COVID-19 UPDATE 11.18.2020

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Learn more: covid19.mcw.edu
Wisconsin is an epicenter of COVID-19 in USA

• 3 of the top 20 metro areas in terms of worst burden of new case per 100,000 population are in Wisconsin. This is down from 11 two weeks ago.

• Top 20: Beaver Dam (7), Eau Claire (13), and Wausau-Weston (14).

• Nearby, Dubuque, IA is #16.

• More than a dozen Wisconsin metro areas have fallen out of the top 20.

• There are no Wisconsin metro areas on the top 20 areas for “Bad News Ahead” (where cases are increasing the fastest). This is down from 8 two weeks ago.

• Wisconsin has 4 of the metro areas with the highest burden of disease since the beginning of the pandemic: Beaver Dam (9), Green Bay (14), Oshkosh-Neenah (16), and Fond du Lac (19). Dubuque is #10.

• Great Lakes and Upper Midwest surges continue. Sun Belt also is surging again.


Presented on 11/19/2020
### CUMULATIVE PEOPLE TESTED REPORTED AS OF YESTERDAY

<table>
<thead>
<tr>
<th></th>
<th>Wisconsin</th>
<th>Milwaukee</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2,348,9649</td>
<td>380,368</td>
</tr>
<tr>
<td>Negative</td>
<td>2,024,801</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>323,848</td>
<td>Positive</td>
</tr>
<tr>
<td>Positive</td>
<td>323,848</td>
<td>57,104</td>
</tr>
</tbody>
</table>

- # of people tested yesterday in WI = **22,7438**
- Highest total of people tested was **42,451** on 10.08.2020
- Testing capacity: Up to **59,235**. 131 laboratories currently testing. 19 planning to test.

### DAILY POSITIVE CASES

<table>
<thead>
<tr>
<th></th>
<th>Wisconsin</th>
<th>Milwaukee</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>7,090</td>
<td>846</td>
</tr>
<tr>
<td>% Case Positivity</td>
<td>33.6%</td>
<td>29.3%</td>
</tr>
<tr>
<td>7-day average trending</td>
<td>stable</td>
<td>stable</td>
</tr>
</tbody>
</table>

- WI daily cases first exceeded 2,000 on 09.17.2020; 3,000 on 10.08.2020; 4,000 on 10.20.2020; 5,000 on 10.27.2020, 6,000 on 11.05.2020, and 7,000 on 11.07.2020.
- Previous high positive cases: WI: **7,777** on 11.13.2020 MKE: **1,097** on 11.13.2020

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Cumulative Patients: 14,817
Increasing (4.6% of positive cases)

Inpatients: 2,277
Increasing rapidly
(Previous high: 2,274 on 11.16.2020)
(Low: 235 on 7.05.2020)

ICU Patients: 431
Increasing
(Previous high: 456 on 11.16.2020)
(Low: 65 on 7.05.2020)

ICU Capacity: 139
Available ICU Beds
Worsening

Ventilator Capacity: 1,751
Decreasing but adequate

PPE Trends
Worsening
Most critical needs: gowns and paper masks
WIСONСIN HOSPITAL COVID-19 TAKEAWAYS

• Hospitalizations are rising in all 7 Healthcare Emergency Readiness Coalition Regions
  - COVID-19 hospitalizations at or near all-time highs for all HERC regions:
    o Fox Valley (142), North Central (244), Northeast (193), Northwest (240), South Central (355), Southeast (982) and Western (121)

• COVID-19 ICU admissions are rising or peaking in all HERC Regions
  - COVID-19 ICU admissions are at or near all-time highs for Wisconsin and for all HERC regions:
    o Fox Valley (142), North Central (41), Northeast (43), Northwest (20), South Central (86), Southeast (201) and Western (21)

• ICU censuses are high in all Healthcare Emergency Readiness Coalition Regions
  - Fox Valley (88%), North Central (94%), Northeast (95%), Northwest (94%), South Central (88%), and Southeast (90%), and Western (75%).

• Southeastern HERC (includes Milwaukee)
  - COVID-19 hospitalizations are rising rapidly (now at all time high).
  - ICU admissions for COVID-19 are rising (now at all time high).
SE Wisconsin (29 hospitals)  

Wisconsin (134 hospitals)  

Source: Wisconsin Hospital Association  

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### Various COVID-19 Indicators – 11.17.2020

#### % of Cases by Recovery Status

<table>
<thead>
<tr>
<th>Status</th>
<th>Wisconsin</th>
<th>Milwaukee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovered</td>
<td>76.8%</td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>22.3%</td>
<td></td>
</tr>
<tr>
<td>Died</td>
<td>0.8%</td>
<td></td>
</tr>
</tbody>
</table>

#### Cumulative Deaths

<table>
<thead>
<tr>
<th></th>
<th>Wisconsin</th>
<th>Milwaukee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>54.8%</td>
<td>54.2%</td>
</tr>
<tr>
<td>Female</td>
<td>44.9%</td>
<td>45.7%</td>
</tr>
<tr>
<td>Black/AA*</td>
<td>10.0%</td>
<td>31.3%</td>
</tr>
<tr>
<td>White</td>
<td>82.1%</td>
<td>50.3%</td>
</tr>
<tr>
<td>Hispanic/Latinx*</td>
<td>7.4%</td>
<td>14.4%</td>
</tr>
</tbody>
</table>

*Wisconsin death rate is rising*

**Worst days:** 92 (11.17), 66 (11.10), 64 (10.27) and 62 (11.06 and 11.11)

#### Positive Cases

<table>
<thead>
<tr>
<th></th>
<th>WI</th>
<th>MKE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doubling time (days):</td>
<td>40.7</td>
<td>67.8</td>
</tr>
<tr>
<td>7-day growth rate:</td>
<td>2.2%</td>
<td>1.7%</td>
</tr>
<tr>
<td>R number:</td>
<td>1.04</td>
<td>1.02</td>
</tr>
</tbody>
</table>

*Totals may exceed 100% due to overlap between Black/African American and Hispanic/Latinx*
COVID-19 VACCINE PROGRESS

Will we have a COVID-19 vaccine in the US by the end of 2020?

• Probably, but limited initially to front line healthcare providers, first responders, high risk populations.
• Recruitment was slowed by deceleration of pandemic in the US in August and early September but picked up briskly in October.
• No single drug company will be able to meet the short-term demand; many 100’s of millions of doses needed.
COVID-19 VACCINE PROGRESS

Will COVID-19 vaccines be safe?

- Probably, but development time frame is compressed from average of 12 years to 10-12 months.
- Nine vaccine manufacturers signed a vaccine pledge on 09.08.2020.
- We will not have long term safety data until late 2021.
- We saw vaccine makers showing caution during development – pausing studies to assess potential risks.
- Confidence in FDA’s “historic independence as the gold-standard international regulatory body” has been eroded.
- First to market might not be best vaccine.
COVID-19 VACCINE MAKER’S PLEDGE

COVID-19 Vaccine Maker Pledge

We, the undersigned biopharmaceutical companies, want to make clear our ongoing commitment to developing and testing potential vaccines for COVID-19 in accordance with high ethical standards and sound scientific principles.

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COVID-19 VACCINE PROGRESS IN US

• Two mRNA vaccine candidates will apply for Emergency Use Authorization by end of November (Pfizer-BioNTech, Moderna)

• Two adenovirus-based vaccines will complete phase 3 trials within weeks (Johnson & Johnson Janssen, AstraZeneca-Oxford).

• The Pfizer-BioNTech vaccine requires ultra-low temperatures, posing significant logistical challenges.

• The other three require more standard temperatures. Other possible market entrants also have transportation and storage advantages (Novavax fusion protein, Sanofi-GSK fusion protein, CureVac mRNA).
**DATA SOURCES**

- We use multiple external data sources for these presentations
  - Wisconsin Hospital Association: wha.org/COVID-19Update
  - Wisconsin Department of Health Services: [https://www.dhs.wisconsin.gov/covid-19/index.htm](https://www.dhs.wisconsin.gov/covid-19/index.htm)
  - Milwaukee County: [https://county.milwaukee.gov/EN/COVID-19](https://county.milwaukee.gov/EN/COVID-19)
  - Reproductive number calculator: Rt.live
  - Wisconsin Electronic Disease Surveillance System (secure access required)
  - Milwaukee County Unified Emergency Operations Center (secure access required)

- Medical College of Wisconsin analytics
  - Institute for Health and Equity
  - Division of Epidemiology
  - Epidemiology Data Resource Center and Geographic Information System

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APPENDICES: FOR REFERENCE

• Detailed slides for the four COVID-19 vaccines in Phase 3
  - Comparison slide
  - Pfizer-BioNTech
  - Moderna
  - Oxford-AstraZeneca
  - Johnson & Johnson Janssen

• Framework: Non-pharmacological interventions for individual COVID-19 risk reduction

• Framework: Framework for community COVID-19 risk reduction

• Social risk factors for COVID-19

• Individual risk factors for COVID-19
### PHASE 3 COVID-19 VACCINES IN US

<table>
<thead>
<tr>
<th>Company</th>
<th>Approach</th>
<th>Vaccine</th>
<th>Injection</th>
<th>BARDA R&amp;D Funding?</th>
<th>Phase 3 Trial</th>
<th>Storage and distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Oxford and AstraZeneca</td>
<td>Cold virus delivery of C-19 gene</td>
<td>AZD-1222</td>
<td>Two IM jabs of 5×10^{10} viral particles 28 days apart</td>
<td>$1.2 B</td>
<td>30,000</td>
<td>Operation Warp Speed (OWS) distribution.</td>
</tr>
<tr>
<td>Johnson &amp; Johnson Janssen</td>
<td>Cold virus delivery of C-19 gene</td>
<td>JNJ-78436735</td>
<td>Single IM jab of 5×10^{10} viral particles</td>
<td>$1.0 B</td>
<td>ENSEMBLE 60,000</td>
<td>OWS distribution.</td>
</tr>
<tr>
<td>BioNTech and Pfizer</td>
<td>mRNA</td>
<td>BNT162b2</td>
<td>Two IM jabs of 30 µg 21 days apart</td>
<td>No</td>
<td>44,000</td>
<td>Pfizer distribution. Specialized ultra-cold storage.</td>
</tr>
<tr>
<td>Moderna</td>
<td>mRNA</td>
<td>mRNA-1273</td>
<td>Two IM jabs of 100 µg 28 days apart</td>
<td>$955 M</td>
<td>COVE 30,000</td>
<td>OWS distribution.</td>
</tr>
</tbody>
</table>
PFIZER-BioNTech COVID-19 VACCINE

- **BNT162b2**: Uses modified mRNA to instruct human ribosomes to build COVID-19 spike protein
- Funding: The companies have decided not to accept US government R&D funding

Manufacturing and distribution (600+ million doses):
- **100 million doses** to the US government ($1.95 billion purchase)
- **100 million doses** to Canadian government
- **120 million doses** to Japanese government
- **200-300 million doses** to European Union
- Working on deals with WHO, CEPI and GAVI the Vaccine Alliance

Learn more: covid19.mcw.edu
• Design: Randomized, observer-blinded, placebo-controlled, stratified
  - Efficacy, safety, immunogenicity
• Vaccine: 2 shots of 30 µg BNT162b2 or placebo administered 21 days apart
• Primary Endpoint: efficacy against symptoms and positive COVID-19 test
  - Secondary endpoint: efficacy against severe COVID-19 (death, shock, ICU, respiratory failure)
  - Results by end of October
• Participants:
  - 21,999 recipients, age 16 and above
  - 40% of participants over 55 years old
  - Randomization to vaccine or placebo at 1:1 ratio
MODERNÁ COVID-19 VACCINE

• **moderna**: mRNA-1273
  - Uses modified mRNA to instruct human ribosomes to build COVID-19 spike protein

• Funding: $2.45 BB (BARDA $955 million + US government $1.525 billion)

• Manufacturing and distribution (1 billion doses):
  - 100 million doses to the US government ($1.525 billion purchase)
  - In discussions with European Commission
  - In discussions with Japanese government
  - Multiple manufacturing deals
    - ROVI, Catalant and CordenPharma
MODERNA COVID-19 VACCINE

• Design: Randomized, stratified, observer-blinded, placebo-controlled
  - Efficacy, safety, immunogenicity

• Vaccine: 2 shots of 100 µg mRNA-1273 or placebo administered 28 days apart

• Primary Endpoint: efficacy to prevent COVID-19, 14 days after second dose; adverse events
  - Secondary endpoint: efficacy to prevent COVID-19 infection and severe COVID-19 infection
  - Results by November

• Participants:
  - 30,000 recipients, age 18 and above
  - 25-40% of participants either over 65 years old, or under 65 with co-morbid risk factors
  - Randomization to vaccine or placebo at 1:1 ratio
OXFORD-ASTRAZENECA COVID-19 VACCINE

• **AstraZeneca** • **Oxford University** : AZD1222
  - Weakened chimpanzee cold virus to deliver genetic material from COVID-19 spike protein

• Funding: $1.2 billion R&D funding from BARDA

• Manufacturing and distribution (1.8 billion doses)
  - 300 million dose option to purchase by US government
  - 100 million doses to Great Britain
  - 100 million doses supplied by GAVI and CEPI ($750 million)
  - 1 billion doses supplied by the Serum Institute of India
  - 400 million doses for the European Commission
• Design: Randomized, double-blinded, placebo-controlled
  - Efficacy, safety, immunogenicity

• Vaccine: 2 shots of AZD-1222 (one of two doses) or placebo administered 28 days apart

• Primary Endpoint: efficacy to prevent COVID-19, ≥ 15 days to one year after second dose
  - Secondary endpoints: efficacy and safety up to one year; presence of neutralizing antibodies at 28 days
  - Results by end of 2020

• Participants:
  - Up to 50,000 recipients in US, UK, Brazil, Japan and South Africa, age 18 and above (30,000 in US)
  - Diverse racial, ethnic, geographic groups; who are healthy or have stable co-morbidities
  - Randomization to two different doses of vaccine or placebo at 2:1 ratio
JOHNSON & JOHNSON JANSSEN COVID-19 VACCINE

- **Johnson & Johnson Janssen**
  - JNJ-78436725
  - Human adenovirus virus to deliver genetic material from COVID-19 spike protein

- **Funding**: $1.0 billion R&D funding from BARDA

- **Manufacturing and distribution (1.8 billion doses)**
  - 300 million dose option to purchase by US government
  - 1 billion doses in 2021
  - Manufacturing deals with Emergent Biosolutions, Catalent and PCI Pharma Services
• Design: Randomized, quadruple-blinded, placebo-controlled
  - Efficacy, safety
• Vaccine: 1 or 2 shots of JNJ-78436725 or placebo administered 28 days apart
• Primary Endpoint: efficacy to prevent moderate-severe COVID-19, ≥ 15 days to two years after dose
  - Secondary endpoints: efficacy and safety up to one year
  - Results by end of 2020
• Participants:
  - Up to 60,000 recipients in US and international
  - Diverse racial, ethnic, geographic groups; who are healthy or have stable co-morbidities; 18 years old or older
  - Randomization to one or two jabs of vaccine or placebo
Amount of COVID-19 inoculum is based on four contact parameters:

- **Number**
  - Avoid crowds
  - Stay at home
  - Work from home

- **Proximity**
  - Maintain distance

- **Intensity**
  - Avoid singing
  - Avoid shouting
  - Limit indoor activities
  - Wear a face covering
  - Wash hands

- **Duration**
  - Limit time of exposure
COVID-19 COMMUNITY RISK FACTORS

Community Risk is based on five parameters:

Population density, population health, interactions, pre-existing conditions, disease burden

- Regional Population Density
- Population Health
- Education Level
- Income Level
- Age (60+)
- Number of Interactions
- Number of Social Interactions
- Number of Work Interactions
- Number of Family Interactions
- Smoking/Vaping
- Diabetes
- Asthma
- Heart Conditions
- Pre-Conditions
- R Number
- Trajectory
- Positivity Rate
- Daily Case Numbers
- COVID-19 Burden
INDIVIDUAL RISK FACTORS FOR COVID-19

- Male gender
- Age > 60
- Obesity
- Race (Black and African American, Native American, possibly Asian)
- Ethnicity (Hispanic, Latinx)
- High ACE levels
- Non-type O blood group
- Pre-existing conditions
  - Kidney disease; obesity; heart disease; hypertension; diabetes mellitus; cancer; lung disease, COPD and asthma; auto-immune disorder; immune dysfunction
- Low zinc, vitamin D levels?
SOCIAL RISK FACTORS FOR COVID-19

• Zip code, neighborhood

• Healthcare access and utilization

• Occupation

• Educational, income, and wealth gaps

• Housing