The study used electronic health records to search for drug candidates that could be repurposed to treat COVID-19.

The study found 17 drug ingredients that are significantly associated with a decreased risk of death and other severe COVID-19 outcomes.

The list of drugs proposed by this study could provide additional insights into developing new candidates for COVID-19 treatment.

**Study highlights**

- Patient counts for each severity group included in the study.
- Study drug associations grouped by outcome.
- Drug class associations.
- Statistical analysis.
- Associations conducted for primary and secondary outcomes.

**Study design**

- The study applied the overlap weighting with a propensity score method to account for differences between the patients exposed to the drug prior to being diagnosed with SARS-CoV-2 (exposed group) and those not exposed (unexposed group).

- The propensity score for being exposed to a drug was estimated by a multivariable logistic regression model using age, sex, race, ethnicity, and weighted Exhuilasar comorbidity score.

- The effect of drug exposure on COVID-19 outcomes was estimated using weighted multivariable logistic regression.

- All drugs with corresponding effect estimates indicating reduced severity risk (OR < 1) were reported as potential candidates for COVID-19 treatment repurposing.

**Drug classes**

- Antihistamines
- Antidepressants
- Antimicrobials
- Antivirals
- Anticoagulants
- Antifungal
- Antiplatelet
- Antihypertensives
- Antiinflammatory
- Antiemetics

**Patient characteristics**

- All patients
- Hospitalized patients

- Sex:
  - Male: 3,878 (39.8)
  - Female: 5,807 (59.6)

- Race:
  - White: 8,212 (84.2)
  - Black: 1,276 (13.1)
  - Asian: 260 (2.7)

- Ethnicity:
  - Not Hispanic or Latino: 9,611 (96.5)
  - Hispanic or Latino: 397 (3.5)

- Weighted Exhuilasar comorbidity score:
  - <0: 1,414 (14.5)
  - 0: 1,101 (11.6)
  - 1: 3,163 (32.0)
  - ≥2: 3,341 (34.3)

- Excluded from the study

**Outcome**

- A cumulative severity scale
  - Hospitalized (mild illness)
  - On ventilator
  - Dead

- A severity scale
  - No severity
  - Exclusivity

**Significant drug associations grouped by outcome**

- **Primary outcome: all-cause death**
  - **PCV13a**
    - Vaccine:
      - Exposed: 338 (856)
      - Unexposed: 338 (856)
      - Odds Ratio: 0.31 (0.12-0.81)
  - **PCV13b**
    - Vaccine:
      - Exposed: 572 (604)
      - Unexposed: 572 (604)
      - Odds Ratio: 0.50 (0.20-1.19)
  - **Diphteria toxoid vaccine, inactivated**
    - Vaccine:
      - Exposed: 933 (820)
      - Unexposed: 933 (820)
      - Odds Ratio: 0.85 (0.37-1.96)
  - **PPSV23**
    - Vaccine:
      - Exposed: 478 (8751)
      - Unexposed: 478 (8751)
      - Odds Ratio: 0.46 (0.20-0.98)

- **Secondary outcome: on ventilator, cumulative severity**
  - **PCV13a**
    - Vaccine:
      - Exposed: 339 (608)
      - Unexposed: 339 (608)
      - Odds Ratio: 0.27 (0.11-0.67)
  - **PPSV23**
    - Vaccine:
      - Exposed: 571 (603)
      - Unexposed: 571 (603)
      - Odds Ratio: 0.39 (0.14-0.94)

- **Secondary outcome: hospitalized, cumulative severity**
  - **Estradiol**
    - Exposed: 942 (835)
    - Unexposed: 942 (835)
    - Odds Ratio: 0.45 (0.20-0.95)
  - **Turmeric extract**
    - Exposed: 605 (602)
    - Unexposed: 605 (602)
    - Odds Ratio: 0.41 (0.20-0.90)

- **Secondary outcome: hospitalized, exclusive severity**
  - **Esomeprazole**
    - Exposed: 500 (878)
    - Unexposed: 500 (878)
    - Odds Ratio: 0.70 (0.34-1.49)

**Patient counts for each severity group included in the study**

<table>
<thead>
<tr>
<th>Severity group</th>
<th>Cumulative severity</th>
<th>Exclusivity severity</th>
<th>Total</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No severity</td>
<td></td>
<td></td>
<td>9,748</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Mild illness</td>
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<td></td>
<td>42</td>
<td>20</td>
<td>60.9</td>
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<tr>
<td>On ventilator</td>
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<td></td>
<td>404</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>Dead</td>
<td></td>
<td></td>
<td>106</td>
<td>106</td>
<td>100</td>
</tr>
</tbody>
</table>