Inpatient Cardiac Arrests in ESRD Patients: Trends and Outcomes

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Introduction:

There is a paucity of literature on in-patient cardiac arrests and cardiopulmonary resuscitation for the ESRD population. To our knowledge there are no publications on potential dialysis dependent risk factors for cardiac arrest in the hospitalized patient, no data on initial rhythm with corresponding outcome, and a lack of outcome data on those that survive a cardiac arrest.

The primary objective of this study is to identify potential modifiable factors, both dialysis dependent (dialysate Rx) and non-dialysis dependent factors (ICD criteria, medication use), associated with cardiac arrest. The secondary objective is to characterize trends and outcomes in hospitalized ESRD patients, including initial rhythm, survival to discharge, survival to 6 months, and post arrest prognostication.

Methods:

This is a single center retrospective study at Beth Israel Medical Center, from July 2010 to February 2016. Data acquisition was performed with help from the decision support team and code committee. Through clinical data query of electronic health records and billing and procedure codes, baseline characteristics, laboratory data and dialysis prescription prior to code, type of arrest, survival rates, and neurologic outcome- using cerebral performance category scoring (CPC)- were determined. A root cause analysis of each arrest was also performed.

Results:

There are 29 cardiac arrests (27 patients, 2 of which coded twice). The majority of patients were white, male, >65 years old, and having coronary artery disease, diabetes, hypertension, heart failure, hyperlipidemia, and tobacco use.

Table 1: Initial Rhythm and Outcome:

Total Number of Codes:	29	
Initial Rhythm:	Total	Survival to D/C
VT/VF	8 (27%)	3 (38%)
PEA	17 (59%)	9 (53%)
Asystole	4 (14%)	1 (25%)
Survival:		
To D/C	13 (48%)	
6 Months	10 (77%)	
CPC <=2 at D/C:	10 (77%)	

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The dialysis prescription preceding arrest revealed average dialysate potassium of 2.4 mEq/L (SD 0.6), average calcium of 2.5 mEq/L (SD 0.13), and average bicarbonate of 34 mEq/L (SD 3.6). There was no documentation to suggest inadequate or aggressive volume removal via ultrafiltration. Root cause analysis determined 1 arrest precipitated by dialysis (fluid and electrolyte shift).

Of patients that died 4/14 were taking a beta blocker, 1/14 taking an ACEI/ARB, and 8/14 exposed to a QT prolonging agent. For the patients that survived 8/13 were on a beta blocker, 5/13 taking an ACEI/ARB, and 8/13 on a QT prolonging agent. There were 3 patients having low enough LVEF that they met criteria for ICD placement.

Conclusion:

Our data reveals higher than expected PEA arrest survival and survival to discharge. This study lacks the robustness for statistical analysis however suggests similar survival and neurologic outcomes seen in the general population.

There is little variation in dialysis prescription to account for dialysis dependent factors associated with cardiac arrest. The patients that survived arrest were more likely to be on a beta-blocker and ACEI/ARB, which may suggest an association with better peri-arrest outcomes. Additionally, 3 patients that met criteria for ICD placement had none (2 of which that had an initial rhythm that was shockable).

This work is meant to provoke thought and hypothesis generation for change in management of hospitalized ESRD patients who have a cardiac arrest. Changing dialysis practice, medication use, and placement of an ICD may help decrease the incidence of cardiopulmonary events or improve post arrest outcomes, however a larger study is needed to help determine such conclusions.