Travel Bursary Report 2017
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Project background
Acute kidney injury (AKI) in pregnancy requiring renal replacement therapy (RRT) is associated with high rates of maternal and fetal complications. While the incidence of obstetric AKI has significantly reduced in high-income countries in recent decades, in low-income countries it still accounts for up to 25% of referrals for RRT. In the majority, AKI does not require RRT despite substantial renal injury; however accurate assessment of the incidence of all obstetric AKI in low- and middle-income countries is limited and its association with adverse obstetric and renal outcomes are unknown. A recent meta-analysis of population studies has reported that chronic kidney disease (CKD) affects up to twice as many women of childbearing age in low-income countries compared to high-income countries. High rates of obstetric AKI in the developing world may be a contributory factor to this finding.

CRADLE II was a prospective observational study of women with a clinical diagnosis of pre-eclampsia treated at three tertiary facilities in South Africa undertaken between January 2015 and May 2016. 17.6% (272/1547) of women admitted with pre-eclampsia had a creatinine of ≥90 µmol (suggestive of AKI) during their hospital admission.

I was delighted to be awarded a Travel bursary 2016, enabling me to travel to South Africa for a 2-month period to gather additional data on the women who experienced obstetric AKI at the three sites. The project aims were:

i) To define the incidence of all obstetric AKI in the Cradle II cohort
ii) To identify maternal risk factors for obstetric AKI
iii) To explore the association between obstetric AKI with adverse maternal and fetal outcomes
iv) To determine the renal outcomes in women with obstetric AKI

Data collection
During my stay in South Africa I worked at the three hospital sites and collected serial creatinine values for all women who had a maximal creatinine ≥90 µmol/L during admission. Where clinical notes were available (one of the three sites) I also recorded presenting symptoms, maternal comorbidities and medication history in all women with maximal creatinine ≥90 µmol/L and a random sample of 100 women without evidence of AKI (< 90 umol/L) to enable assessment of risk factors.

Findings and future work
Findings from our preliminary analysis:

- **Incidence of obstetric AKI:** 15.3% of women with pre-eclampsia in the CRADLE II cohort had AKI as defined by KDIGO (Kidney disease: Improving Global Outcomes) criteria.
- **Association between AKI and maternal outcomes:** Maximal creatinine ≥90 µmol/L during admission was associated with an increased risk of maternal death (relative risk of death 6.2).
- **Renal recovery post AKI:** 66% of women had recovered from AKI at discharge, with rates of recovery reducing with increasing severity of AKI stage.

We have presented these findings to the American Society of Nephrology Kidney week conference 2017 and the British Maternal Fetal Medicine Society Conference 2018 as poster presentations (please see abstract below). We also planning further analysis to determine if women with pre-existing medical conditions such as HIV and chronic hypertension were more likely to experience AKI, and whether presenting symptoms can be used to determine risk of AKI in collaboration with the international 0 by 25 AKI project team.

Personal development: Impact of award
Following on from this work I was accepted onto an academic clinical fellowship obstetrics and gynaecology training post, and hope to pursue a career as an academic obstetrician. Completing this research project has developed my clinical research skills, particularly my understanding of ethical approval processes, data extraction and statistical analysis. We plan to use the data from this project in applications for funding larger studies investigating the incidence and outcomes of obstetric AKI in a global setting.

TITLE: Obstetric acute kidney injury (AKI) and renal outcomes secondary to pre-eclampsia

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OBJECTIVES: To define the incidence, severity and rates of renal recovery from obstetric AKI in the CRADLE-II pre-eclampsia cohort.

DESIGN AND METHOD: A prospective observational study of women admitted with pre-eclampsia at three centres in South Africa was conducted (Jan 2015-May 2016). Serial creatinine concentrations (pre-pregnancy-May 2017) were extracted from national databases in women with maximal creatinine during admission ≥90μmol/L (MaxCr90).

RESULTS: 272/1547 (17.6%) women had MaxCr90 (median 114μmol/l, range 90-1097). Relative risk of death in women with MaxCr90 was 6.2 (95% CI 2.2,17.8). 237 (15.3%) of women met KDIGO AKI criteria and in this group there were 7 maternal deaths (107 (6.9%) Stage 1 – 2 deaths; 67 (4.3%) Stage 2 – 3 deaths; 63 (4.1%) Stage 3 – 2 deaths). 156/237 (65.8%) of women with AKI had renal recovery at discharge (creatinine <1.5x baseline). Rate of renal recovery decreased with increasing AKI stage (96/107 (89.7%) Stage 1; 38/67 (56.7%) Stage 2; 22/63 (34.9%) Stage 3, $p<0.01$). 44 (18.6%) women with AKI had not recovered renal function at discharge with no follow-up; 31 (13.1%) women had and 6 (2.5%) had not recovered renal function respectively at follow-up after discharge.

CONCLUSIONS: Obstetric AKI was common in women with pre-eclampsia in this middle-income cohort. Approximately one third of women with AKI had persistently raised serum creatinine at discharge. Whilst many women with abnormal renal function at discharge had no follow-up, recovery where assessed was high. Long-term impact of recovered obstetric AKI on future CKD development and pregnancy outcomes requires further study.