Objectives

1. Identify emerging roles for occupational health professionals in occupational safety and health standards
2. Analyze the role of occupational health professionals in responding to 2009 H1N1
3. Describe exposure investigation and medical removal issues in occupational health practice

Collaborations

• Change to lead regulation
  – Blood lead levels
  – Routes of exposure

• Guidelines for coroners for heat illness
<table>
<thead>
<tr>
<th>Emerging Roles for Occupational Medicine</th>
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<tbody>
<tr>
<td>• Injury triggers for standards</td>
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<tr>
<td>– Repetitive Motion Injuries</td>
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<td>– Diacetyl</td>
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<td>• Infectious diseases</td>
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<td>– Prevention</td>
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<td>– Work-related determinations</td>
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<td>– Research</td>
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<td>• Medical privacy</td>
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<td>• Recording improvements</td>
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<table>
<thead>
<tr>
<th>RMI Injury Trigger (Section 5110)</th>
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<td>• More than one qualifying injury in 12</td>
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<tr>
<td>month period required to trigger standard</td>
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<td>• Criteria not consistent with other regulations (e.g. workers comp, recording)</td>
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<td>• No application of the standard without two diagnosed cases</td>
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<th>RMI Triggers</th>
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<td>Two injuries within 12 months that:</td>
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<td>• Work related causation. The RMIs were</td>
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<td>predominantly caused (i.e. 50% or more) by a repetitive job, process, or operation;</td>
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<td>• Relationship between RMIs at the workplace. Injured employees performing a job process, or operation of identical work activity.</td>
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<tr>
<td>• Medical requirements. The RMIs were musculoskeletal injuries that a licensed physician objectively identified and diagnosed;</td>
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<td>• Reported to employer within previous 12 months</td>
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Diacetyl (Section 5197)

- Standard applies to establishments using food and flavorings with ≥ 1% diacetyl (no injury required)
- Some provisions apply to other food and flavoring establishments if employee diagnosed:
  - “work-related” intended to be consistent with 14300.5
  - fixed obstructive lung disease – criteria from American Thoracic Society Guidelines
- Employer must report to the Division any “flavor-related diagnosis” of fixed obstructive lung disease.

Infectious Diseases

- Occupational infections are often not identified
- How do you prove an infection was contracted in the workplace?
  - Widespread – e.g. H1N1 influenza, TB
  - Rare – e.g. measles
  - Environmental – e.g. valley fever
  - Identified index case
  - Clusters investigations

HIV adult film outbreak 2004

HIV QUARANTINE LIST 6-30-04
UPDATE 6-30-04 6:00 pm
As of 4/13/04, the AIM Healthcare Foundation found a positive detection for the HIV Virus of an actor named Darren James. We have taken confirmatory tests which validate his positive status. The following people are on quarantine from working in the industry until they retest!
(from AIM website)

Tricia Deveraux
Photo from Online Spectator
Adult Film Outbreak 2004

- Barrier protection not widely used
- Many LA area heterosexual companies use 30 day testing protocol
- Index case tested negative March 17, 2004, positive April 9, 2004
- Of 13 contacts identified, three contracted HIV
- CDC molecular analysis of index and two contacts found 100% identical virus

H1N1? fatality July 2009

- Oncology nurse admitted to ICU 7/8
- Bronchoscopy 7/9 found mixed pattern predominantly CA MRSA plus Influenza A
- Autopsy did not address MRSA
- Nurse’s MRSA exposures not initially investigated
- Investigation did not find direct link to any H1N1 patient.

Exposure Investigations
RATDs

- Reportable Aerosol Transmissible Disease
  - Reportable under California Public Health Regulations (Title 17, Section 2500)
  - Listed in ATD Standard, App. A
  - Includes “unusual disease” for which CDPH requires a report
  - Triggers requirements for investigation of exposure incidents (Subsections (h)(6) through (h)(9))

Exposure Incident reports

- Diagnosing health care provider or HCP’s employer reports RATD to local health officer (LHO)
- Employer determines from its records other employers whose employees may have had contact with case and notify
  - E.g. Ambulance, paramedics, EMTs, referring physician’s office or clinic

Exposure Analysis

- Each employer conducts analysis of exposure scenario within timeframe reasonable for specific disease and no longer than 72 hours after report to LHO or receipt of notification. Record:
  - name and employee identifier of each employee included in analysis
  - basis for determining that an employee doesn’t need to be referred for medical follow-up
  - Person performing exposure analysis and PLHCP consulted re immunity
Evaluating Exposure Incidents

- What determines the likelihood of transmission of disease?
  - Distance
  - Time
  - Infectivity of the source
    - Superspreaders
  - Control measures and PPE
  - Susceptibility of the host
- TB contact tracing typically limited by time and distance

Exclusion from post-exposure follow-up

- Employee did not have “significant exposure”
  - “An exposure to a source of ATPs or ATPs-L in which the circumstances of the exposure make the transmission of a disease sufficiently likely that the employee requires further evaluation by a PLHCP.”
- PLHCP determined that employee not susceptible to disease
  - Susceptibility to be determined in accordance with applicable public health guideline

Exposure Incident Medical Follow-Up

- Within reasonable time frame for disease and no more than 96 hours after employer informed of exposure
  - Notify all employees with significant exposures
  - As soon as feasible, refer to medical provider who is knowledgeable about the specific disease
Precautionary Removal

- As a result of follow-up for TB conversion
- As a result of follow-up for an exposure incident
- Employee is otherwise able to work
- Physician or Local Health Officer recommends removal for infection control
- Employer must maintain employee’s pay and other benefits during period of removal
- PRP ends at end of potential infectious period or if employee becomes sick

Neisseria meningitidis

- Gram negative aerobic bacteria
- Leading cause of bacterial meningitis
- Case-fatality rate of invasive meningococcal disease is 9-12%, even with antibiotics; up to 40 percent if meningococcemia
- Transmitted by respiratory secretions
- Up to 20 percent of survivors have permanent sequelae
- Incubation period 2-10 days
- Chemoprophylaxis recommended within 24 hours for close contacts

Suspect or confirmed case to be reported immediately to local health department

(17 CCR 2500)

Employee Meningitis Cases in Alameda County

- December 3, welfare check found a patient unconscious in his home. Responding agencies: Police, Fire, Ambulance
- Patient transported to hospital
- About a dozen people worked on the patient in the ED, including intubation
- December 4 suspect case (not reported to local health department)
  - 9:30 a.m. CSF positive for gram negative diplococci bacteria
  - 3:30 p.m. blood positive for gram negative diplococci
Meningitis Cases in Alameda County (cont)

- Dec. 6, 9:30 a.m. CSF confirm N. mening.
  - Confirmed case, no report at that time
- December 7 hospital:
  - 2:10 p.m. notified Alameda County
  - Possibly notified ambulance company but not police or fire
- December 8, Alameda County reported to Oakland Police Department (OPD)
- December 9, OPD notifies 3 of 4 officers
- December 9, police officer sees doctor, then hospitalized
- December 10, 10:45 p.m. respiratory therapist taken unconscious by ambulance to hospital

Meningitis Cases in Alameda County (cont)

- December 11, RT department informed of employee hospitalization and emergency department managers start exposure investigation and prophylaxis
- December 15, hospital IC and EE health managers complete exposure analysis with radiology and respiratory therapy

What Went Wrong?

- Hospital did not immediately report suspected case on December 4
- Hospital did not immediately report confirmed case on December 6
- Hospital claims to have notified ambulance company on 12/7, never notified police or fire
- Hospital didn’t initiate exposure analysis until 12/11 (after employee hospitalized)
- “Some diseases, such as meningococcal disease, require prompt prophylaxis of exposed individuals to prevent disease.” (note to 5199(h)(6)(B))
Occupational Health and Infectious Disease Exposure Investigations

- Exposure investigations generally done by infection preventionists or infectious disease specialists
- "Rules of thumb" from CDC and public health focus on “close contacts”
- Occupational exposures may be higher risk
  - Patients may be sicker
  - Occupational activities may have unrecognized high risks
- Precautionary removal – alternate assignments

2009 H1N1

- March 2009 – reportedly 60% of population in La Gloria, Veracruz, Mexico were sickened with flu
- March 7 – CDC routine surveillance detected increase in influenza cases
- March 17 earliest Mexican case later confirmed as 2009 H1N1
- March 28 earliest U.S. case later confirmed in Imperial County
- April 21 CDC notification to physicians
- April 24 first World Health Organization (WHO) outbreak notice
OSHA and Cal/OSHA Initial Response

- April 27, 2009 WHO raised alert level from Phase 3 to 4
- April 29 WHO raised alert level to 5
  - Cal/OSHA posted webpage with advice to employers and employees
  - May 7 Acting OSHA Director Jordan Barab
    "OSHA stands prepared to use its existing authority to aggressively enforce safe work practices to ensure employees receive appropriate protection."

OSHA and Cal/OSHA Initial Response

- May 18, 2009 OSHA opened inspection of Flushing Hospital which treated several patients from the Brooklyn High School
  - Citations issued 8/14/09 for four serious respirator violations regarding novel H1N1
- May 21 Standards Board passed ATD standards
- June 11 WHO raised alert level to 6

Cal/OSHA’s H1N1 Summer

- California continued to experience cases and respirator supplies were challenged
  - Cal/OSHA raised stockpile distribution with CDPH in early summer
- August 5, 2009 ATD standard effective
- Guidance issued 8/21/2009 re application of ATD standard to H1N1
- September 8, Cal/OSHA issued new guidance addressing respirator supply including redonning and prioritization
And then in the fall…

- Oct. 19 California Nurses Association announced one-day strike on Oct. 30 over H1N1 protection
- October 22 CDPH announced up to half of 52 million state stockpiled respirators will be released to local health departments for distribution
- October 22 Cal/OSHA guidance revised to remove prioritization

The Great H1N1 Respirator Controversy

- Initially CDC and CDPH recommended respirators for health care worker protection
- Some other states and local jurisdictions recommended only surgical masks
- June 12, 2009 SHEA* recommended reducing to surgical masks
- July 23 HICPAC** recommended use of surgical mask for patient contact

More on Respirators

- Institute of Medicine convened panel August 11-14, report September 3 recommended respirator use for patient contact
- October 14, 2009 CDC guidance recommended use of respirators as part of control strategy that included engineering controls, work practices
  – Addressed “extended use” and “reuse” if shortages
- Federal OSHA enforcement directive CPL-02-02-075, effective November 20, 2009 required respirator use and other control measures.

* Society for Healthcare Epidemiology of America
**Healthcare Infection Control Practices Advisory Committee
Institute of Medicine Report
September 2009
Healthcare workers (including those in non-hospital settings) who are in close contact with individuals with nH1N1 influenza or influenza-like illnesses should use fit-tested N95 respirators or respirators that are demonstrably more effective as one measure in the continuum of safety and infection control efforts to reduce the risk of infection.

CDC Recommendations
October 14, 2009
“CDC continues to recommend the use of respiratory protection that is at least as protective as a fit-tested disposable N95 respirator for healthcare personnel who are in close contact with patients with suspected or confirmed 2009 H1N1 influenza. This recommendation applies uniquely to the special circumstances of the current 2009 H1N1 pandemic during the fall and winter of 2009-2010…”

Loeb Study

- **Press release statement:**
  “A Canadian study in the Journal of the American Medical Association in October found no difference between fit-tested N95 masks and surgical masks.”

- **Loeb Abstract:**
  “Among nurses in Ontario tertiary care hospitals, use of a surgical mask compared with an N95 respirator resulted in noninferior rates of laboratory confirmed influenza.”

Mark Loeb; Nancy Dafoe; James Mahony, et al. Surgical Mask vs N95 Respirator for Preventing Influenza Among Health Care Workers: A Randomized Trial. JAMA. published online Oct 1, 2009; (doi:10.1001/jama.2009.1406)
But the Loeb Study also...

- Found statistically significant difference between surgical masks and respirators for fever:
  - "A significantly greater number of nurses in the surgical mask group (12, or 5.66%) reported fever compared with the N95 respirator group (2, or 0.9%; P=.007)."
- Found difference 9/212 (sm) vs. 2/210 (resp) influenza like illness (p=0.06 not enough power)
- Had NO control group
- Had very small observational component
- Although stated it had accounted for vaccination use in analysis, numbers do not reflect that

Letter to President

- Infectious Disease Society of America (IDSA), Association of Professionals in Infection Control (APIC), and Society of Healthcare Epidemiologists of America (SHEA) wrote to Obama that:
  - IOM and CDC recommendations based on flawed study (McIntyre, not yet published)
  - CDC recommendations should be downgraded
- IOM report had stated it was not based on studies presented that had not been published yet. (neither Loeb nor McIntyre had been published)

AIHA and APHA

- 11/12/09 American Industrial Hygiene Association (AIHA) statement supported the use of respirators in the context of an overall program to control risks of aerosol transmissible diseases
- 11/19/09 American Public Health Association (APHA) letter supported CDC recommendations and process
OSHA Instruction

- Employers to implement a system of controls to address H1N1 hazards in high and very high hazard workplaces.
- If respirators not used per CDC recommendations,

  “The employer failed to select and provide an appropriate respirator based on the respiratory hazard(s) to which workers were exposed and workplace and user factors that affect respirator performance and reliability pursuant to 29 CFR 1910.134(d)(1)(iv). Employees were provided with a [surgical mask, if applicable; list manufacturer/model] instead of NIOSH-certified N95 respirators for protection against airborne transmission of H1N1 [subtype] influenza virus when performing high hazard tasks [including close contact care of patients with suspected or confirmed pandemic influenza].

- OSHA CPL-02-02-075, effective 11/20/2009

2010

- February 4, 2010 CDPH and Cal/OSHA issued guidance (still current as of 9/2/10)
  - CDPH changed case definition due to low prevalence of H1N1 in community
- June 22 CDC published proposed guidance for seasonal flu to include H1N1
  - Respirator use for aerosol generating procedures;
  - Surgical masks for other use; may provide respirator instead
- Public comment period ended July 22

Limitations of Incident Command Paradigm for Public Health

- Incident command is intentionally:
  - Centralized
  - Hierarchical
  - Limited inputs
  - Limited term
- Public health response is:
  - Decentralized -- based in Local Health Departments
  - Requires coordination between different agencies/organizations
  - Requires the inputs of many constituencies
  - May go on for many months
Infection Control, Public Health and Occupational Health

- What risks are acceptable for health care workers, and who has the right to accept those risks?
- What role/influence is accorded to occupational health agencies (regulatory and non-regulatory)?
- Health care facilities are seen as part of the public health response, so employers are often included in planning. But how are employees and their representatives included in planning for public health emergencies and response?

Respirator Supplies

- Respirator manufacturers claimed to have addressed issues that led to respirator shortages during SARS
- By May 2009 respirator purchasers reported that prices had increased
- By June 2009 some distributors reported shortages
- Lack of standardized triggers or mechanisms for requesting/releasing stockpiled respirators
- As shortages developed, new products, with no track record, were introduced

Conserving Respirator Supplies

- Reuse of filtering facepiece respirators (redonning) is common practice in general industry and, prior to 2009, for TB in health care
- Is there a risk to patients or employees from extended use and reuse/redonning?
  - What are appropriate risk reduction measures if extended use or re-use, e.g. hand hygiene, storage, limitation time respirator is in service
- Can filtering facepiece respirators be disinfected?
Respirator Fit-Test Exercises

- Normal Breathing
- Deep Breathing
- Turning head side to side
- Moving head up and down
- Talking
- Grimace (not done for qualitative, not counted for quantitative)
- Bending over
- Normal breathing

Quantitative Fit Test

- Current NIOSH respirator certification protocols for filtering facepiece respirators do not require the manufacturer to determine fit capability
- Large health care provider in California found very low fit-test success rate with 3M 8000 respirator, which comprised 60 percent of state stockpile
- NIOSH testing using protocol similar to the Total Inward Leakage proposal found much higher pass rates

Respirator Fit

- Normal Breathing
- Deep Breathing
- Turning head side to side
- Moving head up and down
- Talking
- Grimace (not done for qualitative, not counted for quantitative)
- Bending over
- Normal breathing
Why Didn’t NIOSH find a Problem?

• Fit tests include 7-8 exercises designed to test the facepiece seal
• Qualitative fit-testing may be more sensitive to a brief break in the seal
• Quantitative fit protocol averages exercises during each test – a respirator that failed an exercise could still pass the test
• NIOSH Protocol counted as a pass if respirator passed test on one of three trials for user
• NIOSH did find pass rates lower than TIL proposal would permit

Novel Pathogens

• ATD standard requires higher level precautions for novel pathogens
• What determines that a pathogen is no longer novel?
  – The pathogen has been subtyped or sequenced?
  – The pathogen has proved stable over some period?
  – A percentage of the population has immunity?
  – A vaccination is available?
  – The attack rate or case fatality rate is “acceptable”?

Conclusions

• Although H1N1 caused some serious disease and death, in most cases illness was self-limited and managed in an outpatient or non-medical setting.
• The H1N1 epidemic revealed many weaknesses in planning and implementation that might have had more serious consequences had the disease been worse.
• Significant changes in respirator supply, respirator certification, and use must be made if respirators are to be sustained for a prolonged period of time in a nationwide epidemic.
Find Cal/OSHA on the Web

- Section 5199:
  http://www.dir.ca.gov/Title8/5199.html
- Cal/OSHA regulations:
  – http://www.dir.ca.gov/samples/search/query.htm
- Advisory committee webpage:
  – http://www.dir.ca.gov/dosh/DoshReg/advisory Committee.html