Overview of Presentation

1. Occupational population at risk
2. Case definition
3. Signs and symptoms
4. Causal agents
   • biological & chemical
5. Relevant frameworks & legislation
   • British Columbia & United States
6. Methods for Risk Assessment
7. Strengths & Limitations
8. Recommendations
Occupational Population at Risk

Estimated 5,200 - 6,200 lifeguards currently working in British Columbia (BC),

- 130-year round indoor pools in BC
- Average of 40 lifeguard/aquatic staff per pool
- 7,790 certified lifeguards in BC and Yukon

Young workers especially vulnerable to lifeguard lung:

1. Early life exposure = longer potential life suffering
2. More likely to work in physically demanding/hazardous environments

Lifeguard Lung = indoor pool + poor air quality

Aerosolized water spray features facilitate inhalation

Longer, more frequent exposure → greater risk of lifeguard lung

- ~50% aquatic centre staff are under 22 years old
Developing a case definition

**Lifeguard Lung**
- Granulomatous pneumonitis
- Chronic respiratory impairment
- Linked with exposure to substances in water sprays, waterfalls and waterslides

**Hot Tub Lung**
- Granulomatous/hyperse nsitivity pneumonitis
- Chronic respiratory impairment
- Linked with exposure to substances in hot tubs & indoor pools

**Signs & Symptoms**
- Difficulty breathing
- Nasal congestion
- Wheezing
- Coughing
- Fatigue
- Night sweats
- Weight loss
- Mycobacterial infection
- Asthma
- Headaches
- Mycotoxicosis
- Sarcoidosis
- Interstitial opacities
- Farmer's lung
- Eosinophilic bronchiolitis
- Long term chemical sensitivity
- Chest discomfort
- Bronchiolitis obliterans
Biological Causal Agents

**Endotoxins**: toxins kept within bacterial wall; released when cell wall destroyed\textsuperscript{10}

**Nontuberculous Mycobacteria (NTM)**: fungus-like bacteria (“myco”) that does NOT cause tuberculosis\textsuperscript{5,11,12}

**Mycobacterium Avium Complex (MAC)**: NTM most associated with hot tub lung\textsuperscript{5,9}

1. Highly resistant to chlorine\textsuperscript{13}
2. At 42°C, can grow at maximal rate for up to 5 days\textsuperscript{5,14}
3. Aerosolization drastically increases number of NTM cells/mL water droplets ejected from water\textsuperscript{4}
4. Poor ventilation exacerbates persistence\textsuperscript{15}

Chemical Causal Agents

**Chloramines**\textsuperscript{15-20}: group of disinfectant by-products (DBPs) associated with respiratory and eye symptoms among pool staff

**Trichloramine (NCL\textsubscript{3})**: chloramine most associated with these symptoms\textsuperscript{17,19,21}

- prevalence associated with 5 factors:
  1. Quality of air ventilation\textsuperscript{17,22,23}
  2. Air temperature\textsuperscript{23}
  3. Water chemistry\textsuperscript{17,19,23}
  4. Number of people in pool\textsuperscript{19,23}
  5. Use of water spray features\textsuperscript{9,23}
Relevant Regulatory Frameworks & Legislation within BC

WCB and CUPE legislation unable to address long latency period of lifeguard lung
- WCB Compensation for Occupational Disease Policy
- Schedule B of the Workers Compensation Act
- PoolSafe BC: Best Practices Guide

BC pool facility health & safety legislation is unsatisfactory
2. B.C. Guidelines for Swimming Pool Operation
3. B.C. Guidelines for Swimming Pool Design

Relevant Regulatory Frameworks from United States

US Centre for Disease Control (CDC)
1. Provide patron and employee education
2. Ensure spray features draw from treated/filtered water
3. Allow water to drain of features when not in use
4. Consider locations of ventilation supply and return ducts

American Society of Heating, Refrigerating and Air-Conditioning Engineering (ASHRAE)
- Source capture and exhaust strategy
- Figure on next slide...
1. Identify hazards of lifeguard lung

2. Rank identified hazards by importance

3. Identify appropriate control measures

4. Implement control measures

5. Evaluate control measures’ effectiveness

Methods of a Risk Assessment (within pool setting)

Source: Baxter, 2012 (Ref. 21)
Strengths and Uncertainties

Strengths of this report:

Hot tub lung and lifeguard lung discussed

Identifies need for further investigation on behalf of indoor pool workers

Written by students with non-partisan view

Uncertainties regarding:

Hazard assessment assumptions

Toxicological information

Exposure Parameters

Applicability of ASHRAE Source capture and exhaust strategy

Recommendations (Biological; Chemical) via CUPE’s 4 targets for prevention/monitoring

1. At the source
   • Saltwater chlorination

2. Along the path
   • Source capture and exhaust strategy
   • Filtration of water in spray features
   • Increase turnover rates of pool water

3. At the worker level
   • Education on symptoms & claims process

4. At the business/administrative level
   • Washroom reminders over PA system
   • Schedule busy shifts across all pool staff
   • Amend BC legislation to address hazards
Thank you!

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References – 1 of 6

1. Personal communication with Dale Miller, Executive Director of the Lifesaving Society of BC and the Yukon, November 15, 2012
References – 2 of 6


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References – 6 of 6


Image Sources

Granulomatous pneumonitis (slide 2)

Indoor waterpark (slide 8)

Lifeguard in tower (slide 8)

Source capture and exhaust strategy (slide 11 – Ref. 21)