Charlson Comorbidity Index (CCI) as prognostic indicator of outcomes in older patients undergoing renal transplantation

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Figure 1.

Introduction: End stage renal disease (ESRD) is most prevalent in the elderly. Both incidence and prevalence of ESRD continues to rise in an ageing UK population. Renal transplantation (including use of extended-criteria donors) remains the best treatment for end stage renal disease and several publications have shown improved quality and expectancy of life in older patients undergoing transplant compared to older patients on dialysis. The surgery itself carries risk and patients need to make a choice after being counselled appropriately. Frailty is a significant factor but there are no concrete criteria to help include/exclude patients for transplantation.

The Charlson Comorbidity Index (CCI)¹ predicts the one-year mortality for a patient who may have a range of comorbid conditions, (a total of 22 conditions, Fig.2). Each condition is assigned a score of 1, 2, 3, or 6, depending on the risk of dying associated with each one. The CCI can be adjusted for age by adding 1 point for each decade of age over 40 years. Scores are summed to provide a total score to predict mortality.

Our group has shown excellent results using old DCD donor kidneys to older recipients. The Charlson Comorbidity Index (CCI) has been previously shown to be a sensitive tool predicting mortality in those with comorbid conditions. We aimed to assess if we could use CCI as a prognostic tool to aid selection of older candidates, based on the outcomes of graft function and patient and graft survival.

References:
1-Charlson, Mary E., Peter Pompei, Kathy L.Ales, and C. Ronald MacKenzie. "A New Method of Classifying Prognostic Comorbidity in Longitudinal Studies: Development and Validation." *Journal of Chronic Diseases* 40, no. 5 (1987): 373-83. doi:10.1016/0021-9681(87)90171-8.

Charlson Comorbidity Index (Charlston et al. 1987)

Assigned weights for disease conditions	
1	Myocardial infarct
	Congestive heart failure
	Peripheral vascular disease
	Cerebrovascular disease
	Dementia
	Chronic pulmonary disease
	Connective tissue disease
	Ulcer disease
	Mild liver disease
	Diabetes
2	Hemiplegia
	Moderate or severe renal disease
	Diabetes with end organ damage
	Any tumor
	Leukemia
3	Lymphoma
6	Moderate or severe liver disease
6	Metastatic solid tumor
	AIDS
Assigned weights for each condition that a patient has. The total equals the score. Example: chronic pulmonary disease (1) and lymphoma (2) = total score (3). Add 1 point to the CCI score for each decade of age over 40 years	

Figure 2.

Methods: We investigated a cohort of older (age >60) renal transplant patients; all receiving kidneys from older DCD donors (age >60) who had follow up of 3 years. 62 patients were identified, and CCI (age adjusted) was calculated for each patient based on comorbidities at the time of surgery. Pearson correlation was used initially to correlate graft function (eGFR) with CCI. Given the confounding factors we additionally compared the patient and graft survival and function at 1 and 3 years between patients having a CCI<5 compared to those with CCI ≥5.

Results: The CCI score ranged between 2-10. Using Pearson-correlation there was no significant correlation of CCI with graft function (eGFR) at 1 year (r=-0.14, p=0.28) or 2 years (r=-0.19, p=0.15). Patient survival at 1 and 3 years was 94% and 90% among those with CCI less than 5, compared to 90% and 76 % respectively in those with CCI ≥5. Graft survival at 3 years (censored for death) was 97% in patients with CCI less than 5 vs. 90% in those with higher CCI. A graph with the respective eGFRs of the two groups is presented in Figure 1.

Conclusion: In our cohort, older patients with higher CCI had higher mortality at 3 years and slightly lower graft survival and graft function. The results in patients with CCI <5 seem extremely good in terms of both patient and graft survival.

Given the small number of recipients future studies with larger cohort are needed to confirm these findings.