Protecting Workers from Infectious Diseases:

Cal/OSHA's Aerosol Transmissible Disease Standards

Deborah Gold, MPH, CIH,

dgold184@gmail.com

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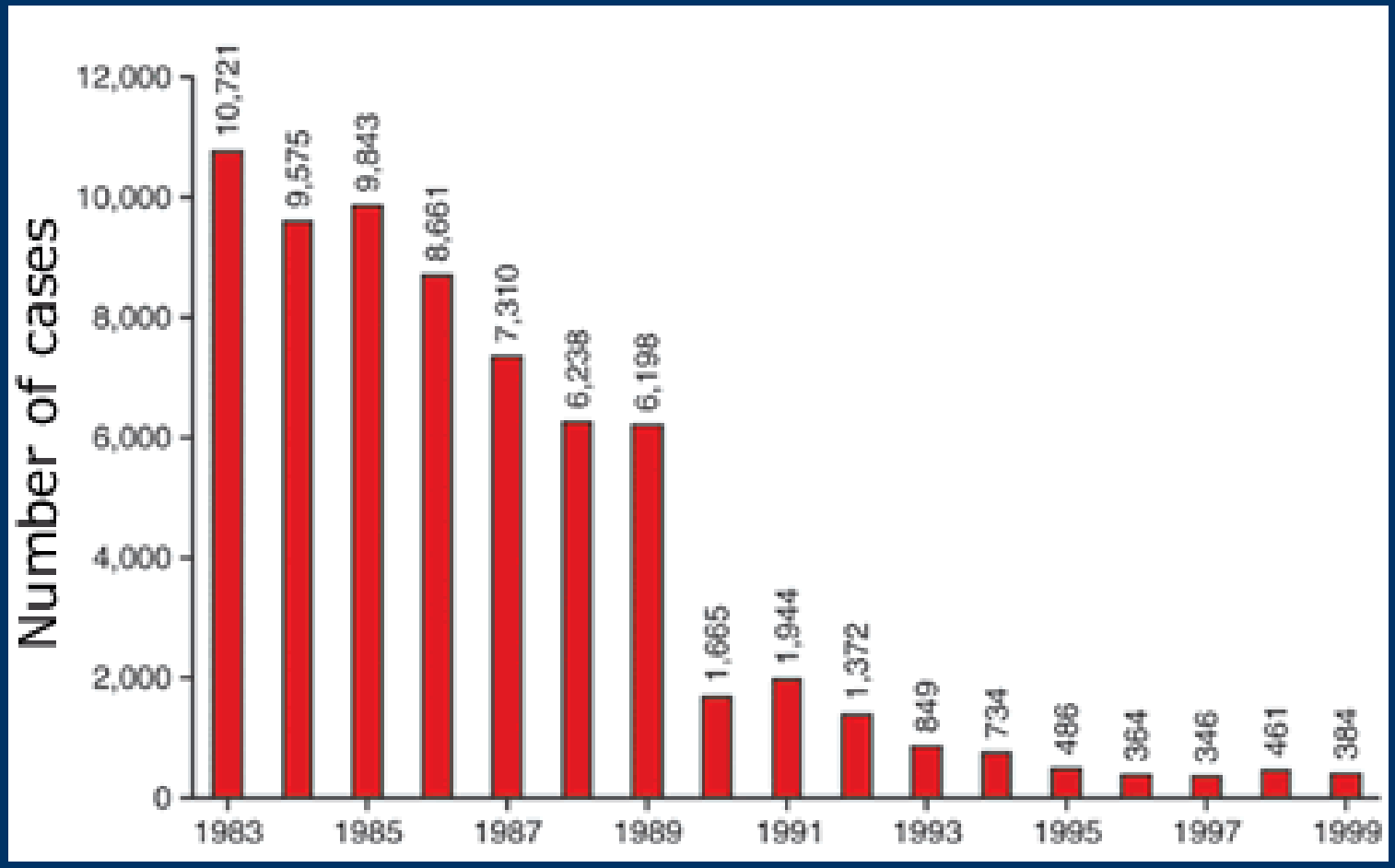
OSHA
I THINK DR WEILER NEEDS TO HANDLE THIS ONE

Protecting Workers from Infectious Diseases

- Work exposes employees to infectious diseases
- Without an OSHA standard, there is no mandate for employee health
- Communicable disease emergencies are normally "run" by public health agencies without OSH
- The bloodborne pathogens regulation shows that OSHA regs can make a difference
- TB, SARS, pandemic flu, MERS, Ebola, varicella are occupational hazards in workplaces such as health care
- Infectious disease risks in other environments

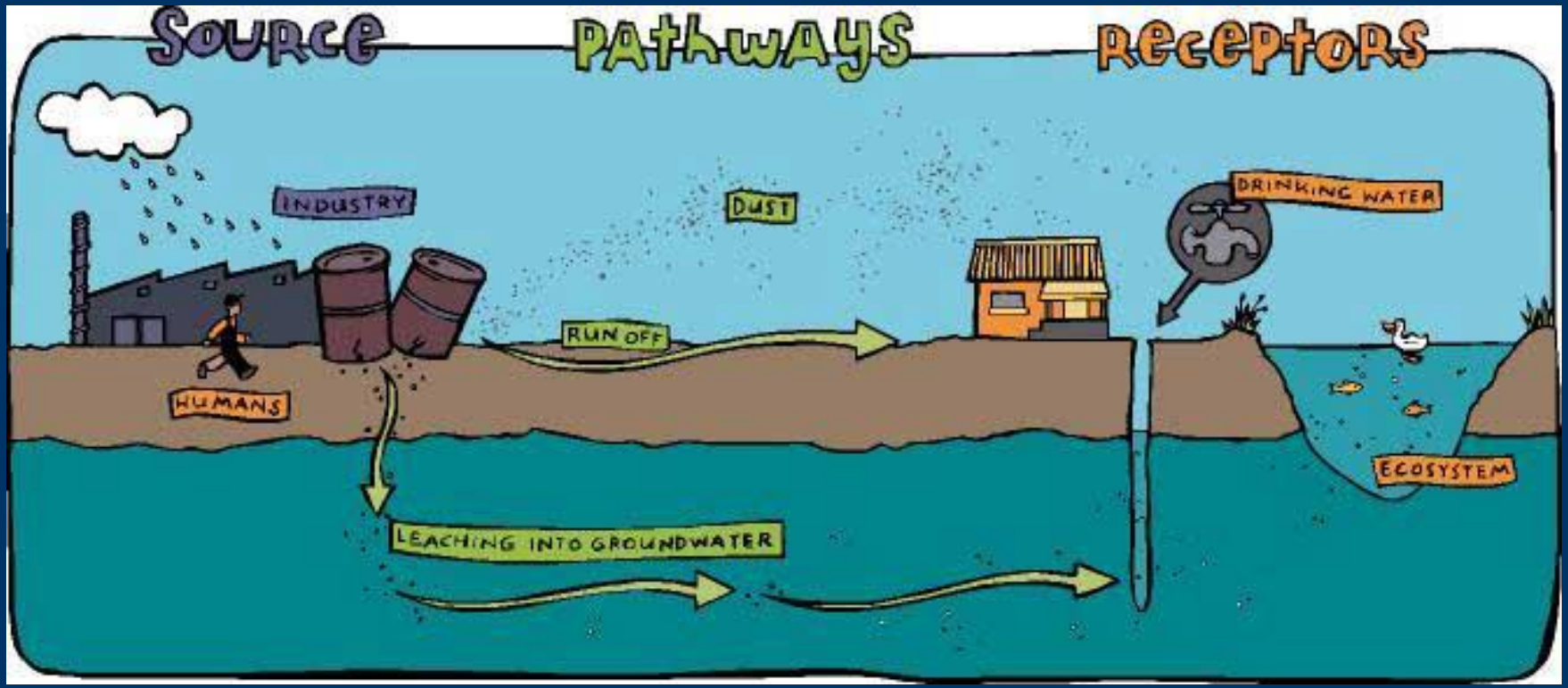
New Infections HBV in Health Care Workers (CDC 2002)



Infectious Diseases

- Infectious diseases considered “public health”
- National (passive) disease tracking
- Local and state health departments typically do contact tracing and (rarely) disease intervention
- Specific programs in drinking water, sewage treatment, food safety, vector control, rabies
- Existing (OSHA) workplace standards include sanitation, bloodborne pathogens

Source – Receptor Model



Routes of Exposure

- Exposure to blood or OPIM -- BBP
- Inhaled droplets or droplet nucleii -- ATD
- Droplets or droplet nucleii contacting mucous membranes or the skin – ATD
- Laboratory generated aerosols – ATD, BBP
- Animals
  - Experimentally infected with BBP -- BBP
  - Zoonotic aerosol risk – ATD--Zoonotic
- Skin, oral (e.g. fecal/oral) – if covered BBP or ATD, if not, sanitation, special orders
- Environmental

Why an ATD Standard

- Existing aerosol transmissible diseases such as TB – health care workers still at increased risk
- Experience of Canada and Asia with SARS
- Planning for pandemic flu and other surge events
- Incidents of laboratory transmission and near misses
- Increased research on BSL 3 and above

Cal/OSHA Regulations

- Rulemaking by independent Board appointed by governor
  - Labor Code mandates Cal/OSHA initiate health rulemaking
- Can not enforce General Duty Clause
  - Uses “special orders” where no standard
- Injury and Illness Prevention Program required since 1991
- Unfunded local mandate prohibition very broadly interpreted

Origins of ATD Project

- Early 1990's Cal/OSHA worked on draft TB standard
- 1994 OSHA announced rulemaking so CA dropped
- 1997-2000 Health care unions and ERs supported safety sharps legislation & regs
- 2003 Feds dropped TB rulemaking, put respirators under general industry
- 2004 CA equivalent action, ERs and unions asked Cal/OSHA to develop comprehensive standard

Our Advisory Process

- American Federation of State County and Municipal Employees
- American Medical Response
- Association of Professionals in Infection Control
- B-SAFE
- California Association of Health Facilities
- California Conference of Local Health Officers
- California Hospital Association
- California Nurses Association
- California Professional Firefighters
- California Tuberculosis Controllers Association
- Cities and Counties – San Francisco, San Bernardino, San Diego, Los Angeles, Alameda, Contra Costa, Lake,
- California Department of Public Health – Emergency Preparedness Office, Immunization Branch, Occupational Health Branch, TB Control Branch,
- Health Care organizations including Kaiser Permanente, Sutter Health Care
- International Brotherhood of Teamsters
- Service Employees International Union
- Stanford University
- State of California – Departments of Food and Agriculture, Fish and Game, Corrections and Rehabilitation
- University of California at San Diego, Los Angeles, San Francisco, Berkeley, Davis

ATD Standards Adoption

- 10 public advisory meetings from 2004-2007
  - Separate zoonotics meeting May 2006
- Many additional meetings with state and local agencies, professional groups, unions, employer groups
- Held up by Board staff for over a year
- Rulemaking noticed in 2008
- Standards passed 5/09, effective 8/5/09

Why Not Just Adopt CDC guidelines?

- CDC Guidelines aren't enforceable
  - Nonmandatory language
  - Lots of different guidelines, recommendations may be inconsistent or unnecessary for OSH
- Many in public health do not understand why recommendations to protect employees should be different from those to protect the public.
  - E.g.how can we recommend respirators for employees and not for the public

OSHA vs. Other Public Health

OSHA

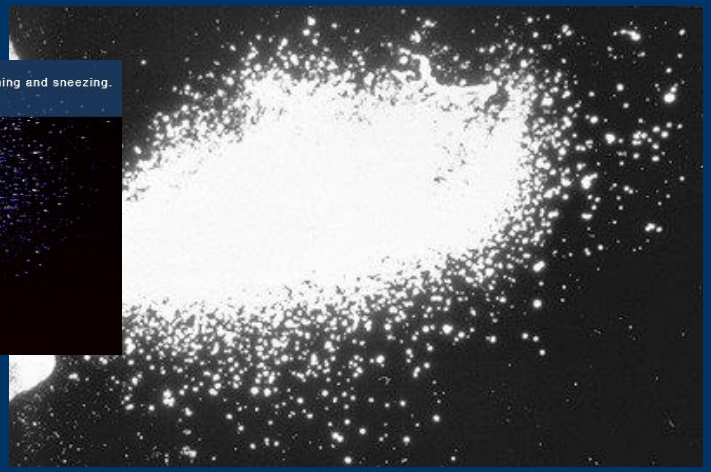
- Mission is to protect individual workers
- Medical surveillance for the protection of the employee
- Regulatory enforcement mechanism
- Risk at work is often more concentrated than risks to the general public
- Employees jobs require them to take risks to protect others.

Public Health

- Mission is to protect the overall public's health
- Medical surveillance to protect the public
- Usually relies on guidelines, and enforces through licensing
- Develops risk reduction measures for the general public, don't always focus on specific occupational risks to individual workers

What is an Aerosol Transmissible Disease?

- A disease
- That is transmitted by aerosols (A gaseous suspension of fine solid or liquid particles)



Coughing, talking, singing, etc. generate particles of different sizes

Which diseases?

- Infection control professionals distinguish between diseases primarily spread by:
  - larger droplets (near field) >5 microns (droplet precautions)
  - Small droplets, droplet nucleii, dusts containing the pathogen (airborne isolation)
- Not congruent with IH approach to aerosols
- There is evidence for an “airborne route” for many diseases
  - E.g Roy CJ, Milton DK NEJM 350;17 April 22, 2004

Airborne Infectious Diseases

- Airborne spore release (e.g. anthrax) until decon
- Chickenpox (Varicella)
- Avian influenza capable of causing serious human disease
- Herpes zoster (varicella-zoster, disseminated disease, per CDC)
- Measles (rubeola)
- Monkeypox
- SARS (Severe Acute Respiratory Syndrome)
- Smallpox
- Tuberculosis

Cal/OSHA added:

- Novel or Unknown pathogen
- Any other disease or pathogen for which CDPH or local health officer recommends AII

Some Droplet Diseases

- Diphtheria
- Influenza
- Meningococcal disease
- Mumps
- Mycoplasma pneumonia
- Pertussis
- Plague (pneumonic)
- Rubella
- SARS
- Viral hemorrhagic fevers
- Any other disease or pathogen for which CDPH or LHO recommends droplet precautions

Novel and Unknown Pathogens

- CDC and WHO initially didn't recommend AII for SARS
- Nosocomial transmission of SARS in Canada and Asia
- Standard initially classifies a new ATD as "airborne" (AII and respirators) until mode is known
- Would apply to avian and early stages of pandemic flu
  - Worked with state health dept for PFP

“One example was the debate during SARS over whether SARS was transmitted by large droplets or through airborne particles. The point is not who was right and who was wrong in this debate. When it comes to worker safety in hospitals, we should not be driven by the scientific dogma of yesterday or even the scientific dogma of today. We should be driven by the precautionary principle that reasonable steps to reduce risk should not await scientific certainty.” *SARS Commission Final Report, Volume 3, p. 1157*

CDC Revised Paradigm in 2010

- CDC recommended respirator use for 2009 H1N1 as a “novel” pathogen
- In 2010, H1N1 classified as seasonal flu
- CDC recommended use of respirators and AII for aerosol generating procedures (AGP) for influenza (and later Ebola)
- CDPH followed; that allowed Cal/OSHA to require respirators based on their recommendation for AGP

What do ATDs have in common?

- Initial symptoms and signs are often not specific
  - E.g. TB initially presenting as “pneumonia”
- Many pose significant risks, particularly to health care workers – e.g. TB
- There is often an airborne route, even for diseases classified as droplet
- It is currently believed that cough etiquette (respiratory hygiene) can reduce the spread of disease, particularly in the period prior to initiation of appropriate treatment.

Why Cal/OSHA did ATD vs ID?

- Origin is the respirator standard
- Many high consequence or emerging pathogens have an aerosol route:
  - Public Health agencies reluctant to recommend respirator use and AII
  - Hospitals and other ERs not prepared
  - Drug resistant TB, SARS, MERS, H5N1 influenza, Ebola difficult to treat, no vaccine
- ATD standard requires all HICPAC transmission-based precautions for ATDs
- Cal/OSHA current proposal for STDs

ATD Application (1)

- Health care facilities, services and operations, including:
  - Hospitals, skilled nursing, long term care, facilities where high hazard procedures are performed
  - Clinics, medical offices, other outpatient operations
  - Home care
  - Medical outreach services
  - Paramedics, EMTs (including firefighters) and medical transport
- First receiver from biological releases
- Biological laboratories (research, clinical, academic)

ATD Application (2)

- Specified law enforcement and public health
- Identified high hazard environments
  - Corrections
  - Homeless shelters
  - Drug treatment programs
- High hazard procedures on cadavers:
  - Coroners, pathologists, medical examiners, mortuaries
- Certain environmental operations
  - Maintenance, renovations, service or repair in areas or equipment reasonably anticipated to contain ATPs or ATPs-L
- Order to take special action for other workplaces

Conditionally exempt

- Dentists
- Medical specialty offices that don’t treat ATDs
- To be exempt, employers must have screening and referral procedures

ATD Standard -- Concepts

- Early identification and broad source control measures (respiratory hygiene)
- Tracks HICPAC recommendations for specific precautions
- “Referring employer” category covers primary care, etc.
- Facilities that provide services to “airborne infectious” disease cases must have engineering controls, respirators, etc.

ATD Standard – Concepts (2)

- Exposure Incident – employees exposed without control measures to a confirmed case of a Reportable ATD, as listed in Title 17.
- ER required to offer vaccinations; EE may decline
- Precautionary Removal – when an employee is NOT sick, but is required to be removed from the workplace during an incubation period because the employee may be infectious (tied to positive TB or exposure incident)
- Novel or Unknown Pathogen – e.g. SARS in 2003

Airborne Infection Isolation

- Suspected or confirmed case must generally be transferred within 5 hours
  - Conditional exceptions for late night, patient condition, availability; must be documented
- AIIR includes:
  - 12 air changes per hour (6 can be air cleaning)
  - Annual measurement
  - Daily verification of neg pressure when in use
- Respirators for suspect and confirmed AirIDs
  - Minimum N95
  - PAPR, equivalent or better for AGP
  - N, P or R 100 for high hazard field EMT
  - Now annual fit-test required!

Different Approach for Zoonotics

- Applies to exposures to animals, which includes products, waste and carcasses (up to passing of food inspection)
- Under normal circumstances, address under IIPP, Sanitation, and PPE
- Increased precautions
  - Wildlife alert
  - Premise quarantine or movement restrictions
  - Infected premises or depopulation
  - Vivariums (ABSL3 or above)

Exposures to Animals

Obtaining a swab for diagnosing disease from a presumably sick chicken. Source: http://www.avian-influenza.com/Disease/AI_in_poultry/Diagnosis.asp; accessed April 2, 2006.

A few examples:
Agriculture
Zoos
Pet shops
Veterinarians
Park and outdoor maintenance
Field biologists

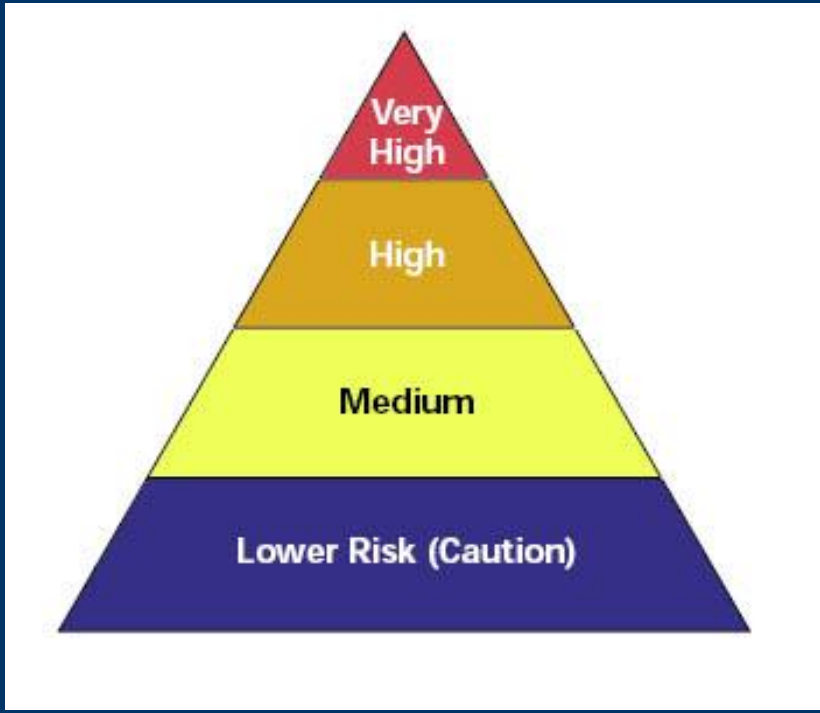
Some Good Choices

- Require respirator use independent of vaccination status for AirIDs
- Strong requirements for AII, and for exposures to infected animals
- Biological labs must treat incoming pathogens as virulent or “wild type” until verified
- Public health agencies can add pathogens to standard or increase protections, but can’t decrease below standard
- Addressed all transmission-based precautions for covered diseases

And Some Questionable Ones

- Initial decision not to cover environmental pathogens (except in labs)
  - Legionella
  - Coccidiodes (Valley Fever) and other soil borne
- Covers only diseases requiring either droplet or airborne precautions
- Doesn’t cover contact with the presumed “healthy” public, e.g. retail

OSHA Risk Pyramid



How Do You Know it's a pyramid?

HCW – Aerosol Generating Procedures

HCW

High Frequency Contact with General Population

Minimal contact with general public and other co-workers

Definition of Occupational Exposure

Exposure from work activity or working conditions that is reasonably anticipated to create an elevated risk of contracting any disease caused by ATPs or ATPs-L if protective measures are not in place. In this context, “elevated” means higher than what is considered ordinary for employees having direct contact with the general public outside of the facilities, service categories and operations listed in subsection (a)(1) of this standard. Occupational exposure is presumed to exist to some extent in each of the facilities, services and operations listed in subsection (a)(1)(A) through (a)(1)(I).

What About Public Contact?

- Schools
- Grocery checkers, bank tellers, etc.
- Public offices such as social services, DMV
- Some public transit and terminals

Outdoor Air Supply

Trend nationally and in California is to decrease ventilation in congregate spaces,

Required Demand Control Ventilation. HVAC systems with the following characteristics shall have demand ventilation controls complying with 121(c)4:

A. They have an air economizer; and

B. They serve a space with a design occupant density, or a maximum occupant load factor for egress purposes in the CBC, greater than or equal to 25 people per 1000 ft2 (40 square foot per person); and

C. They are either:

i. Single zone systems with any controls; or

ii. Multiple zone systems with Direct Digital Controls (DDC) to the zone level.

EXCEPTION 1 to Section 121(c)3: Classrooms, call centers, office spaces served by multiple zone systems that are continuously occupied during normal business hours with occupant density greater than 25 people per 1000 ft2 per Section 121(b)2B, healthcare facilities and medical buildings, and public areas of social services buildings are not required to have demand control ventilation.

Effect of Ventilation

- Myatt (2004)
  - Varied outdoor air supply
  - Correlated 100 ppm CO2 increase with increased collection of virus particles
    - DCV permits 600 ppm increase
- Blachere (2009) found influenza virus in hospital emergency department

Some ATD Accomplishments

- 2009 H1N1 clearly required respirator use and cited UCSF for refusal; most hospitals complied
  - Cal/OSHA included in emergency management
  - Project with CDPH to train primary and long term care on respirator use and standard
- Hospitals cited for failure to investigate and report to local health department meningitis exposures, measles
- Vaccination requirements for pertussis (Tdap) came into effect just in time to support vaccination of HCWs
- Many problems found and corrected in airborne infection isolation ventilation systems

Some ATD Accomplishments

- Correctional officers accompanying TB patients to outside hospital had not been trained or fit-tested for respirators
- Investigation of lab related meningitis death at VA
  - No citations issued for many biosafety violations due to OSHA determination EE was an “unpaid federal” EE although working for a private contractor.
- LA County used ATD for homeless TB outbreak
- Based on CDPH recommendation, special order issued requiring use of PAPR for all contact with XDR TB patient
- Were able to use ATD and BBP for Ebola in dealing with government guidelines and hospitals

Zoonotics

- Bovine TB infected herds
  - Identified through USDA slaughterhouse procedures
  - Followed up with farms with CDFA
- Chlamydia in turkey farm
- CDPH is using standard for working with local health departments
- Recent hantavirus outbreak was in federal jurisdiction

We can do Better

- Cal/OSHA has done too little to implement both standards due to lack of resources
- Should require respirator and AII for high hazard procedures on all ATDs.
- Require respirators for high consequence droplet
- Federal government must do better to ensure respirator quality, fit, and supply
- Fit-testing procedures in hospitals (and probably elsewhere) do not detect poor fits
- ATD Standard requires surge procedures including stockpiling and staffing, but it isn't done

We Can Do Better (2)

- Increase protection for “high consequence” pathogens e.g. XDR TB and Ebola (similar to biosafety paradigms)
- How to deal with public environments at increased risk, e.g. schools, transportation
  - Cal/OSHA standard applies to school nurse, but not other school employees
  - Cal/OSHA standard applies to “nurse in the box” but not the retail employees
  - Cal/OSHA has a minimal HVAC standard, but real requirements are in building code
- Contact precautions?

It's too early to claim success, but…

- Cal/OSHA is at the table for public health guidance on infectious disease
- Most hospitals in California are:
  - Prepared to use respirators
  - Have implemented some PAPRs
  - Regularly testing AIIR
  - Notifying public health and pre-hospital employers
- Licensed facilities in California
  - Have some employee training
  - Have a written program and designated administrator
- Corrections has implemented respirators

ATD Standard on the Web

Standards

- http://www.dir.ca.gov/Title8/5199.html
- http://www.dir.ca.gov/Title8/5199-1.html

Rulemaking docs:

- http://www.dir.ca.gov/oshsb/atd0.html
- http://www.dir.ca.gov/oshsb/zoonotics0.html