Incidence, Clinical Correlates, and Outcomes of Pulmonary Hypertension After Kidney Transplantation: Analysis of Linked U.S. Registry and Medicare Billing Claims

SCIENTIFIC REGISTRY OF TRANSPLANT RECIPIENTS

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Introduction

- Cardiovascular disease is a leading cause of non-immunologic morbidity and mortality after **kidney transplant (KTx).** To date, much attention has focused on ischemic heart disease and heart failure in this population.
- In recent years, **pulmonary hypertension (P-HTN)** has gained recognition as a clinically important cardiovascular condition among patients suffering from chronic kidney disease, including **KTx** candidates and recipients.
- The incidence and mortality implications of P-HTN after KTx have not been described in large, national samples.

Methods

- We examined a linkage of **Scientific Registry of Transplant Recipients (SRTR)** data with Medicare claims to investigate P-HTN diagnoses among Medicare-insured KTx recipients in 2000-2016 (**N=59,610**).
- We identified diagnoses of "primary" and "secondary" P-HTN based on International Classification of Diseases, Clinical Modification (ICD-CM) diagnostic codes (**ICD-CM-9** through October 2015, then **ICD-CM-10**) on billing claims.
- **Cox regression** was used to identify independent correlates of P-HTN (**adjusted hazard ratio,** $_{95\%\,LCL}$**aHR** $_{95\%UCL}$), and to examine P-HTN diagnoses as time-dependent mortality predictors, stratified by baseline clinical factors.

Results

- At **3 years** post-KTx, P-HTN was diagnosed in **7.0%** of patients without P-HTN in the year before KTx, but in **45.8%** of those with **P-HTN in the year before KTx**.
- The incidence of **new onset P-HTN** was higher with baseline factors including **older age** (aHR for age ≥60 vs <18-30, $_{2.46}3.12_{3.95}$), **obesity** (aHR, $_{1.04}1.15_{1.28}$), **limited functional status** (aHR, $_{1.09}1.25_{1.43}$), **coronary artery disease** (aHR, $_{1.18}1.34_{1.52}$), **chronic obstructive lung disease** (aHR, $_{1.57}1.97_{2.48}$), **longer pre-KTx dialysis** duration (aHR for >5 yrs vs preemptive, $_{1.30}1.47_{1.66}$), dialysis modality (aHR for **hemo-** vs peritoneal, $_{1.28}$ 1.50 $_{1.77}$), and **lower organ quality** (aHR Kidney Donor Profile Index >85 vs 20-25, $_{1.17}1.32_{1.48}$).

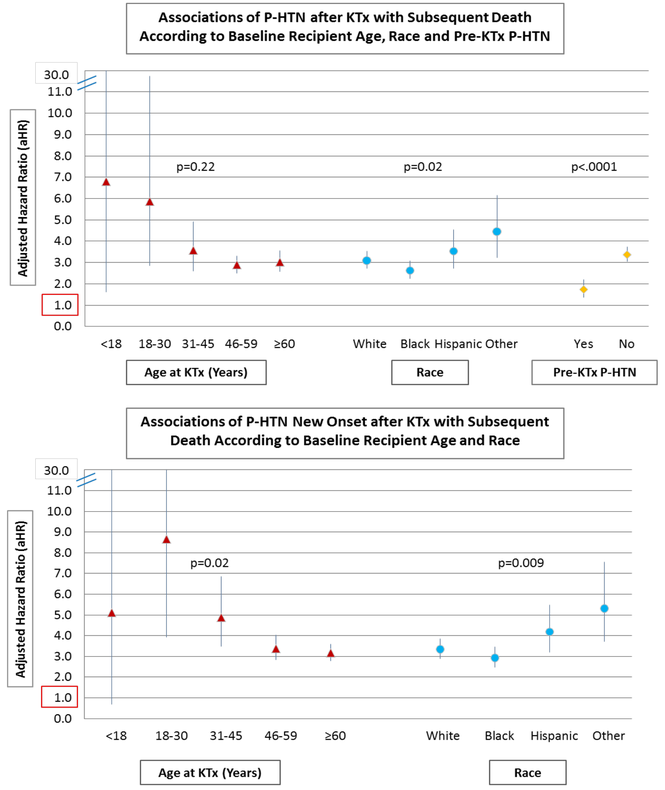

Figure. Variation in associations of P-HTN after kidney transplant with subsequent morality risk, according to baseline clinical factors.

Results

- P-HTN diagnosis was associated with **3.0-fold** increased risk of **subsequent mortality**, with relative risk being highest in **young recipients,** those of **non-white/non-black race**, those with kidney failure due to **glomerulonephritis** or **polycystic kidney disease**, those **without pretransplant P-HTN**, and those who underwent transplant in **more recent years** (**Figure**).

Limitations

- Retrospective design limits ability to objectively confirm clinically coded P-HTN diagnoses.
- The ICD- diagnostic scheme does not discriminate cause of P-HTN.
- Clinical covariates are recorded with limited granularity in the registry.

Conclusions

- Clinical diagnosis of P-HTN after KTx is correlated with **increased risk of subsequent mortality.**
- More work is needed to **refine diagnostic** and **management strategies** to improve outcomes in KTx recipients who develop this challenging complication.

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