



# Incidence of infections in the first year post-transplant: trends from 1995-2002 in the U.S. Medicare population

## Introduction

- The past 20 years have seen a 41% improvement in one year graft survival for recipients of a deceased donor kidney and a 10% improvement for recipients of a living donor kidney in the US, no doubt a result of a reduction in the incidence of acute rejection. (2006 USRDS Annual Data Report. Tables F2 & F8, Fig. 7.34)
- Nevertheless, survival with a functioning graft beyond the first year has changed little. (2006 USRDS Annual Data Report. Figs. 7.17 & 7.18)
- As a result, attention has shifted towards the management of immunosuppression and complications that may affect long-term graft survival and patient morbidity.
- Death with function is a leading cause of graft loss, and infection is second only to cardiovascular disease as the most common cause of death after kidney transplantation. (2005 USRDS Annual Data Report. Fig. 7.24)
- We examined trends in rates of infections and risk factors for post-transplant infections in adult patients receiving a kidney transplant in the US during 1995-2003.
- Infections studied included bacterial (septicemia, tuberculosis, other bacterial), viral (varicella-zoster, herpes, hepatitis B, C, other), HIV, CMV, other viral), fungal, and parasitic (pneumocystosis, other parasitic).

## Methods

- The cohort included 46,471 adult (aged 18+), first kidney transplant recipients between 1995 and 2003 who had Medicare Part A and Part B primary coverage at the time of transplantation.
- Infections were identified by searching Medicare claims files during the first 3 years post-transplant (patients aged 18+ at the time of transplant) and during the first 5 years post-transplant (patients aged 62+ at the time of transplant, N=9,415).
- Patients were followed until 12/31/2003 or the earliest of transplant failure, death, or loss of Medicare coverage.
- A person was positively identified as having a specific infection if one Part A inpatient claim or two outpatient Part A or Part B claims within one year indicated an infection in any field on the claim (excluding admitting diagnosis).
- In addition, hospitalizations with a primary discharge diagnosis of infection were analyzed to assess the relative frequency of various infection-caused hospitalizations.
- For the purpose of assessing trends, a Poisson regression was used to estimate rates adjusted for age, gender, race, primary cause of renal failure, donor type, and dialysis time, standardized to the 2002 transplant cohort characteristics.

## Results

- Infections occurred at a rate of 79.2 infections per 100 patient-years in 1995. The rate dropped to 70.0 per 100 patient-years in 2002 (Figure 1. P-value for trend: <0.0001).
- Bacterial infections were the most common, followed closely by viral infections, then by fungal and parasitic. This trend was consistent across all years. (Figure 1).
- Considering infections associated with a hospitalization, rates were 20-40% lower for each infection type (Figure 2), indicating 60-80% of infections were associated with an inpatient hospitalization.
- Infection rates were highest during the first year post-transplant for all infection types, with rates approximately 50% lower during subsequent years (Figures 3 & 4).
- Considering specific viral infections during the combined 3 years post-transplant, rates of CMV were highest and trending downward (Figure 5).
- Rates of varicella-zoster, hepatitis B, and hepatitis C were increasing (Figure 5, p=0.0049, <0.0001, <0.0001, respectively).
- Urinary tract infections, pneumonia, and septicemia were the most common causes of infectious hospitalizations over the first 3-years post-transplant (Figures 7 & 8).

Figure 1. Trends in infection rates during the first year post-transplant, 1995-2002.

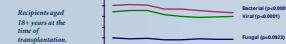


Figure 3. Infection rates per 100 patient-years by post-transplant follow-up year.



Figure 5. Trends in specific viral infection rates during the first 3 years post-transplant, 1995-2001.

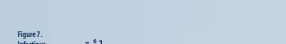


Figure 7. Infectious hospitalizations by cause and year post-transplant.

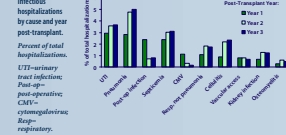


Figure 2. Trends in rates of hospitalizations with an infection during the first year post-transplant, 1995-2002.



Figure 4. Infection rates per 100 patient-years by post-transplant follow-up year.



Figure 6. Trends in specific bacterial infection rates during the first 3 years post-transplant, 1995-2001.

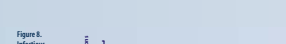
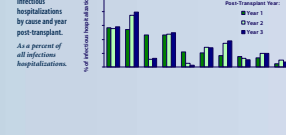


Figure 8. Infectious hospitalizations by cause and year post-transplant.



## Conclusions

- Overall, infection rates in kidney transplant recipients have been declining, although a few specific viral infection rates have increased over the time period studied.
- Rates of viral, bacterial, and parasitic infections during the first 3 years post-transplant showed modest declines, while rates of fungal infections have remained fairly constant (Figure 1).
- The incidence rates of CMV and herpes simplex infections have declined, whereas the incidence rates of HCV and HBV infections have increased.
- Rates of all types of infections are twice as high during the first year post-transplant compared with subsequent years.
- Importantly, the relative frequencies of different types of infections were similar during the first 5 years post-transplant.
- Urinary tract infections are the most common cause of hospitalization due to infection during the first year post-transplant, while pneumonia is the most common infectious cause during years two and three.