Hospital Clinical Data Network and Research Organization Collaboration for Analysis of Infection Burden in Immunocompromised Patients in France using Real-World Electronic Medical Record Data

Jennifer Dusendang[1]; Alexandre Thorel[1]; Daniel Poscover[1] ; Quentin Serrau[2] ; Leslie Grammatico-Guillon[2]; Julien Herbert[2]; Sylvain Robert[3]
[1]Graticule Inc. MA, USA, [2]University Hospital of Tours, Tours, France, [3]University Hospital of Rennes, Rennes, France

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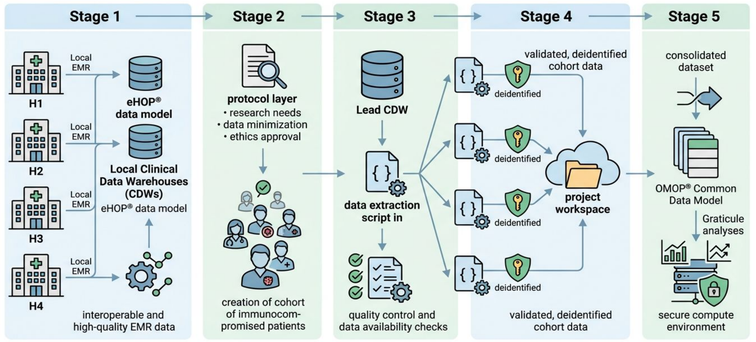
Introduction

Immunocompromised individuals constitute a distinctly at-risk demographic within global healthcare infrastructures, marked by an elevated vulnerability to infections and markedly escalated morbidity and mortality rates when contrasted with immunocompetent counterparts.

This cohort, which includes patients with hematological malignancies, recipients of solid organ transplants, individuals undergoing immunosuppressive treatment regimens, and those afflicted with primary immunodeficiency disorders, bears an inequitable burden of healthcare-associated infections that considerably complicate their clinical management.

- → PrimaryObjective: Describe viral respiratory infection rates in IC patients by subgroup
- → Secondary Objective:Demonstrate feasibility of a multi-site EMR data collaboration model for real-world research in Europe

Figure 1. Clinical Data Flow



Methods and Materials

The Human Genome Organisation (HUGO) network deployed Clinical Data Warehouse (CDWs) using the Entrepôt Hôpital (eHOP®) data model to provide interoperable and quality EMR data across hospitals. A protocol that met research needs, data minimization policies, and ethics requirements was developed for creating a cohort of IC patients from four hospitals. The lead CDW developed a data extraction script, including quality controls and data availability checks, and distributed this script to the network. Following validation, the deidentified cohort from each hospital was securely transferred to the project workspace on the Ouest Data Hub, where the consolidated dataset was converted to the Observational Medical Outcomes Partnership (OMOP®) Common Data Model for Graticule access and analyses within a secure compute environment.
This duration encapsulates the dynamic stages of the SARS-CoV-2 virus COVID-19 pandemic, which included Patients ≥12 years old were indexed on their first visit between December 2021 and October 2023 in which there was prior or current documentation of an IC condition. Rates of viral respiratory infections during follow-up were described.

Results

A total of 30,150 IC patients qualified for the study, including those with immunosuppressive therapy (56%), hematologic malignancy (27%), organ transplantation (21%), solid tumor (17%), and primary immunodeficiency (6%).

Rates of infection were 107.8 cases per 1,000 person-years for SARS-CoV-2, 12.4 for influenza, 9.3 for hMPV, and 5.4 for RSV

Figure 2. Summary Table

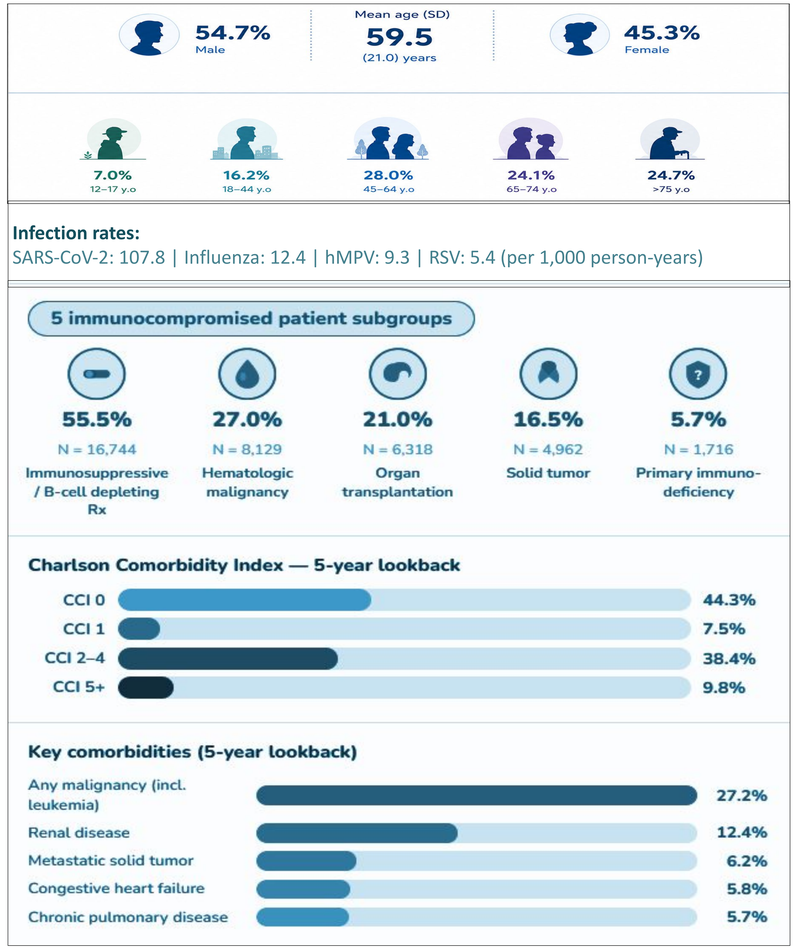
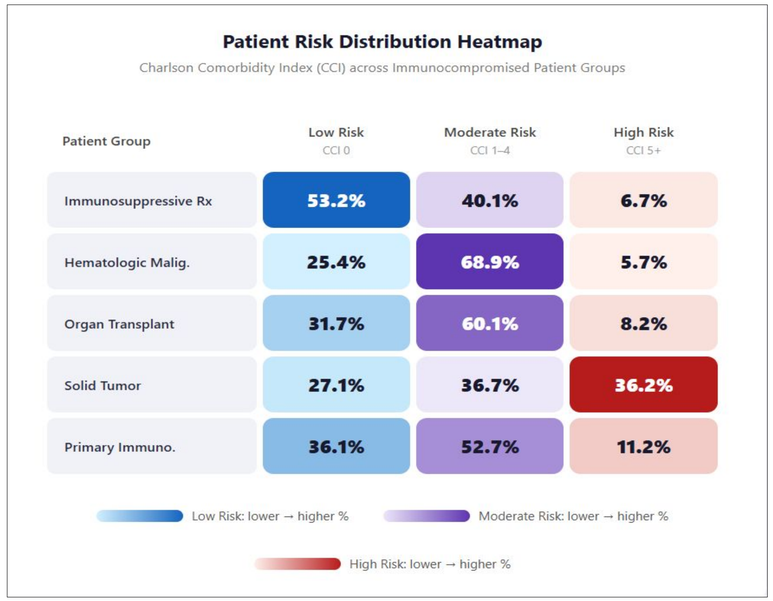


Chart 2. Patient Risk Distribution



Discussion

This study demonstrates a high burden of respiratory viral infections among IC patients, with SARS-CoV-2 rates substantially exceeding those of influenza, hMPV, and RSV. These findings align with prior reports of elevated COVID-19 morbidity in immunocompromised populations.

The HUGO network and OMOP CDM standardization enabled multi-site analysis across four French university hospitals, confirming the feasibility of federated real-world data approaches for infectious disease surveillance in IC cohorts.

Limitations include potential under-detection of infections diagnosed outside the participating hospitals and the retrospective observational design. Future work should evaluate temporal trends and the impact of vaccination on infection rates in IC subgroups.

Conclusions

This IC cohort of 30,150 patients demonstrates that collaborative and flexible partnerships can integrate heterogeneous EMR data into medical research at scale without compromising data integrity or patient privacy. Beyond cohort size, the initiative enables nuanced subgroup analyses across immunocompromising conditions, comorbidity profiles, and care settings that conventional data sources cannot support. It is a proven framework, built for the evidence demands of tomorrow.

Contact

Daniel Poscover
Graticule, INC
Email: info@graticule.life
Website: https://graticule.life/
Phone: (617) 564-3179

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Disclosures

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