Characterizing Health Associated Risks, and Your Baseline Disease In SARS-COV-2 (CHARYBDIS)

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#OHDSICCOVID19
Characterization Study Group
AGENDA

• Why CHARYBDIS?
• Aims & Methods
• Data sources
• Findings to date
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Why CHARYBDIS?

COVID-19 -> new disease -> need to understand its natural history

COVID-19 Patient trajectory

- Presentation of symptoms
- Tested for COVID-19
- Tested positive or diagnosed with COVID-19
- Hospitalization
- Hospitalization requiring intensive services
- Death
Why CHARYBDIS?

• Many published characterization studies
Many published characterization studies
  - Small sample size
  - Few countries
  - Grunality of information
  - Hospital settings

Why CHARYBDIS?
Why CHARYBDIS?

• But many unanswered questions:
  – Who gets tested, infected and hospitalized?
    • Age and gender
    • Most frequent comorbidities
    • Treatment history
  – What are their symptoms and outcomes?
  – How different is COVID-19 from influenza?

COVID-19 Patient trajectory

Health pre-COVID-19

Presentation of symptoms  Tested for COVID-19  Tested positive or diagnosed with COVID-19  Hospitalization  Hospitalization requiring intensive services  Death

Demographics  Conditions  Drugs  Health service utilization
Why CHARYBDIS?

A global pandemic requires a global response

OHDSI Collaborators:
- 2,770 users
- 25 workgroups
- 18,700 posts on 3,250 topics

OHDSI Network:
- 152 databases
- 18 countries
- approx. 600M patient records
AGENDA

• Why CHARYBDIS?
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  • Findings to date
1) Describe the baseline demographic, clinical characteristics, treatments, symptoms and outcomes of interest among individuals with COVID-19 overall and stratified by sex, age and specific comorbidities

2) Describe characteristics and outcomes of influenza patients between September 2017 and April 2018 compared to the COVID-19 population

FULL STUDY PROTOCOL AVAILABLE AT https://github.com/ohdsi-studies/Covid19CharacterizationCharybdis
CHARYBDIS – Target cohorts

**Persons tested for SARS-CoV-2**

- Persons **tested positive** for SARS-CoV-2
- Persons with a **COVID-19 diagnosis** or a SARS-CoV-2 positive test
- Persons **hospitalized with a COVID-19** diagnosis record or a SARS-CoV-2 positive test
- Persons hospitalized and **requiring intensive services** with a COVID-19 diagnosis record or a SARS-CoV-2 positive test

**Persons with influenza diagnosis or positive test 2017-2018**

- Persons **hospitalized with influenza** diagnosis or positive test 2017-2018
- Persons hospitalized with influenza diagnosis or positive test and **requiring intensive services** 2017-2018

COHORT DEFINITIONS AVAILABLE AT:

https://atlas.ohdsi.org/
CHARYBDIS – Stratification factors

COVID-19 and...

- Asthma
- Cancer
- Cardiac Outcomes
- Chronic Kidney Disease
- COPD
- Elderly
- End-Stage Renal Disease
- Gender Differences
- Heart Disease
- Hepatitis C
- HIV infection
- Hypertension
- Immune Disorders
- Obesity
- Pediatrics
- Pregnant Women
- Tuberculosis
- Type 2 Diabetes
- Dementia
- Gender

... And more!

PHENOTYPE DEFINITIONS AVAILABLE AT:
https://atlas.ohdsi.org/
**CHARYBDIS – Features**

**Pre-index characteristics** (the last 30 days and the year prior to index):
- **Conditions** groups (SNOMED + descendants)
- **Drug** groups (ATC/RxNorm + descendants)

**Post-index characteristics** (at index date and in the 30 days from index date):
- **Demographics**: Age, Sex, Race
- **Conditions** groups (SNOMED + descendants)
- **Symptoms**
- **Outcomes**
- **Procedural treatments**
- **Drug** groups (ATC/RxNorm + descendants)

R PACKAGE TO RUN AVAILABLE AT [https://github.com/ohdsi-studies/Covid19CharacterizationCharybdis](https://github.com/ohdsi-studies/Covid19CharacterizationCharybdis)
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## CHARYBDIS - OHDSI COVID-19 Data Network

<table>
<thead>
<tr>
<th>USA (11)</th>
<th>EUROPE (8)</th>
<th>ASIA-PACIFIC (3)</th>
</tr>
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<tbody>
<tr>
<td>Columbia University (NY – EHR)</td>
<td>CPRD (UK – EHR)</td>
<td>HIRA (South Korea – Administrative Claims)</td>
</tr>
<tr>
<td>Department of Veterans Affairs (National – EHR)</td>
<td>DA Germany (Germany – EHR)</td>
<td>DCMC (South Korea – EHR)</td>
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<td>HealthVerity (Claims linked to diagnostic testing)</td>
<td>HM Hospitales (Spain – Hospital Billing)</td>
<td>Nanfang Hospital (China – EMR)</td>
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<td>IQVIA Open Claims (National – Administrative Claims)</td>
<td>IPCI (Netherlands – EHR)</td>
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<td>Optum EHR (National – EHR)</td>
<td>LPD France (France – EHR)</td>
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<td>Optum SES (National – EHR linked to Socio-economic data)</td>
<td>LPD Italy (Italy – EHR)</td>
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<td>Premier (National – Hospital Billing)</td>
<td>SIDIAP (Spain – EHR)</td>
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<td>Stanford University (CA – EHR)</td>
<td>SIDIAP-H (Spain – EHR Hospital linkage)</td>
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<td>Tufts University (MA – EHR)</td>
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<td>University of Colorado Anschutz Medical Campus (CO – EHR)</td>
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<td>University of Washington Medicine COVID Research Dataset (WA – EHR)</td>
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Together, OHDSI has studied:
- **>7.4m** patients tested for SAR-COV-2
- **>1.6m** patients diagnosed or tested positive for COVID-19
- **>300k** patients hospitalized with COVID-19

As of 12Oct2020

EHR = Electronic Health Records, EMR = Electronic Medical Records
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CHARYBDIS – web app

data.ohdsi.org/Covid19CharacterizationCharybdis/

Characterizing Health Associated Risks, and Your Baseline Disease In SARS-COV-2 (CHARYBDIS)

PLEASE NOTE: All results are preliminary and subject to change

Terms of Use:
These results are being shared as part of OHDSI’s open science community efforts to characterize disease natural history of COVID-19, for the purposes of enabling collaborative research within the community. Synthesis of the results and interpretation of the findings is underway and manuscripts are being prepared. All manuscripts must be reviewed and approved by all co-authors and data partner contributors prior to submission. Until final publication, all results are to be considered preliminary and subject to change, and may only be used under the terms of use of the respective data partner contributors.

Objectives:
1) Describe the baseline demographic, clinical characteristics, treatments and outcomes of interest among individuals tested for SARS-CoV-2 and/or diagnosed with COVID-19 overall and stratified by sex, age and specific comorbidities;
2) Describe characteristics and outcomes of patients diagnosed/tested positive for influenza as well as patients hospitalized with influenza between September 2017 and April 2018 compared to the COVID-19 population.

Resources:
- The study protocol is available here
- All analytic code is available at GitHub

Cohort Diagnostics:
- COVID cohorts
- Influenza cohorts
- Strata cohorts
- Feature cohorts
Findings to date – COVID-19

- Diagnosed -> more frequently females
- Hospitalized -> more frequently male
Findings to date – COVID-19

- Diagnosed -> more frequently females
- Hospitalized -> more frequently male
- Age differences -> hospitalized older than diagnosed
Findings to date – COVID vs Flu

- COVID is no flu
- Healthier
- Less history of drug use
Findings to date – COVID vs Flu

- COVID is no flu
- Healthier
- Less history of drug use
- Worse outcomes
Publications to date

Deep phenotyping of 34,128 adult patients hospitalised with COVID-19 in an international network study

Comorbid conditions appear to be common among individuals hospitalised with coronavirus disease 2019 (COVID-19) but estimates of prevalence vary and little is known about the prior medication use of patients. Here, we describe the characteristics of adults hospitalised with COVID-19 and compare them with influenza patients. We include 34,128 (US: 8,362, South Korea: 7,341, Spain: 18,425) COVID-19 patients, summarising between 4,811 and 11,643 unique aggregate characteristics. COVID-19 patients have been majority male in the US and Spain, but predominantly female in South Korea. Age profiles vary across data sources. Compared to 84,585 individuals hospitalised with influenza in 2014-2019, COVID-19 patients have more typically been male, younger, and with fewer comorbidities and lower medication use. While protecting groups vulnerable to influenza is likely a useful starting point in the response to COVID-19, strategies will likely need to be broadened to reflect the particular characteristics of individuals being hospitalised with COVID-19.

Heterogeneity and temporal variation in the management of COVID-19: a multinational drug utilization study including 71,921 hospitalized patients from China, South Korea, Spain, and the United States of America

Characteristics and outcomes of 627 044 COVID-19 patients with and without obesity in the United States, Spain, and the United Kingdom
<table>
<thead>
<tr>
<th>Paper Topic</th>
<th>Title</th>
<th>Study Lead(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autoimmune</td>
<td>Characteristics, outcomes and mortality amongst 45,576 patients with prevalent autoimmune disease hospitalized with COVID-19: a multinational distributed network cohort analysis</td>
<td>Eng Hooi Tan (Cheryl), Daniel Prieto-Alhambra</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>Clinical characteristics, symptoms, management and health outcomes in 8,598 pregnant women diagnosed with COVID-19 compared to 27,510 with seasonal influenza in 2017-2018 in France, Spain and the US: a distributed cohort analysis</td>
<td>Lana Lai, Asieh Golozar, Talita Duarte-Salles and Daniel Prieto-Alhambra</td>
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<tr>
<td>Pediatrics</td>
<td>Baseline characteristics, hospital treatments, and outcomes of 55,270 children and adolescents diagnosed (3,693 hospitalized) with COVID-19 in France, Germany, Spain, South Korea and the United States: an international network cohort study</td>
<td>Talita Duarte-Salles, Daniel Prieto-Alhambra</td>
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<tr>
<td>HIV</td>
<td>Using Real World Data to Understand HIV and COVID-19 Co-Infection in Two Countries: Characterizing HIV-COVID-19 Co-Infected Patients Across the Care Cascade</td>
<td>Julianna Kohler, Kristin Kostka, Rupa Makadia, Daniel Prieto-Alhambra</td>
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<td>Asthma</td>
<td>Characteristics and outcomes of 674,532 COVID-19 patients with and without asthma in the United States, Spain, and the United Kingdom</td>
<td>Daniel Morales</td>
</tr>
<tr>
<td>Testing</td>
<td>Baseline characteristics, symptoms and outcomes among people tested for COVID-19: an international network cohort analysis including &gt;1.9 million people tested and &gt;111,000 tested positive for SARS-CoV-2 in South Korea, Spain and the USA</td>
<td>Lana Lai, Asieh Golozar and Daniel Prieto-Alhambra</td>
</tr>
<tr>
<td>Racial disparities</td>
<td>Characterizing COVID-19 disease natural history differences between Blacks and Whites</td>
<td>Patrick Ryan, Shawn Baldry</td>
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<td>Interventions</td>
<td>Use of dialysis, tracheostomy, and extracorporeal membrane oxygenation among 240,151 patients hospitalised with COVID-19 in the United States</td>
<td>Edward Burn, Kristin Kostka, Talita Duarte-Salles</td>
</tr>
<tr>
<td>General - Clinical Paper</td>
<td>Characterizing Health Associated Risks, and Your Baseline Disease In SARS-COV-2 (CHARYBDIS): a international network cohort including 1.2 Million COVID-19 cases from 8 countries</td>
<td>Talita Duarte-Salles, Albert Prats-Uribe, Kristin Kostka</td>
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<tr>
<td>General - Informatics Paper</td>
<td>TBD</td>
<td>Talita Duarte-Salles, Albert Prats-Uribe, Kristin Kostka, Patrick Ryan</td>
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<td>Gender differences</td>
<td>TBD</td>
<td>Kristin Kostka, Maura Beaton, Noemie Elhdad, Ru-fong Cheng</td>
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<td>VTE</td>
<td>TBD</td>
<td>Kristin Kostka, Daniel Prieto-Alhambra, Evan Minty</td>
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<td>Cancer</td>
<td>Characteristics and outcomes of 118,155 COVID-19 individuals with cancer in the United States and Spain: a network cohort study</td>
<td>Elena Roel, Talita Duarte-Salles</td>
</tr>
<tr>
<td>Follow-Up Time / Repeated Testing</td>
<td>TBD</td>
<td>Vojtech Huser</td>
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CHARYBDIS

Only a monster can beat another monster
# CHARYBDIS

https://data.ohdsi.org/Covid19CharacterizationCharybdis/
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