PANDEMIC

AARC APPROVED FOR 1 LIVE CRCE CREDIT HOUR

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Learning Objectives

- Describe the stages of pandemics
- Discuss historically significant pandemics
- Contrast historical pandemics with Coronavirus 2019

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What Defines a Pandemic?

- Pandemic vs. Epidemic
  - Epidemic – an outbreak of disease that spreads quickly and affects many individuals at the same time
  - Pandemic – a type of epidemic with greater range and coverage, spreading over countries or continents

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Vocabulary

- Passage
- Virulence
- Attenuation

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PANDEMIC INTERVALS

AS DEFINED BY THE CENTERS FOR DISEASE CONTROL AND PREVENTION

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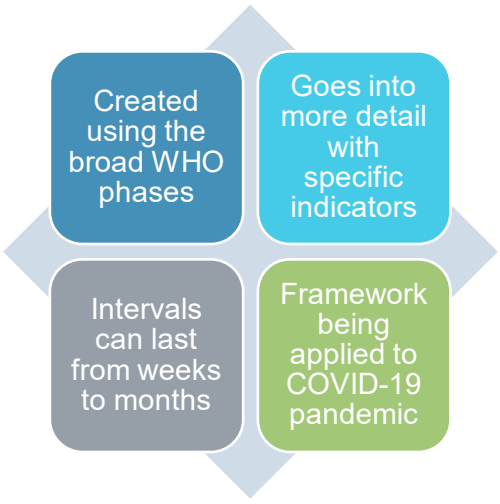

Pandemic Intervals

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Investigation Interval

- Begins when a new virus is identified in humans or animals anywhere in the world that is judged by experts to have potential implications for human health
- Public health actions
  - Targeted surveillance and epidemiologic investigations – identify infections, assess potential to cause disease
  - Person-to-person transmission, co-investigations of animal outbreaks, consideration of control-based measures
    - Antiviral treatment and antiviral postexposure prophylaxis
    - IRAT – determines potential for emergence

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Recognition Interval

- Initiated when increasing numbers of human cases or clusters of infection are identified anywhere in the world
- Virus characteristics indicate an increased potential for ongoing human-to-human transmission
- Public health actions
  - Control of the outbreak
  - Case-based control measures
  - Treatment and isolation of ill persons and voluntary quarantine of contacts

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Initiation Interval

- Begins when human cases of a pandemic virus infection are confirmed anywhere in the world with demonstrated efficient and sustained human-to-human transmission
- “Efficient and sustained” defined during an event based on the characteristics of the virus
- Public health actions
  - Case based control measures
  - Routine personal protective measures like hand hygiene
  - Enhanced surveillance for detecting additional cases of the virus to determine community mitigation measures

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Acceleration Interval

- Indicated by a consistently increasing rate of the pandemic virus identified in the United States
- Community mitigation measures must be initiated immediately
- Efficient management of medical countermeasures
- Actions are guided by the Pandemic Severity Assessment Framework, or PSAF
- Isolation and treatment of the infected and voluntary quarantine are key

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Deceleration Interval

Indicated by a consistently decreasing rate of the virus cases in the U.S.

Planning for appropriate suspension of community mitigation measures

Recovery begins

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Preparation Interval

- Preparation for a subsequent pandemic wave
- Characterized by low pandemic virus activity, although smaller outbreaks may continue to occur
- Primary actions

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Pandemic is Over

- Declared ended when evidence indicates that the virus, worldwide, is transitioning to seasonal patterns of transmission

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HISTORICALLY SIGNIFICANT PANDEMICS

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Plague of Athens

- 430 B.C.
- First documented pandemic
- Killed 25% of the population
- Scholars and physicians debate what the disease was
- Social response
- Care for the ill

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Black Death

- 1347 to 1351
- Killed 30-50% of the European population, tens of millions of people
- Either Bubonic Plague or haemorrhagic fever
- Likely originated in China
- Transmitted through fleas, ticks, human lice and rats
- Decreased life expectancy by 20 years
- Had some positive effects in its aftermath

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HIV/AIDS

- 70 million infected, 35 million deaths
- Obstacles – fear, stigma, ignorance
- Used to be a death sentence, now we have a one pill a day treatment
- WHO's goal to end AIDS by 2030 might not be met
- Disproportionally affects vulnerable populations

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1918 INFLUENZA

THE SPANISH FLU

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1918 Influenza (Spanish Flu)

- 1918 – most severe pandemic in recent history
- 500 million infected, 1/3 of world's population
- 50 million killed, 675,000 of these deaths in the U.S.
- News of the virus was suppressed in the U.S. to maintain positive morale during the war
- The war effort caused poor living conditions for millions

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1918 Influenza (Spanish Flu)

- Highest mortality
  - Under 5 years
  - 20 to 40 years
  - 65 years and older
- No flu vaccine, no antibiotics
- Control efforts were non-pharmaceutical
- No national, state, or local coordinated pandemic planning

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Summer 1918

- June 1 – August 1: 10% of British soldiers in France too sick to report for duty
- Suddenly, in August, the virus disappeared
- British command and medical journals stated the epidemic was over
- The virus was mutating – the deadly second wave was about to begin

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Why the Waves?

- Waves were different diseases – highly unlikely – victims of first wave showed resistance to second wave
- Mild virus met other flu virus – reassorted genes and became the lethal second wave – most modern flu experts don't believe this
- Adaptation to man – as the virus jumped from animal to people, the shock weakened the virus. Over time, it became better at infecting its new host and became lethal

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Denial & Inaction

"NO DANGER OF AN EPIDEMIC – IT SELDOM ATTACKS WELL-NOURISHED PEOPLE"

20% OF NYC SCHOOLCHILDREN WERE MALNOURISHED

NO ACTION TAKEN

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Camp Devens

- September 1 – 4 soldiers diagnosed with pneumonia and admitted to the hospital at Camp Devens
- Two weeks later, in a single day, 1,543 reported ill with the flu
- 19.6% of the entire camp was sick
- Healthcare workers – "Am I next?"
- Philadelphia public health director does nothing

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Pressure to Act

- Not all remained silent
- Philadelphia health officials refused emergency planning while doctors and local faculty begged for action to be taken
- Campaign against coughing, sneezing and spitting begins
- Newspapers assure that there is no concern felt by military and naval physicians, as well as civil authorities
- Board of Health states no concern

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Health Board Recommendations

STAY WARM

KEEP THE FEET DRY

KEEP THE BOWELS OPEN

AVOID CROWDS

CAMP CHANGES

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Serum and Masks

- Joe Capps at Camp Grant warned of a more toxic and fatal pneumonia
- Capps had begun testing a pneumonia serum from chickens
- Showed the National Research Council his gauze masks
- It was decided – masks and quarantining of new soldiers at camps was necessary
- "Obey the laws, wear the gauze"

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EPIDEMIC BROKEN AT CAMP GRANT; DEATH TOTAL 452

Camp Grant, Rockford, Ill., Oct. 6.—[Special.]—While a line of more than 500 silent visitors watched and waited on the base hospital veranda and in the big Red Cross rest rooms today, the small army of expert workers under the command of Lieut. Col. H. C. Michie battled the pneumonia epidemic in Camp Grant to a standstill.

Seventy deaths occurred among the pneumonia patients, but more than 100 fighting men pulled through the crisis of their illness with the aid of sunshine and a cessation of the dust storm which has raged in camp for forty-eight hours. At 6 p. m. the casualty total of the epidemic had climbed to 452 deaths, but only 170 new patients had been received in the hospital, less than half the number admitted yesterday, and 175 patients had been released after winning their fight.

Reports from every ward showed encouraging improvement and surgeons who have worked without sleep for two days at a time knew that the backbone of the epidemic was broken.

Infection Spreads and Press Suppresses

- Capp's serum
- Germicidal solutions used in noses and mouths of troops
- October 6, 1918 - *Chicago Tribune* publishes that the epidemic has been broken

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Addressing Rumors

- Disinfectants, drugs, typhoid vaccine, diphtheria antitoxin – nothing worked
- Symptoms seemed endless, and combinations of them didn't always make sense
- Misdiagnosed as dengue, malaria, typhoid
- Mental states of victims

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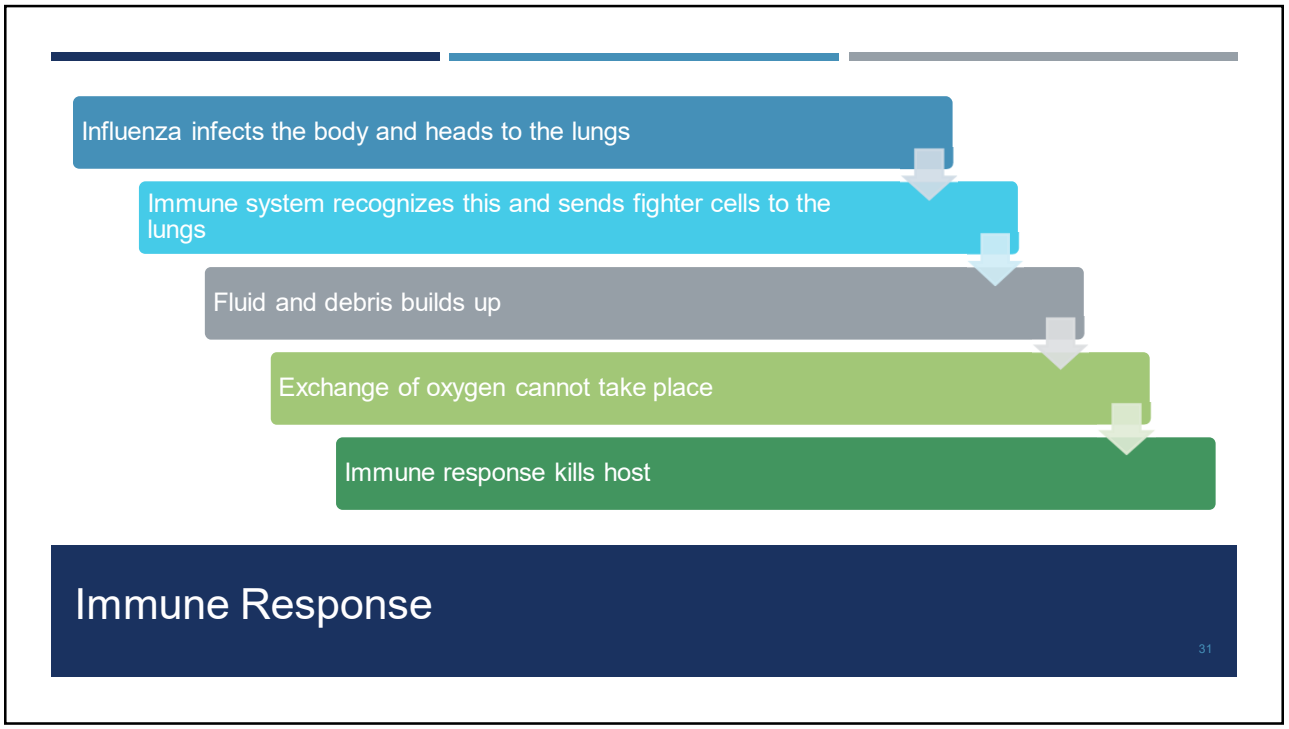
Influenza infects the body and heads to the lungs
Immune system recognizes this and sends fighter cells to the lungs
Fluid and debris builds up
Exchange of oxygen cannot take place
Immune response kills host
Immune Response
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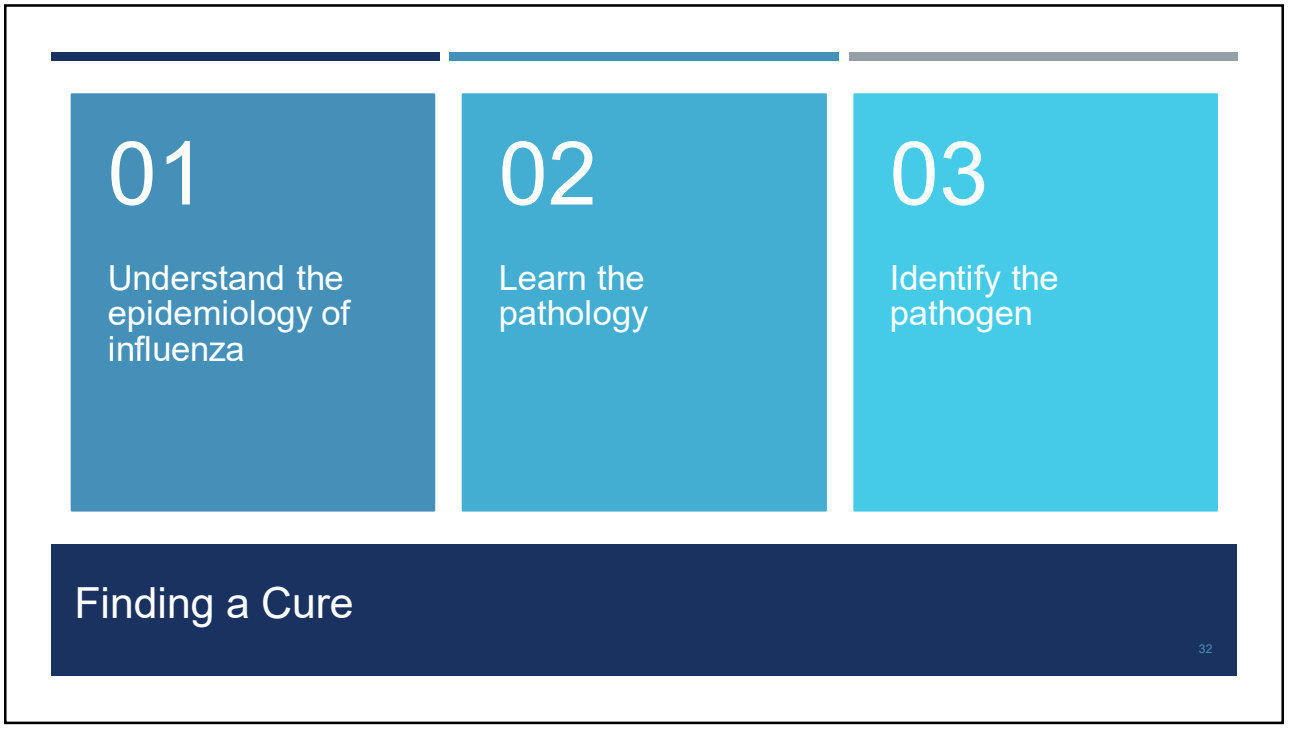
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Understand the epidemiology of influenza
02
Learn the pathology
03
Identify the pathogen
Finding a Cure
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Potential Identification

- *Bacillus influenzae*
- Presence denied by bacteriologists
- Very difficult to spot
- William Park and Anna Williams found it in over 80% of cases
- Disproved at Rockefeller in Berkefeld filter experiments
- Simultaneously, Redden drew blood from survivors, extracted the serum and injected it into patients

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Search for a Cure

- Avery, Cole, and Rockefeller Institute developed a vaccine that looked promising in the spring
- Avery and Cole also developed a serum for pneumonias
- Other developed vaccines were useless
- VMS created
- Red Cross steps in
- Population loses confidence in press

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Desperate Treatments

- Stimulation of mucus membranes
- Alkalinity
- Typhoid vaccines
- Quinine
- Injections of hydrogen peroxide
- Serum transfers from survivors

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False Hope

- October 19, ten thousand vaccines were delivered – they didn't work
- No medicine and no vaccine was developed to cure the influenza
- Masks were also useless
- Some scientists feared it was the end of the human race
- The flu does not need humans to survive

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A Sudden End

- Populations develop immunity as the virus progresses
- By late November, the virus had made its way through the whole world
- The second wave was over

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Third Wave

- The virus mutated again, striking previously spared places
- Post-influenzal manifestations on CNS
- Effects on President Wilson's decision making

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Virus Fades Away

- No prevention or cure was found
- Virus finally fades away
- Decreases invirulence
- Immunity increases

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Decision Making and Risk Assessment

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Considerations in Decision Making

- Virus transmission parameters
- Severity of disease among different age and risk groups
- Availability and effectiveness of control measures and treatment options
- Impact on health care, schools, businesses and the community

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Risk Assessment Tools

- IRAT – Influenza Risk Assessment Tool
- PSAF – Pandemic Severity Assessment Framework

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IRAT

- Used when a new novel virus is discovered in humans, but is not circulating widely in the population in order to assess:
  - The risk that the virus will develop efficient and sustained human to human transmission
  - The risk that the virus will substantially affect public health

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IRAT

- Involves data gathering, discussion, and consensus building to assign risk scores, one for emergence and one for impact, for elements in three categories:
  - Biologic properties of the virus
  - Population
  - Ecology and epidemiology of the virus
- Next step - PSAF

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PSAF

- Determines how bad the pandemic will be
  - Clinical severity
  - Transmissibility

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Planning and Response

- Incident management
- Surveillance and epidemiology
- Laboratory
- Community mitigation
- Medicinal care and countermeasures
- Vaccine
- Risk communications
- State/local coordination

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WERE WE READY?

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The CDC

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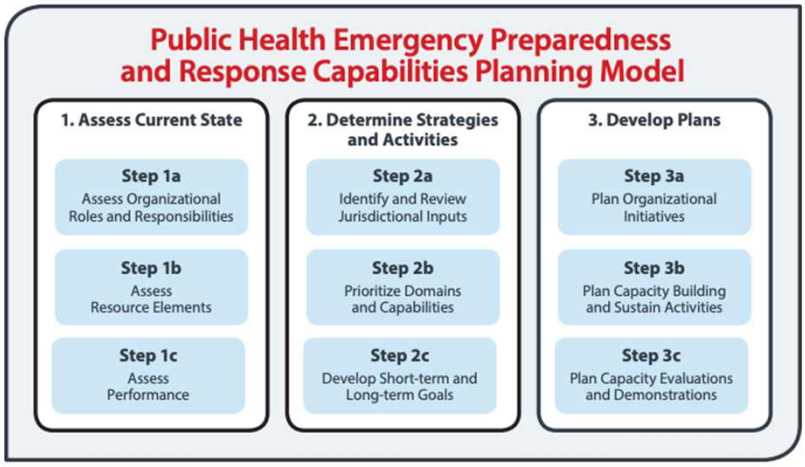

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Budgets

- Federal support to build state and local capabilities to manage a new viral crisis fell 50% since 2003
- PHEP grant and private health grants have dropped
- More emphasis was put on fighting more predictable problems
- Stockpiling supplies and vents doesn't make financial sense at for-profit hospitals

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We Forget

- 2014 – 70% of hospital administrators say they aren't ready for an emerging infectious disease
- 2017 – 14% of hospital administrators say they aren't ready for an emerging infectious disease

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Summary & Review

- What is a pandemic?
- Passage, virulence, attenuation
- CDC intervals of a pandemic

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Summary & Review

- Historically significant pandemics
  - Plague of Athens
  - Black Death
  - HIV/AIDS
- 1918 Influenza Pandemic

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Summary & Review

- Decision making and risk assessment
- IRAT and PSAF
- Readiness
- PHEP
- CDC and HHS guidance
- Budget cuts
- We forget

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Tell the Truth

- Lesson from 1918

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