Protocol Guide

HCA Graduate Medical Education Protocol Guidelines

Graduate Medical Education

Version 2 – 04/2019

HCA Healthcare

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HCA Healthcare

Introduction

- This is an example of a well written protocol.
- Protocols are the first line of communication between the investigator and research analyst. This allows the analyst to gather the most accurate data for the project before having first contact with the investigator during the SOW call.
- Scope of Work (SOW) calls allow analysts to directly discuss the project with an investigator. The assigned analyst will present the investigator with a sample of project data. This is also a chance for analysts to highlight available data or to ask any further questions about the research project.

Getting started

- This is just one example of the way a protocol can be organized. All successful protocols will have these six parts:
  - Background
  - Research Objectives
  - Study Design/ Methods
  - Timeframe and Scope
  - Selection of Patients
  - Variables/Data Elements

- Some divisions have their own protocol templates available for use. This is an example of a successful protocol; please contact your GME program staff for more information about division-specific resources.

Background

- Include information on relevant studies and why your project is important
- Basic information about the project
- Any relevant statistics or data points
- Brief and concise (1 paragraph)

I. Introduction

a. Background and Rationale

Breast cancer is the most common cancer among women, regardless of race or ethnicity, effecting an estimated 3,418,124 women in the United States in 2015 (1,2). Further, roughly 12.4% of women are diagnosed with breast cancer during their lifetime. The National Cancer Institute projects that 266,120 women will be newly diagnosed in 2018, making up 15.3% of all new cases of cancer in the country (2). While every patient's treatment is tailored to their individual diagnosis and needs, some patients may require a mastectomy during their treatment course. If criterion are met, post-mastectomy reconstruction may be recommended, whether immediate or delayed. The decision to undergo post-mastectomy reconstruction involves collaboration between a patient and their healthcare team. Studies have been conducted to examine factors related to patient election to undergo post-mastectomy reconstruction, including patient age. However, on review, more recent studies have utilized small sample sizes, or those with larger sample sizes have used patient data sets that are currently out of date, or they do not address patient age as a primary factor (3, 4). **As a result, this study will examine the more recent relationship between patient age and the election to undergo post-mastectomy reconstruction.** We will expand this study by examining if there is a relationship between age and the timing of post-mastectomy reconstruction (immediate or delayed). Lastly, we will examine the forms of complications, as well as the differences in complication rates in patients that have had immediate or delayed reconstruction.

Research Objectives

- A clearly stated hypothesis or goal lets the analyst know what you are looking for
- The objective should be a short, thesis of project
  - The objective can be listed or stated in a few sentences

II. Hypothesis/Key Questions

This study will examine the more recent relationship between patient age and the election to undergo post-mastectomy reconstruction. We will expand this study by examining if there is a relationship between age and the timing of post-mastectomy reconstruction (immediate or delayed).

III. Objectives:

a. To examine the relationship between age and patient election to undergo post-mastectomy reconstruction (whether immediate or delayed)
b. To examine the relationship of age with the selection of either immediate or delayed reconstruction
c. To examine and compare the rates of complication seen in patients with either immediate or delayed reconstruction
d. To examine the most common complications that occur with post-mastectomy reconstruction

Study Design and Methods

- Scope of the data
  - Hospital, Division, Enterprise
  - Start with Hospital or Division data
- Brief description of statistical analysis
- Timeframe being studied
  - Data is available starting January 2014
- Estimated number of records for feasibility
  - Minimum number of patients needed to power the study

VI. Study Design/Methods

a. Source (location) of records to be identified: **Brandon Regional Hospital**
b. Describe how the charts to be reviewed will be identified: With use of inclusion criteria, exclusion criteria, and age range listed in section IV.
c. Describe who will identify charts to be reviewed: All principle investigators and statisticians affiliated with HCA.
d. Provide the date range of the chart review: **January 1, 2014-July 1, 2018**
e. **Estimated number of records** (include only the number of records that will be included in the data set to be analyzed rather than the number to be included for inclusion): **3000**

If the data is available, the analyst will expand the scope or date range to meet your minimum number

Selection of Patients

- The analysts use inclusion criteria as the starting point in building your patient population
- Inclusion criteria can include:
  - Gender
  - Age
  - Diagnosis, Procedures, Medications
- List exclusion criteria in this section, the analyst will exclude as much as the coding structure allows
- Include an age range

IV. Selection of Patients:

a. **Inclusion Criteria:** Female, diagnosed with breast cancer, have undergone non-prophylactic mastectomy (unilateral or bilateral, of any type), have undergone either immediate or delayed reconstruction post-mastectomy (of any type).
b. **Exclusion Criteria:** Male, patients that have undergone a prophylactic mastectomy
c. **Age Range**: 25-90

Variables

- A list of variables allows the analysts to know what data points are needed to make a project successful
- Clearly stated variables are essential for statistical analysis

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Elements to be collected during chart review:
Facility, state, gender, age, breast cancer stage, TNM classification, mastectomy (yes or no), type of mastectomy, post-mastectomy reconstruction (yes or no); timing to reconstruction (immediate or delayed), type of reconstruction, complications after reconstruction (yes or no); type of complication

List Data Elements

- Providing ICD codes allows for a more accurate sample of your data at the time of your SOW call
  - If you are unsure of the ICD code, list the diagnoses you are studying
- For procedures, a CPT or ICD code is helpful

ICD9:
V51.0- Encounter for breast reconstruction following mastectomy
85.7-Total reconstruction of breast
85.71-Latissimus dorsi myocutaneous flap
85.72-Transverse Rectus Abdominus Myocutaneous (TRAM) flap, pedicles
85.73 - Transverse Rectus Abdominus Myocutaneous (TRAM) flap, free
85.74- Deep inferior epigastric artery perforator (DIEP) flap, free
85.75- Superficial inferior epigastric artery (SIEA) flap, free
85.76- Gluteal artery perforator flap, free
85.79-Other total reconstruction of breast

ICD10:
C50.011-C50.929- Malignant neoplasm of breast
Z85.3-Personal history of malignant neoplasm of breast
Z90.10-Z90.13-Acquired absence of breast [following medically necessary mastectomy or lumpectomy resulting in significant deformity]
Z42.1- Encounter for breast reconstruction following mastectomy
I97.2-Post-mastectomy lymphedema syndrome
T80-T88- Complications of surgical and medical care, not elsewhere classified
T85-complications of other internal prosthetic devices, implants, and grafts
T85.40-T85.44 and T85.49- complications involving breast implants and prosthesis

CPT:
19303-19307-Mastectomy procedures

Examples of Successful Projects

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A Retrospective Study on The Demographic Factors, BMI And Diagnosis Correlated With The Administration Of Emergency Treatment Orders In Patients In Psychiatric Wards

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Introduction

Emergency Treatment Orders (ETO) are defined by Florida Law as "an immediate administration of rapid response psychotropic medications to a person to expeditiously treat symptoms that if left untreated, present an immediate danger to the safety of the person or others" [3]. Although ETOs are often used in psychiatric wards; published data on the practice of these ETOs are very limited. Thus far, research have shown some discrepancies between genders indicating that males receive more ETOs [2]. Immigration status also plays a role in determining the need for ETOs [1]. Our aim is to replicated these studies in psychiatric wards and explore other discrepancies in the administration of these ETOs.

Methods

Study Population

1460 patients who received at least one ETO in 3 psychiatric wards from January 2015 to December 2017 were included in the analysis. Based on the numbers of ETO, the patients were classified into two groups: Low ETO (1-3) and High ETO (≥4).

Statistical Analysis

Univariate analysis was performed to evaluate potential risk factors of high ETO; while multivariate logistic regression model was conducted to determine the most important risk factors of high ETO, in which the model included only the significant factors with missing value rate less than 20% in the univariate analysis. A p-value of less than 0.05 was considered as statistically significant. All data analyses were conducted using IBM SPSS

Results

The study's final analytic file included data for 1460 patients with at least one ETO. Mean age was 41.2 years with a standard deviation of 15.5, and there were 657 females (45.3%) and 792 males (54.7%). The univariate analyses (Table 1) revealed that age, BMI, LOS and diagnosis were significantly associated with ETO, Table 2 showed that compared to the patients with normal BMI (18.5≤BMI<25), the patients with BMI less than 18.5 did not increase risk of receiving more ETO (OR=1.18, p=0.702); the patients with high BMI value significantly increase risk of receiving more ETO (OR=1.60, p=0.037 for patients with 25≤BMI<30, and OR=1.97, p=0.003 for patients with BMI ≥30).

[redacted]

[redacted]	Low ETO (1-3)		High ETO (≥4)		
[redacted]	Total	n (%)	Total	n (%)	p-value
[redacted]	1084		365		0.584
[redacted]		487 (44.9%)		170 (46.6%)	
[redacted]		597 (55.1%)		195 (53.4%)	
[redacted]	1092	179 (16.4%) 438 (40.1%) 350 (32.1%) 125 (11.4%)	368	75 (20.4%) 108 (29.3%) 128 (34.8%) 57 (15.5%)	0.002
[redacted]	1092		368		0.161
[redacted]		790 (72.3%)		247 (67.1%)	
[redacted]		158 (14.5%)		63 (17.1%)	
[redacted]		144 (13.2%)		58 (15.8%)	
[redacted]	524		162		
[redacted]		31 (5.9%)		8 (4.9%)	0.022
[redacted]		219 (41.8%)		48 (29.6%)	
[redacted]		151 (28.8%) 123 (23.5%)		53 (32.7%) 53 (32.7%)	
[redacted]	1092	921 (84.3%) 171 (15.7%)	368	188 (51.1%) 180 (48.9%)	<0.001
[redacted]					
[redacted]	1092	444(40.7%)	368	213(57.9%)	<0.001
[redacted]	1092	364(33.3%)	368	122(33.2%)	0.949
[redacted]	1092	492(45.1%)	368	119(32.3%)	<0.001
[redacted]	1092	230(21.1%)	368	48(13.0%)	0.001
[redacted]	1092	24(2.2%)	368	13(3.5%)	0.159
	1092	84(7.7%)	368	26(7.1%)	0.693
	1092	53(4.9%)	368	33(9.0%)	0.004
	1092	190(17.4%)	368	42(11.4%)	0.007

Multivariate analysis (Table 3) showed that compared to the patients with 26≤Age<41, the younger patients with 18≤Age<26 significantly increased risk of receiving more ETO (OR=1.47, p=0.039); the older patients did not significantly increase risk of receiving more ETO (OR=1.20, p=0.248 for patients with 41≤age<61, and OR=1.19, p=0.419 for patients with age ≥61); no surprise, compared to the patients with LOS≤14 days, the patients with LOS >14 days significantly increased risk of receiving more ETO (OR=4.69, p<0.001); the patients with a Schizophrenia Spectrum / other Psychotic Disorder were more likely to receive more ETO (OR=1.67, p<0.001)

Table 2. Univariate Logistic Regression Analysis for High ETO (≥4) event on BMI

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	20.5% (8/39) 18.0% (48/267) 26.0% (53/204) 30.1% (53/176)	1.18 1 1.60 1.97	0.51-2.72 1.03-2.49 1.26-3.08	0.702 0.037 0.003

Table 3. Multivariate Logistic Regression Analysis for High ETO (≥4) event

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	29.5% (75/254) 19.8% (108/546) 28.0% (185/660) 17.0% (188/1109) 51.3% (180/351) 32.4% (213/657) 19.3% (155/803)	1.47 1 1.20 1 4.68 1.67 1	1.02-2.11 0.90-1.60 3.57-6.13 1.29-2.15 	0.039 0.225 <0.001 <0.001

Discussion

No gender, race, age bias were observed; our research shows that patients with a higher BMI have a significantly increase risk of receiving ETOs. This may be due to inadequate dosing and the need for additional ETOs in that population. This of course affects patient care and jeopardizes their safety and the safety of staff. Further research will need to be conducted to evaluate the efficacy of ETOs.

References

1. Association between patients' gender, age and immigrant background and use of restraint—A 2-year retrospective study at a department of emergency psychiatry. Knutzen, M., Friis, S., Nordic Journal of Psychiatry 2007
2. Restraint use for psychiatric patients in the pediatric emergency department. Dorfman DH1, Mehta SD. Pediatr Emerg Care. 2006 Jan;22(1):7-12
3. Emergency Treatment Orders - dcf.state.fl.us. [illegible]

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Examples of Successful Projects

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Comparison of the performance of the NCDR CathPCI score and Mehran score to predict acute kidney injury post-percutaneous coronary intervention

UCF College of Medicine
UNIVERSITY OF CENTRAL FLORIDA

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Introduction

Contrast-induced acute kidney injury (AKI) is a common complication in patients undergoing percutaneous coronary intervention (PCI) and is known to be associated with increased mortality rates, worsening of chronic kidney disease (CKD), prolonged hospital stay and significantly higher healthcare costs(1-3). Even though the risk of contrast-induced AKI is low in the general population, it is significantly augmented in patients undergoing diagnostic procedures for comorbid conditions such as coronary artery disease (CAD).

Multiple prediction models have been previously developed to predict the risk of AKI after PCI. However, a direct comparison of the commonly used models is lacking. Tsai et al. developed a risk stratification model using the National Cardiovascular Data Registry (NCDR) for predicting AKI post-PCI, which is helpful in developing preventative and protective strategies (6). Similarly, Mehran et al. also developed a risk scoring system which assessed the cumulative risk of multiple variables on the development of contrast induced nephropathy (CIN) in patients who underwent PCI (7). In this study, we aim to compare these scoring systems to determine which of the two models deliver a higher predictive value. This will allow healthcare providers to foresee possible complications, and consequently deliver better healthcare by implementing preventive strategies.

Objective

The aim of this study is to compare the performance of the NCDR Cath-PCI model with the Mehran score.

Methods

The NCDR CathPCI Registry is sponsored by the American College of Cardiology (ACC) and the Society for Cardiovascular Angiography and Intervention. This is a retrospective study using de-identified data from 1511 patients who received PCI at our institution between July 2015 and December 2017. We excluded patients who had diagnostic catheterization without PCI, patients without a pre- and or post-PCI serum creatinine, and patients currently on dialysis.

We used the Student's t-test and Chi-square/Fisher's exact test to analyze mean and proportional differences between ACS and non-ACS patients. The performance of the NCDR CathPCI score and Mehran score was evaluated by comparing the area under the receiver operating characteristic curve (AUROC).

Figures

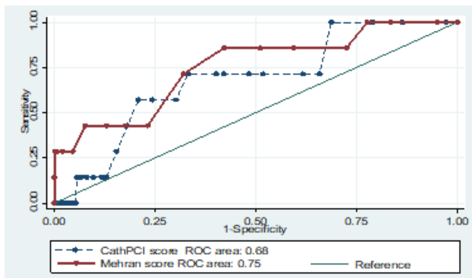

Figure 1: Comparison of the NCDR CathPCI AKI model to the Mehran score in non-acute coronary syndrome group

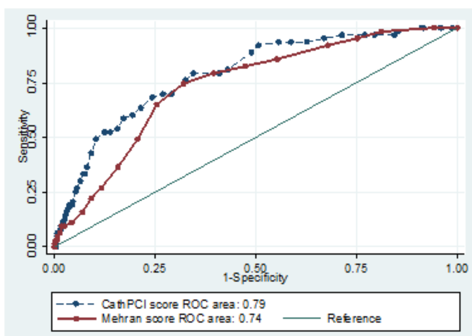

Figure 2: Comparison of the NCDR CathPCI AKI model to the Mehran score in acute coronary syndrome group

Results

1024 out of the 1511 patients in this study (67.77%) presented with ACS. Among 1511 patients, a total of 70 patients (4.64%) developed AKI post-PCI. Of those AKI patients, 63 (6.18%) had ACS, and 7 (1.44%) did not have ACS. Comparing non-ACS and ACS patients, ACS patients were significantly younger, more likely to be smokers, to have anginal class Canadian Cardiovascular Society classification (CCS) IV, to have HF within 2 weeks of presentation, and to have New York Heart Association class III and IV; associated with higher rates of diagnostic catheterizations with PCI, IABP, urgent/emergent/salvage PCI status, and cardiogenic shock and bleed after PCI; and associated with lower pre-PCI left ventricular ejection fraction (LVEF) and pre-PCI hemoglobin. Surprisingly, non-ACS patients were more likely to have comorbidities such as HTN, dyslipidemia, prior HF, prior PCI, cerebrovascular disease, and peripheral vascular disease (PAD).

Both NCDR AKI model and Mehran risk score showed good discrimination in the cohort (Figure 1 & 2). In patients who presented with non-ACS, the Mehran score performed better than the NCDR AKI model with an AUROC 0.75 and 0.68 respectively (Figure 1). In patients presenting with ACS, the NCDR AKI model was superior to the Mehran score in predicting AKI risk with an AUROC 0.79 vs 0.74 (Figure 2).

Conclusion

NCDR AKI model is superior in the ACS population and the Mehran score is superior in the non- ACS population in predicting AKI post-PCI. Both scores were validated and performed better than their derived cohort. Given this result, we can better predict AKI post-PCI using the appropriate score in the specific clinical presentation.

References

Disclaimer: This research was supported (in whole or in part) by HCA and/or an HCA affiliated entity. The views expressed in this publication represent those of the authors and do not necessarily represent the official views of HCA or any of its affiliated entities.

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Examples of Successful Projects

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Early Aggressive Hydration is Associated with Decreased Narcotic Use and Readmission In Mild Acute Pancreatitis

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3 Digestive Disease Associates, Gainesville, FL

Introduction

Acute pancreatitis is among the leading causes of hospitalization due to gastrointestinal disease in the United States and accounts for 2.6 billion dollars annually in medical costs. No pharmacologic agents have been shown to impact the course of acute pancreatitis except early aggressive hydration which was studied in recent randomized clinical trial[1] for mild acute pancreatitis. Our aim was to determine if aggressive hydration has been followed for mild acute pancreatitis and difference in outcomes for standard versus aggressive hydration patients.

Methods

- Acute Pancreatitis patients were identified with ICD-10 codes.
- Patients with Sepsis, SIRS, heart failure, ascites, gastrointestinal bleeding, pancreatic necrosis and abscess, pulmonary edema, peripheral edema, cirrhosis, low blood pressure, kidney dysfunction and hyponatremia were excluded with ICD-10 codes, initial vitals and laboratory values.
- A total of 500 subjects who met the inclusion and exclusion criteria for mild acute pancreatitis were included retrospectively in the analysis.
- The subjects were classified into three groups based on the amount of hydration the received in the first 12 hours of admission: Hydration Group A (0-1.5 ml/kg/hr), Hydration Group B (>1.5-3 ml/kg/hr), and Hydration Group C (>3 ml/kg/hr). Length of stay (LOS), narcotic use on the last day and readmission rate among the three groups were analyzed using Chi-square test.
- A p-value of less than 0.05 was considered statistically significant. All data analyses were conducted using IBM SPSS Statistics 24.

Results

- Patients with aggressive hydration (>3 ml/kg/hr) had a greater reduction in creatinine (mean difference = -0.05, p= 0.017) compared to those who received standard hydration (0-1.5 ml/kg/hr).
- There was no significant difference in LOS among the three hydration groups, p>0.05. (Table 1)
- Patients with aggressive hydration (>3 ml/kg/hr) were less likely to use narcotics on the last day of hospitalization (OR=1.916, 95%CI, 1.078-3.406, p=0.027) compared to those who received low hydration (0-1.5 ml/kg/hr) (Table 2)
- Patients with hydration (>1.5 ml/kg/hr) were less likely to experience a within 30 days readmission for any reason (OR=1.603, 95%CI, 1.064-2.414, p=0.024) compared to those who received low hydration (0-1.5 ml/kg/hr) (Table 3)

Table 1: Length of stay (LOS) comparisons among intravenous hydration groups

Outcome	(A). Hydration (0-1.5 ml/kg/hr) N mean(SE)	(B). Hydration (>1.5-3 ml/kg/hr) N mean(SE)	(C). Hydration (>3 ml/kg/hr) N mean(SE)	Mean difference C – A Mean(SE) P value
LOS	252 3.80(0.18)	161 3.61(0.23)	87 4.03(0.31)	0.23(0.36) 0.520

Table 2: Narcotics use on the last day by three intravenous hydration groups

Effect	Rate of Narcotics use	Odds Ratio	95%CI	P-value
Hydration (ml/kg/hr)				
0≤Hydrations≤1.5	34.5% (87/252)	1.916	1.078-3.406	0.027
1.5<Hydrations≤3	28.0% (45/161)	1.368	0.737-2.540	0.320
Hydration>3 (Ref.)	23.0% (20/87)	1		

Table 3: Readmission within 30 days for any reason by two intravenous hydration groups

Effect	Rate of 30-day readmission	Odds Ratio	95%CI	P-value
Hydration (ml/kg/hr)				
0≤Hydrations≤1.5	29.8% (75/252)	1.603	1.064-2.414	0.024
Hydration>1.5 (Ref.)	21.4% (53/248)	1		

Discussion & Conclusion

Narcotic use in last twenty-four hours of hospitalization and readmission rate were significantly less in aggressive hydration group. Only 17% patients receive early aggressive hydration even guidelines recommend early hydration for better outcomes in acute pancreatitis. There is a huge potential for awareness regarding early aggressive hydration for acute pancreatitis.

References

1. Buxbaum, J.L., Quezada, M., Da, B., Jani, N., Lane, C., Mwengela, D., Kelly, T., Jhun, P., Dhanireddy, K. and Laine, L., 2017. Early aggressive hydration hastens clinical improvement in mild acute pancreatitis. The American journal of gastroenterology, 112(5), p.797.

Examples of Successful Projects

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Prognosis of Patients with AKI after Percutaneous Mechanical Thrombectomy: A Retrospective Cohort Analysis

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Introduction

Percutaneous Mechanical Thrombectomy (PMT) is an endovascular procedure utilized in both arterial and venous thrombosis. Acute kidney injury (AKI) has been recognized as one undesired sequela of PMT. There is no study to investigate the outcomes in this specific patient population.

Methods

This is a retrospective cohort study using the de-identified clinically relevant datasets from inpatient databases of seven community hospitals between 01/2015-12/2017. There were 262 unique adult patients who underwent PMT included in the final cohort analysis. The primary outcome was in-hospital mortality which was the composite of recorded death during hospital stay or discharges to a hospice. The secondary outcome was the length of hospital stay (LOS).

Results

There were 28 out of 262 (10.9%) patients that developed post-PMT AKI. The composite in-hospital mortality was 21.4% in the AKI group, and it was 6.8% (*P*=0.009) in the non-AKI group. In the AKI group 19 (67.9%) patients stayed in the hospital longer than five days, and 115 patients (49.1%) in the non-AKI group stayed longer than five days (*P*=0.061). Univariate analysis showed that sex (*P*=0.026), race (*P*=0.044), shock (*P*=0.028) and AKI (*P*=0.009) were correlated with the composite in-hospital mortality; sex (*P*=0.012), age (*P*=0.026), heart failure (*P*=0.002), chronic kidney disease (*P*=0.009), and diabetes mellitus (*P*=0.031) were correlated with LOS. In the patients with LOS>5 days 19 (14.2%) patients developed AKI while 9 patients (7.0%) had post-PMT AKI in the group with LOS ≤ 5days (*P*=0.061). Using multivariate logistic regression analysis with the Backward elimination method, two independent prognostic risk factors were revealed that significantly increased the risk of the composite in-hospital mortality: age (Odd Ratio [OR]=1.07, 95% Confidence Index [CI] 1.03-1.12, *P*=0.001) and post-PMT AKI (OR=4.77, 95% CI 1.42–16.11, *P*=0.012). Using the same multivariate analysis model, among patients with AKI, there was a trend of longer hospital stay though it is not statistically significant (OR=1.86, 95% CI 0.77–4.46, *P*=0.167)..

Discussion & Conclusion

Among the patients treated with PMT in the hospitals:

10.9% developed post-PMT AKI.

The composite in-hospital mortality was 21.4% in the AKI group, and it was 6.8% (*P*=0.009) in the non-AKI group.

The odds of dying for the patients who develop post-PMT AKI are 4.77 times as large as the odds for the patients without post-PMT AKI.

Vigilant renal protection strategies are required before, during and post PMT procedure.

References

[1] Escobar GA, Burks D, Abate MR, et al: **Risk of Acute Kidney Injury after Percutaneous Pharmacomechanical Thrombectomy Using AngioJet in Venous and Arterial Thrombosis**. *Annals of vascular surgery* 2017, **42**:238-245.
[2] Morrow KL, Kim AH, Plato SA, et al: **Increased risk of renal dysfunction with percutaneous mechanical thrombectomy compared with catheter-directed thrombolysis**. *Journal of vascular surgery* 2017, **65**(5):1460-1466.
[3] Kellum JA, Bellomo R, Ronco C: **Progress in Prevention and Treatment of Acute Kidney Injury: Moving Beyond Kidney Attack**. *Jama* 2018, **320**(5):437-438.

Table 1. Multivariate Logistic Regression Analysis for Composite In-Hospital Mortality

Variables	Wald Score	Adjusted OR	95% CI	*P* - Value
Age	10.460	1.073	1.028 – 1.120	0.001
Shock	2.150	2.837	0.704 – 11.437	0.143
Nephrotoxin	3.228	4.361	0.875 – 21.743	0.072
Post-PMT AKI	6.345	4.774	1.415 -16.110	0.012

Multivariate logistic regression analysis with the Backward elimination method using select *p*-value=0.20, including risk factors with *p*-value < 0.2: age, shock, nephrotoxin, post-PMT AKI and race.

Table 2. Multivariate Logistic Regression Analysis for Length of Hospital Stay

Variables	Wald Score	Adjusted OR	95% CI	P - Value
Heart Failure	10.374	3.550	1.642 – 7.674	0.001
Race				
White	Reference	Reference	Reference	Reference
Black	1.710	1.820	0.742 – 4.463	0.191
Other	3.786	2.051	0.950 – 4.231	0.052
Sex (female)	7.044	2.038	1.205 – 3.447	0.008
Post-PMT AKI	1.906	1.856	0.771 – 4.4 64	0.167

Multivariate logistic regression analysis with the Backward elimination method using select *p*-value = 0.20, including risk factors in Table 2 with p-value < 0.2: heart failure, PMT-AKI, diabetes, sex, age, CKD, nephrotoxin, hypertension and race.

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