# Interdisciplinary Approach to Biological Exposure Monitoring and Health Monitoring

**Advanced Practice Short Course**

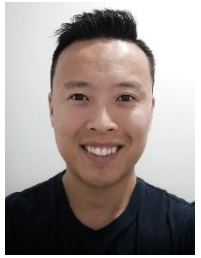
# Collaboration

# Introduction

- Dr Mary Obele
- Dr Berni Cameron
- Kate Cross
- Bridgette Jennings
- Kerry Cheung







# Purpose & Aim

- APSC programme
  - Ongoing training for practicing occupational hygienists or other allied H&S professionals
  - Tailored to needs and developing issues
  - Fills gap between theory and practice
- Interdisciplinary Approach to BEM & HM
  - Advanced knowledge and applied skills
  - Planning, conducting, and interpreting BEM & HM programmes
  - Collaboration between occupational hygienists, occupational health nurses, occupational physicians, businesses, and human resources.

# In scope/out of scope

**In scope**

- We assume you already know the fundamentals
- Perspectives from different stakeholders
- Interpretation of information; wider thinking

**Out of scope**

- “How-to” course
- Technical details
- Interpreting health monitoring reports

# Learning Objectives

- Differentiate between BEM and HM
- Apply NZ regulatory frameworks, BEIs, and good practice principles to monitoring programmes
- Discuss BEM and HM through case studies and examples
- Collaborate effectively between OHs, OHNs, OPs, businesses and HR to ensure monitoring results are acted upon
- Evaluate ethical, privacy, and record-keeping considerations in monitoring
- Design monitoring and follow-up strategies that integrate worker, business, and allied H&S perspectives

# Participate

- Because it’s online we want this course to be as interactive as possible
- It’s not often you get specialists from different disciplines together talking about the same thing
- Keep it positive, collaborative, no politics
- Feel free to ask us any questions in the chat or during discussion time
- We’ll even ask questions of you

# Agenda

| Presenter | Time | Topic |
|---|---|---|
| **Kerry** | 1230-1245 | Welcome, Housekeeping, Discussion |
| | 1245-1315 | Regulator's Perspective, Calculation Exercise, Discussion |
| **Bridgette** | 1315-1335 | Business Perspective Part 1 of 2, Discussion |
| | 1335-1345 | **Break (10 min)** |
| **Kate** | 1345-1405 | HR Perspective |
| **Bridgette** | 1405-1430 | Business Perspective Part 2 of 2, Discussion |
| | 1430-1440 | **Break (10 min)** |
| **Berni** | 1440-1500 | Occupational Health Nurse Perspective, Discussion |
| **Mary** | 1500-1520 | Occupational Physician Perspective, Discussion |
| | 1520-1530 | **Break (10 min)** |
| **All** | 1530-1620 | Case Study, Discussion |
| **Mary** | 1620-1625 | Call to Action |
| **Kerry** | 1625-1630 | Closing |

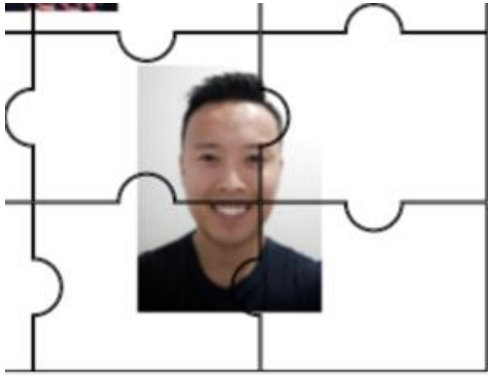
NZOHS

# First discussion

- What do you already know and understand about biological exposure monitoring and health monitoring?
- What is your experience with BEM and HM?
- What challenges do you have with BEM and HM?
- What do you want to learn from this course?

# Regulator’s Perspective

Kerry Cheung



# Definitions

- Biological Exposure Monitoring
  - The measurement and evaluation of exposure to a health hazard experienced by a person (GRWM 2016)
  - Exposure monitoring can be used to:
    - identify, assess and confirm health risks
    - identify where new control measures are needed
    - monitor how well current control measures are performing, and
    - identify when control measures need to be reviewed, updated or removed (GPG, 2022)
- Health Monitoring
  - Monitoring the individual to identify any changes in his or her health status because of exposure to certain health hazards (GRWM 2016)
  - Health monitoring can be used to tell you if workers are experiencing health effects from potential exposures. Health monitoring can also confirm that control measures are preventing harm (GPG, 2022)

# BEM or HM?

1. Measuring carboxyhaemoglobin levels in firefighters after a large structural fire

BEM

or

HM

# BEM or HM?

2. Monitoring blood lead levels in battery manufacturing workers to ensure they're below the biological limit value

BEM

or

HM

# BEM or HM?

3. Conducting audiometry for workers exposed to high noise levels

BEM

or

HM

# BEM or HM?

4. Testing expired breath for isopropanol after cleaning operations

BEM

or

HM

# NZ Legislation

- HSWA 2015
- GRWM 2016
- HSW Asbestos Regulations 2016
- Lead Process Regulations 1950
- HSW Mining Operations and Quarrying Operations Regulations 2016
- WorkSafe Guidance
  - WES & BEI
  - Exposure Monitoring and Health Monitoring GPG

# HSWA 2015

- s36 Primary duty of care
  - A PCBU must ensure, so far as is **reasonably practicable**, the health and safety of [workers and other persons]
  - That the **health** of workers and the **conditions** at the workplace are monitored for the purpose of preventing injury or illness of workers arising from the conduct of the business or undertaking
- s22 Meaning of reasonably practicable
  - Likelihood
  - Degree of harm
  - What you know, or ought reasonably to know about the hazard/risk and how to control the risk
  - Availability and suitability of ways to control the risk
  - After everything above is considered, then cost involved in controlling the risk, including whether it is grossly disproportionate to the risk

# HSWA 2015

- s60 When engagement is required:
  - When making decision about the procedures for the following:
    - Monitoring the health of workers:
    - Monitoring the conditions at any workplace under the management or control of the PCBU
- s59 Nature of engagement
  - Relevant information be shared
  - Let workers express their view, raise H&S issues
  - Let workers contribute to the decision-making process
  - PCBU takes workers' view into account
  - Advise workers of the outcome of the engagement
  - Involve HSR if there is one

# HSWA 2015

- WorkSafe could require a PCBU to carry out monitoring:
  - when an Inspector has told the PCBU to ensure monitoring is carried out, e.g. through an Improvement Notice
  - when a WorkSafe-appointed health and safety medical practitioner requires workers to be medically examined or biological samples to be taken (this can happen if they are satisfied the worker has been exposed to a significant work hazard) (s184).

# GRWM 2016

- Reg 30 – When exposure monitoring required
  - if the PCBU is not certain on reasonable grounds whether the concentration of a **substance hazardous to health** at the workplace exceeds the relevant **prescribed exposure standard**…
  - Question – does a scrap metal recycler with high levels of lead in the air have to measure blood lead levels of their workers and compare results again the WorkSafe BEIs?
- Reg 31 – When health monitoring required
  - the worker is carrying out ongoing work involving a **substance hazardous to health** that is **specified in a safe work instrument** as requiring health monitoring; and there is a **serious risk to the worker's health** because of exposure to the substance hazardous to health.
  - Question – is health monitoring required for the fumigant, ethanedinitrile? (audiometric and respiratory health monitoring)

# GRWM 2016

- Do these apply?
  - Reg 32 – Exposure monitoring
  - Reg 33-42 Health monitoring
- But how do you check that workers aren't being overexposed or experience health effects from exposure?
  - BEM and HM are ways to:
    - Reg 7 – Duty to maintain effective control measures
    - Reg 8 – Duty to review control measures

# Other Regulations

- HSW Asbestos Regulations 2016
  - Reg 15 (Duty to provide health monitoring )
  - Reg 16 (Duty to ensure that appropriate health monitoring is provided)
- Lead Process Regulations 1950
  - Reg 24 - A Medical Officer may require the examination of the blood or urine of workers if they consider workers may be absorbing lead in a quantity likely to injure health. A Medical Officer may require workers to undergo a medical
  - examination if they consider workers may be absorbing lead in a quantity likely to injure health
- HSW Mining Operations and Quarrying Operations Regulations 2016
  - Reg 127 and 128 - The operator must offer medical examinations to each mine, quarry and alluvial mine worker:
    - immediately before the worker starts work at the operation
    - immediately before the worker ceases working, if the worker has not been examined within the 12 months before that date
    - periodically throughout the time that the worker is working at the operation, but no less than once every 5 years
    - if a worker wishes to be examined.

# GPG - EM & HM

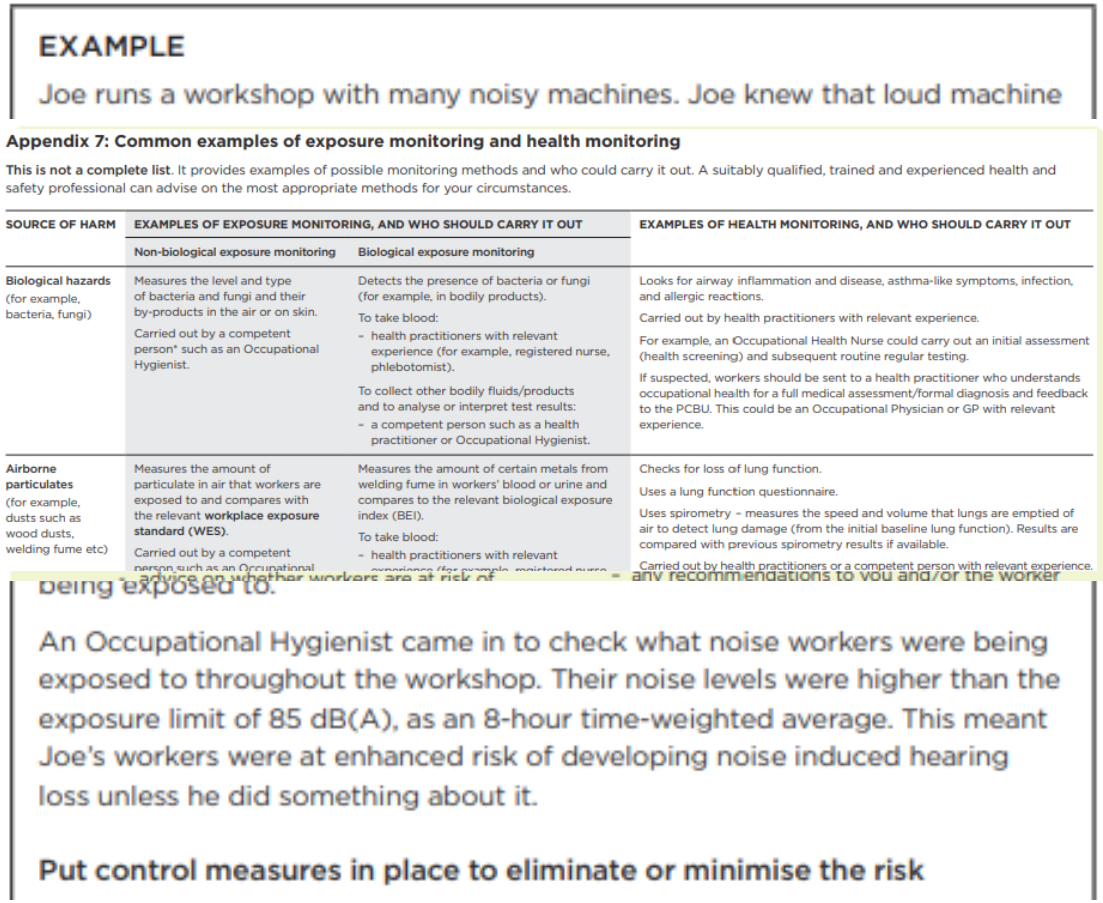
This guidance:

- explains what exposure monitoring and health monitoring are
- explains how exposure monitoring and health monitoring are used in managing health risks
- explains when to monitor
- describes what to think about when getting monitoring programmes underway
- explains next steps once decisions have been made.

# GPG - EM & HM

Useful information:

- Examples
- Questions to ask
- Comparison tables for EM & HM
- Appendix 7: Common examples of EM and HM
- Supports legislation



**EXAMPLE**

Joe runs a workshop with many noisy machines. Joe knew that loud machine

**Appendix 7: Common examples of exposure monitoring and health monitoring**

**This is not a complete list**. It provides examples of possible monitoring methods and who could carry it out. A suitably qualified, trained and experienced health and safety professional can advise on the most appropriate methods for your circumstances.

| SOURCE OF HARM | EXAMPLES OF EXPOSURE MONITORING, AND WHO SHOULD CARRY IT OUT | | EXAMPLES OF HEALTH MONITORING, AND WHO SHOULD CARRY IT OUT |
|---|---|---|---|
| | Non-biological exposure monitoring | Biological exposure monitoring | |
| **Biological hazards** (for example, bacteria, fungi) | Measures the level and type of bacteria and fungi and their by-products in the air or on skin.<br>Carried out by a competent person* such as an Occupational Hygienist. | Detects the presence of bacteria or fungi (for example, in bodily products).<br>To take blood:<br>– health practitioners with relevant experience (for example, registered nurse, phlebotomist).<br>To collect other bodily fluids/products and to analyse or interpret test results:<br>– a competent person such as a health practitioner or Occupational Hygienist. | Looks for airway inflammation and disease, asthma-like symptoms, infection, and allergic reactions.<br>Carried out by health practitioners with relevant experience.<br>For example, an Occupational Health Nurse could carry out an initial assessment (health screening) and subsequent routine regular testing.<br>If suspected, workers should be sent to a health practitioner who understands occupational health for a full medical assessment/formal diagnosis and feedback to the PCBU. This could be an Occupational Physician or GP with relevant experience. |
| **Airborne particulates** (for example, dusts such as wood dusts, welding fume etc) | Measures the amount of particulate in air that workers are exposed to and compares with the relevant **workplace exposure standard (WES)**.<br>Carried out by a competent | Measures the amount of certain metals from welding fume in workers' blood or urine and compares to the relevant biological exposure index (BEI).<br>To take blood:<br>– health practitioners with relevant | Checks for loss of lung function.<br>Uses a lung function questionnaire.<br>Uses spirometry – measures the speed and volume that lungs are emptied of air to detect lung damage (from the initial baseline lung function). Results are compared with previous spirometry results if available.<br>Carried out by health practitioners or a competent person with relevant experience. |

being exposed to.

An Occupational Hygienist came in to check what noise workers were being exposed to throughout the workshop. Their noise levels were higher than the exposure limit of 85 dB(A), as an 8-hour time-weighted average. This meant Joe's workers were at enhanced risk of developing noise induced hearing loss unless he did something about it.

**Put control measures in place to eliminate or minimise the risk**

# WES & BEI Special Guide

- BEI = Guideline values. Not mandatory
- Monitoring results (blood/urine) compared with BEI
- BEM is complementary to personal air monitoring
- BEM provides better indication of substance uptake by the work
- BEM can also detect non-occupational exposure

# WES & BEI Special Guide

- Exposure periods – timing of samples matter
- BEM can be classed as a health service – Code of Health and Disability Services Consumer's Rights apply.
  - Inform workers, voluntary consent.
  - Collaborate with an occupational health professional.

# WES & BEI Special Guide

## 4.1 Table of BEI values

The following table (Table 5) lists the BEI values set by WorkSafe.

| EXPOSURE | DETERMINANT | SAMPLING TIME | BEI | NOTE | YEAR ADOPTED |
|---|---|---|---|---|---|
| **Acetone** | Acetone in urine | End of shift | 50mg/litre | | |
| **Arsenic** | Sum of inorganic arsenic compounds and its metabolites (MMA and DMA) in urine | End of work week. Dietary sources of arsenic should be considered in the sampling protocol | 15µg/litre | carcinogen category 1; oto | 2020 |
| **Benzene** | S-Phenylmercapturic acid (S-PMA) in urine | End of shift | 2µg/g creatinine | carcinogen category 1; skin | 2020 |

# Calculation Examples (ethyl benzene)

A worker who paints with a solvent mixture containing ethyl benzene provides an end-of-shift urine sample after their 8-hour shift.

**The lab reports:**

- Mandelic acid: 110 mg/L
- Phenylglyoxylic acid: 40 mg/L
- Urine specific gravity (SG): 1.028
- Urine creatinine: 1.40 g/L
- Assume biological half-life for the sum of metabolites = 10 hours
- Reference SG for correction = 1.024
- WorkSafe BEI for ethyl benzene = 0.25 g/g creatinine (i.e., 250 mg/g creatinine)

**Your task is to:**

1. Calculate the combined metabolite concentration
2. Apply SG correction
3. Calculate creatinine-adjusted concentration
4. Estimate what the creatinine-adjusted concentration would be 16 hours after the end of the shift
5. Compare results to WorkSafe BEI

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**1. Calculate the combined metabolite concentration**

$C_{measured}$ = 110+40 = 150 mg/L

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**2. Apply SG correction**

$$C_{SG\text{-}adj} = C_{measured} \times (1.024\text{-}1) / (SG\text{-}1)$$

$$C_{SG\text{-}adj} = 150 \times (1.024\text{-}1) / (1.028\text{-}1)$$

$$C_{SG\text{-}adj} = 128.6 \text{ mg/L}$$

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**3. Calculate creatinine-adjusted concentration**

$C_{(mg/g\ Cr)} = C_{measured\ (mg/L)}$ / creatinine (g/L)

$C_{(mg/g\ Cr)}$ = 150 mg/L / 1.40 g/L

$C_{(mg/g\ Cr)}$ = 107.1 mg/g creatinine

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**4. Estimate concentration 16-h after end-of-shift**

$$C_t = C_0 \times e^{-0.693t/T1/2}$$

$$C_t = 107.1 \times e^{-0.693 \times 16 / 10}$$

$$C_t = 35.3 \text{ mg/g Cr}$$

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**5. Compare results to WorkSafe BEI**

$C_{(mg/g\ Cr)}$ = 107.1 mg/g creatinine

BEI = 250 mg/g creatinine

$C_{(mg/g\ Cr)}$ /BEI x 100 = 43% of the BEI

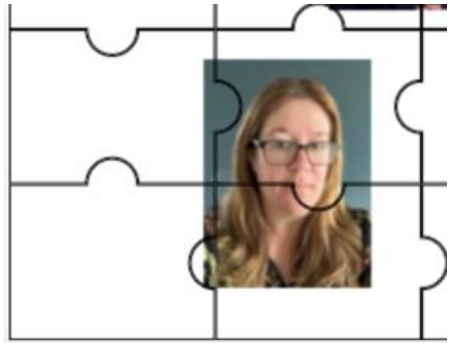
$C_{16h}$ = 35.3 mg/g Cr = 14% of the BEI

# Discussion

- Questions?

# Business Perspective

Bridgette Jennings



# In-house Occupational Hygienist

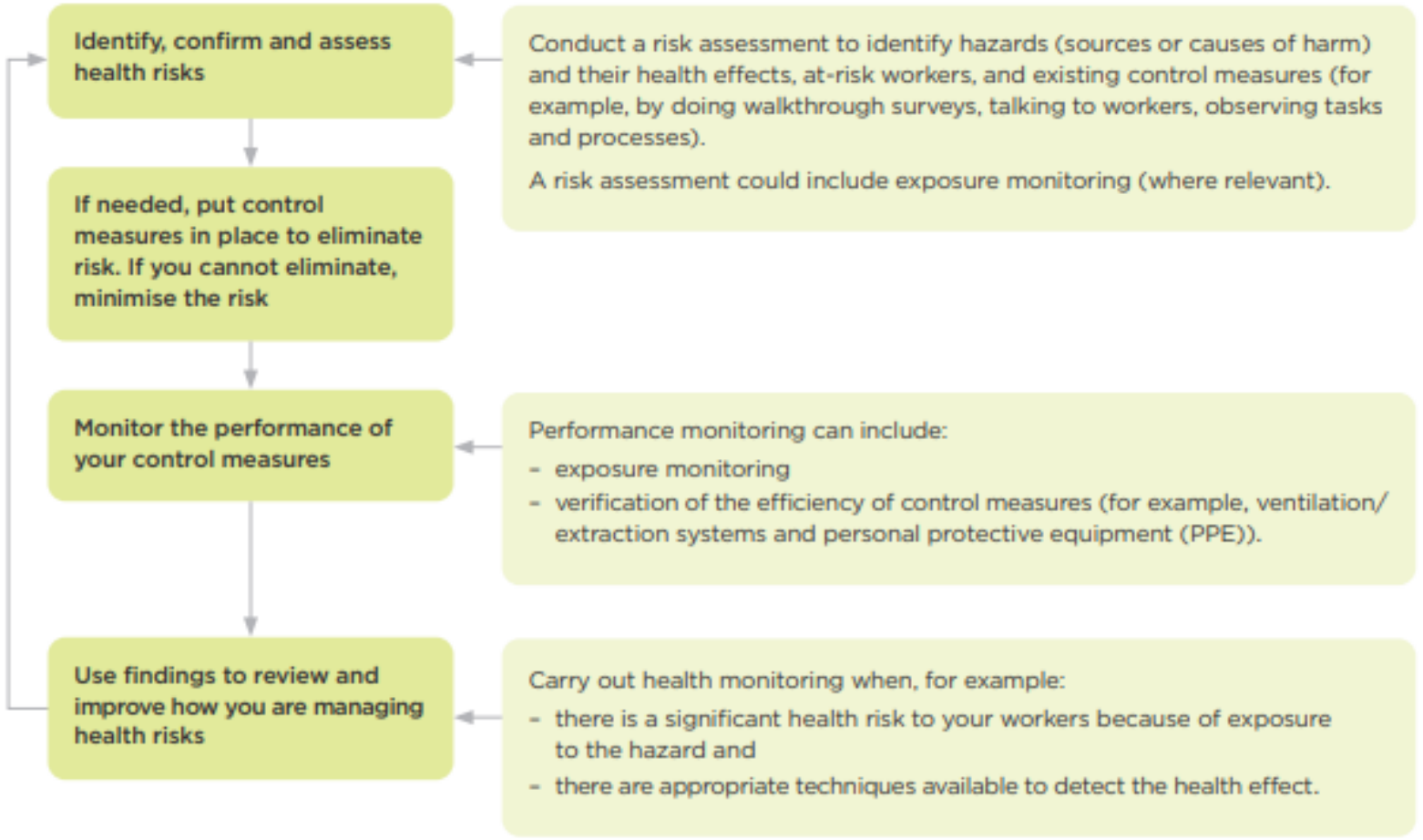
- Anticipate health risks entering the business
- Identify health risks existing within the business
- Evaluate the risk the health risk pose to employees
  - Qualitative risk assessment
  - Exposure monitoring
- Control the health risks to prevent harm

- **CONTROL IS KEY**

# Relationships

- EHS Managers and Advisors
- Frontline
- Management – Supervisors through to GMs
- P&P Team
- Contractors – Occ Hygienists, OHNs, and Occ Physicians

# Health Management Programme




Occ Hygienist
H&S Team
Workers

Occ Hygienist
H&S Team
Workers (maintenance)

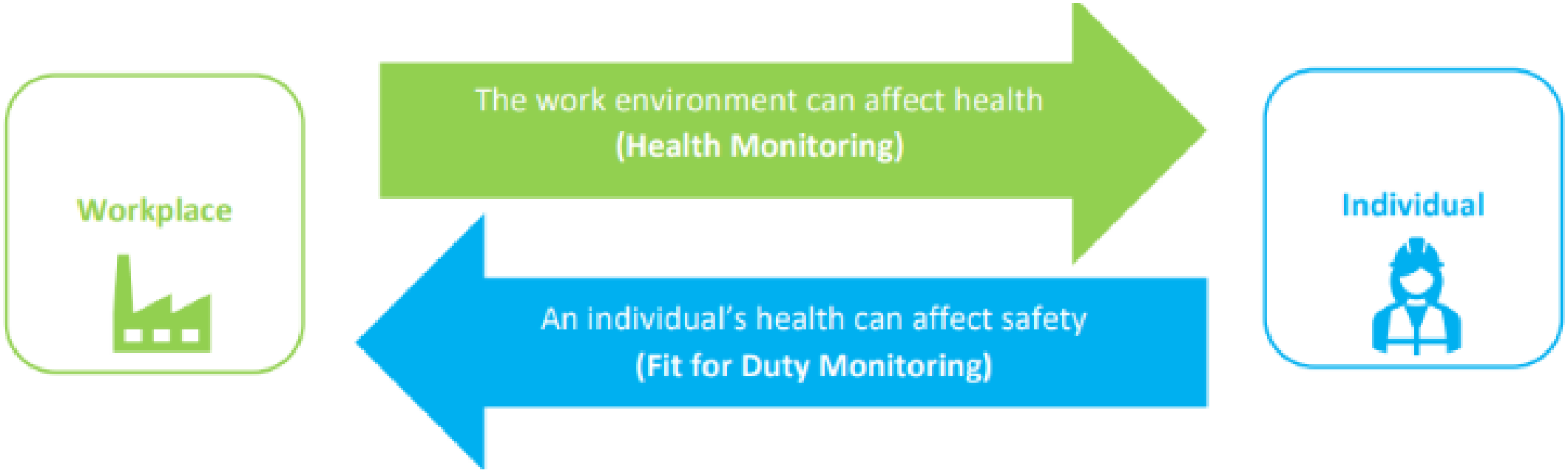
OHNs
Occ Hygienist
H&S Team
Workers

# Risk Assessment

- For each SEG and each health hazard in that SEG choose
  - Implement control
  - Exposure monitoring to better understand the risk
  - No action needed – review periodically
- This forms your occupational hygiene program which contains your exposure monitoring program

- **Alongside that you must consider if health monitoring is required and develop a health monitoring program**

# Why do we do Health Monitoring



# Health monitoring for harm

- Is there are risk of harm to the worker?
  - Elevated exposure monitoring results
  - A potential for chronic harm – chemicals, hearing loss, HAV, lung disease
- Is there a regulatory requirement?
- You must understand sample criteria, lab acceptability, and guidelines
- We are measuring changes - Deterioration
- Pre-employment is our opportunity for baseline

- **Here we must talk to an Occupational Health Professional**

# Biological Exposure Monitoring

- Understand sampling criteria
- Make sure samples get to the lab on time and not compromised
- Communicate to the workers why it is ocurring
- Train workers on sample collection – wash hands before urine collection
- Understand how to calculate results for comparison to BEIs

# Health monitoring for safety

- Is there are risk of the persons health having a safety impact on work?
  - Blood pressure
  - Vision
  - Fatigue
  - Blood sugar
  - Functional capacity
  - Hearing and Spirometry too
- We also have a duty to other people on site to keep them safe from other people.
- Pre-employment is our opportunity for determining fitness for role

- **And again we must talk to an Occupational Health Professional**

# Health Monitoring Programme

- Scope – who and what parameters
- **Guidance by Occ Health Professionals**
- Inform workers – provide information and direction
- Manage privacy!!
- Define roles and responsibilities
- Qualify your provider – are they competent
- **Do the monitoring**
- Communication of results

# Occ Hygiene Opportunity

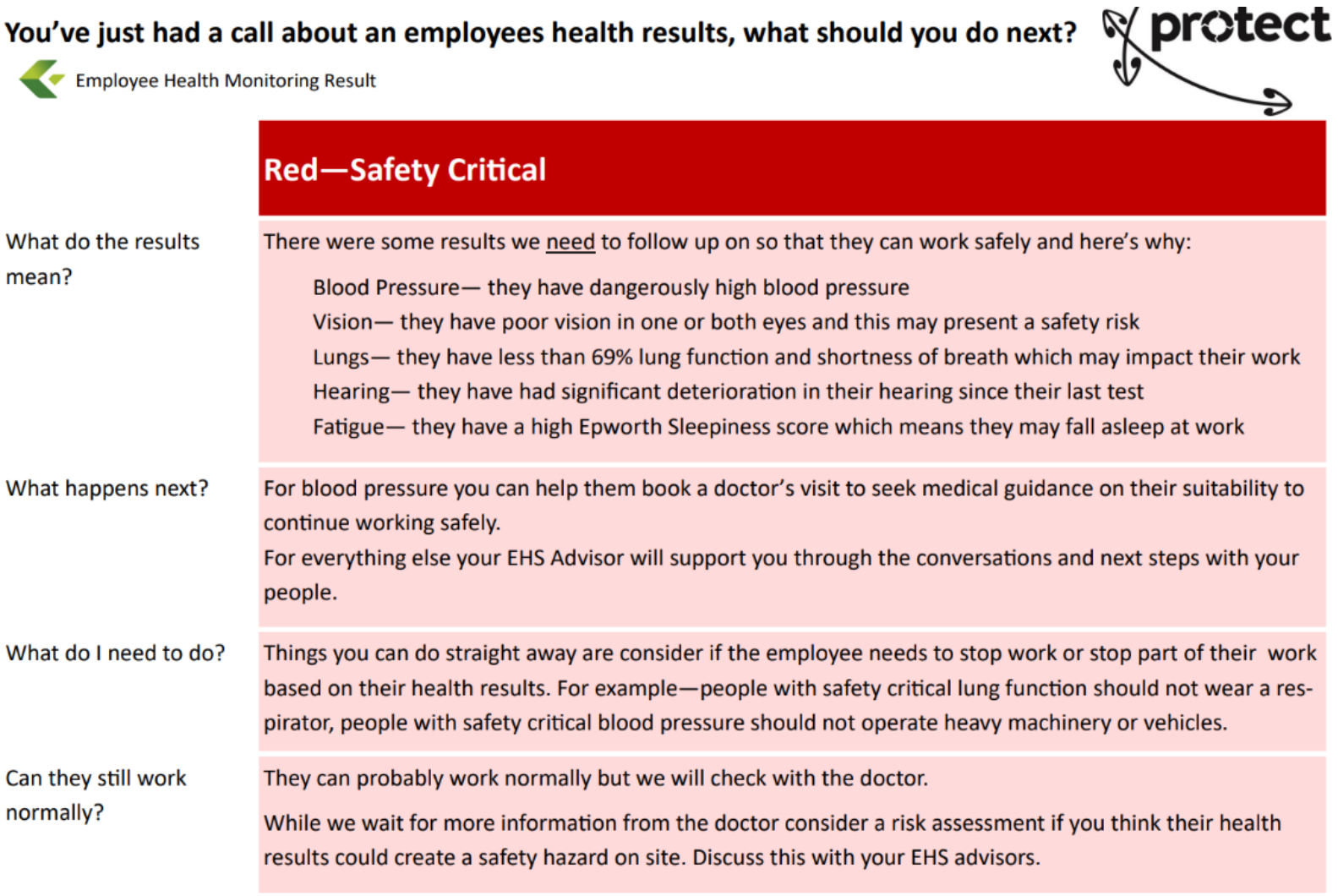
## Ask for the data

# Discussion

- Questions?

# Pre-Health Monitoring Comms

- Posters
- Video
- Toolbox
- FAQ's
- Training each role



**You've just had a call about an employees health results, what should you do next?**

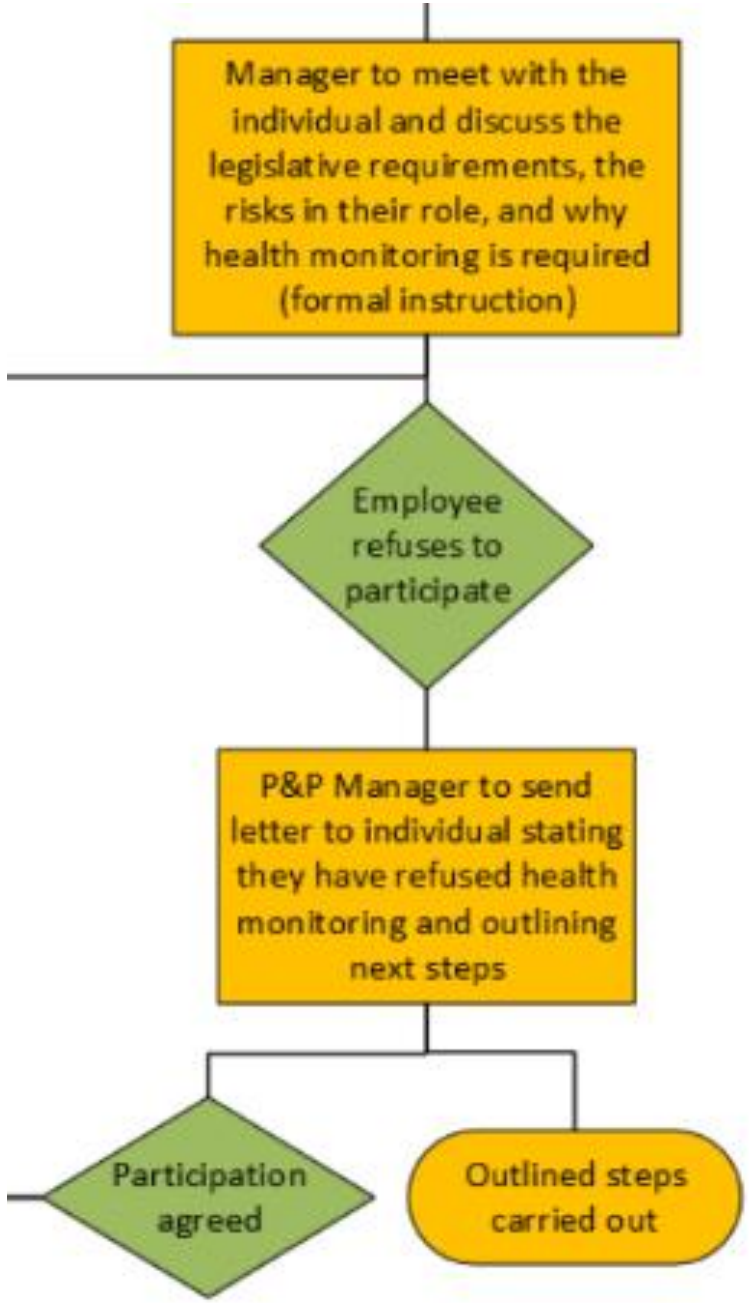
protect

Employee Health Monitoring Result

| | **Red—Safety Critical** |
|---|---|
| What do the results mean? | There were some results we need to follow up on so that they can work safely and here's why:<br>Blood Pressure— they have dangerously high blood pressure<br>Vision— they have poor vision in one or both eyes and this may present a safety risk<br>Lungs— they have less than 69% lung function and shortness of breath which may impact their work<br>Hearing— they have had significant deterioration in their hearing since their last test<br>Fatigue— they have a high Epworth Sleepiness score which means they may fall asleep at work |
| What happens next? | For blood pressure you can help them book a doctor's visit to seek medical guidance on their suitability to continue working safely.<br>For everything else your EHS Advisor will support you through the conversations and next steps with your people. |
| What do I need to do? | Things you can do straight away are consider if the employee needs to stop work or stop part of their work based on their health results. For example—people with safety critical lung function should not wear a respirator, people with safety critical blood pressure should not operate heavy machinery or vehicles. |
| Can they still work normally? | They can probably work normally but we will check with the doctor.<br>While we wait for more information from the doctor consider a risk assessment if you think their health results could create a safety hazard on site. Discuss this with your EHS advisors. |

# Refusal process

- Listen to concerns
- If one parameter is of concern consider if it is really needed
  (e.g. hearing if noise levels well below 85dBA)
- **Provide information on what happens next**
- Don't use pass or fail language
- Most refusals can be worked out



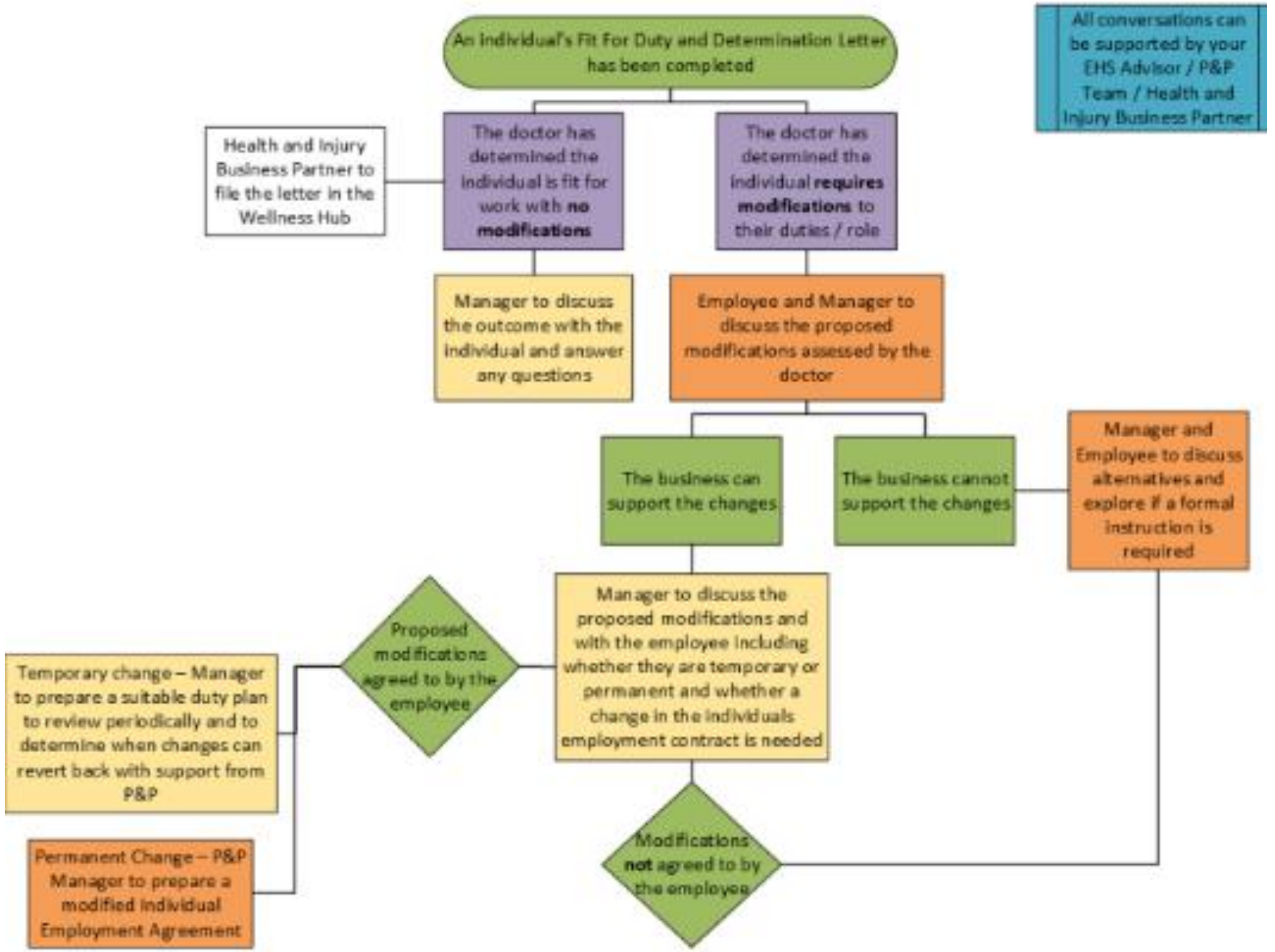
# For the individual - follow-up is key

- To improve the health of your team and the safety of your workplace you must identify high risk individuals and ensure they get help

- Examples
  - High blood pressure referral resulted in enrolment with a GP and hypertension management. The individual felt so much better and we removed a medical event risk

  - Poor lung function referral resulted in GP appointment and specialist referral which identified a heart condition and subsequent surgical repair.

# Individual Follow-Up



# The role of personal health

- Hearing loss has non-work causes
- Lung disease has non-work causes
- Blood pressure, vision, fatigue has non-work causes
- All often have solutions driven by personal choice

As a business we need to have systems and evidence that we are doing what is reasonably practical to prevent harm

**Collaborative effort**

# Collaboration Opportunity

- P&P and H&S Teams and Managers work together to support an individual with poor health
- Action referrals to a doctor or occ health professional
- Review results with OHNs and Occ Physicians to understand if they are still fit for role or modifications are needed
- What's next for that person...

# Human Resources Perspective

Kate Cross

# Where HR Fits

**Supports EHS team, people leaders and employees with**

- Culture of safety, prevention, early identification and intervention, and wellbeing
- Annual health monitoring
- Injury and medical management
- Fit for duty determinations (Safety Critical)
- Non-Safety Critical GP referrals
- Alternative duties/Return to work plans
- Fitness for work journey

# Common Health Concerns (Civil Construction)

- Noise induced hearing loss (historical)
- Hypertension
- Lung Function
- Heart disease
- Vision
- Fatigue – sleep apnoea
- Addiction
- Screening and healthy lifestyle compliance - early aging
- Fear of role and income loss

# Liaise with

- Employee health care providers including GP, Physio, OT
- Company Health & Injury Business Partners & Occupational Hygiene Lead
- ACC Case Managers/Work Aon
- Arrange Occupational Physician assessments

# ACC Accredited Employer Programme

- Specialist Injury Management
- Administers ACC related work injury claims for larger employers
- Can transfer non-work injury claims with employee consent
- Levy discounts
- Full visibility over claims including accepting/determining cover
- Direct contact with Case Manager
- Active participation in claim and RTW

# Provide Employee Information

**Financial Support options**

- Sick and Annual Leave in Advance
- Additional (Special) Leave
- ACC liaison (usually work anon)
- WINZ
- Employee Welfare Fund
- Company benefits e.g. optometry discounts
- Specialised PPE e.g. Prescription safety glasses

# Provide Employee Information

**Assessment and/or Recovery Support options**

- Company GP and Physiotherapist
- Company arranged and funded OT
- Psychological support including EAP referrals, and awareness of wider offering
- Return to work requirements e.g. driver medical
- Encourage family involvement
- Alternative employment options
- Protecting current and future health status, impact of current role
- Empathy and support
- Medical retirement/incapacity process

# Your client’s resources

- Company size and resourcing
- EMA membership
- Chamber of commerce
- EHS consultants
- HR consultants/lawyer

# For the business - analysis is key

- As hygienists we must look at the data – we are uniquely positioned to see the trends and intervene by recommending control.
- Use SEGs if you can.
- Communicate the trends and next steps!!
- Look for
  - Higher instances of hearing deterioration – check noise conservation programs and hearing protection plans
  - Higher instances of fatigue – check for work related factors, program deadlines, shift work
  - Higher instances of poor lung function – check dust controls, RPE training and use, dust reduction programs

# Collaboration Opportunity

- H&S Teams and Managers work together to review controls and implement strategies
- Action exposure monitoring needs
- Review trends next year...

# Linking exposure and health

## Exposure Monitoring Tells Us

- What health hazards people are exposed to
- Which people are exposed to health hazards
- If control measures are reducing exposure
- If new control measures are needed

## Health Monitoring Tells Us

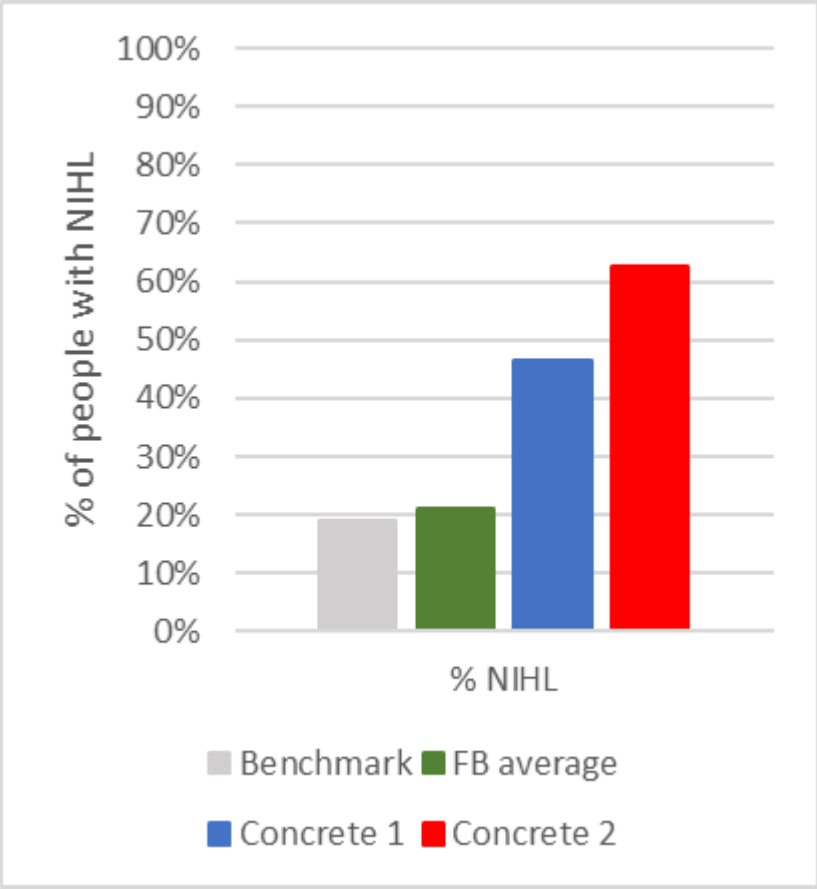
- About the health of a person
- Whether people may be experiencing health effects from work exposures
- If control measures are preventing harm

# Truck Drivers

- Sedentary work
- Remote / off site
- Intermittent exposures
- Long hours

- Higher instance of blood pressure elevation
- Poorer hearing health
- Slightly worse lung health
- A resistance to change

# Truck Drivers and Noise




- Noise surveys show results 75-82dBA (corrected)
- Higher instance of NIHL (screening)
- Task Assessments

# Collaboration Opportunity

- H&S Teams and OHNs and Managers work together to implement additional controls
- Develop exposure monitoring programme to better understand the risk
- Review SOPs and signage
- Train the team on risks and use of control measures

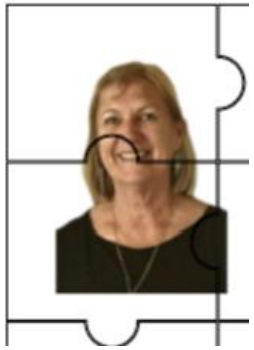
# Discussion

- Questions?

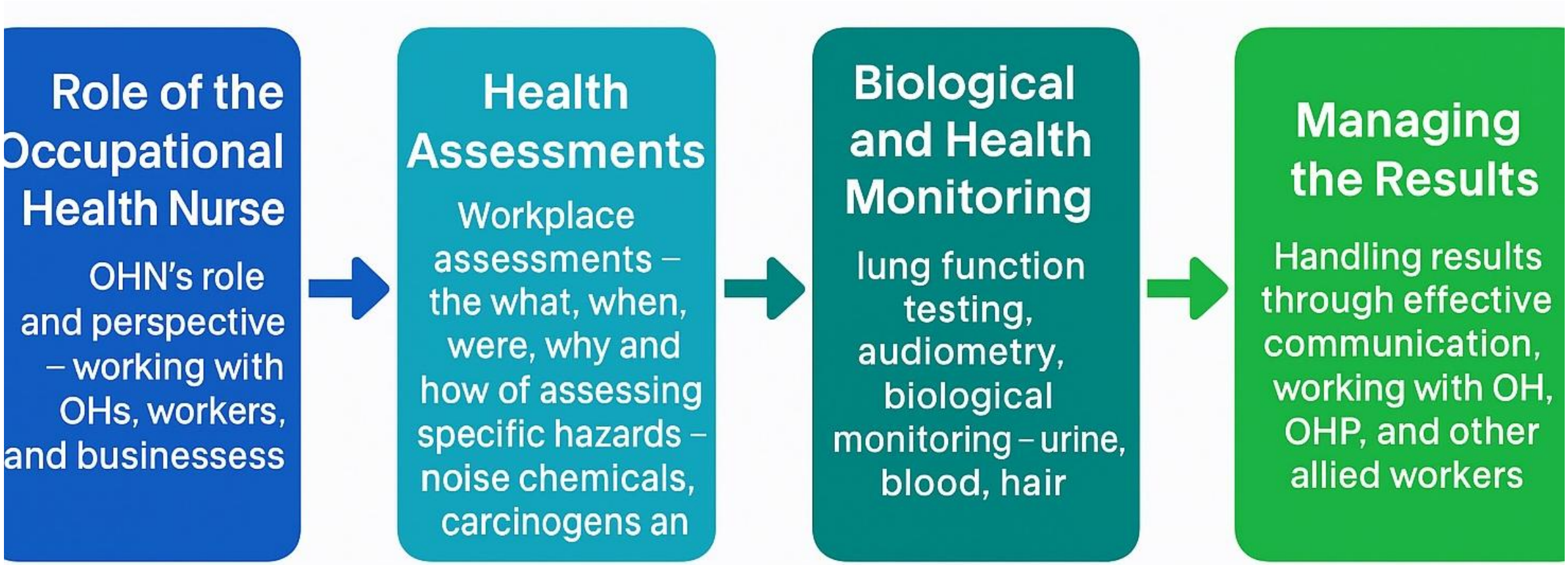
# Occupational Health Nurse Perspective

Dr Berni Cameron

*Workplace Health Through Collaboration*



# Overview


Role of the Occupational Health Nurse
OHN's role and perspective – working with OHs, workers, and businessess
Health Assessments
Workplace assessments – the what, when, were, why and how of assessing specific hazards – noise chemicals, carcinogens an
Biological and Health Monitoring
lung function testing, audiometry, biological monitoring – urine, blood, hair
Managing the Results
Handling results through effective communication, working with OH, OHP, and other allied workers

# The Role of an Occupational Health Nurse (OHN)


- What does an Occ Health Nurse do?
- What are some of the qualifications they may hold?
- There are 10 main areas of work for an OHN. What do you think they are?

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# Duties of an OHN

1. Health Risk Assessments
2. On-site Duties, Health Surveillance
3. Injury Management & Return-to-Work
4. Health Promotion
5. Record Keeping
6. Policy Development
7. Training & Education
8. Emergency Response
9. Compliance Monitoring
10. COMMUNICATION, EDUCATION and COLLABORATION

***OHNs strive to keep everyone healthy, happy, and alive!***

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# Terminology

**“Health”**

- Management
- Exposures
- Surveillance
- Assessments
- And Wellness
- Primary, Secondary and Tertiary


**“Monitoring”**

- Health
- Exposure
- Biological

Biomedical vs Biopsychosocial Model

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# Health Assessments

- What is an occupational health assessment?
- What areas of the individual worker are assessed during a health assessment?
- What are the most common tests performed on employees?

# Biological Health Monitoring

- The analysis of biological samples (e.g., blood, urine) to assess exposure to hazardous substances and their effects on the body.
- What is the most important thing to do BEFORE any biological monitoring takes place?

# Managing the Results - Collaboration

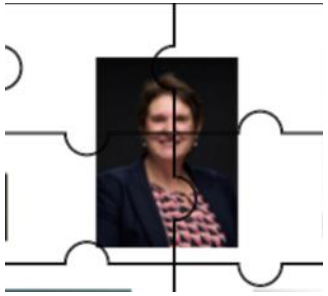

- Which results should be shared and with whom?
- What do you do if monitoring results show workers are at risk?
- How do you report back to all workers on how you are managing your health risks?
- What different communication methods should be used?

# Communication and Collaboration


- Who are the relevant people in the workplace?
- Who are the relevant people outside the workplace?
- Why is this collaboration so important?
- What are some of the barriers with communicating results?
- How can we overcome these barriers?

# When the pieces fit together


# Occupational Physician Perspective



Dr Mary Obele

From Data to Duty: Interpreting results ethically and clinically

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# Where the Occupational Physician Fits

- Airborne Exposure Monitoring → Occupational Hygiene & Science
- Biological Exposure Monitoring → Measured uptake (BEIs)
- Health Monitoring → Early effect detection (spirometry, audiometry, labs)
- PCBU obligations under HSWA 2015 & GRWM Regs 29–32
- Medical oversight ensures ethical, clinical integrity

# Understanding BEIs: Beyond the Number

- BEIs = Guideline biological concentrations (WorkSafe 2025 Edition)
- Context matters: timing, sample validity, confounders (diet, smoking, medications)
- Threshold ≠ Safety guarantee
- Example markers:
  - Lead (blood Pb)
  - Benzene (urinary S-phenylmercapturic acid)
  - Toluene (urinary hippuric acid)

# From Exposure to Effect: Linking Findings to Function

- Tools: spirometry, audiometry, skin checks, vision tests, LFTs
- Example: Silica → $FEV_1$ decline, chest X-ray changes
- Example: Noise → 4 kHz notch
- Integrate with exposure data to determine reversibility, cumulative burden

# Ethical Tensions in Monitoring

- **Autonomy:** informed consent for sampling & data sharing
- **Confidentiality:** individual results protected (Privacy Act 2020)
- **Beneficence:** duty to act when harm is possible
- **Justice:** ensure equitable monitoring access across worker groups
- **Transparency:** communicate limits & meaning of results

# When the Numbers Matter Legally

- Exceeding a **Prescribed Exposure Standard (PES)** = offence (GRWM 30–32)
- Physician's duties:
  - Report significant findings (aggregate, anonymised)
  - Advise PCBU on health risks, control adequacy
  - Retain records confidentially
- Reference: WorkSafe Exposure Monitoring GPG Section 3 & 4

# Clinical Interpretation Pathway

- Validate data quality
- Correlate with exposure & symptoms
- Determine clinical significance
- Communicate actionable advice to PCBU
- Arrange follow-up and review monitoring frequency

# Say what? To whom?

| Audience | What they receive | Why |
|---|---|---|
| **Worker** | Personal results, interpretation, recommendations | Right to know, consent |
| **PCBU** | Summary trends, actions required | Duty to manage risk |
| **Regulator** | When required (e.g., PES breach) | Compliance |
| **Team** | Aggregate learning | Prevention |

# From Data to Duty

- Collaboration: each role contributes to a holistic monitoring cycle:

  Identify → Assess → Act → Communicate → Review

- Evidence → Interpretation → Ethical Action
- Protect the worker, respect privacy, support the PCBU
- Monitoring is only meaningful when it leads to change.

# Case Study: Silica Exposure for a Transient Truck Driver

Investigating health risks from occupational silica exposure

NZOHS

# Background

**Worker Profile and History**
John is a 42-year-old former smoker and truck driver with over ten years of experience in mining logistics. He has not undergone any recent health surveillance or health monitoring.

**Exposure to Crystalline Silica**
John transports 96% pure crystalline silica quartz, which poses significant occupational health risks.

**Health Monitoring Gaps**
John underwent pre-employment medical tests but has had no health follow-up since commencing employment over 15 years ago.

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# Exposure

**Frequent Exposure to Silica Dust**

John transports silica quartz multiple times weekly, exposing him to environments rich in hazardous silica dust. The quartz transported contains 96% silica, a known RCS Group 1 Carcinogen.

**Contaminated Work and Rest Areas**

The uncovered lunch area is located near the truck loading bay and is frequently contaminated with silica dust.

**Lack of Protective Measures**

Historical and ongoing health surveillance and monitoring are absent, with little or no PPE visible within the truck.

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# Current Issues

**Persistent Dry Cough**

John experiences a persistent dry cough every morning and intermittent coughing throughout the day. He occasionally produces a little clear phlegm, but not all the time.

**Audible Expiratory Wheeze**

John experiences an audible wheeze on expiration most mornings.

**Breathlessness**

John experiences some breathlessness climbing up the truck to secure the tarpon and the loads. He does not believe his breathlessness is of concern, but his fellow workers are concerned, having mentioned that his nickname is “Puffing Billy”.

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# Recent Observations

**Assessment of Silica Exposure**
Occupational health staff conducted site visits, identifying very high dust levels during loading processes, especially on windy days.

**Hygiene and Safety Observations**
Poor hygiene practices were noted in the crib room, poor handwashing, lack of separation from food and dust, and work clothes are constantly contaminated with silica dust.

**Inclusion of Transient Workers**
Transient workers lack PPE, poor silica exposure education, and little health monitoring, indicating gaps in occupational health coverage.

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# Silicosis Hygiene Report (Summary)

## Occupational Hygiene Exposure Report – Excessive RCS Levels

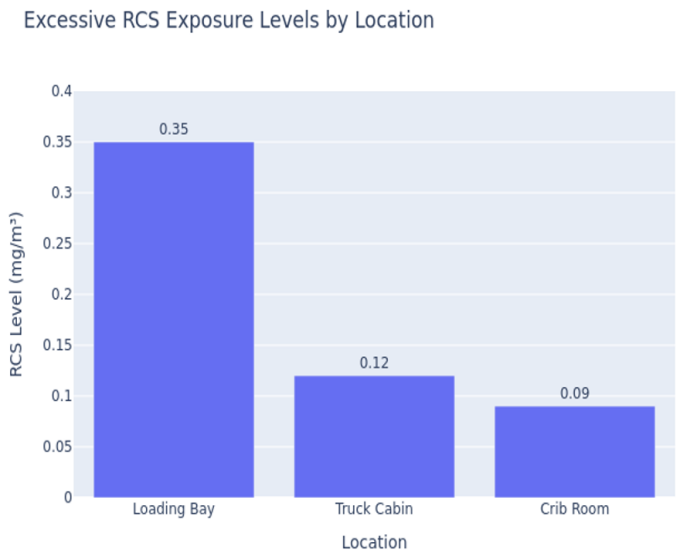
**Subject: John – Transient Truck Driver**

Date: October 2025

Location: Silica Quartz Mine Site.

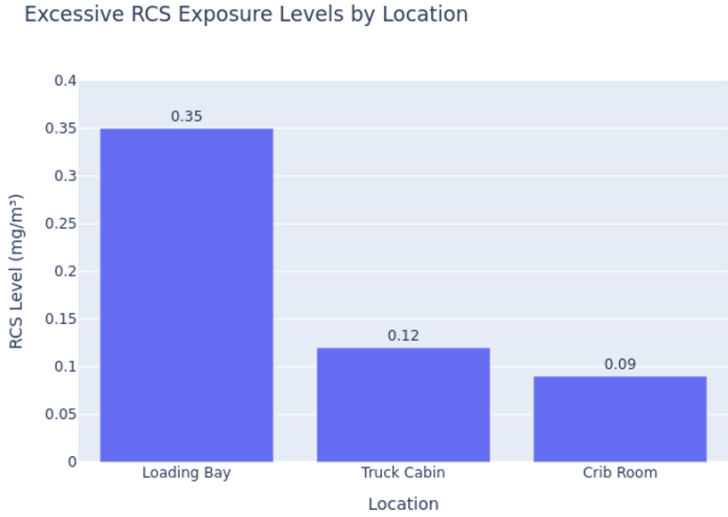
### Exposure Monitoring Summary

The following chart illustrates excessive respirable crystalline silica (RCS) levels measured across various work locations. All values exceed the NZ Workplace Exposure Standard (WES) of 0.025 mg/m³.




### Graphical Representation

The following chart illustrates the excessive respirable crystalline silica (RCS) exposure levels recorded across different work locations. All values exceed the New Zealand Workplace Exposure Standard (WES) of 0.025 mg/m³.




### Detailed Air Sampling Log

The table below presents simulated air sampling data collected from various tasks and locations. All measured RCS levels significantly exceed the recommended exposure limits.

| Date | Location | Task | Duration (hrs) | RCS Level (mg/m³) |
|---|---|---|---|---|
| 2025-10-20 | Loading Bay | Load Securing | 2 | 0.35 |
| 2025-10-20 | Truck Cabin | Driving | 6 | 0.12 |
| 2025-10-20 | Crib Room | Resting | 1 | 0.09 |

### Air Sampling Log

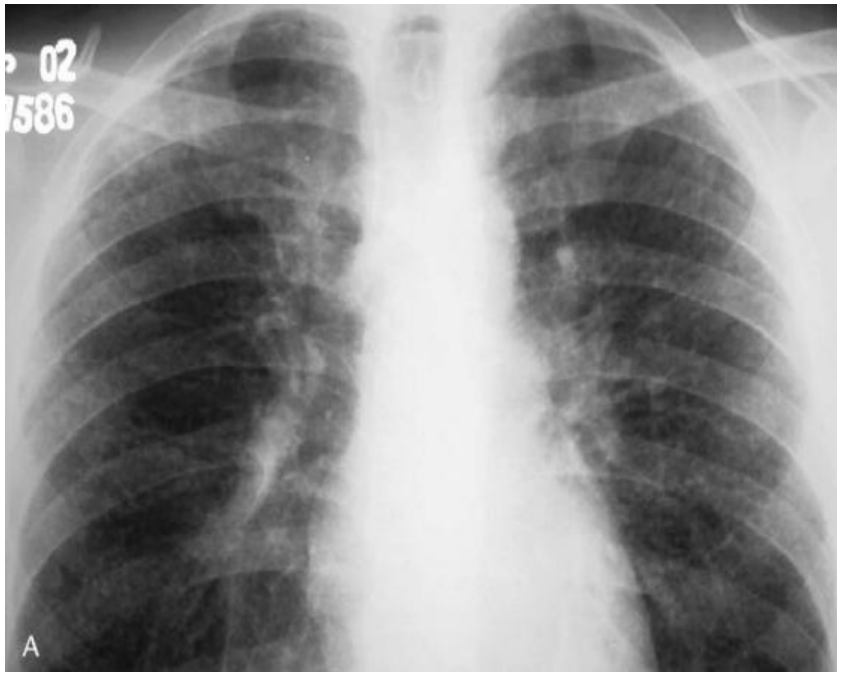
Detailed sampling data is provided in the attached Excel log.

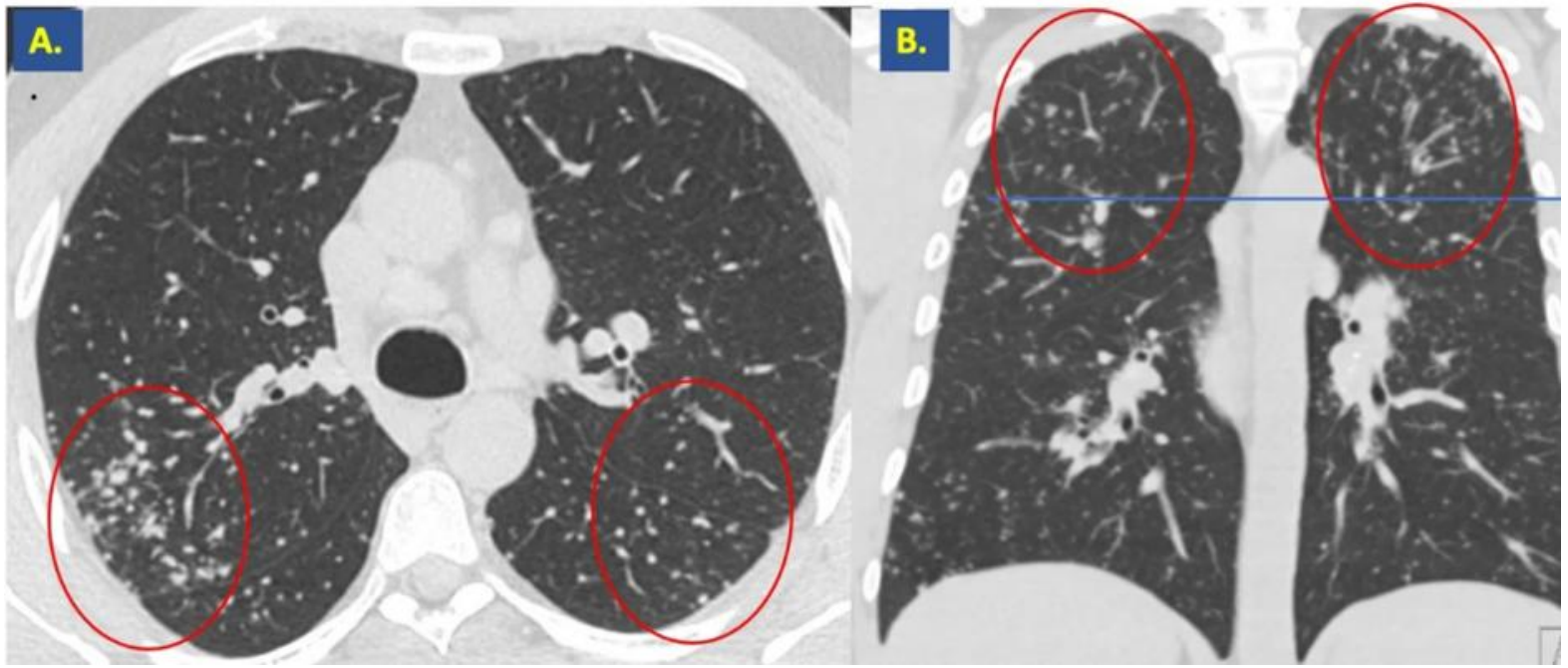
### Observations and Risk Factors

- No respiratory PPE observed during high-exposure tasks.
- Truck cabin lacks HEPA filtration or sealing.
- The crib room is not isolated from dusty operations.
- Work clothes visibly contaminated and taken home for laundering.
- No health surveillance has been conducted in over 15 years.

# Silicosis Monitoring – the LDCT Scan

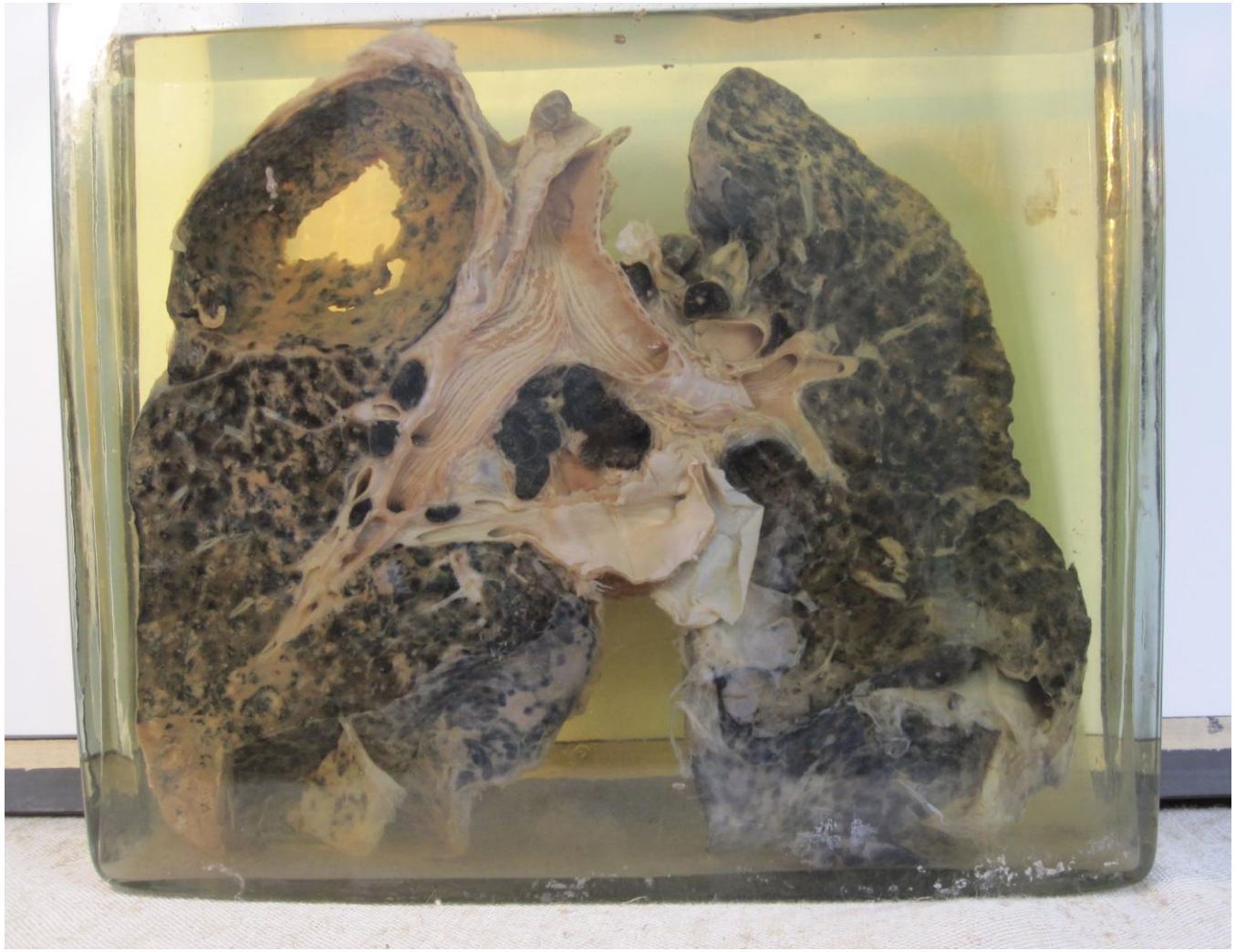
**Comparison of an X—Ray and LDCT image, showing the predominance of nodules located in the upper lobes and peripheral regions of the lungs.**




CT Chest (**A**, axial; **B**, coronal) shows posterior, upper-lung predominant, well-defined, sub-5-mm but variably-sized, perilymphatic nodularity (red circle) without ground-glass or consolidative opacities.

# Silicosis Lung – the final result



# Aus vs NZ Monitoring Aspects

| Aspect | Australia AU | New Zealand NZ |
|---|---|---|
| **Regulatory Framework** | Model WHS Laws (Safe Work Australia + state regulators) | Health and Safety at Work Act 2015; WorkSafe NZ |
| **Exposure Standard** | 0.05 mg/m³ (8-hour TWA) | 0.025 mg/m³ (8-hour TWA) |
| **Air Monitoring** | Required if exposure levels are uncertain | Required if exposure levels are uncertain |
| **Health Monitoring** | Mandatory if exposed to hazardous levels; LDHRCT scans required in WA | Encouraged via ASAP pathway; LDHRCT not nationally mandated |
| **LDHR (Low Dose High Resolution) CT Scan Requirements** | Modified ILO (Kusaka) ≤1 mSv dose, ≤1.5 mm slice thickness, inspiratory & expiratory views (WA only) | Not specified nationally |
| **Employer Duties** | Implement control measures; must provide ongoing health monitoring | Implement control measures; offer health checks |

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# Aus vs NZ Silicosis Management

| Aspect | Australia | New Zealand |
|---|---|---|
| First Reported Case | 2015 | Around 2020 |
| Engineered Stone Ban | Complete ban from July 2024 | Consultation carried out in 2025 |
| Import Restrictions | Prohibited from Jan 2025 | No import ban |
| Health Monitoring Program | National Dust Disease Taskforce | Accelerated Silicosis Assessment Pathway |
| Agencies Involved | Safe Work Australia, Dept of Health | WorkSafe NZ, ACC, Health NZ |
| Worker Eligibility | All with historical exposure | 6+ months exposure in last 10 years |
| Compensation Scheme | Workers' compensation insurance | ACC and public healthcare |
| Public Awareness | Strong campaigns led to ban | Growing advocacy |
| Future Plans | Eliminate silicosis by 2030 | Reviewing regulations, possible ban |

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# Discussion

**Identify Exposure Points**
Participants analyse main exposure points in the workplace to understand contamination sources.

**Evaluate Health Surveillance**
Discussion on the effects of lacking health surveillance on worker safety and health.

**Improve Hygiene Practices**
Suggesting enhancements in workplace hygiene to reduce health risks effectively.

**PPE and Responsibility**
Discuss the necessity of PPE for transient workers and assign responsibility for safety adherence.

# When the pieces fit together


# Call to Action

- What specific changes will you commit to implementing in your own workplace or client sites to better identify and control silica exposure risks?
- How can we, as occupational health professionals, collaborate more effectively across disciplines to ensure that no worker - especially a transient one - falls through the gaps in surveillance and protection?
- What will you do differently tomorrow to strengthen the culture of prevention rather than reaction in silica risk management?

# Closing

- What we covered
  - Legislative framework
  - How businesses build monitoring programmes and manages workers
  - Clinical perspectives
- Collaboration
- Thank you for your time (attendees and presenters)
- Post-course survey and attendance certificates