



# Impact of Functional Status on Outcomes of Simultaneous Pancreas-Kidney Transplantation: Risks and Opportunities for Patient Benefit

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## Introduction

- **Simultaneous pancreas-kidney transplant (SPKT)** offers the best long-term outcomes for type 1 diabetes mellitus associated with end-stage kidney disease.
- As more diabetic patients present for transplant evaluation at older ages and with higher comorbidity burdens, frailty and impaired **functional status** have become important considerations in clinical assessment and management.
- The **Karnofsky Performance Score (KPS)**, a categorical assessment tool for **functional impairment**, has been commonly used for many chronic disease assessments.
- We sought to characterize the associations of **KPS** with **patient survival** in a large national cohort of U.S. SPKT candidates and recipients.

## Methods

- We examined national Scientific Registry of Transplant Recipients (SRTR) registry data for 16,822 patients listed for SPKT in the U.S. (2006-2019).
- Functional status was categorized by **center-reported KPS** as: **normal** (80-100); **cares for self** (70); **requires assistance** (50-60); or **disabled** (10-40).
- We assessed associations of functional status at listing and transplant with **subsequent patient survival**, adjusted for baseline patient and transplant factors.
- We also explored **time-dependent associations** (adjusted hazard ratio, aHR) of SPKT with survival risk after listing compared with continued waiting in each functional status group by multivariable **Cox regression**, partitioned by time  $\leq 30$ d and  $>30$ d of SPKT.

## Results

- KPS distributions among candidates (N=16,822) and recipients (N=10,316), respectively, were: **normal**, 62.0%, 57.8%; **capable of self-care**, 23.5%, 24.7%; **requires assistance**, 12.4%, 14.2%; and **disabled**, 2.1%, 3.3%.
- There was a **graded increase in mortality** after listing and after transplant with lower functional levels. Compared with mortality after SPKT for patients with normal functioning, mortality rose progressively (**Figure 1**) for patients capable of self-care (aHR,  $1.00$   $1.18_{1.41}$ ), requiring assistance (aHR,  $1.06$   $1.31_{1.60}$ ), and disabled (aHR,  $1.10$   $1.55_{2.19}$ ).

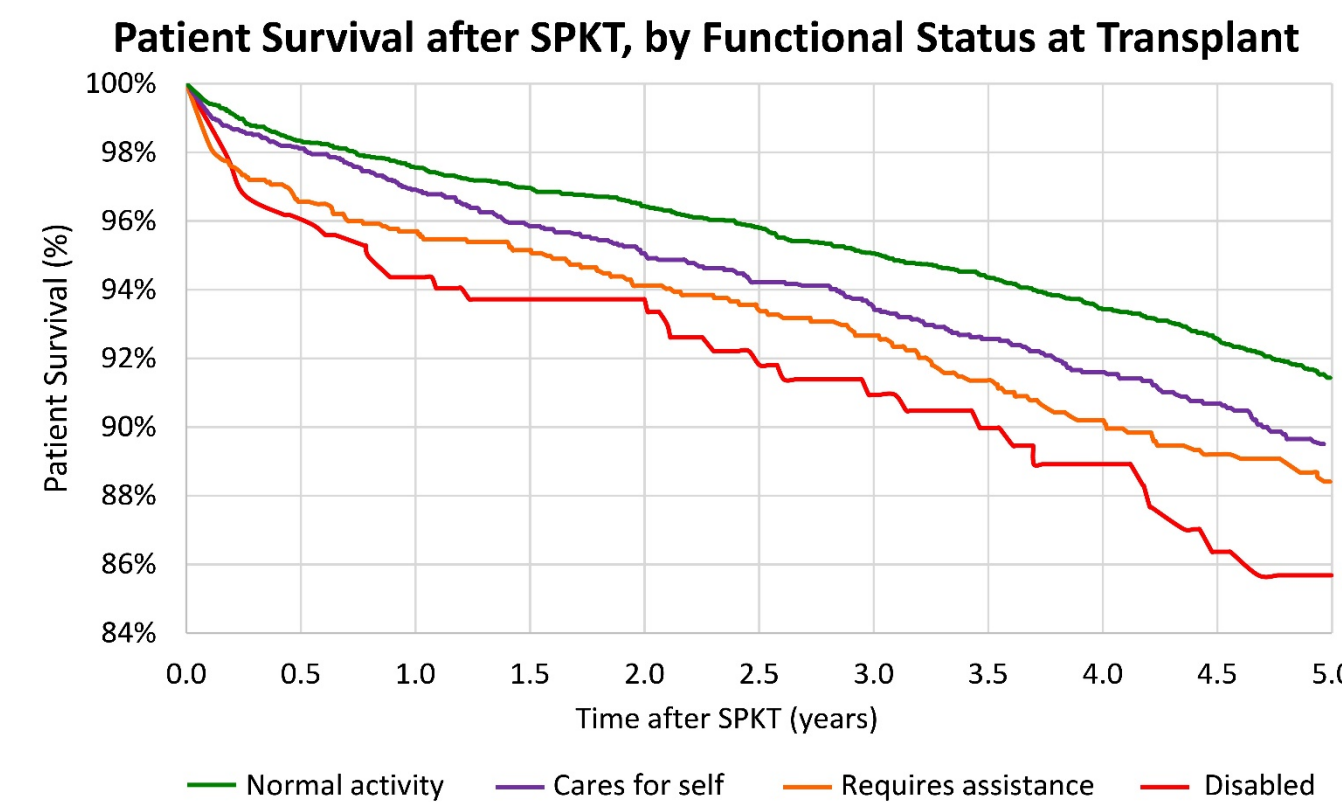
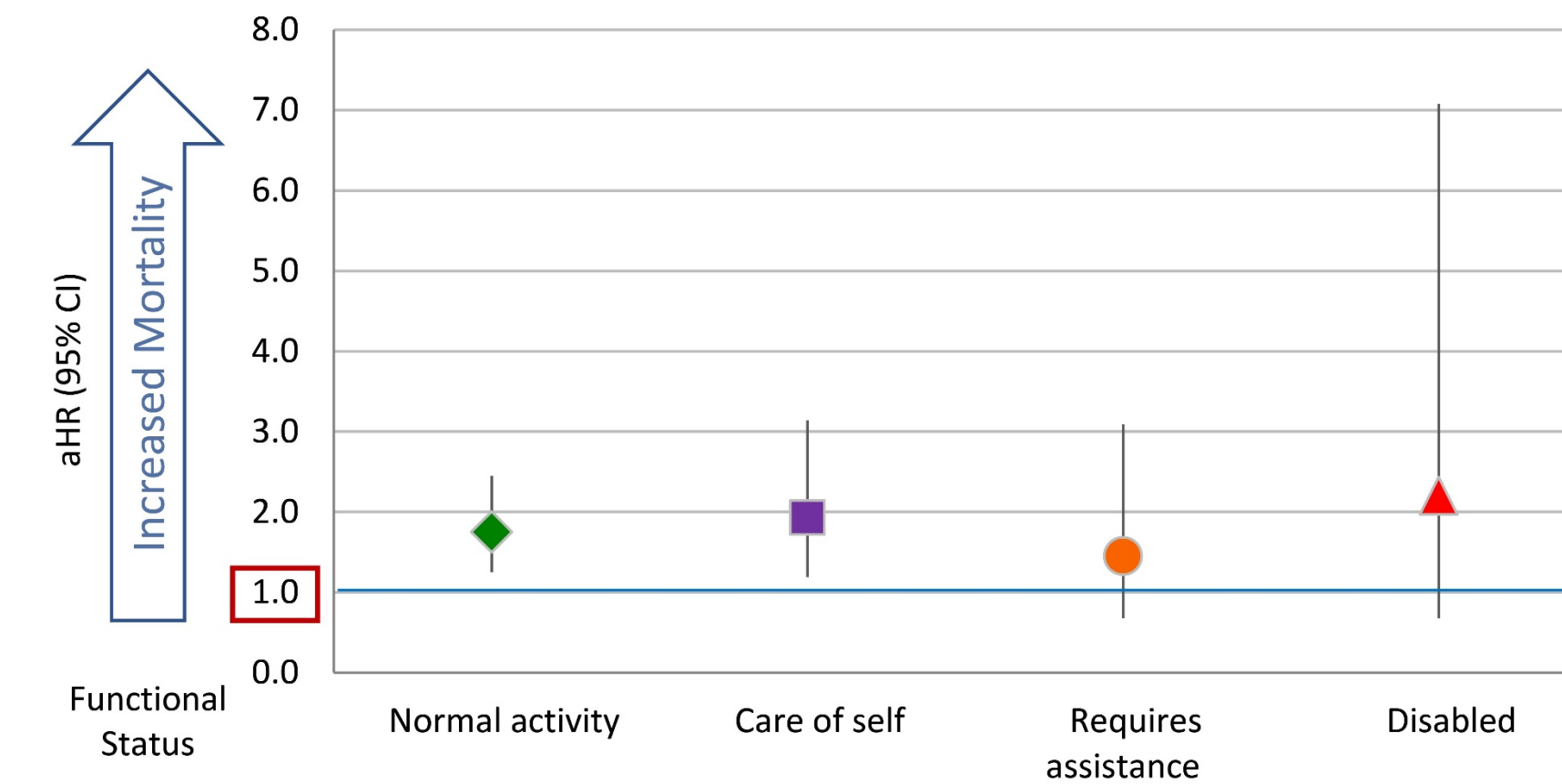


Figure 1. Patient survival after SPKT according to functional status at transplant..

### A. Adjusted Mortality Risk associated with SPKT (within 30d after transplant), vs Continued Waiting, by Functional Status at Listing



### B. Adjusted Mortality Risk associated with SPKT (>30d after transplant), vs Continued Waiting, by Functional Status at Listing

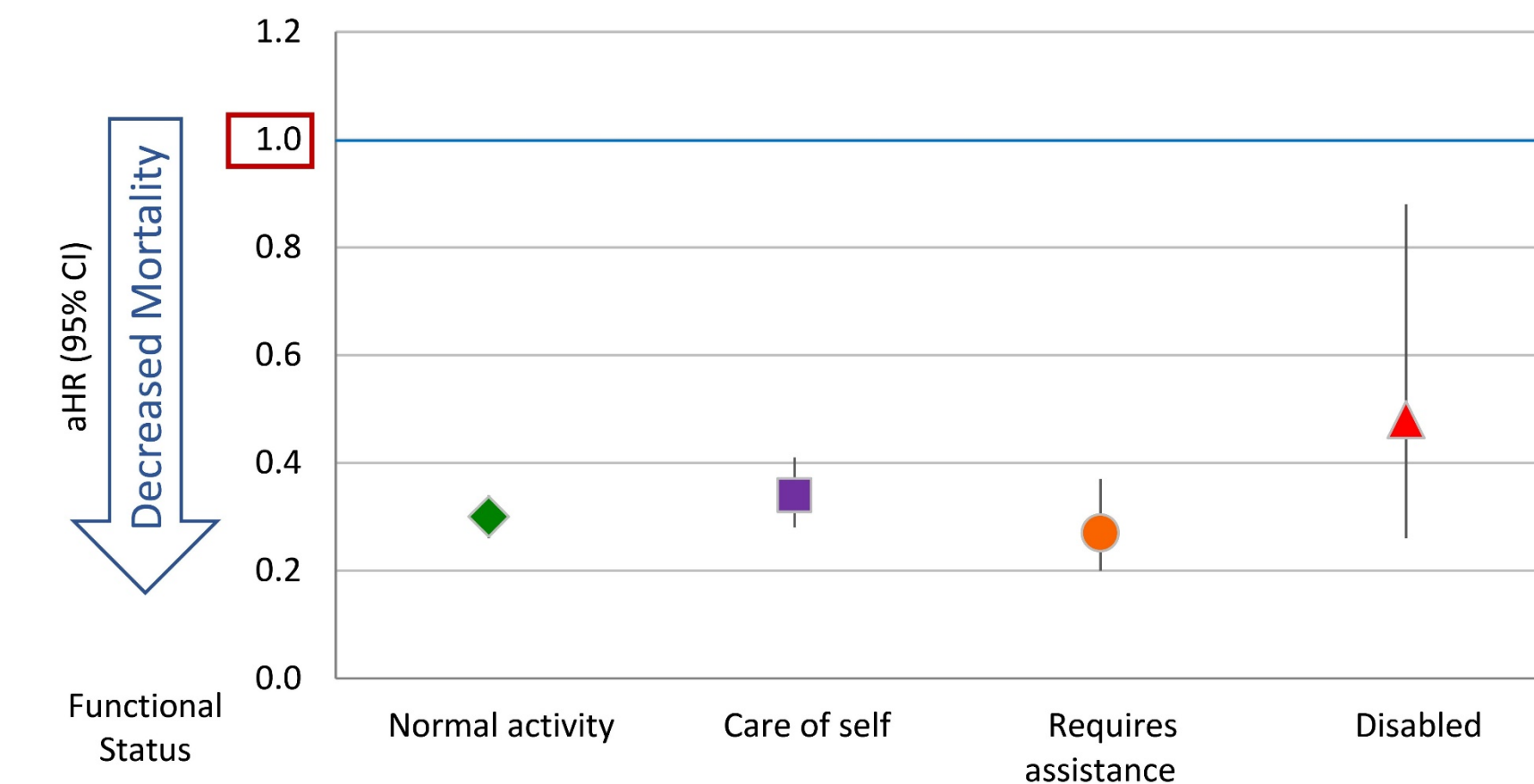


Figure 2. Adjusted mortality risk associated with SPKT A) within 30 days and B) after 30 days posttransplant, by functional status at listing.

## Results

- In time-dependent regression, compared with waiting, SPKT was associated with 2-fold mortality risk within 30 days of transplant. However, **beyond 30 days**, SPKT was **associated with reduced mortality**, from **52%** for **disabled patients** (aHR,  $0.26$   $0.48_{0.88}$ ) to **70%** for patients with **normal functioning** (aHR,  $0.26$   $0.30_{0.34}$ ) (**Figure 2**).

## Limitations

- Retrospective design limits ability to objectively confirm reported KPS
- Patients with decreased functional status who were listed and underwent transplant **may be selected** based on clinical information not included in the registry, these results **may not be generalizable** to all patients with lower KPS values.

## Conclusions

- While **lower functional status** is associated with **increased mortality risk** among SPKT candidates and recipients, **SPKT** can provide **long-term survival benefit across functional status levels** in those selected for transplant.