BACKGROUND: Mortality after liver transplantation depends on heterogeneous recipient and donor factors. Our aim was to assess risk of death and to develop models to help predict mortality after liver transplantation.

METHODS: We analysed data from 34,664 first adult liver transplants from the European Liver Transplant Registry to identify factors associated with mortality at 3-months (n=21,605 in training dataset) and 12-months (n=18,852 in training dataset) after transplantation. We used multivariable logistic regression models to generate mortality scores for each individual, and assessed model discrimination and calibration on an independent validation dataset (n=9489 for 3-month model and n=8313 for 12-month model).

FINDINGS: 2540 of 21,605 (12%) individuals in the 3-month training sample had died by 3 months. Compared with those transplanted in 2000-03, those transplanted earlier had a higher risk of death. Increased mortality at 3-months post-transplantation was associated with acute liver failure (adjusted odds ratio 1.61), donor age older than 60 years (1.16), compatible (1.22) or incompatible (2.07) donor-recipient blood group, older recipient age (1.12 per 5 years), split or reduced graft (1.96), total ischaemia time of longer than 13 h (1.38), and low United Network for Organ Sharing score (score 1: 2.43; score 2: 1.67). However, cirrhosis with hepatocellular carcinoma, alcohol cirrhosis, hepatitis C or primary biliary cirrhosis, donor age 40 years or younger, or less, hepatitis B, and larger size of transplant centre (> or = 70 transplants per year) were associated with improved early outcomes. The 3-month mortality score discriminated well between those who did and did not die in the validation sample (C statistic=0.688). We noted similar findings for 12-month mortality, although deaths were generally underestimated at this timepoint.

INTERPRETATION: The 3-month and 12-month mortality models can be effectively used to assess outcomes both within and between centres. Furthermore, the models provide a means of assessing the risk of post-transplantation mortality, giving clinicians important data on which to base strategic decisions about transplant policy in particular individuals or groups.