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ORIGINAL ARTICLE

Impact of Insurance Type on Initial Rejection Post Heart Transplant

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Background Heart transplantation allocation is often restricted from patients with low socioeconomic status (SES) due to concern for worse outcomes. We hypothesised that comorbidities would have a greater impact on risk of severe rejection post-orthotopic heart transplant than would Medicaid insurance and Median Household Income (MHI).

Methods A retrospective study of 171 patients who underwent orthotopic heart transplant between 7/1999-11/2013 at our facility were followed until 9/2014 for rejection hospitalisations or death. Survival and multivariable analyses with adjustment for age, race, and gender were performed to estimate the risk of severe cellular rejection, ≥2r (hazard ratio [HR], 95% confidence interval [CI]).

Results Eighteen per cent of patients had Medicaid, and 72% of patients had low or medium MHI. Severe rejection occurred in 23% of patients. In the univariable analysis, Medicaid and diabetes were associated with increased risk of rejection while age >60 years, Caucasian race, and male sex were associated with reduced risk [Medicaid 2.32(1.20,4.51), diabetes 2.49(1.09,5.69), age 0.41(0.20,0.84), Caucasian 0.44(0.21,0.93), male 0.49(0.26,0.92)]. Median Household Income had no correlation [MHI 0.79(0.51,1.23)]. In the multivariable adjusted model, Medicaid was not associated with rejection [1.65(0.79,3.41)]; diabetes was strongly associated with risk of severe rejection [3.9(1.59,9.39)], and age >60 years was associated with risk reduction [0.42 (0.20,0.82)].

Conclusions Medicaid insurance and MHI were not associated with increased risk of severe cellular rejection requiring hospitalisation post-orthotopic heart transplant in the adjusted model. Rather the presence of diabetes and age ≤60 years were associated with increased risk.

Keywords Socioeconomic status • Outcomes • Diabetes

Introduction

Hospitalised rejection is associated with worse outcomes post-orthotopic heart transplant.[1–3] Efforts to improve survival have led to further restrictions on patients who are offered advanced therapies.[3–6] Often, underinsured populations are excluded from access to orthotopic heart transplant. In 2003, uninsured patients provided 16.9% of donor organs yet comprised 0.8% of transplant recipients.[6] State safety-net programs and Medicaid allow for some parity in organ allocation. However, some of the existing literature show that underinsurance and low socioeconomic status (SES) are associated with worse outcomes in heart allograft patients particularly from diverse racial/ethnic

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backgrounds.[2–5,7] We sought to evaluate if comorbidities had a greater impact on initial severe cellular rejection readmission post-orthotopic heart transplant than insurance status and median household income (MHI).

Methods

This study had institutional review board approval. A retrospective evaluation of 171 consecutive patients who underwent orthotopic heart transplant at The Ohio State University Wexner Medical Center from 7/1999 – 11/2013 was performed. Follow-up was through 9/2014 for the outcome of severe cellular rejection requiring hospitalisation, classified as International Society for Heart & Lung Transplantation (ISHLT) grade ≥2r on endomyocardial biopsy by centre pathologists and cardiologists, or competing risk of death. Insurance status, Medicaid or Non-Medicaid (includes Medicare and private payors) and MHI, which was estimated by the patient's zip code and corresponding United States 2013 Census data, were assessed. Median Household Income was divided into three even tertiles based upon range of MHI: low MHI was <$38,371, medium MHI was $38,371 – $56,890, and high MHI was >$56,890. Median Household Income was chosen as an estimate of SES given comparable precision to complex neighbourhood models for assessment of SES in contemporary studies.[8,9] One patient had no MHI data given the absence of a population in their zipcode at the time of the census collection; there were 171 patients with insurance data and 170 patients with MHI data.

The following was assessed during initial heart transplantation hospitalisation using the institutional Information Warehouse which is populated from the medical record: demographics (age >60 years [which was chosen given a previous study supporting reduced risk of rejection with age >60 years[2]], race, and sex), presence of common comorbid diseases (atherosclerosis, cerebral vascular accident, diabetes, hypertension, and myocardial infarction), receipt of immunosuppression (tacrolimus, cyclosporine, mycophenolate mofetil, azathioprine, and prednisone), and laboratory values on date of transplant (bilirubin, creatinine, haemoglobin, sodium, and white blood cell count).

Statistical Analysis

Baseline patient characteristics were compared among insurance type and MHI, using chi-square tests for categorical variables and analysis of variance for continuous variables. Cox proportional hazards multivariable analysis with adjustment for age, race, and gender was performed to assess risk of severe rejection (hazard ratio [HR], 95% confidence interval [CI]). Patients were censored at the time of death if death preceded hospitalisation as a competing risk. Kaplan-Meier analyses were performed to compare survival times. Statistical analyses were performed using SAS 9.4 (Cary, NC), and the significance level was set at 0.05 for all tests.

Results

Out of a cohort of 171 patients from 1999–2013, the insurance and MHI distribution was the following: Medicaid 18%, Non-Medicaid 82%, Low MHI 22%, Medium MHI 50%, High MHI 27%. Across insurance and MHI groups, there were some significant differences (Table 1). Medicaid patients were on average 14 years younger (p<0.0001), less likely to be Caucasian (p=0.002), and more likely to be a male (p=0.01). Medicaid patients were more likely to be prescribed azathioprine (p=0.04). Otherwise there were no differences in comorbidities, remaining medications, or labs across insurance and MHI groups.

Twenty-three per cent had severe rejection requiring hospitalisation, and 22% died over the 15-year follow-up. Forty-one per cent of patients with Medicaid had severe rejection, and 19% of patients with other insurance had severe rejection (p=0.01) (Table 2, Figure 1). There were significant differences in the ages of patients who had severe rejection (p=0.009). Nineteen per cent of male patients compared to 37% female patients had severe rejection (p=0.02). There were differences in medications provided during initial transplant hospitalisation for those who developed severe rejection. Patients taking mycophenolate mofetil (p=0.04) and prednisone (p=0.03) compared to patients not taking these medications had higher rates of severe rejection. There were no differences in severe rejection based upon MHI (Figure 2), other comorbidities, nor other medications. Patients taking cyclosporine compared to patients not taking this medication had higher rates of death (p=0.02); otherwise there were no

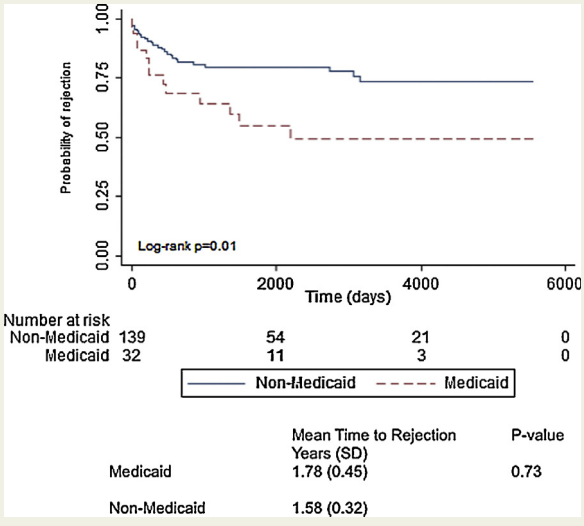

Figure 1 Time to Severe Rejection Based On Insurance Type.
This represents unadjusted time to severe rejection based upon having Medicaid or Non-Medicaid health care insurance over 15 years. Patients were censored at the time of death if death preceded hospitalisation as a competing risk. The mean time to rejection based upon insurance is also shown.

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