Occupational Diseases In Singapore - What Else Do We Need To Do?

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Ministry of Manpower
Scope

✓ Recognize ODs
✓ Managing ODs
✓ Prevention
✓ Rehabilitation and early return-to-work
## Confirmed Cases of Occupational Diseases by Type of Disease, 2014-2015

<table>
<thead>
<tr>
<th>Disease Type</th>
<th>2015</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>935</td>
<td>992</td>
</tr>
<tr>
<td><strong>Noise Induced Deafness</strong></td>
<td>498</td>
<td>594</td>
</tr>
<tr>
<td>NID (E) - Early</td>
<td>476</td>
<td>580</td>
</tr>
<tr>
<td>NID (A) - Advanced</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td><strong>Work-related Musculoskeletal Disorders</strong></td>
<td>304</td>
<td>315</td>
</tr>
<tr>
<td>Back injuries due to ergonomic risks</td>
<td>281</td>
<td>302</td>
</tr>
<tr>
<td>Tendinitis</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Cervical Spondylosis</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Trigger Finger/Thumb</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Nerve Disorders such as Carpal Tunnel Syndrome, Cubital Tunnel Syndrome</td>
<td>3</td>
<td>2</td>
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<tr>
<td>Lateral Epicondylitis (Tennis Elbow)</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Musculoskeletal Disorder of the Back</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Others</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Occupational Skin Disease</strong></td>
<td>89</td>
<td>54</td>
</tr>
<tr>
<td>Eczema</td>
<td>68</td>
<td>52</td>
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<tr>
<td>Others</td>
<td>21</td>
<td>2</td>
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<tr>
<td>Compressed Air Illness</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td>CAI Type 1</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>CAI Type 2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Barotrauma</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Aural</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Sinus</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Cancers</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Mesothelioma</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Occupational Lung Disease</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Occupational Asthma</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Silicosis</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Tuberculosis (pulmonary)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Heat Disorder</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Infectious Disease</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Chemical Poisoning</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Methyl Bromide</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Excessive Absorption of Chemicals</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Cadmium</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Lead</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Upper Respiratory Tract Irritation</td>
<td>0</td>
<td>1</td>
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</table>
Recognition of Noise Induced Deafness (NID)

Exposure to loud noise over a few years
Irreversible sensorineural hearing loss

EARLY STAGE

• No difficulty in hearing

• Affected workers may have tinnitus which interfere with daily activities, like telephone conversation and sleep
Recognition of Noise Induced Deafness (NID)

**LATE STAGE**

- Experience difficulty in hearing telephone and ordinary conversation
- Difficulty in hearing words and speech clearly especially consonants
- Tends to speak loudly
- Others complain that volume of TV & radio is tuned too loud
Prevention of NID: Hearing Conservation Programme (HCP)

- **Risk Assessment**
  - Identify noise hazards

- **Risk Control**
  - Elimination
  - Substitution
  - Engineering controls
  - PPE (hearing protection) • Administrative Measures • Training & Education

- **Monitoring and Feedback**
  - Annual Audiometric Examinations
  - Cases of Occupational Disease

- **Evaluate results**
  - Record keeping
  - Gaps/deficiencies
# Hearing Conservation Programme (HCP)— is it Working?

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>Shipyards</th>
<th>Metal industries</th>
<th>Others</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean age at NID(A) diagnosis (years)</strong></td>
<td>54.63 (7.00)</td>
<td>53.68 (5.29)</td>
<td>55.23 (8.79)</td>
<td>54.63 (5.62)</td>
<td>0.758</td>
</tr>
<tr>
<td><strong>Mean noise exposure duration at NID(A) diagnosis (months)</strong></td>
<td>355.13 (128.20)</td>
<td>388.79 (170.53)</td>
<td>350.50 (108.24)</td>
<td>332.36 (109.91)</td>
<td>0.365</td>
</tr>
<tr>
<td><strong>Mean dosimetry (dBA)</strong></td>
<td>89.3 (4.3)</td>
<td>91.1 (7.5)</td>
<td>88.8 (3.8)</td>
<td>89.6 (4.0)</td>
<td>0.545</td>
</tr>
<tr>
<td><strong>PPE compliance (%)</strong></td>
<td>100%</td>
<td>69.01</td>
<td>63.16</td>
<td>63.33</td>
<td>81.82</td>
</tr>
<tr>
<td></td>
<td>&gt;50%</td>
<td>26.76</td>
<td>31.58</td>
<td>33.33</td>
<td>13.64</td>
</tr>
<tr>
<td></td>
<td>&lt;50%</td>
<td>4.22</td>
<td>5.26</td>
<td>3.33</td>
<td>4.55</td>
</tr>
<tr>
<td><strong>PPE technique adequate (%)</strong></td>
<td>61.97</td>
<td>52.63</td>
<td>66.67</td>
<td>63.64</td>
<td>0.604</td>
</tr>
<tr>
<td><strong>Proportion with tinnitus (%)</strong></td>
<td>66.20</td>
<td>63.16</td>
<td>66.67</td>
<td>68.18</td>
<td>0.942</td>
</tr>
</tbody>
</table>

10 year Retrospective Study of confirmed NIDA cases from 1 Jan 2001 to 31 Dec 2010
-- Advanced noise-induced deafness amongst workers in Singapore

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Guides and Code of Practice

- WSH Guidelines for Hearing Conservation Programme
- Worker’s Safety Handbook – Working in Noisy Environment
- Technical Advisory for Work in Noisy Environment
- These can be downloaded from: https://www.wshc.sg/wps/portal/

- CP76 – Code of Practice of the selection, use, care and maintenance of hearing protectors
- CP99 – Code of Practice for industrial noise control
Occupational Skin Diseases

- Irritant Contact dermatitis (90%)
  - water, solvents, coolants, oils, hand rubs/antiseptics (healthcare)

- Allergic Contact Dermatitis (10%)
  - cement, acrylates, fragrances, massage oils

- Contact Urticaria
  - rubber latex gloves, fruits/vegetables
Case Study 1- Allergic contact dermatitis to Coolant

56 yrs-old, worked 34 yrs in company manufacturing parts- no problems

Oct 14 -- Transferred to new department handling new coolant(X)

Feb 15 (4 months later), itchy rashes over forearms and neck

12-15 May - Transferred temporarily to another grinding machine -- better

18 May 15-- Back to previous department but rashes RECURRED, more extensive and worse (face, neck, hand, body)
Patch test **positive to:**

*Triethanolamine*

Own cutting oil (X) contains *triethanolamine*

Hydroperoxides of Limonene

Cocamidopropyl betaine

DMDM Hydantoin

Methylosothiazolinone+
methylchloroisothiazolinone

2-Bromo-2-Nitropropane-1,3-Diol

Sorbitan sesquioleate
Case Study—Prevention and Return-To-Work Arrangements

- Aug 15 -- Transferred permanently away from machining area to ‘Traffic’ - better

- Possible risk of exposures:
  - dermal contact despite use of nitrile gloves (poor hygiene or work practices)
  - exposure to oil mist in environment (oil mist range <0.01 to 0.2 mg/m$^3$)

- Ensured that walking route to ‘Traffic’ area – no contact with coolant
Prevention and Back to work advice

- Minimize Skin Contact
  - Automate work processes/use of splash guards
  - Improved handling techniques (tools)
  - Administrative control
    - Job rotation (ICD) – temporary transfer
    - Job reassignment (ACD) - permanent transfer
  - Good personal hygiene (wash hands)
  - Ensure compliance with impervious PPE
Avnstorp C.
Prevalence of cement eczema in Denmark before and since the addition of ferrous sulphate to Danish cement.
Acta Derm Venereol (Stockh) 69: 151-55, 1989

Technical Implications of using low hexavalent chromium cement – the Danish experience

**Hexavalent to Trivalent Chrome**

- 1981, ferrous sulphate added to all cement sold, increasing cost by 1%
- 1983, legislation passed, content of Cr\(^{+6}\) not to exceed 2 ppm
- Prevalence of chromate allergy reduced (10.5% to 2.6%)

- Properties of concrete were studied according to ‘Nordic directions for testing admixture for concrete’
- Iron sulphate did not change properties of concrete
- No change in colour after 1.5 years of outdoor exposure

Reduction of chromate in cement by iron sulphate by Sigfrid Fregert et al.
Contact Dermatitis 1979;5:39-42
Substituting with hypoallergenic cement for plastering work i.e. cement containing 2 ppm or less of water soluble Cr\(^{+6}\)

Study conducted by MOM found that cement contained up to 11.2 ppm of total Cr\(^{+6}\)

- Fact sheet – Preventing skin rash in construction work
- Recommend Cr\(^{+6}\) testing
- Use of hypoallergenic cement
Case 2: Bilateral Tennis Elbow

- Merchandiser in company since 2008 (7yrs) developed insidious onset of bilateral elbow pain (R) > (L) in Aug 15
- Ergonomic risk factors:
  - increase workload(increase sales), more lifting, repetitive movements
  - increase force due to change in packaging
- Pain worse during stacking of cartons
- MRI - partial tear of common extensor tendon and epicondylitis
- Treatment – surgery for (R) elbow on 4th Sep 15 and (L) elbow on 20th April 16
## Preventive measures and Return to work plan

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase force, load weights</td>
<td>--IW advised to lift carton loads &lt; 5kg</td>
</tr>
<tr>
<td></td>
<td>--Job accommodation by providing buddy for Injured worker (IW) during ‘Light Duty’ period to assist with heavy carton loads &gt;5kg until she recuperates and regains full functional/work capacity (trial of work conditioning/hardening)</td>
</tr>
<tr>
<td></td>
<td>--Change of packaging bottles from glass back to plastic bottles</td>
</tr>
<tr>
<td>Repetitive lifting</td>
<td>--Frequent short rest-breaks</td>
</tr>
<tr>
<td></td>
<td>--Surveillance and early reporting of symptoms</td>
</tr>
<tr>
<td></td>
<td>--Ergonomic survey of all merchandisers</td>
</tr>
</tbody>
</table>
Resources

General Ergonomics & MSD Awareness e-Learning Course

1. Go to iWSH portal.
2. Click on e-Tools, located on the top right side of the green title bar.
3. Click on “e-learning”.
4. Click on “MSD Awareness Course”.

WSH Guidelines: Improving Ergonomics in the Workplace
--Ergonomics Program
Ergonomics Programme

An ergonomics programme provides a systematic approach for the organisation to manage ergonomic hazards and issues at the workplace.

Elements of Ergonomics Programme

1. Management Commitment and Policy
2. Employee Involvement
3. Training and Education
4. Hazard Identification
5. Workplace Monitoring, Reporting and Medical Management
6. Implementation of Control Measures
7. Evaluation and Review
Case 3: De Quervain’s tendinitis

- Worked 12 hours per day (weekday)
- Travel once per week (1 to 3 days each time)
- Right wrist pain on using mouse and mobile phone use
- Symptom relief on weekends and off days
- Symptoms improved >50% with less work demands
- Right hand dominant

Repeated thumb extension/flexion, abduction/adduction

Ulnar deviation of wrist observed
# Confirmation of Case for work-relatedness

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there scientific evidence of WR for De Quervain’s Tenosynovitis and</td>
<td>Yes, evidence associating repeated texting using thumbs and disease</td>
</tr>
<tr>
<td>mobile device use?</td>
<td></td>
</tr>
<tr>
<td>Are there work exposures specifically associated with this condition?</td>
<td>Yes, frequent use of Blackberry device for texting (every 5-minute interval when overseas)</td>
</tr>
<tr>
<td></td>
<td>&gt;50% symptom improvement (no surgery) after 30 June 2014.</td>
</tr>
<tr>
<td>Are the work exposures excessive or significant?</td>
<td>Yes, overtime work (&gt;12hr/day), tight deadlines, and excessive use of phone for texting</td>
</tr>
<tr>
<td>Are there significant non-work factors contributing to the condition?</td>
<td>None except age (51 year old)</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Work-related De Quervain Tenosynovitis due to excessive use of mobile device</td>
</tr>
</tbody>
</table>
Recommendations

• Avoid prolonged use
  — Frequent breaks
  — Long messages typed on desktop computer
  — Avoid prolonged use of mobile devices for work (e.g. clearing chains of email, type long messages, drafting contracts)
  — Adopt neutral postures
Mobile Handheld Device & Tenosynovitis - An Emerging Trend

• Media Platform – Awareness on ergonomic risk

## Mobile Handheld Device & Tenosynovitis - An Emerging Trend

- **Media Platform – Awareness on relation**

- **Scientific / Medical Community – Evidence**

<table>
<thead>
<tr>
<th>Case Report and Others</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isaiah WW, Byron SK. Texting tendinitis in a teenager. <em>The Journal of Family Practice</em>, 2011:60(2); 66-68</td>
<td>14 y.o. Teenager; mobile texting and De Quervain’s Symptoms</td>
</tr>
<tr>
<td>Ines MFG. “WhatsAppitis”. <em>The Lancet</em>, 2014;383:1040</td>
<td>34 y.o. Dr, pregnant; mobile texting and De Quervain’s Tenosynovitis.</td>
</tr>
</tbody>
</table>
Silicosis

• Fibrotic or scarring of the lung
• Caused by inhalation of silicon dioxide (‘free silica’)
• Silica particles of respirable size-0.5 to 5 um
• Latency depends on type of silicosis
Case Study 4- Silicosis

• 55 year old man
• shortness of breath for 2 years
• Chest X-ray: nodular opacities
• normal lung function
• Worked 36 yrs as a tombstone engraver
• Smoker-- 30 years
Silicosis was the No 1 Occupational Disease in early 1970s and the leading occupational lung disease in the 70s and 80s
In 1970 there were 25 granite quarries employing 1200 workers. Dust monitoring in 1968 and 1971 showed high dust levels. Radiological survey in 1965 of 1,188 granite quarry workers showed a silicosis prevalence of 8%. A follow-up survey of 1230 quarry workers in 1971 showed a prevalence of 15%.

Mean respirable dust levels (8hr TWA) of crusher workers at granite quarries:

- Silica-crystalline
  - Cristobalite, respirable dust 0.05
  - Quartz, respirable dust 0.1
  - Tridymite, respirable dust 0.05
Decline of Silicosis in Singapore, 1970-2015

No cases have been detected among those first exposed to granite dust in 1979 or later

1970-Sand and Granite Quarries Regulations
1971-Medical surveillance
1972-Implementation of dust control measures
1973-Dust monitoring

1990s - Phasing out of granite quarries
last quarry (Aik Hwa in Pulau Ubin) closed in 1999
Are we still at risk of silicosis?

Has Silicosis been completely eliminated?
Silicosis Risk from Countertop Manufacturing, Finishing and Installation

- Silica exposure depends on silica content of stone
  - Dry grinding green marble with very low silica content of 1.8% (no LEV) exposed to silica levels of 39 and 45 μg/m³
  - Granite shop (no engineering controls), silica exposures much higher (89 to 460 μg/m³).

- 22 sawyers using wet methods,
  - Median = 54 μg/m³,
  - Mean = 61 μg/m³ (range: 15 to 134 μg/m³).
  - 12 (55%) >50 μg/m³,
  - 4(18%) >100 μg/m³.

<table>
<thead>
<tr>
<th></th>
<th>PEL (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH</td>
<td>25</td>
</tr>
<tr>
<td>OSHA</td>
<td>100</td>
</tr>
<tr>
<td>NIOSH</td>
<td>50 (REL)</td>
</tr>
<tr>
<td>Singapore</td>
<td>50 (for cristobalite, tridymite); 100 (for quartz, tripoli)</td>
</tr>
</tbody>
</table>
## Silica in the Construction Industry

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Median silica exposure (µg/m³)</th>
<th>Range of exposure to silica (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Painters (abrasive blasting with sand / coal)</td>
<td>1280</td>
<td>260 - 26200</td>
</tr>
<tr>
<td>Bricklayers (hand drills, grinders, saws, jack hammers)</td>
<td>320</td>
<td>7 – 12400</td>
</tr>
<tr>
<td>Operating Engineers (vertical drills, backhoes, street sweepers, dowel packs, road milling, crushers)</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Laborers (drills, saws, jackhammers, chipping guns, rakes, brooms)</td>
<td>350</td>
<td>7 - 5900</td>
</tr>
</tbody>
</table>

### Job Task

- **Abrasive Blasting of concrete structures**: Up to 14000 µg/m³ over 96-min
- **Drilling concrete highway**: Up to 4400 µg/m³ over 358-min
- **Concrete wall grinding during new building construction**: Up to 660 µg/m³ over 191-min
- **Concrete sawing**: Up to 14000 µg/m³ over 350-min


No construction companies currently under hygiene surveillance.
No cases have been detected among those first exposed to granite dust in 1979 or later.
Common ODs—What else do we need to know?

All Occupational Diseases are **PREVENTABLE**

- Recognize new causes of ODs
- Be on alert for hazards and conduct surveillance
- Evaluate gaps/deficiencies in programs
- Investigate to identify causal agent as it helps with returning the worker safely back to work and prevent other workers from developing OD
Thank you

Any questions?