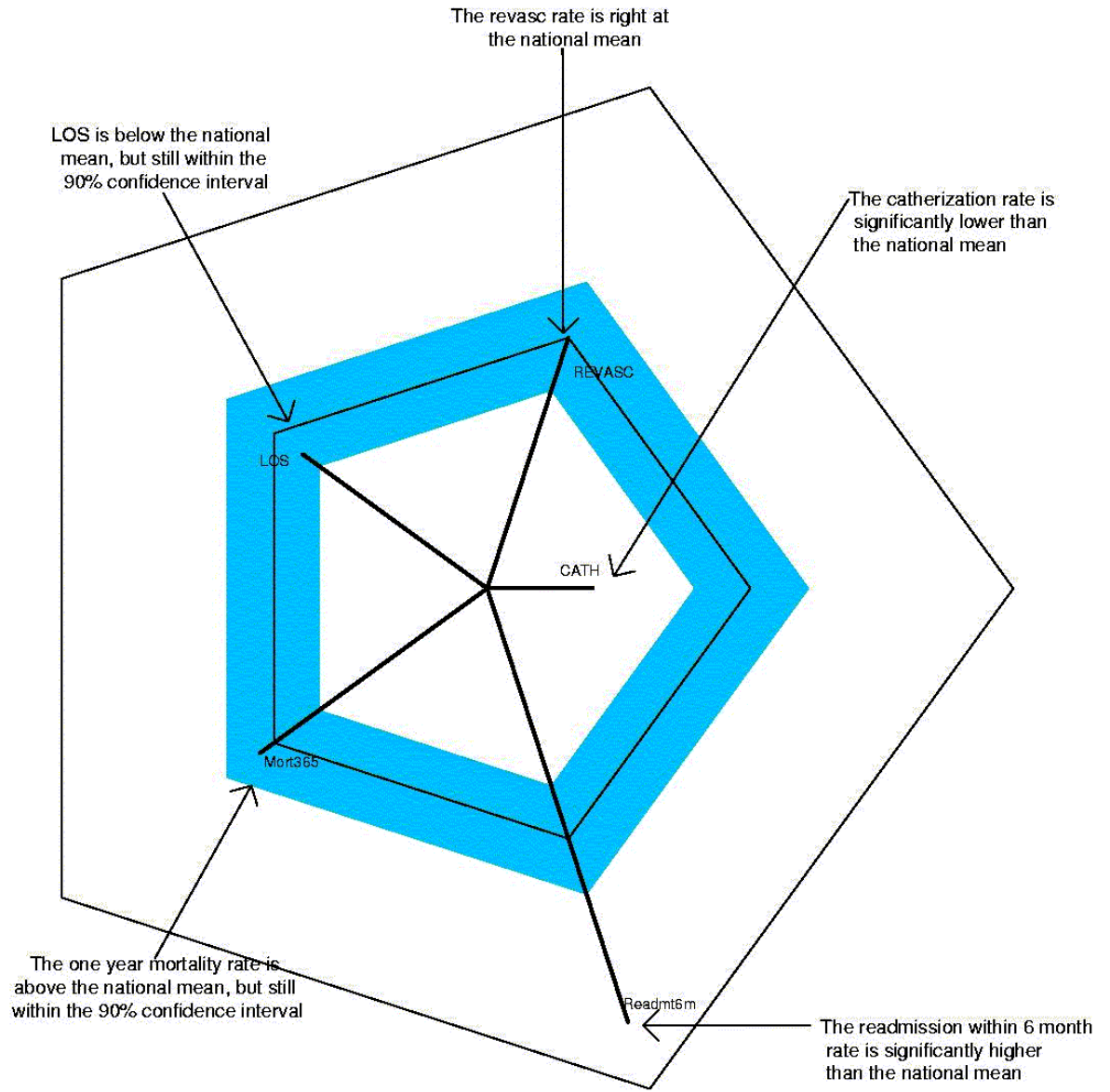
Summary “spider” graphs are shown in Figure D8 for each VISN displaying 1999 adjusted utilization and outcomes. Figure D7 (“Interpreting the ‘spider plots’”) summarizes the components of these graphs. For example, each graph shows the positive or negative deviation (beyond 90% confidence intervals) from the national average in that year. The plots show the adjusted percentage of patients having a catheterization within 30 days, revascularization within 30 days, readmission for any cause within 6 months, length of stay and 1-year mortality. There are no consistent differences across VISNs although VISNs 1 and 7 had a higher length of stay and lower readmissions within 6 months; this was not always the case (e.g., VISNs 18 and 19).¹⁰

¹⁰ Note that the confidence limits on the SPIDER plots are, as elsewhere in the text, 90% ones. If we had used 95% levels, several of the measures that appear different across VISNs would have disappeared.

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Figure D7

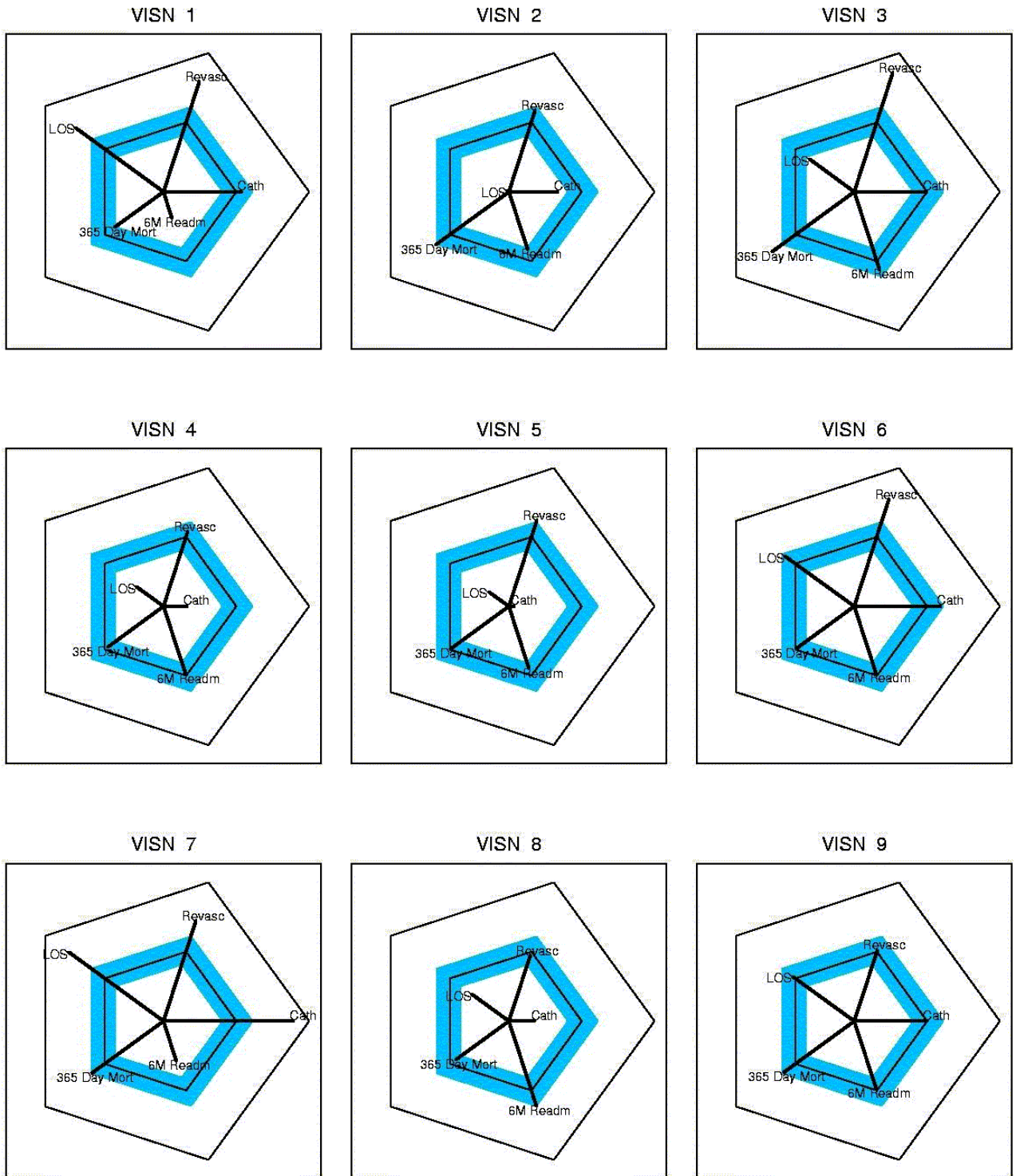
Interpreting the 'spider' plots



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Figure D8

Standard Deviations from Mean, Selected Measures by VISN
1999 AMI Cohort

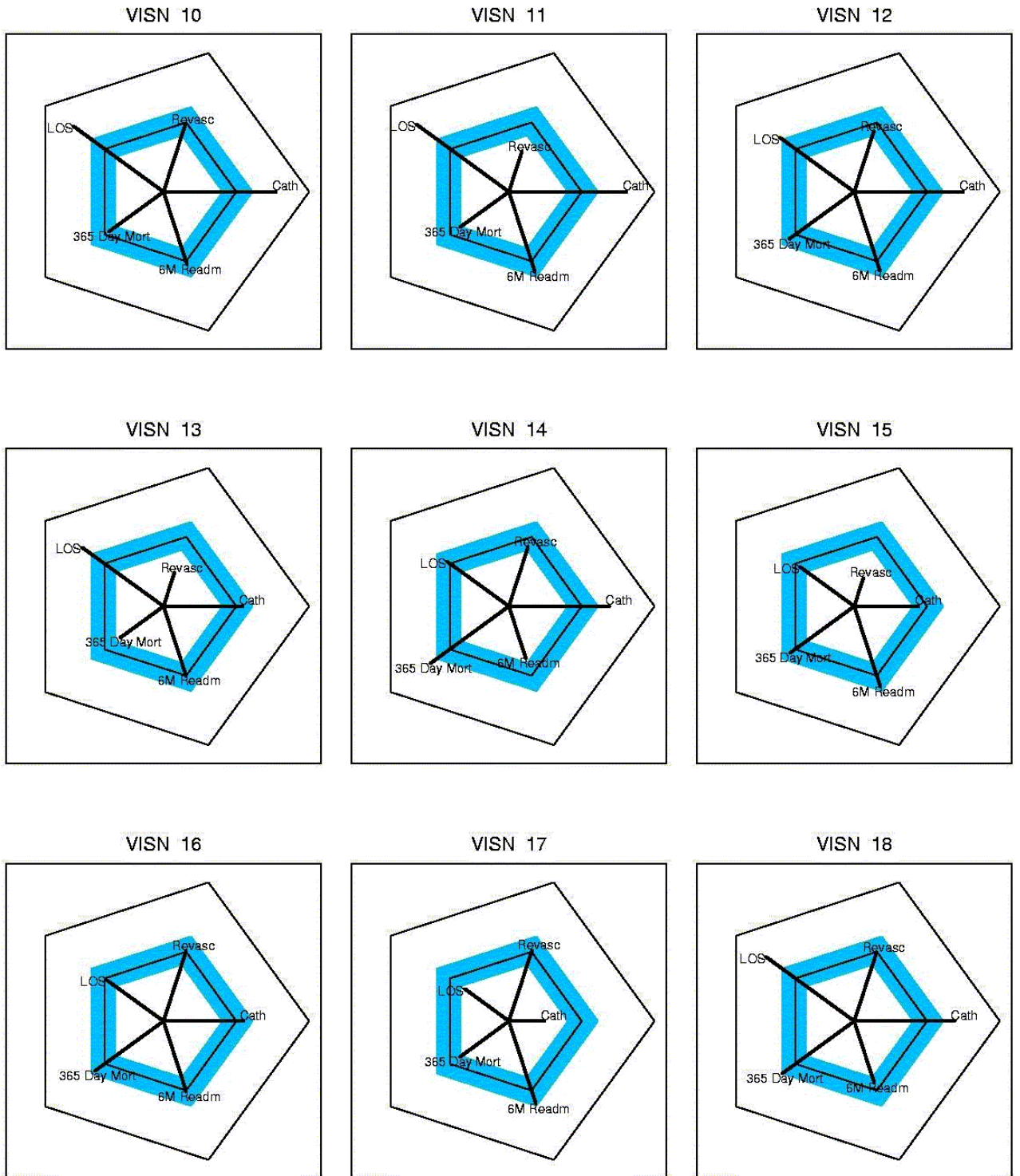


Cath = Catherization; 6M Readm = 6 Month Readmission, All Causes;
365 Day Mort=365 Day Mortality; LOS = Length of Stay; Revasc = Revascularization

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Figure D8

Standard Deviations from Mean, Selected Measures by VISN
1999 AMI Cohort

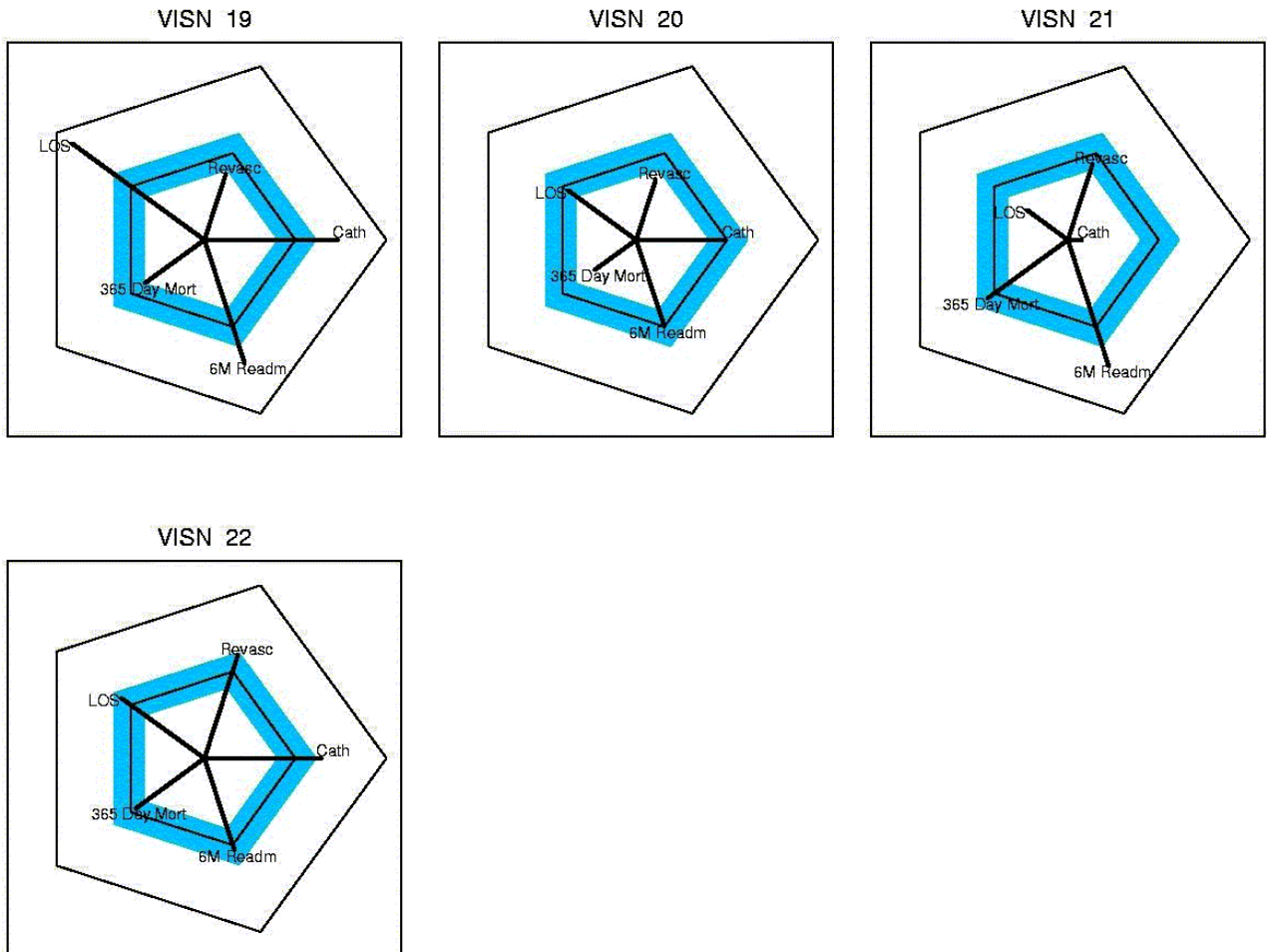


Cath = Catheterization; 6M Readm = 6 Month Readmission, All Causes;
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Figure D8

Standard Deviations from Mean, Selected Measures by VISN
1999 AMI Cohort



Cath = Catheterization; 6M Readm = 6 Month Readmission, All Causes;
365 Day Mort=365 Day Mortality; LOS = Length of Stay; Revasc = Revascularization

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Comparison of Readmissions for VA-Medicare Matched Cohorts

National Trends in Readmissions in the Matched Cohorts

Adjusted analyses comparing the percentage of male, elderly VA patients readmitted following their index AMI to a matched sample of Medicare patients are reported in Table D4.

There were few differences between the two systems in the percent of patients readmitted for CHF after their AMI. However, VA patients were significantly more likely to be readmitted for IHD both within 30 days and 6 months, for AMI within 6 months and for any of the three cardiac diseases within 6 months in FY 1997, 1998 and 1999.

Table D4
Percent of Patients with an AMI Readmitted 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
Readmission for CHF w/in 30 days (%)	2.0	1.9	.68	1.6	2.5	.005	2.2	2.3	.776
Readmission for IHD w/in 30 days (%)	5.7	4.2	.001	5.8	3.5	<.001	5.3	3.8	<.001
Readmission for CHF w/in 6 months (%)	7.9	6.9	.087	7.7	7.4	.68	8.0	7.4	.27
Readmission for AMI w/in 6 months (%)	7.5	5.8	<.001	8.5	5.9	<.001	8.2	5.9	<.001
Readmission for IHD w/in 6 months (%)	15.6	10.7	<.001	15.1	9.7	<.001	14.5	10.0	<.001
Readmission for cardiac disease w/in 6 months (%)	25.7	20.6	<.001	25.9	19.7	<.001	25.9	20.1	<.001

Bolded numbers represent significant differences at a 10% level

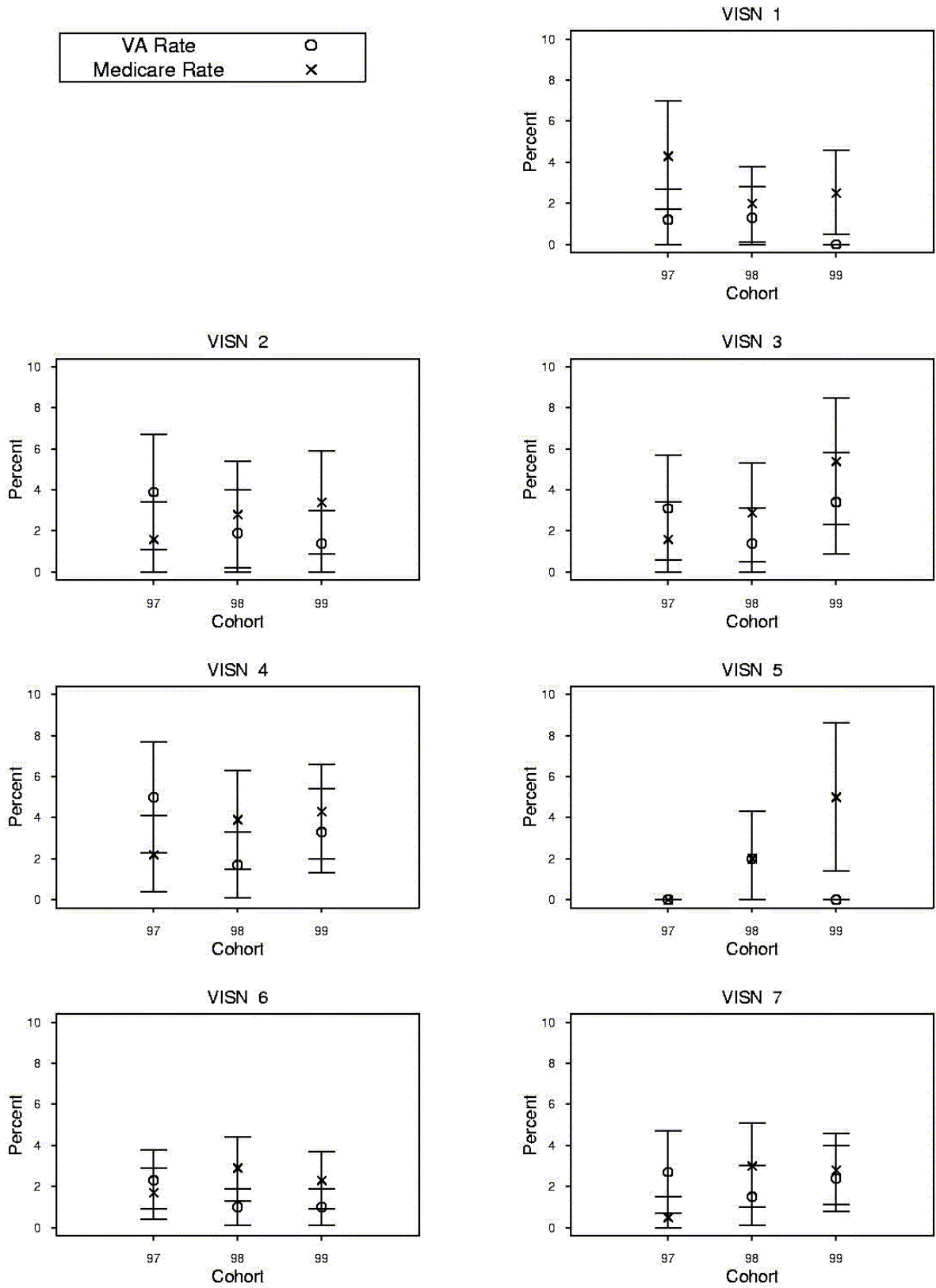
Within VISN Comparisons Between Elderly VA and Medicare Patients

Within service networks, elderly VA patients were generally more likely to be readmitted compared to matched Medicare patients, although often these differences were not statistically significant (Figures D9-D14).

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Figure D9

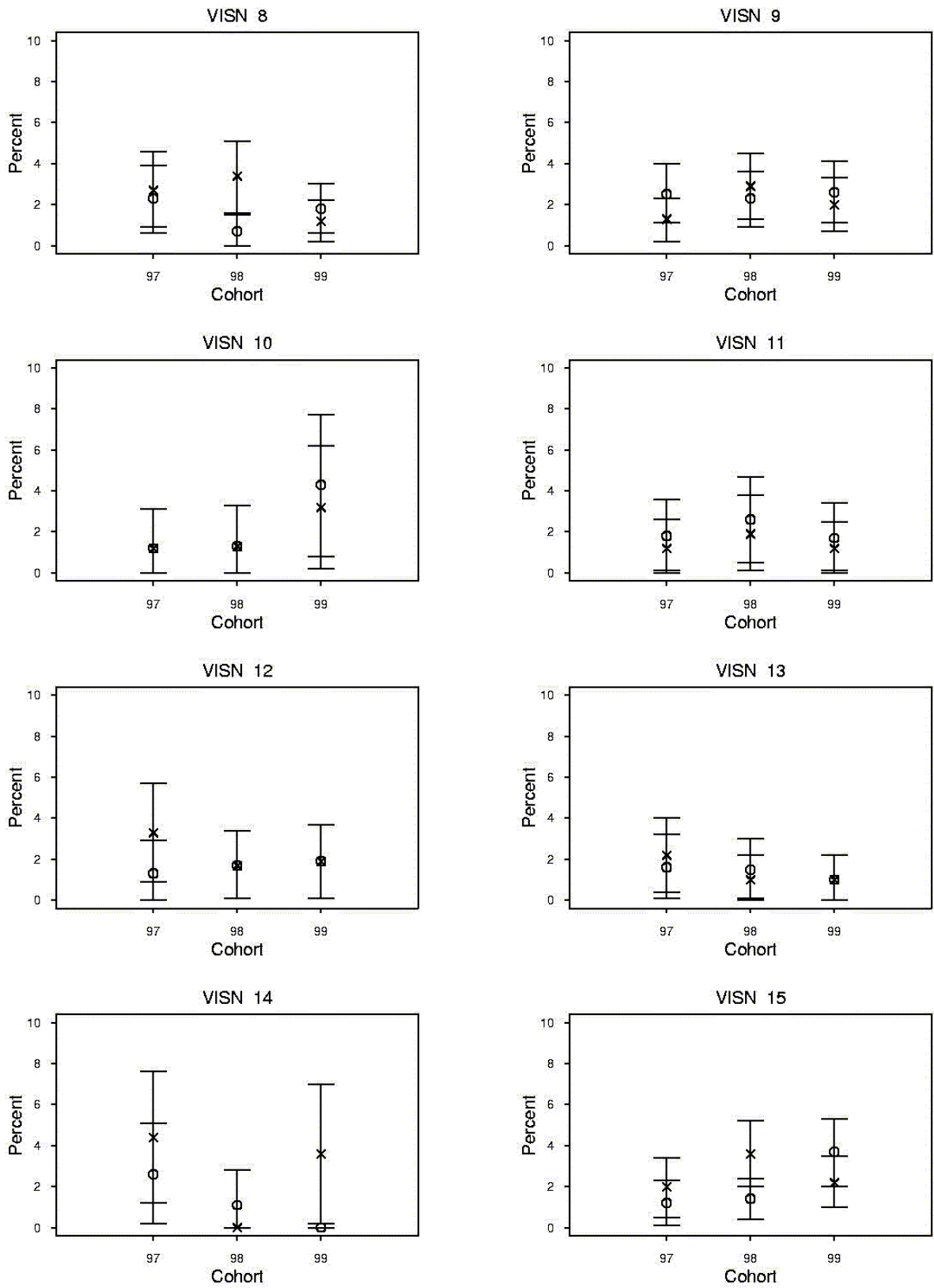
30 Day CHF Readmission Rates, Matched AMI Cohort



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Figure D9

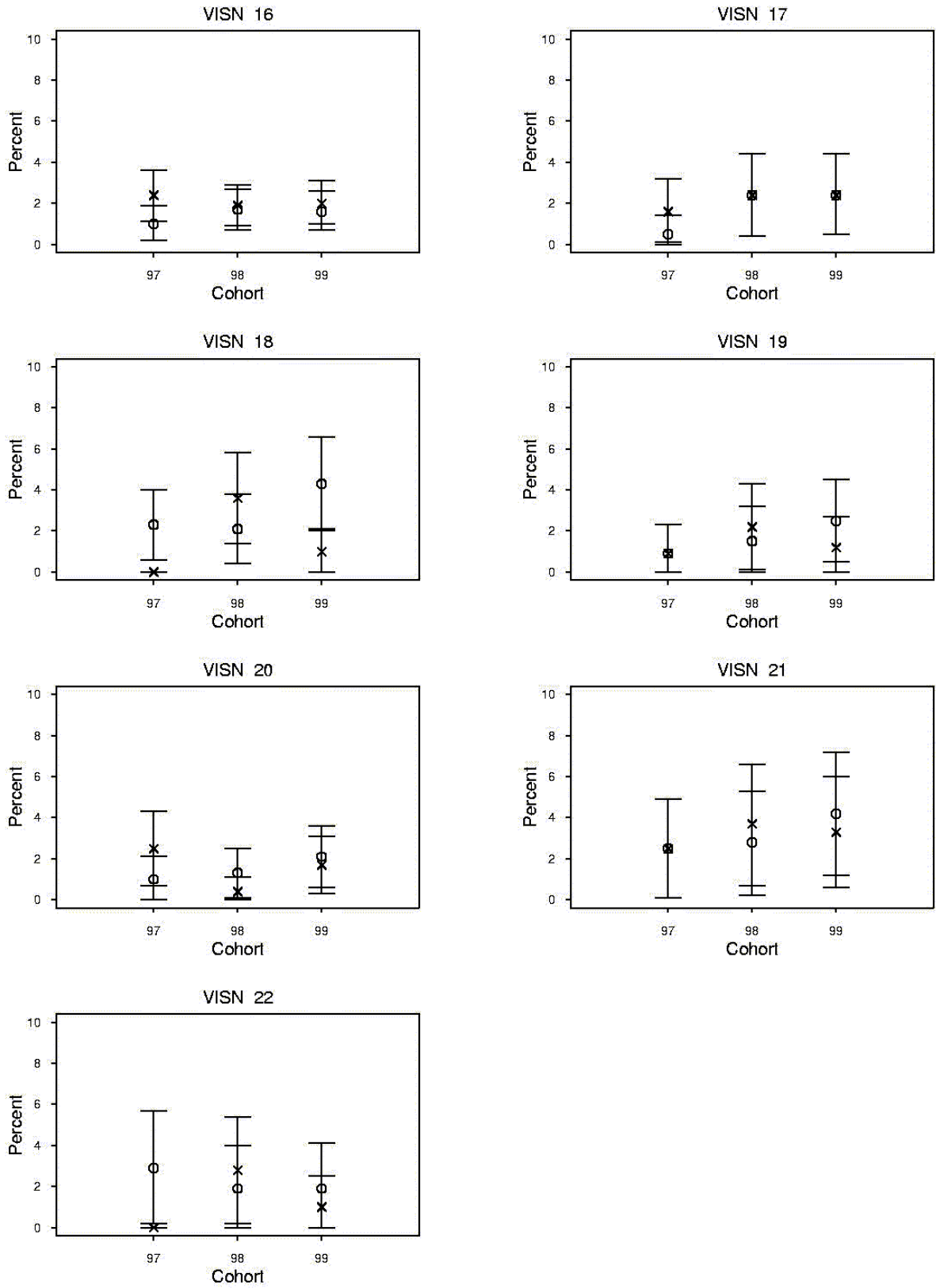
30 Day CHF Readmission Rates, Matched AMI Cohort



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Figure D9

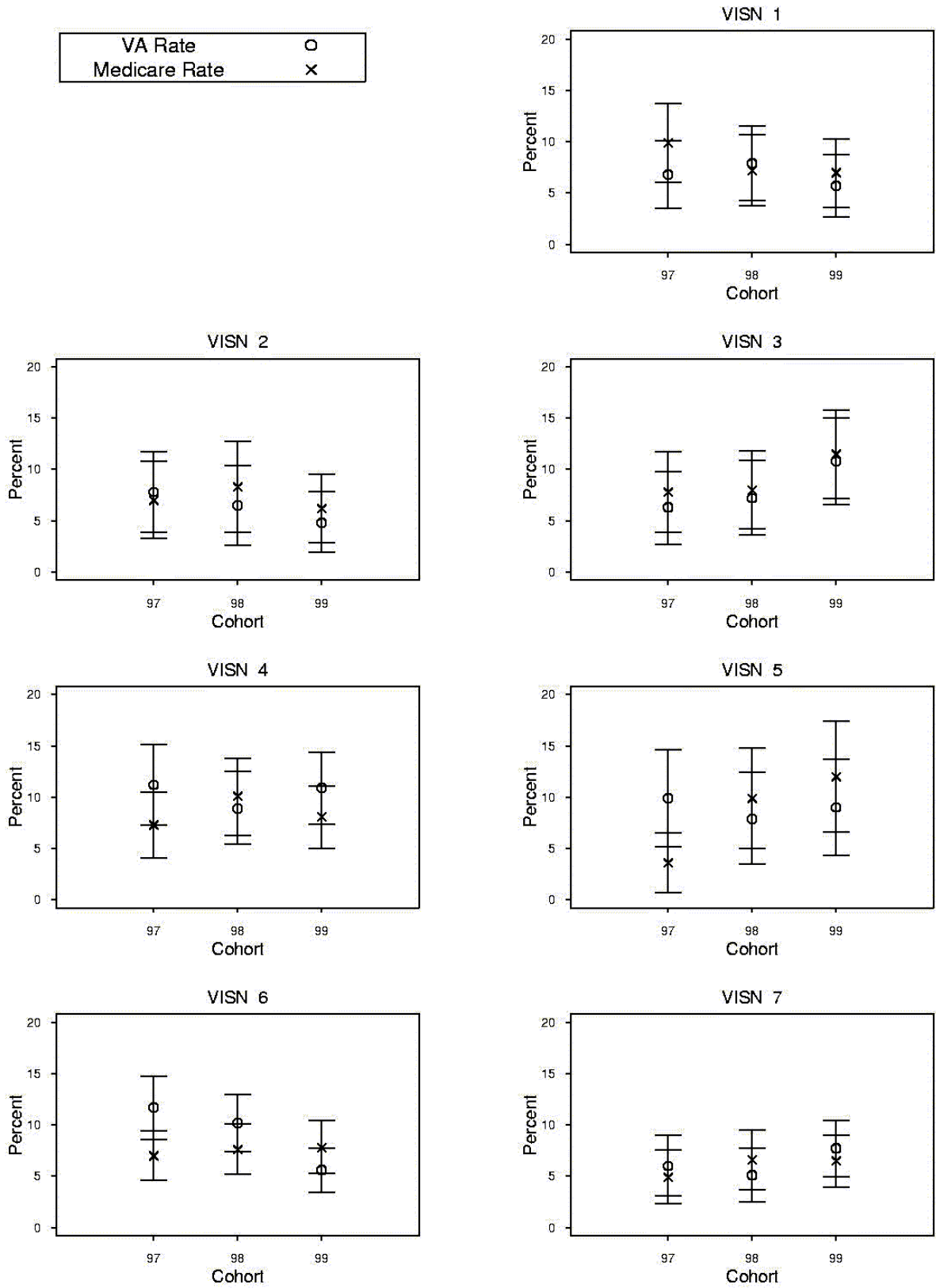
30 Day CHF Readmission Rates, Matched AMI Cohort



Program Evaluation of Cardiac Care Programs in the VHA

Figure D10

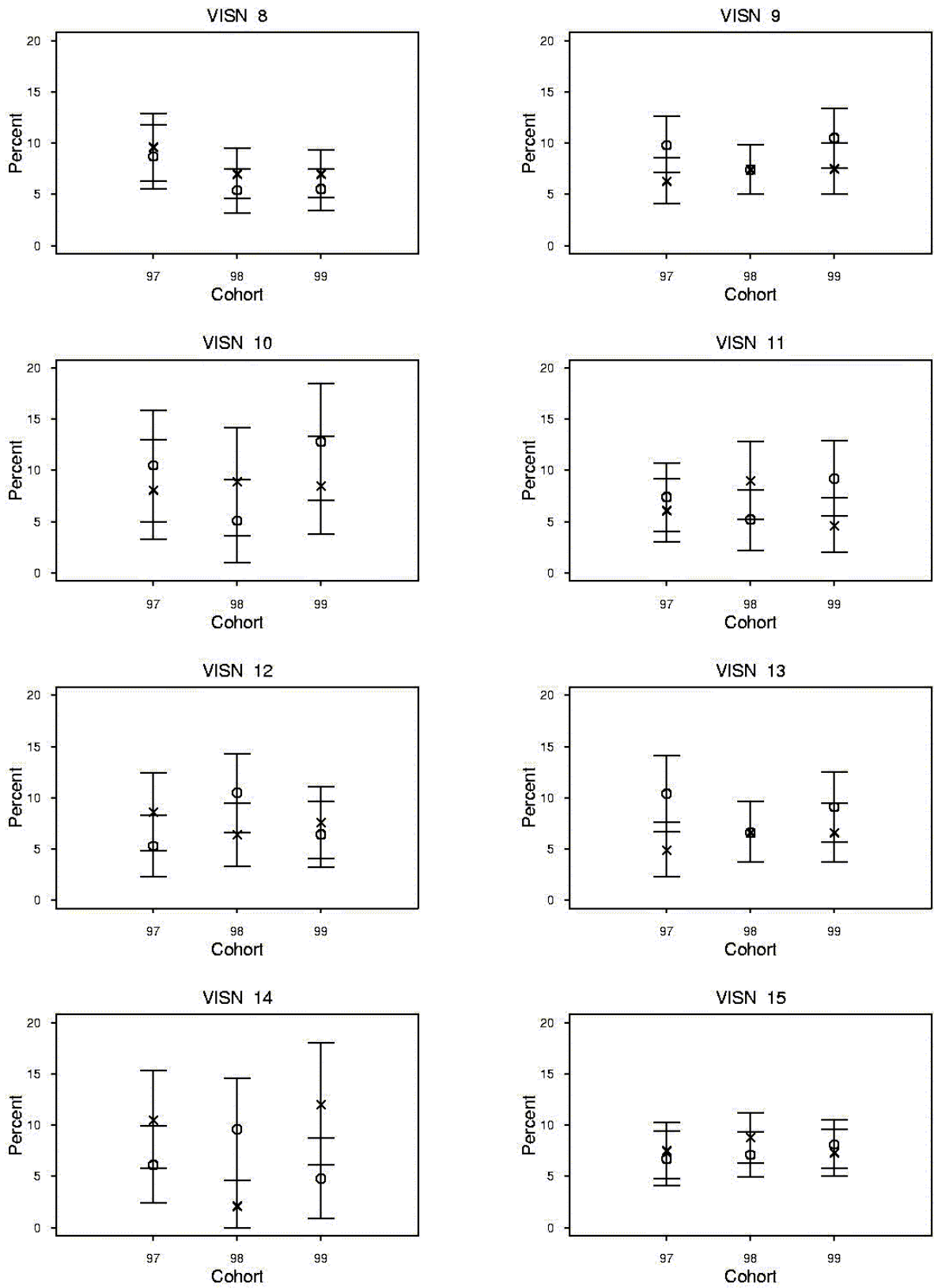
6 Month CHF Readmission Rates, Matched AMI Cohort



Program Evaluation of Cardiac Care Programs in the VHA

Figure D10

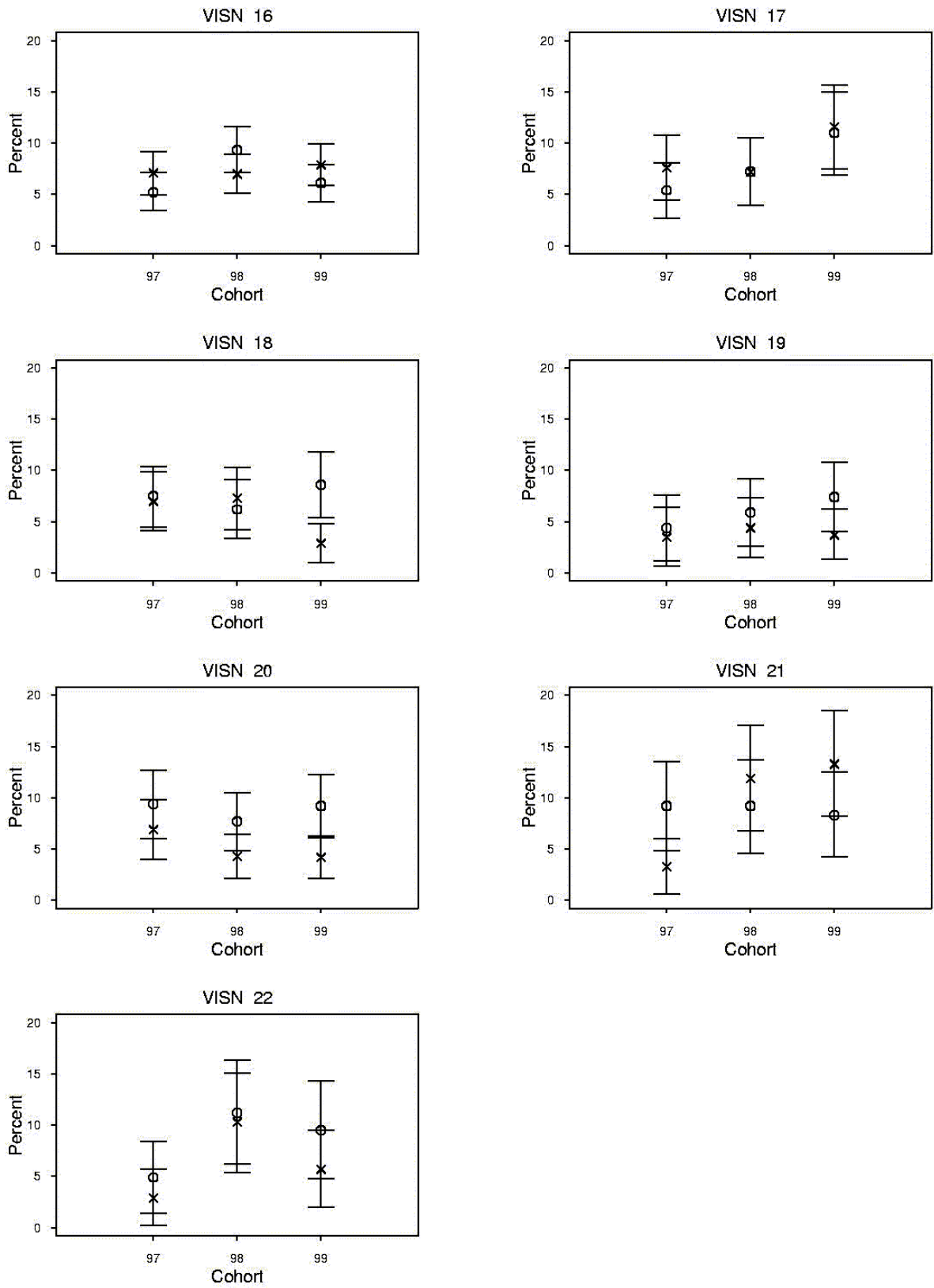
6 Month CHF Readmission Rates, Matched AMI Cohort



Program Evaluation of Cardiac Care Programs in the VHA

Figure D10

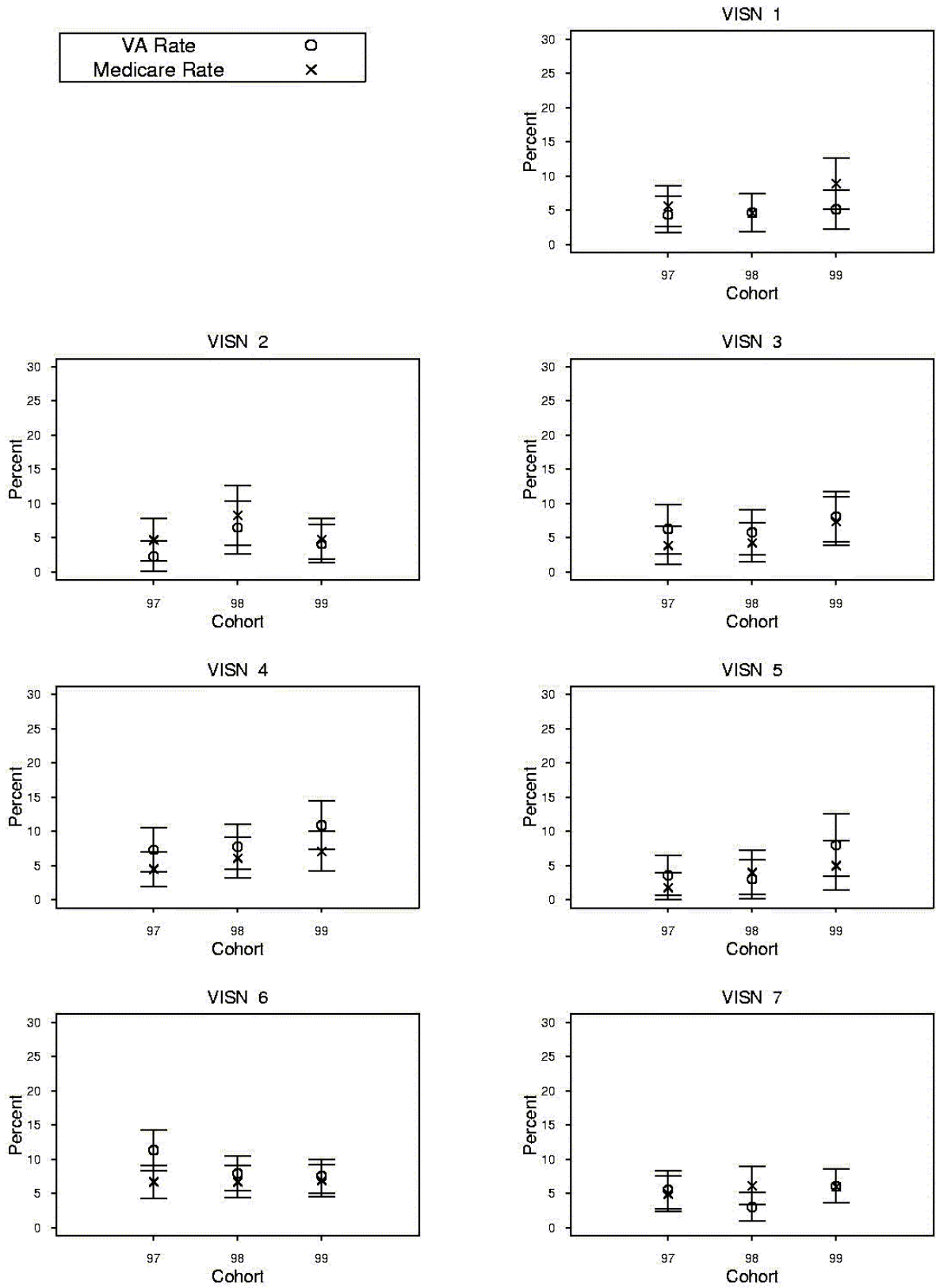
6 Month CHF Readmission Rates, Matched AMI Cohort



Program Evaluation of Cardiac Care Programs in the VHA

Figure D11

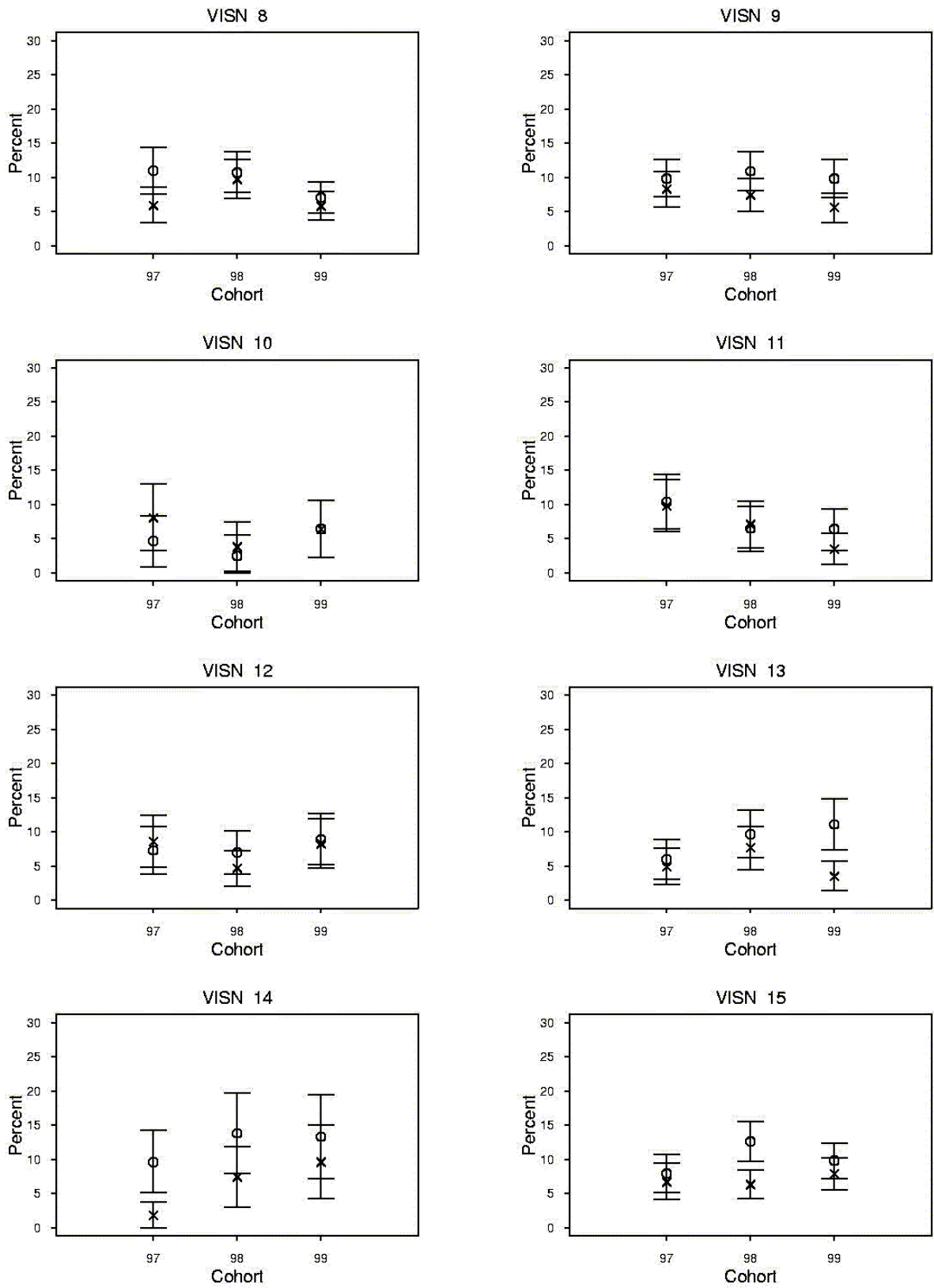
6 Month AMI Readmission Rates, Matched AMI Cohort



Program Evaluation of Cardiac Care Programs in the VHA

Figure D11

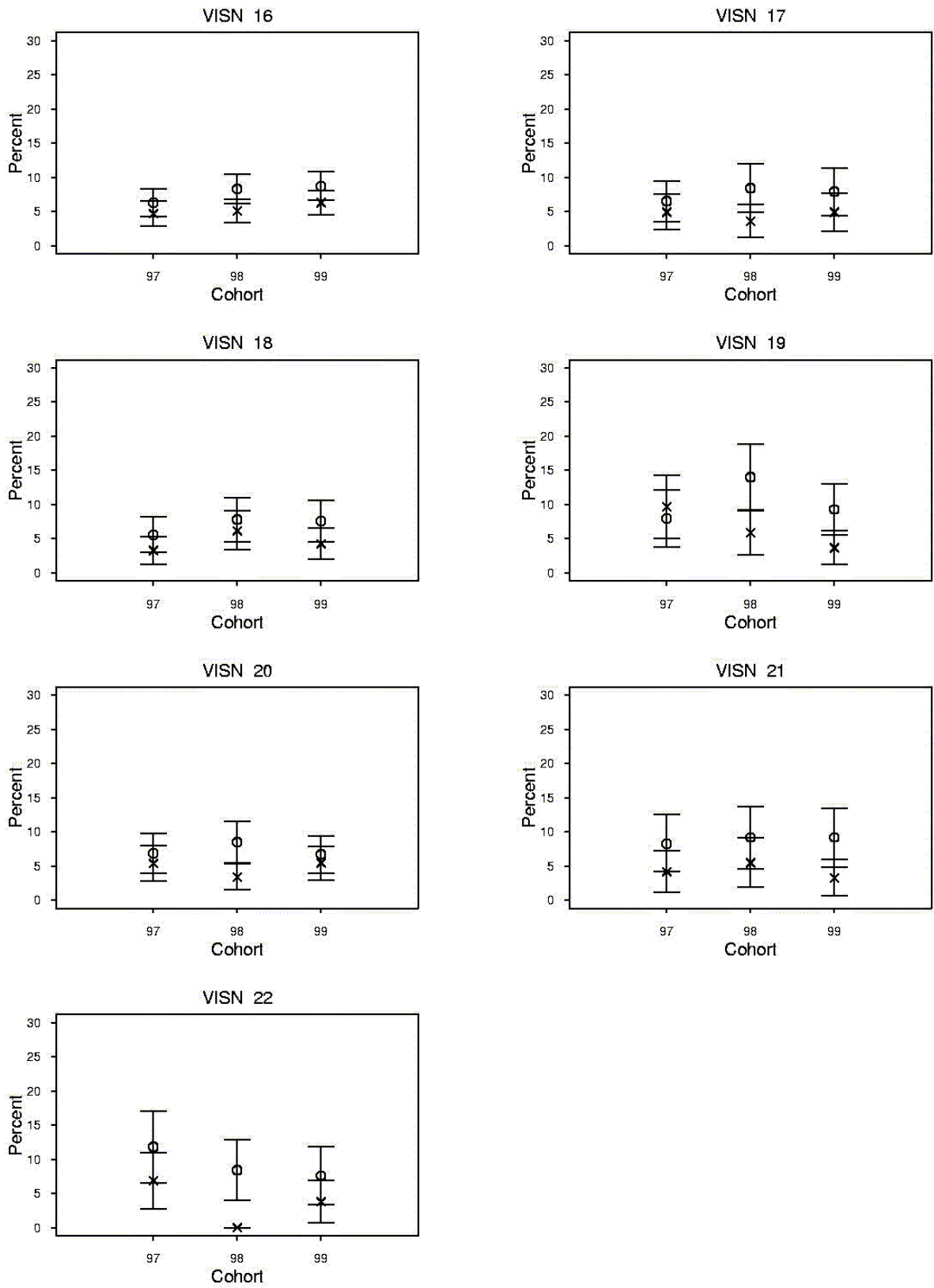
6 Month AMI Readmission Rates, Matched AMI Cohort



Program Evaluation of Cardiac Care Programs in the VHA

Figure D11

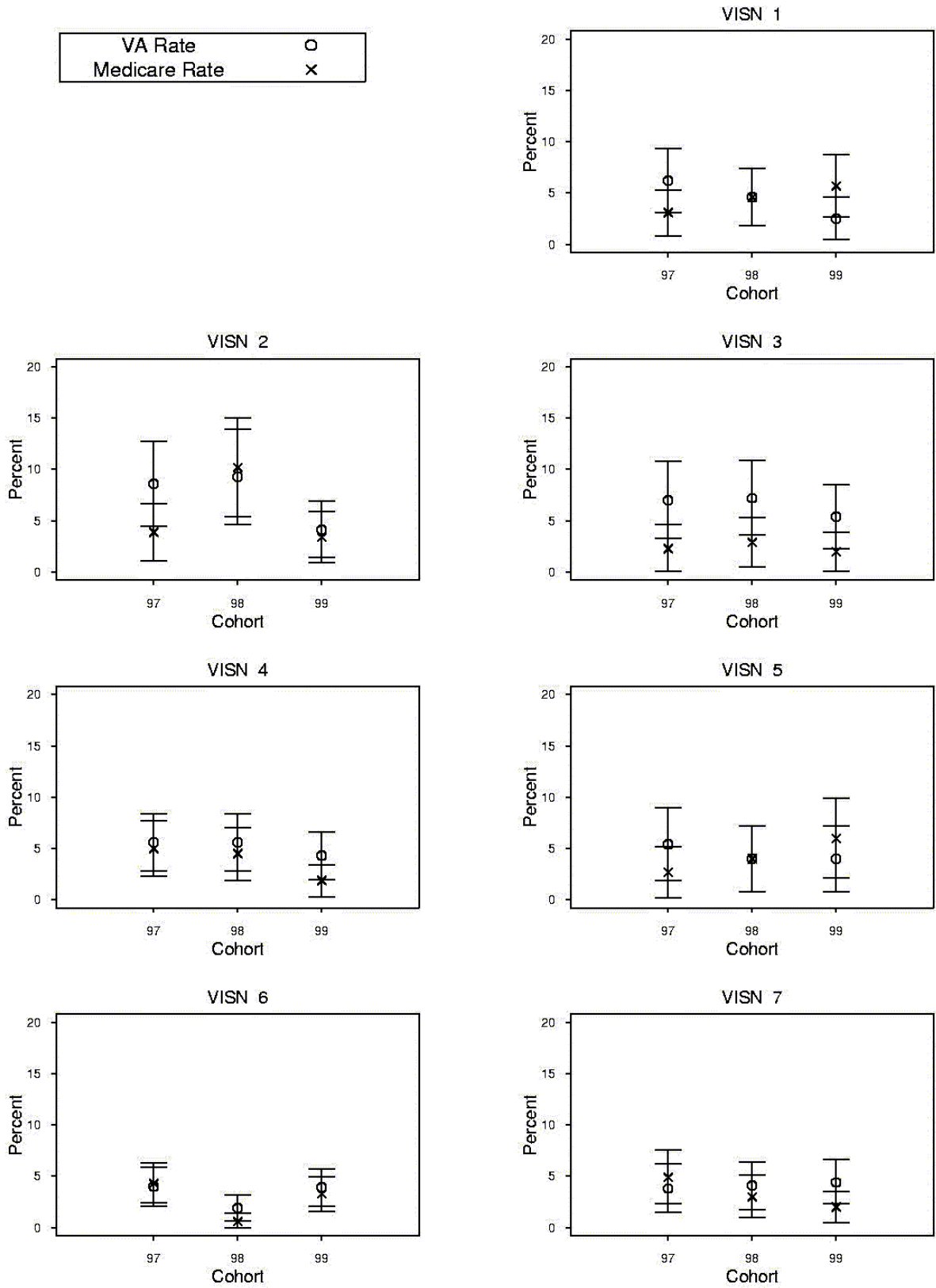
6 Month AMI Readmission Rates, Matched AMI Cohort



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Figure D12

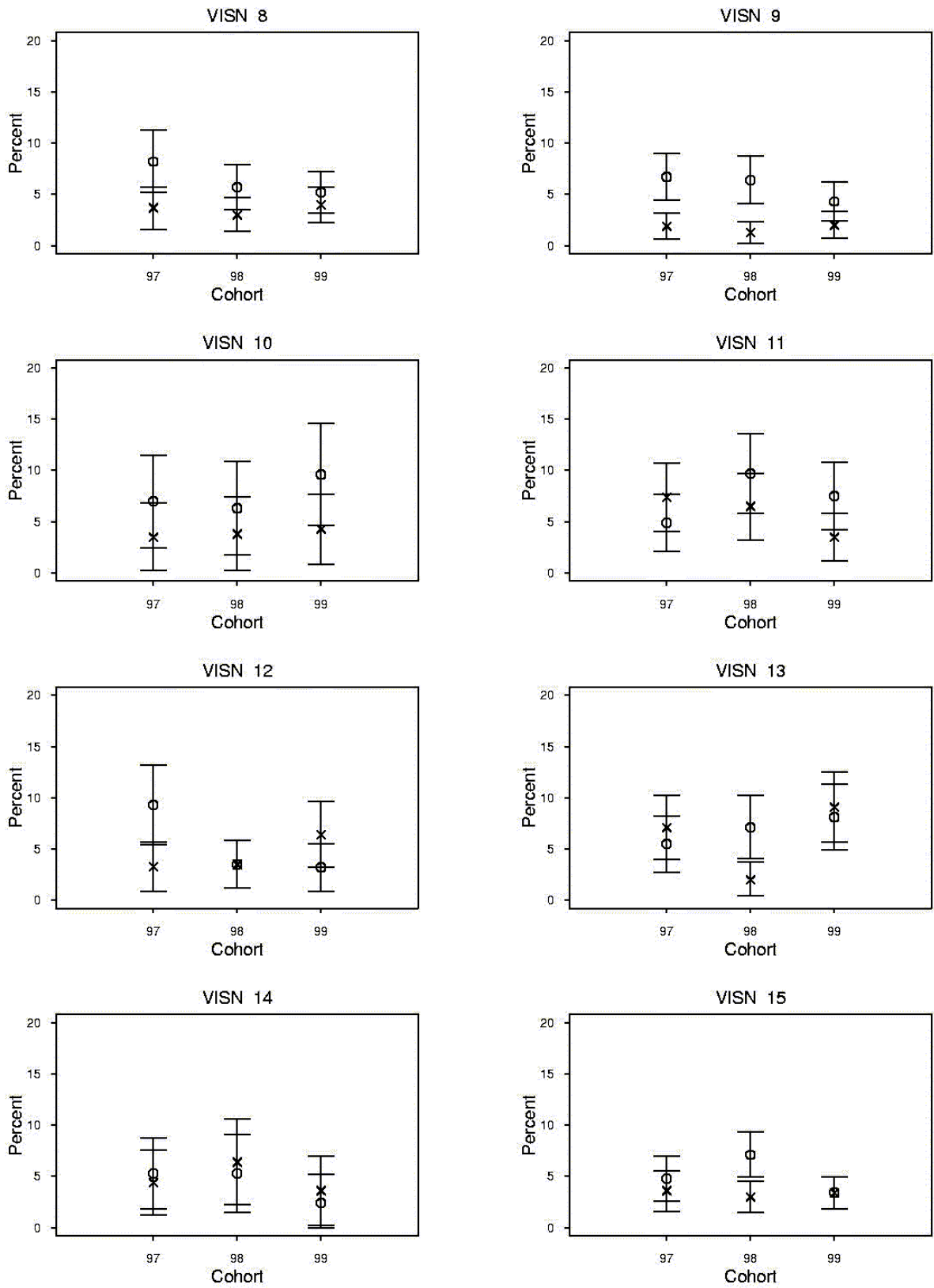
30 Day IHD Readmission Rates, Matched AMI Cohort



Program Evaluation of Cardiac Care Programs in the VHA

Figure D12

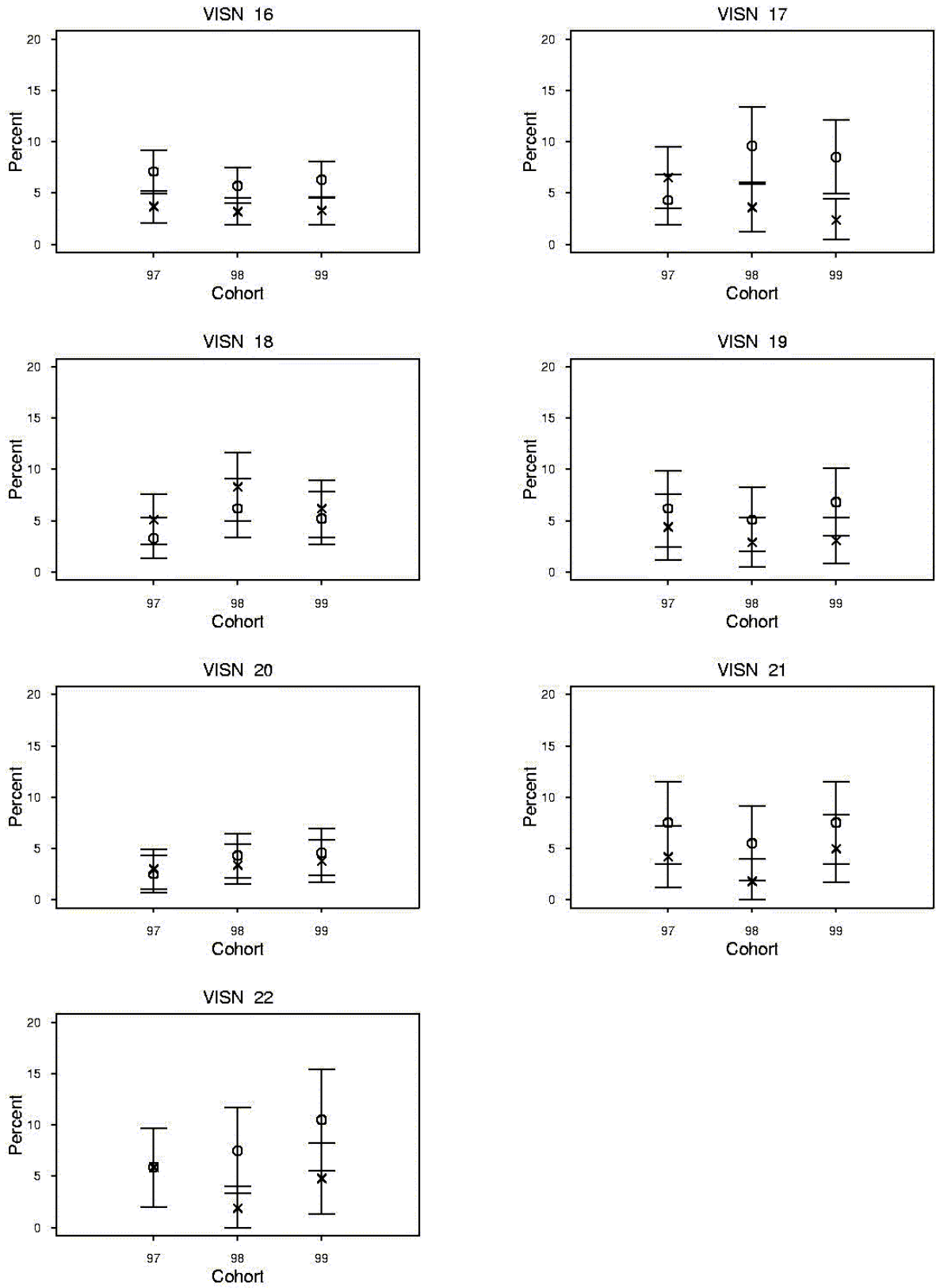
30 Day IHD Readmission Rates, Matched AMI Cohort



Program Evaluation of Cardiac Care Programs in the VHA

Figure D12

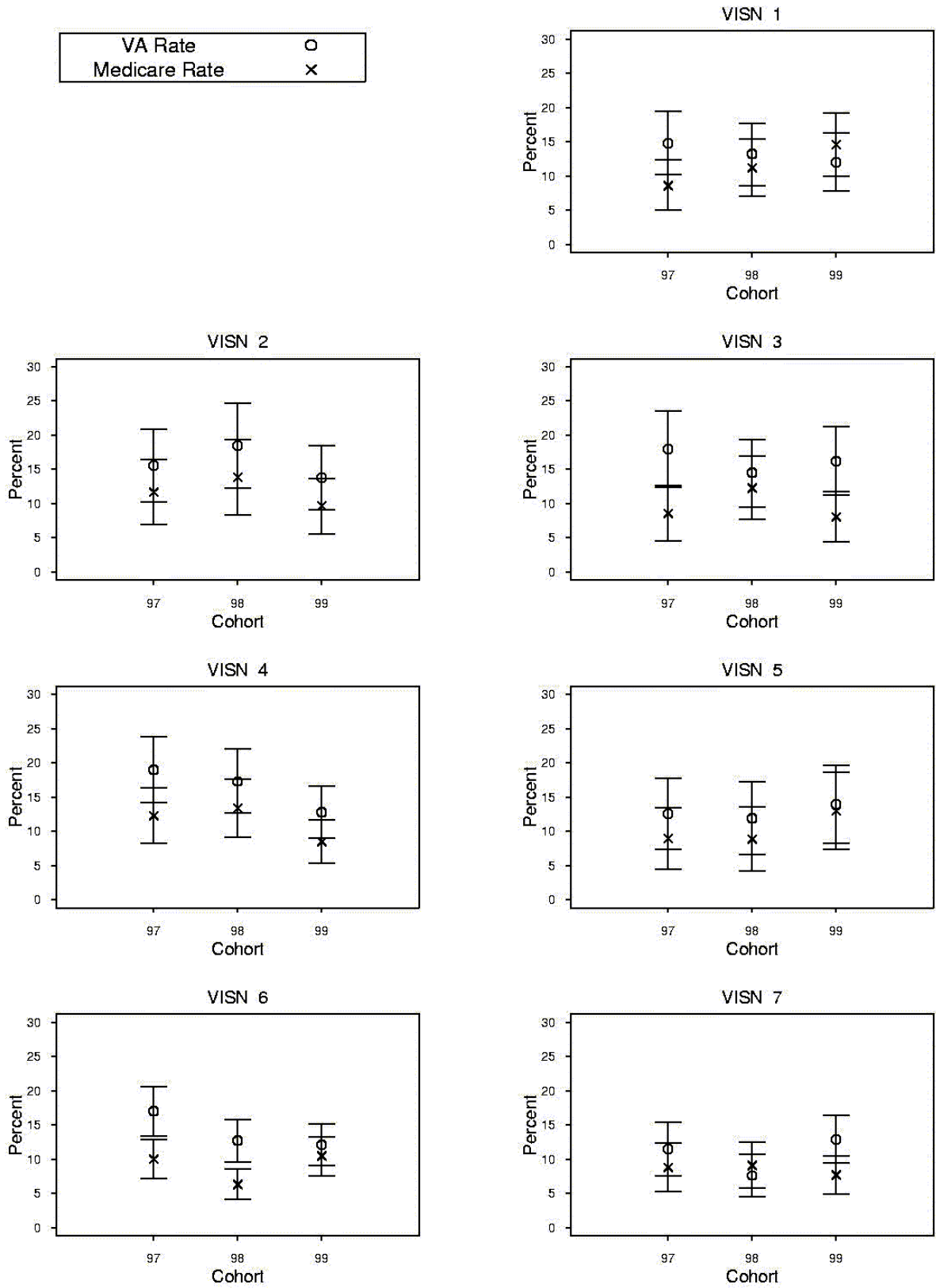
30 Day IHD Readmission Rates, Matched AMI Cohort



Program Evaluation of Cardiac Care Programs in the VHA

Figure D13

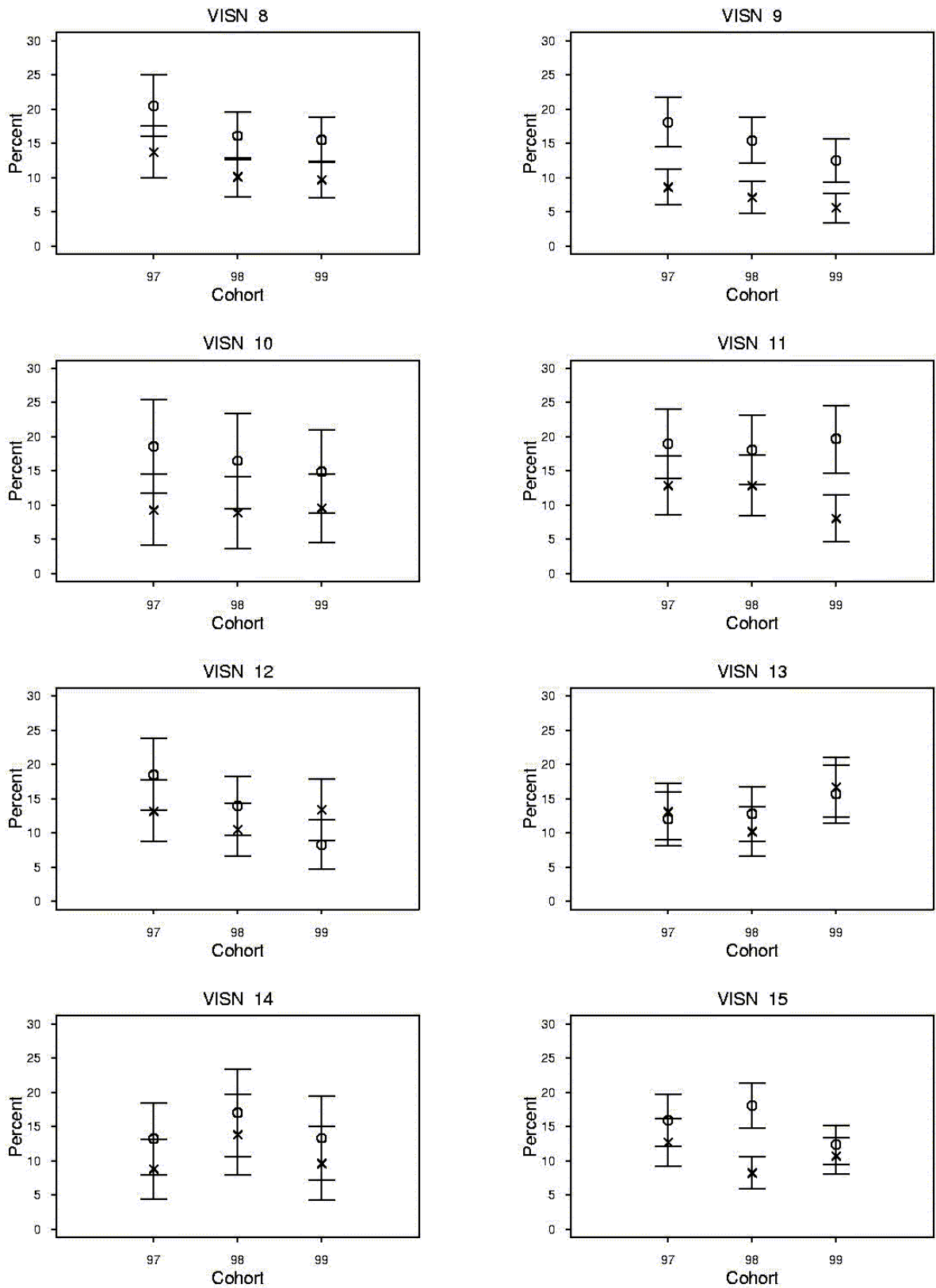
6 Month IHD Readmission Rates, Matched AMI Cohort



Program Evaluation of Cardiac Care Programs in the VHA

Figure D13

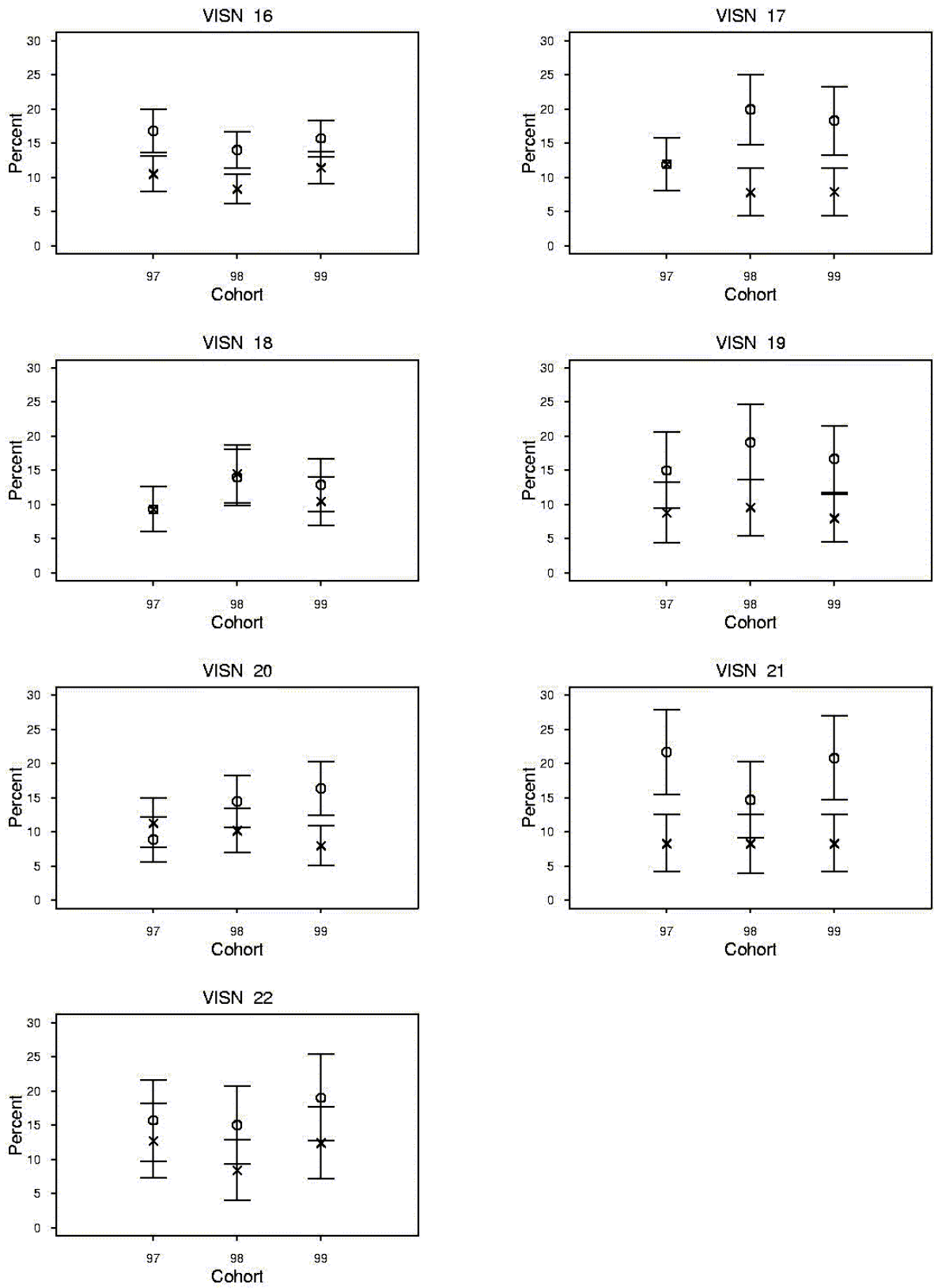
6 Month IHD Readmission Rates, Matched AMI Cohort



Program Evaluation of Cardiac Care Programs in the VHA

Figure D13

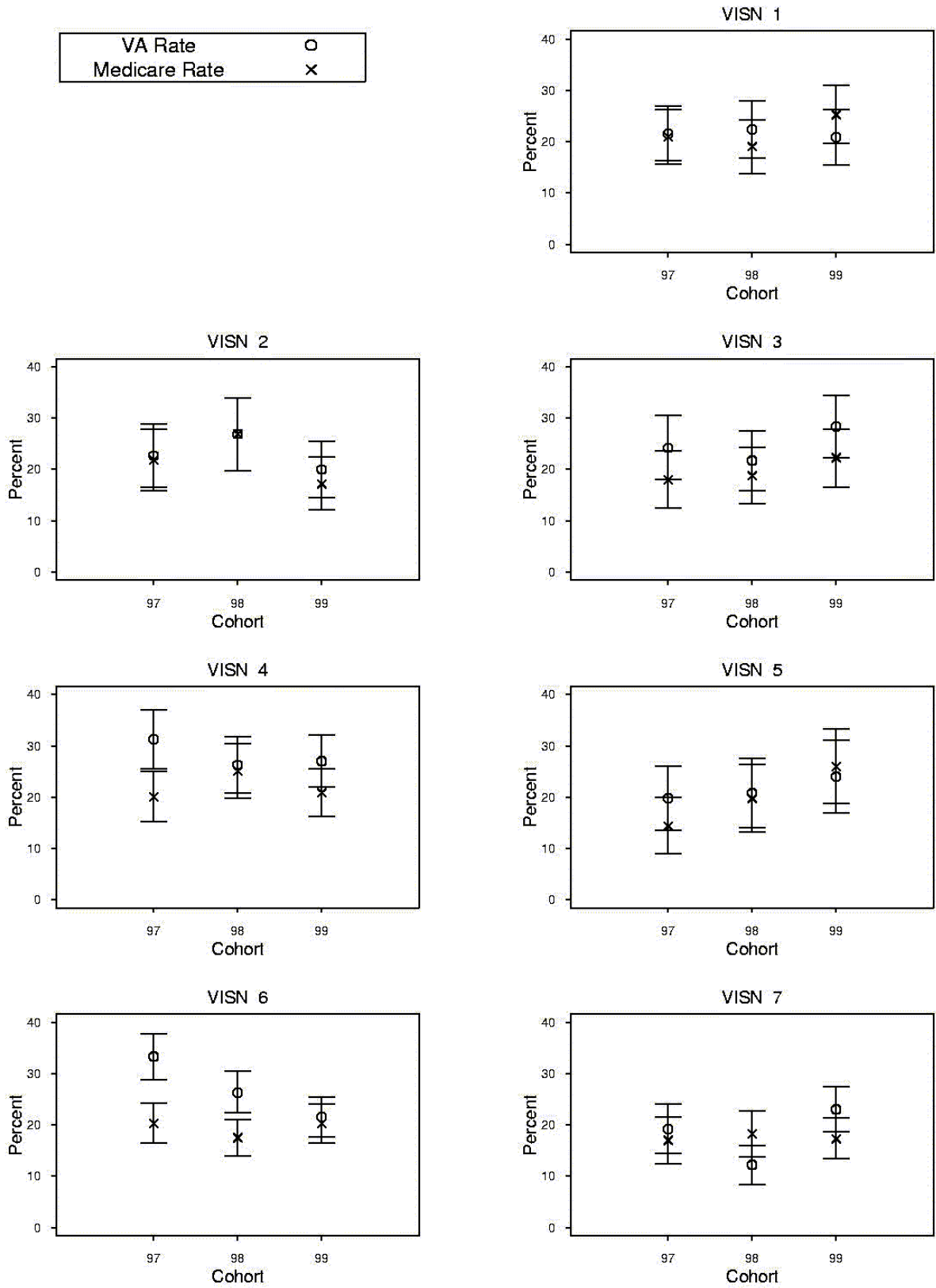
6 Month IHD Readmission Rates, Matched AMI Cohort



Program Evaluation of Cardiac Care Programs in the VHA

Figure D14

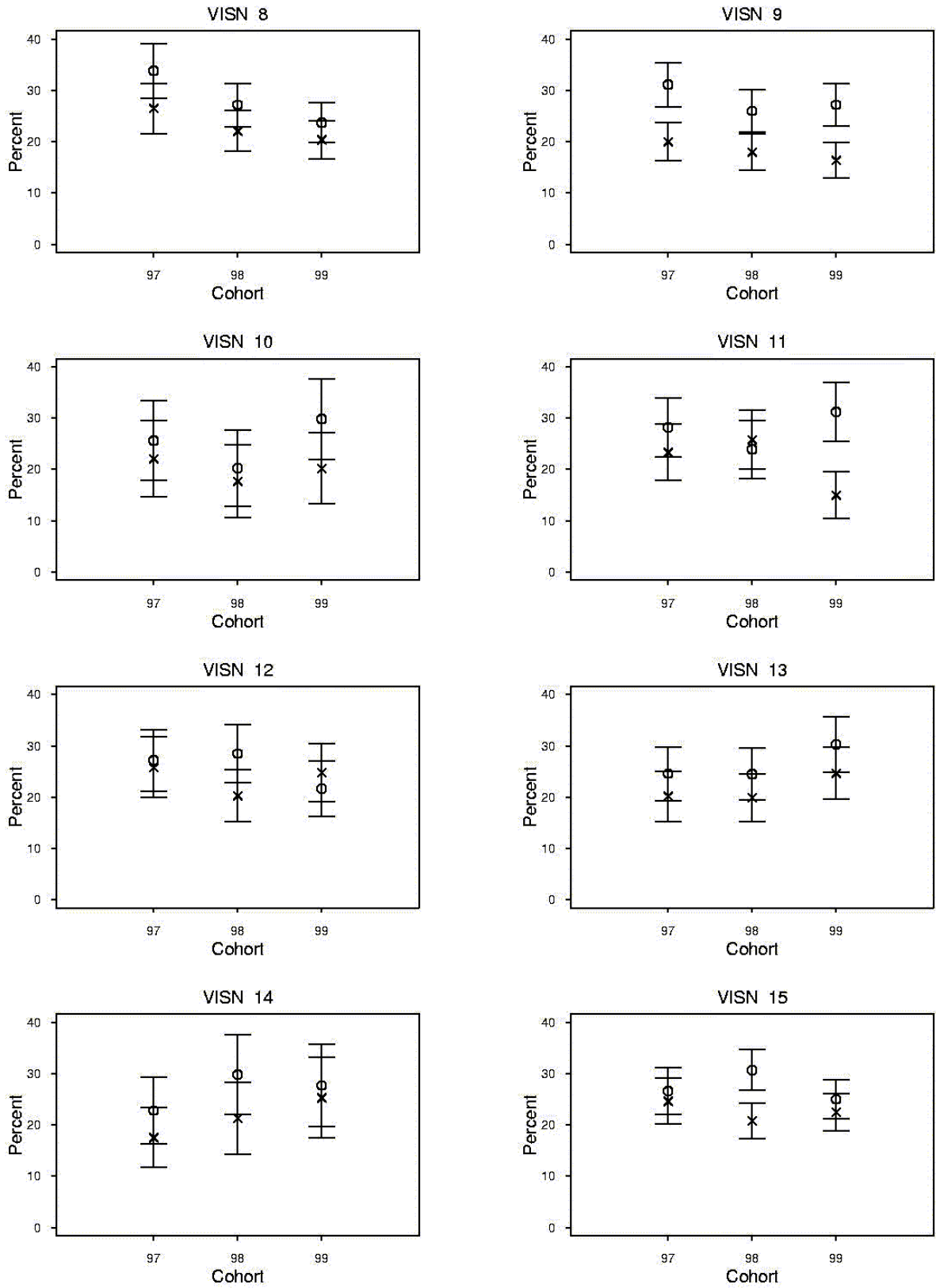
6 Month Readmission Rates, All Causes, Matched AMI Cohort



Program Evaluation of Cardiac Care Programs in the VHA

Figure D14

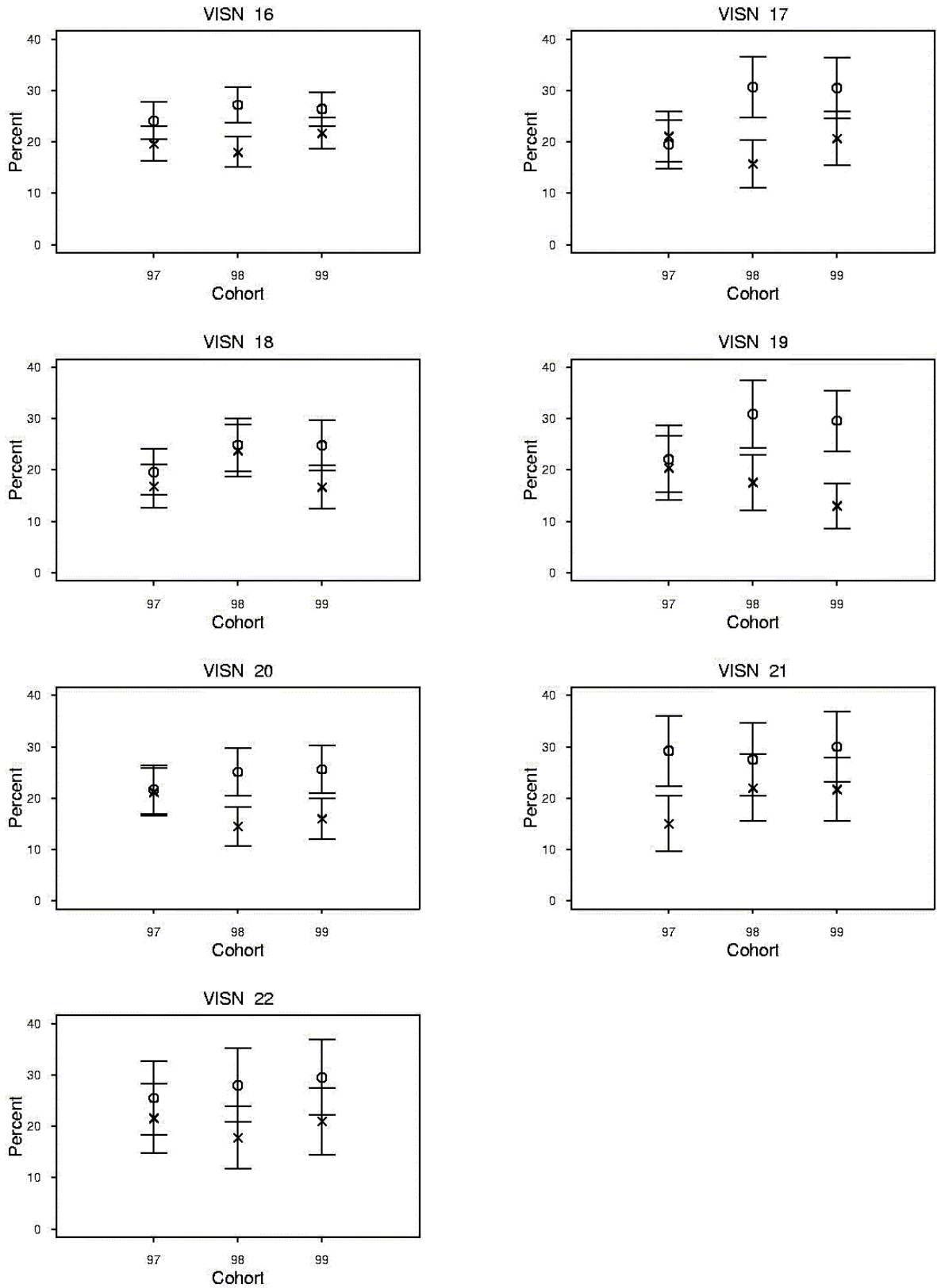
6 Month Readmission Rates, All Causes, Matched AMI Cohort



Program Evaluation of Cardiac Care Programs in the VHA

Figure D14

6 Month Readmission Rates, All Causes, Matched AMI Cohort



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