Executive Summary

COVID-19 Patient Insights

- In the United States, Pennsylvania saw a 36% increase in COVID cases reported. Connecticut has now replaced Texas in the list of top 10 states with highest confirmed number of cases.
- 66% of diagnosed patients are > 50 years old.
- The most common chronic co-morbidities observed in the COVID-19 patient population are hypertension, hyperlipidemia and Type 2 Diabetes.
- Acute respiratory failure with hypoxia, cough, fever, shortness of breath, acute kidney failure, hypoxemia, sepsis and ARDS are the most common acute conditions that accompany a COVID-19 diagnosis.

COVID-19 Treatment Candidates

- Azithromycin is currently the top drug used by respiratory patients that have been exposed to COVID-19. Shortages are expected as a result of heavy use in COVID-19 patients.
- There are six drugs classified as Blockers and cytokine storm management medications being evaluated as treatments.
- Anti-viral drug Remdesivir is the treatment candidate farthest along in clinical trials (this drug is primarily distributed via the compassionate use program).
- Research is beginning to evaluate if Januvia, an existing therapy for Type 2 Diabetes, will improve outcomes for COVID-19 patients with Type 2 Diabetes as a chronic co-morbidity.

Market Specific Insights

- As the number of COVID-19 cases continues to rise impacts on prescription trends for vulnerable patient populations are starting to emerge:
  - Diabetes therapy volumes are up slightly with week ending 4/17/2020, driven by male & female patients ages 40-59.
  - Anti-Obesity prescriptions are starting to increase after weeks of decline, especially among women & men ages 18-59, however are still trending below normal thresholds.
- We investigated the impact social distancing may have on Mental health in this week’s report and have found overall trends with psychotherapeutics show minimal change across males & females for ages 18+.
- For the 4th straight week, “Elective Therapies” have dropped compared to the same week in 2019. Products within the Ophthalmic Preparations USC class saw the most significant impact with a 28% decline.

See next page
Executive Summary (Pg 2)

General Rx Market Trends

- Retail activity is down -0.7% from week ending 4/10/2020, dropping further below 2019 thresholds. Mail Order dropped an additional -5.1% with week ending 4/17/2020, bringing current trends within normal reporting thresholds.
- Prescriptions paid for out-of-pocket or with an assistance program increased by an average of 2-3% compared to the prior year.
- Patient abandonment rates for cash only prescriptions are also on the decline, a potential consequence of lost coverage due to rising unemployment. Further analysis underway on state level trends based on unemployment volume.
- On average patient in all markets are refilling their prescriptions sooner. For medically administered products the average time between infusions declined in all market except diabetes.
- Trend line shifts in average days supply coincide with timing of “shelter in place” announcements across most states with Immunology and Oncology up approximately 3% over pre-COVID-19 levels.

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- Latest COVID-19 Events: Slide 5-7
- COVID-19 Patient Cohort Analysis: Slides 9-11
- COVID-19 Potential Treatment Candidate: Slides 13-18
  - Mental Health Impact from Social Distancing: Slide 25-26
  - Elective Therapies: Slide 27
- General Rx Market Health Checks: Slide 29-33
Latest COVID-19 Events
COVID-19 Weekly Trend Insights
Week Ending April 17, 2020

Timeline: Latest COVID-19 Developments

April 15th
Operation Gridlock: Thousands of protestors swarmed the Michigan state capitol to protest Governor Gretchen Whitmer’s 'stay-at-home' orders

April 20th
Georgia Governor Brian Kemp announces plans to restart shuttered businesses for limited operations, ahead of the stay at home order through April 30th and as early as Friday, April 24th.

April 12th - 13th
Storms/Tornadoes in the South (AL, GA, LA, MS declared state of emergency)
As of Tuesday 4/13, 560,000 people in 16 states lost power due to storm damage.

April 17th
Florida Governor Ron DeSantis announces beaches are able to open while the Coronavirus confirmed cases surpassed 25,000.

April 23rd
26.4 million Americans have filed for unemployment in the past five weeks - over 15% of the US workforce.

Sources:
https://apnews.com/0cd7680bd2d21944ed95f86e91bb3537
COVID-19 INSIGHTS

Confirmed Cases Worldwide

- Since last week’s COVID-19 insight report, Global cases have increased by over 561,319 cases or approximately 26%.
- Over 653,181 cases have been noted as recovered, increasing by over 168,159 cases or nearly 35% since last week’s COVID-19 insights report.

Confirmed Cases

2,729,274

Deaths

191,613

Recovered

653,181

Source: https://www.theguardian.com/world/2020/apr/01/coronavirus-world-map-countries-most-cases-and-deaths
COVID-19 INSIGHTS

Confirmed Cases in the USA

- Confirmed cases of COVID-19 increased by over 197,700 from April 17th, 2020 to April 24th, 2020, representing an increase of roughly 29%.

- Texas is no longer on the Top 10 list for confirmed cases (replaced by Connecticut).

- Since last week’s Insights, Pennsylvania has garnered over 10,000 new cases representing a 36% increase.

<table>
<thead>
<tr>
<th>State/Territory</th>
<th>Confirmed Cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>263,460</td>
<td>20,982</td>
</tr>
<tr>
<td>New Jersey</td>
<td>100,025</td>
<td>5,426</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>46,023</td>
<td>2,360</td>
</tr>
<tr>
<td>California</td>
<td>39,561</td>
<td>1,533</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>38,379</td>
<td>1,724</td>
</tr>
<tr>
<td>Illinois</td>
<td>36,937</td>
<td>1,688</td>
</tr>
<tr>
<td>Michigan</td>
<td>35,296</td>
<td>2,977</td>
</tr>
<tr>
<td>Florida</td>
<td>29,648</td>
<td>987</td>
</tr>
<tr>
<td>Louisiana</td>
<td>25,739</td>
<td>1,599</td>
</tr>
<tr>
<td>Connecticut</td>
<td>23,100</td>
<td>1,639</td>
</tr>
</tbody>
</table>

Trends Among COVID-19 Patient Cohorts
PRA U.S. Patient RWD - COVID-19 Infection Trends

- Through patient activity observed for diagnosis, testing, exposure or symptoms of COVID-19 infection, PRA is tracking approximately 440,650 patients during the time period Feb 4, 2020 to Apr 15, 2020.
- CDC and CMS published guidance is used to classify patients as diagnosed, tested, exposed, symptomatic and exposed or tested.
- Amongst the Covid-19 diagnosed patients
  - 66% of the diagnosed patients are > 50 years old.
  - 52% of cases are diagnosed by Primary Care physicians (IM/FM)

Caveats: Due to expected lag in claim submissions to payers, trends for metrics such as patient volumes by all demographic and other attributes are expected to change on a rolling 8 to 10 weeks period. Data is updated weekly to report on latest updates for trends observed.
Diagnosis Distribution of Patients with the COVID-19 Infection

- Hypertension, hyperlipidemia and Type 2 Diabetes were the most common chronic comorbidities observed in patients diagnosed with COVID-19 infections.
- Acute respiratory failure with hypoxia, cough, fever, shortness of breath, acute kidney failure, hypoxemia, sepsis and ARDS are the most common Acute conditions that accompany a COVID-19 diagnosis.

**Chronic - Up to 1 year before Cov-19 diagnosis**

- N = 48,930 patients
- Hypertension: 43%
- Hyperlipidemia: 30%
- Diabetes Mellitus - Type II: 27%
- Obesity: 17%
- Anemia: 15%
- GERD: 15%
- Osteoarthritis: 12%
- CAD: 11%
- Chronic Kidney Disease (CKD): 10%

**Acute - Dx captured up to 1 month before or after first Cov-19 diagnosis date**

- N = 47,208 patients
- Other Viral Pneumonia: 40%
- Acute Respiratory Failure with Hypoxia: 27%
- Cough: 26%
- Fever, Unspecified: 25%
- Shortness of Breath: 23%
- Pneumonia, Unspecified Organism: 22%
- Acute Kidney Failure, Unspecified: 14%
- Hypoxemia: 11%
- Sepsis, Unspecified Organism: 11%
- Unspecified Acute Lower Respiratory Infection: 10%
- Acute Upper Respiratory Distress Syndrome: 9%
- Hypo-osmolality and Dehydration: 7%
- Dyspnea, Unspecified: 6%
- Diarrhea, Unspecified: 5%
- Severe Acute Respiratory Distress Syndrome: 5%

**Acute - Dx captured the same day as first Cov-19 diagnosis date**

- N = 47,208 patients
- Other Viral Pneumonia: 32%
- Acute Respiratory Failure with Hypoxia: 19%
- Shortness of Breath: 12%
- Cough: 11%
- Fever, Unspecified: 11%
- Sepsis, Unspecified Organism: 10%
- Unspecified Acute Lower Respiratory Infection: 8%
- Hypoxemia: 7%
- Diarrhea, Unspecified: 6%
- Severe Acute Respiratory Distress Syndrome: 6%

Data Period for Diagnosed Patients - Feb 4th, 2020 to Apr 15th, 2020, Updated Apr 22nd, 2020
Caveats: Due to expected lag in claim submission to payers, trends for metrics such as patient volumes by all demographic and other attributes are expected to change on a rolling 8 to 10 weeks period.
Drug utilization varies for respiratory disease patients depending on whether a patient is exposed to or confirmed to have COVID-19. The top drugs prescribed to these patient cohorts are not necessarily specific to their COVID-19 treatment.

- Azithromycin is currently the top drug used by respiratory patients that have been exposed to COVID-19.
- Concomitant use of Azithromycin & Hydroxychloroquine are top treatments for respiratory disease patients with confirmed COVID-19 cases.

PATIENT COHORT DETAIL

- The charts list top drugs that COVID-19 patients take (drugs may not be COVID-19 specific)
- The patient cohort for these analyses include those diagnosed with COVID-19 exposure or confirmed cases who also have a respiratory disease listed on the same claim (bronchitis, ARDS, pneumonia, or lower respiratory infection).
- The CDC provided the diagnosis codes used to identify COVID-19 exposed and confirmed cases.

New York has the highest number of COVID-19 exposed patients followed by New Jersey.

Confirmed COVID-19 patients has increased in New York followed by New Jersey, Michigan and Pennsylvania.
COVID-19 Current & Potential Treatment Candidates
Disclaimer: COVID-19 Current & Potential Treatment Candidates

The following slides detail top therapies COVID-19 patients are currently utilizing along with off-label candidates.

**Current Treatments**

There are currently no FDA-approved treatments for COVID-19.

For now, the treatment for patients with mild symptoms is to self-isolate at home.

Patients who are hospitalized receive supportive care (such as oxygen), enroll in clinical trials, and are given medications off-label based on hospital guidelines and their doctors’ clinical judgment.

Source: [https://www.goodrx.com/blog/coronavirus-treatments-on-the-way/](https://www.goodrx.com/blog/coronavirus-treatments-on-the-way/)

**COVID-19 Treatment Progress**

The FDA recently created a new emergency program, Coronavirus Treatment Acceleration Program (CTAP), aimed at speeding up research for the development of COVID-19 treatments.

Researchers are testing older medications typically used to treat other conditions to see if they are also effective in treating COVID-19.

The drug that’s furthest along in clinical trials for treating COVID-19 is Gilead’s Remdesivir, a new antiviral.

Source: [https://www.goodrx.com/blog/coronavirus-treatments-on-the-way/](https://www.goodrx.com/blog/coronavirus-treatments-on-the-way/)
CURRENT DRUGS IN USE: POPULAR AMONG COVID-19 EXPOSED OR CONFIRMED PATIENTS WITH A RESPIRATORY DISEASE COMORBIDITY

<table>
<thead>
<tr>
<th>DRUG NAME</th>
<th>BRAND / GENERIC</th>
<th>MARKET / INDICATION</th>
<th>USES FOR COVID-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALBUTEROL SULFATE HFA</td>
<td>G</td>
<td>ASTHMA &amp; COPD</td>
<td>Albuterol is used to prevent and treat difficulty breathing, wheezing, shortness of breath, coughing, and chest tightness caused by lung diseases such as asthma and chronic obstructive pulmonary disease (COPD).</td>
</tr>
<tr>
<td>AZITHROMYCIN</td>
<td>G</td>
<td>BRONCHITIS &amp; PNEUMONIA</td>
<td>Azithromycin (Z-pak) is an antibiotic commonly used to treat bacterial infections such as bronchitis and pneumonia. Azithromycin has been shown to have some in vitro activity against viruses like influenza A and Zika, but did not work against the coronavirus that causes MERS. One research group looked at azithromycin in combination with hydroxychloroquine for COVID-19. They reported that 93% of patients cleared the virus after 8 days, but there was no control group to prove whether patients would have cleared the virus without medications.</td>
</tr>
<tr>
<td>BENZONATATE</td>
<td>G</td>
<td>NON-NARCOTIC COUGH MEDICINE</td>
<td>Benzonatate works by numbing the throat and lungs, making the cough reflex less active.</td>
</tr>
<tr>
<td>PREDNISONE</td>
<td>G</td>
<td>ANTI-INFLAMMATORY OR IMMUNOSUPPRESSANT</td>
<td>Prednisone is a corticosteroid.</td>
</tr>
</tbody>
</table>

• Azithromycin shortages are expected as a result of heavy use in COVID-19 patients.
• There are concerns about potentially serious side effects when using azithromycin and hydroxychloroquine together.

Sources: https://www.goodrx.com/blog/coronavirus-treatments-on-the-way/

• Only Albuterol Sulfate HFA is reporting TRx Units above normal thresholds with week ending 4/17/2020.
• Continuing declines in other popular therapies may be additional indications of shortages.
On April 7th, the CDC removed Hydroxychloroquine as a recommended therapy for COVID-19. Although still trending higher than baseline volumes, Hydroxychloroquine may continue to decline in successive weeks.

Sources:
- https://www.goodrx.com/blog/coronavirus-treatments-on-the-way/
- Can a popular class of diabetes drugs that includes Merck’s Januvia help treat COVID-19?

### CURRENT DRUGS IN USE:
**POPULAR AMONG COVID-19 EXPOSED OR CONFIRMED PATIENTS WITH A RESPIRATORY DISEASE COMORBIDITY**

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<tbody>
<tr>
<td>CHLOROQUINE PHOSPHATE</td>
<td>MULTIPLE</td>
<td>G</td>
<td>MALARIA &amp; AUTOIMMUNE CONDITIONS (RHEUMATOID ARTHRITIS &amp; LUPUS)</td>
<td>A few small studies suggest these therapies may also be helpful for treating hospitalized patients with mild cases of COVID-19, while other studies showed that hydroxychloroquine did not make a difference.</td>
<td>419</td>
<td>508</td>
<td>-17%</td>
<td>3,198</td>
<td>3/20/2020</td>
</tr>
<tr>
<td>HYDROXYCHLOROQUINE SULFATE</td>
<td>MULTIPLE</td>
<td>G</td>
<td></td>
<td>(April 20, 2020) Debate about whether the chloroquine family of antimalarial meds work in COVID-19 has dragged on since President Donald Trump publicly touted its use without definite proof. Now, to gather evidence, Novartis is launching a phase 3 clinical trial, planning to enroll about 440 hospitalized patients starting in the next few weeks.</td>
<td>143,798</td>
<td>103,333</td>
<td>39%</td>
<td>278,840</td>
<td>3/20/2020</td>
</tr>
</tbody>
</table>

The U.S. Food and Drug Administration has not approved hydroxychloroquine as a COVID-19 treatment, but it has provided an emergency use authorization for the anti-malaria drug.

- **HYDROXYCHLOROQUINE UPDATE 4-22-2020:**
  - “A U.S. Department of Veterans Affairs (VA) study found that severe COVID-19 patients treated with antimalarial hydroxychloroquine alone or in combination with antibiotic azithromycin showed "no evidence" of reduced risk of death or mechanical ventilation over supportive care.
  - Meanwhile, patients treated with hydroxychloroquine alone showed a significantly higher risk of all-cause mortality over either supportive care or a combination of hydroxychloroquine and azithromycin.”

(4/22/2020) Source: Hydroxychloroquine takes another hit in failed small-scale COVID-19 study
### POTENTIAL COVID-19 CANDIDATES:
#### IL-6 BLOCKERS & CYTOKINE STORM MANAGEMENT

- The candidates below work by blocking interleukin-6 (IL-6), a protein involved in our natural immune responses.
- IL-6 normally signals other cells to activate the immune system, but too much activation can cause issues.
- One serious issue that can arise from an overactive immune system (a particular risk with COVID-19 patients) is a cytokine storm, a potentially fatal problem in which the immune system goes haywire and inflammation gets out of control.

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<tbody>
<tr>
<td>ACTEMRA / ACTEMRA ACTPEN</td>
<td>GENENTECH / ROCHE</td>
<td>B</td>
<td>RHEUMATOID ARTHRITIS (RA)</td>
<td>With COVID-19, people can be at risk of cytokine storms as their bodies continue to ramp up their immune system to fight off the infection. By blocking IL-6, Actemra helps to calm down the immune system and is believed to also help with managing cytokine storms.</td>
<td>2,312</td>
<td>2,026</td>
<td>14%</td>
<td>2,381</td>
<td>4/10/2020</td>
</tr>
<tr>
<td>CALQUENCE</td>
<td>ASTRAZENECA</td>
<td>B</td>
<td>CHEMOTHERAPY</td>
<td>Used to treat adults with mantle cell lymphoma (MCL)</td>
<td>As the body’s immune system fights the coronavirus, the reaction can spin out of control in a phenomenon known as cytokine storm, which can cause serious lung damage. Previous studies suggest that BTK, the oncogenic protein Calquence targets, is also a key regulator of the production of multiple inflammatory molecules in the lung. Therefore, BTK inhibition could theoretically reduce the release of these cytokines and dampen an excessive immune response.</td>
<td>389</td>
<td>292</td>
<td>33%</td>
<td>428</td>
</tr>
<tr>
<td>JAKAFI</td>
<td>INCYTE</td>
<td>B</td>
<td>CHEMOTHERAPY</td>
<td>Used to treat adults with polycythemia vera</td>
<td>[April 3, 2020] Novartis and Incyte will initiate a phase 3 clinical trial for Jakafi to test it as a treatment for cytokine storm, an immune overreaction that causes respiratory complications in severe COVID-19 patients.</td>
<td>513</td>
<td>571</td>
<td>-10%</td>
<td>621</td>
</tr>
<tr>
<td>KEVZARA</td>
<td>AVENTIS</td>
<td>B</td>
<td>RHEUMATOID ARTHRITIS (RA)</td>
<td>[April 9, 2020] The drug is one of a group of IL-6 inhibitors being evaluated to treat COVID-19.</td>
<td>755</td>
<td>678</td>
<td>11%</td>
<td>810</td>
<td>3/20/2020</td>
</tr>
<tr>
<td>OLUMIANT</td>
<td>Lilly</td>
<td>B</td>
<td>RHEUMATOID ARTHRITIS (RA)</td>
<td>[April 13, 2020] Olumiant’s “anti-inflammatory activity” might hold a benefit for patients hospitalized with COVID-19, Lilly said in a statement. The project started in February when BenevolentAI, a U.K. artificial intelligence group, identified Lilly’s baricitinib as a possible COVID-19 treatment not only for its anti-inflammatory effects, but also an antiviral effect.</td>
<td>414</td>
<td>314</td>
<td>32%</td>
<td>414</td>
<td>4/17/2020</td>
</tr>
<tr>
<td>XELJANZ / XELJANZ XR</td>
<td>Pfizer</td>
<td>B</td>
<td>RHEUMATOID ARTHRITIS (RA)</td>
<td>Used to treat adults with psoriatic arthritis, ulcerative colitis</td>
<td>[April 9, 2020] Pfizer is exploring whether rheumatoid arthritis drug Xeljanz might be able to help COVID-19 patients.</td>
<td>9,002</td>
<td>7,950</td>
<td>13%</td>
<td>9,002</td>
</tr>
</tbody>
</table>

Sources:
- https://www.goodrx.com/blog/coronavirus-treatments-on-the-way/
- AstraZeneca to test blood cancer drug Calquence in COVID-19 after NIH sees ‘some clinical benefit’
- Novartis, Incyte set to roll JAK inhibitor Jakafi into COVID-19 clinical trial
- Biopharma roundup: Sanofi, Regeneron push Kevzara commercial rework; U.S bans export of key medical supplies
- Lilly partners with NIH to test Olumiant in patients hospitalized with COVID-19
- Coronavirus tracker: Pfizer to test Xeljanz in COVID-19; Gottlieb regrets stepping down from FDA

Confidential 16
### POTENTIAL COVID-19 CANDIDATES: ANTIVIRALS

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</tr>
</thead>
<tbody>
<tr>
<td>IVERMECTIN</td>
<td>MULTIPLE</td>
<td>G</td>
<td>ANTIPARASITIC (HEAD LICE)</td>
<td>[April 15, 2020] A recent in vitro study found that ivermectin has an antiviral action against the SARS-CoV-2 clinical isolate, with a single dose able to control viral replication within 24-48 hours in our system. More research is needed to see if the doses studied would be safe and effective against the virus in humans.</td>
<td>6,119</td>
<td>6,467</td>
<td>-5%</td>
<td>7,297</td>
<td>3/6/2020</td>
</tr>
<tr>
<td>KALETRA</td>
<td>ABBVIE</td>
<td>B</td>
<td>HIV ANTIVIRAL COMBINATIONS</td>
<td>Kaletra is an HIV medication containing a combination of two antivirals - lopinavir and ritonavir In vitro and clinical studies looking at patients who had previously received these antiviral agents suggest that they may have some activity against SARS and MERS (infections caused by other coronaviruses). Data for using Kaletra in COVID-19 is limited.</td>
<td>605</td>
<td>536</td>
<td>13%</td>
<td>1,078</td>
<td>3/20/2020</td>
</tr>
<tr>
<td>REMDESIVIR</td>
<td>GILEAD</td>
<td>B</td>
<td>ANTIVIRAL</td>
<td>Remdesivir is an antiviral that is given by intravenous (IV) infusion in the hospital Farthest along in clinical trials This is a brand-new drug that has not been approved for use on the market yet, and is being tested in carefully controlled environments. It was previously shown to have some effect against SARS, MERS, and Ebola in cell and animal models. In a recent in vitro study, remdesivir prevented human cells from being infected with SARS-CoV-2 (the virus that causes COVID-19). Because this was through a compassionate use program, limited data collected.</td>
<td>PRESCRIPTION ACTIVITY NOT AVAILABLE AS OF WEEK ENDING 4/17/2020</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RYANODEX</td>
<td>EAGLE PHARMA</td>
<td>B</td>
<td>MALIGNANT HYPERTHERMIA</td>
<td>[April 16, 2020] In a controlled laboratory test, Eagle Pharmaceuticals' malignant hyperthermia treatment Ryanodex (dantrolene sodium) inhibited the growth of SARS-CoV-2, the virus causing the COVID-19 pandemic.</td>
<td>PRESCRIPTION ACTIVITY NOT AVAILABLE AS OF WEEK ENDING 4/17/2020</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAMIFLU</td>
<td>GENENTECH / ROCHE</td>
<td>B</td>
<td>INFLUENZA (FLU) ANTIVIRALS</td>
<td>Results from a hospital in Wuhan, China were not promising. Of 138 hospitalized patients, 124 got Tamiflu along with other medications. By the end of the study, 85 patients (62%) were still hospitalized and 6 had died. Nonetheless, several clinical trials are currently looking at Tamiflu in combination with other medications for coronavirus.</td>
<td>89</td>
<td>9,372</td>
<td>-99%</td>
<td>13,126</td>
<td>2/7/2020</td>
</tr>
</tbody>
</table>

**High-Performers:**

- **Ivermectin**: While the majority of non-essential drugs declined week ending 4/10/2020, Ivermectin scripts spiked among patients age 40-59.
- **Remdesivir**: Farthest along in clinical trials (drug primarily distributed via compassionate use program)

Sources:
- [https://www.goodrx.com/blog/coronavirus-treatments-on-the-way/](https://www.goodrx.com/blog/coronavirus-treatments-on-the-way/)
THE DPP-4 ENZYME AS A POTENTIAL TARGET

The DPP-4 enzyme represents a potential target that deserves further analysis for its role in COVID-19 respiratory disease. Several DPP-4 inhibitors are already on the market, including Januvia, which can be tested in clinical trials for their ability to lower inflammation in COVID-19 patients with Type 2 diabetes, a group that’s disproportionately suffering from severe disease [April 15, 2020].

**JANUVIA**

**MANUFACTURER**: MERCK & CO

**BRAND / GENERIC**: B

**MARKET / INDICATION**: TYPE 2 DIABETES

**USES FOR COVID-19**: The DPP-4 enzyme represents a potential target that deserves further analysis for its role in COVID-19 respiratory disease. Several DPP-4 inhibitors are already on the market, including Januvia, which can be tested in clinical trials for their ability to lower inflammation in COVID-19 patients with Type 2 diabetes, a group that’s disproportionately suffering from severe disease [April 15, 2020].

**WEEK ENDING 4/17/2020**: 159,451

**AVERAGE 8 WEEK BASELINE 1/3/2020 - 2/21/2020**: 160,683

**CURRENT WEEK DIFFERENCE FROM BASELINE**: -1%

**MAX TRX UNITS IN 2020**: 180,145

**MAX DATE**: 3/20/2020

**UPDATE 4-23-2020: A NEW DIABETES DRUG CANDIDATE**

- "AstraZeneca has launched a phase 3 trial evaluating Farxiga [a Type 2 Diabetes medication] as a treatment for severe COVID-19 patients with cardiovascular, metabolic or kidney risk factors that increase the probability of severe complications, including organ failure."

Source: AstraZeneca’s fast-rising diabetes med Farxiga jumps into the COVID-19 fray

**POTENTIAL COVID-19 CANDIDATES: DIABETES THERAPIES**

Existing therapies for Type 2 Diabetes, specifically Merck’s Januvia, may show promise in improving outcomes for COVID-19 patients with Type 2 Diabetes comorbidities.

- **JANUVIA**: MERCK & CO

**BRAND / GENERIC**: B

**MARKET / INDICATION**: TYPE 2 DIABETES

**USES FOR COVID-19**: The DPP-4 enzyme represents a potential target that deserves further analysis for its role in COVID-19 respiratory disease. Several DPP-4 inhibitors are already on the market, including Januvia, which can be tested in clinical trials for their ability to lower inflammation in COVID-19 patients with Type 2 diabetes, a group that’s disproportionately suffering from severe disease [April 15, 2020].

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**MAX TRX UNITS IN 2020**: 180,145

**MAX DATE**: 3/20/2020

Although identified as a potential COVID-19 candidate for patients with Type 2 Diabetes, there have been no significant shifts in overall TRx activity as of 4/17/2020.

Source: https://www.goodrx.com/blog/coronavirus-treatments-on-the-way/

*Can a popular class of diabetes drugs that includes Merck’s Januvia help treat COVID-19?*
Market Insights:
High-Risk Patients - Diabetes & Obesity
Impact of Social Distancing - Psychotherapeutics
COVID-19 Market Insights

Vulnerable Patient Populations:
Focus: Diabetes & Obesity

Markets potentially impacted by extended social distancing:
Focus: Psychotherapeutics

- As the number COVID-19 cases in the U.S. continue to rise and social distancing efforts remain in effect for the majority of states, impacts to prescription trends differ depending on whether therapies are maintenance vs. lifestyle or "elective".

Source: CDC.GOV
Type 2 Diabetes has been identified by the CDC as a high-risk patient population. Patients with uncontrolled blood sugar levels are more likely to have diabetes-related health problems making it harder to overcome COVID-19.

- Diabetes therapy volumes are up slightly with week ending 4/17/2020, driven by male & female patients ages 40-59.

- The chart views are based on all prescriptions utilized by Type 1 and Type 2 Diabetes patients.
COVID-19 Market Insights

Vulnerable Patient Populations:
Focus: Diabetes

The use of Assistance Programs to pay for diabetes therapies increased by 2% compared to the prior year.

Diabetes Therapy: Pay Type Distribution

Payer rejection rates continue to average 7-8%, remaining consistent with historical trends.
Severe obesity increases the risk of acute respiratory distress syndrome (ARDS), which is a major complication of COVID-19 and can cause complications when physicians attempt to provide respiratory support for seriously ill patients [Source: CDC].

- Anti-Obesity prescriptions are starting to increase after weeks of decline, especially among women & men ages 18-59.
- Anti-Obesity drugs are still trending below normal thresholds as of week ending 4/17/2020.
While the use of Assistance Programs to cover Anti-Obesity drugs increased by 5% compared to the prior year, instances of patients paying out-of-pocket declined by 5%.
As social distancing efforts continue, overall trends with psychotherapeutics show minimal change across males & females for ages 18+. However, select drugs within the market show increases in prescription volume compared to a year ago.

- Females ages 18+ have higher psychotherapeutic prescription volumes than males, but a lower percentage of new prescription fills.
- Other than a minor decline in new script volume among both males and females, no major changes in reporting trends have occurred.

<table>
<thead>
<tr>
<th>DRUG NAME</th>
<th>CHANNEL</th>
<th>CURRENT WEEK</th>
<th>WEEK (PRIOR YEAR)</th>
<th>% CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUPROPION XL</td>
<td>MAIL ORDER</td>
<td>29,201</td>
<td>27,082</td>
<td>7.8%</td>
</tr>
<tr>
<td></td>
<td>RETAIL</td>
<td>480,877</td>
<td>446,900</td>
<td>7.6%</td>
</tr>
</tbody>
</table>

Individual psychotherapeutics show upticks in retail & mail order activity compared to a year ago, particularly Bupropion (depression).

Bupropion also helps with smoking cessation which might be a contributor to its latest increase.

Source: https://americanaddictioncenters.org/addiction-medications/bupropion
Only younger patients show any significant decline in new prescription volumes across all psychotherapeutics (-4% for males and -5% for females as of 4/17/2020).

Males (Ages 0-17)

Higher psychotherapeutic volumes than females, including higher new fills.

Females (Ages 0-17)

Lower new and total script activity overall compared to males.
COVID-19 INSIGHTS
Decrease in Other Elective Therapies Continue

• For the 4th straight week, “Elective Therapies” have dropped compared to the same week in 2019.

• Products with the Ophthalmic Preparations USC class continue to garner the highest change in prescriptions, with a decrease of 28% in week 16 of 2020.
General Rx Market Health Checks:
Prescription Coverage Behaviors
Channel Distribution Trends
Prescriptions paid for out-of-pocket or with an assistance program increased by an average of 2-3% compared to the prior year. Patient abandonment rates for cash only prescriptions are also on the decline, a potential consequence of lost coverage due to rising unemployment.

Pay Type Distribution for Paid (Approved), Rejected, & Abandoned Claims
Current vs. Prior Year (All Claims)

4 WEEKS PRIOR YEAR

- **PAID** = Approved prescriptions taken home by the patient
- **REJECTED** = Prescription claims rejected by the payer
- **ABANDONED** = Prescription claims not taken home by the patient

CURRENT 4 WEEKS

- **PAID** = Approved prescriptions taken home by the patient
- **REJECTED** = Prescription claims rejected by the payer
- **ABANDONED** = Prescription claims not taken home by the patient
As ‘stay-at-home’ orders remain in effect with week ending 4/17/2020, both retail and mail order prescriptions trends continue to decline.

Retail Weekly Trend

Retail activity is down -0.7% from week ending 4/10/2020, dropping further below 2019 thresholds.

Mail Order Weekly Trend

Mail Order dropped an additional -5.1% with week ending 4/17/2020, bringing current trends within normal reporting thresholds.
Patient New to Brand, Time to Fill, & Days Supply Trends
COVID-19 INSIGHTS
Market Summary: Average Time to Fill

- On average patient in all markets are refilling their prescriptions sooner. The average time to fill has decreased across all markets, but the drop is more dramatic in Antivirals (down by 5.7 days) and Antimalarials (down by 2.8 days) from pre-COVID-19 levels.

- For medically administered products the average time between infusions declined in all market except diabetes. Respiratory products had the largest decrease in time between administration (6 days).

Index = Current Year vs. 13 Week Rolling Average (from the same time period in 2019)
Shifts in average days supply occurred approximately around the same time most states went into lockdown mode.

COVID-19 INSIGHTS

Market Summary: Average Days Supply

- Immunology and Oncology are up approximately 3% over pre-COVID-19 levels.
- Average days supply for Antivirals has increased by 80% during the same time period, but has leveled off in the last couple of weeks.
- Antimalarials have seen a significant drop in the average days supply, dropping over 27% from its pre-COVID-19 levels.