

## The Impact of Acute Kidney Injury Requiring Haemodialysis on Patient Survival: 10 years of Prospective Data - An Australian Perspective

Dr Benjamin Talbot<sup>1,6,7</sup>, Dr Priyanka Sagar<sup>2,3</sup>, Dr Ray Lin<sup>4</sup>, Dr Min Jun<sup>1,7</sup>, Dr Shaundee Sen<sup>5,6</sup>, Professor Martin Gallagher<sup>1,5,6,7</sup>

<sup>1</sup>The George Institute for Global Health, Sydney, Australia, <sup>2</sup>Westmead Hospital, Sydney, Australia, <sup>3</sup>Westmead Institute of Medical Research, Sydney, Australia, <sup>4</sup>John Hunter Hospital, Newcastle, Australia, <sup>5</sup>Concord Repatriation and General Hospital, Sydney, Australia, <sup>6</sup>University of Sydney Medical School, Sydney, Australia, <sup>7</sup>University of New South Wales, Sydney, Australia

### Introduction

Acute kidney injury (AKI), with or without the need for renal replacement therapy (RRT) is associated with short and long-term mortality. Few prospective studies have compared the survival of patients with AKI requiring haemodialysis (HD) with patients enrolled in a RRT program.

### Methods

This single centre, observational cohort study, conducted in a tertiary renal unit in Sydney, Australia included eligible adult patients who required HD and did not have a functioning dialysis access, thereby requiring a central venous catheter (CVC), regardless of expected chronicity or aetiology of renal failure. Patients were classified by treating physician into one of 4 groups based upon reason for initial CVC insertion. Patients believed to have AKI and expected to recover to dialysis independence were classified as AKI; patients starting maintenance HD without a permanent access in place as end stage kidney disease (ESKD); patients with failure of an existing HD access as HD failure and patients transferring from peritoneal dialysis (PD) without HD access as PD failure. Prospective data were collected over 10 years and linked to administrative health and registry data. Descriptive and survival analyses were performed and censored for transplantation. Time split cox regression survival analyses at 2 yearly intervals were performed as the assumption of proportional hazards was not met due to the changing effect of variables over time.

### Results

The study cohort included 557 patients. Classifications for CVC insertion were AKI (246 patients, 44.2%), ESKD (182, 32.7%), PD failure (45, 8.1%) and HD failure (84, 15.1%) respectively. The median ages of AKI and PD failure patients were older than ESKD and HD failure patients (Table 1). Median dialysis vintage was greatest in access failure patients and rare in the AKI & ESKD groups (Table 1).

In the AKI group the initial episode ended in death in 46 patients (18.7%). Of those who survived, 132 (66%) recovered renal function and 59 (29.5%) required long term RRT.

Time split survival analysis, adjusted for patient characteristics and co-morbidities (Figure 1), showed AKI was associated with a significantly increased risk of death in the first 2 years following CVC insertion compared to ESKD (HR 1.81 [1.20-2.73],  $p=0.01$ ) and a reduction in the risk of death over the next 2 years (HR 0.45 [0.22-0.92],  $p=0.03$ ), related to renal recovery (sub group analyses). After year 4, no difference in the risk of death was seen between the 4 groups. Ischaemic heart disease (IHD) (HR 1.69 [1.19-2.39],  $p<0.01$ ) and dialysis vintage (HR 1.09 [1.01-1.17],  $p=0.04$ ) were associated with a significantly increased risk of death in the first 2 years. Age was associated with a significantly increased risk of death at all time points (Figure 1).

### Conclusion

This prospective study describes the high risk profile of patients with AKI requiring HD, with significantly higher hazard ratios for death than patients with ESKD commencing dialysis within the first 2 years after

CVC insertion and comparable risk to chronic dialysis patients in the longer term. We also highlight the difficulties in predicting renal recovery in patients with presumed AKI.