

## **AACP 2019 Paper Presentation**

**Saturday, February 9, 2019 (07:45 – 9:30 AM)**

### **USING A QUALITY IMPROVEMENT INITIATIVE TO REDUCE ACUTE KIDNEY INJURY DURING ON-PUMP CORONARY ARTERY BYPASS GRAFTING**

Mitchell Katona, Joshua Walker, Nitin Das, Stewart Miller<sup>1</sup>, Edward Sako; The University of Texas Health Science Center at San Antonio, Department of Cardiothoracic Surgery, The University of Texas at San Antonio, College of Business<sup>1</sup>

Sponsored by Joshua Walker  
walkerj3@uthscsa.edu

The University of Texas Health Science Center at San Antonio, Department of Cardiothoracic Surgery  
The University of Texas at San Antonio, College of Business<sup>1</sup>

Acute kidney injury (AKI) following surgery utilizing cardiopulmonary bypass (CPB) is a costly morbidity with a reported prevalence ranging from 2-40%. It is estimated that incremental costs associated with AKI following cardiac operations is about one billion US dollars annually. In response to a perceived high incidence of AKI following CPB at our institution, a quality improvement (QI) initiative consisting of a systematic change to a delivered oxygen (DO<sub>2</sub>) goal directed perfusion (GDP) practice was implemented. A retrospective chart review was conducted to assess the efficacy of reducing AKI following the initiative.

The study population included all patients receiving isolated, non-emergent, on-pump coronary artery bypass grafting from January 2015 through June 2018 (n = 452), excluding patients requiring preoperative hemodialysis. DO<sub>2</sub> GDP was instituted in February 2017. The pre-GDP cohort included 264 patients, and the post-GDP cohort included 188 patients. Controlled variables were hemoglobin on CPB, and pump index (collectively, DO<sub>2</sub>). Outcomes included AKI prevalence, postoperative change in serum creatinine, and mortality. Shapiro-Wilks tests were used to confirm lack of normality of each quantitative variable. Wilcoxon rank-sum tests and two-sample z tests were used to assess the statistical significance of differences between quantitative and categorical variables, respectively.

With regard to age, body mass index, prevalence of anemia, diabetes, and HbA<sub>1c</sub> there was no statistical difference. DO<sub>2</sub> was significantly higher in the post-GDP group ( $p < 0.001$ ). The primary outcomes of postoperative change in serum creatinine and incidence of AKI were significantly lower in the post-GDP group ( $p < 0.001$ ,  $p < 0.001$ , respectively).

We instituted this QI initiative with the goal to reduce the incidence of post-CPB AKI. With initiation of a DO<sub>2</sub> GDP practice we noted a 37% reduction in post-CPB AKI. This initiative confirms previous assertions that DO<sub>2</sub> is a critical intraoperative parameter and should direct perfusion intervention accordingly.

| Variables                                     | Pre-GDP<br>(n = 264) | Post-GDP<br>(n = 188) | <i>p</i> Value |
|---|----------------------|-----------------------|----------------|
| Male gender                                   | 185 (70)             | 150 (80)              | 0.020          |
| Age (years)                                   | 60.8 ± 9.6           | 60.5 ± 10.0           | 0.826          |
| Hispanic ethnicity                            | 138 (52)             | 122 (65)              | 0.007          |
| BMI (kg/m <sup>2</sup> )                      | 30.7 ± 5.8           | 30.7 ± 5.7            | 0.904          |
| Anemia  | 125 (47)             | 82 (44)               | 0.435          |
| Diabetes                                      | 179 (68)             | 121 (64)              | 0.447          |
| HbA <sub>1c</sub> (%)                         | 7.74 ± 2.09          | 7.49 ± 2.14           | 0.091          |
| eGFR (mL/min/1.73m <sup>2</sup> )             | 81.0 ± 23.5          | 76.0 ± 23.1           | 0.024          |
| Transfusion                                   | 110 (42)             | 93 (49)               | 0.101          |
| Min. DO <sub>2</sub> (mL/min/m <sup>2</sup> ) | 238 ± 37.5           | 278 ± 42.7            | <0.001         |
| Min. CPB Hb (g/dL)                            | 7.54 ± 1.24          | 8.48 ± 1.38           | <0.001         |
| Min. CI (L/min/m <sup>2</sup> )               | 2.04 ± 0.16          | 2.11 ± 0.16           | <0.001         |
| Postoperative ΔSCr (%)                        | 136 ± 47.6           | 122 ± 39.6            | <0.001         |
| AKI   | 115 (44)             | 52 (28)               | <0.001         |
| Mortality (30-day)                            | 4 (1.5)              | 1 (0.5)               | 0.322          |

Values are mean ± SD or n (%).

BMI = body mass index; HbA<sub>1c</sub> = glycated hemoglobin; eGFR = estimated glomerular filtration rate; Min. DO<sub>2</sub> = minimum delivered oxygen; Min. CPB Hb = minimum hemoglobin during cardiopulmonary bypass; Min. CI = minimum cardiac index; SCr = serum creatinine; AKI = acute kidney injury.