Predicting Patient Survival at Time of Kidney Transplantation

Oliver Staeck, Dmytro Khadzhynov, Anna Kleinsteuber, Lukas Lehner, Michael Dürr, Klemens Budde, Fabian Halleck

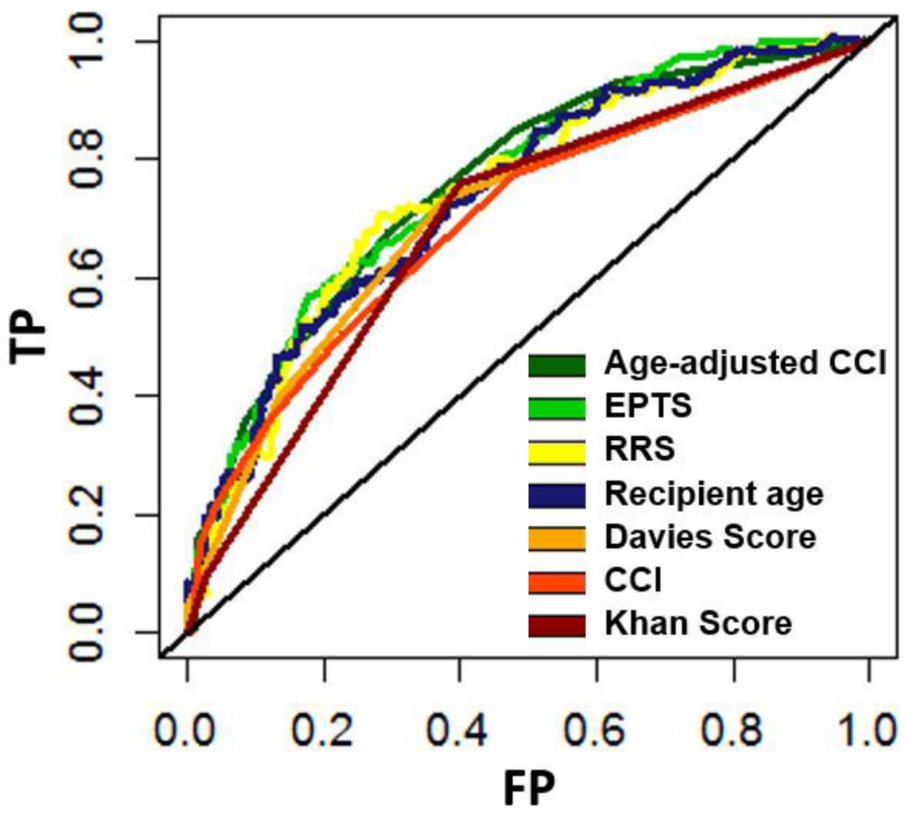
Department of Nephrology, Charité Universitätsmedizin Berlin, Germany

Background: Estimating life expectancy in kidney transplant recipients (KTR) at time of transplantation is important to achieve the best functional match between patient and graft survival. Various scores exist assessing life expectancy of patients, however few of these clinical prognosis models have been validated and compared in KTR.

Methods: This retrospective long-term study included 878 deceased KTR (mean age 54 years) transplanted 1998-2014. All relevant co-morbidities were determined at time of transplantation. Estimated-Post-Transplant-Survival (EPTS), Charlson Comorbidity Score (CCI), age-adjusted CCI, Davies Score, Recipient Risk Score (RRS) and Khan Score were calculated at time of transplant. Survival data were analyzed with time-dependent survival ROC-curves over maximal 23 years using a Kaplan Meier method. R^2-coefficients for censored time-to-event data were implemented. A cox model for each score was established.

Figure 1

Predictors for mortality. Survival –ROC.



Results: All scores were significantly associated with mortality. Best fit (assessed by R^2 coefficient) reached the EPTS (including age, time on dialysis, prior kidney transplantation, diabetes), followed by the age-adjusted CCI (including age, myocardial infarction, congestive heart failure, peripheral vascular disease, dementia, chronic pulmonary disease, connective tissue disease, peptic ulcer disease, liver disease, diabetes, hemiplegia, malignancy, leukemia, lymphoma, AIDS). Age-adjusted CCI and EPTS best predicted mortality at 7 years in a survival-ROC analysis. The AUC were 0.758 and 0.757, respectively (Figure 1). Other scores or age alone did not reach the level of concordance of age-adjusted CCI and EPTS (Table 1). The age-adjusted CCI reached this predictive value by assessing comorbidity in more detail, despite neglecting important KTR-specific relevant influence factors used in the EPTS.

Table 1

Predictors for death: AUC, R^2 coefficient, Cox proportional hazards models

Score	AUC	R^2	HR	p
Age-adjusted CCI	0.758	0.357	1.33	<0.0001
EPTS	0.757	0.376	1.03	<0.0001
RRS	0.741	0.239	1.42	<0.0001
Recipient age	0.739	0.339	1.06	<0.0001
Davies Score	0.705	0.280	1.80	<0.0001
CCI	0.696	0.234	1.36	<0.0001
Khan Score	0.689	0.291	2.68	<0.0001

Conclusions: The EPTS (in use in the US-allocation system) may be improved including further important comorbid conditions for estimating life expectancy especially in elderly and comorbid KTR. Utilization of a refined scoring for the allocation in these KTR may help to achieve the best functional match with marginal kidneys and may also avoid the discard of organs without compromising the outcome.

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