

Risk of Severe COVID-19 in Four Immunocompromised Populations: A French Expert

Perspective

Supplementary Material

Authors

Paul Loubet¹, Ilies Benotmane², Slim Fourati^{3,4,5}, Florent Malard⁶, Fanny Vuotto⁷, Elodie Blanchard⁸, François Raffi⁹, Stéphanie Nguyen¹⁰, Nicolas de Prost^{3,4,11}, Jérôme Avouac¹²

Affiliations

¹VBIC, INSERM U1047, Université de Montpellier, Service des Maladies Infectieuses et Tropicales, Centre Hospitalier Universitaire (CHU) de Nîmes, Nîmes, France

²Service de Néphrologie-Dialyse-Transplantation, CHU de Strasbourg, Strasbourg, France

³Université Paris-Est-Créteil (UPEC), Créteil, France

⁴VHC (Viruses, Hepatology, Cancers) Henri Mondor, INSERM U955, Créteil, France

⁵Department of Virology, Hôpitaux Universitaires Henri Mondor Assistance Publique – Hôpitaux de Paris (AP-HP), Créteil, France

⁶Sorbonne Université, Centre de Recherche Saint-Antoine, INSERM UMRs938, Service d'Hématologie Clinique et de Thérapie Cellulaire, AP-HP Hôpital Saint-Antoine, Paris, France

⁷Service de Maladies Infectieuses, CHU de Lille, Lille, France

⁸Service de Pneumologie, Hôpital Haut Lévêque, CHU de Bordeaux, Pessac, France

⁹Department of Infectious Diseases, INSERM CIC 1413, Nantes Université, CHU de Nantes, Nantes, France

¹⁰Sorbonne Université, INSERM U1135, CNRS EMR 8255, Centre d'Immunologie et des Maladies Infectieuses (CIMI), Service d'Hématologie et de Thérapies Cellulaires, AP-HP Hôpital de la Pitié-Salpêtrière, Paris, France

¹¹Médecine Intensive Réanimation, Hôpitaux Universitaires Henri Mondor AP-HP, Créteil, France

¹²Service de Rhumatologie, Hôpital Cochin, AP-HP Centre Université Paris Cité, INSERM U1016/UMR 8104, Paris, France

Correspondence: Paul Loubet, MD, PhD. Email: paul.loubet@chu-nimes.fr

Supplementary Table S1 Search strategies to identify key studies of SARS-CoV-2 vaccine responses and/or severe COVID-19–related outcomes in immunocompromised patient populations

Embase, medRxiv and bioRxiv, LitCOVID extension of PubMed	
<i>Search number (topic)</i>	<i>Search string</i>
#1 (COVID-19)	'coronavirus disease 2019'/exp OR 'coronavirus disease 2019':ab,ti OR '2019 novel coronavirus disease':ab,ti OR '2019 novel coronavirus epidemic':ab,ti OR '2019 novel coronavirus infection':ab,ti OR '2019-ncov disease':ab,ti OR '2019-ncov infection':ab,ti OR 'coronavirus disease 2':ab,ti OR 'coronavirus disease 2010':ab,ti OR 'coronavirus disease 2019 pneumonia':ab,ti OR 'coronavirus disease-19':ab,ti OR 'coronavirus infection 2019':ab,ti OR 'covid':ab,ti OR 'covid 19':ab,ti OR 'covid 19 induced pneumonia':ab,ti OR 'covid 2019':ab,ti OR 'covid-10':ab,ti OR 'covid-19':ab,ti OR 'covid-19 induced pneumonia':ab,ti OR 'covid-19 pneumonia':ab,ti OR 'covid19':ab,ti OR 'ncov 2019 disease':ab,ti OR 'ncov 2019 infection':ab,ti OR 'new coronavirus pneumonia':ab,ti OR 'novel coronavirus 2019 disease':ab,ti OR 'novel coronavirus 2019 infection':ab,ti OR 'novel coronavirus disease 2019':ab,ti OR 'novel coronavirus infected pneumonia':ab,ti OR 'novel coronavirus infection 2019':ab,ti OR 'novel coronavirus pneumonia':ab,ti OR 'paucisymptomatic coronavirus disease 2019':ab,ti OR 'sars coronavirus 2 infection':ab,ti OR 'sars coronavirus 2 pneumonia':ab,ti OR 'sars-cov-2 disease':ab,ti OR 'sars-cov-2 infection':ab,ti OR 'sars-cov-2 pneumonia':ab,ti OR 'sars-cov2 disease':ab,ti OR 'sars-cov2 infection':ab,ti OR 'sarscov2 disease':ab,ti OR 'sarscov2 infection':ab,ti OR 'severe acute respiratory syndrome 2':ab,ti OR 'severe acute respiratory syndrome 2 pneumonia':ab,ti OR 'severe acute respiratory syndrome coronavirus 2 infection':ab,ti OR 'severe acute respiratory syndrome coronavirus 2019 infection':ab,ti OR 'severe acute respiratory syndrome cov-2 infection':ab,ti OR 'wuhan coronavirus disease':ab,ti OR 'wuhan coronavirus infection':ab,ti
#2 (immunocompromised patients)	'immunocompromised patient':ab,ti OR 'compromised host':ab,ti OR 'compromized host':ab,ti OR 'immune compromise':ab,ti OR 'immune compromised host':ab,ti OR 'immune compromised patient':ab,ti OR 'immunocompromise':ab,ti OR 'immunocompromised host':ab,ti OR 'immunocompromized host':ab,ti OR 'immunocompromized patient':ab,ti
#3 (immunosuppressive/depleting therapies)	'immunological antineoplastic agent'/exp OR 'immunosuppressive agent'/exp OR 'antineoplastic agent'/exp OR 'bruton tyrosine kinase inhibitor'/exp OR 'alkylating agent'/exp OR 'tumor necrosis factor inhibitor'/exp OR 'antigen*', cd20':ab,ti OR 'cd20 antigen*':ab,ti OR 'cd52 antigen*':ab,ti OR 'cd52, lymphocyte antigen*':ab,ti OR 'b lymphocyte depletion therap*':ab,ti OR 'depleting therap*':ab,ti OR 'bpc protein':ab,ti OR 'bruton agammaglobulinemia tyrosine kinase':ab,ti OR 'bruton tyrosine kinase':ab,ti OR 'immunosuppressive therap*':ab,ti OR 'antirejection therap*':ab,ti OR 'anti-rejection therap*':ab,ti OR 'transplantation conditioning':ab,ti OR 'immunosup* medication*':ab,ti
#4 (HSCT/CAR T-cell therapy)	hematopoietic stem cell transplantation'/exp OR 'chimeric antigen receptor immunotherapy'/exp OR 'hematopoietic cell transplant*':ab,ti OR 'bone marrow transplant*':ab,ti OR 'stem cell transplant*':ab,ti OR 'transplantation of stem cells':ab,ti OR 'car-t recipient':ab,ti OR 'chimeric antigen receptor t cells':ab,ti OR 'car-t cell therap*':ab,ti OR 'car-t therap*':ab,ti OR 'adoptive

	cellular immunotherap*':ab,ti
#5 (solid organ transplant)	'heart transplantation'/exp OR 'kidney transplantation'/exp OR 'intestine transplantation'/exp OR 'liver transplantation'/exp OR 'lung transplantation'/exp OR 'pancreas transplantation'/exp OR 'graft versus host reaction'/exp OR 'solid organ transplant*':ab,ti OR 'heart grafting':ab,ti OR 'liver grafting':ab,ti OR 'lung grafting':ab,ti OR 'pancreas grafting':ab,ti OR 'sot':ab,ti OR 'transplanted organ':ab,ti
#6 (solid tumors/hematologic malignancy)	'solid malignant neoplasm'/exp OR 'hematologic malignancy'/exp OR 'solid tumors':ab,ti OR 'hematological malignancies on treatment':ab,ti OR 'hematological malignancies on therapy':ab,ti OR 'hematological malignanc*':ab,ti
#7 (ESRD/dialysis)	'end stage renal disease'/de OR 'hemodialysis'/exp OR 'esrd':ab,ti OR 'dialysis':ab,ti OR 'chronic kidney failure':ab,ti OR 'chronic renal failure':ab,ti OR 'renal dialyses':ab,ti OR 'chronic kidney disease':ab,ti OR 'chronic renal impairment':ab,ti OR 'ckd':ab,ti
#8 (immunodeficiencies)	'immune deficiency'/exp OR 'acquired immune deficiency syndrome'/exp OR 'severe primary immunodeficiency':ab,ti OR 'primary immune disorders':ab,ti OR 'primary immunodeficiencies':ab,ti OR 'pid':ab,ti OR 'antibody deficiency syndrome':ab,ti OR 'acquired immuno-deficiency syndrome*':ab,ti OR 'acquired immunologic deficiency syndrome*':ab,ti OR 'acquired immuno deficiency syndrome*':ab,ti
#9 (full search string)	#1 AND (#2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8)

PubMed

Search #	Query	Search string
#1	(COVID-19) OR (SARS-CoV-2)	"covid 19"[All Fields] OR "covid 19"[MeSH Terms] OR "covid 19 vaccines"[All Fields] OR "covid 19 vaccines"[MeSH Terms] OR "covid 19 serotherapy"[All Fields] OR "covid 19 nucleic acid testing"[All Fields] OR "covid 19 nucleic acid testing"[MeSH Terms] OR "covid 19 serological testing"[All Fields] OR "covid 19 serological testing"[MeSH Terms] OR "covid 19 testing"[All Fields] OR "covid 19 testing"[MeSH Terms] OR "sars cov 2"[All Fields] OR "sars cov 2"[MeSH Terms] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "ncov"[All Fields] OR "2019 ncov"[All Fields] OR (("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields] OR "cov"[All Fields]) AND 2019/11/01:3000/12/31[Date - Publication]) OR ("sars cov 2"[MeSH Terms] OR "sars cov 2"[All Fields] OR "sars cov 2"[All Fields])
#2	(#1) AND (immuno-compromised)	("covid 19"[All Fields] OR "covid 19"[MeSH Terms] OR "covid 19 vaccines"[All Fields] OR "covid 19 vaccines"[MeSH Terms] OR "covid 19 serotherapy"[All Fields] OR "covid 19 nucleic acid testing"[All Fields] OR "covid 19 nucleic acid testing"[MeSH Terms] OR "covid 19 serological testing"[All Fields] OR "covid 19 serological testing"[MeSH Terms] OR "covid 19 testing"[All Fields] OR "covid 19 testing"[MeSH Terms] OR "sars cov 2"[All Fields] OR "sars cov 2"[MeSH Terms] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "ncov"[All Fields] OR "2019 ncov"[All Fields] OR (("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields] OR "cov"[All Fields]) AND 2019/11/01:3000/12/31[Date - Publication]) OR ("sars cov 2"[MeSH Terms] OR "sars cov 2"[All Fields] OR "sars cov 2"[All Fields])) AND ("immunocompromisation"[All Fields] OR "immunocompromise"[All Fields] OR "immunocompromised host"[MeSH Terms] OR ("immunocompromised"[All Fields] AND "host"[All Fields]) OR "immunocompromised host"[All Fields] OR "immunocompromised"[All Fields] OR "immunocompromising"[All Fields])
#3	(hospitalisation) OR	"hospital s"[All Fields] OR "hospitalisation"[All Fields] OR "hospitalization"[MeSH Terms] OR "hospitalization"[All Fields] OR

	(ICU) OR (mortality)	"hospitalised"[All Fields] OR "hospitalising"[All Fields] OR "hospitality"[All Fields] OR "hospitalisations"[All Fields] OR "hospitalizations"[All Fields] OR "hospitalize"[All Fields] OR "hospitalized"[All Fields] OR "hospitalizing"[All Fields] OR "hospitals"[MeSH Terms] OR "hospitals"[All Fields] OR "hospital"[All Fields] OR ("intensive care units"[MeSH Terms] OR ("intensive"[All Fields] AND "care"[All Fields] AND "units"[All Fields]) OR "intensive care units"[All Fields] OR "icu"[All Fields]) OR ("mortality"[MeSH Terms] OR "mortality"[All Fields] OR "mortalities"[All Fields] OR "mortality"[MeSH Subheading])
#4	(#2) AND (#3)	("covid 19"[All Fields] OR "covid 19"[MeSH Terms] OR "covid 19 vaccines"[All Fields] OR "covid 19 vaccines"[MeSH Terms] OR "covid 19 serotherapy"[All Fields] OR "covid 19 nucleic acid testing"[All Fields] OR "covid 19 nucleic acid testing"[MeSH Terms] OR "covid 19 serological testing"[All Fields] OR "covid 19 serological testing"[MeSH Terms] OR "covid 19 testing"[All Fields] OR "covid 19 testing"[MeSH Terms] OR "sars cov 2"[All Fields] OR "sars cov 2"[MeSH Terms] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "ncov"[All Fields] OR "2019 ncov"[All Fields] OR ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields] OR "cov"[All Fields]) AND 2019/11/01:3000/12/31[Date - Publication]) OR ("sars cov 2"[MeSH Terms] OR "sars cov 2"[All Fields] OR "sars cov 2"[All Fields])) AND ("immunocompromisation"[All Fields] OR "immunocompromise"[All Fields] OR "immunocompromised host"[MeSH Terms] OR ("immunocompromised"[All Fields] AND "host"[All Fields]) OR "immunocompromised host"[All Fields] OR "immunocompromised"[All Fields] OR "immunocompromising"[All Fields]) AND ("hospital s"[All Fields] OR "hospitalisation"[All Fields] OR "hospitalization"[MeSH Terms] OR "hospitalization"[All Fields] OR "hospitalised"[All Fields] OR "hospitalising"[All Fields] OR "hospitality"[All Fields] OR "hospitalisations"[All Fields] OR "hospitalizations"[All Fields] OR "hospitalize"[All Fields] OR "hospitalized"[All Fields] OR "hospitalizing"[All Fields] OR "hospitals"[MeSH Terms] OR "hospitals"[All Fields] OR "hospital"[All Fields] OR ("intensive care units"[MeSH Terms] OR ("intensive"[All Fields] AND "care"[All Fields] AND "units"[All Fields]) OR "intensive care units"[All Fields] OR "icu"[All Fields]) OR ("mortality"[MeSH Terms] OR "mortality"[All Fields] OR "mortalities"[All Fields] OR "mortality"[MeSH Subheading]))
#5	(#4) AND (("2022/07/01" [Date - Publication] : "3000" [Date - Publication]))	("covid 19"[All Fields] OR "covid 19"[MeSH Terms] OR "covid 19 vaccines"[All Fields] OR "covid 19 vaccines"[MeSH Terms] OR "covid 19 serotherapy"[All Fields] OR "covid 19 nucleic acid testing"[All Fields] OR "covid 19 nucleic acid testing"[MeSH Terms] OR "covid 19 serological testing"[All Fields] OR "covid 19 serological testing"[MeSH Terms] OR "covid 19 testing"[All Fields] OR "covid 19 testing"[MeSH Terms] OR "sars cov 2"[All Fields] OR "sars cov 2"[MeSH Terms] OR "severe acute respiratory syndrome coronavirus 2"[All Fields] OR "ncov"[All Fields] OR "2019 ncov"[All Fields] OR ("coronavirus"[MeSH Terms] OR "coronavirus"[All Fields] OR "cov"[All Fields]) AND 2019/11/01:3000/12/31[Date - Publication]) OR ("sars cov 2"[MeSH Terms] OR "sars cov 2"[All Fields] OR "sars cov 2"[All Fields])) AND ("immunocompromisation"[All Fields] OR "immunocompromise"[All Fields] OR "immunocompromised host"[MeSH Terms] OR ("immunocompromised"[All Fields] AND "host"[All Fields]) OR "immunocompromised host"[All Fields] OR "immunocompromised"[All Fields] OR "immunocompromising"[All Fields]) AND ("hospital s"[All Fields] OR "hospitalisation"[All Fields] OR "hospitalization"[MeSH Terms] OR "hospitalization"[All Fields] OR "hospitalised"[All Fields] OR "hospitalising"[All Fields] OR "hospitality"[All Fields] OR "hospitalisations"[All Fields] OR "hospitalizations"[All Fields] OR "hospitalize"[All Fields] OR "hospitalized"[All Fields] OR "hospitalizing"[All Fields] OR "hospitals"[MeSH Terms] OR "hospitals"[All Fields] OR "hospital"[All Fields] OR ("intensive care units"[MeSH Terms] OR ("intensive"[All Fields] AND "care"[All Fields] AND "units"[All Fields]) OR "intensive care units"[All Fields] OR "icu"[All Fields]) OR ("mortality"[MeSH Terms] OR "mortality"[All Fields] OR "mortalities"[All Fields] OR "mortality"[MeSH Subheading])) AND

Gray literature

<i>Institution</i>	<i>URL</i>
UKHSA	https://www.gov.uk/government/statistics/national-flu-and-covid-19-surveillance-reports-2022-to-2023-season
	https://www.gov.uk/government/organisations/uk-health-security-agency
CDC	https://www.cdc.gov/media/index.html
	https://www.cdc.gov/mmwr/index2023.html
	https://www.cdc.gov/flu/about/burden/preliminary-in-season-estimates.htm
	https://www.cdc.gov/rsv/research/rsv-net/dashboard.html
	https://www.cdc.gov/surveillance/nrevss/rsv/natl-trend.html
NICD	https://www.nicd.ac.za/diseases-a-z-index/disease-index-covid-19/surveillance-reports/weekly-respiratory-pathogens-surveillance-report-week/
NNDSS	https://www.health.gov.au/resources/collections/nndss-fortnightly-reports
Public Health Agency of Canada	https://www.canada.ca/en/public-health/services/surveillance/respiratory-virus-detections-canada.html
Public Health Scotland	https://scotland.shinyapps.io/phs-respiratory-covid-19/
ECDC	https://www.ecdc.europa.eu/en/news-events
	https://www.ecdc.europa.eu/en/search?search_section%5B0%5D=1382&search_section%5B1%5D=1244&s=&sort=published_at&order=desc&page=0
<i>Nature</i> news	https://www.nature.com/subjects/sars-cov-2
<i>BMJ</i>	https://www.bmj.com/news/news
medRxiv and bioRxiv (preprints)	https://connect.medrxiv.org/relate/content/181

BMJ, *British Medical Journal*; CAR, chimeric antigen receptor; CDC, United States Centers for Disease Control and Prevention; COVID-19, coronavirus disease 2019; ECDC, European Centre for Disease Prevention and Control; ESRD, end-stage renal disease; HSCT, hematopoietic stem cell transplantation; ICU, intensive care unit; NICD; National Institute for Communicable Diseases of South Africa; NNDSS, Australian National Notifiable Diseases Surveillance System; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2; UKHSA, United Kingdom Health Security Agency