Learning to live with COVID: The role of epidemiology and the importance of primary prevention

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Disclosures

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  • Mayo Clinic Research Committee
  • National Institute on Aging
• Industry:
  • Exact Sciences
  • Moderna
Overview

• Relationship between population health, public health, epidemiology and prevention strategies

• COVID pandemic in our region
  – Rochester Epidemiology Project (REP)

• Prevention strategies
  – Masking and distancing
  – Healthy behaviors
    • Food choices, physical activity, smoking, alcohol use
  – Vaccination
Learning objectives

• To understand:
  1. How epidemiology and public health intersect in COVID prevention strategies
  2. How the COVID pandemic has evolved in southeastern MN and southwestern WI
  3. Prevention strategies as the pandemic evolves
     • Masking and social distancing
     • Role of healthy behaviors in primary prevention
       • Food choices, physical activity, smoking, alcohol use, sleep
     • Vaccination
What is Epidemiology?
Population health and public health prevention strategies

Healthy → Sick → Really Sick → Complications/death

Primary
Stay healthy

Secondary
Don’t get worse

Tertiary
Don’t get worse/don’t die

Adapted from PCORE: Primary care online resources and education; Levels of Preventive Strategies
Epidemiology Toolkit

Descriptive

Person, Place, Time

Incidence
Prevalence
Cross Sectional

Hypothesis Testing

Exposure Observed

Case Control
Cohort
Pragmatic
Clinical Trial

Exposure Assigned
January 20, 2020

• “CDC confirms the first U.S. laboratory-confirmed case of COVID-19 in the U.S. from samples taken on January 18 in Washington state.”
So many questions

• How does it spread?
• How quickly does it spread?
• How do we stop it from spreading?
• How do we figure out who has it?
• Who is going to get really sick?
• How do we treat people who get sick?
• Can we get rid of it?
Population health and public health prevention strategies

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Masking and social distancing – does it even work?

*Chu et al, Lancet, 2020*
Downsides

- Social distancing
  - Economic costs
  - Educational costs
  - Social isolation
    - Increase in substance use and mental health issues
    - Isolation in elderly population
- Masking
  - Discomfort, skin conditions, communication issues
So many questions

• How does it spread? – **Respiratory transmission**
• How quickly does it spread? - **Fast**
• How do we stop it from spreading? - **Masking and social distancing**
• How do we figure out who has it?
• Who is going to get really sick?
• How do we treat people who get sick?
• Can we get rid of it?
Project Goal

• Identify risk factors for severe infections – especially in younger people
Approach

- **Data source**: Rochester Epidemiology Project (REP)
  - Research partnership between Mayo Clinic, Olmsted Medical Center, Olmsted County Public Health Services, and Zumbro Valley Health
    - Share medical record information for research
    - [https://rochesterproject.org/](https://rochesterproject.org/)
Approach

• **Data source:** Rochester Epidemiology Project (REP)

• **Study population:** Persons living in a 27-county region of south-eastern MN and west-central WI
  - March 1 – September 30, 2020 (pre-surge)

• **Definition of severe infection:** Hospitalization or death due to COVID-19
Results

• 9,928 infections
  • 456 hospitalizations (4.6%)
  • 72 deaths (0.7%)
  • 474 severe infections (4.8%)

St Sauver et al, Mayo Clin Proc, 2021
Figure 1. Cumulative incidence of hospitalizations among persons with COVID-19 infections by demographic characteristics and number of chronic conditions.
Risk of severe COVID-19 infection in 3 age groups: 0-44 years, 45-64 years, and 65+ years
Role of healthy behaviors

• Maintain a healthy weight
  • Exercise regularly
  • Eat a healthy diet
• Don’t smoke
• Moderate alcohol consumption
• Get enough sleep
Risk of severe COVID-19 infection in smokers and persons with obesity

**Smoking history**

- Former
- Current

**Current weight**

- Overweight
- Obese
Role of healthy behaviors and COVID

- Don’t smoke
  - Limited associations with poor outcomes
- Maintain a healthy weight
  - Exercise regularly
  - Eat a healthy diet
    - Living with obesity is associated with poor outcomes
- Moderate alcohol consumption
  - No direct link, but consumption increased during the pandemic
- Get enough sleep
  - No direct link, but sleep problems prevalent in persons who had COVID
Role of healthy behaviors and COVID

Obesity

Chronic diseases

Smoking, alcohol misuse, sleep problems

Hospitalization or death due to COVID
Population health and public health prevention strategies

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Covid-19 vaccine from Pfizer and BioNTech is strongly effective, early data from large trial indicate

By MATTHEW HERPER  @matthewherper
NOVEMBER 9, 2020
Reprints
U.S. Begins Shipping Vaccine as Virus Rages On

- The first doses left a Pfizer facility in Michigan early Sunday, kicking off the most ambitious inoculation campaign in U.S. history.
- The effort to ship the vaccine to all 50 states comes as the country’s coronavirus death toll approaches 300,000. Here’s the latest.

NEW: Sandra Lindsay, a critical care nurse in Queens, today became the first person to receive the COVID-19 vaccine in New York.

"It didn’t feel any different from taking any other vaccine," she said.
WHAT ARE YOU UP TO?
YOU KNOW HOW WHEN I HAVE A PACKAGE COMING, I SIT HERE, REFRESHING THE PACKAGE TRACKER?
IS THAT THE STATE VACCINE WEBSITE?

YOU KNOW IT WILL BE A WHILE BEFORE YOU CAN—[REFRESH]
THEY HAVEN'T EVEN ANNOUNCED WHEN—[REFRESH]

ARE YOU GOING TO SIT THERE CLICKING REFRESH FOR SEVERAL MONTHS?
I AM READY FOR THE PANDEMIC TO BE DONE.

PERMANENT LINK TO THIS COMIC: HTTPS://XKCD.COM/2398/
COVID-19 Vaccination Visit
Department of Family Medicine, West Campus Building, in Austin, Minnesota
West Campus Building, First Floor Desk 1

Appointment is Today
PreCheck-in is complete. See you soon.
**Appointments**

<table>
<thead>
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<th>Appointment Date:</th>
<th>Arrival Time:</th>
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<tbody>
<tr>
<td>Fri, Apr 2, 2021</td>
<td>1:20 PM CDT</td>
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</tbody>
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**COVID-19 Vaccination Visit**

Department of Family Medicine, West Campus Building, in Austin, Minnesota

**West Campus Building, First Floor Desk 1**

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**Covid-19 Live Updates:**

**F.D.A. to Authorize Pfizer Vaccine for Adolescents by Early Next Week**

New York, New Jersey and Connecticut will let most businesses fully reopen in mid-May and New York City will return to 24-hour subway service. But the virus continues to rage across the world: A lack of oxygen has led to a wave of deaths in India on Sunday.

**RIGHT NOW** The European Union recommends opening travel to foreigners.

**Here's what you need to know:**

- The F.D.A. is set to authorize the Pfizer-BioNTech vaccine for those 12-15 years old by early next week.
- N.Y., N.J. and Connecticut will let many businesses fully reopen in mid-May and N.Y.C.'s subway will resume 24-hour service.
- Deaths mount during an oxygen shortage in India, and a high court intervenes.
COVID-19 positive tests in the 9-county region of southeast Minnesota

Notes:
Positive tests include PCR and/or Ab. Each person is counted only once across all weeks (unique persons). In case of multiple positive tests, the earliest date is used.
The 9-county population is an estimation of July 2020 (0-5 = 30,610; 6-19 = 72,969; 20-44 = 119,423; 45-64 = 96,085; 65+ = 69,704).
50-64: 56% one dose, 33% two doses
65+: 86% one dose, 80% two doses
Current vaccine effectiveness information

- Protection varies depending on the circulating strain(s)
- Some protection against symptomatic infection
  - 35-72% within 1-3 months*
  - 12-69% within 4-6 months*
- Good protection against hospitalization and death
  - 68-92% protection after second dose*
    - Varies based on age, comorbidities

Population health and public health prevention strategies

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So many questions

- How does it spread? – *Respiratory transmission*
- How quickly does it spread? - *Fast*
- How do we stop it from spreading? - *Masking and social distancing*
- How do we figure out who has it? – *Rapid, cheap, widely available testing*
- Who is going to get really sick? – *More likely: older, living with obesity, more chronic diseases, specific diseases in younger people*
  - *Less likely: vaccinated*
- How do we treat people who get sick? – *New medications, standard hospital protocols*
Can we get rid of it?

Not yet.
Where are we now?

- May 19, 2022
  - US reaches over 1 million deaths due to COVID
- August, 2022
  - Deaths
    - US: 1,038,819
    - Minnesota: 13,014
    - Wisconsin: 13,255
COVID-19 was third leading cause of death in the United States in both 2020 and 2021
Long COVID

• 1 in 8 people may continue to experience symptoms 90-150 days post infection*
  • Multiple systems may be affected+
• Still a lot to learn

*Ballering et al, Lancet, 2022
+Al-Aly et al, Nature, 2021

Among COVID-19 survivors, an increased risk of death, serious illness – Washington University School of Medicine in St. Louis (wustl.edu)
Good news

• Vaccination estimated to prevent over 240,000 deaths and 1.1 million hospitalizations in the US*

*Vilches et al, JAMA Network Open, 2022
Good news

• Persons who are vaccinated at a lower risk of long COVID*

*Notarte et al, eClinical Medicine; 2022
Where are we now?

- Percent fully vaccinated (2+ doses)
  - US: 67.4%
    - 65+ years: 92%
  - Minnesota: 67.4%
    - 65+ years: 93.4%
  - Wisconsin: 61.6%
    - 65+ years: 82.3%

Data from: CDC COVID Data Tracker: Vaccinations in the US; COVID-19 Vaccine Data / COVID-19 Updates and Information - State of Minnesota (mn.gov); COVID-19: Vaccine Data | Wisconsin Department of Health Services
So, now what?

• Primary prevention strategies
  • Masking/social distancing
    • If you’re sick, stay home
    • Mask if you have symptoms

• Secondary prevention strategies
  • Maintain a healthy weight
  • Healthy behaviors indirectly reduce risk
  • Get vaccinated
    • Boosters combat waning immunity
    • New vaccines will target multiple strains
So, now what?

- Recognize that this is new to everyone, and the situation will continue to change
  - What you do today may differ tomorrow, next week, next month, or next year
Thank you!

**Mayo Clinic**
- Quantitative Health Sciences
  - Division of Epidemiology
    - REP
  - Survey Research Center
  - Division of Biostatistics
  - Kern Center for the Science of Health Care Delivery
  - Laboratory Medicine and Pathology

**Community Partners**
- Olmsted County Health Housing and Human Services
- Olmsted County Public Health Services
- Olmsted Medical Center
- Zumbro Valley Health Center
Questions?
References


