Interdisciplinary Education and Experiential Learning in Occupational Safety and Health

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A NIOSH Education and Research Center
Objectives

• At the end of this activity attendees will be able to:
  – Understand the importance of interdisciplinary education in occupational safety and health
  – Identify examples of interdisciplinary education used by the NYNJ Education and Research Center
  – Understand the importance of site visits (experiential) as a learning methodology in occupational safety and health
Educational spectrum

Multidisciplinary  Interdisciplinary  Transdisciplinary
Interdisciplinary Education

• An educational approach in which two or more disciplines collaborate in the learning process with the goal of fostering inter-professional interactions that enhance the practice of each discipline.
Experiential Learning

- Learning through experiences and reflection.
- Direct experiences in a structured environment
  - actively seeks information, reflects on experiences encountered
- Derives meaning (active learning)
  - discourse with others that is transferable to other situations.

“Learning is experience. Everything else is just information”
Albert Einstein
NIOSH Education and Research Centers

• 18 ERCs in the US
• Graduate education
  – Occupational medicine
  – Industrial hygiene
  – Occupational safety
  – Occupation health nursing
• Continuing education
• Outreach
• Interdisciplinary education

1. University of Alabama at Birmingham
2. University of California, Berkeley
3. University of California, Los Angeles
4. University of Cincinnati
5. University of Colorado Denver
6. Harvard University
7. University of Illinois at Chicago
8. Icahn Mount Sinai School of Medicine
9. University of Iowa
10. Johns Hopkins University
11. University of Kentucky
12. University of Michigan
13. University of Minnesota
14. University of North Carolina at Chapel Hill
15. University of South Florida
16. University of Texas Health and Science Center at Houston
17. University of Utah
18. University of Washington
NYNJ ERC

- Established in 1978
- Administrative base at Icahn School of Medicine at Mount Sinai
- Occupational Medicine Residency
  - Icahn School of Medicine at Mount Sinai
  - Rutgers School of Public Health
- Industrial Hygiene (MS, MPH)
  - City University of New York (CUNY) School of Public Health
- Occupational Safety and Health Engineering (MS, PhD)
  - New Jersey Institute of Technology
- Occupational Health Nursing (PhD)
  - New York University
- Ergonomics and Biomechanics (MS, PhD)
  - New York University
- Continuing Education
  - Rutgers School of Public Health
Occupational Safety and Health

- Broad disciplines
- Diversity
- Common goals
Occupational Safety and Health

Exposures
- Physical
- Chemical
- Biological
- Radiological

Hierarchy of Controls

- Elimination: Physically remove the hazard
- Substitution: Replace the hazard
- Engineering Controls: Isolate people from the hazard
- Administrative Controls: Change the way people work
- PPE: Protect the worker with Personal Protective Equipment
Identify Exposures

Industrial hygiene
- Monitoring
- Sampling

Safety
- Job hazard analysis
- Work place design

Medicine
- Injuries
- Illnesses
Develop Controls

Industrial hygiene
• Evaluates worker exposures

Safety
• Evaluates workplace hazards

Medicine
• Sees impact of exposures and hazards on worker

How do we connect these approaches?
Interdisciplinary Approach

“Interdisciplinary cooperation has shown itself to be a prerequisite for being able to analyze and develop solutions to the often very aggregated and complex problems characterizing today’s working environment”


“A divide between the worlds of occupational health and safety practitioners and the medical care professionals who provide services for injured workers”


“To ensure optimal progress in addressing the problem [biomechanical], an interdisciplinary approach is essential”

– Biomechanics of Musculoskeletal Injury, Whiting and Zernicke, 2008, p. 3
Interdisciplinary Approach

“Occupational physicians need expertise in handling health and safety problems within a variety of different industries”


“Occupational hygiene should be taught firstly in the interdisciplinary context of the whole of occupational health (including occupational medicine, OHN, OS, and ergonomics) and secondly in relation to the wider field of public health (including epidemiology and biostatistics)”

Experiential Learning: Bernardo Ramazzini

• “[t]here were two main risk factors for working people: on the one hand those arising from the harmful effects of the substances and materials used, and on the other, those associated with the work-place and the work processes.”

• “From the artisans’ hovels —which in this sense are like centres of instruction where you can learn so much— I have sought to extract what may most interest the curious and what is more important, to provide medical precautions, both healing and preventive.”

Medical biographies and their historical significance. The figure and the work of Bernardino Ramazzini (1633-1714) http://scielo.isciii.es/pdf/mesetra/v60s2/en_especial02.pdf
Experiential Learning: Alice Hamilton

• “Hamilton and her assistants visited factories, read hospital records and interviewed labor leaders and druggists to uncover instances of lead poisoning.”

• “I was put on the trail of new lead trades.” Hamilton discovered more than seventy industrial processes in which workers were exposed to lead poisoning.

1 https://www.acs.org/content/acs/en/education/whatischemistry/landmarks/alicehamilton.html
2 Exploring the Dangerous Trades. The Autobiography of Alice Hamilton
HISTORICAL PERSPECTIVES ON OCCUPATIONAL SAFETY AND HEALTH TOUR
Historical Perspectives Tour

• Interdisciplinary
• Experiential
• Frame issues in an historical context
• A picture is worth a thousand words…..
Historical Perspectives Tour Objectives

• Upon completion students will be able to:
  – describe the hierarchy of controls as applied to the sites visited.
  – describe the hazards and protections identified and observed at the sites visited
  – describe the functions and strengths of an interdisciplinary occupational safety and health team
  – participate effectively as a member of an interdisciplinary OSH team describing a particular industrial facility.
Historical Perspectives Tour Site Visits

• Industrial facilities
  – Auto manufacturing
  – Textiles
  – Beryllium
  – Steel

• Dangerous occupations
  – Agriculture
  – Fishing
  – Mining (Asbestos, Coal, Granite)

• Hazardous Waste Clean-up
  – Love Canal
  – Hudson River
Interdisciplinary Teams

• 1: What is the process all about?
  – take us through the process (but not the hazards).
• 2: What are the IH hazards?
  – cover sampling and exposure assessment (briefly).
• 3: What are the safety hazards?
  – There are many, focus on the major issues.
• 4: What are the diseases?
  – present the health effects, medical monitoring, and treatment
• 5: What prevention strategies can be implemented?

• After tour: How did the tour of the site change the perception you had of the site prior to the visit?
The “Northern” Route
The “Western” Route
Historical Perspectives Tour
Unhealthy Conditions

Many workers incurred chronic health problems as a result of years in the mills. The Carding Room and other rooms in the mill were unhealthy over the span of a working life. High heat and humidity, stagnant air, and unsanitary conditions bred diseases, while the high levels of noise resulted in hearing impairment.

During the early years of the Lowell experiment the textile corporations established a hospital to deal with these health problems. In 1910, the Lowell Corporation Hospital admitted approximately 750 textile workers, over half of whom were suffering from work-related lung ailments.

Varicose veins, dropsical swelling of the feet and limbs, and prolapse of the uterus, diseases that end only with life, are not rare but common occurrences [among mill workers].

Letter from John Allen, c. 1849
Lowell Physician
Interdisciplinary and Experiential Education

• Real life scenarios
• Understanding practical and applied safety, rather than theoretical situations
• Hands on experience, learning
• Experience first-hand what it was like to be in work situations
• Interaction with fellow faculty and other students
• Assess work hazards with the assistance of a team
• Continuously analyze workplaces
• Understanding questions, surveys, and observations to identify potential hazards/risks
• Integrating industrial hygienists, safety and health, ergonomics professionals in the hazard evaluation