10 years on burned patients with AKI started on RRT and found that early RRT approach reduced mortality of burned patients with AKI. Early RRT could halt the accumulation of toxic wastes that interfere healing of burned wounds and affect hemodynamic stability of patients. RRT also allows better management of fluid, electrolytes and acid-base balance. All these advantages could improve overall outcome of burned patients with AKI.

**Table 1. Comparison of burned patients with AKI started on RRT in different studies**
NA – Not available

| | Steinvall 2008 (n=4) | Chung 2009 (n= 29) | Soltani 2009 (n= 33) | Mariano 2010 (n=70) | Gille (2014) (n=14) |
|---|---|---|---|---|---|
| Age (year) | NA | 27 (mean) | 49 (mean) | 57.5 (mean) | 64 (median) |
| TBSA (%) | NA | 64% (mean) | 36% (mean) | 40% (median) | Median 42.5% (median) |
| Criteria to start RRT | Creatinine > 300 umol/L, together with oliguria or anuria | AKIN 2 + shock, AKIN 3 | Severe fluid overload refractory to diuretics; Refractory hyperkalemia; Severe metabolic acidosis Azotemia | NA | Oxygenation index (PaO2/FiO2) < 200 mmHg; Serum potassium > 6 mmol/L; Increase of serum creatinine >200%; Reduction of glomerular filtration rate > 50%; Urea > 25 mmol/L; Diuresis ≤ 0.5 ml kg/hour for 6 hours; Rhabdomyolysis |
| Time to RRT (days from admission) | Started on day 5 to 19 | 9 (median) | 14 (mean) | 16.8 (mean) | 6 (median) |
| Duration of RRT (days) | Ranging from 10 to 15 days | 5.6 (mean) | 10.5 (mean) | 9.5 (mean) | 7 (median) |
| Abdominal compartment syndrome | NA | NA | 7 | NA | NA |
| Mortality rate | 3 (75%) | 18 (62%) | 23 (69.7%) | 50 (71.4%) | 2 (11.1%) |

## 059

### RENAL REPLACEMENT THERAPY IN ECMO, MODALITIES, ACCESS AND SAFETY PROFILE: EXPERIENCE OF AN ECMO CENTRE IN A DEVELOPING COUNTRY

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**Category:** RRT Applications and Targeted Interventions
**Presenter:** Dr POOJA WADWA
**Keywords:** ECMO, CRRT, Fluid Balance, AKI
**Introduction:** ECMO (Extra Corporeal Membrane Oxygenation) is a lifesaving modality for patients with severe organ dysfunction. The incidence of Acute Kidney Injury (AKI) in such patients is very high. Fluid overload is the single most important predictor of mortality in such patients and Continuous Renal Replacement Therapy (CRRT) is the preferred modality to manage it, alongwith AKI and metabolic disturbances. In India, ECMO with CRRT is a rarely used modality and very few centers practice it.
**Objective:** To assess the experience of a tertiary care center in India of combining ECMO with CRRT during the first 3 years of inception.
**Method:** We collected data retrospectively of 30 patients on ECMO from Dec 2013 to Dec 2016 at our center. All data related to prevalence of AKI (by AKIN criteria), indications, modality and access for RRT and associated complications were collected. Outcome parameters like survival and net fluid balance were determined.
**Results:** Of the 30 cases, 18 (60%) underwent some form of RRT while on ECMO. Nine patients (50%) each were on VenoArterial (VA) and VenoVenous (VV) ECMO. Seven (38.9%) of these were on RRT pre ECMO also. The commonest indication was AKI (88.8%, 16/18), associated with metabolic acidosis(AKI+Met acidosis 66.7% (12/18). Fluid overload was the second commonest indication(27.8% (5/18). Independent access was commoner (12 cases; 66.7%) than access via ECMO circuit for RRT 10(55.6%) cases. A CRRT device was used in 7 and an inline hemofilter was used in 3 cases. In 4 cases, ECMO circuit access was switched to independent access due to complications: 2 had damaged CRRT filter due to high pressure gradients; one had recurrent clotting in CRRT circuit and one had ECMO pump failure due to microbubbles in the circuit. One of the 5 overloaded (20%) and one of 13 non overloaded patients survived (7.7%). Of 12 patients with met acidosis on RRT, acidosis was corrected in 8(66.7%): (of which 7 were weaned off ECMO; 2 survived). Mortality rates were high on patients with CRRT and ECMO (16 of 18 cases, 88.9%) as compared to those without RRT (2 of 12; 16.7%). The survivors on ECMO had a much less positive fluid balance than non survivors.
**Conclusions:** The incidence of AKI was high (16/30 , 53.3%) in our study and a majority required RRT. The associated mortality was higher in these patients. Our study shows that CRRT is a safe technique for maintenance of fluid and acid base balance. Independent access for CRRT was found to be safer in our patients. Patients with less positive fluid balance had a better survival.

## 079

### OUTCOMES EVALUATION OF PATIENTS ON EXTRACORPOREAL MEMBRANE OXYGENATION WITH CONCOMITANT CONTINUOUS RENAL REPLACEMENT THERAPY

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**Category:** RRT Applications and Targeted Interventions
**Presenter:** Mr PETER CHI KEUNG LAI
**Keywords:** Extracorporeal Membrane Oxygenation, Concomitant Continuous Renal Replacement Therapy
**Introduction:** Patients on Extracorporeal Membrane Oxygenation (ECMO) often have acute kidney injury or fluid overload requiring Continuous Renal Replacement Therapy (CRRT). There was evidence that ECMO patient requiring CRRT had higher mortality due to increased severity of illness, but it is uncertain how CRRT affects outcomes of ECMO patients.
**Objectives:** To explore the characteristics of ECMO survivors who underwent concomitant CRRT.
**Methodology:** Retrospective chart review of 27 adult ECMO patients with CRRT in a university-affiliated hospital in 2015 - 2016.
**Results:** 12 patients had veno-venous ECMO and 15 had veno-arterial ECMO. Indications for ECMO were hypoxemic respiratory failure refractory to conventional therapy, cardiogenic shock associated with myocardial infarction, myocarditis and cardiac arrest. Mean age was $49.4 \pm 14.8$ years. 9 ECMO-CRRT patients survived and 18 died. There were more patients with primary respiratory diseases in survivor group (77.8% vs 17.8%, p=0.01). Similar findings were observed between survivors and non-survivors for ECMO blood flow rate ($3.96 \pm 0.56$ vs $3.5 \pm 0.6$, p=0.06), ECMO duration ($16.7 \pm 14.1$ vs $13.8 \pm 16.1$, p=0.64) and length of stay in intensive care unit (ICU) ($29.3 \pm 25.6$ vs $15.0 \pm 17.0$, p=0.16). CRRT-ECMO configuration was the same for all cases, except for one case in which CRRT was conducted with non-tunneled dialysis catheter. Indications for CRRT treatment included acute kidney injury, fluid overload and metabolic disturbance. 23 patients received systemic ECMO anticoagulation with unfractionated heparin infusion at 12-18unit/kg/hour while 4 patients in non-survivor group received regional citrate anticoagulation for CRRT. Baseline creatinine before CRRT was $327.7 \pm 233.9$umol/L and percentage creatinine change was $41.4 \pm 21.2\%$. CRRT treatment hours ($151.6 \pm 191.1$ hours), total fluid removal with CRRT ($12.9 \pm 18.1$ liters) and number of hemofilter change ($5.0 \pm 4.6$) were not associated to increase in mortality.
**Conclusion:** In this series of 27 patients managed with ECMO and concomitant CRRT in an adult ICU, survival to ICU discharge was 33.3%. Mortality risk was increased in patients with circulatory failure but not it was not associated with CRRT treatment modality.

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### DOES VANCOMYCIN TROUGH CONCENTRATION USEFUL TO PREDICT OPTIMAL DOSING DURING CONTINUOUS VENOVENOUS HAEMOFILTRATION? PRELIMINARY FINDINGS FROM THE VALLEY STUDY

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**Category:** RRT Research
**Presenter:** Dr FARIZ SAFHAN MOHAMAD NOR
**Keywords:** vancomycin, continuous renal replacement therapy, pharmacokinetic
**Introduction:** Achieving optimal vancomycin dosing, particularly in septic critically ill patients receiving continuous renal replacement therapy (CRRT) is crucial. Established guidelines recommend the use of trough concentrations to manage vancomycin dosing in adult patients with gram-positive infections. Importantly, obtaining the area under the plasma concentration-time curve (AUC), based on the pharmacokinetic / pharmacodynamics (PK/PD) concept, is extremely required.
**Objective:** This study aimed to describe the pharmacokinetics (PK) of vancomycin in Malaysian critically ill patients receiving CRRT, and the achievement of its therapeutic target, the ratio of the AUC to the minimum inhibitory concentration (MIC) of causative pathogen (AUC/MIC >400), using a standard dosing regimen (750 mg 12 hourly).
**Methodology:** This was a prospective PK study of vancomycin using standard dosing regimen, in critically ill patients receiving continuous venovenous haemofiltration (CVVH). Blood samples were collected at ten sampling times during a dosing interval. PK analyses were evaluated using non-compartmental method. Vancomycin trough concentrations (15-20 mg/L), and the achievement of the ratio of AUC/MIC>400, based on selected susceptibility breakpoint (MIC=1 mg/L), were evaluated.
**Results:** Fifty blood samples from five PK profiles of five patients were analysed. The median (interquartile range) of vancomycin total clearance ($CL_{total}$) and volume of distribution ($V_d$) were 62.8 (45.1-62.7) mL/min and 62.0 (48.7-94.2) L respectively, during CVVH. Maximum concentration, $C_{max}$ [30.8 (30.5-33.2) mg/L] was observed at $1.8\pm0.3$ h. The standard dosing regimen (750 mg 12 hourly) resulted in $AUC_{0-24}$ and $C_{min}$ of 400.1 (399.0-504.1) mg.h/L and 12.1 (10.7-16.1) mg/L, respectively. Of these, only two patients, who were anuric, obtained trough concentration between 15-20 mg/L and subsequently achieved the targeted AUC/MIC>400 (MIC=1 mg/L).
**Conclusion:** Obtaining trough concentration between 15-20 mg/L relatively achieved the desired AUC/MIC >400 for vancomycin during CVVH. Higher trough concentration (e.g 20-25 mg/L) may be required when targeting for a higher MIC (e.g >1mg/L). Initiation of a higher dosing regimen could also be necessary, particularly in patients undergoing CVVH with significant residual native renal function. Further data is required, from continuation of this study, to clarify the findings.

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### ACUTE RENAL REPLACEMENT THERAPY IN INTENSIVE CARE SETTING: A SINGLE TERTIARY CENTRE EXPERIENCE

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**Category:** RRT Research
**Presenter:** Dr MALINI SHANMUGANATHAN
**Keywords:** RRT, Critical Care Nephrology, AKI
**Introduction:** The number of patients requiring renal replacement therapy (RRT) due to acute kidney injury (AKI) is increasing in trend. AKI carries high morbidity and mortality, increases overall medical cost and results in longer inpatient stay.
**Objective:** To describe CCN service in a tertiary hospital setting by analyzing admissions that required RRT and factors influencing their outcome.
**Methodology:** Patients in intensive care unit (ICU), cardiac care unit (CCU), cardiothoracic intensive care unit (CICU) and cardiac high dependency ward (CHDW) requiring RRT from 2006 to 2016 was included, with data from our electronic Hospital Information System (eHIS). Patients whom developed AKI were described in detail. The team consists of 1 nephrologist, 1 nephrology trainee, 2 medical officers and 2 HD staff. We are equipped with 4 continuous renal replacement therapy (CRRT) machines (2 Prismaflex, 2 Aquarious), 1 Fresenius sustained low efficiency daily diafiltration (SLEDD) machine and 4 Fresenius HD machines. Our comprehensive CCN service is well-structured, right from the initial renal referral and consult, decision on RRT, venous access insertion, initiation of RRT and subsequent RRT related monitoring and management.

**Results:** Outpatient HD has grown from 9059 to 14775 and acute RRT increased from a mere 99 to 938. In 2016 alone, 258 patients required RRT, out of which 76 were end stage renal disease(ESRD) patients and 182 patients with a mean age of 52.1 ±16.0 developed AKI in the intensive care setting and required RRT. A total of 867 procedures was performed; 55.5% CRRT, 27.5% SLEDD and 17% HD. 59.3% of patients were admitted in ICU. The rest were in CCU (18.7%), CICU (18.7%) and CHDW (1.6%). Femoral vein catheter (FVC) was the preferred vascular access, with 99% (180) insertions and 2 internal jugular catheters (IJC). Some patients required more than one catheter insertion due to prolonged stay and continued RRT requirement. Patients with sepsis and multi organ dysfunction (MOD) were more likely to be on CRRT. Mortality rate in that group was higher at 64%. A significant number of these patients were diabetic (p=0.031).
**Conclusion:** There has been a tenfold increase in the number of acute RRT procedures performed over the past 10 years. However this tremendous rise has not been matched by a mere increase from 10 to 20 dialysis staff throughout this period. As AKI is a common complication in critically ill patients, efficient and prompt critical care nephrology treatment is of utmost importance in ensuring better outcome for patients.

| | N =182 | |
|---|---|---|
| Gender (%) | Male | 129(70.9) |
| | Female | 53(29.1) |
| Age, mean (SD) | | 52.1(16.0) |
| | Range (%) | |
| | 10-44 | 60(33.0) |
| | 45-54 | 38(20.9) |
| | 55-64 | 32(17.6) |
| | 65-74 | 38(20.9) |
| | 75+ | 14(7.7) |
| Race (%) | | |
| | Malay | 113(62.1) |
| | Chinese | 40(22.0) |
| | Indian | 29(15.9) |
| Comorbidities (%) | | |
| | Diabetes | 137(75.3) |
| | Hypertension | 117(64.3) |
| | IHD | 44(24.2) |
| | | |

Table 1: Baseline characteristics

## 067

### AN ANALYSIS OF FIXED VERSUS ADJUSTABLE DOSING IN CONTINUOUS RENAL REPLACEMENT THERAPY IN CRITICALLY ILL PATIENTS WITH ACUTE KIDNEY INJURY

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**Category:** RRT Technique Characteristics
**Presenter:** Dr WAN HASNUL HALIMI WAN HASSAN
**Keywords:** CRRT, AKI, Fixed CRRT dosing, Adjustable CRRT dosing, outcome
**Introduction:** Fixed CRRT dosing between 20-35 ml/kg/hr has been shown effective and improves renal function an reduced mortality. Locally, we will adjust the CRRT dosing periodically depending on the patient's response.
**Methods:** This retrospective study was conducted in a general hospital in Kelantan, Malaysia. Medical records of all patients admitted to ICU from January 2016 to March 2017 with diagnosis of AKI were reviewed for inclusion criteria. All critically ill adults patient (>18 years old) diagnosed with AKI with any types of CRRT and completed at least 48 hours treatment were enrolled in this study.

It was considered to be fixed dose of CRRT if the patient received a fixed dosing throughout the treatment and adjustable dose if, at any time, the managing physician alter the dosing on intention-to- treat basis.

The data was analysed using IBM SPS statistics version 20.0 for Windows software. A p value of <0.05 was considered statistically significant.
**Results:** A total of 24 critically ill patients with acute kidney injury (AKI) were included in the analysis after considering inclusion and