CORONARY

CRT-100.01

Chronic Kidney Disease Effect on the Long-term Cardiovascular Outcomes of Stented Percutaneous Coronary Interventions (PCI) Among Veterans: Veterans Administration National Data 2005-2010

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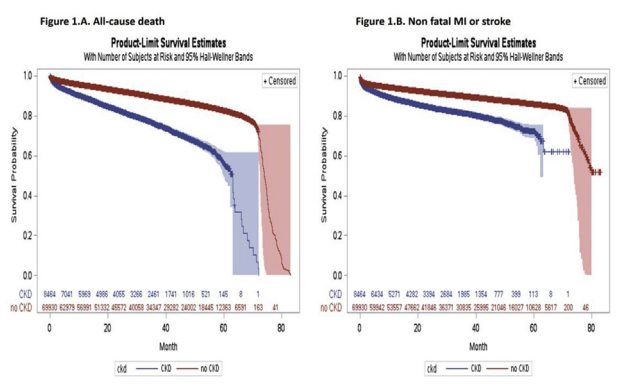
BACKGROUND Chronic Kidney Disease (CKD) prevalence rate among veterans has risen in the past decade. The CKD associations with long term mortality and cardiovascular adverse event risks after stented PCI are unknown among veterans population.

METHODS This study extracted data from VA national Corporate Data Warehouse (CDW) veterans who received stented PCI at Veterans Administration Hospital System between January 01 2005 and December 31, 2010 (n=78,706). This study excluded patients without ACS (n=312), yielding a final sample size of 78,394. Kaplan-Meier curves and Cox models were used for time to event analysis and Hazard Ratios (HR) and 95% Confidence Intervals (CIs) were presented.

RESULTS The mean follow up length of the study was 37 months. Of all, about 10% of patients (n=8,464) had CKD condition at the time of PCI. CKD patients compared to non CKD patients were significantly older (64.4±9.4 and 68.4±9.6, p<0.0001) and more likely to have other comorbid conditions (Diabetes 62.8% vs. 42.7%, p<0.0001; Hypertension 95.4% vs. 83.1%, p<0.0001; Hyperlipidemia 76.6% vs. 74.2%, p<0.0001). CKD patients were at increased risk of mortality and non-fatal MI or stroke than non CKD patients, but at a similar risk of repeated revascularization (HR 1.04, 95% CI 0.96-1.14, p=0.3175) at 5 years (Figure 1). After adjusting baseline characteristics, CKD patients were at increased risk of mortality (HR 1.97, 95% CI 1.87-2.08, p<0.0001) and non-fatal MI or stroke (HR 1.79, 95% CI 1.20-1.32, p<0.0001) than non CKD patients at 5 years.

CONCLUSION CKD comorbidity doubled mortality risk of patients who underwent stented PCI procedure at 5 years. While CKD patients are at 1.7 fold increased risk of non-fatal myocardial Infarction (MI) and stroke at 5 years than non-CKD patients, but CKD was not associated with need for repeat revascularization in 5 years.

Figure 1. Kaplan-Meier curves of all-cause deaths and non-fatal myocardial infarction (MI) or stroke within 5 years of stented percutaneous coronary intervention (PCI) between VA patients with and without chronic kidney disease (CKD)



CRT-100.02

Drug Eluting Stents Should Be the Standard of Care in STEMI Patients: A Review From the National In-patient Sample

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BACKGROUND From 2007 through 2013, bare metal stents (BMS) were the guidelines recommended option for percutaneous coronary intervention (PCI). We sought to analyze trends and in-hospital outcomes of patients treated with BMS or drug eluting stents (DES) during primary angioplasty for ST segment elevation myocardial infarction (STEMI). Not many studies have been done on a large scale data comparing type of stent used for percutaneous coronary intervention (PCI).

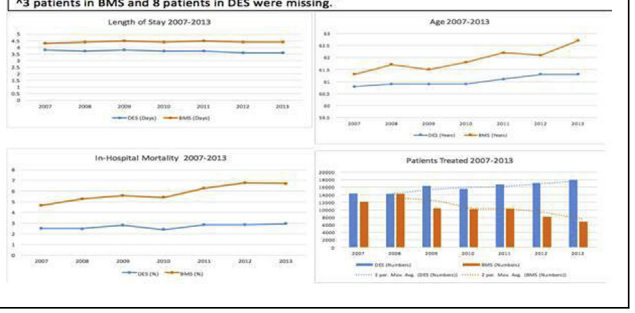
METHODS With the use of nationwide inpatient sample database from 2007-2013, we have identified 180,734 STEMI patients undergoing PCI using International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9 CM) codes (DES-36.07, BMS-36.06). Analysis was performed using SAS 9.4 (SAS Institute Inc, Cary, North Carolina). Missing data on in-hospital outcomes and age were excluded from our study.

RESULTS Overall, the number of STEMI patients undergoing PCI from 2007-2013 has been decreasing; however their age has been increasing. Patients receiving DES had more comorbidities, however even after correcting for confounders, lower in-hospital mortality and length of stay (LOS) was seen in patients receiving DES as compared to BMS (Ptrend <0.0001). Secondary outcomes including acute renal failure, stroke, cardiogenic shock, acute pulmonary edema, gastrointestinal hemorrhage, blood loss requiring transfusion, cardiac arrest and LOS were noted significantly lower with DES compared to BMS (P<0.0001).

CONCLUSION BMS have been the preferred and recommended device for use in STEMI for years, however this data adds to the mounting evidence that DES should be considered the preferred option. This study demonstrates DES is associated with a significant reduction in length of stay and in-hospital mortality.

Variable Name	BMS (N=68501)	DES (N=112,233)	P value
Baseline Characteristics			
Age(Years)*	61.8 ±13.6	61.1±12.4	<0.0001
Male(n)^	48845 (71.31%)	79542 (70.88%)	0.0498
Female(n)^	19653 (28.69%)	32683 (29.12%)	
BMI>30 (n)	5945 (8.68%)	11157 (9.94%)	<0.0001
BMI>40 (n)	2400 (3.50%)	3661 (3.26%)	0.0056
Hypertension(n)	41774 (60.98%)	70577 (62.88%)	<0.0001
Diabetes Mellitus (n)	19635 (28.66%)	33841 (30.15%)	<0.0001
Hyperlipidemia (n)	39943 (58.31%)	73204 (65.23%)	<0.0001
Family History of CAD(n)	25861 (37.75%)	37630 (33.53%)	<0.0001
Prior MI (n)	4716 (6.88%)	7976 (7.11%)	0.0731
Carotid Artery Disease (n)	561 (0.82%)	765 (0.68%)	0.0009
Congestive Heart Failure (n)	10931 (15.96%)	14680 (13.08%)	<0.0001
Chronic Pulmonary Disease (n)	9599 (14.01%)	13567 (12.09%)	<0.0001
Peripheral Vascular Disease (n)	864 (1.26%)	1003 (0.89%)	<0.0001
Renal Disease (n)	9504 (13.87%)	11723 (10.45%)	<0.0001
Cerebrovascular Disease (n)	2205 (3.22%)	2538 (2.26%)	<0.0001
Smoking (n)	32645 (47.66%)	50300 (44.82%)	<0.0001
Location of the Heart:			
Anterior wall MI(n)	19132 (27.93%)	36452 (32.48%)	<0.0001
Inferior Wall (n)	40871 (59.66%)	59244 (52.79%)	<0.0001
In-Hospital Outcomes:			
Acute Renal Failure (n)	6248 (9.12%)	6968 (6.21%)	<0.0001
Any Stroke (n)	824 (1.20%)	814 (0.72%)	<0.0001
Cardiogenic Shock (n)	7406 (10.81%)	7384 (6.58%)	<0.0001
Acute Pulmonary Edema (n)	395 (0.58%)	454 (0.40%)	<0.0001
GI Hemorrhage (n)	2247 (3.28%)	2249 (2.00%)	<0.0001
Hemorrhage/Hematoma/Blood Loss Requiring Transfusion (n)	3776 (5.51%)	4845 (4.32%)	<0.0001
Cardiac Arrest (n)	4240 (6.19%)	4590 (4.09%)	<0.0001
Death During Hospitalization (n)$	4002 (5.84%)	3034 (2.70%)	<0.0001
Length of Stay (Days)	4.4±5.2	3.71±4.0	<0.0001

* 5 patients had missing data. $-41 patients had missing data.
^3 patients in BMS and 8 patients in DES were missing.



CRT-100.03

Appropriateness of Use of Bivalirudin in Patients Undergoing Percutaneous Coronary Catheterization Using Crusade Bleeding Score: Single Center Study

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BACKGROUND Percutaneous coronary intervention (PCI) is a conventional procedure for the management of stable coronary artery disease. The goals of this study were to establish periprocedural bleeding risk before elective PCI and to observe consequent changes in anticoagulant after implementation of use of a bleeding risk calculator. The secondary outcome included average total cost per case in which bivalirudin was used compared to use of heparin.

METHODS This pilot retrospective study was approved by St. Vincent Charity Medical Center Institutional review board. The cohort consisted of 100 patients who underwent PCI procedures between October 2014 and October 2015, whose bleeding risk was derived by using CRUSADE bleeding risk calculator to determine the appropriate use of Angiomax in them. The CRUSADE Bleeding Score was developed using data from over 89,000 "real-world" patients enrolled in the CRUSADE Quality Improvement Initiative that presented with NSTEMI. A patient's CRUSADE Bleeding Score equals the sum of the weighted scores for the independent predictors (range 1-100 points).The CRUSADE Bleeding Score considers baseline patient characteristics (female sex, history of diabetes, peripheral vascular disease), admission clinical variables (heart rate, systolic blood pressure, signs of CHF), and admission laboratory values (hematocrit, calculated creatinine clearance) to estimate the patient's likelihood of having an in-hospital major bleed event.

RESULTS The CRUSADE bleeding risk calculator distinguished patients in the pilot cohort as high risk, moderate risk and low risk for bleeding after a PCI procedure. Among 100 patients who underwent PCI, 23 were high, 26 moderate, 27 low, 24 very low risk. 96 out of 100 patients received bivalirudin irrespective of their bleeding risk score. Out of 4 patients who received heparin 2 were low risk, 1 was very low risk and 1 was moderate risk.

CONCLUSION A simple bleeding risk calculator can substantially reduce overall bivalirudin use by specifically decreasing its use among patients at low bleeding risk while maintaining its use among patients at high bleeding risk. Studies have proven that incidence of bleeding complications remained unchanged despite decreasing bivalirudin use among patients undergoing elective PCI who were at low risk of bleeding. The cost of bivalirudin is 20 times more than heparin and its inappropriate use would be burden for patient.

CRT-100.04

Impact of Ambient Air Pollution on Coronary Artery Spasm

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BACKGROUND Ambient air pollution is well-known to be a serious risk factor for cardiovascular diseases, stroke, and death. However, the association between air pollutants (AP) exposure and coronary artery spasm (CAS) by acetylcholine (Ach) provocation test is not well elucidated yet.

METHODS A total of 5,822 consecutive patients without significant coronary artery disease (CAD) who underwent Ach provocation test between November 2004 and May 2014 were enrolled for this study. Significant CAS was defined as > 70% of narrowing by incremental intracoronary injection of 20, 50 and 100 μg. APs are largely divided into two types: Particulate matter with aerodynamic diameter of less than or equal to 10 μm in size (PM_{10}) and gaseous pollutants such as nitrogen dioxide (NO_2), and sulfur dioxide (SO_2), carbon monoxide (CO) and ozone (O_3).

RESULTS Among various APs, PM_{10} was only strongly correlated to CAS with Lag_{01}, Lag_{12} and Lag_{012}. Patients exposed to PM_{10} was divided into four quartile groups by four different ranges of concentration from lowest PM_{10} concentration group (Q1) to highest PM_{10} concentration group (Q4) before being analyzed. Group Q4 showed higher incidence of CAS than group Q1, and the risk of CAS increased 24 % (95% CI: 7 % to 44%, p=0.004) in Group Q1 than Group Q4. After baseline adjustment analysis, the risk of CAS increased 26 % (95% CI: 8 % to 47 %, p=0.004) in Group Q1 than Group Q4.

CONCLUSION Among various APs, only PM_{10} is significantly related with CAS, and it is a strong risk factor for CAS. Our findings indicate that exposure to AP such as PM_{10} is associated with endothelial dysfunction which may cause variant angina and other cardiovascular disease.

Table. Angiographic Clinical Outcomes at Acetylcholine Provocation Test

Variables, N (%)	1 Quartile (n=1464)	2 Quartile (n=1521)	3 Quartile (n=1415)	4 Quartile (n=1422)	P value
Angiographic and Clinical Outcomes at Acetylcholine Provocation Test					
CAS positive	817 (55.8)	870 (57.2)	807 (57.0)	869 (61.1)	0.025
Spontaneous spasm,	291 (19.9)	314 (20.6)	265 (18.7)	321 (22.6)	0.077
EKG change	63 (4.3)	64 (4.2)	67 (4.7)	67 (4.7)	0.858
ST-segment elevation	8 (0.5)	19 (1.2)	25 (1.8)	25 (1.8)	0.012
ST-segment depression	30 (2.0)	20 (1.3)	17 (1.2)	26 (1.8)	0.206
T-inversion	14 (1.0)	15 (1.0)	14 (1.0)	11 (0.8)	0.920
Atrial fibrillation	13 (0.9)	12 (0.8)	15 (1.1)	8 (0.6)	0.522
Chest pain	654 (44.7)	703 (46.2)	612 (43.3)	660 (46.4)	0.282

A total of 5,822 eligible patients were divided on quartile groups by a lag same day to 2 day before for PM_{10} (i.e: Lag_{012} of PM_{10}): Q1 (n=1464; PM_{10} < 34), Q2 (n=1521; 34≤ PM_{10}< 48), Q3 (n=1415; 48≤ PM_{10}< 63) and Q4 (n=1422; PM_{10} ≥ 63).

CRT-100.05

Tissue Characteristics of Culprit Coronary Lesions in Acute Coronary Syndrome and Target Coronary Lesions in Stable Angina Pectoris Using Virtual Histology and Intravascular Ultrasound

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OBJECTIVE Coronary plaque composition cannot be assessed accurately using gray-scale intravascular ultrasound (IVUS). Using virtual histology IVUS (VH-IVUS), a comparison of coronary plaque composition between acute coronary syndromes (ACS) and stable angina pectoris (SAP) was performed.

METHODS Pre-intervention IVUS of de novo culprit and target lesions was performed in 46 patients (20 with ACS and 26 with SAP). Using VH-IVUS, plaque was characterized as fibrotic, fibro-fatty, dense calcium, and necrotic core. VH-IVUS-derived thin-cap fibro-atheroma (VH-TCFA) was defined as necrotic core >10% of plaque area without overlying fibrous tissue in a plaque burden >40%. Lesions were classified into 3 groups: ruptured, VH-TCFA, and non-VH-TCFA plaque. Unstable lesions were defined as either VH-TCFA or ruptured plaque.

RESULTS Compared with patients with SAP, those with ACS had significantly more unstable lesions (89% vs 62%, p <0.001). Planar VH-IVUS analysis at the minimum luminal site and at the largest necrotic core site and volumetric analysis over a 10-mm-long segment centered at the minimum luminal site showed that the percentage of necrotic core was significantly greater and that the percentage of fibro-fatty plaque was significantly smaller in patients with ACS. The percentages of fibrotic and fibro-fatty plaque areas and volumes were smaller, and the percentages of necrotic core areas and volumes were larger in VH-TCFAs compared with non-TCFAs. Ruptured plaques in VH-IVUS analyses showed intermediate findings between VH-TCFAs and non-VH-TCFAs.

CONCLUSION Culprit lesions in patients with ACS were more unstable and had greater amounts of necrotic core and smaller amounts of fibro-fatty plaque compared with target lesions in patients with SAP.

CRT-100.06

Differences in Quantitative Coronary Angiographic (QCA) Characteristics of Coronary Artery Disease and Clinical Outcomes Between Statin Pre-treated and Statin-Naïve Human Immunodeficiency Virus (HIV) Patients Undergoing Percutaneous Coronary Intervention (PCI)

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