



# PCI-CAMPOS ADVISORY OVERSIGHT COMMITTEE JUNE 23<sup>TH</sup>, 2011



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## Pilot-Hospital Interventionalists

# Pilot-Hospital Coders

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## Doctors Medical Center

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Dennis Patrick

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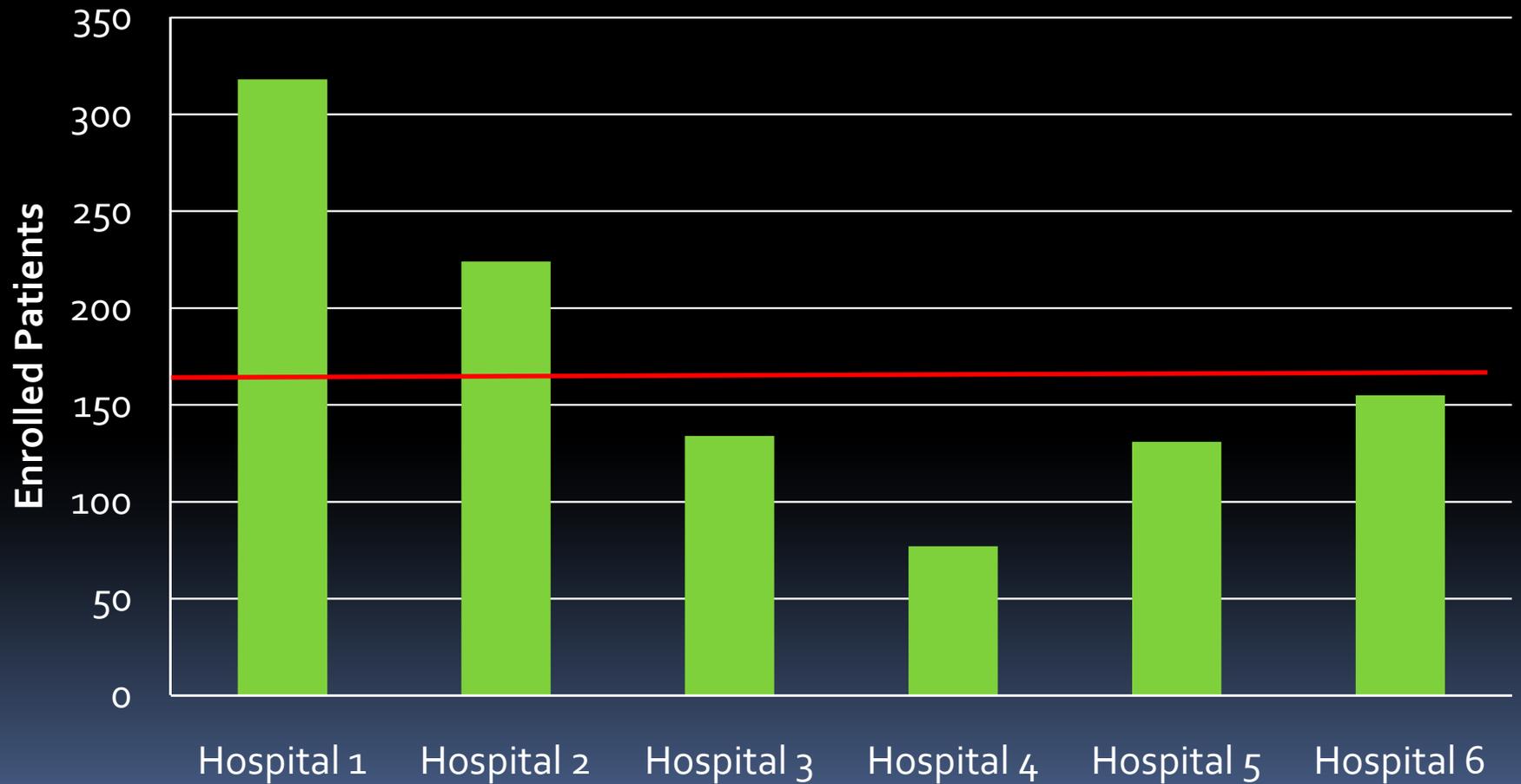
Jennifer Cardenas

# Enrollment Update

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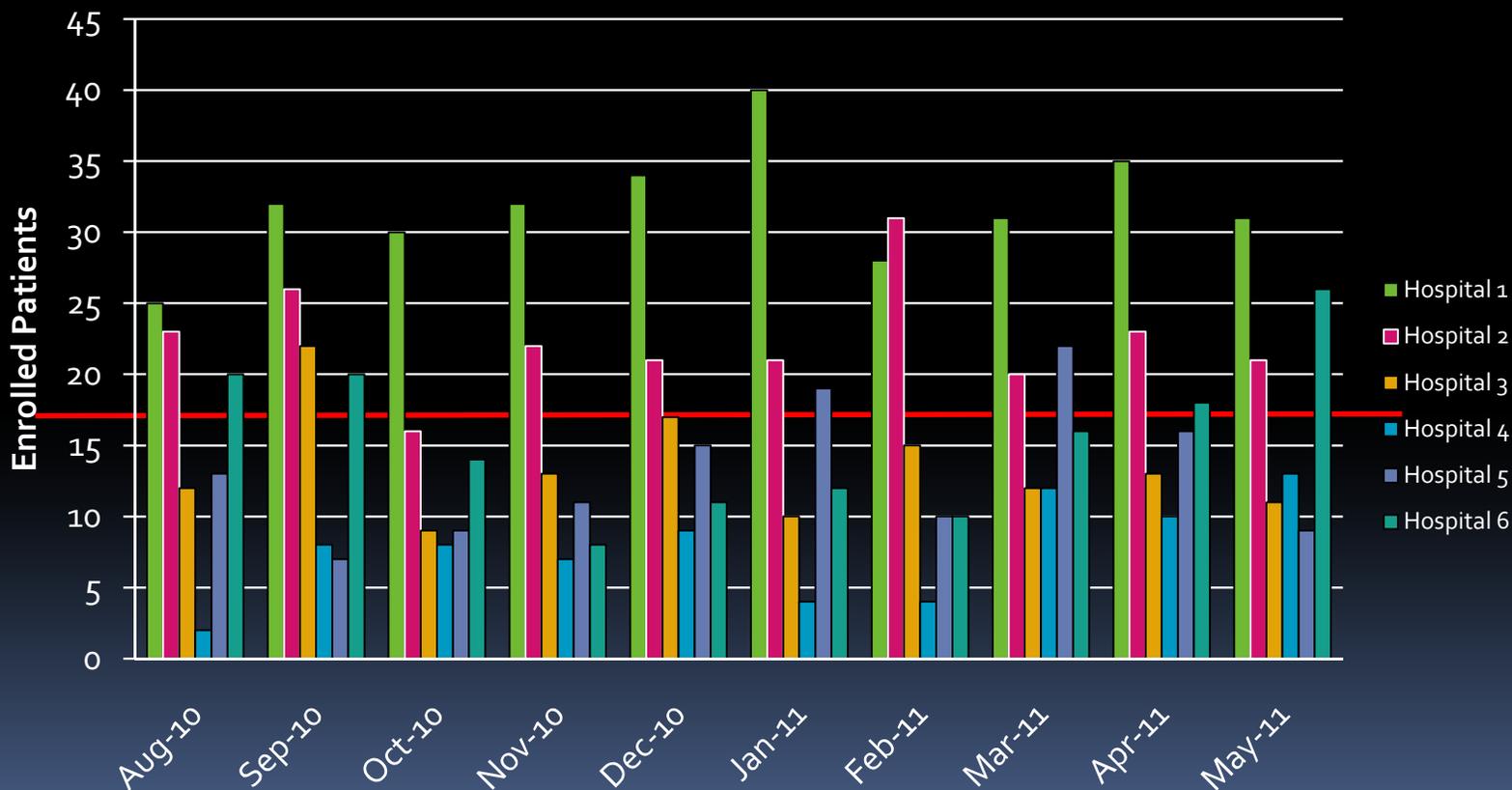
	5 months	10 months
▪ STEMI	177 (35.7%)	356 (34.3%)
▪ NSTEMI	140 (28.2%)	270 (26.0%)
▪ Unstable Angina	93 (18.8%)	219 (21.1%)
▪ Stable Angina	63 (12.7%)	156 (15.0%)
▪ No Sxs, no angina	22 (4.4%)	35 (3.4%)
▪ Sx unlikely to be ischemic	1 (0.2%)	3 (0.29%)
Total	496 patients	1,039 patients

# Enrollment per hospital(8/1/10-5/31/11)



# Monthly Enrollment Rates per Hospital

## Enrollment Rates by Month



# Enrollment Update: primary PCIs

	Total PCIs 2010	Primary PCIs 2010	Total PCIs 8/10 – 5/11	Primary PCIs 8/10 – 5/11
Pilot- Hospital 1	153	31 (20.26%)	318	60 (18.87%)
Pilot- Hospital 2	108	43 (22.22%)	224	85 (37.95%)
Pilot Hospital 3	73	30 (41.10%)	134	56 (41.79%)
Pilot- Hospital 4	34	9 (26.47%)	77	19 (24.68%)
Pilot Hospital 5	55	15 (27.27%)	131	39 (29.77%)
Pilot- Hospital 6	73	49 (67.12%)	155	97 (62.58%)

# Enrollment Update

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## Hospital 1 :

	5 months	10 months
▪ STEMI	31 (20%)	60 (18.9%)
▪ NSTEMI	49 (32%)	87 (27.4%)
▪ Unstable Angina	36 (24%)	76 (23.9%)
▪ Stable Angina	26 (17%)	75 (23.6%)
▪ No Sxs, No Angina	11 (7%)	19 (6.0%)
▪ Sxs unlikely to be ischemic	0 (0%)	1 (0.3%)
▪ Total procedures	153	318

# Enrollment Update

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## Hospital 2 :

	5 months	10 months
▪ STEMI	43 (39.8%)	85 (38.0%)
▪ NSTEMI	24 (22.2%)	52 (23.2%)
▪ Unstable Angina	20 (18.5%)	57 (25.4%)
▪ Stable Angina	14 (13.0%)	20 (8.9%)
▪ No Sxs, No Angina	7 (6.5%)	10 (4.5%)
▪ Sxs unlikely to be ischemic	0 (0%)	0 (0%)
▪ Total procedures	108	224

# Enrollment Update

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## Hospital 3 :

	5 months	10 months
▪ STEMI	30 (41.1%)	56 (41.8%)
▪ NSTEMI	17 (23.3%)	32 (23.9%)
▪ Unstable Angina	19 (26.0%)	33 (24.6%)
▪ Stable Angina	6 (8.2%)	10 (7.5%)
▪ No Sxs, No Angina	1 (1.4%)	2 (1.5%)
▪ Sxs unlikely to be ischemic	0 (0%)	1 (0.7%)
▪ Total procedures	73	134

# Enrollment Update

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## Hospital 4 :

	5 months	10 months
▪ STEMI	9 (26.5%)	19 (24.7%)
▪ NSTEMI	14 (41.2%)	28 (36.4%)
▪ Unstable Angina	4 (11.8%)	13 (16.9%)
▪ Stable Angina	5 (14.7%)	15 (19.5%)
▪ No Sxs, No Angina	1 (2.9%)	1 (1.3%)
▪ Sxs unlikely to be ischemic	1 (2.9%)	1 (1.3%)
▪ Total procedures	34	77

# Enrollment Update

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## Hospital 5 :

	5 months	10 months
▪ STEMI	15 (27.3%)	39 (29.8%)
▪ NSTEMI	23 (41.8%)	42 (32.1%)
▪ Unstable Angina	7 (12.7%)	20 (15.3%)
▪ Stable Angina	8 (14.6%)	26 (19.9%)
▪ No Sxs, No Angina	2 (3.6%)	4 (3.1%)
▪ Sxs unlikely to be ischemic	0 (0%)	0 (0%)
▪ Total procedures	55	131

# Enrollment Update

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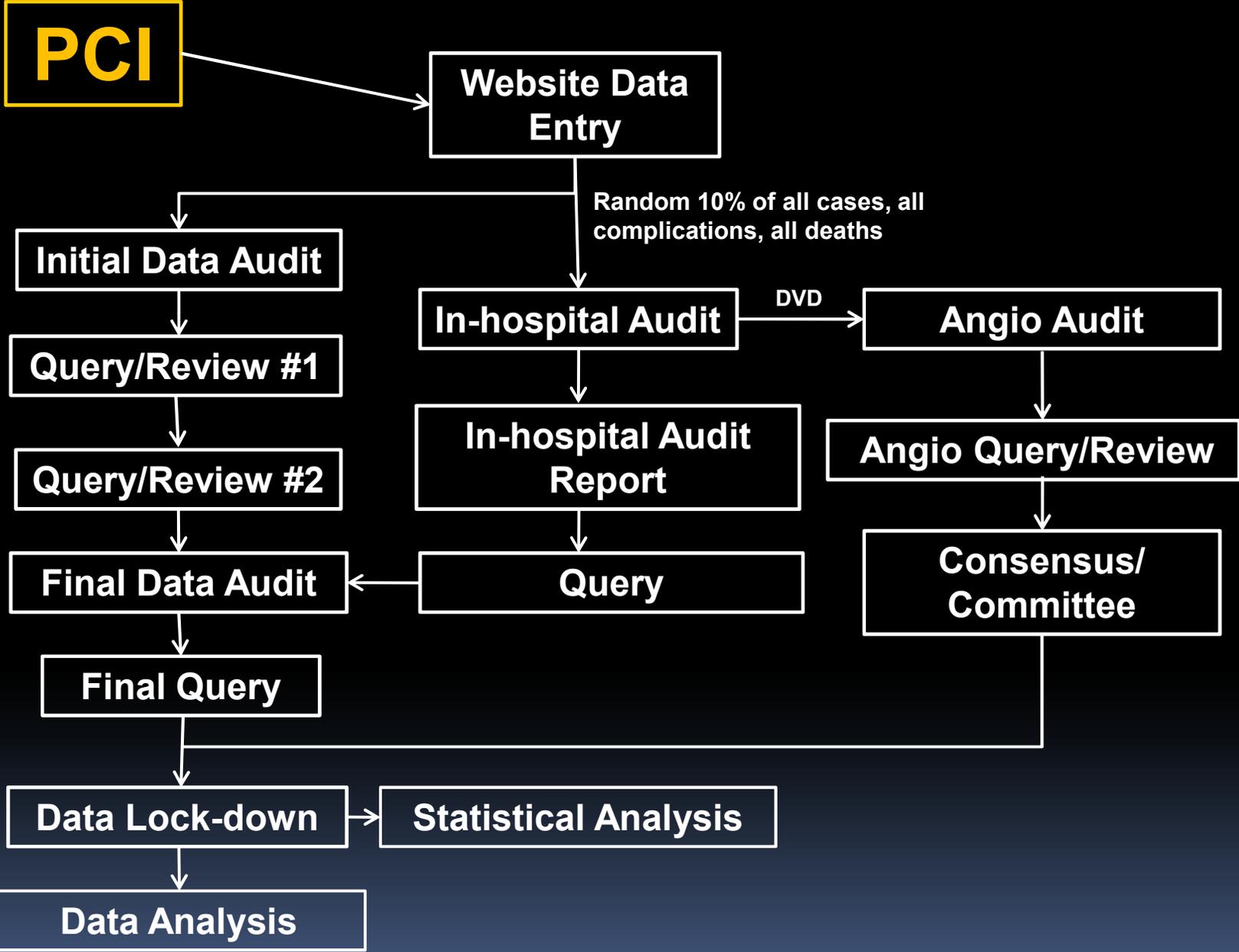
## Hospital 6 :

	5 months	10 months
▪ STEMI	49 (67.1%)	97 (62.6%)
▪ NSTEMI	13 (17.8%)	28 (18.1%)
▪ Unstable Angina	7 (9.6%)	21 (13.6%)
▪ Stable Angina	4 (5.5%)	9 (5.8%)
▪ No Sxs, No Angina	0 (0%)	0 (0%)
▪ Sxs unlikely to be ischemic	0 (0%)	0 (0%)
▪ Total procedures	73	155

# Website Update

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- Data lock-down all patients in 2010: 5/31/2011
- Velos 8.10: Automatic log-out warning, scheduled for 7/1/2011
- eCardio 2.0 : allows pilot coder to run data completeness and initiate harvest report, scheduled for 7/1/2011
- Server downtime: 6/2/2011, 8:00AM, reboot at 12:00PM, reloaded by 4:30PM



**Velos Servers**

**SAS Computer**

**Xcelera Server**

# Initial Data Audit

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- Completeness check
- Internal consistency (arrival date/procedure date, CHF, troponin/MI, PCI-status, CABG/graft, CTO/STEMI, appropriate meds)
- NCDR definitions compliance

# In-Hospital Audits

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## **208 audits at pilot-hospitals**

- Hospital 1: 68 procedures audited
- Hospital 2: 53 procedures audited
- Hospital 3: 21 procedures audited
- Hospital 4: 12 procedures audited
- Hospital 5: 17 procedures audited
- Hospital 6: 37 procedures audited

# Angiographic Audit: Diagnostic

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- IABP or other mechanical ventricular support
- Diagnostic cath (and/or left heart cath) done
- Diagnostic cath status (elective, urgent, emergent, salvage)
- Coronary anatomy: % stenosis in  $\geq 2$ mm vessels and grafts
  - LM
  - Prox. LAD
  - Mid/Distal LAD, diag. branches
  - CIRC, OMs, LPDA, LPL branches
  - RCA, RPDA, RPL, AM branches
  - Ramus

# Angiographic Audit: PCI

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- Segment number of PCI coronary artery
- Culprit Lesion,
- Stenosis immediately prior to RX
  - If 100%: CTO
  - If 40-70%: IVUS
  - If 40-70%: FFR
    - If Yes: Ratio
- Pre-procedure TIMI Flow
- Prev. treated lesion
- Lesion in graft
- **Lesion complexity**
- Lesion length
- Thrombus present

# Lesion Complexity

## Non-High/Non-C Lesion

Non-high/non-C lesions are considered Type A or B lesions. They can be characterized as follows:

### Low Risk or Type A lesions:

- Discrete (<10 mm length)
- Concentric
- Readily accessible
- Non-angulated segment <45 degrees
- Smooth contour
- Little or no calcification
- Less than totally occlusive
- Not ostial in location
- No major branch involvement
- Absence of thrombus

### Medium Risk (Type B1) lesions:

- Tubular (10-20 mm length)
- Eccentric
- Moderate tortuosity of proximal segment
- Moderately angulated segment, 45-90 degrees
- Irregular contour
- Moderate to heavy calcification
- Ostial in location
- Bifurcation lesions requiring double guidewires
- Some thrombus present
- Total occlusion <3 months old

Medium Risk (Type B2 lesions): Two or more "B" characteristics.

## High/C Lesion

### Descriptions of a High Lesion Risk (C Lesion):

- Diffuse (length > 2cm)
- Excessive tortuosity of proximal segment
- Extremely angulated segments > 90 degrees
- Total occlusions > 3 months old and/or bridging collaterals
- Inability to protect major side branches
- Degenerated vein grafts with friable lesions

# Angiographic Audit: PCI

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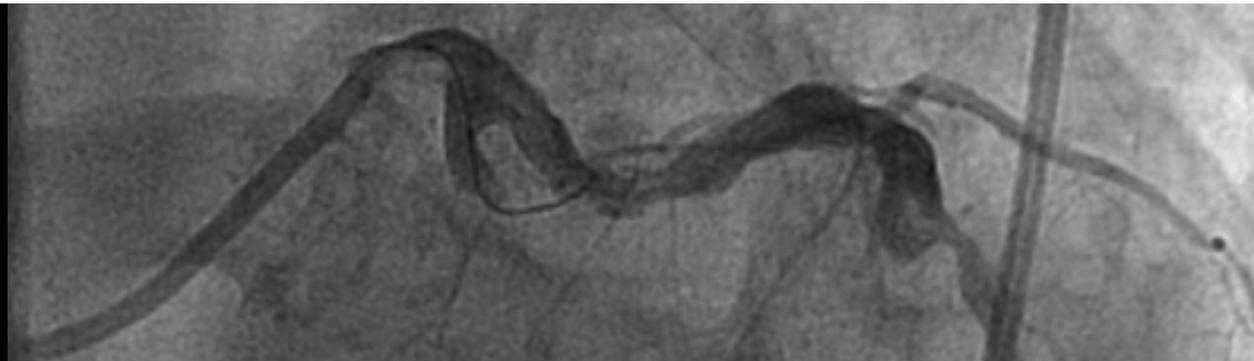
- Bifurcation lesion
- Guidewire across lesion
- Stenosis post-procedure
- Post-procedure TIMI flow
- Device deployed
- Intracoronary devices used
- PCI complication: Significant dissection or perforation
- LVEF (if documented)

# Angiographic Audit: Example 1

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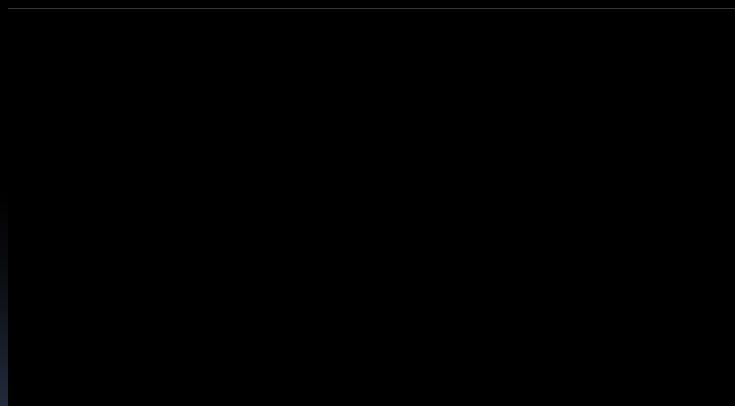
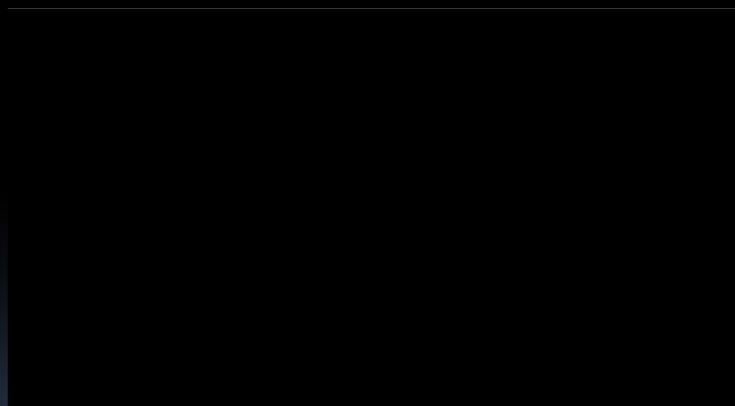


# Angiographic Audit: Example 2abc



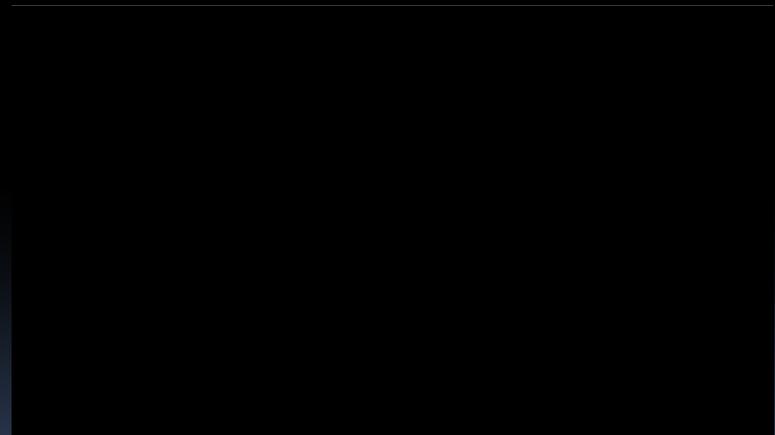
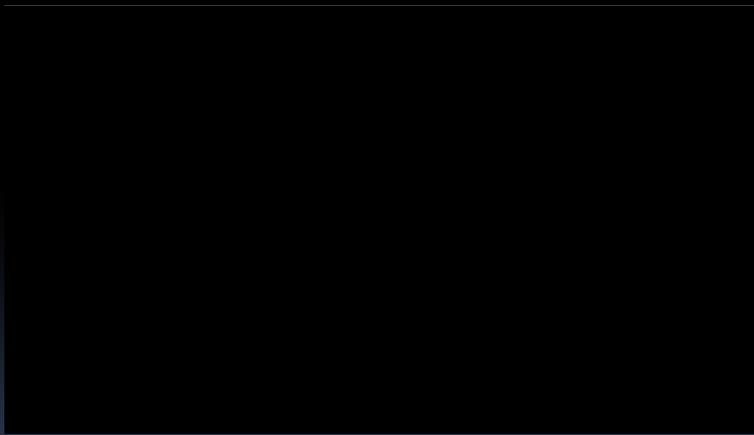
# Angiographic Audit: Example 2a

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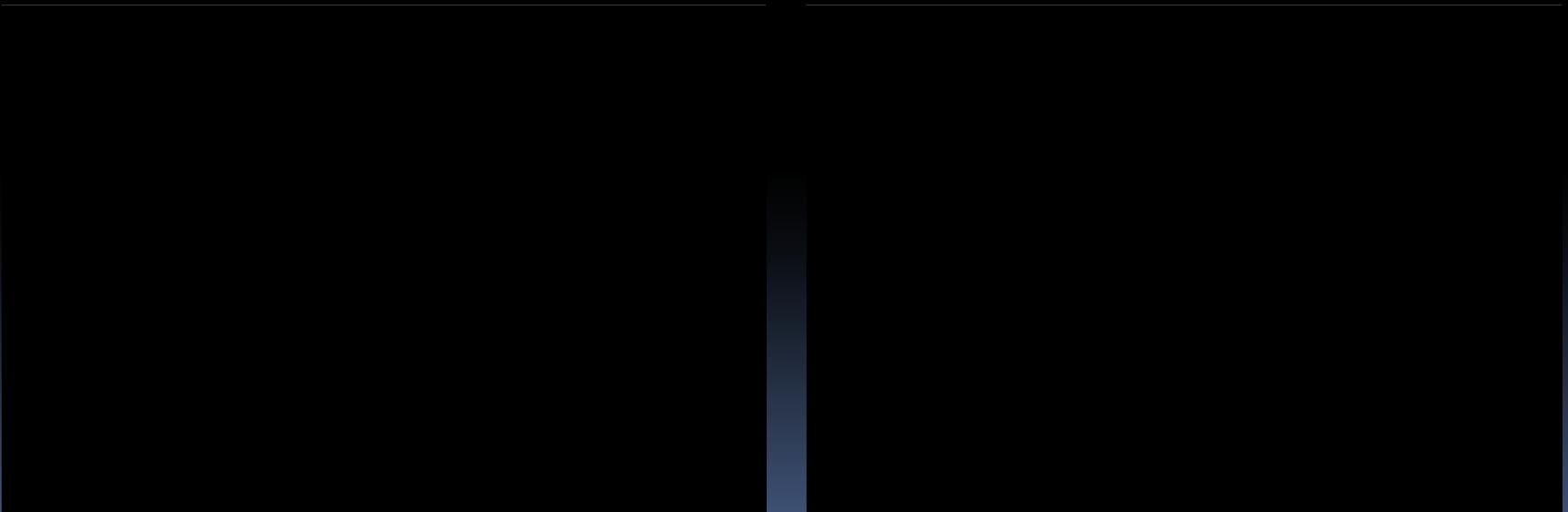
# Angiographic Audit: Example 2b

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# Angiographic Audit: Example 2c

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# Compassionate Use Criteria

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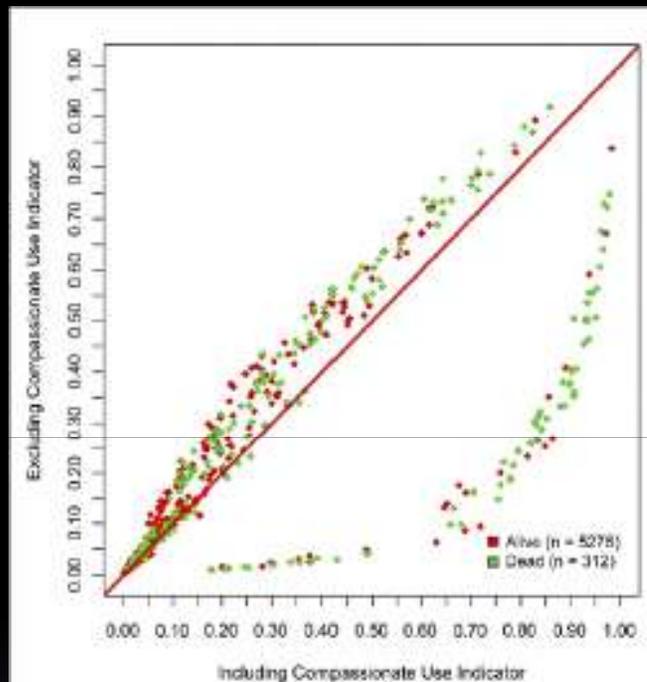
- Coma on presentation
- Use of ventricular assist device
- CPR at start of procedure

# Massachusetts: compassionate use

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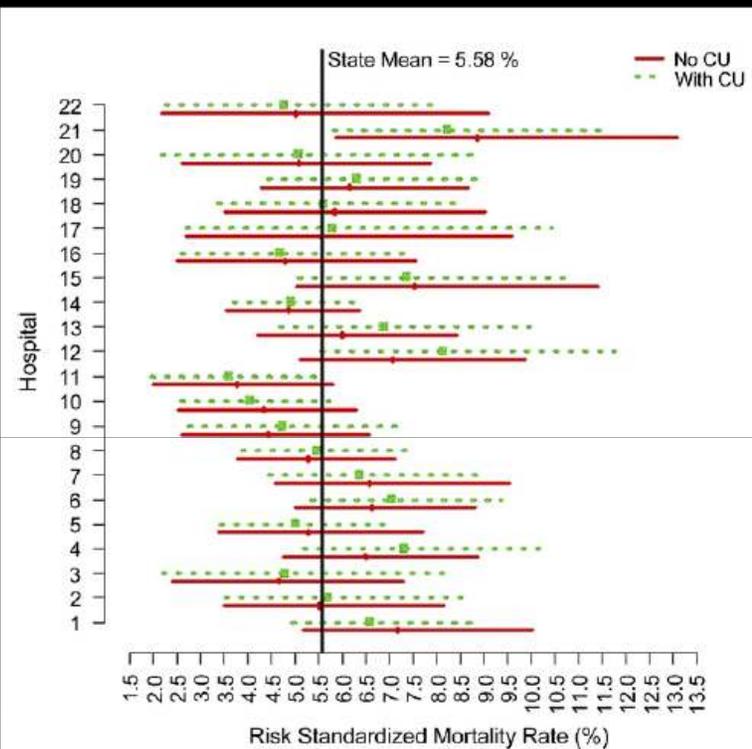
- STEMI or shock: 18.9%
- Compassionate Use: 1.7%
- Cardiogenic shock : 8.2 vs 65.6%
- IABP: 12.5 vs 49%
- Renal insuff: 4.1 vs 15.6%
- Procedure success: 94.2 vs 79.2%
- Mortality: 4.5 vs 69.8%

# Compassionate Use



**Figure 1** Impact of Inclusion of CU on Predicted Mortality in 5,588 PCI Patients With Shock or STEMI

Impact of inclusion of compassionate use (CU) indicator on predicted mortality for patients in the high-risk (cardiogenic shock or ST-elevation myocardial infarction [STEMI]) cohort. The **horizontal axis** represents the predicted mortality excluding CU, whereas the **vertical axis** represents predicted mortality after inclusion of the CU indicator covariate. The **diagonal line** indicates no change in predicted mortality for individual cases. The patients with CU features had significant increases in their predicted mortality, which further discriminated patients who survived versus those who were an in-hospital fatality. PCI = percutaneous coronary intervention.

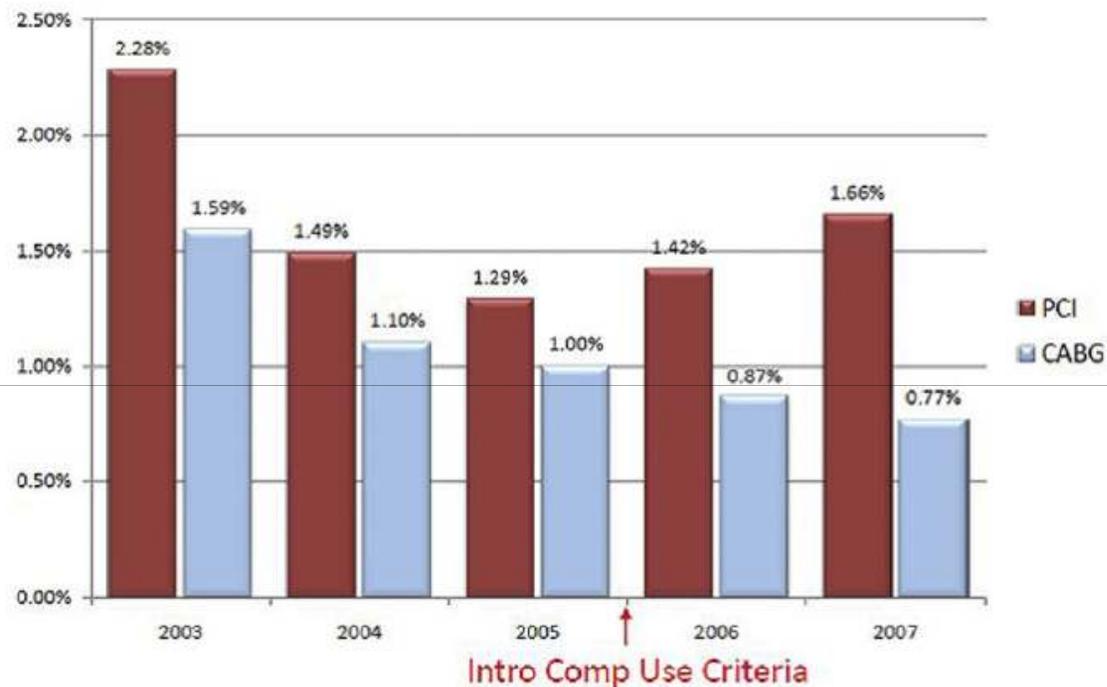


**Figure 2** Hospital Risk-Adjusted Mortality With and Without CU Variable

Posterior mean risk-standardized mortality rates and corresponding 95% intervals (x axis) for each Massachusetts hospital (y axis) based on a hierarchical model excluding the compassionate use (CU) variable (**solid red line**) and on a hierarchical model including the CU variable (**dashed green line**).

Resnic et al., J Am Coll Cardiol 2011; 57(8), 904-11.

# Compassionate Use



**Figure 3** Emergent Revascularization for Cardiogenic Shock in Massachusetts, 2003–2007

Temporal trends of the prevalence of treatment for cardiogenic shock for both the percutaneous coronary intervention (PCI) (**red bars**) and isolated coronary artery bypass graft (CABG) (**blue bars**) cohorts in Massachusetts, 2003–2007. The **red arrow** indicates the time of introduction of the compassionate use (Comp Use) indicator covariates in the PCI mortality prediction models. There was no change in the risk prediction methodology for isolated CABG during the study period. A change in the prevalence of cardiogenic shock as an indication for PCI is noted to be temporally associated with the introduction of the compassionate use indicator covariate.

Resnic et al., J Am Coll Cardiol 2011; 57(8), 904-11.

# Compassionate Use

File Edit View Favorites Tools Help

★ Patient Form

Current Page: Patient Form

velos Patient Search Study Patients Report Central

Homepage Demographics Patient Profile Protocols Reports Appendix

Personalize Account Manage Patients Report Central Ad-Hoc Queries Help Logout

Pat.ID: 654321 Age: 90 years Gender: Pat.Name: test formtwo Org: PCI-Training

NO

Did the patient meet compassionate use criteria?  Yes  No

Was the patient in a coma (Glasgow <7) on presentation?  Yes  No

Was cardiopulmonary bypass (CPB), extracorporeal membrane oxygenation (ECMO), or percutaneous ventricular assist device (PVAD) begun before PCI?  Yes  No

Was patient receiving CPR at the start of PCI?  Yes  No

Current User: Melanie Aryana

System Timezone: (GMT-08:00) Pacific Time (US and Canada) Tijuana

Form Status\* Work In Progress e-Signature\*

Form Version Number: 5

# PCI Success Rate

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	<b>5 months</b> (8/1/2010 – 12/31/2010)	<b>10+ months</b>
<b>Post procedure stenosis &lt;20%:</b>	<b>85.5%</b>	<b>86.7%*</b>
<b>Post-procedure TIMI 3 flow:</b>	<b>95.0%</b>	<b>95.3%**</b>

\*Data collection period from 8/1/2010 – 6/30/2011

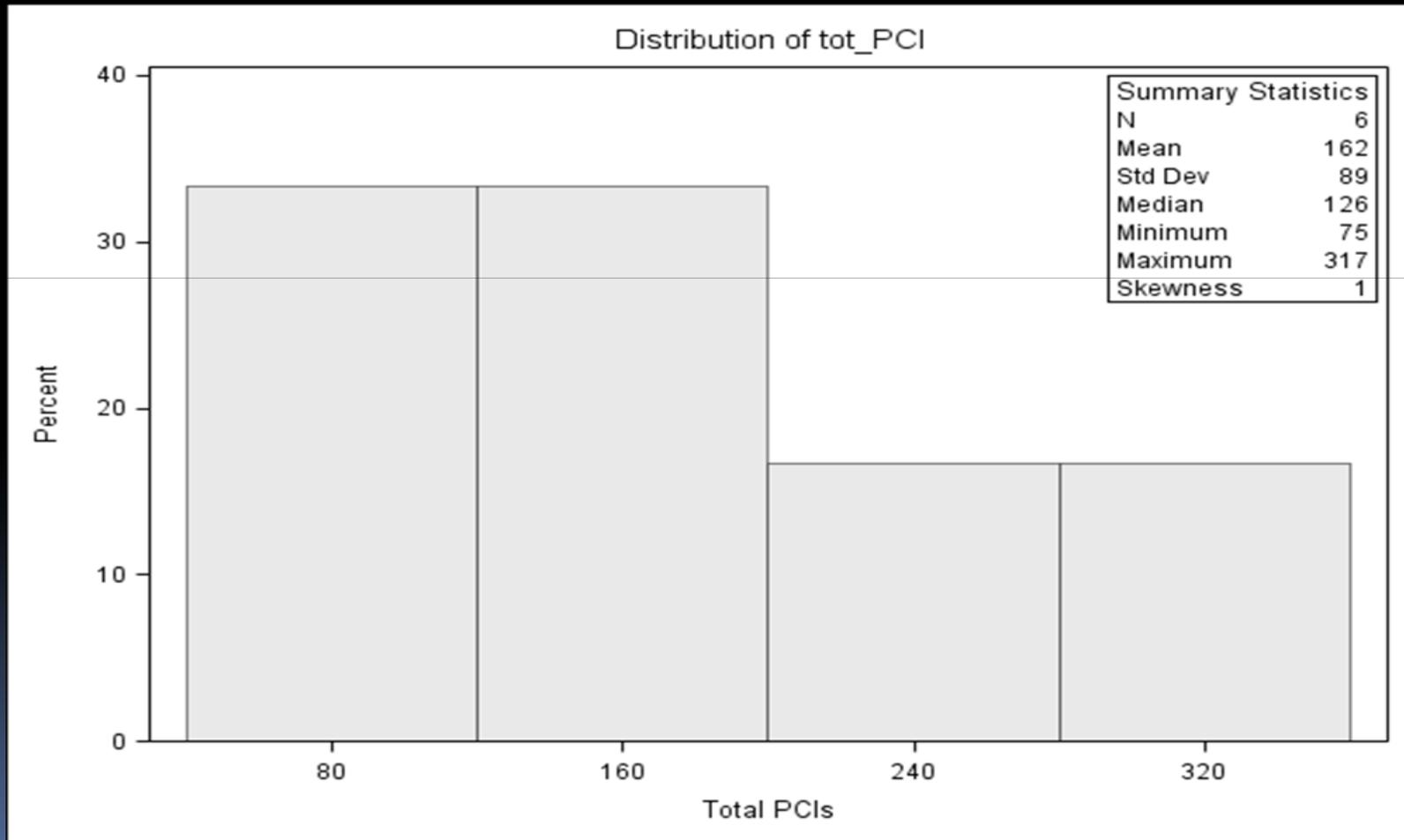
\*\* Data collection period from 8/1/2010 – 6/15/2011

# PCI CAMPOS: Basic Statistics

- Total submission: 1,056
- Complete Data Entry: 973
  - 497 for 8/1/2010 - 12/31/2010
  - 476 for 1/1/2011 – 6/5/2011
- In-hospital mortality: N=21 (2.16%)
  - 2010: N=10 (2.01%)
  - 2011: N=11 (2.31%)
  - Test for yearly difference:  $p = 0.7485$
- Hospital observed mortality range:
  - Overall: 0 – 5.22%
  - 2010: 0 – 8.22%
  - 2011: 0 – 5.77%

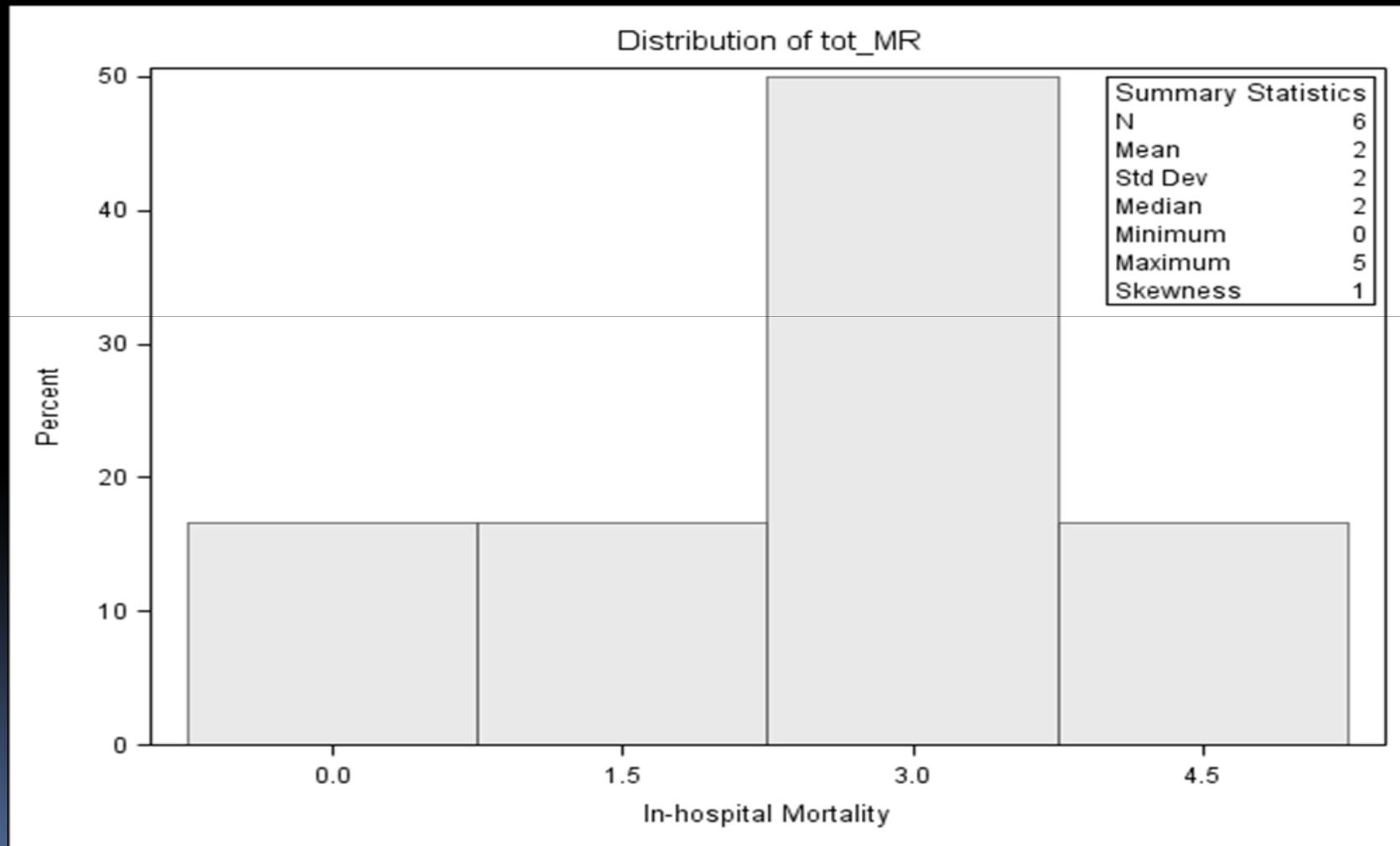
# PCI CAMPOS:

## Hospital Distribution of PCI Volume, 8/1/2010 – 6/5/2011

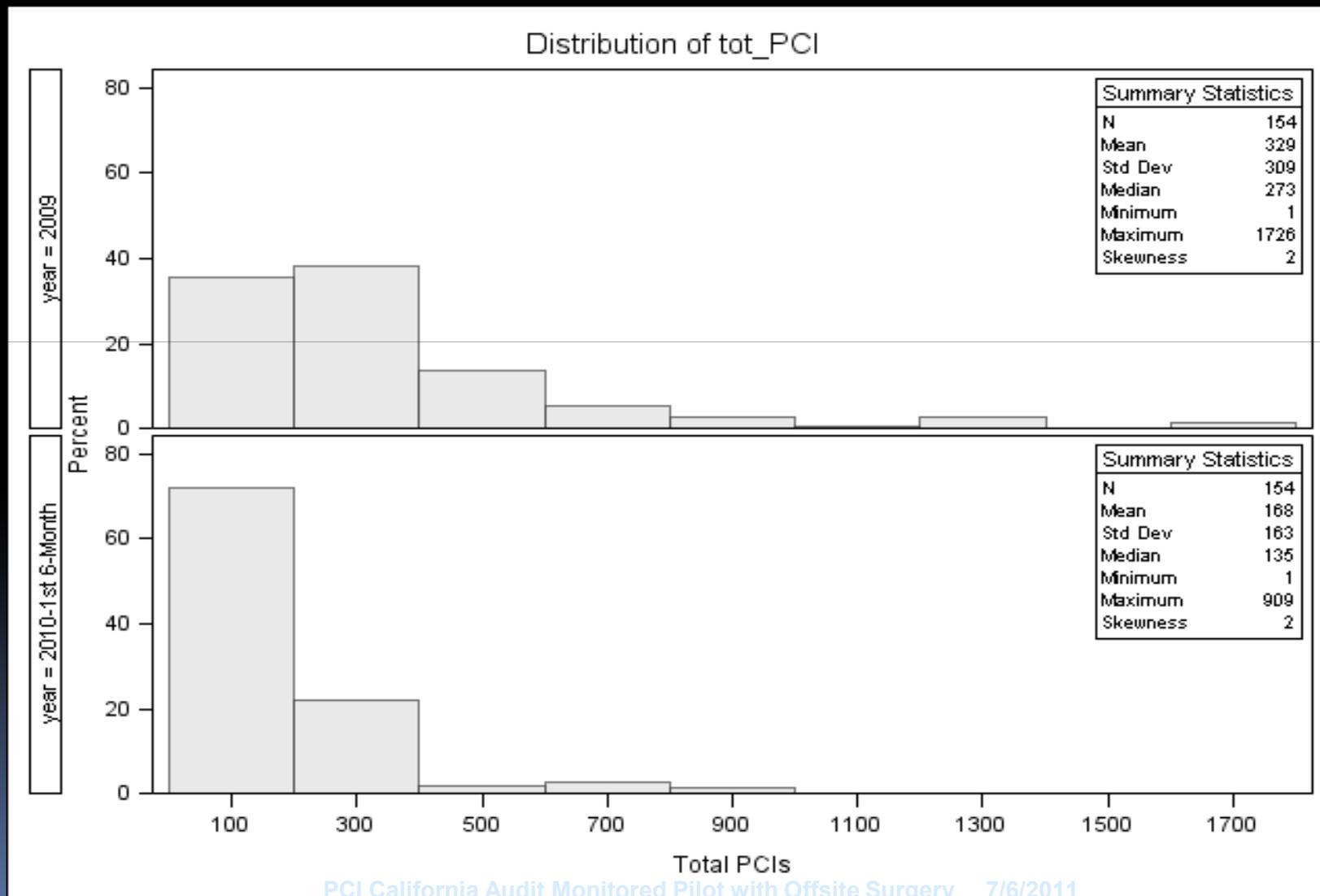


# PCI CAMPOS:

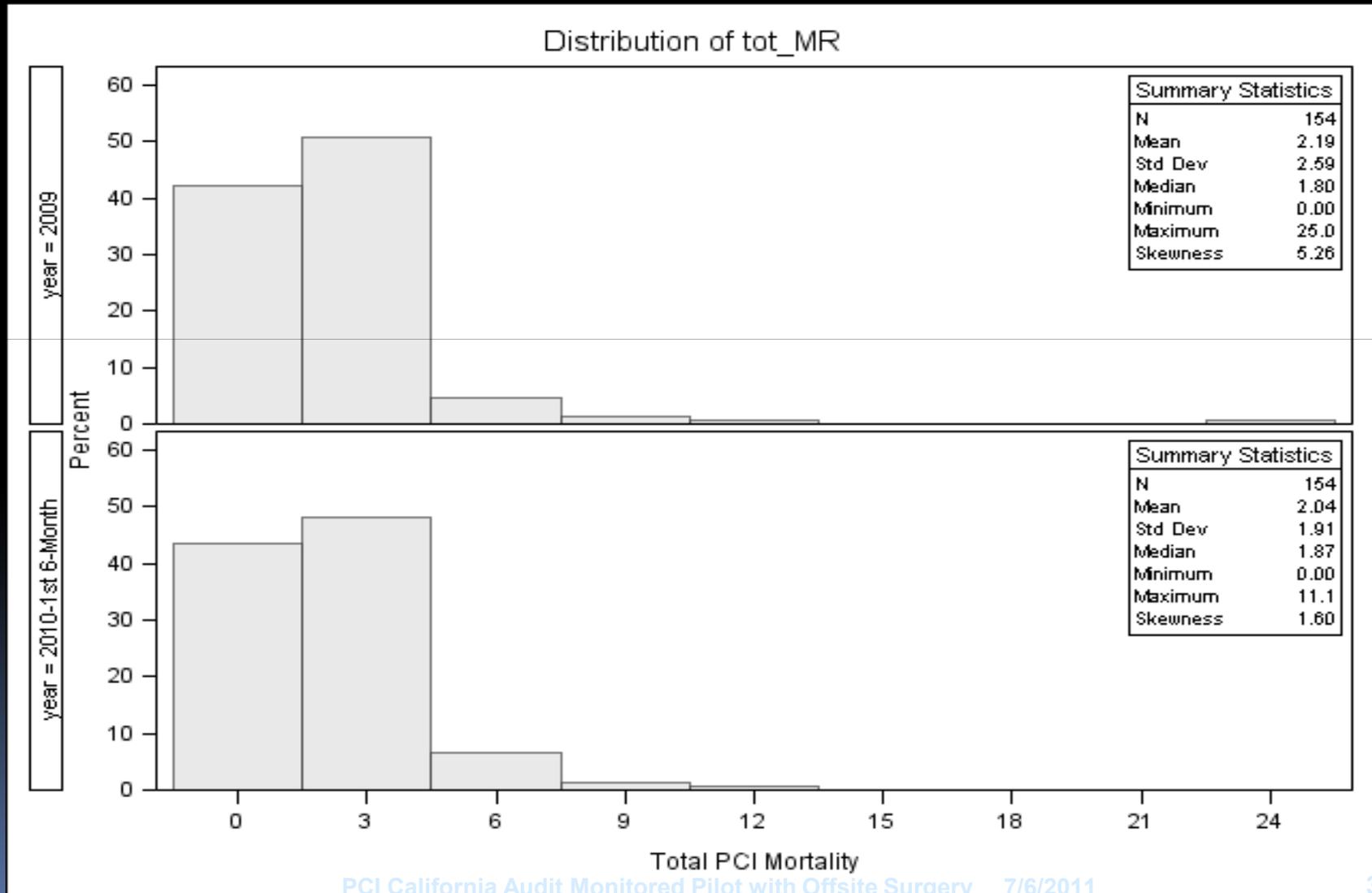
## Hospital Observed Mortality Rate, 8/1/2010 – 6/5/2011



# Patient Discharge Data (PDD Non-Pilot): Hospital PCI Volume, 2009 and 2010-1<sup>st</sup> 6-month



# PDD Non-Pilot : Hospital Observed Mortality Rate



# PCI CAMPOS vs. PDD Non-Pilot: Patient Case-mix

	STEMI/Non-STEMI Ratio, Mean (95% CI)	Unstable Angina/Stable Angina Ratio, Mean (95% CI)
PDD Non-Pilot (1/1 – 6/30/2010)	1.19 (0.96 – 1.41)	3.45 (2.79 – 4.10)
PCI-CAMPOS (8/1 – 12/31/2010)	1.54 (0.37 – 2.71)	1.60 (0 – 4.90)
<b>P-value</b>	<b>0.765</b>	<b>0.316</b>
PCI-CAMPOS (8/1 /2010– 6/5/2011)	1.48 (0.31 – 2.65)	1.73 (0 – 5.04)
<b>P-value</b>	<b>0.691</b>	<b>0.279</b>

# PCI-CAMPOS Performance, Quality, Outcome, Utilization, Data Quality, Test, and Process Metrics

**A direct comparison of PCI performance measures (mortality) and quality, outcome, utilization, data quality, test, and process metrics between PCI-CAMPOS patients and PCI patients at hospitals with on-site cardiac surgery cannot be made. Although indirect comparisons can be shown for several patient cohorts (PDD-California administrative data set; NCDR National Registry), the data collection, audit, and risk differences preclude any accurate comparison. Thus, the indirect comparisons included in this report are provided only as general indicators. The data from 8/1/2010 – 12/31/2010 has completed the audit and review process. The data from 1/1/2011 – 5/30/2011 has not been fully reviewed and audited and should be considered preliminary and not final. This data is being provided to the PCI-CAMPOS program for monitoring purposes only.**

# PCI CAMPOS vs. PDD Non-Pilot: Hospital Observed Mortality by MI Type

	STEMI MR% (95%CI)	STEMI <b>Excluded</b> MR% (95%CI)	Total PCI MR% (95%CI)
PDD Non-Pilot (1/1 – 6/30/2010)	4.39 (3.68-5.10)	1.27 (0.96 – 1.58)	2.02 (1.71 - 2.33)
PCI-CAMPOS (8/1 – 12/31/2010)	2.29 (0-5.89)	1.78 (0.22 – 3.35)	1.90 (0.34-3.46)
P-value	0.9415	0.8472	0.7592
PCI-CAMPOS (8/1 /2010– 6/5/2011)	4.25 (0.66 - 7.84)	1.43 (0 - 3.00)	2.26 (0.71-3.82)
P-value	0.2583	0.5308	0.8804
GLM/F-Test: P-value	0.5266	0.8095	0.9415

# PCI CAMPOS vs. PDD Non-Pilot: Hospital Observed Mortality for STEMI Excluded

	NSTEMI MR% (95%CI)	No MI MR% (95%CI)
PDD Non-Pilot (1/1 – 6/30/2010)	1.90 (1.42-2.38)	0.90 (0.56 - 1.23)
PCI-CAMPOS (8/1 – 12/31/2010)	3.60 (1.17-6.03)	0
P-value	0.3668	0.3368
PCI-CAMPOS (8/1 /2010– 6/5/2011)	3.11 (0.68 – 5.54)	0
P-value	0.2097	0.1775
GLM/F-Test: P-value	0.2663	0.3646

# Risk adjustment

- PCI CAMPOS data as of 2011
- Risk factors:
  - Demographics
  - Prior PCI clinical conditions
  - Prior PCI lesion risk

# Risk Factor Prevalence and Mortality I

Risk factor		N	Prevalence (%)	Mortality rate (%)	p-value
Age group	≤70	626	64.3	1.76	0.2475
	>70	347	35.7	2.88	
Gender	Female	298	30.6	2.01	0.8363
	Male	675	69.4	2.22	
White	No	169	17.4	1.78	0.7061
	Yes	804	82.6	2.23	
Body Mass Index	18.5-39.9	905	93.0	2.32	0.4465
	< 18.5	18	1.9	0.00	
	40.0+	50	5.1	0.00	

# Risk Factor Prevalence and Mortality II

	Risk factor	N	Prevalence (%)	Mortality rate (%)	p-value
PCI status	Elective/Urgent	618	63.5	0.65	
	Emergent/Salvage	355	36.5	4.79	<0.0001
STEMI	STEMI	321	33.0	4.67	0.0001
	NSTEMI	256	26.3	2.34	
	Others	396	40.7	0.00	
Glomerular filtration rate (GFR)	Stage 1-2	854	87.8	1.99	0.335
	Stage 3,4,5	119	12.2	3.36	
Cardiogenic shock	No	935	96.1	1.39	
	Yes	38	3.9	21.05	<0.0001

# Risk Factor Prevalence and Mortality III

Risk factor		N	Prevalence (%)	Mortality rate (%)	p-value
NYHA	Class I, II, III	934	96.0	1.61	
	Class IV	39	4.0	15.38	<0.0001
Heart failure	No	841	86.4	1.66	
	Yes	132	13.6	5.30	0.0075
Diabetes	No diabetes	697	71.6	1.43	
	Noninsulin diabetes	169	17.4	4.14	0.0464
	Insulin diabetes	107	11.0	3.74	
Prior PCI	No	696	71.5	2.44	0.3334
	Yes	277	28.5	1.44	

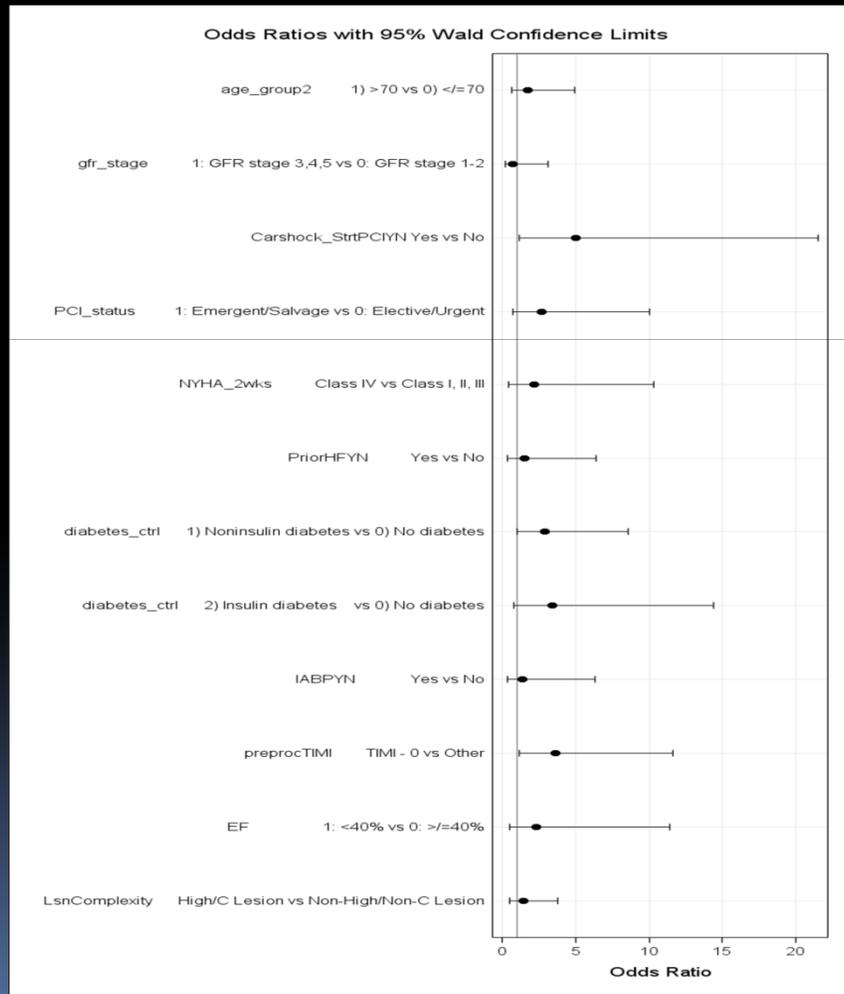
# Risk Factor Prevalence and Mortality IV

Risk factor		N	Prevalence (%)	Mortality rate (%)	p-value
Cerebrovascular Disease	No	885	91.0	2.15	0.9382
	Yes	88	9.0	2.27	
Peripheral Artery Disease	No	884	90.8	2.38	0.1416
	Yes	89	9.2	0.00	
Chronic Lung Disease	No	855	87.9	1.87	0.0973
	Yes	118	12.1	4.24	
Intra-aortic balloon pump	No	939	96.5	1.49	<b>&lt;0.0001</b>
	Yes	34	3.5	20.6	

# Risk Factor Prevalence and Mortality V

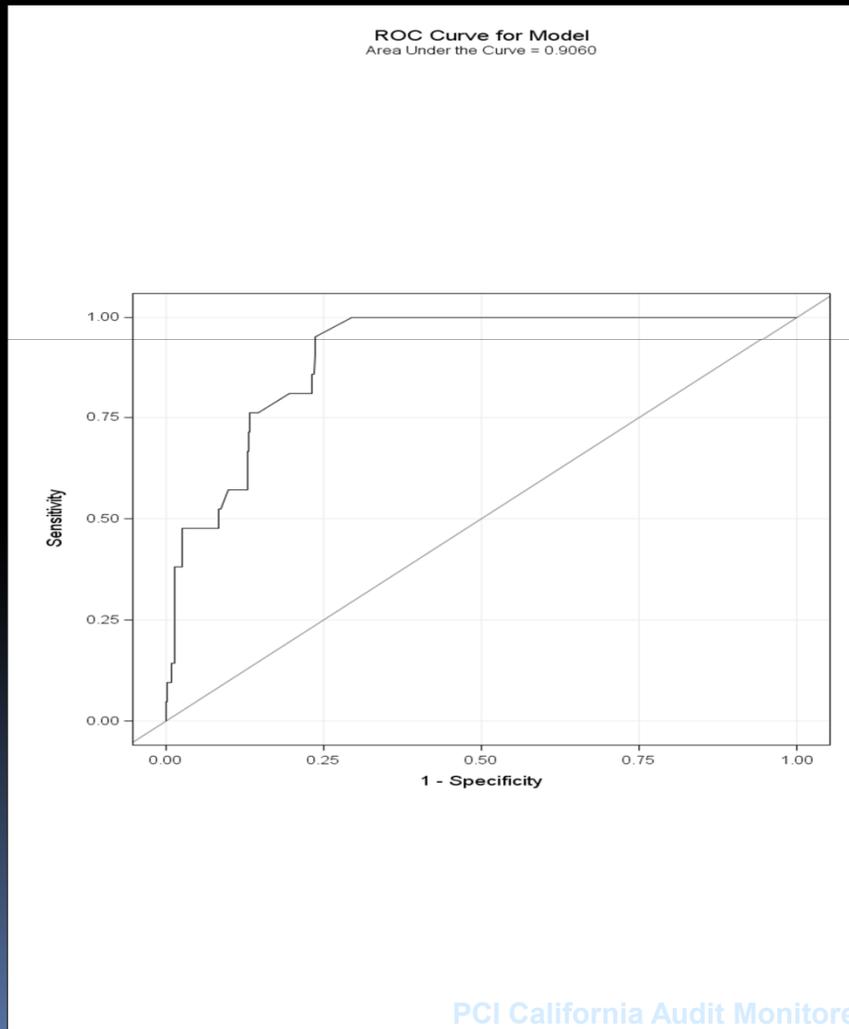
Risk factor		N	Prevalence (%)	Mortality rate (%)	p-value
Left main stenosis	≤75%	946	97.2	2.11	0.5752
	>75%	27	2.8	3.70	
Ejection Fraction	≥40%	931	95.7	1.93	
	<40%	42	4.3	7.14	0.0231
Lesion complexity	High/C Lesion	344	35.4	3.70	0.0101
	Non-High/Non-C Lesion	621	64.6	1.27	
Thrombosis	No	665	68.4	1.50	
	Yes	308	31.6	3.57	0.039
Preproc TIMI	Other	680	69.9	0.88	
	TIMI - o	293	30.1	5.12	<0.0001

# PCI-CAMPOS : Multivariable Logistic Regression Model for In-hospital Mortality I



- 11 risk factors
- 4 sig. predictors via stepwise selection ( $\alpha < 0.05$ )
- Adjusted OR > 2.00:
  - Cardiogenic shock
  - Diabetes
  - Preproc TIMI=0

# PCI-CAMPOS : Multivariable Logistic Regression Model for In-hospital Mortality II



- Parsimonious Model:
  - C-statistic: 0.829
  - Hosmer-Lemeshow test:  $p=0.4625$
- Full model:
  - C-statistic: 0.906
  - HL test:  $p=0.7217$

# PCI CAMPOS:

## Risk-adjusted PCI in-hospital mortality, 2010

Hospital	PCI Cases	Death at Discharge	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	95%CI for RAMR	Performance Rating
<b>PCI-CAMPOS</b>	<b>497</b>	<b>10</b>	<b>2.01</b> 				
#1	153	2	1.31	1.73	1.52	(0.18, 5.49)	No Difference
#2	108	2	1.85	2.42	1.54	(0.19, 5.56)	No Difference
#3	74	0	0	1.41	0	(0.00, 7.12)	No Difference
#4	34	0	0	1.19	0	(0.00, 18.32)	No Difference
#5	55	0	0	1.53	0	(0.00, 8.83)	No Difference
#6	73	6	8.22	6.38	2.59	(0.95, 5.63)	No Difference

# PCI CAMPOS: Risk-adjusted PCI in-hospital mortality, 8/1/2010-6/5/2011

Hospital	PCI Cases	Death at Discharge	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% RAMR)	95%CI for RAMR	Performance Rating
<b>PCI-CAMPOS</b>	<b>973</b>	<b>21</b>	<b>2.16</b>				
#1	317	4	1.26	1.31	2.07	(0.56, 5.31)	No Difference
#2	215	5	2.33	2.52	1.99	(0.65, 4.64)	No Difference
#3	126	3	2.38	1.42	3.61	(0.74, 10.55)	No Difference
#4	75	0	0	1.81	0	(0.00, 5.87)	No Difference
#5	125	3	2.4	1.78	2.9	(0.60, 8.50)	No Difference
#6	115	6	5.22	5.24	2.15	(0.79, 4.68)	No Difference

# PCI CAMPOS: Risk-adjusted STEMI Excluded PCI in-hospital mortality, 8/1/2010-6/5/2011

Hospital	PCI Cases	Death at Discharge	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% , RAMR)	95%CI for RAMR	Performance Rating
PCI-CAMPOS	652	6	0.92				
#1	260	1	0.38	0.65	0.54	(0.01, 3.02)	No Difference
#2	130	1	0.77	1.08	0.65	(0.02, 3.64)	No Difference
#3	75	2	2.67	0.75	3.26	(0.39, 11.77)	No Difference
#4	57	0	0	0.96	0	(0.00, 6.18)	No Difference
#5	88	0	0	1.3	0	(0.00, 2.97)	No Difference
#6	42	2	4.76	3.19	1.37	(0.17, 4.96)	No Difference

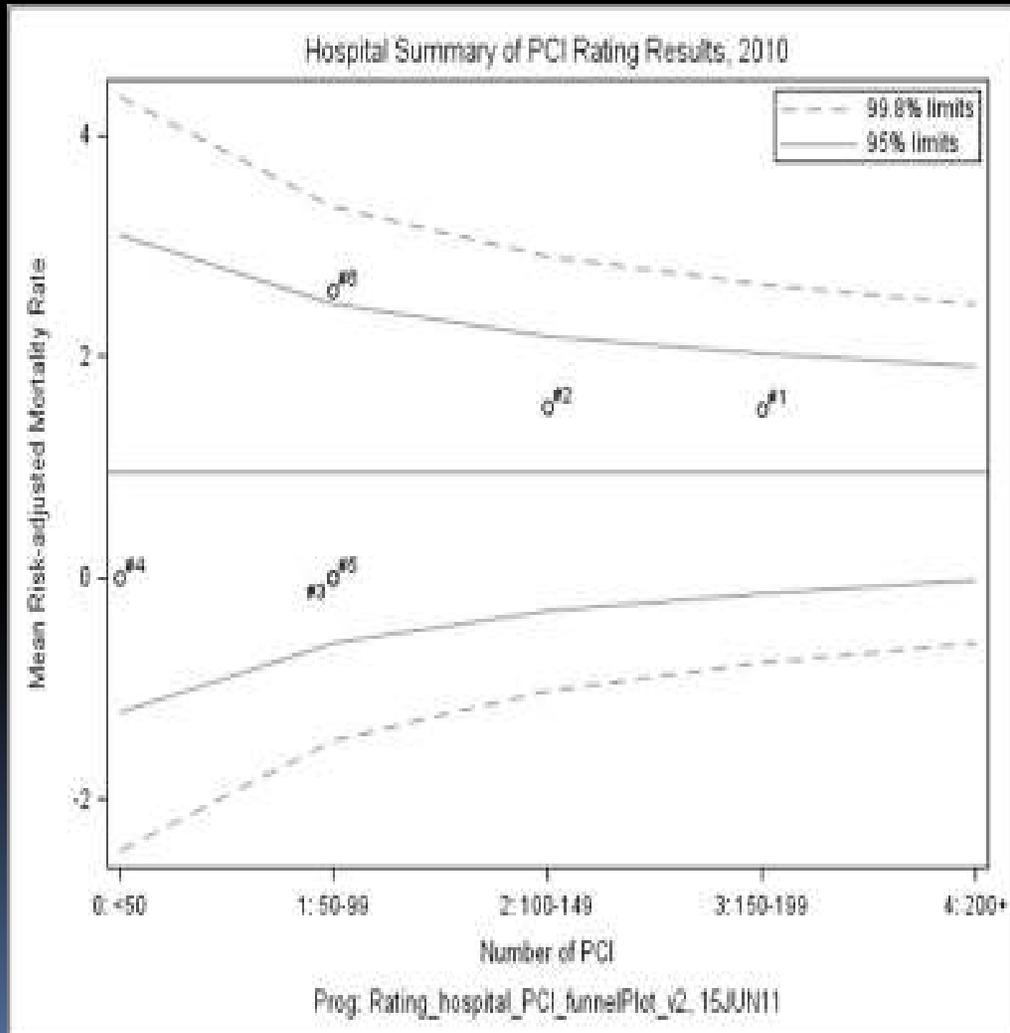
# Statistical Analysis Summary with Traditional Methods

- PCI-CAMPOS vs PDD Non-Pilot observed hospital mortality:  
No significant difference
- PCI-CAMPOS risk-adjusted mortality:  
No significant outlier hospitals

# Funnel Plots for Comparing Performance

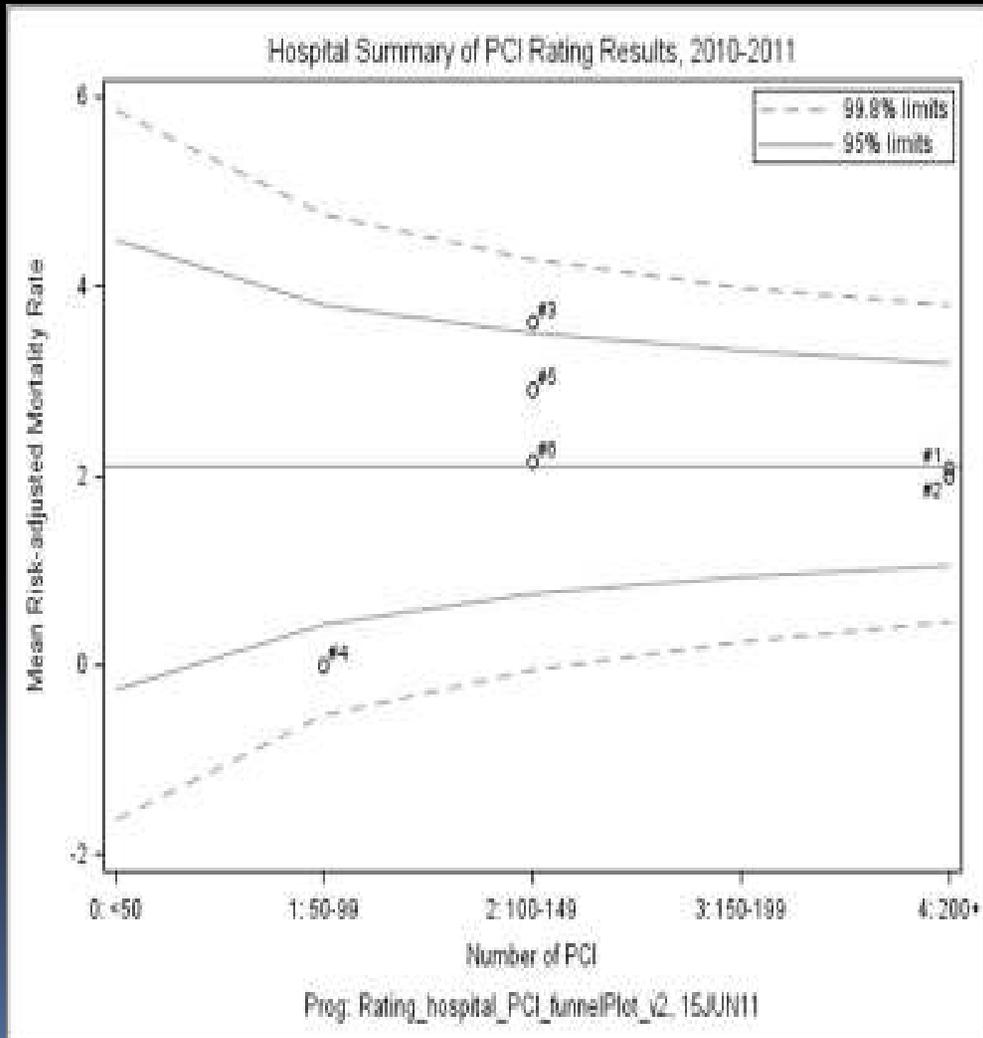
- Spiegelhalter, DJ Funnel plots for comparing institutional performance. *Statist. Med.* 2005; 24:1185-1202.
- Mohammed, MA and Deeks, JJ In the Context of Performance Monitoring, the Caterpillar Plot Should Be Mothballed in Favor of the Funnel Plot. *Ann Thorac Surg* 2008;86:348.

# Comparisons in Risk-adjusted Mortality Rates Among 6-Pilot Hospitals, 8/1 – 12/31/2010



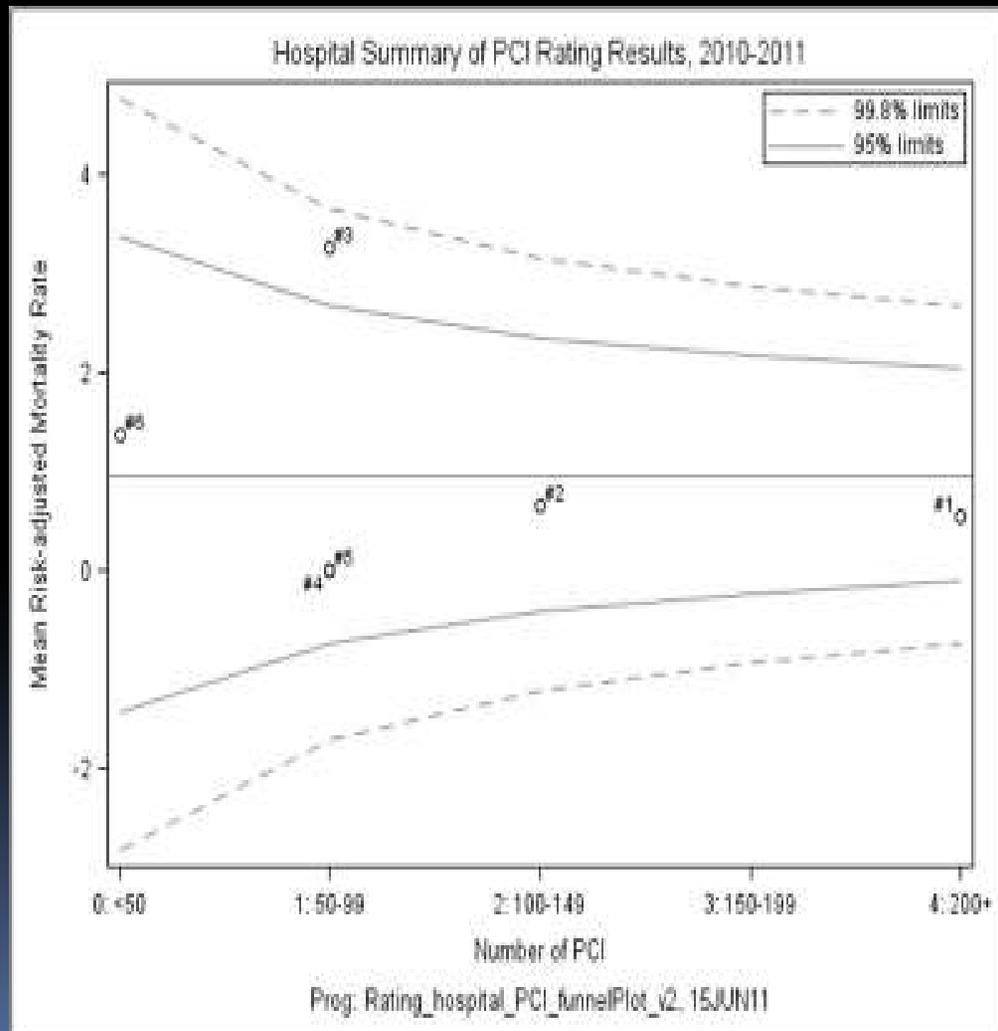
- With 95%CI:
  - Hospital #6 is a worse outlier
  - All others are No different overall
- But, all are in 99.8% CI

# Comparisons in Risk-adjusted Mortality Rates Among 6-Pilot Hospitals, 8/1/2010 – 6/5/2011



- With 95% CI:
  - Hospital #4 is a better outlier
  - Hospital #3 is a worse outlier
  - All others are as expected
- However, all are in 99.8% CI.

# Comparisons in Risk-adjusted Mortality Rates for STEMI Excluded, 8/1/2010 – 6/5/2011



- With 95% CI:
  - Hospital #3 is a worse outlier
  - All others are as expected
- But, all are in 99.8% CI.

# Patients Transferred for Cardiac Surgery

	<i>emergent</i>	<i>urgent</i>	<i>elective</i>	<i>Total</i>	<i>Deaths</i>
#1	2	0	0	2	0
#2	0	0	0	0	0
#3	0	0	2	2	0
#4	0	2	0	2	0
#5	0	2	0	2	0
#6	4	0	0	4	1
<i>Total</i>	6	4	2	12	1

# PCI Process Metrics

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- Positive stress or imaging study prior to elective PCI: 52.4%
- Median time to immediate PCI for STEMI patients: 63.0 minutes
- Proportion of STEMI patients receiving immediate PCI w/in 90': 88.5%

# PCI Process Metrics

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- Median time from ED arrival at STEMI transferring facility to ED arrival at STEMI receiving facility among transferred patients:  
85 minutes
- Median time from ED arrival at STEMI transferring facility to immediate PCI at STEMI receiving facility among transferred patients:  
117 minutes
- Median fluoro time: ?

# PCI Process Metrics

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- Aspirin prescribed at discharge: 97.3%
- Thienopyridine prescribed at discharge(pts with stents): 98.4%
- Lipid lowering agent prescribed at discharge(pts with dyslipidemia): 92.8%

# PCI Outcome Metrics

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- Vascular Access Site injury requiring treatment or major bleeding: 1.4%
- Emergency CABG: 0.3%
- Post procedure MI(among routine biomarker): 3.1%
- Post procedure MI(among not routine biomarkers): 1.5%
- Acute kidney injury: 2.2%
- Post procedure stroke: 0.2%
- Composite: Death, emergency CABG, stroke or repeat target vessel revascularization: 2.3%

# Utilization Metrics

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- Median post-procedure length of stay(in days)for PCI patients with STEMI: 3.0
- Median post-procedure length of stay(in days)for PCI patients with no STEMI: 1.0

# Data Quality Metrics

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- Creatinine assessed pre and post PCI procedure: 76.9%
- Test metric: Transfusion of whole blood or RBCs: 2%
- Test Data Quality Metric: Biomarkers assessed post-PCI for elective inpatients: 45.8%

# PCI Process Comparison Metric

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- Anticoagulant Use: Low molecular weight heparin 10%, direct thrombin inhibitors 55%, GP IIb/IIIa inhibitor 36%(pts with acute coronary syndrome)
- Stent Use: Average # of stents per PCI admission 1.4, DES 1.1
- Intermediate stenosis lesion(40-70%): Further invasive evaluation performed: IVUS 18%; FFR 5%
- Outpatients: Proportion of PCI admissions whose hospital status was coded as "outpatient" 15.7%

Hospital	1	2	3	4	5	6	Total
# of Elective PCI pts. (excl. pts. with ACS)	100	36	13	22	30	9	210
Stress, Imaging Studies, or FFR +/indeterminant/total	58/6/70	24/0/25	10/0/10	12/1/14	15/4/20	7/0/8	126/11/147
Stand. Exercise Stress Test +/indeterminant/total	28/4/34	3/0/3	0	0	0/2/2	0	31/6/39
Stress Echo +/indeterminant/total	0	1/0/1	5/0/5	0/1/1	2/0/2	6/0/6	14/1/15
SPECT +/indeterminant/total	25/2/30	19/0/20	5/0/5	12/0/13	13/2/16	1/0/2	75/4/86
CMR +/indeterminant/total	0	1/0/1	0	0	0	0	1/0/1
FFR ≤0.75/total	5/6	0	0	0	0	0	5/6
+ stress test/# el.PCI pts*	58/100	24/36	10/13	12/22	15/30	7/9	126/210
% +stress/# elec.PCI pts.*	58.0	66.7	76.9	54.5	50.0	77.8	60.0

\* NCDR national 2010Q4 : median, 25<sup>th</sup> – 75<sup>th</sup> percentile: 61.2%, 50.0 – 71.1%  
PCI California Audit Monitored Pilot with Offsite Surgery 7/6/2011

Hospital	1	2	3	4	5	6	All pilot	NCDR median	NCDR 25 <sup>th</sup> – 75 <sup>th</sup> percentile
Time to immediate PCI for STEMI patients (minutes)	73	59	67	64	72	65	67	64.5	58.2-69.9
Proportion of STEMI patients receiving immediate PCI within 90 minutes (%)	95.7	93.1	94.3	91.7	72.4	92.9	91.1	90.5	83.5-95.1
# of single vessel lesion w/out prior CABG	248	158	99*	44	108	103	760	-	-
Fluoro time in minutes (single vessel lesion, no prior CABG)	17.8	13.9	11.7	11.7	9.9	11.6	12.8	9.0	7.6 – 10.7
% of pts. discharged on ASA, no contraind. for ASA	100	99.0	98.3	97.2	100	99.0	99.3	98.0	96.0 – 99.2

\* One fluoroscopy dose reported of 125Gy

Hospital	1	2	3	4	5	6	All pilot	NCDR median	NCDR 25 <sup>th</sup> – 75 <sup>th</sup> percentile
% of pts. d/c on thienopy., no contraind. for thienopy.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.0	97.6 – 99.7
% of pts. discharged on statin, no contraindications	100.0	96.4	93.2	91.8	93.6	97.6	96.6	90.4	85.6 – 94.3
Patients with vascular access site injury requiring treatment or major bleeding (%)	0.9 (3/327) (2xhematoma, 1xretroperit. bleeding)	1.3 (3/238) (1xhematoma, 2xvascular complication)	0.0 (0/124)	3.6 (3/84) (2xhematoma, 2xbleeding @ access site)	0.8 (1/129) (1xhematoma)	2.7 (4/150) (4xhematoma, 2xbleeding @ access site)	1.3 (14/1,052)	1.1	0.6-1.8
Emergency CABG (%)	0.6 (2/327)	0.0 (0/238)	0.0 (0/124)	0.0 (0/84)	0.0 (0/129)	2.7 (4/150)	0.6 (6/1,052)	0.2	0.0-0.5
Post procedure MI (%)	2.6 (4/153)	4.6 (4/87)	0.0 (0/22)	3.3 (1/30)	0.0 (0/31)	0.0 (0/27)	2.6 (9/350)	1.4	0.7-2.7
Acute kidney injury (%)	1.0 (3/304)	1.3 (3/227)	3.2 (3/95)	2.7 (2/74)	6.0 (6/99)	5.7 (6/106)	2.5 (23/905)	2.1	1.5-2.9

Hospital	1	2	3	4	5	6	All pilot	NCDR median	NCDR 25 <sup>th</sup> – 75 <sup>th</sup> percentile
Post procedure stroke (%)	0 (0/327)	0 (0/238)	0.8 (1/124)	0 (0/84)	0 (0/129)	2.0 (3/150)	0.38 (4/1,052)	0.1	0.0-0.3
Composite: Death, emergency CABG, stroke	1.8 (2x emerg. CABG, 4 deaths)	2.1 (5x death)	3.2 (3x death, 1 stroke)	0.0	3.1 (4x death)	9.3 (4 emerg. CABG, 7 deaths, 2 s strokes, 1 death/stroke)	3.9	2.3	1.6-3.1
Median post-proc LOS for PCI with STEMI (days)	3.0	3.0	3.0	2.0	3.0	2.0	2.67	2.7	2.0-2.9
Median post-proc LOS for PCI with no STEMI (days)	1.0	1.0	1.0	1.0	1.0	2.0	1.17	0.8	0.6-0.9
Creatinine assessed pre-and post PCI (%)	94.5 (309/327)	97.1 (231/238)	81.5 (101/124)	91.7 (77/84)	79.1 (102/129)	75.3 (113/150)	88.7 (933/1,052)	85.3	73.6 – 93.2
Transfusion of whole blood or RBCs	1.5 (5/325)	7.6 (18/237)	0.9 (1/117)	7.4 (6/81)	2.4 (3/123)	5.6 (8/142)	3.7 (41/1025)	1.7	0.7-2.9
Biomarkers assess.post proc. for elect.inpts. (%)	26.4 (39/148)	84.6 (44/52)	95.5 (21/22)	8.3 (2/24)	75 (6/8)	34.6 (9/26)	43.2 (121/280)	36.9	13.3-80.3

Hospital	1	2	3	4	5	6	All pilot	NCDR %
Direct thrombin inhibitor (% of pts. w/ ACS)	71.2 (166/233)	77.0 (157/204)	52.1 (63/121)	39.1 (25/64)	47.3 (52/110)	3.2 (5/154)	52.8 (468/886)	55
GP IIb/IIIa inhibitors (% of pts. w/ ACS)	30.0 (70/233)	30.4 (62/204)	49.2 (59/120; 1xcontraind.)	54.7 (35/64)	43.6 (48/110)	93.5 (144/154)	47.2 (418/885)	36
LMWH (% of pts. w/ ACS)	17.2 (40/233)	38.7 (79/204)	25.6 (31/121)	21.9 (14/64)	18.2 (20/110)	13.6 (21/154)	23.1 (205/886)	10
Intermediate stenosis lesions (40-70%): IVUS (% of patients)	2.7 (9/333)	0.4 (1/241)	0 0/134	4.6 (4/87)	0 (0/141)	0 (0/163)	1.3 (14/1,099)	18
Intermediate stenosis lesions (40-70%): FFR (% of patients)	3.9 (13/333)	0.4 (1/241)	1.5 (2/134)	1.1 (1/87)	0 (0/141)	0 (0/163)	1.5 (17/1,099)	5

# Transfer Costs

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- **Hospital 1: Transfers for 'emergent' CABG**

Transfer 1	\$1,106
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Transfer 2	\$1,106
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Average cost per transfer	\$1,106
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# Transfer Costs

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- **Hospital 3:**
- Transfer to CABG facility (10.9 miles)

Base rate \$599 plus \$20/mile = \$819

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Average cost per transfer \$819

# Transfer Costs

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- **Hospital 4:** Transfers for 'urgent' CABG

Transfer 1	\$255
Transfer 2	\$255

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Average cost per transfer      \$255

# Transfer Costs

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- **Hospital 5: Transfers for 'urgent' CABG**

Transfer 1	\$600
Transfer 2	\$888

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Average cost per transfer     \$744

# Transfer Costs

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- **Hospital 6: Transfers for 'emergent' CABG**

Transfer 1	\$897
Transfer 2	\$1,036
Transfer 3	\$897
Transfer 4	\$897

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Average cost per transfer      \$932

# NCDR PCI on-site surgery data

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**Option 1: ACCF NCDR to create and transmit a de-identified dataset of CA hospitals that does not require hospital consents, with select elements suppressed, masked, or calculated, including 3 transmissions of patient data from discharges between 7/1/09-6/30/11: ~~\$105,000~~ \$50,000**

**Option 2: ACCF NCDR to create and transmit a patient record dataset of CA hospitals that does require hospital consents, including 3 transmissions of patient data from discharges between 7/1/09-6/30/11: \$26,000**

**Option 3: ACCF NCDR to release technical documents with updates to unlock files data files (both XML and CSV formats) sent directly from CA hospitals to UC Davis (or subcontractor), no technical or project consultation time included but full access to [www.NCDR.com](http://www.NCDR.com): \$1,000 per year**

# Summary I

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- 8/1/2010 – 5/31/2011 (10 months): 1,039 pts. enrolled
- 1,030 initial audits, 496 procedures 'locked down', 208 on-site audits, 269 angio audits
- Average enrollment rate/hospital: 174 (range 77 – 318)

## Observed Mortality

	<u>5 months</u>	<u>10 months</u>
total	1.9%	2.26%
STEMI	2.29 %	4.25%
NSTEMI	3.6%	3.11%
Elective	0	0

# Summary II

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▪ Success Rate	<u>5 months</u>	<u>10+ months</u>
post-proc. stenosis <20%	85.5%	86.7%
post-proc. TIMI 3 flow	95.0%	95.3%
▪ Mortality		
Tradit. Risk Model:	No outliers	No outliers
Funnel:	1 worse outlier	1 better, 1 worse