Prevalence of Double-Stranded DNA Viral Infections Among Allogeneic Hematopoietic Cell Transplant Recipients

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ABSTRACT

Background: Viral infections complicate the morbidity and mortality of allogeneic hematopoietic cell transplantation (allo-HCT) recipients. While some viral infections, such as cytomegalovirus (CMV) and adenovirus (AdV), can be reduced with prophylactic antiviral treatments, other infections, especially those caused by double-stranded DNA (dsDNA) viruses, can be easily underestimated in hospital discharge records.

INTRODUCTION

Allogeneic hematopoietic cell transplantation (allo-HCT) is a potentially curative therapy for certain malignant and non-malignant diseases.

METHODS

Study population

Patients who received allo-HCT between January 2009 and September 2013 were identified from the Premier Healthcare Database (Premier, Rome, GA, USA), a commercial claims database comprised of linked discharge records and linked hospital readmissions data from over 750 hospitals with >1 million patient admissions annually. A total of 1617 patients who received allo-HCT were included in the study population. The majority (51.3%) of patients who received allo-HCT had CCI = 1–2. The absolute and relative percentages of these post-allo-HCT hospital discharges are shown in Table 1.

Demographics and clinical characteristics

Demographics, including age, sex, US region of residence, race, health plan type, urban vs. rural hospital, hospital stay status, and hospital size, and clinical characteristics, including Charlson Comorbidity Index (CCI) score and Malignant and Related Diseases (MPR) summary of severity of illness were determined during a 1-month baseline period.

RESULTS

The frequencies of opportunistic infections, documented by diagnostic codes, were evaluated during the index hospitalization and 12 months after the index allo-HCT hospitalization. Opportunistic infections were categorized as follows:

- Any opportunistic infection, including fungal, bacterial, and viral infections
- CMV infection
- AdV infection
- Other dsDNA virus infection, including human papilloma virus (HPV), human herpes virus (HHV) 6 or 7, varicella zoster virus (VZV), Epstein-Barr virus (EBV), and herpes simplex virus (HSV)

The frequency and causes for hospital readmissions were evaluated during a 12-month follow-up period after the allo-HCT hospitalization and during the subsequent 12 months.

Conclusions:

- Among the patients who survived the index allo-HCT hospitalization, 60.6% (n=979) had a hospital readmission for any cause during the 12-month post-allo-HCT hospitalization (Figure 2).
- Approximately 1 out of 2 (50.0%) of the patients readmitted during the index hospitalization had viral infections, 46.6% occurred within 1 month and 71.7% occurred after 20 days (Figure 2).
- Hospital readmissions for any cause, 65.3% occurred within 1 month and 73.4% occurred after 20 days (Figure 2).
- Among patients with AdV-related readmission during the index hospitalization, HSV infection was the most common viral infection (52.0%) followed by CMV (20.6%) and Epstein-Barr virus (EBV) (9.1%) infections (Figure 2).
- The prevalence of hospital readmissions for any cause, 65.3% occurred within 1 month and 73.4% occurred after 20 days (Figure 2).
- Among patients with hospital discharges within the index hospitalization, 27.9% had viral infections, 20.6% occurred within 1 month and 70.3% occurred after 20 days (Figure 2).
- Among the patients who died during the index hospitalization, 79.5% (n=110) had a diagnostic code for viral infections, while 38.0% of patients died during the index hospitalization.
- The majority of hospital readmissions involved an opportunistic infection within the first post-allo-HCT hospitalization.
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LIMITATIONS

- Based on analyses of hospital discharge records, approximately 3 out of 4 hospital readmissions were for any cause and included hospital discharges related to infections.
- Approximately 1 out of 2 opportunistic infections was a dsDNA viral infection.
- These results support that allo-HCT recipients are at risk of opportunistic infections after transplantation.
- Although antiretroviral therapy (ART) to prevent opportunistic bacterial and fungal infections, the toxicities of current antiviral drugs do not allow their use for routine prevention of viral infections among these severely immunocompromised patients.

CONCLUSIONS

These results support that allo-HCT recipients are at risk of opportunistic infections after transplantation. While some viral infections, such as CMV and AdV, can be reduced with prophylactic antiviral treatments, other infections, especially those caused by dsDNA viruses, can be easily underestimated in hospital discharge records. This study supports the need for improved coding for viral infections to accurately capture the true burden of these infections in allo-HCT recipients.

REFERENCES


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DISCLOSURES

The authors report that E Mozaffari is an employee of Chimerix, Inc. J Lin and M Lingohr-Smith are employees of Novosys Health, Green Brook, NJ, USA. Professional editorial assistance was provided by Yelena Lyustikman, MSc, and Dana Fox, PhD, at Caudex Medical (New York, NY, USA), funded by Chimerix Inc.