Accelerated Silicosis

September 2020
Who’s here?

Clinical Experts
- Dr Adrienne Edwards – Respiratory Physician, Canterbury DHB
- Dr Graham McGeoch – FRNZCGP, Canterbury Initiative and HealthPathways Clinical Leader
- Dr Jim McLeod - Occupational health Clinician, WorkSafe
- Dr John Monigatti – Occupational Physician, ACC
- Dr Alexandra Muthu, Occupational and Environmental Physician, Auckland DHB

Accelerated silicosis joint governance group
- Catherine Epps - General Manager Health and Technical Services, WorkSafe
- Dr John Robson – ACC Chief Clinical Officer
- Dr Andy Simpson – Ministry of Health, Chief Medical Officer
To provide an overview of accelerated silicosis including:

- Accelerated Silicosis Assessment Pathway
- Silica Exposure HealthPathway
- Information on the exposure threshold, ACC eligibility criteria, ACC claim lodgement and silica investigations
- WorkSafe, ACC and Ministry of Health roles and contributions
- Opportunity for questions to clinical experts and agencies
Historical context – Australia and NZ

Australia
- First noticed in Queensland in 2017 by an occupational clinician
- Queensland and Victoria quick to set up active case finding

New Zealand
- Started to discuss a coordinated response in early 2019
- First time active case finding for an occupational disease in New Zealand
Dust Disease Taskforce

Established July 2019

Membership
• Clinical experts
• Occupational health professional groups
• Research/academia

Purpose
• Provide advice to WorkSafe, Ministry of Health and ACC on dust diseases
• Initial focus has been to concentrate on accelerated silicosis and the process to actively find and assess exposed workers
Location of workplaces and current workers

ENGINEERED STONE INDUSTRY

Upper North Island
- Workplaces: 58 (51%)
- Workers: 233 (44%)

Lower North Island
- Workplaces: 13 (12%)
- Workers: 64 (12%)

Central North Island
- Workplaces: 22 (19%)
- Workers: 118 (22%)

South Island
- Workplaces: 20 (18%)
- Workers: 115 (22%)

16 July 2020
Collaborative approach

- WorkSafe, ACC and the Ministry of Health have been working collaboratively with health professionals in the New Zealand Dust Diseases Taskforce on a nationally coordinated response to concerns about the emerging occupational disease risk of accelerated silicosis.

- This includes identifying those who may be at risk and ensuring the right guidance and services are in place to prevent harm and support exposed workers as needed.
Agency roles and contributions

- WorkSafe – Prevention and “front door” to health checks
- ACC – Prevention, claim assessment, diagnosis, and support
- Ministry of Health – Assessment, diagnosis and management
Clinical experts in accelerated silicosis

- Summary and an occupational physician perspective
- A respiratory physician perspective
- Silica Exposure HealthPathway
**Silicosis**

**Chronic**
- Most common form worldwide, particularly in mining.
- Develops slowly over decades due to prolonged low intensity exposure to respirable crystalline silica (RCS).
- Two types: simple nodular and complicated silicosis.

**Accelerated**
- Develops more rapidly
- Associated with higher intensity RCS exposure.
- Similar radiological features as chronic.

**Acute**
- Rare – result of very high levels of RCS exposure over a few weeks to less than 5 years.
Accelerated Silicosis

- Accelerated silicosis is an emerging occupational disease caused by exposure to significant concentrations of respirable crystalline silica from unsafe work with engineered (artificial) stone.

- It is an aggressive form of silica-related disease that can develop over a short period of time (approximately 3-10 years, however it can appear in less than one year).
Those most at risk

- People who work with engineered (i.e. artificial) stone are at risk of exposure to respirable crystalline silica, which is created when materials containing silica are cut, ground, drilled, sanded, polished or which releases respirable crystalline silica into the air.

- Crystalline silica is a natural substance found in concrete, bricks, rocks, sand, clay, and stone (including artificial or engineered stone composite benchtops used in kitchens, bathrooms and laundries).

- Respirable crystalline silica particles are extremely small (“respirable”); they can’t always be seen with the naked eye. Exposure to respirable crystalline silica dust, from any source, can harm human health.
Occupational physician perspective

The exposure history, obtained by questionnaire, is key.
- Chronology of current and longest jobs
- Description of tasks
- Efficacy of controls and PPE

A thorough respiratory and medical history is needed to exclude other causes.

Diagnostic certainty is important.
Occupational physician perspective

- There is no established, effective treatment so the focus is on prevention.
- It may be necessary to curtail further exposure altogether, or make sure it is reduced by:
  - lowering allowable workplace exposures
  - substitution, engineering controls, PPE
  - monitoring compliance and health
Respiratory physician perspective

- Case description outlining importance of early identification
National Israeli Lung Transplant Centre

- Overall conducted 350 LTX
- Large increase in referrals of patients with Silicosis as cause of respiratory failure
- All exposed to same occupational exposure
- Dry cutting caesarstone (7-22yrs)

*CHEST 2012;142(2):419-424*
Autoimmune disease in silicosis linked to artificial stone

National Transplant Centre Israel

- 40 silicosis cases referred between 1997 and 2012
- All cases occupational exposure to an artificial stone produced in Israel
- 9/40 (23%) autoimmune disease
- 3/40 findings of pulmonary alveolar proteinosis

Table 2: Symptoms, physical findings, serology and clinical diagnosis among nine cases of silicosis with concomitant autoimmune diseases

<table>
<thead>
<tr>
<th>Case</th>
<th>Symptoms</th>
<th>Physical findings</th>
<th>Relevant serologies</th>
<th>Clinical diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Raynaud's, Dysphagia</td>
<td>Sclerodactyly; Telangiectasia; Serositis</td>
<td>Anti-Scl-70 (+); SSA (anti-Ro) (+)</td>
<td>SSc</td>
</tr>
<tr>
<td>2</td>
<td>Raynaud's, Arthritis</td>
<td>Digital pitting; Arthritis; Serositis; Fever</td>
<td>ANA &gt; 1:160; RNP (+); SSA (anti-Ro) (+)</td>
<td>MCD</td>
</tr>
<tr>
<td>3</td>
<td>Raynaud's, Dysphagia</td>
<td>Sclerodactyly; Digital pitting; Arthritis; Serositis</td>
<td>ANCA (+)</td>
<td>SSc</td>
</tr>
<tr>
<td>4</td>
<td>Raynaud's</td>
<td>Digital pitting; Arthritis; Serositis</td>
<td>Anti-Scl-70 (+); RNP (+); SSA (anti-Ro) (+); SSB (anti-La) (+)</td>
<td>SSc</td>
</tr>
<tr>
<td>5</td>
<td>Arthritis, Xerostomia</td>
<td>Arthritis</td>
<td>ANA &gt; 1:160; SSA (anti-Ro) (+)</td>
<td>Sjogren's syndrome</td>
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<tr>
<td>6</td>
<td>Arthritis</td>
<td>Arthritis; Fever; Rash</td>
<td>ANA 1:80; RNP (+); SSA (anti-Ro) (+)</td>
<td>MCD</td>
</tr>
<tr>
<td>7</td>
<td>Arthritis</td>
<td>Arthritis; Serositis</td>
<td>ANA &gt; 1:160; RF (+)</td>
<td>RA</td>
</tr>
<tr>
<td>8</td>
<td>Arthritis</td>
<td>Arthritis</td>
<td>RF (+)</td>
<td>RA</td>
</tr>
<tr>
<td>9</td>
<td>Arthritis, Myalgia</td>
<td>Arthritis; Myositis</td>
<td>ANA (+); SSA (anti-Ro) (+); SSB (anti-La) (+); anti-Ro-1 (++)</td>
<td>Polymyositis—anti-synthetase syndrome</td>
</tr>
</tbody>
</table>

ANCA, antinuclear cytoplasmic antibody; Anti-Scl-70, anti-scleroderma; RF, rheumatoid factor; RNP, ribonucleoprotein; SSA, anti-Sjoegren's syndrome A; SSB, anti-Sjoegren's syndrome B.
Caesarstone
First synthetic decorative stone of its type, introduced in 1987.

Leading Global Footprint with Diverse Revenue Mix

Caesarstone U.S. Revenue Performance ($mm)

YoY organic growth

34.4% CAGR


31 60 87 123 186 223 223 245

CS partners along the value chain

Architects & Designers ~240 K
Kitchen & Bath ~18 K
Fabricators ~9 K
Developers/builders ~9 K

relevant in the direct sales market
Silica associated disease

Respiratory manifestations
• Silicosis
• Sarcoidosis like
• COPD
• Pulmonary fibrosis
• Lung cancer
• Caplan’s syndrome
• Mycobacterial disease

Autoimmune disease
• Rheumatoid arthritis
• Systemic lupus erythematosus
• Scleroderma
• Dermatomyositis/myositis
• ANCA-associated vasculitis

Renal disease
Case study (33 year old stonemason)

Respiratory history
- Fit and well with no respiratory limitation or symptoms
- Enjoys hunting
- No prior asthma/TB/other history
- Family history of auto-immune related interstitial lung disease
- No birds other environmental exposures
- 15 pack year smoking history
  - 18yo-current 5-15/day
    - Vaping previously to aid with smoking cessation

Occupational exposure
- Cutting, grinding, sanding and polishing of engineered stone benchtops
- At least eight years exposure and involved with high intensity dry processing without wearing adequate PPE.
Case finding investigations

**Lung function**

<table>
<thead>
<tr>
<th>Visit date</th>
<th>Norm Set: Combined GLI 2012 and ECCS 1993</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Pred</td>
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<tr>
<td>FVC</td>
<td>L</td>
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<tr>
<td>FEV1</td>
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<tr>
<td>FEV1%F</td>
<td>%</td>
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<tr>
<td>MFEF</td>
<td>L/s</td>
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<tr>
<td>TLC</td>
<td>L</td>
</tr>
<tr>
<td>VC</td>
<td>L</td>
</tr>
<tr>
<td>FRCpl</td>
<td>L</td>
</tr>
<tr>
<td>RV</td>
<td>L</td>
</tr>
<tr>
<td>RV%TLC</td>
<td>%</td>
</tr>
<tr>
<td>DLCO_SB</td>
<td>ml/(min*mmHg)</td>
</tr>
<tr>
<td>KCQ_SB</td>
<td>ml/(min<em>mmHg</em>L)</td>
</tr>
<tr>
<td>VA_SB</td>
<td>L</td>
</tr>
</tbody>
</table>

**Blood tests**

- Antinuclear antibody
  - Weak positive homogenous 1:80
- ENA negative
- Myositis antibodies negative
- ANCA negative
- Anti-CCP negative
- Full blood count normal
- Serum ace normal
- Renal function normal
- Urinalysis normal
- Widespread micronodularity/upper zone predominant
- Simple silicosis and lymphadenopathy on HRCT
Accelerated Silicosis

- Latency < 10 years from initial RCS exposure
- Onset and progression of disease more rapid than classical chronic silicosis
- Higher intensity RCS exposure
- Radiological and pathological manifestations almost identical to those of classical silicosis

Simple silicosis

Complicated silicosis/Progressive massive fibrosis (PMF)
Artificial stone silicosis: rapid progression following exposure cessation

- Bay of Cadiz area in Spain, population 514,512 (2009-2018)
- 106 workers diagnosed with silicosis
- 220 Workers exposed to artificial stone
- Mean age at diagnosis 36.2 (+/-7)
- Mean duration of exposure 12 years (+/-4.3)
- All male, 44% non smokers, symptoms mild

At diagnosis:
- 99 simple silicosis (93.%) and 7 PMF (6.6%)
- At follow up (4 +/-2 years):
  - 4 patients died, 2 following lung transplant
  - 56% had progressed >2 ILO Chest x-ray subcategories
  - At follow up increase from 7 to 40 workers with PMF (37.7%)
  - Average decrease 86.8 FVC and 83.4ml FEV1 but >157ml and >133ml in 25% of patients (FVC and FEV1).
- Lower FVC at diagnosis and longer duration of exposure were associated with progression to PMF

https://doi.org/10.1016/j.chest.2020.03.026
24 cases referred by occupational physician
Stone benchtop company (South Island)
One case referred directly to general respiratory physician

CHEST XRAY/HRCT
Detailed health/exposure questionnaire 24/25
Autoimmune serology
Urinalysis

3 ILD specialists
Occupational physician and registrar
Two chest radiologists
ACC
= +/- Rheumatology
Accelerated Silicosis Assessment Pathway

- The assessment pathway outlines a process for people potentially exposed to high concentrations of respirable crystalline silica in a New Zealand workplace to obtain a health check to assess for a possible diagnosis of accelerated silicosis.

- If workers are at risk of developing disease due to exposure to RCS, they can go through a pathway for assessment, diagnosis and support.

- This pathway can be found on the Ministry of Health website and HealthPathways.
Accelerated silicosis is an emerging occupational disease risk caused by exposure to significant concentrations of respirable crystalline silica from unsafe work with engineered stone. It is an aggressive form of silica-related disease that can develop over a short period of time (approximately 3-10 years’, although it can appear in less than a year). It is distinct from chronic silicosis, which is not uncommon, and rarely becomes progressive.

A. Identify a potentially exposed person and encourage GP visit

A person at risk of developing accelerated silicosis from more than six months of work with engineered stone in the last ten years should be encouraged to visit their GP for a health check. The person may initiate the visit or be encouraged by family, a workmate, their employer or a member of a profession or relevant organisation (e.g. a WorkSafe Inspector, occupational health nurse or union). It is helpful if the person brings any relevant health monitoring records from work to the appointment.
B. GP or other medical practitioner visit and initial assessment
1. The person discusses health and/or exposure concerns with GP.
2. If the accelerated silicosis exposure threshold is met, GP completes initial assessment with the person. If there are other health concerns, GP assesses as per usual process.
3. Obtain the person’s consent to agreed actions. Consider any psychological support needs (e.g. workplace Employee Assistance Programme where available), complete initial assessment.
4. Lodge ACC claim if the accelerated silicosis exposure threshold and ACC eligibility criteria are met.

C. ACC initial assessment
1. Case is reviewed. Contact person to discuss their claim, explain the process and gain consent to proceed.
2. Obtain relevant work and non-work exposure history using a questionnaire.
3. Confirm accelerated silicosis exposure threshold and ACC eligibility criteria are met.
4. Request GP to make a further appointment with person and provide authorisation for silica-exposure investigations or issue decline cover decision.

D. GP or other medical practitioner visit and follow-up assessment (as needed)
1. Complete follow-up clinical assessment with the person (including spirometry). If other health concerns, GP assesses as per usual process.
2. Obtain the person’s consent to agreed actions. Consider any psychological support needs (e.g. workplace Employee Assistance Programme where available).
3. Order silica-exposure investigations requested by ACC: chest x-ray, high resolution CT scan silicosis protocol (private radiology provider) and autoimmune screen bloods/urine (local community lab).

FOLLOW-UP
Follow-up will take place at different points on the pathway for each person, usually when an ACC cover decision is made on a person’s work related accelerated silicosis claim.

If a person is eligible to receive public health care in New Zealand, but their exposure has occurred overseas and/or they are not covered by ACC, then their GP will consider a referral to a respiratory physician for further assessment.

Non-ACC health issues/ACC claim declined
- ACC provides reports to GP (with the person’s consent).
- GP manages patient follow-up of any non-ACC health issues.
- The person is advised to talk to employer, union or see WorkSafe website about any workplace concerns.
- The person is advised to contact GP about any further health concerns.

Possible/probable silicosis
- ACC provides reports to GP (with the person’s consent) and authorises payment for recommended follow-up investigations on a case-by-case basis.
- ACC discusses a return to work plan with the person, GP and employer (with the person’s consent) based on recommendations from Occupational Medicine Physician.
E. ACC follow-up assessment
1. Case is reviewed. Contact is made with the person to discuss their claim and confirm they have had follow-up GP appointment and investigations.
2. Request and review medical records and investigation results from GP.
3. Determine need for any further information or follow-up e.g. lung function test (spirometry & DLCO®).
4. Contact person to discuss next steps and gain consent to proceed.
5. Issue cover decision and follow up with GP or refer for external clinical expertise as needed.

F. Occupational medicine assessment
Required if there are abnormalities on clinical assessment or investigations that raise the possibility of accelerated silicosis and/or concern based on level of exposure to engineered stone.
1. Full history and examination of the person.
2. Person advised of results and preliminary diagnosis, clearance for return to work, how to mitigate exposure risk, next steps.
3. Provide assessment report and recommendations to ACC.

G. ACC follow-up assessment
1. Case is reviewed. Contact is made with the person to discuss next steps and gain consent to proceed.
2. Issue cover decision and follow up with GP or refer for accelerated silicosis multidisciplinary meeting (MDM) expert clinical review as discussed with the person.

H. Accelerated silicosis multidisciplinary meeting* discussion (as needed)
1. Expert clinical review of ACC-referred cases at accelerated silicosis MDM.
2. Confirm diagnosis.
3. Provide report and recommendations to ACC.

recommendations from Occupational Medicine Physician and accelerated silicosis MDM as required.
• GP manages the person’s follow-up as needed (ACC-funded referral or publicly funded health system).

Accepted ACC claim
• ACC follows up with the person, GP and employer (with the person’s consent).
• ACC discusses a return to work or alternative work plan with the person, GP and employer based on recommendations from Occupational Medicine Physician and an accelerated silicosis MDM as required.
• Treatment and support plan referrals made based on individual needs with the person’s consent.
• Usual medical certification process of fitness for work/modified work duties.

Feedback to WorkSafe New Zealand
Medical Officers of Health are required to notify WorkSafe of any injuries caused by a hazardous substance arising from work. This would apply to injuries caused by respirable crystalline silica, which meets the definition of a hazardous substance. (Note this substance is only hazardous if it’s respirable.)

2. Person includes worker, patient and client depending on the pathway stage and terminology.
3. The accelerated silicosis exposure threshold is more than six months working with engineered stone in the last 10 years.
4. The ACC eligibility criteria are that some of the exposure occurred in a New Zealand workplace and the accelerated silicosis threshold is met.
Exposure threshold and eligibility

Accelerated silicosis exposure threshold

- Workers will be encouraged to see their GP if they have worked for more than six months with engineered stone benchtops in the last ten years.

ACC eligibility criteria

- At least some of the exposure must have occurred in a New Zealand workplace for an ACC work related claim to be lodged and investigated.
Exposure occurred overseas or not covered by ACC

Workers whose exposure occurred outside New Zealand and/or are not covered by ACC

- If a person is eligible to receive public health care in New Zealand, but their exposure has occurred overseas and/or they are not covered by ACC, their GP will consider a referral to a respiratory physician for further assessment.
Implementation of Accelerated Silicosis Pathway – from September 2020

- **WorkSafe** inspectors will revisit the 113 businesses and approximately 530 workers known to work with engineered stone to:
  - Provide information to businesses and workers
  - Ensure workplaces are managing the risks of RCS

- **An ACC** work related claims process in place to:
  - Begin the necessary investigations once a claim is lodged
  - Pay for the cost of diagnostic tests, assessments and specialist referrals required to investigate the claim to reach a cover decision
Implementation of Accelerated Silicosis Assessment Pathway – from September 2020

- The **Ministry of Health** has the assessment pathway and guidance documents available on their website.
- The **Ministry of Health** has worked with the Canterbury HealthPathways Team to develop a Silica Exposure HealthPathway.
Silica Exposure HealthPathway
Next steps

- Initial check on the start of implementation
- Review of the assessment pathway
- Next phase:
  - Data and research
  - Monitoring
  - Health surveillance
  - Health monitoring for businesses
  - Insights from inspector visits
Silica Exposure HealthPathway

Silica Exposure
This pathway is about managing the occupational health risks of asymptomatic or symptomatic workers exposed to crystalline silica from engineered stone.

Background
About silica exposure

Assessment
Ask about engineered stone work
Accelerated silicosis may occur in patients working with engineered stone bench tops after short exposures.

ACC permits a telehealth consultation for the initial appointment.

1. Ask about exposure to mined or machined silica, e.g., engineered stone, stone, sand, or concrete:
   - Type of exposure – domestic and occupational
   - Where the exposure occurred (New Zealand or other country)
   - Timing, duration, and intensity of occupational dust or silica exposure in any role, including cleaning:
     - Fabrication, dry-cutting, and installation of engineered stone bench tops, which have a higher silica content than natural stone
     - Construction-related work, particularly crushing or polishing cement
     - Mining-related work
     - Sandblasting or abrasive blasting
     - Pottery and sculpture
   - Any additional factors:
     - High levels of dust in the workplace, including history of coughing on dust after work
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     - Sandblasting or abrasive blasting
     - Pottery and sculpture
   - Any additional factors:
     - High levels of dust in the workplace, including history of coughing up dust after work
     - Nature of dust-control measures at workplace
     - Whether a mask was worn during the activity, and what type
     - Smoking history
     - Co-morbidities, e.g. COPD, latent tuberculosis, heart disease, joint or skin disease

2. Review and copy to the patient record any workplace health monitoring records, e.g. spirometry and radiology.

3. Ask about respiratory, skin, or rheumatological symptoms.

4. Perform an examination for signs of active cardiopulmonary, rheumatological, or skin disease.

5. Assess the risk of accelerated silicosis. The patient is at risk if they have worked with engineered stone for more than 6 months in the last 10 years.

6. Make an ACC claim if it is possible the patient is at risk:
   - Use ACC45 – Read code: silica pneumoconiosis NOS (H42z).
   - Type of claim: Use "Work related".
   - Description: Include details of how criteria are met.

7. For engineered stone workers, but only if ACC requests it, arrange a funded 30-minute appointment:
   - Complete the Adapted Crystalline Silica Health Form – Medical Section.<ref>
   - If at risk of accelerated silicosis, arrange investigations funded by ACC.
Request

- If severely unwell, request acute general medicine assessment or acute respiratory assessment before ACC approval.
- If unsure of management, seek respiratory advice or occupational medicine advice.
- If symptomatic and ACC declines the claim, request non-acute respiratory assessment or seek respiratory advice.
- Seek respiratory advice on repeat investigations and management.

Information

For health professionals

Further information

- ACC – Accelerated Silicosis
- Dr Adrienne Edwards – Silica Exposure
- Ministry of Health:
  - Accelerated Silicosis
  - Accelerated Silicosis Assessment Pathway
- Royal Australian College Physicians – Frequently Asked Questions: Accelerated Silicosis
- The Thoracic Society of Australia & New Zealand – Accelerated Silicosis, Kitchen Benchtops And The Emerging Epidemic [webinar]
- WorkSafe – Safety Alert: Accelerated Silicosis
Thank you.

Questions?