2020 COVID-19 Trends in the Amplity Real-World Research Database

An Amplity Health White Paper

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Amplity HEALTH

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2020 COVID-19 TRENDS
in the Amplity Real-World Research Database

Executive Summary

Coronaviruses are human and animal pathogens. In late 2019, a novel coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was identified from a cluster of cases occurring in the city of Wuhan, China, and subsequently spread throughout the world giving rise to a pandemic.

In this white paper, we report the demographics, symptoms, comorbidities, and COVID-19 risk factors, and treatments received by patients in the Amplity Real-World Research Database who either had a confirmed COVID-19 diagnosis (positive or negative) or who had at least 3 symptoms consistent with COVID-19 in 2020. The Amplity Real-World Research Database was established in 2014 and has exclusive rights to information captured in over 50 million medical transcription records from across the United States. These records offer a view of the interactions between the provider and patient with a level of detail not found in other commercially available databases.

Results presented in this paper are based on all available data from transcriptions of care provided in healthcare encounters between January 2020 and August 2020 for male and female patients of all ages with:

- Confirmed COVID-19 positive or negative diagnosis, or
- 3 or more symptoms that may be indicative of COVID-19 documented within the same record for patients who have not been confirmed as COVID-19 positive or negative, hereafter referred to as 3+ symptom patients. These symptoms included:
  - Congestion or runny nose
  - Cough
  - Diarrhea
  - Fatigue
  - Fever or chills
  - Headache
  - Loss of smell or taste
  - Muscle or body aches
  - Nausea or vomiting
  - Shortness of breath or difficulty breathing
  - Sore throat

In all 3 patient cohorts (Positive, Negative, 3+ symptom), the majority of patients were in the 50-64 years age group. 70% of patients who tested positive or negative were aged 50 years or older, whereas only 55% of patients in the 3+ symptom group were aged 50 or older. This difference between the age distributions of patient cohorts suggests that younger patients were less likely to be tested than older patients, although determining the drivers of this trend is beyond the scope of the current study.

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The most frequent symptom in the COVID-19 positive and the COVID-19 negative cohorts was shortness of breath, whereas in the 3+ symptom cohort the most frequent symptom was headache. Surprisingly, the loss of smell or taste was only rarely documented in the transcription records even in COVID-19 positive patients, suggesting that assessment of the status of olfactory and gustatory perception has not become a routine part of the clinical workup of patients with possible COVID-19.

In our dataset, hypertension, smoking, cancer, serious heart conditions, chronic kidney disease, and chronic obstructive pulmonary disease were frequently noted in the transcription records. Most likely these conditions are associated with increased healthcare utilization, which would have led to an overrepresentation of these patients in our database. Since some researchers have shown healthcare visits to be associated with increased COVID-19 infection risk, the high prevalence of these patients in Amplity Insight's database suggests that healthcare utilization puts several vulnerable patient groups at increased risk.

The prevalence of obesity in our dataset is dramatically lower than the prevalence of obesity in the US general population. The most likely reason for this discrepancy is that existing obesity was not documented by the HCPs during the specific visits analyzed for this study.

We identified the widespread use of generic antibiotics in all 3 patient cohorts. Given that generic antibiotics do not treat COVID-19, the widespread use of these agents in patients who were tested for COVID-19 is surprising. The high prevalence of generic antibiotic use in the COVID-19 positive cohort suggests that antibiotic may be overused in this population, or that these agents may have been used during the period in which the patient's diagnosis was not yet definitive. Regardless, this finding suggests an opportunity to better educate physicians on appropriate treatment options for patients with COVID-19.

We also identified frequent prescribing of hydroxychloroquine and azithromycin to all 3 cohorts. The analysis interval of this study spans the period during which the FDA emergency use authorization for hydroxychloroquine for the treatment of COVID-19 was in force. Some of the hydroxychloroquine prescribing may be attributed to the emergency use authorization. Azithromycin is most often prescribed as an adjunct to hydroxychloroquine. However, the emergency use authorization for hydroxychloroquine does not explain the prescribing of hydroxychloroquine or hydroxychloroquine + azithromycin to COVID-negative patients or to 3+ symptom patients, unless physicians were proactively treating patients either before receipt of a definitive diagnosis or as a precaution. In any case, this pattern highlights the diversity of treatment approaches that have been used during this period while specific treatment protocols have been in flux.

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Introduction

About COVID-19

As of this writing, on November 2, 2020, a total of 46.6 million cases have occurred worldwide, with 31.1 million recovered and 1.2 million deaths. In the US, a total of 9.28 million cases with 231,000 deaths have occurred.[2] The reported case counts are likely an underestimate of the total COVID-19 burden. Many people who become infected with SARS-CoV-2 remain asymptomatic and are never tested.[3] Consequently, only a fraction of active cases are diagnosed and reported.[3] Seroprevalence surveys in Europe and the US suggest that the rate of prior exposure to SARS-CoV-2 exceeds the incidence of reported cases of COVID-19 by a factor of 10 or more.[4,5]

Patients with symptomatic COVID-19 experience a viral-type illness with symptoms including[6,7]:

- Mild upper respiratory tract infection with pharyngitis and/or rhinorrhea
- Lower respiratory tract infection with cough and/or fever
- Influenza-like symptoms including fever, chills, headache, and myalgias
- Gastroenteritis with nausea, vomiting, and/or diarrhea

Loss of smell and taste can also occur and is typically reported early in the course of the illness.[8] Shortness of breath or difficulty breathing typically develops between 4 and 8 days after the onset of symptoms.[9]

Most patients with COVID-19 are managed on an outpatient basis. In these cases, the illness is mild and does not require medical intervention. However, COVID-19 disease surveillance in the US between January 22 and May 30, 2020, showed that 14% of patients were hospitalized, 2% were admitted to an intensive care unit (ICU), and 5% died.[7]

A coronavirus disease 2019 case surveillance study described demographic characteristics, underlying health conditions, symptoms, and outcomes among 1,320,488 laboratory-confirmed COVID-19 cases individually reported to CDC from January 22 to May 30, 2020. In this population, deaths occurred 12 times more often in patients with underlying health conditions (19.5%) than in those without such conditions (1.6%).[7] In the overall study population, the most common underlying health conditions among patients with COVID-19 were:[7]

- Cardiovascular disease (32%)
- Diabetes (30%)
- Chronic lung disease (18%)

About Amplity Insights

The Amplity Real-World Research Database was established in 2014 (formally RealHealthData) and has exclusive data rights to a database of over 50 million medical transcription records from across the United States. The records offer a view of the interactions between the provider and patient with a level of detail not available in other commercially available databases and provides the foundational data for this white paper.

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The data licensed by Amplity customers has provided unique and valuable insights into the patient journey, treatment patterns and standard of care, physician treatment decisions and rationale, and outcome and effectiveness of therapeutic interventions. The data reflected in the Amplity database is current, accurate, and comprehensive. Patients represented within the Amplity database include the commercially insured, uninsured, Medicare, and Medicaid recipients from both in-patient and out-patient facilities in all 50 states and 2 US territories.

Amplity's data warehouse is updated daily and reflects current physician narratives from over 150,000 multi-specialty providers at approximately 40,000 clinics and hospitals across the nation. Currently, the database contains patient-level detail on approximately 20 million unique patient lives and averages the addition of almost 2 million new records monthly. At least 70% of the patient information regarding treatment decisions, test and procedural results, patient-reported outcomes, reasons for visits, medical histories, current and past medication regimens, and other key clinical information regarding the care of a patient can be found within the unstructured notes. The machine learning technology developed by Amplity Insights can quickly extract many customized data endpoints to provide a unique, holistic perspective of the patient journey as well as a deeper understanding of the provider's rationale related to treatment decisions.

Objective

In this white paper, we report the results on the age distribution, symptoms, comorbidities, risk factors, and treatments received by patients in the Amplity Insights' Database between January 2020 and August 2020. The data reported here was collected from patients who:

- Had a medical encounter AND
- Met the inclusion criteria for the study as defined below in the Patient Selection Criteria section

We analyzed data from patients that had received a positive or negative COVID-19 test result. Since many cases of COVID-19 go undiagnosed and unreported, we also analyzed data from patients who showed 3 or more symptoms that might be indicative of COVID-19 in the same visit, as described in the Patient Selection section below.

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Methods

The Amplity Insights Dataset

All transcription records contained within the database have been certified as HIPAA compliant in accordance with the Safe Harbor methodology. Unique identifiers (UIDs) have been assigned to patients so that individuals may be tracked across multiple healthcare providers. All defined study data points are extracted using a validated process of proprietary Natural Language Processing (NLP) algorithms. Novel research questions may be addressed efficiently, and, in most cases, analyses can be easily refined by modifying existing NLP logic to capture specific endpoints and outcomes of interest. Examples of the type of information that may be extracted from the Amplity Real-World Research Database include:

- Key diagnosis and comorbidities
- Current medication regimens
- Patient-reported symptomatology
- Effectiveness of therapies
- Treatment rationale
- Reasons reported for treatment switch or discontinuation, including patient preference
- Concomitant medication use, including both over the counter and prescription medications
- Laboratory test results
- Use of medical procedures and related results

For this exploratory, descriptive study, all patient-level data examined were obtained from transcription records for patient encounters with all types of healthcare providers between January 2020 and August 2020. Treatment settings represented in this analysis include:

- Emergency room visits
- Hospital inpatient treatment
- Ambulatory and acute care
- Private practices
- Community clinics
    - Muscle or body aches
    - Nausea or vomiting
    - Shortness of breath or difficulty breathing
    - Sore throat

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Patient Selection Criteria

Results presented in this paper are based on all available data from transcriptions of care provided January 2020 through August 2020 for male and female patients of all ages with:

- Confirmed COVID-19 positive or negative diagnosis, or
- 3 or more symptoms that may be indicative of COVID-19 documented within the same record for patients who have not been confirmed as COVID-19 positive or negative (3+ symptom). These symptoms included:
  - Congestion or runny nose
  - Cough
  - Diarrhea
  - Fatigue
  - Fever or chills
  - Headache
  - Loss of smell or taste
  - Muscle or body aches
  - Nausea or vomiting
  - Shortness of breath or difficulty breathing
  - Sore throat

Findings

Patients

- COVID-19 Positive: 3,832 patients
- COVID-19 Negative: 8,509 patients
- 3+ symptom: 128,065 patients

Age distribution

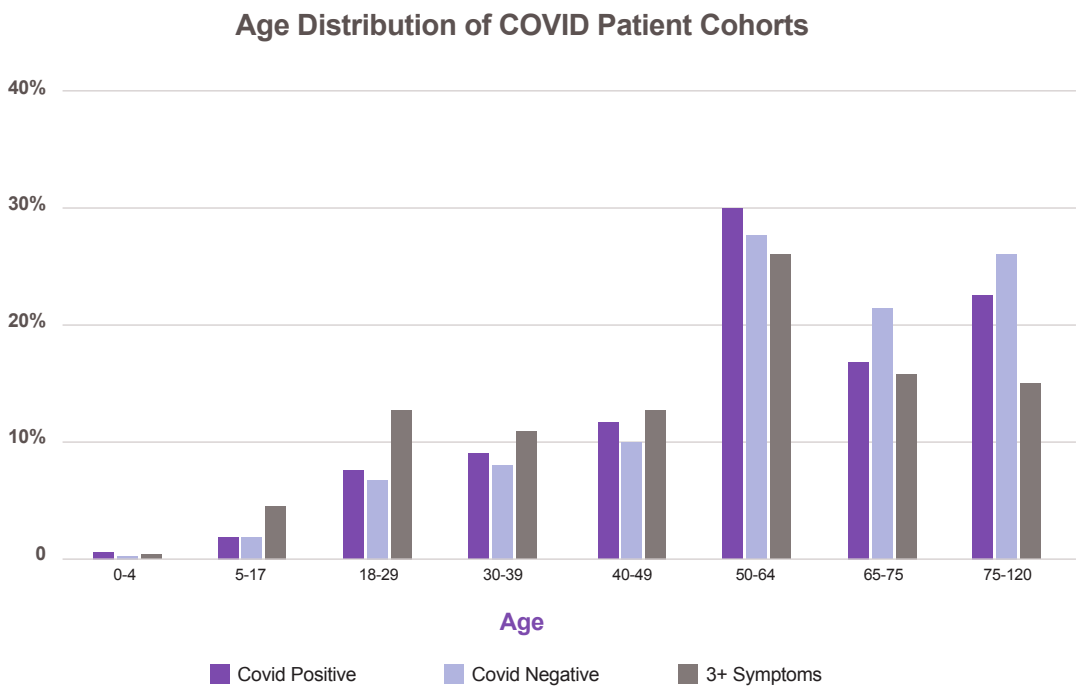

Figure 1: Age distribution of the patient cohorts. Percentages refer to the proportions of patients in the COVID-19 positive, COVID-19 negative, and 3+ Symptom cohorts. Age was not recorded for all patients; consequently, the percentages for each of the 3 cohorts may add up to less than 100%.

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Ages were recorded for 2,983 COVID-19 positive patients; 7,213 COVID-19 negative patients, and 120,032 3+ symptom patients. The majority of patients in all 3 cohorts were in the older age groups with the highest percentage of patients in the 50-64-year-old group. Notably, 70% of patients who tested positive or negative were aged 50 years or older, whereas only 55% of patients in the 3+ symptom cohort were aged 50 or older. Apart from the youngest age group, patients in the 3+ symptom group had the highest percentages in each of the age groups under 50 years. Our findings of the age distribution of COVID-19 positive patients broadly align with US coronavirus case surveillance data, which finds the greatest number of patients in the 50-59-year-old age group.[7] This difference between the age distributions of patient cohorts suggests that younger patients were less likely to be tested than older patients, although determining the drivers of this trend is beyond the scope of the current study.

Symptoms

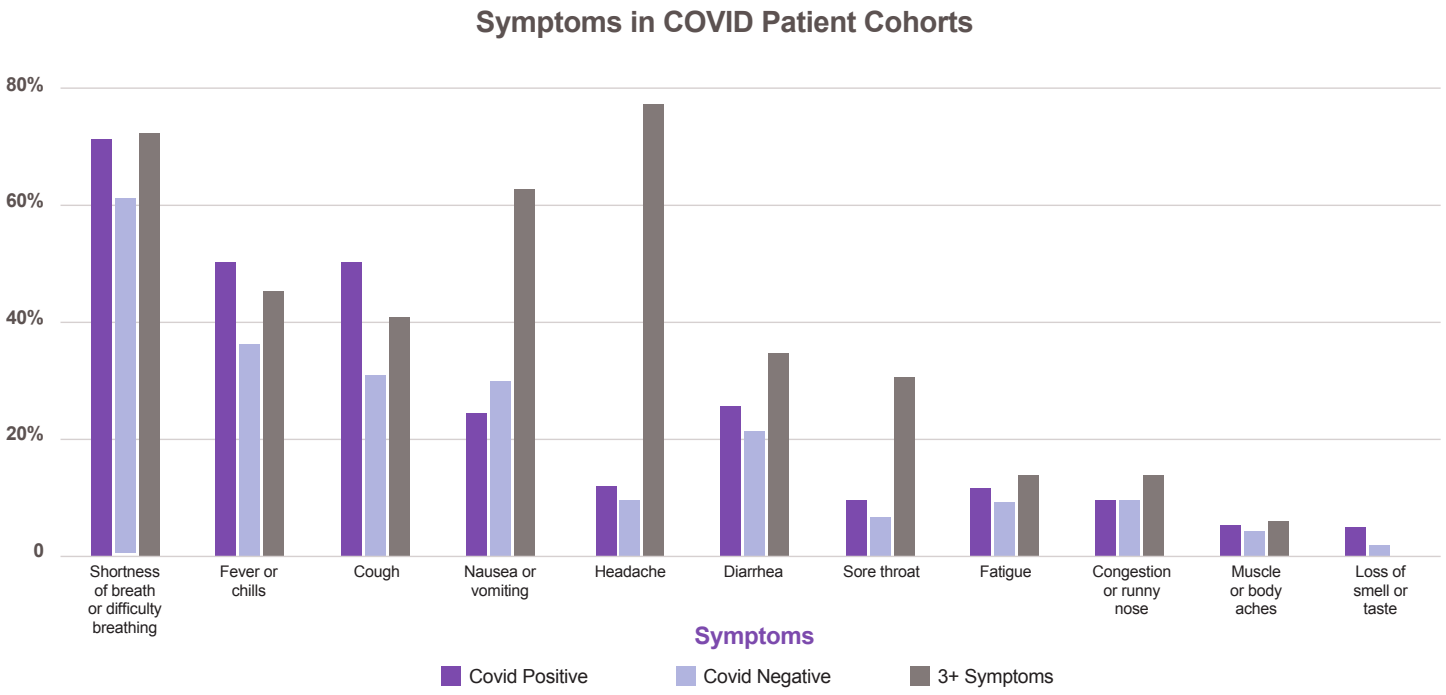

Figure 2: Symptoms patient cohorts. Percentages refer to the proportions of patients in the COVID-19 positive, COVID-19 negative, and 3+ Symptom cohorts.

The distribution of symptoms in the 2 patient cohorts that were tested for COVID-19 is similar, with shortness of breath being the most common symptom in both groups. Conversely, the distribution of symptoms in the 3+ symptom cohort shows a higher prevalence of headache, nausea or vomiting, diarrhea, and sore throat than in the 2 COVID-19-tested groups. The most prevalent symptoms in the 3+ symptom group substantially overlap with the most common presenting symptoms in primary care, which include cough, back pain, abdominal symptoms, pharyngitis, dermatitis, fever, headache, leg symptoms, unspecified respiratory concerns, and fatigue.[10]

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Surprisingly, the loss of smell or taste was only rarely documented in this dataset even in COVID-19 positive patients. However, the symptom has been described as highly suggestive of COVID-19.[11] In a study of 1,480 patients with influenza-like symptoms who underwent COVID-19 testing, smell and taste loss were reported in 68% and 71% of COVID-19 positive patients, respectively, compared to 16% and 17% of COVID-19 negative patients ($p < 0.001$).[11] Smell and taste impairment were independently and strongly associated with COVID-19 positivity (anosmia: adjusted odds ratio [aOR] 10.9; 95% CI, 5.08-23.5; ageusia: aOR 10.2; 95% CI, 4.74-22.1). In the same study, sore throat was negatively associated with COVID-19 (aOR 0.23; 95% CI, 0.11-0.50).[11] This negative association between sore throat and COVID-19 parallels our own finding that sore throat is one of the most frequent symptoms in the 3+ symptom cohort. The fact that loss of smell or taste was only rarely documented in the transcription records suggests that assessment of the status of olfactory and gustatory perception has not become a routine part of the clinical workup of patients with possible COVID-19.

Finally, Figure 2 shows a higher overall symptom burden in the 3+ symptom cohort as compared to the 2 COVID-19-tested cohorts. This difference may have arisen because patients with few or no symptoms may have received a test for COVID-19, whereas patients in the 3+ symptom cohort had to have at least 3 symptoms suggestive of COVID-19 to be included in the study.

Incidence of Likely Risk Factors

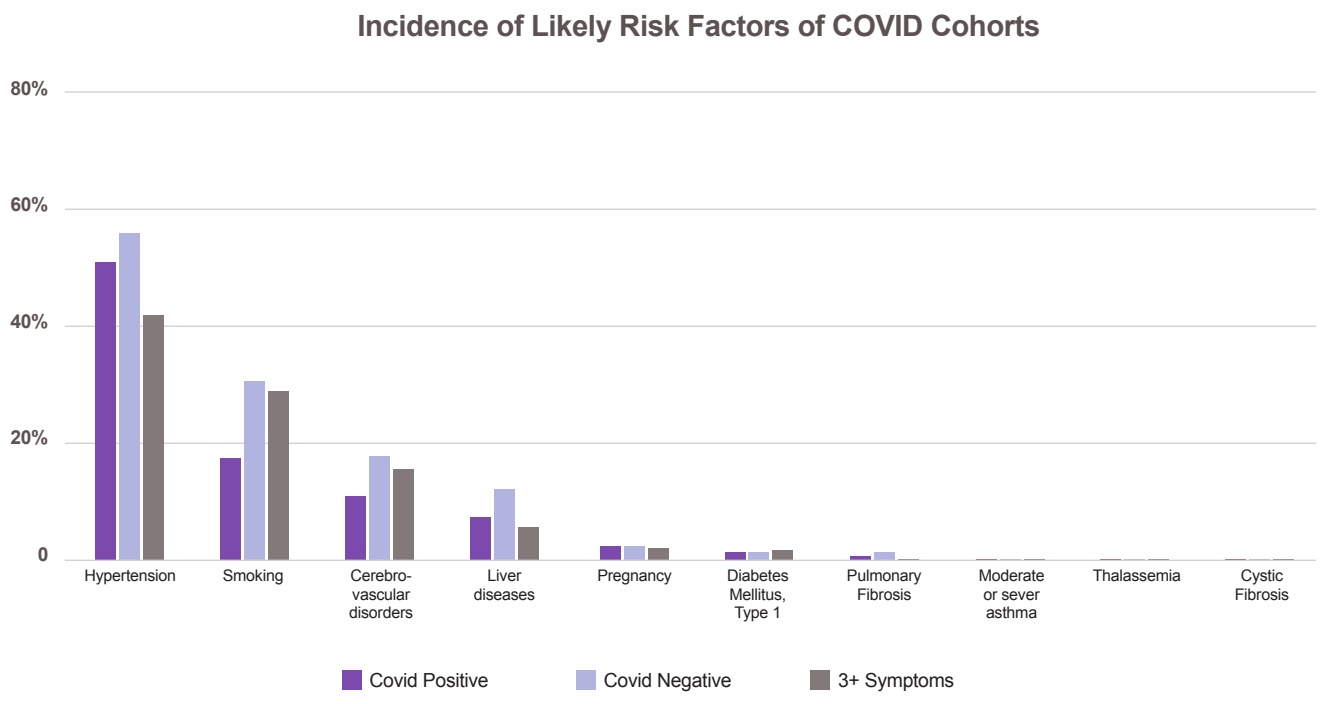

Figure 3: Distribution of likely risk factors for COVID-19 symptoms across the patient cohorts. Percentages refer to the proportions of patients in the COVID-19 positive, COVID-19 negative, and 3+ Symptom cohorts.

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Hypertension

In our dataset, hypertension was present in 49% of COVID-19 positive patients, nearly 57% of COVID-19 negative patients, as well as in 41% of 3+ symptom patients. While hypertension is documented as a comorbidity of COVID-19 in up to 23.7% of cases,[13] its prevalence in our dataset is much higher than previously described. One possible explanation for this discrepancy lies in healthcare utilization. Patients with hypertension may have underlying conditions that necessitate frequent visits, and the observed prevalence of hypertension in this study may be an artifact of that greater likelihood of medical encounters among patients with hypertension. The increased prevalence of COVID-19 positive patients in our dataset may also arise from the effects of antihypertensive therapy. The host receptor for SARS-CoV-2 cell entry is the angiotensin-converting enzyme 2 (ACE2) receptor. Antihypertension therapy with ACE inhibitors or angiotensin-receptor blockers may lead to an increased expression of the ACE2 receptor and leave patients more vulnerable to COVID-19.[14]

Smoking

In our dataset, 18% of COVID-19 positive patients, 31% of COVID-19 negative patients, and 28% of 3+ symptom patients smoked. While smoking is a known risk factor for COVID-19, a meta-analysis of 76,993 patients with COVID-19 estimated the prevalence of smoking history among COVID-19 positive patients at only 7.6%.[15] As discussed with hypertension above, smokers may have conditions that require more frequent healthcare visits and may be overrepresented in our database as a result.

Cerebrovascular Disorders

Cerebrovascular disorders were noted in the records of 12% of COVID-19 positive patients, 18% COVID-negative patients, and in 15% of 3+ symptom patients. Cerebrovascular disorders are documented as a comorbidity of COVID-19, occurring in up to 22% of cases, which is in line with our present findings.[13]

Liver Disease

Liver disease was present in 9% of COVID-19 positive patients, 13% COVID-negative patients, and in 7% of 3+ symptom patients. In a case series of 148 consecutive hospitalized patients with COVID-19 in Shanghai, abnormal liver function was documented in 37.2% of patients with COVID-19 in a case series in Shanghai.[16] Given that our study population was treated in a wide variety of care settings, including primary care and ambulatory settings, clinical differences between the populations may contribute to or explain the lower prevalence of abnormal liver function observed in our population.

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Incidence of Increased Risk Factors

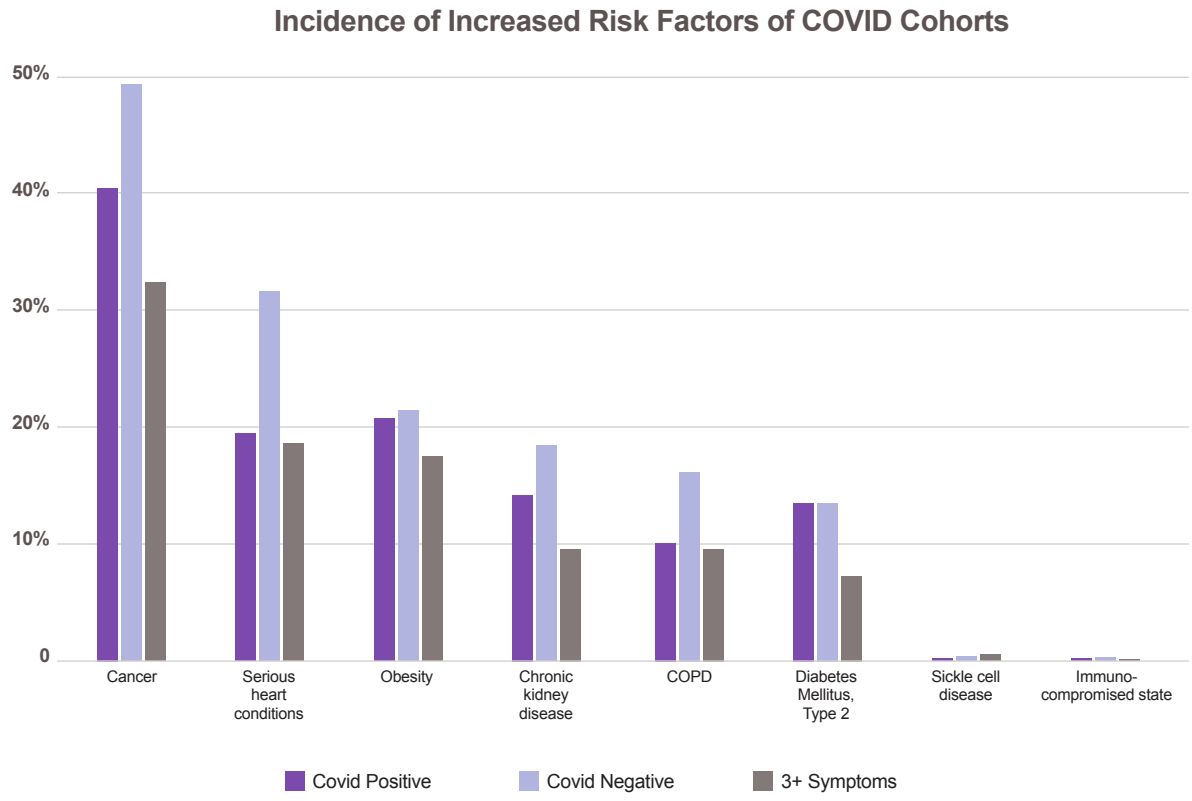

Figure 4: Distribution of increased risk factors for COVID-19 symptoms across the patient cohorts. Percentages refer to the proportions of patients in the COVID-19 positive, COVID-19 negative, and 3+ Symptom cohorts.

Cancer

Approximately 40% of COVID-19 positive patients, 50% of COVID-negative patients, and in 33% of 3+ symptom patients had cancer reported in their records, which is much higher than the 5.5% cancer prevalence in the US population overall.[17] The cancer prevalence in our dataset also far exceeds the previously reported 1.0% prevalence of cancer among people with COVID-19.18 Moreover, our processing algorithms may have identified patients with active cancer as well as those with a history of cancer. Thus, our definition of cancer is likely broader than that used in previous studies, which may also have contributed to the increased prevalence of cancer in our patient cohorts.

It has been suggested in the medical literature that people with cancer are at increased risk from COVID-19. First, cancer patients must seek treatment at healthcare facilities where there is an increased likelihood of being infected with COVID-19.[19] Second, cancer treatments themselves may leave patients immunocompromised and therefore more vulnerable to infection with COVID-19.[19] To enable the best possible outcomes for cancer patients during the COVID-19 pandemic, HCPs who care for patients with cancer must weigh the risks of deferring treatment against the possible benefits of protecting patients from infection.[19]

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Serious Heart Conditions

Serious heart conditions were documented in the records of 19.39% of COVID-19 positive patients, 32% of COVID-negative patients, and in 18% of 3+ symptom patients. Cardiovascular disease in patients with COVID-19 in this study appears to be more prevalent than reported in the medical literature. In a study of 191 patients from Wuhan, China, cardiovascular disease was present in 8% of patients diagnosed with COVID-19.[14] Since there are likely large clinical differences between the Chinese study and our study population, interpreting this discrepancy is difficult.

Cardiovascular disease may contribute to symptom clusters reminiscent of COVID-19. Therefore, CV patients may be more likely to be tested for COVID-19 and/or more likely to produce the 3+ symptom intersection. The literature suggests that cardiovascular conditions may arise as a consequence of COVID-19 infection, especially COVID-19-related acute myocardial injury and chronic damage to the cardiovascular system,[14], and the cardiovascular conditions documented for some of the patients in our study population may reflect these COVID-19-related complications.

Obesity

Obesity was documented in the records of 21% of COVID-19 positive patients, 22% of COVID-negative patients, and in 16% of 3+ symptom patients. The prevalence of obesity in our dataset is dramatically lower than the prevalence of obesity in the US general population which was 42.4% in 2017–2018.[20] The most likely reason for this discrepancy is that existing obesity is not documented by the HCPs during every patient encounter.

However, it is important to note that other studies have found associations between obesity and an increased risk of death from COVID-19, with the causal pathway appearing to be the association of obesity with key measures of respiratory function including decreased expiratory reserve volume, functional capacity, and respiratory system compliance. In patients with significant abdominal fat, pulmonary function is further compromised in supine patients by decreased diaphragmatic excursion, making ventilation more difficult.[21]

Chronic Kidney Disease

Chronic kidney disease (CKD) was documented for 14% of COVID-19 positive patients, 18% of COVID-negative patients, and in 9% of 3+ symptom patients. A meta-analysis of 76,993 patients with COVID-19 found a significant association of chronic kidney disease with severe COVID-19 infection.[22] Moreover, even without COVID-19, the pneumonia-related mortality rate in patients with chronic kidney disease appears to be 14–16 times higher than in the general population.[22]

This elevated mortality risk underscores the importance of comprehensive infection control procedures in healthcare facilities where patients with CKD receive their routine care.

Chronic Obstructive Pulmonary Disease (COPD)

COPD was documented for 10% of COVID-19 positive patients, 16% of COVID-negative patients, and in 9% of 3+ symptom patients. Previous research has reported a COPD prevalence of 2% of patients with COVID-19 overall and 9% in smokers with COPD.23 The literature also indicates that patients with COPD are at risk for more severe COVID-19 [RR, 1.88 (95% CI, 1.4–2.4)].[23] The prevalence of COPD in our dataset is several times higher than the previously reported values. However, since our study population is likely demographically and clinically different from those of other studies assessing risk factors for COVID-19, these differences must be interpreted with caution.

COPD can produce symptoms reminiscent of COVID-19 and thereby increase the likelihood of a patient being tested or producing the 3+ symptom intersection.

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Type 2 Diabetes Mellitus (T2DM)

T2DM was documented for 14% of COVID-19 positive patients, 14% of COVID-negative patients, and in 7% of 3+ symptom patients. The prevalence of T2DM in our study is similar to the 16.25% prevalence of T2DM reported previously in China.13 The of T2DM prevalence in our dataset is lower than the 33.8% prevalence seen in a case series of 5,700 hospitalized patients with COVID-19 in New York City.[24] It is important to note key differences in the underlying populations used in our study and that in the New York City case series. In particular, the New York City case series studied only hospitalized patients, while our study included patients from both inpatient and outpatient settings, and many of our patients may have had mild or asymptomatic COVID-19. It is also important to acknowledge that age is a risk factor for T2DM in the general population, so the age structure of these populations may also play a role in the observed patterns.

Patients with T2DM are at increased risk from infectious diseases generally, which may translate into an increased risk of infection with SARS-CoV-2.25 T2DM, especially poorly controlled T2DM has been associated with an increased risk of morbidity, complications, and death from COVID-19.[25,26]

Hypoxia OR Ventilator/Respirator

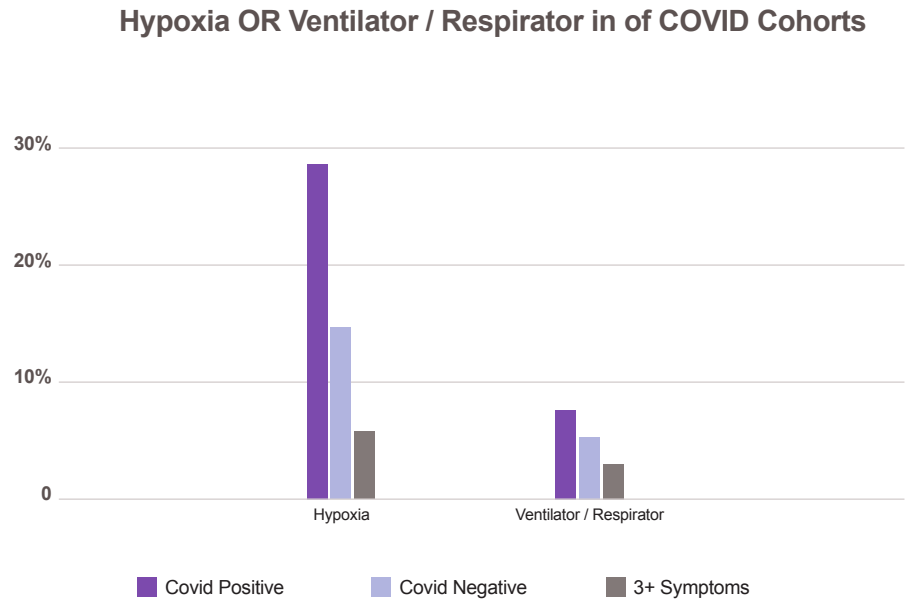

Figure 5: Distribution of hypoxia and ventilator or respirator use across the patient cohorts. Percentages refer to the proportions of patients in the COVID-19 positive, COVID-19 negative, and 3+ Symptom cohorts.

Hypoxia was documented for 29% of COVID-19 positive patients, 14% COVID-negative patients, and in 5% of 3+ symptom patients. Ventilator or respirator use was documented for 8% of COVID-19 positive patients, 5% of COVID-negative patients, and in 1% of 3+ symptom patients. Both hypoxia and ventilator/respirator use were most commonly documented for COVID-19 positive patients. Other conditions that may have induced hypoxia or required ventilator/respirator use by patients in our dataset are severe exacerbations of COPD or asthma.

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Treatments

*Dexamethasone OR Methylprednisolone OR Prednisone

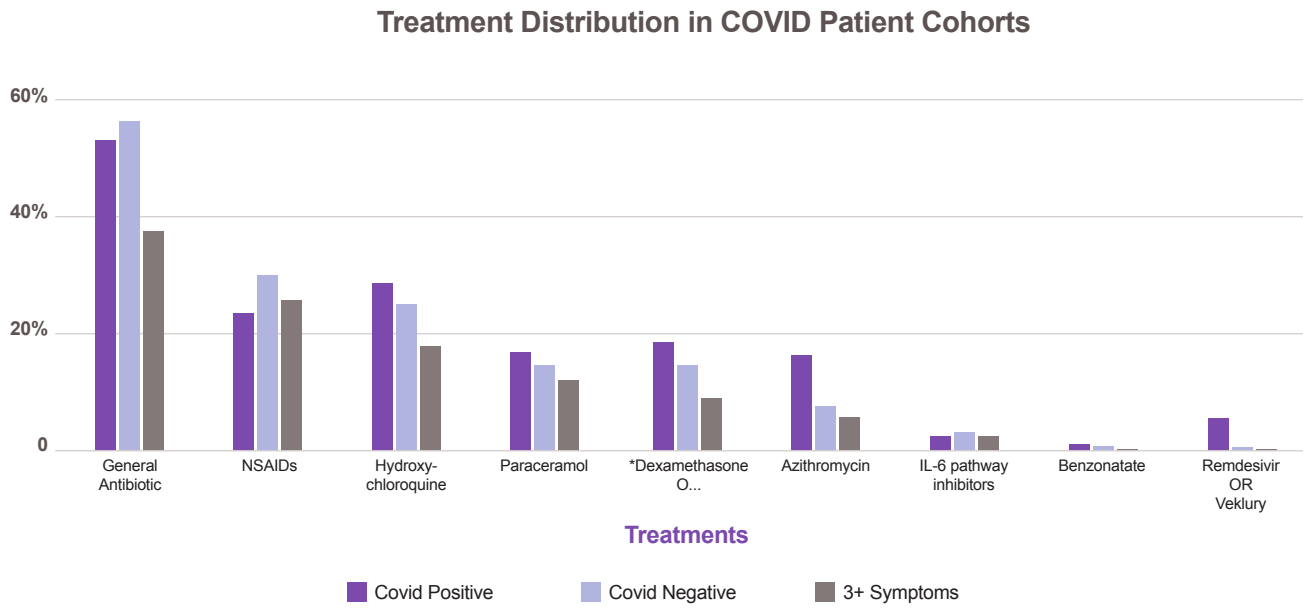

Figure 6: Distribution pharmacological across the patient cohorts. Percentages refer to the proportions of patients in the COVID-19 positive, COVID-19 negative, and 3+ Symptom cohorts.

Generic Antibiotic

The use of generic antibiotics was documented for 53% of COVID-19 positive patients, 56% of COVID-negative patients, and in 36% of 3+ symptom patients. Given that generic antibiotics do not treat COVID-19, the widespread use of these agents in patients who were tested for COVID-19 is surprising. The high prevalence of generic antibiotic use in the COVID-19 positive cohort suggests that antibiotic may be overused in this population, or possibly used during the period in which the patient's diagnosis is not yet definitive. Regardless, this finding suggests an opportunity to better educate physicians on appropriate treatment options for patients with COVID-19.

Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) and Paracetamol

The use of NSAIDs was documented for 21% of COVID-19 positive patients, 29% of COVID-negative patients, and in 24% of 3+ symptom patients. The use of paracetamol was documented in our dataset in 15% of COVID-19 positive patients, 13% of COVID-negative patients, and in 11% of 3+ symptom patients. Both NSAIDs and paracetamol are used for the symptomatic treatment of COVID-19 as well as for the treatment of underlying conditions. During the early phases of the pandemic, concerns were raised about the safety of NSAIDs for the treatment of COVID-19. It is therefore surprising to see that in patients with COVID-19, NSAIDs were prescribed more frequently than paracetamol. However, a population-based study using Danish administrative and health registries compared the safety of NSAIDs and paracetamol and found that the use of NSAIDs was not associated with 30-day mortality, hospitalization, ICU admission, mechanical ventilation, or renal replacement therapy in Danish individuals who tested positive for COVID-19.[27]

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Hydroxychloroquine and Azithromycin

The use of hydroxychloroquine was documented for 29% of COVID-19 positive patients, 24% of COVID-negative patients, and in 17% of 3+ symptom patients. The use of azithromycin was documented for 16% of COVID-19 positive patients, 8% of COVID-negative patients, and in 5% of 3+ symptom patients. Azithromycin was usually prescribed in combination with hydroxychloroquine. The analysis interval for this dataset spans the period during which the FDA emergency use authorization for the use of hydroxychloroquine and chloroquine to treat COVID-19 in certain hospitalized patients was in force. It is, therefore, possible that the hydroxychloroquine and azithromycin prescriptions for COVID-19 positive patients documented here were made due to the emergency use authorization. However, the emergency use authorization for hydroxychloroquine does not explain the prescribing of hydroxychloroquine or hydroxychloroquine + azithromycin to COVID-negative patients or 3+ symptom patients.

The emergency use authorization for hydroxychloroquine for the treatment of COVID-19 has since been revoked due to the risk of QT interval prolongation and the Infectious Diseases Society of America has issued guidelines recommending against the use of hydroxychloroquine or hydroxychloroquine + azithromycin for the treatment of COVID-19.[28]

Dexamethasone, Methylprednisolone, or Prednisone

The use of dexamethasone, methylprednisolone, or prednisone was documented for 18% of COVID-19 positive patients, 12% of COVID-negative patients, and in 9% of 3+ symptom patients. The Infectious Disease Society of America Guideline for the management of COVID-19 recommends the use of glucocorticoids for the treatment of severe COVID-19, but against the use of these agents in cases of COVID-19 without hypoxia.[28] We document hypoxia in 29% of COVID-19 positive patients, which suggests that dexamethasone was prescribed for a subset of eligible patients.

Other uses of glucocorticoids include the treatment of COPD exacerbations, which may account for the prescribing to COVID-19 negative patients and those with 3+ symptoms.

IL-6 Pathway Inhibitors

The use of IL-6 pathway inhibitors is documented for 2% of COVID-19 positive patients, 2% of COVID-negative patients, and in 1% of 3+ symptom patients. The IL-6 receptor blockers tocilizumab and sarilumab, and the direct IL-6 inhibitor siltuximab have been evaluated in randomized trials for the treatment of COVID-19. Trial results are available from press releases only. In our dataset, these agents were rarely used.

Remdesivir

The use of remdesivir is documented for 5.38% of COVID-19 positive patients, 0.15% of COVID-negative patients, and in 0.00% of 3+ symptom patients. The Infectious Disease Society of America Guideline for the management of COVID-19 recommends remdesivir over no antiviral treatment for hospitalized patients with severe COVID-19.28 In our dataset, prescribing of remdesivir was very rare and limited to COVID-19 positive patients.

In the US, remdesivir is priced between $2,340 and $3,120 per 5-day treatment course, and supply is limited due to the limited production capacity and global demand during the COVID-19 pandemic.[29] The FDA issued an emergency use authorization for COVID-19 treatment with remdesivir on May 1, 2020.[30] The combination of high price, limited availability, and an approval date during our study interval may all have contributed to the low use of remdesivir we documented here.

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