## Supplementary Materials

**Appendix 1: Search strategy.**

### PubMed

("influenza vaccines"[MeSH Terms] OR Influenza Vaccine[Text Word]) AND ("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 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])

### Web of science

Query #1: TI = ((COVID-19) OR (SARS-CoV-2) OR (coronavirus) OR (2019-nCoV))

Query #2: TS = ((influenza vaccine) OR (flu vaccine))

Query #3: TS = ((influenza vaccination) OR (flu vaccination))

Final query: #1 AND (#2 OR #3)

TI = ((COVID-19) OR (SARS-CoV-2) OR (coronavirus) OR (2019-nCoV)) AND TS = ((influenza vaccine) OR (flu vaccine)) AND TS = ((influenza vaccination) OR (flu vaccination))

### Cochrane library database

ID Search Hits

#1 MeSH descriptor: [COVID-19] explode all trees 1852

#2 MeSH descriptor: [SARS-CoV-2] explode all trees 985

#3 #1 OR #2 1857

#4 MeSH descriptor: [Influenza Vaccines] explode all trees 1664

#5 #3 AND #5 7

## Embase

#1

'coronavirus disease 2019'/exp OR 'coronavirus disease 2019' OR 'severe acute respiratory syndrome coronavirus 2'/exp OR 'severe acute respiratory syndrome coronavirus 2'

225,160

#2

'influenza vaccine'/exp OR 'influenza vaccination'/exp

47,318

#1 AND #2

1,148

**Appendix 2: The detail results of COVID-19 infection and clinical outcomes in included studies.**

**Supplementary Table 1: The detail results of COVID-19 infection and clinical outcomes in included studies.**

| Author | Influenza vaccination time | Infection | | Hospitalization | | ICU admission | | Ventilator support | | Death | | Adjusted factors |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *N* | aOR 95% CI | *N* | aOR 95% CI | *N* | aOR 95% CI | *N* | aOR 95% CI | *N* | aOR 95% CI | |
| Yang *et al*[1] | One year before earliest confirmed diagnosis | NA | | 2005 | 2.44 (1.68–3.61)† | 2005 | 3.29 (1.18–13.77)† | NA | | NA | | Race, age, gender, hypertension, diabetes, chronic obstructive pulmonary disease, obesity, coronary artery disease, and congestive heart failure |
| Wilcox *et al*[2] | Between 20191.1 and the diagnosis of COVID-19 | NA | | 6921 | 0.87 (0.78–0.98) | NA | | NA | | 6921 | 0.59 (0.51–0.69) | Age, sex, BMI, socioeconomic status (IMD), smoking status, frailty score, pre-existing comorbidities (chronic obstructive pulmonary disease, stroke, cancer, depression, peripheral arterial disease, rheumatoid arthritis, atrial fibrillation, dementia, chronic kidney disease, heart failure, learning disability, hypertension, other mental health disorder, cardiovascular disease, epilepsy, asthma, osteoporosis, |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | coronary artery disease, osteoarthritis and diabetes) and the number of prescribed medications |
| | | | | | 588 | 1.88 (1.18–3.99)† | 588 | 0.94 (0.43–2.06)† | 588 | 0.87 (0.47–1.62)† | Length of hospital stay; age, sex, race and BMI; hypertension, diabetes, coronary artery disease, stroke, chronic kidney disease, chronic obstructive pulmonary disease, chronic kidney disease, end-stage renal disease, asthma, malignant tumor; fever, cough, dyspnea, chest pain, respiratory illness, pneumonia, anemia, myalgia, and diarrhea. |
| Umasabor-Bubu *et al*[3] | 2019.9.1–2020.1.31 | NA | NA | | NM | 2.03 (0.66–6.27)†,§ | NM | 0.57 (0.20–1.61)†,§ | NM | 1.03 (0.48–2.21)†,§ | |
| Taghioff *et al*[4] | Six months-two weeks prior to SARS-CoV-2 positive diagnosis | NA | 37,377 | 1.10 (1.00–1.21)† | 37,377 | 1.21 (1.05–1.38)† | NA | | 37,377 | 1.02 (0.91–1.14)† | Age, race, gender, ethnicity, diabetes mellitus, elevated BMI status, hypertension, chronic ischemic heart disease, heart failure, COPD, musculoskeletal disease, and factors influencing health status and contact with human services which includes factors influencing health status including tobacco use, BMI, and socioeconomic status |
| Sánchez-García *et al*[5] | Season prior to study period | NA | NA | | NA | | NA | | 16,879 | 0.44 (0.35–0.55) | Age, gender, diabetes mellitus, hypertension, cardiovascular disease, obesity and chronic kidney disease |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pedote *et al*[6] | 2019.10–2020.1 | NA | | 3872<br><br>NM | 1.20 (0.70–1.90)<br><br>1.03 (0.56–1.92)§ | NA | | NA | | NM | 1.60 (0.80–3.20)<br>1.70 (0.80–3.60) | Sex, age at diagnosis, chronic disease, and influenza vaccination as determinants |
| Pastorino *et al*[7] | During the last campaign (2019.10–2020.2) | NA | | 741<br><br>406 | 1.03 (0.66–1.62)<br><br>0.98 (0.58–1.68)§ | 741<br><br>406 | 1.26 (0.74–2.21)<br><br>1.54 (0.80–2.94)§ | NA | | 741<br><br>406 | 1.33 (0.77–2.31)<br>1.41 (0.80–2.49) | Age, gender, and comorbidity |
| Paganoti *et al*[8] | Before the onset of COVID-19 symptoms | NA | | NA | | 1539 | 0.62 (0.49–0.78)¶ | 1555 | 0.53 (0.39–0.72)¶ | 1664 | 0.33 (0.23–0.47)¶ | Ethnicity, asthma, and education |
| Massoudi and Mohit[9] | 2019.9–2019.12 | 83<br><br>261 | 0.01 (0.00–0.15)‡<br>0.04 (0.01–0.14)†† | NA | | NA | | NA | | NA | | NA<br><br>NM |
| Kristensen *et al*[10] | Seasonal vaccination of 2019/2020 | 35,168 | 1.06 (0.97–1.17)‖ | 3379 | 0.91 (0.49–1.67) | NA | | NA | | NA | | Age, sex, ever smoker, unhealthy alcohol consumption, diabetes, immune deficiency, lung, heart, or |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3379 | 1.24 (0.97–1.59)†† | | | | | | | | kidney disease, patient contact, working at COVID-19 wards, and educational level |
| Kowalska *et al*[11] | Last year | 5479 | 0.68 (0.55–0.83)‖ | NA | NA | | NA | | NA | | Age, obesity and overweight, and previous COVID-19 contact or quarantine |
| | | | 0.54 (0.29–0.93) ‡§ | | | | | | | | NM |
| Kline *et al*[12] | Within 1 year | NA | | NA | 149 | 1.17 (0.50–2.72) | 149 | 1.40 (0.60–3.23) | 149 | 1.29 (0.31–5.29) | Age, sex, and BMI |
| | | 1701 | 0.93 (0.66–1.32) | | | | | | | | |
| Kissling *et al*[13] | 2019–2020 season vaccination | 367 | 0.92 (0.51–1.67)§ | NA | NA | | NA | | NA | | Study site, time, age, sex, and chronic condition |
| Huang *et al*[14] | Between September 1, 2019, and December 31, 2019 | 55,667,977 | 0.76 (0.75–0.77) | NA | NA | | 5566 7977 | 0.72 (0.68–0.76) | NA | | Age 75 or older, gender, vaccinated against a disease other than influenza between July 1 and December 31, whether the influenza vaccine contained an adjuvant, and comorbidities that may increase the risk of COVID-19 |
| Green *et* | Winter of | 2256 | 0.79 | NA | NA | | NA | | NA | | Previous influenza vaccination, age, |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *al*[15] | 2019–2020 | 3 | (0.67–0.98) | | | | | | | | orthodox Jews, low socioeconomic status, smoking, depression/anxiety, dementia, hypertension, ischemic heart disease, cerebrovascular disease, chronic heart failure, diabetes mellitus, and chronic lung disease |
| Greco *et al*[16] | In the last 12 months | NA | | 952 | 1.44 (1.01–2.05) | NA | | NA | | 448 | 1.15 (0.65–2.04) | Age, gender |
| Fink *et al*[17] | In the most recent influenza vaccination campaign | NA | | NA | | 39156 | 0.93 (0.87–0.99) | 39745 | 0.83 (0.77–0.89) | 36543 | 0.84 (0.77–0.91) | Age, treatment facility, gender, race, and educational attainment group and comorbidities |
| El-Qutob *et al*[18] | 2019–2020 season | NA | | NA | | NA | | NA | | 255 | 0.87 (0.29–2.08) | Age, sex, oxygen saturation/fraction of inspired oxygen ratio, HTA, renal insufficiency, cardiovascular disease, dementia |
| Diallo *et al*[19] | In the current season | NA | | NA | | 819 | 0.94 (0.86–1.03) | NA | | NA | | Age, sex, BMI, tobacco use, alcohol use, history of hypertension, ischemic heart disease, heart failure, stroke, peripheral artery disease, diabetic kidney disease, retinopathy, dyslipidemia, HbA1c, respiratory failure and/or chronic obstructive pulmonary disease, treatment for obstructive sleep apnea, active cancer, and the use |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | of metformin, insulin, dipeptidyl peptidase-4 inhibitor, glucagon-like peptide-1, statin, thiazide diuretic, potassium-sparing diuretic, acarbose, sulphonylurea/glinide, angiotensin-converting enzyme inhibitor and/or angiotensin receptor blocker, beta blocker, antiplatelet agent, and anticoagulant. |
| Conlon *et al*[20] | 2019.8.1–2020.7.15 | 27201 | 0.76 (0.68–0.86)‡‡ | 1218 | 0.58 (0.46–0.73) | 505 | 0.64 (0.41–1.00) | 505 | 0.45 (0.27–0.78) | NA | Ethnicity, race, gender, age, BMI, Elixhauser score, smoking status and the combined metric for chronic pulmonary disease, congestive heart failure, diabetes, and hypertension |
| Arce-Salinas *et al*[21] | 2019 | NA | | NA | | NA | | NA | | 560 | 0.60 (0.40–0.90) | NA |
| Xiang *et al*[22] | Past 1 year (from September 1, 2019 onward) | 30835 | 0.60 (0.53–0.68)‡‡ | NA | | NA | | NA | | 27147 | 0.23 (0.11–0.52) | Basic demographic variables (age, sex, ethnic group), comorbidities (coronary artery disease, diabetes, hypertension, asthma, chronic obstructive pulmonary disease, depression, dementia, history of cancer, blood urea and creatinine reflecting renal function), indicators of general health (number of medications taken, number of non-cancer illnesses), |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1.72 (1.43–2.06)‡ | | | | | | | | anthropometric measures BMI, socioeconomic status (Townsend deprivation index) and lifestyle risk factor (smoking status) |
| Candelli *et al*[23] | 2019–2020 | 602 | 0.69 (0.53–0.89)§ | NA | | NA | | 602 | 0.73 (0.35–1.56) | 602 | 0.20 (0.08–0.51) | Adjusted OR of infection: age. Adjusted OR of ventilator and death: gender, age, and comorbidities (congestive chronic heart failure, Chronic obstructive pulmonary disease, Cardiac heart disease, Diabetes, hypertension, and neoplasms) |
| Scozzari *et al*[24] | 2019–2020 | 8761 | 0.95 (0.76–1.19)‖ | NA | | NA | | NA | | NA | | Age, gender, BMI, smoking habit, comorbidities, Intake of therapeutic drugs (regularly), Job profile, working in COVID-19 wards, household contacts, other contacts, employment contract and place of work |
| Pawlowski *et al*[25] | Over the past 1 years | 25582 | 0.85 (0.75–0.96)* 0.74 (0.61–0.89) *§ | 959 | 1.10 (0.83–1.50)* | 959 | 1.10 (0.56–2.20)* 0.97 (0.57–1.70)*§ | NA | | NA | | Demographics, county-level COVID-19 incidence rate, county-level COVID-19 test positive rate, Elixhauser comorbidities, pregnancy, number of other vaccines |
| Ilic *et al*[26] | | 107 | 0.21 (0.05–0. | NA | | NA | | NA | | NA | | Obesity, diabetes mellitus, coronary artery disease, cerebrovascular |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 85)** | | | | | disease, current smoker, heart failure, seasonal influenza immunization |
| Fernández-Prada *et al*[27] | 2019/20 flu vaccine | 188 | 1.70 (0.96–3.25)‡ | NA | NA | NA | NA | NA |
| Debisarun *et al*[28] | 2019/2020 influenza season | 6856 | 0.63 (0.47–0.84)* | NA | NA | NA | NA | NA |
| Noale *et al*[29] | Autumn of 2019 | 6680 | 0.89 (0.78–1.01)§§<br>0.87 (0.59–1.28)§,§§ | NA | NA | NA | NA | Sex, age, education, Italian area of residence, dichotomized self-reported diseases (CVD, hypertension, lung diseases, diabetes treated with medications, metabolic diseases), smoking status, and contact with confirmed COVID-19 cases |
| Ragni *et al*[30] | 2019.10–2020.3 | 17608 | 0.89 (0.80–0.99)<br>0.87 (0.75–1.00)§ | NA | NA | NA | NA | Age, comorbidity, and time of execution of the swab test over the pandemic period |
| Martínez-Baz *et al*[31] | 2019.10–2019.11 (2019/2020 season) | 2582<br>8935 | 0.86 (0.68–1.08)<br>0.93 | NA | NA | NA | NA | Age groups, sex, major chronic condition, any influenza-like illness diagnosis in the previous five years, and type of professional |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | (0.78–1.11)[‖] | | | | | | | |
| Olivar-López *et al*[32] | In the last year | NA | | NA | NA | 11 | 2.00 (1.10–3.00)[†] | NA | | NA |
| King *et al*[33] | 2019–2020 influenza vaccination (at least 14 days before positive confirmed) | 1736 | 0.80 (0.62–1.03) | NA | NA | NA | | NA | | Age, sample collection interval, sex, high-risk condition, and month of onset |
| Ortiz-Prado *et al*[34] | In the last year | NA | | NA | NA | NA | | 9468 | 1.40 (0.46–4.28)[*,†] | NA |
| | | | | | | | | 60 | 2.05 (0.79–5.36)[*,†,¶] | |
| Bersanelli *et al*[35] | 2019–2020 | 3520 | 0.41 (0.07–2.39) 0.89 (0.29–2.79)[‖] | NA | NA | NA | | NA | | Age, gender |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Tayar[36] | 2020 influenza vaccination campaign, at least 14 days before PCR test | 2576 | 0.70 (0.52–0.95) | NA | NA | NA | NA | Sex, age group, nationality groups, reason for PCR testing, and bi-weekly PCR test date |

*The estimate was reported by RR. †The estimate took vaccine group as a reference, and was taken reciprocal of it in the pooled estimate analyses. ‡The estimate was unadjusted in original study. §The estimate was reported of elders aged 65 years and above. ||The estimate was reported on the basis of serum confirmed COVID-19. ¶The estimate was reported of pregnant women. **The estimate was reported on the basis of CT-confirmed bilateral pneumonia. ††The estimate was reported on the basis of symptomatic or pulmonologist-confirmed COVID-19.

‡‡The estimate was reported on the basis of laboratory-confirmed COVID-19. §§The estimate was reported on the basis of nasopharyngeal swab confirmed COVID-19. CI: Confidence interval; COVID-19: Corona virus disease 2019; ICU: Intensive care unit; ORs: Odds ratios; NA: The information was not involved in the study; NM: The information should have but was not mentioned in the study; RR: Risk ratio; SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2. The estimates without marks above were all reported on the basis of Reverse Transcription-Polymerase Chain Reaction confirmed COVID-19 and calculated by the adjusted odds ratio.

**Appendix 3: The assessment of quality evaluation and risk of bias.**

**Supplementary Table 2: The NOS for cohort study.**

| Inclusion study | | Selection | | | | Comparability | Outcome | | | Score |
|---|---|---|---|---|---|---|---|---|---|---|
| Author | Year | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | |
| Yang *et al*[1] | 2021 | 1 | 1 | 1 | 0 | 2 | 1 | 1 | 1 | 8 |
| Wilcox *et al*[2] | 2021 | 1 | 1 | 1 | 0 | 2 | 1 | 1 | 1 | 8 |
| Umasabor-Bubu *et al*[3] | 2021 | 1 | 1 | 0 | 0 | 2 | 1 | 1 | 1 | 7 |
| Taghioff *et al*[4] | 2021 | 1 | 1 | 1 | 0 | 2 | 1 | 1 | 1 | 8 |
| Sánchez-García *et al*[5] | 2021 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 7 |
| Pedote *et al*[6] | 2021 | 1 | 1 | 1 | 0 | 2 | 1 | 1 | 1 | 8 |
| Pastorino *et al*[7] | 2021 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 9 |
| Paganoti *et al*[8] | 2022 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 6 |
| Kristensen *et al*[10] | 2022 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 7 |
| Kline *et al*[12] | 2021 | 1 | 1 | 1 | 0 | 2 | 1 | 1 | 1 | 8 |
| Greco *et al*[16] | 2021 | 1 | 1 | 1 | 0 | 2 | 1 | 1 | 1 | 8 |
| Fink *et al*[17] | 2021 | 1 | 1 | 1 | 0 | 2 | 1 | 1 | 1 | 8 |
| El-Qutob *et al*[18] | 2022 | 1 | 1 | 1 | 0 | 2 | 1 | 1 | 1 | 8 |
| Diallo *et al*[19] | 2022 | 1 | 1 | 0 | 0 | 2 | 1 | 1 | 0 | 6 |
| Conlon *et al*[20] | 2021 | 1 | 1 | 1 | 0 | 2 | 1 | 1 | 1 | 8 |
| Xiang *et al*[22] | 2021 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 9 |
| Candelli *et al*[23] | 2021 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 6 |
| Scozzari *et al*[24] | 2021 | 1 | 1 | 0 | 1 | 2 | 1 | 1 | 1 | 8 |
| Pawlowski *et al*[25] | 2021 | 1 | 1 | 1 | 0 | 2 | 1 | 1 | 1 | 8 |
| Ilic *et al*[26] | 2021 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 5 |
| Ragni *et al*[30] | 2020 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 7 |
| Martínez-Baz et *al*[31] | 2020 | 0 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 8 |
| Ortiz-Prado *et al*[34] | 2021 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 5 |

① Representativeness of the exposed cohort. ② Selection of the non-exposed cohort. ③ Ascertainment of exposure. ④ Demonstration that outcome of interest was not present at the start of the study. ⑤ Comparability of cohorts on the basis of the design or analysis. ⑥ Assessment of outcome. ⑦ Was follow-up long enough for outcomes to occur. ⑧ Adequacy of follow-up of cohorts. NOS: Newcastle–Ottawa Scale.

**Supplementary Table 3: The NOS for case-control study.**

| Inclusion study | | Selection | | | | Comparability | Outcome | | | Score |
|---|---|---|---|---|---|---|---|---|---|---|
| Author | Year | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | |
| Massoudi *et al*[9] | 2021 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 7 |
| Kissling *et al*[13] | 2021 | 1 | 0 | 1 | 1 | 2 | 0 | 1 | 0 | 6 |
| Arce-Salinas *et al*[21] | 2022 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 7 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Fernández-Prada *et al*[27] | 2021 | 1 | 1 | 1 | 1 | 0 | | 1 | 1 | 1 | 7 |
| King *et al*[33] | 2021 | 1 | 1 | 1 | 1 | 2 | | 1 | 1 | 1 | 9 |
| Tayar[36] | 2022 | 1 | 1 | 1 | 1 | 2 | | 1 | 1 | 0 | 8 |

① Is the case definition adequate. ② Representativeness of the cases. ③ Selection of controls. ④ Definition of controls. ⑤ Comparability of cases and controls on the basis of the design or analysis. ⑥ Ascertainment of exposure. ⑦ Same method of ascertainment for cases and controls. ⑧ Non-response rate. NOS: Newcastle–Ottawa Scale.

**Supplementary Table 4: The AHRQ for cross-sectional study.**

| First author | Year | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ | ⑩ | ⑪ | Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kowalska *et al*[11] | 2021 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 9 |
| Huang *et al*[14] | 2021 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 11 |
| Green *et al*[15] | 2021 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 10 |
| Debisarun *et al*[28] | 2021 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 9 |
| Noale *et al*[29] | 2020 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 8 |
| Olivar-López *et al*[32] | 2020 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 11 |
| Belingheri *et al*[35] | 2020 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 9 |

① Define the source of information (survey, record review). ② List inclusion and exclusion criteria for exposed and unexposed subjects (cases and control) or refer to previous publications. ③ Indicate time period used for identifying patients. ④ Indicate whether or not subjects were consecutive if not population-based. ⑤ Indicate if evaluators of subjective components of study were masked to other aspects of the status of the participants. ⑥ Describe any assessments undertaken for quality assurance purposes (e.g., test/retest of primary outcome measurements). ⑦ Explain any patient exclusions from analysis. ⑧ Describe how confounding was assessed and/or controlled. ⑨ If applicable, explain how missing data were handled in the analysis. ⑩ Summarize patient response rates and completeness of data collection. ⑪ Clarify what follow-up, if any, was expected and the percentage of patients for which incomplete data or follow-up was obtained. AHRQ: Agency for Healthcare Research and Quality.

**Appendix 4: Reference of included studies.**

1. Yang MJ, Rooks BJ, Le TT, Santiago IO 3rd, Diamond J, Dorsey NL, *et al*. Influenza vaccination and hospitalizations among COVID-19 infected adults. J Am Board Fam Med 2021;34(Suppl):S179–S182. doi: 10.3122/jabfm.2021.S1.200528.

2. Wilcox CR, Islam N, Dambha-Miller H. Association between influenza vaccination and hospitalisation or all-cause mortality in people with COVID-19: A retrospective cohort study. BMJ Open Respir Res 2021;8:e000857. doi: 10.1136/bmjresp-2020-000857.

3. Umasabor-Bubu OQ, Bubu OM, Mbah AK, Nakeshbandi M, Taylor TN. Association between influenza vaccination and severe COVID-19 outcomes at a designated COVID-only hospital in Brooklyn. Am J Infect Control 2021;49:1327–1330. doi: 10.1016/j.ajic.2021.04.006.

4. Taghioff SM, Slavin BR, Holton T, Singh D. Examining the potential benefits of the influenza vaccine against SARS-CoV-2: A retrospective cohort analysis of 74,754 patients. PLoS One 2021;16:e0255541. doi: 10.1371/journal.pone.0255541.

5. Sánchez-García C, Salinas-Aguirre JE, Rodríguez-Muñoz L, Rodríguez-Sánchez R, Díaz-Castaño A, Bernal-Gómez R. History of influenza immunization in COVID-19 patients: Impact on mortality. Gac Med Mex 2021;157:102–106. doi: 10.24875/GMM.M21000527.

6. Pedote PD, Termite S, Gigliobianco A, Lopalco PL, Bianchi FP. Influenza vaccination and health outcomes in COVID-19 patients: A retrospective cohort study. Vaccines (Basel) 2021;9:358. doi: 10.3390/vaccines9040358.

7. Pastorino R, Villani L, La Milia DI, Ieraci R, Chini F, Volpe E, *et al*. Influenza and pneumococcal vaccinations are not associated to COVID-19 outcomes among patients admitted to a university hospital. Vaccine 2021;39:3493–3497. doi: 10.1016/j.vaccine.2021.05.015.

8. Paganoti CF, Rodrigues AS, Francisco RPV, Costa RAD. The influenza vaccine may protect pregnant and postpartum women against severe COVID-19. Vaccines (Basel) 2022;10:206. doi: 10.3390/vaccines10020206.

9. Massoudi N, Mohit B. A case-control study of the 2019 influenza vaccine and incidence of COVID-19 among healthcare workers. J Clin Immunol 2021;41:324–334. doi: 10.1007/s10875-020-00925-0.

10. Kristensen JH, Bo Hasselbalch R, Pries-Heje M, Nielsen PB, Dehlbaek Knudsen A, Fogh K, *et al*. Effect of influenza vaccination on risk of COVID-19 - A prospective cohort study of 46,000 health care workers. J Infect Dis 2022;226:6–10. doi: 10.1093/infdis/jiac001.

11. Kowalska M, Niewiadomska E, Barański K, Kaleta-Pilarska A, Brożek G, Zejda JE. Association between influenza vaccination and positive SARS-CoV-2 igG and igM tests in the general population of Katowice region, Poland. Vaccines (Basel) 2021;9:415. doi: 10.3390/vaccines9050415.

12. Kline A, Trinh LN, Hussein MH, Elshazli RM, Toraih EA, Duchesne J, *et al*. Annual flu shot: Does it help patients with COVID-19? Int J Clin Pract 2021;75:e14901. doi: 10.1111/ijcp.14901.

13. Kissling E, Hooiveld M, Brytting M, Vilcu A-M, de Lange M, Martínez-Baz I, *et al*. Absence of association between 2019-20 influenza vaccination and COVID-19: Results of the European I-MOVE-COVID-19 primary care project, March-August 2020. Influenza Other Respir Viruses 2021;15:429–438. doi: 10.1111/irv.12839.

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