

**IDSA 2025 Guidelines on the use of vaccines for the prevention of seasonal COVID-19, Influenza, and RSV infections in immunocompromised patients**

**Supplemental material for Influenza section**

Search Strategy

Supplemental Table 1. IDSA Supplemental Search

Supplemental Table 2. Study Characteristics

Supplemental Figure 1. Pooled incidence rate ratios (IRRs) for risk of Guillain-Barre syndrome following Influenza vaccination from self-controlled case series

Supplemental Figure 2. Risk of Bias Assessment

IDSA Conflict of Interest

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## Search Strategy

To establish the basis for recommendations, the panel reviewed the best available evidence published in the 18–24 months since the evidence base for the last CDC recommendations for each vaccine (search start dates were June 2024 for COVID-19; August 2024 for RSV; and August 2023 for influenza and search end date was July 31, 2025). A rapid systematic literature review conducted by the Vaccine Integrity Project provided evidence for vaccine effectiveness and serious adverse events [1], and a supplemental search within the same search limits provided evidence for exacerbations of immunocompromising or autoimmune conditions (see Supplemental Table 1).

### Supplemental Table 1. IDSA Supplemental Search

A supplemental search was conducted for the additional outcome of ‘exacerbations of immunocompromising or autoimmune conditions.’ Searches were run individually for each specific population in PubMed. The timeframe for the searches was informed by the timeframe for the VIP searches. Title/abstract and full-text screening were done by a single reviewer using Excel. Staff completed a final review of included studies.

Inclusion Criteria: 1) reports data on exacerbations of immunocompromising or autoimmune conditions resulting from vaccination, 2) studies at least one U.S-licensed or emergency-authorized vaccine, 3) has a sample size  $\geq 10$

Exclusion Criteria: 1) studies on infection-based exacerbations, treating exacerbations, vaccine effectiveness, epidemiology, characterization of immune response, impact of dosing, comparison of vaccines, reports for other AEs (e.g., myocarditis/pericarditis), or exacerbations of non-IC conditions (e.g., alopecia)

#### PubMed Specific Populations Search Strategy

| # | Descriptor                       | String                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Vaccinations (flu, RSV, COVID-19 | "covid 19 vaccines"[MeSH Major Topic] OR "Comirnaty"[Title/Abstract] OR "SPIKEVAX"[Title/Abstract] OR "MNEXSPIKE"[Title/Abstract] OR "Vaxzevria"[Title/Abstract] OR "Nuvaxovid"[Title/Abstract] OR "Covovax"[Title/Abstract] OR "NVX-CoV2373"[Title/Abstract] OR "COVID-19 vaccine"[Title/Abstract:~4] OR "covid 19 vaccines"[Title/Abstract:~4] OR "COVID-19 vaccination"[Title/Abstract:~4] OR "COVID-19 vaccinations"[Title/Abstract:~4] OR "COVID-19 vaccinate"[Title/Abstract:~4] OR "COVID-19 vaccinated"[Title/Abstract:~4] OR "COVID-19 vaccinating"[Title/Abstract:~4] OR "COVID-19 immunization"[Title/Abstract:~4] OR "COVID-19 |

|  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  | immunizations"[Title/Abstract:~4] OR "COVID-19 immunize"[Title/Abstract:~4] OR "COVID-19 immunized"[Title/Abstract:~4] OR "COVID-19 immunizing"[Title/Abstract:~4] OR "COVID-19 inoculation"[Title/Abstract:~4] OR "COVID-19 inoculations"[Title/Abstract:~4] OR "COVID-19 inoculate"[Title/Abstract:~4] OR "COVID-19 inoculated"[Title/Abstract:~4] OR "COVID-19 inoculating"[Title/Abstract:~4] OR "SARS-CoV-2 vaccine"[Title/Abstract:~4] OR "SARS-CoV-2 vaccines"[Title/Abstract:~4] OR "SARS-CoV-2 vaccination"[Title/Abstract:~4] OR "SARS-CoV-2 vaccinations"[Title/Abstract:~4] OR "SARS-CoV-2 vaccinate"[Title/Abstract:~4] OR "SARS-CoV-2 vaccinated"[Title/Abstract:~4] OR "SARS-CoV-2 vaccinating"[Title/Abstract:~4] OR "SARS-CoV-2 immunization"[Title/Abstract:~4] OR "SARS-CoV-2 immunizations"[Title/Abstract:~4] OR "SARS-CoV-2 immunize"[Title/Abstract:~4] OR "SARS-CoV-2 immunized"[Title/Abstract:~4] OR "SARS-CoV-2 immunizing"[Title/Abstract:~4] OR "SARS-CoV-2 inoculation"[Title/Abstract:~4] OR "SARS-CoV-2 inoculations"[Title/Abstract:~4] OR "SARS-CoV-2 inoculate"[Title/Abstract:~4] OR "SARS-CoV-2 inoculated"[Title/Abstract:~4] OR "SARS-CoV-2 inoculating"[Title/Abstract:~4] OR "Respiratory Syncytial Virus Vaccines"[MeSH Major Topic] OR "Abrysvo"[Title/Abstract] OR "Arexvy"[Title/Abstract] OR "MRESVIA"[Title/Abstract] OR "Beyfortus"[Title/Abstract] OR "nirsevimab"[Title/Abstract] OR "ENFLONIA"[Title/Abstract] OR "clesrovimab"[Title/Abstract] OR "Synagis"[Title/Abstract] OR "palivizumab"[Title/Abstract] OR "RSV vaccine"[Title/Abstract:~4] OR "RSV vaccines"[Title/Abstract:~4] OR "RSV vaccination"[Title/Abstract:~4] OR "RSV vaccinations"[Title/Abstract:~4] OR "RSV vaccinate"[Title/Abstract:~4] OR "RSV vaccinated"[Title/Abstract:~4] OR "RSV vaccinating"[Title/Abstract:~4] OR "RSV immunization"[Title/Abstract:~4] OR "RSV immunizations"[Title/Abstract:~4] OR "RSV immunize"[Title/Abstract:~4] OR "RSV immunized"[Title/Abstract:~4] OR "RSV immunizing"[Title/Abstract:~4] OR "RSV inoculation"[Title/Abstract:~4] OR "RSV inoculations"[Title/Abstract:~4] OR "RSV inoculate"[Title/Abstract:~4] OR "RSV inoculated"[Title/Abstract:~4] OR "RSV inoculating"[Title/Abstract:~4] OR "respiratory syncytial virus vaccine"[Title/Abstract:~4] OR "Respiratory Syncytial Virus Vaccines"[Title/Abstract:~4] OR "respiratory syncytial virus vaccination"[Title/Abstract:~4] OR "respiratory syncytial virus vaccinations"[Title/Abstract:~4] OR "respiratory syncytial virus vaccinate"[Title/Abstract:~4] OR "respiratory syncytial virus vaccinated"[Title/Abstract:~4] OR "respiratory syncytial virus vaccinating"[Title/Abstract:~4] OR "respiratory syncytial virus immunization"[Title/Abstract:~4] OR "respiratory syncytial virus immunizations"[Title/Abstract:~4] OR "respiratory syncytial virus immunize"[Title/Abstract:~4] OR "respiratory syncytial virus immunized"[Title/Abstract:~4] OR "respiratory syncytial virus immunizing"[Title/Abstract:~4] OR "respiratory syncytial virus inoculation"[Title/Abstract:~4] OR "respiratory syncytial virus inoculations"[Title/Abstract:~4] OR "respiratory syncytial virus inoculate"[Title/Abstract:~4] OR "respiratory syncytial virus inoculated"[Title/Abstract:~4] OR "respiratory syncytial virus inoculating"[Title/Abstract:~4] OR "Influenza Vaccines"[MeSH Major Topic] OR "Fluzone"[Title/Abstract] OR "Afluria"[Title/Abstract] OR "Fluad"[Title/Abstract] OR "Flucelvax"[Title/Abstract] OR |
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|   |                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |                                                                                                                                         | "FluMist"[Title/Abstract] OR "Flublok"[Title/Abstract] OR "Fluarix"[Title/Abstract] OR "Flulaval"[Title/Abstract] OR "Fluvirin"[Title/Abstract] OR "Agriflu"[Title/Abstract] OR "Arepanrix"[Title/Abstract] OR "Audenz"[Title/Abstract] OR "Afluria"[Title/Abstract] OR "flu vaccine"[Title/Abstract:~4] OR "flu vaccines"[Title/Abstract:~4] OR "flu vaccination"[Title/Abstract:~4] OR "flu vaccinations"[Title/Abstract:~4] OR "flu vaccinate"[Title/Abstract:~4] OR "flu vaccinated"[Title/Abstract:~4] OR "flu vaccinating"[Title/Abstract:~4] OR "flu immunization"[Title/Abstract:~4] OR "flu immunizations"[Title/Abstract:~4] OR "flu immunize"[Title/Abstract:~4] OR "flu immunized"[Title/Abstract:~4] OR "flu immunizing"[Title/Abstract:~4] OR "flu inoculation"[Title/Abstract:~4] OR "flu inoculations"[Title/Abstract:~4] OR "flu inoculate"[Title/Abstract:~4] OR "flu inoculated"[Title/Abstract:~4] OR "flu inoculating"[Title/Abstract:~4] OR "influenza vaccine"[Title/Abstract:~4] OR "Influenza Vaccines"[Title/Abstract:~4] OR "influenza vaccination"[Title/Abstract:~4] OR "influenza vaccinations"[Title/Abstract:~4] OR "influenza vaccinate"[Title/Abstract:~4] OR "influenza vaccinated"[Title/Abstract:~4] OR "influenza vaccinating"[Title/Abstract:~4] OR "influenza immunization"[Title/Abstract:~4] OR "influenza immunizations"[Title/Abstract:~4] OR "influenza immunize"[Title/Abstract:~4] OR "influenza immunized"[Title/Abstract:~4] OR "influenza immunizing"[Title/Abstract:~4] OR "influenza inoculation"[Title/Abstract:~4] OR "influenza inoculations"[Title/Abstract:~4] OR "influenza inoculate"[Title/Abstract:~4] OR "influenza inoculated"[Title/Abstract:~4] OR "influenza inoculating"[Title/Abstract:~4] |
| 2 | Specific population(s)                                                                                                                  | <b>See appendix 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 3 | Date filter                                                                                                                             | 2023/08/26:2025/09/22[pdat]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 4 | Language filter                                                                                                                         | English[lang]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 5 | Exclusion by publication type & additional exclusion terms (from VIP search with addition of guidelines or “narrative review” in title) | "case reports"[Publication Type] OR "clinical trial protocol"[Publication Type] OR "clinical trial, veterinary"[Publication Type] OR "Comment"[Publication Type] OR "Editorial"[Publication Type] OR "Guideline"[Publication Type] OR "letter"[Publication Type] OR "practice guideline"[Publication Type] OR "Published Erratum"[Publication Type] OR "modeling"[Title] OR "modelling"[Title] OR "mathematical model"[Title/Abstract] OR "simulation model"[Title/Abstract] OR "simulation"[Title] OR "cost-effectiveness"[Title] OR "costing"[Title] OR "cost analysis"[Title/Abstract] OR "economic evaluation"[Title/Abstract] OR "cost utility"[Title/Abstract] OR "microsimulation"[Title/Abstract] OR "markov model"[Title/Abstract] OR "agent-based model"[Title/Abstract] OR "macaque"[Title] OR "primate"[Title] OR "case report"[Title] OR "mouse model"[Title/Abstract] OR "murine"[Title/Abstract] OR "in vitro"[Title] OR "cell line"[Title/Abstract] OR "protein structure"[Title/Abstract] OR "molecular docking"[Title/Abstract] OR "molecular dynamics"[Title/Abstract] OR "animal model"[Title/Abstract] OR "rodent"[Title/Abstract] OR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

|        |  |                                                                                                                                                      |
|--------|--|------------------------------------------------------------------------------------------------------------------------------------------------------|
|        |  | "bioinformatics"[Title/Abstract] OR "receptor binding"[Title/Abstract] OR "viral genome"[Title/Abstract] OR Guidelines[TI] OR "Narrative review"[TI] |
| Search |  | 1 AND 2 AND 3 AND 4 NOT 5                                                                                                                            |

## Appendix 1. Specific population search strings

### a. Solid Organ Transplant

"Tissue Transplantation"[MeSH Terms] OR "Organ Transplantation"[MeSH Terms] OR ("transplant"[Title/Abstract] AND ("kidney"[Title/Abstract] OR "liver"[Title/Abstract] OR "heart"[Title/Abstract] OR "lung"[Title/Abstract] OR "intestine"[Title/Abstract] OR "pancreas"[Title/Abstract] OR "multivisceral"[Title/Abstract] OR "organ"[Title/Abstract] OR "tissue"[Title/Abstract]))

### b. HCT/CAR-T & JAK-STAT inhibitors

("Hematopoietic Stem Cell Transplantation"[MeSH Terms] OR "Bone Marrow Transplantation"[MeSH Terms] OR "immunotherapy, adoptive"[MeSH Terms] OR ("bone marrow transplant"[Title/Abstract] OR "bone marrow transplants"[Title/Abstract] OR "Bone Marrow Transplantation"[Title/Abstract] OR "bone marrow transplantations"[Title/Abstract] OR "stem cell transplant"[Title/Abstract] OR "stem cell transplants"[Title/Abstract] OR "stem cell transplantation"[Title/Abstract] OR "stem cell transplantations"[Title/Abstract] OR "car t"[Title/Abstract] OR "car t"[Title/Abstract] OR "cord blood transplant"[Title/Abstract] OR "cord blood transplants"[Title/Abstract] OR "cord blood transplantation"[Title/Abstract] OR "cord blood transplantations"[Title/Abstract] OR "Chimeric Antigen Receptor Therapy"[Title/Abstract] OR "Chimeric Antigen Receptor Therapies"[Title/Abstract])) AND ("janus kinase inhibitors"[MeSH Terms] OR "janus kinase inhibitors"[Pharmacological Action] OR ("Janus kinase-signal transducers and activators of transcription"[Title/Abstract] OR "janus kinase inhibitors"[Title/Abstract:~4] OR "Janus kinase inhibitor"[Title/Abstract:~4] OR "JAK inhibitor"[Title/Abstract:~4] OR "JAK inhibitors"[Title/Abstract:~4] OR "ruxolitinib"[Title/Abstract] OR "tofacitinib"[Title/Abstract] OR "baricitinib"[Title/Abstract] OR "itacitinib"[Title/Abstract] OR "Upadacitinib"[Title/Abstract] OR "filgotinib"[Title/Abstract] OR "abrocitinib"[Title/Abstract] OR "oclocitinib"[Title/Abstract] OR "fedratinib"[Title/Abstract] OR "pacritinib"[Title/Abstract] OR "decernotinib"[Title/Abstract] OR "ritlecinib"[Title/Abstract] OR "deucravacitinib"[Title/Abstract] OR "delgocitinib"[Title/Abstract] OR "peficitinib"[Title/Abstract]))

### c. Hematologic Malignancies

"Leukemia"[MeSH Terms] OR "Lymphoma"[MeSH Terms] OR "Multiple Myeloma"[MeSH Terms] OR "leukemia"[Title/Abstract] OR "lymphoma"[Title/Abstract] OR "myeloma"[Title/Abstract] OR "hematologic malignancy"[Title/Abstract] OR "hematologic malignancies"[Title/Abstract] OR "hematologic malignant"[Title/Abstract:~4]

### d. Solid Tumor Chemotherapy

"neoplasms/drug therapy"[MeSH Terms] OR ("solid tumor"[Title/Abstract] OR "Glioblastoma"[Title/Abstract] OR "Astrocytoma"[Title/Abstract] OR "Oligodendroglioma"[Title/Abstract] OR "Meningioma"[Title/Abstract] OR "Medulloepithelioma"[Title/Abstract] OR "Craniopharyngioma"[Title/Abstract] OR "oral cavity cancer"[Title/Abstract] OR "pharyngeal cancer"[Title/Abstract] OR "laryngeal cancer"[Title/Abstract] OR "salivary gland tumor"[Title/Abstract] OR "thyroid cancer"[Title/Abstract] OR "parathyroid cancer"[Title/Abstract] OR "lung cancer"[Title/Abstract] OR "mesothelioma"[Title/Abstract] OR "thymoma"[Title/Abstract] OR "esophageal cancer"[Title/Abstract] OR "gastric cancer"[Title/Abstract] OR "stomach

cancer"[Title/Abstract] OR "colorectal cancer"[Title/Abstract] OR "liver cancer"[Title/Abstract] OR "hepatocellular carcinoma"[Title/Abstract] OR "pancreatic cancer"[Title/Abstract] OR "gallbladder cancer"[Title/Abstract] OR "bile duct cancer"[Title/Abstract] OR "cholangiocarcinoma"[Title/Abstract] OR "kidney cancer"[Title/Abstract] OR "renal cell carcinoma"[Title/Abstract] OR "bladder cancer"[Title/Abstract] OR "prostate cancer"[Title/Abstract] OR "testicular cancer"[Title/Abstract] OR "penile cancer"[Title/Abstract] OR "breast cancer"[Title/Abstract] OR "ovarian cancer"[Title/Abstract] OR "endometrial cancer"[Title/Abstract] OR "cervical cancer"[Title/Abstract] OR "vulvar cancer"[Title/Abstract] OR "vaginal cancer"[Title/Abstract] OR "osteosarcoma"[Title/Abstract] OR "chondrosarcoma"[Title/Abstract] OR "Ewing sarcoma"[Title/Abstract] OR "soft tissue sarcomas"[Title/Abstract] OR "melanoma"[Title/Abstract] OR "basal cell carcinoma"[Title/Abstract] OR "squamous cell carcinoma"[Title/Abstract] OR "Merkel cell carcinoma"[Title/Abstract] OR "adrenal cancer"[Title/Abstract] OR "pituitary tumor\*"[Title/Abstract] OR "neuroendocrine tumor\*"[Title/Abstract]) AND ("Antineoplastic Agents"[MeSH Terms] OR "chemotherap\*"[Title/Abstract] OR "anticancer therapy"[Title/Abstract] OR "anticancer therapies"[Title/Abstract] OR "antineoplastic agent"[Title/Abstract] OR "Antineoplastic Agents"[Title/Abstract] OR "anticancer drug"[Title/Abstract] OR "anticancer drugs"[Title/Abstract] OR "Altretamine"[Title/Abstract] OR "Bendamustine"[Title/Abstract] OR "Busulfan"[Title/Abstract] OR "Carmustine"[Title/Abstract] OR "Chlorambucil"[Title/Abstract] OR "Cyclophosphamide"[Title/Abstract] OR "Dacarbazine"[Title/Abstract] OR "Ifosfamide"[Title/Abstract] OR "Lomustine"[Title/Abstract] OR "Lurbinectedin"[Title/Abstract] OR "Mechlorethamine"[Title/Abstract] OR "Melphalan"[Title/Abstract] OR "Procarbazine"[Title/Abstract] OR "Streptozocin"[Title/Abstract] OR "Temozolomide"[Title/Abstract] OR "Thiotepa"[Title/Abstract] OR "Trabectedin"[Title/Abstract] OR "Methotrexate"[Title/Abstract] OR "Pemetrexed"[Title/Abstract] OR "Pralatrexate"[Title/Abstract] OR "Trimetrexate"[Title/Abstract] OR "Azathioprine"[Title/Abstract] OR "Cladribine"[Title/Abstract] OR "Fludarabine"[Title/Abstract] OR "Mercaptopurine"[Title/Abstract] OR "Thioguanine"[Title/Abstract] OR "Azacitidine"[Title/Abstract] OR "Capecitabine"[Title/Abstract] OR "Cytarabine"[Title/Abstract] OR "Decitabine"[Title/Abstract] OR "Floxuridine"[Title/Abstract] OR "Fluorouracil"[Title/Abstract] OR "Gemcitabine"[Title/Abstract] OR "Trifluridine"[Title/Abstract] OR "Tipiracil"[Title/Abstract] OR "Aldesleukin"[Title/Abstract] OR "denileukin diftitox"[Title/Abstract] OR "Interferon Gamma"[Title/Abstract] OR "Belinostat"[Title/Abstract] OR "Panobinostat"[Title/Abstract] OR "Romidepsin"[Title/Abstract] OR "Vorinostat"[Title/Abstract] OR "Abiraterone"[Title/Abstract] OR "Apalutamide"[Title/Abstract] OR "Bicalutamide"[Title/Abstract] OR "Cyproterone"[Title/Abstract] OR "Enzalutamide"[Title/Abstract] OR "Flutamide"[Title/Abstract] OR "Nilutamide"[Title/Abstract] OR "Anastrozole"[Title/Abstract] OR "Exemestane"[Title/Abstract] OR "Fulvestrant"[Title/Abstract] OR "Letrozole"[Title/Abstract] OR "Raloxifene"[Title/Abstract] OR "Tamoxifen"[Title/Abstract] OR "Toremifene"[Title/Abstract] OR "Degarelix"[Title/Abstract] OR "Goserelin"[Title/Abstract] OR "Histrelin"[Title/Abstract] OR "Leuprolide"[Title/Abstract] OR "Relugolix"[Title/Abstract] OR "Triptorelin"[Title/Abstract] OR "Lanreotide"[Title/Abstract] OR "Octreotide"[Title/Abstract] OR "Pasireotide"[Title/Abstract] OR "Carboplatin"[Title/Abstract] OR "Cisplatin"[Title/Abstract] OR "Oxaliplatin"[Title/Abstract] OR "Alemtuzumab"[Title/Abstract] OR "Amivantamab"[Title/Abstract] OR "Atezolizumab"[Title/Abstract] OR "Avelumab"[Title/Abstract] OR "Belantamab"[Title/Abstract] OR "Bevacizumab"[Title/Abstract] OR "Blinatumomab"[Title/Abstract] OR "Brentuximab"[Title/Abstract] OR "Cemiplimab"[Title/Abstract] OR "Cetuximab"[Title/Abstract] OR "Daratumumab"[Title/Abstract] OR "Dinutuximab"[Title/Abstract] OR "Dostarlimab"[Title/Abstract] OR "Durvalumab"[Title/Abstract] OR "Elotuzumab"[Title/Abstract] OR "Enfortumab"[Title/Abstract] OR "Gemtuzumab"[Title/Abstract] OR "inotuzumab ozogamicin"[Title/Abstract] OR "Ipilimumab"[Title/Abstract] OR "Margetuximab"[Title/Abstract] OR "Mogamulizumab"[Title/Abstract] OR "moxetumomab pasudotox"[Title/Abstract] OR "Naxitamab"[Title/Abstract] OR

"Necitumumab"[Title/Abstract] OR "Nivolumab"[Title/Abstract] OR "Ofatumumab"[Title/Abstract] OR "Olaratumab"[Title/Abstract] OR "Panitumumab"[Title/Abstract] OR "Pembrolizumab"[Title/Abstract] OR "Pertuzumab"[Title/Abstract] OR "polatuzumab vedotin"[Title/Abstract] OR "Ramucirumab"[Title/Abstract] OR "Rituximab"[Title/Abstract] OR "sacituzumab govitecan"[Title/Abstract] OR "Tafasitamab"[Title/Abstract] OR "Teclistamab"[Title/Abstract] OR "Tisotumab"[Title/Abstract] OR "Vedotin"[Title/Abstract] OR "Tositumomab"[Title/Abstract] OR "Trastuzumab"[Title/Abstract] OR "trastuzumab deruxtecam"[Title/Abstract] OR "trastuzumab emtansine"[Title/Abstract] OR "Tremelimumab"[Title/Abstract] OR "Abemaciclib"[Title/Abstract] OR "Acalabrutinib"[Title/Abstract] OR "Adagrasib"[Title/Abstract] OR "Afatinib"[Title/Abstract] OR "Alectinib"[Title/Abstract] OR "Alpelisib"[Title/Abstract] OR "Asciminib"[Title/Abstract] OR "Axitinib"[Title/Abstract] OR "Binimetinib"[Title/Abstract] OR "Bortezomib"[Title/Abstract] OR "Bosutinib"[Title/Abstract] OR "Brigatinib"[Title/Abstract] OR "Cabozantinib"[Title/Abstract] OR "Capivasertib"[Title/Abstract] OR "Capmatinib"[Title/Abstract] OR "Carfilzomib"[Title/Abstract] OR "Ceritinib"[Title/Abstract] OR "Cobimetinib"[Title/Abstract] OR "Copanlisib"[Title/Abstract] OR "Crizotinib"[Title/Abstract] OR "Dabrafenib"[Title/Abstract] OR "Dacomitinib"[Title/Abstract] OR "Dasatinib"[Title/Abstract] OR "Duvelisib"[Title/Abstract] OR "Enasidenib"[Title/Abstract] OR "Encorafenib"[Title/Abstract] OR "Emsactinib"[Title/Abstract] OR "Entrectinib"[Title/Abstract] OR "Erdafitinib"[Title/Abstract] OR "Erlotinib"[Title/Abstract] OR "Fedratinib"[Title/Abstract] OR "Fruquintinib"[Title/Abstract] OR "Futibatinib"[Title/Abstract] OR "Gefitinib"[Title/Abstract] OR "Gilteritinib"[Title/Abstract] OR "Glasdegib"[Title/Abstract] OR "Ibrutinib"[Title/Abstract] OR "Idelalisib"[Title/Abstract] OR "Imatinib"[Title/Abstract] OR "Infigratinib"[Title/Abstract] OR "Inavolisib"[Title/Abstract] OR "Ivosidenib"[Title/Abstract] OR "Ixazomib"[Title/Abstract] OR "Lapatinib"[Title/Abstract] OR "Larotrectinib"[Title/Abstract] OR "Lazertinib"[Title/Abstract] OR "Lenvatinib"[Title/Abstract] OR "Lorlatinib"[Title/Abstract] OR "Midostaurin"[Title/Abstract] OR "Mobocertinib"[Title/Abstract] OR "Momelotinib"[Title/Abstract] OR "Neratinib"[Title/Abstract] OR "Nilotinib"[Title/Abstract] OR "Niraparib"[Title/Abstract] OR "Olaparib"[Title/Abstract] OR "Olutasidenib"[Title/Abstract] OR "Osimertinib"[Title/Abstract] OR "Pacritinib"[Title/Abstract] OR "Palbociclib"[Title/Abstract] OR "Pazopanib"[Title/Abstract] OR "Pemigatinib"[Title/Abstract] OR "Pexidartinib"[Title/Abstract] OR "Pirtobrutinib"[Title/Abstract] OR "Ponatinib"[Title/Abstract] OR "Quizartinib"[Title/Abstract] OR "Regorafenib"[Title/Abstract] OR "Repotrectinib"[Title/Abstract] OR "Revumenib"[Title/Abstract] OR "Ribociclib"[Title/Abstract] OR "Ripretinib"[Title/Abstract] OR "Rucaparib"[Title/Abstract] OR "Ruxolitinib"[Title/Abstract] OR "Selumetinib"[Title/Abstract] OR "Sonidegib"[Title/Abstract] OR "Sorafenib"[Title/Abstract] OR "Sunitinib"[Title/Abstract] OR "Talazoparib"[Title/Abstract] OR "Tivozanib"[Title/Abstract] OR "Tovorafenib"[Title/Abstract] OR "Trametinib"[Title/Abstract] OR "Trilaciclib"[Title/Abstract] OR "Umbralisib"[Title/Abstract] OR "Vandetanib"[Title/Abstract] OR "Vemurafenib"[Title/Abstract] OR "Vismodegib"[Title/Abstract] OR "Zanubrutinib"[Title/Abstract] OR "Cabazitaxel"[Title/Abstract] OR "Docetaxel"[Title/Abstract] OR "Paclitaxel"[Title/Abstract] OR "Etoposide"[Title/Abstract] OR "Irinotecan"[Title/Abstract] OR "Teniposide"[Title/Abstract] OR "Topotecan"[Title/Abstract] OR "Vinblastine"[Title/Abstract] OR "Vincristine"[Title/Abstract] OR "Vinorelbine"[Title/Abstract] OR "Asparaginase"[Title/Abstract] OR "Pegaspargase"[Title/Abstract] OR "Belzutifan"[Title/Abstract] OR "Bexarotene"[Title/Abstract] OR "Cedazuridine"[Title/Abstract] OR "Eribulin"[Title/Abstract] OR "Everolimus"[Title/Abstract] OR "Hydroxyurea"[Title/Abstract] OR "Ixabepilone"[Title/Abstract] OR "Lenalidomide"[Title/Abstract] OR "Mitotane"[Title/Abstract] OR "Omacetaxine"[Title/Abstract] OR "Pomalidomide"[Title/Abstract] OR "Selinexor"[Title/Abstract] OR "Tagraxofusp"[Title/Abstract] OR "Tazemetostat"[Title/Abstract] OR "Tebentafusp"[Title/Abstract] OR "Telotristat"[Title/Abstract] OR "Temsilolimus"[Title/Abstract] OR "Thalidomide"[Title/Abstract] OR "Venetoclax"[Title/Abstract]))

#### **e. Primary Immunodeficiency**

"Primary Immunodeficiency Diseases"[MeSH Terms] OR "primary immunodeficiencies"[Title/Abstract] OR "primary immunodeficiency"[Title/Abstract] OR "primary immune disorders"[Title/Abstract] OR "primary immune disorder"[Title/Abstract] OR "primary immune disease"[Title/Abstract] OR "primary immune diseases"[Title/Abstract] OR "Ataxia Telangiectasia"[Title/Abstract] OR "Bloom Syndrome"[Title/Abstract] OR "Chediak-Higashi Syndrome"[Title/Abstract] OR "Hereditary Complement Deficiency Diseases"[Title/Abstract] OR "Hereditary Angioedemas"[Title/Abstract] OR "Hyper-IgM Immunodeficiency Syndrome"[Title/Abstract] OR "Job Syndrome"[Title/Abstract] OR "Leukocyte-Adhesion Deficiency Syndrome"[Title/Abstract] OR "Severe Combined Immunodeficiency"[Title/Abstract] OR "X-Linked Combined Immunodeficiency Diseases"[Title/Abstract] OR "Wiskott-Aldrich Syndrome"[Title/Abstract] OR "inborn errors of immunity"[Title/Abstract:~3]

#### **f. Autoimmune on Immunosuppressants/Biologics**

"autoimmune diseases/drug therapy"[MeSH Terms] OR ("autoimmune disease"[Title/Abstract] OR "autoimmune diseases"[Title/Abstract] OR "Autoimmune Polyendocrinopathies"[Title/Abstract] OR "autoimmune diabetes"[Title/Abstract] OR "Autoimmune hepatitis"[Title/Abstract] OR "Addison Disease"[Title/Abstract] OR "Anti-Glomerular Basement Membrane Disease"[Title/Abstract] OR "Anti-Neutrophil Cytoplasmic Antibody-Associated Vasculitis"[Title/Abstract] OR "Churg-Strauss Syndrome"[Title/Abstract] OR "Granulomatosis with Polyangiitis"[Title/Abstract] OR "Microscopic Polyangiitis"[Title/Abstract] OR "Antiphospholipid Syndrome"[Title/Abstract] OR "Juvenile Arthritis"[Title/Abstract] OR "Rheumatoid Arthritis"[Title/Abstract] OR "Felty Syndrome"[Title/Abstract] OR "Rheumatoid Vasculitis"[Title/Abstract] OR "Sjogren's Syndrome"[Title/Abstract] OR "Still's Disease"[Title/Abstract] OR "Anti-N-Methyl-D-Aspartate Receptor Encephalitis"[Title/Abstract] OR "Myasthenia Gravis"[Title/Abstract] OR "Myelin Oligodendrocyte Glycoprotein Antibody-Associated Disease"[Title/Abstract] OR "Polyradiculoneuropathy"[Title/Abstract] OR "Stiff-Person Syndrome"[Title/Abstract] OR "Uveomeningoencephalitic Syndrome"[Title/Abstract] OR "Autoimmune Hypophysitis"[Title/Abstract] OR "Autoimmune Lymphoproliferative Syndrome"[Title/Abstract] OR "Autoimmune Pancreatitis"[Title/Abstract] OR "Birdshot Chorioretinopathy"[Title/Abstract] OR "Dermatitis Herpetiformis"[Title/Abstract] OR "Glomerulonephritis"[Title/Abstract] OR "Graves Disease"[Title/Abstract] OR "Graves Ophthalmopathy"[Title/Abstract] OR "Immunoglobulin G4-Related Disease"[Title/Abstract] OR "Linear IgA Bullous Dermatositis"[Title/Abstract] OR "Lupus"[Title/Abstract] OR "Sympathetic Ophthalmia"[Title/Abstract] OR "Bullous Pemphigoid"[Title/Abstract] OR "Pemphigus"[Title/Abstract] OR "Thrombocytopenic Purpura"[Title/Abstract] OR "Autoimmune Thyroiditis"[Title/Abstract] OR "Hashimoto Disease"[Title/Abstract] OR "Postpartum Thyroiditis"[Title/Abstract] OR "Undifferentiated Connective Tissue Diseases"[Title/Abstract] OR "Multiple sclerosis"[Title/Abstract] OR "Diffuse cerebral sclerosis of schilder"[Title/Abstract] OR "Encephalomyelitis"[Title/Abstract] OR "Leukoencephalitis"[Title/Abstract] OR "Transverse myelitis"[Title/Abstract] OR "Neuromyelitis optica"[Title/Abstract] OR "Autoimmune neuritis"[Title/Abstract] OR "Giant cell arteritis"[Title/Abstract] OR "psoriasis"[Title/Abstract] OR "Crohn's"[Title/Abstract] OR "ulcerative colitis"[Title/Abstract] OR "inflammatory bowel disease"[Title/Abstract] OR "autoimmune anemia"[Title/Abstract:~4] OR "Diabetes Type 1"[Title/Abstract:~3]) AND ("Immunosuppressive Agents"[MeSH Terms] OR "Biological Products"[MeSH Terms] OR "interleukin inhibitor"[Title/Abstract:~3] OR "interleukin inhibitors"[Title/Abstract:~3] OR "Tumor necrosis factor inhibitor"[Title/Abstract] OR "tumor necrosis factor inhibitors"[Title/Abstract] OR "TNF inhibitor"[Title/Abstract] OR "TNF inhibitors"[Title/Abstract] OR "checkpoint inhibitor"[Title/Abstract] OR "checkpoint inhibitors"[Title/Abstract] OR "disease-modifying antirheumatic drugs"[Title/Abstract] OR "DMARD"[Title/Abstract] OR "DMARDs"[Title/Abstract] OR "biologic\*"[Title/Abstract] OR "monoclonal antibody"[Title/Abstract] OR "monoclonal antibodies"[Title/Abstract] OR "immunosuppress\*"[Title/Abstract] OR "immunotherap\*"[Title/Abstract] OR "MTOR inhibitor"[Title/Abstract] OR "MTOR

inhibitors"[Title/Abstract] OR "steroids"[Title/Abstract] OR "corticosteroids"[Title/Abstract] OR "prednisone"[Title/Abstract] OR "prednisolone"[Title/Abstract] OR "methylprednisolone"[Title/Abstract] OR "dexamethasone"[Title/Abstract] OR "colchicine"[Title/Abstract] OR "Hydroxychloroquine"[Title/Abstract] OR "Sulfasalazine"[Title/Abstract] OR "leflunomide"[Title/Abstract] OR "cyclophosphamide"[Title/Abstract] OR "tacrolimus"[Title/Abstract] OR "dapsone"[Title/Abstract] OR "methotrexate"[Title/Abstract] OR "mycophenolate mofetil"[Title/Abstract] OR "Cellcept"[Title/Abstract] OR "Myfortic"[Title/Abstract] OR "azathioprine"[Title/Abstract] OR "anakinra"[Title/Abstract] OR "canakinumab"[Title/Abstract] OR "rilonacept"[Title/Abstract] OR "infliximab"[Title/Abstract] OR "adalimumab"[Title/Abstract] OR "golimumab"[Title/Abstract] OR "etanercept"[Title/Abstract] OR "certolizumab"[Title/Abstract] OR "tocilizumab"[Title/Abstract] OR "sarilumab"[Title/Abstract] OR "eculizumab"[Title/Abstract] OR "rituximab"[Title/Abstract] OR "belimumab"[Title/Abstract] OR "cyclosporine"[Title/Abstract] OR "abatacept"[Title/Abstract] OR "secukinumab"[Title/Abstract] OR "ixekizumab"[Title/Abstract] OR "brodalumab"[Title/Abstract] OR "guselkumab"[Title/Abstract] OR "mepolizumab"[Title/Abstract] OR "reslizumab"[Title/Abstract] OR "benralizumab"[Title/Abstract] OR "dupilumab"[Title/Abstract] OR "vedolizumab"[Title/Abstract] OR "tofacitinib"[Title/Abstract] OR "baricitinib"[Title/Abstract] OR "Upadacitinib"[Title/Abstract] OR "sirolimus"[Title/Abstract] OR "everolimus"[Title/Abstract] OR "thalidomide"[Title/Abstract] OR "lenalidomide"[Title/Abstract] OR "apremilast"[Title/Abstract] OR "nivolumab"[Title/Abstract] OR "pembrolizumab"[Title/Abstract] OR "atezolizumab"[Title/Abstract] OR "avelumab"[Title/Abstract] OR "ipilimumab"[Title/Abstract]))

**g. HIV**

"HIV Infections"[MeSH Terms] OR "Acquired Immunodeficiency Syndrome"[MeSH Terms] OR "HIV"[Title/Abstract] OR "AIDS"[Title/Abstract] OR "human immunodeficiency virus"[Title/Abstract] OR "Acquired Immunodeficiency Syndrome"[Title/Abstract]

## Supplemental Table 2. Study Characteristics

*Outcome: Influenza-associated hospitalization (immunocompromised adults)*

| Author, year of publication | Location, dates of data collection | Study design                        | Population                                                   | Case                                                                     | Control                                                    | Influenza vaccine type             | Results & Notes                                                                 |
|-----------------------------|------------------------------------|-------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------|---------------------------------------------------------------------------------|
| Lewis 2025                  | USA<br>September 2023-May 2024     | Case-Control (Test-negative design) | Adults ≥18 years hospitalized with acute respiratory illness | Patients tested positive for influenza virus and negative for SARS-CoV-2 | Patients tested negative for both influenza and SARS-CoV-2 | 2023-24 seasonal influenza vaccine | 212 cases and 1639 controls; VE: 32% (95% CI 7-50%) in immunocompromised adults |

*Outcome: Influenza-associated hospitalization (overall adults ≥65 yrs)*

| Author, year of publication | Location, dates of data collection                                                                         | Study design                        | Population                                                                                   | Cases                                            | Controls                                                      | Influenza vaccine type        | Results & Notes                                                                                                                                    |
|-----------------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------|---------------------------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Gharpure 2025               | Argentina, Australia, Brazil, Chile, New Zealand, Paraguay, Thailand, and Uruguay; March 5 to Nov 27, 2023 | Case control (test-negative design) | Hospitalized patients with severe acute respiratory infection                                | Patients tested positive for influenza           | Patients tested negative for both influenza and SARS-CoV-2    | 2023 season influenza vaccine | Total 12,609 patients from 8 countries. Influenza vaccination was found to be effective against severe acute respiratory infection hospitalization |
| Martinez-Baz 2025           | Spain; November 2023 to March 2024                                                                         | Case control (test-negative design) | Patients who were consulted in the primary care sentinel network or were hospitalized due to | Patients tested positive for influenza by RT-PCR | Patients from the same settings tested negative for influenza | 2023-24 influenza vaccine     | 402 cases and 1395 controls; adjusted VE: 28% (95% CI: 6 to 45) in older adults                                                                    |

|             |                                                                                          |                                     |                                                                                                                   |                                                         |                                                        |                                      |                                                                                                                                                                  |
|-------------|------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             |                                                                                          |                                     | respiratory symptoms                                                                                              |                                                         |                                                        |                                      |                                                                                                                                                                  |
| Rose 2025   | 17 countries; September/October 2024-January 2025 (Depending on the site)                | Case control (test-negative design) | Patients with influenza-like illness or acute respiratory infection symptoms in primary care or hospital settings | Patients positive for any influenza virus               | Patients negative for all influenza viruses by RT-PCR  | 2024-25 Influenza vaccine            | Vaccination was overall found to be effective against influenza in older adults; VE > 45% in all countries except Scotland (29% 95% CI: 23-36%)                  |
| Emborg 2025 | Denmark; 1 October 2024 to 4 March 2025                                                  | Case control (test-negative design) | Adults ≥ 65 years with influenza-like illness and/or lower respiratory symptoms                                   | Patients positive for either influenza A or B by RT-PCR | Patients negative for both influenza A and B by RT-PCR | Quadrivalent influenza vaccine (QIV) | 978 cases and 9913 controls. VE with standard dose QIV: 36% (95% CI 23-47)                                                                                       |
| Maurel 2024 | Europe; September 2023 to January 2024                                                   | Case control (test-negative design) | Hospitalized patients with severe acute respiratory infection (SARI)                                              | Patients tested positive for influenza by RT-PCR        | Patients tested negative for influenza by RT-PCR       | 2023-24 influenza vaccine            | 703 cases and 2544 controls. VE: 36% (95% CI 22-47%) in older adults                                                                                             |
| Frutos 2025 | USA; October 2024–February 2025                                                          | Case control (test-negative design) | Patients with acute respiratory infection (ARI)                                                                   | Patients with positive influenza molecular assay        | Patients with negative influenza molecular assay       | 2024-25 influenza vaccine            | 1897 cases and 19271 controls; VE: 57% (95% CI 52-61%) in older adults                                                                                           |
| Frutos 2024 | USA; IVY: September 1, 2023–January 31, 2024; VISION: October 15, 2023–January 15, 2024. | Case control (test-negative design) | Patients with acute respiratory infection (ARI)                                                                   | Patients with positive influenza molecular assay        | Patients with negative influenza molecular assay       | 2023-24 influenza vaccine            | IVY: 249 cases and 1945 controls, VE: 42% (95% CI 23-56%) in older adults;<br><br>VISION: 1066 cases and 10118 controls, VE: 42% (95% CI 34-50%) in older adults |

|                   |                                          |                                     |                                                                                                  |                                                                          |                                                                                      |                                    |                                                                            |
|-------------------|------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------|----------------------------------------------------------------------------|
| Silva-Afonso 2025 | Spain; week 40 of 2023 – week 20 of 2024 | Case control (test-negative design) | Patients with severe acute respiratory infection (SARI)                                          | Influenza positive                                                       | No influenza                                                                         | Any influenza vaccine              | 165 cases and 1366 controls; VE: 38.8% (95% CI: 15.0–55.8) in older adults |
| Tenforde 2025     | USA; October 2023-April 2024             | Case control (test-negative design) | Patients with ARI-associated ED/urgent care encounters or hospitalizations who required ICU care | Patients who tested positive for influenza by molecular assay            | Patients who tested negative for influenza by molecular assay, as well as SARS-CoV-2 | 2023-24 influenza vaccine          | 3227 cases and 41513 controls; VE: 36% (95% CI 31-41%) in older adults     |
| Lewis 2025        | USA September 2023-May 2024              | Case control (test-negative design) | Adults ≥18 years hospitalized with acute respiratory illness                                     | Patients tested positive for influenza virus and negative for SARS-CoV-2 | Patients tested negative for both influenza and SARS-CoV-2                           | 2023-24 seasonal influenza vaccine | 505 cases and 3383 controls; VE: 31% (16-43%) in older adults              |

*Outcome: All-cause mortality (Overall adults ≥ 60 yrs)*

| Author, year of publication | Location, dates of data collection    | Study design         | Population      | Intervention      | Comparator | Results & Notes                                                                                                                                     |
|-----------------------------|---------------------------------------|----------------------|-----------------|-------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Acuti Martellucci 2025      | Italy; October 2023 to September 2024 | Retrospective cohort | Adults ≥ 60 yrs | Influenza vaccine | No vaccine | 7372 patients received non-adjuvanted standard dose and 59172 were unvaccinated; adjusted Hazards ratio of all-cause mortality was 0.47 (0.37-0.59) |

*Outcome: Severe disease (ICU admission, in overall adults >18 yrs)*

| Author, year of publication | Location, dates of data collection | Study design | Population | Intervention | Comparator | Results & Notes |
|-----------------------------|------------------------------------|--------------|------------|--------------|------------|-----------------|
|                             |                                    |              |            |              |            |                 |

|               |                              |                                     |                                                                                                  |                                                               |                                                                                      |                                                    |
|---------------|------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------|
| Tenforde 2024 | USA; October 2023-April 2024 | Case control (test-negative design) | Patients with ARI-associated ED/urgent care encounters or hospitalizations who required ICU care | Patients who tested positive for influenza by molecular assay | Patients who tested negative for influenza by molecular assay, as well as SARS-CoV-2 | 824 cases, 12,544 controls: 41% VE (95% CI: 31-50) |
|---------------|------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------|

*Outcome: Guillain-Barre Syndrome (overall adults  $\geq 65$  yrs)*

| Author, year of publication | Location, dates of data collection                                                  | Study design                | Population                                                                                               | Intervention                               | Comparator                                  | Results & Notes                                                                                                                                                                                        |
|-----------------------------|-------------------------------------------------------------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------|--------------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lloyd 2025                  | USA; August 2023 to June 2024 (Fee-for-service) or August 2024 (Medicare Advantage) | Self-controlled Case series | Adults $\geq 65$ years in the FFS and MA Medicare populations who received a 2023-2024 influenza vaccine | At risk window: 1-42 days post-vaccination | Control window: 43-90 days post-vaccination | Total Fee For service: 12,660,709 and Medicare advantage: 7,597,297 patients<br><br>IRR for GBS with any influenza vaccine were 1.10 (0.74, 1.63) for FFS and 0.72 (0.34, 1.51) for Medicare advantage |
| Shi 2024                    | USA; August 2022 to June 2023                                                       | Self-controlled Case series | Adults $\geq 65$ years in the FFS Medicare population who received a 2022-2023 influenza vaccine         | At risk window: 1-42 days post-vaccination | Control window: 43-90 days post-vaccination | Among 12.7 million vaccine recipients, 134 Guillain-Barre syndrome events occurred. IRR 0.90 (95% CI: 0.56-1.42) in the seasonality-adjusted and PPV-based imputation analysis                         |

*Outcome: Severe adverse events (overall adults)*

| Author, year of publication | Location, dates of data collection      | Study design    | Population                                                        | Intervention              | Comparator                 | Results & Notes                                                              |
|-----------------------------|-----------------------------------------|-----------------|-------------------------------------------------------------------|---------------------------|----------------------------|------------------------------------------------------------------------------|
| Lloyd 2025                  | USA; August 2023 to June 2024 (Fee-for- | Self-controlled | Adults $\geq 65$ years in the FFS and MA Medicare populations who | At risk window: 1-42 days | Control window: 43-90 days | Total Fee For service: 12,660,709 and Medicare advantage: 7,597,297 patients |

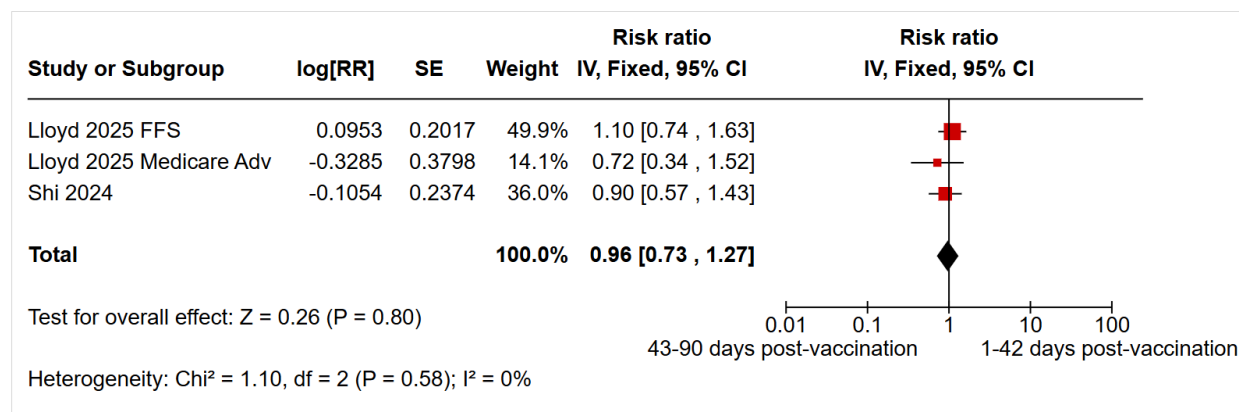
|             |                                              |                             |                                                                |                                                                  |                  |                                                                                                                                                                                                                                                                                                                                        |
|-------------|----------------------------------------------|-----------------------------|----------------------------------------------------------------|------------------------------------------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             | service) or August 2024 (Medicare Advantage) | Case series                 | received a 2023-2024 influenza vaccine                         | post-vaccination                                                 | post-vaccination | Study found no increased risk of ischemic or hemorrhagic stroke following various influenza vaccines overall but identified a statistically significant increased risk of a composite of ischemic stroke or TIA occurring 22-42 days after influenza vaccination (i.e. Medicare Advantage population, IRR 1.10, 95% CI, 1.02 to 1.17). |
| Tanaka 2024 | Canada; September 2009 to December 2018      | Self-controlled Case series | Adults registered under the Alberta Health Care Insurance Plan | Stroke within 3, 7, 14, 21, and 30 days of influenza vaccination | Unexposed time   | No increased risk of stroke within 3, 7, 14, 21, or 30 days of influenza vaccination.<br>aHR within 30 days: 0.66 (95% CI: 0.65-0.68)                                                                                                                                                                                                  |

*Outcome: Exacerbation of immunocompromising or autoimmune condition*

| Author, year of publication | Location, dates of data collection          | Study design                   | Population                                                                               | Intervention                                                                                                                                 | Comparator                                                                         | Results & Notes                                                                                                                                                                                                                                                                      |
|-----------------------------|---------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Grimaldi 2023               | France; January 1, 2007 – December 31, 2017 | Nested case-crossover analysis | Multiple sclerosis (MS) patients                                                         | At risk window: 60 days before and until the index date of MS flare-up                                                                       | Control window: 60-day time windows immediately preceding the at-risk time windows | Found no association between influenza vaccination and risk of hospitalization due to MS flares; aOR: 0.98 (95% CI, 0.88-1.09).<br>431 out of 31712 (1.36%) patients in at-risk time windows compared to 1634 out of 116,901 patients (1.4%) with flares during control time windows |
| Nakafero 2024               | UK; September 1, 2018 – August 31, 2019     | Self-controlled case series    | Influenza vaccinated adults with inflammatory bowel disease (IBD) and at least one flare | Baseline period: from September 1, 2018 to 15 days pre-vaccination, and from 90 days post-vaccination to August 31, 2019, date of leaving GP | Exposure period: vaccination to 90 days                                            | Study found no increased risk of influenza vaccination and excess IBD flares; (aIRR 0.68, 95% CI 0.46 to 1.02)                                                                                                                                                                       |

|                         |                                 |                    |                                              |                                                              |                |                                                                                                                                                                                                                                                                           |
|-------------------------|---------------------------------|--------------------|----------------------------------------------|--------------------------------------------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         |                                 |                    |                                              | surgery, date of death or the latest date of data collection |                |                                                                                                                                                                                                                                                                           |
| Zawiasa-Bryszewska 2025 | Poland; October 2018 - May 2019 | Prospective cohort | Adults with ≥6 months post kidney transplant | Vaccination                                                  | No vaccination | No significant difference between both groups in changes of eGFR, Serum creatinine (sCr) and occurrence of clinically significant proteinuria was observed. None amongst the vaccinated group experienced leucopenia, neutropenia, or thrombocytopenia after vaccination. |

**Supplemental Figure 1. Pooled incidence rate ratios (IRRs) for risk of Guillain-Barre syndrome following Influenza vaccination from self-controlled case series**



**Supplemental Figure 2. Risk of Bias Assessment of studies included for Influenza**

|                         | Risk of bias domains |    |    |    |    |    |    |         |
|-------------------------|----------------------|----|----|----|----|----|----|---------|
|                         | D1                   | D2 | D3 | D4 | D5 | D6 | D7 | Overall |
| Lewis 2025              | -                    | +  | -  | +  | +  | +  | +  | -       |
| Gharpure 2025           | -                    | +  | -  | +  | ✗  | +  | +  | ✗       |
| Martinez-Baz 2025       | -                    | +  | +  | +  | +  | +  | +  | -       |
| Rose 2025               | -                    | ✗  | -  | +  | +  | +  | +  | ✗       |
| Emborg 2025             | -                    | +  | +  | +  | +  | +  | +  | -       |
| Tenforde 2024           | -                    | +  | +  | +  | +  | +  | +  | -       |
| Maurel 2024             | -                    | +  | -  | +  | +  | +  | +  | -       |
| Frutos 2025             | -                    | +  | -  | +  | +  | +  | +  | -       |
| Silva-Afonso 2025       | -                    | +  | +  | +  | +  | +  | +  | -       |
| Frutos 2024             | -                    | +  | -  | +  | +  | +  | +  | -       |
| Acuti Martellucci 2025  | -                    | -  | +  | +  | +  | +  | +  | -       |
| Lloyd 2025              | -                    | +  | +  | +  | +  | +  | +  | -       |
| Shi 2024                | -                    | +  | +  | +  | +  | +  | +  | -       |
| Tanaka 2024             | -                    | +  | +  | +  | +  | +  | +  | -       |
| Grimaldi 2023           | -                    | +  | +  | +  | +  | +  | +  | -       |
| Nakafero 2024           | +                    | +  | ✗  | +  | +  | +  | +  | ✗       |
| Zawiasa-Bryszewska 2025 | ✗                    | -  | +  | +  | +  | +  | +  | ✗       |

Domains:

D1: Bias due to confounding.

D2: Bias due to selection of participants.

D3: Bias in classification of interventions.

D4: Bias due to deviations from intended interventions.

D5: Bias due to missing data.

D6: Bias in measurement of outcomes.

D7: Bias in selection of the reported result.

Judgement

✗ Serious

- Moderate

+

Low

## IDSA Conflict of Interest

### Definitions

#### ***Affected Company:***

An affected company is any commercial entity—including those involved in the development, manufacture, marketing, or distribution of pharmaceutical products, medical devices, diagnostics, or insurance services—that has, or is developing, a product, technology, or service that is directly related to the topic under consideration in the guideline.

- A non-profit organization is not considered a commercial entity, unless it engages in commercial activities or has financial interests that could be affected by the guideline topic.
- Governmental entities are not considered commercial entities. However, they may still present other types of potential conflicts, particularly intellectual or institutional conflicts, depending on the guideline context. IDSA will not consider governmental entities affected companies.

#### ***Related Products & Services:***

For guidelines on RSV, influenza, and COVID-19 vaccination, companies should be considered affected if they have or are developing any product, technology, or service that could influence clinical decision-making or patient care related to these vaccines.

TABLE 1. RELATIONSHIPS PROHIBITED

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Royalties, licensing fees, patents from any product or device related to the topic under consideration. This includes patents, the rights for which have been turned over to an institution but from which the individual benefits.                                                                                                                                                                                                                                                                                                                                |
| 2. Serving as an officer, board of directors member or employee of any device, insurance, pharmaceutical or diagnostic product or commercial entity with a product or device related to the topic under consideration.                                                                                                                                                                                                                                                                                                                                                |
| 3. Representation of any commercial healthcare-related entity (with a product or device related to the topic under consideration) before FDA advisory committees or in any other interactions such an entity may have with FDA.                                                                                                                                                                                                                                                                                                                                       |
| 4. Any honoraria, gifts, or other payments (includes funds for travel/hotel) directly received from any relevant commercial healthcare-related entity (US and International). This includes participation in speakers bureaus labeled as promotional and/or when any associated presentation is content-restricted in any way, including, but not limited to, the requirement to use only company-provided material; paid for by any mechanism other than an unrestricted educational grant to a CME-approved (or other educational) entity; and/or product-specific. |
| 5. Any activity not sponsored by the research arm of the company will <b>NOT</b> be allowed. For example, an advisory board sponsored by the marketing division, even if concentrating on “future research directions,” will <b>NOT</b> be allowed. In addition, consulting on post-research regulatory issues will <b>NOT</b> be allowed.                                                                                                                                                                                                                            |

|                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6. Stock or equity in any commercial healthcare-related entities (excludes diversified funds) related to the topic.                                                                                                                                                                                                                                                     |
| 7. Advisory or consulting roles with an affected company will disqualify an individual from serving on the panel if:<br>(a) Compensation is paid directly to the individual, regardless of the subject matter, or<br>(b) The advisory or consulting work relates to the guideline topic, regardless of whether payment is made to the individual or their institution.  |
| 8. Serving as an investigator on a research study that is supported or sponsored by an affected company will disqualify an individual from serving on the panel if:<br><br>(a) Compensation is paid directly to the individual, or<br>(b) The research is related to the guideline topic, regardless of whether payment is made to the individual or their institution. |

TABLE 2. RELATIONSHIPS ALLOWED

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Advisory/consultancies with an affected company is allowed when the role is <u>unrelated</u> to the guideline topic and payment goes to the institution—not the individual.<br><b>Exception, Chair(s)</b>                                                                                                                                                                                                                                                                                                                                                              |
| 2. Serving as an investigator on a research study that is supported or sponsored by an affected company is allowed if the study is <u>unrelated</u> to the guideline topic and payment goes to the institution—not the individual.<br><b>If you are a panel chair and conduct research, IDSA will require a co-chair with no relationships.</b>                                                                                                                                                                                                                           |
| 3. Presentations at national or international meetings provided that:<br>a. Presentations are non-promotional and there should be no involvement of industry in presentation content. There should be complete intellectual independence with regard to presentation content.<br>b. There is NO direct payment by industry to an individual for his/her participation (any industry support of speaker expenses must be through a third-party organization (e.g., IDSA, ICAAC, ATS, etc.), institution, CME, or other educational provider.<br><b>Exception, Chair(s)</b> |

## References

1. Scott J, Abers MS, Marwah HK, et al. Updated Evidence for Covid-19, RSV, and Influenza Vaccines for 2025-2026. N Engl J Med **2025**.