

Incremental Costs Of Delayed Graft Function (DGF) In Commercially Insured Kidney Transplant Patients Under 65

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Background

Delayed graft function (DGF) is associated with poor clinical outcomes after kidney transplantation (KT), including longer transplant hospitalization, increased risk of graft failure, and higher mortality.¹ Most studies of the incremental healthcare resource use (HCRU) and cost of DGF have focused on the initial hospitalization, with little analysis of the long-term cost-consequences of DGF. Uncomplicated KT is already complex, requiring management not only of graft patency but also multiple comorbid conditions.² In the presence of DGF, it is anticipated that long-term HCRU and costs will be further increased. These data can provide additional support for the urgency to increase kidney transplant and graft survival expressed by US Health and Human Services, as well as the prioritization of the prevention and treatment of DGF by the FDA.^{3,4}

Objectives

Assess the real-world economic burden of DGF within 1-year post kidney transplantation using a national commercial payer claims database.

Methods

Study Design
A retrospective cohort analysis was conducted using administrative claims data from IBM® MarketScan® Commercial claims database from January 2014 to September 2018. This dataset includes patients with employer group health plans from over 60 large employers.

Study Population
Patients aged between 18 and 65 who had at least 1 inpatient KT procedure.

- The first KT procedure was considered as the index date
- At least 1-year pre-index and 1-year post-index continuous coverage was required to minimize impact of turnover in commercial plans.
- Pre-emptive transplants were excluded
- Patients with capitated health insurance plans were excluded

DGF and non-DGF populations were defined as:

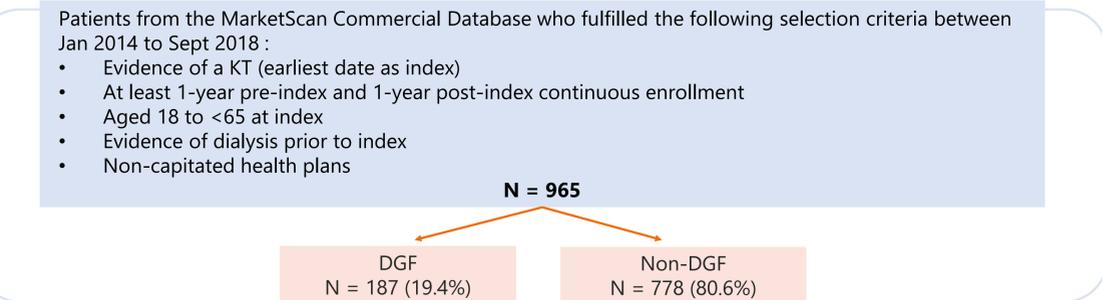
- Non-DGF: Kidney transplant patients with no dialysis on days 1 to 7 post-transplantation. Includes patients who receive dialysis on day of transplant (day 0) but no subsequent days in the first week
- DGF: Kidney transplant patients with dialysis on days 1-7 post-transplantation

Study Outcomes

- Inpatient admissions during first month and 1-year follow up
- Outpatient visits during 1-year follow up

Total medical costs were defined as the sum of all costs over the first year.

Figure 1: Cohort Attrition



Results

965 patients met the study selection criteria. Of these, 187 (19.4%) had DGF.

Demographic characteristics for patients are shown in **Table 1**. DGF patients were slightly older compared to non-DGF patients but were otherwise similar in baseline characteristics.

Overall and categorized costs for KT patients with and without DGF are shown in **Table 2** and **Figure 2**. In the first month, including the initial transplant admission, patients with DGF had higher inpatient costs compared to non-DGF patients (difference=\$28,240; p<0.05). Over the entire year post-transplantation:

- Total incremental healthcare costs for DGF were \$52,589 (p<0.01)
- Incremental inpatient costs for DGF were \$42,265 (p=0.02)
- Incremental outpatient costs for DGF were \$10,324 (NS)

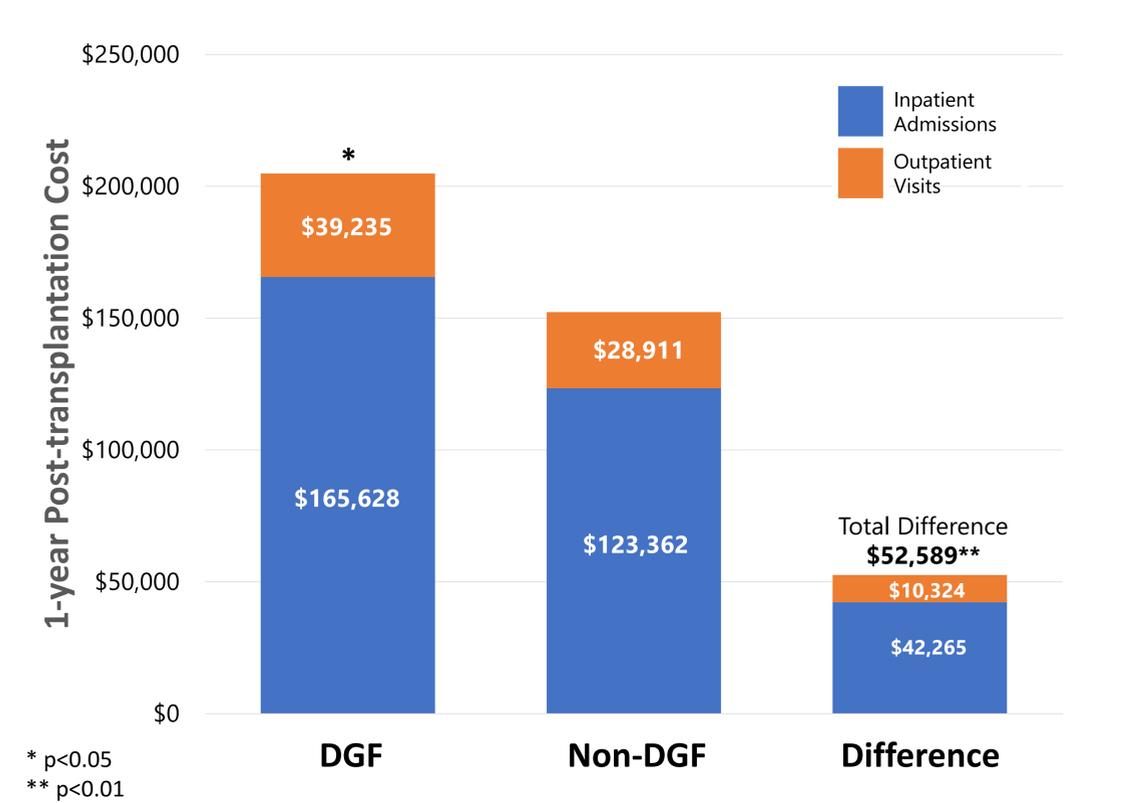
Table 1: Demographic Characteristics

	DGF (n=187)	Non-DGF (n=778)	P-value
Age at Index			
Mean (SD)	51 (10.23)	48 (11.22)	0.005
Gender, n (%)			
Male	119 (63.6%)	471 (60.5%)	0.435
Baseline comorbidities, n (%)			
Anemia	132 (70.6%)	543 (69.8%)	0.832
Congestive heart failure	81 (43.3%)	325 (41.8%)	0.701
Diabetes	41 (21.9%)	172 (22.1%)	0.957
Hypertension	77 (41.2%)	309 (39.7%)	0.715

Table 2: HCRU and Cost Outcomes at 1-year Follow-up

	DGF (n=187)	Non-DGF (n=778)	P-value
Month 1 Inpatient Admission Costs (\$)			
Mean (SD)	136,191 (155,841)	107,951 (92,012)	0.018
Annual Per Patient Inpatient Admission Costs (\$)			
Mean (SD)	165,628 (228,519)	123,362 (123,655)	0.015
Annual Per Patient Outpatient Visit Costs (\$)			
Mean (SD)	39,235 (85,238)	28,911 (72,688)	0.128
Total Annual Per Patient Medical Costs (\$)			
Mean (SD)	204,863 (255,443)	152,273 (158,491)	0.008

Figure 2: Annual Estimated Per-Patient Costs Between DGF and Non-DGF Patients



Discussion

Of the 20,000 kidney transplantations performed in the US per year, approximately one-third experience DGF.^{1,5} Most studies of the incremental HCRU and cost of DGF have focused on initial hospitalization costs using Medicare cost data. Commercially insured patients are younger and among those with ESRD, may represent a sicker population. Results indicate that early hospitalization costs and total costs are significantly higher, and outpatient costs numerically higher, for commercially insured KT patients with DGF. Limitations of any claims analysis apply, including identification of clinical events and selection of patients in high-turnover plans. Nonetheless, an effective treatment option for DGF would have the opportunity for meaningful cost-offset to commercial payers.

Conclusions

KT patients covered by commercial insurance developing DGF have significant incremental yearly cost of >\$52,000 per patient. Effective prevention and management of DGF in KT patients has the potential for substantial cost offset or savings.

REFERENCES: [1] Butala, NM et al. Transplantation. 2013;95(8):1008-1014; [2] Keong, FM et al. Kidney Int Reports. 2016;1(4):269-278; [3] Advancing American Kidney Health. ASPE. Published July 10, 2019. Accessed May 20, 2020. [4] FDA Guidance for Industry: Delayed Graft Function in Kidney Transplantation: Developing Drugs for Prevention, July 2019. [5] Schnitzler, MA et al. Transplantation. 2011; 91(12):1347-56.