



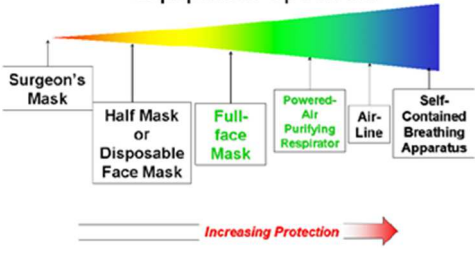
Interim Discussion Document

An Occupational Hygiene Perspective – COVID-19 Risks and Respiratory Protection

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| Introduction | |
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| Background | The New Zealand Occupational Hygiene Society Incorporated (NZOHS) is a non-profit organization supporting the Occupational Hygiene profession in New Zealand. Occupational Hygiene is an internationally recognized profession specializing in the management of worker health risks (anticipation, recognition, assessment and control of workplace risks). |
| The Objective of NZOHS | To further the practice, professionalism and recognition of Occupational Hygiene in New Zealand. |
| NZOHS and COVID-19 | The COVID-19 pandemic has many potential implications on worker health. NZOHS members have been involved in various aspects of management of related risks to the health sector and essential businesses. NZOHS member services include assistance with respirator selection, fit testing to review of effectiveness of ventilation. NZOHS have established an information hub for members to access (free of charge) experienced Occupational Hygienists (Full Members) to assist in the effective management of workplace health risks. |
| Position Summary | <p>The risks associated with exposure to SARS CoV-2 are not well understood. Caution is required to ensure that worker health is protected. When other options for protection of health are not available or do not eliminate the risk, respiratory protection is recommended.</p> <p>The NZOHS position in regard to respiratory protection when there is a risk inhalation of aerosol/droplets/mists containing SARS-CoV-2 is for use of a minimum of “P2 (AS/NZ 1716:2012)”, N95 or equivalent to be worn. Note: the respirator must be well fitted and the wearer trained in donning and doffing and disposing the respirator in a safe manner.</p> <p>Employers should develop respiratory protection programme, including fit testing.</p> |

| Risk Management | |
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| Control of Risks | Control of workplace risks generally (and legislatively under the NZ Health and Safety at Work Act 2015 – HSWA) follows a hierarchy – elimination as far as reasonably practicable or minimisation. This is further defined in related Regulations to prioritize substitution, isolation and engineering controls, over administrative controls and Personal Protective Equipment (PPE). |
| SARS-CoV-2 - workplace risk | <p>The SARS-CoV-2 (as related to COVID-19 illness) is considered a workplace hazard under the HSWA legislation – and must be controlled effectively.</p> <p>Exposure to SARS-CoV-2 could occur in many current work environments – including the health sector and essential businesses.</p> <p>Exposure to SARS-CoV-2 may be through contact, inhalation or ingestion. There remains uncertainty around:</p> <ul style="list-style-type: none"> • The aerosol/mist/droplet particle size relevant to various tasks/exposure types (estimated by some to be mostly greater than 5µm for symptom based aerosol, <5 µm for process generated aerosol) • The duration that the mist/spray/aerosol may be airborne (estimated up to 3 hours) • The longevity of the virus on surfaces • Whether contact or ingestion are significant routes of exposure (given the receptors are in the lungs) <p>Evidence has been presented that indicates that there is an inhalation risk from aerosols in the spread of severe acute respiratory syndrome (SARS) and seasonal influenza. Analysis of various typical ventilation systems in surgical suites suggests that aerosol particles are quickly and evenly distributed throughout the room.</p> |
| SARS-CoV-2 – the controls | Given that the hazard (SARS-CoV-2) cannot be eliminated at this time, the current measures to isolate and provide engineering controls (e.g., ventilation) are crucial. The avenues around ensuring isolation in New Zealand will help to minimise risk and NZOHS support the implementation of these controls. The “last resort” control is use of Personal Protective Equipment (PPE) to further minimise risk. Various elements of PPE have been recommended and implemented throughout the Health Sector. The following section provides further detail around the NZOHS knowledge around respiratory protection specifically – further advice and information is available in relation to other PPE. |
| Respiratory Protection | |
| Respirators as a Control | <p>Respiratory protection is a type of PPE which is required where other controls do not adequately reduce the inhalation risk. Where the risk is well controlled there should be no need to rely on a respirator. The unnecessary wearing of a respirator may lead to supply issues and inappropriate respirator use may produce a false sense of security so that the wearer is less diligent with other control methods such as social distancing, hand washing, and decontamination.</p> <p>Evidence has been presented that indicates that there is an inhalation risk from aerosols in the spread of severe acute respiratory syndrome (SARS) and seasonal influenza. When present in an aerosol, viruses and bacteria can be filtered by respirators with particulate filters. Because no respirator will prevent the inhalation of all particles, such as viruses and bacteria, respirators cannot eliminate the risk of exposure, infection, and illness, but will reduce/minimise the risk.</p> <p>The diagram below provides a simple illustration of the increasing level of protection provided by various respirators (left to right).</p> |

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| | <p style="text-align: center;">Respiratory Protective Equipment Spectrum</p>  <p>Note: the above is a simplification, and assumes effective filter selection, maintenance, fit and use of the defined respirators. In some cases, the filter selection is at least as important as a mask.</p> <p>For situations where there is a shortage of the respirators that provide adequate protection, it may be possible to use respiratory protective equipment with the same or higher level of protection, if these are available.</p> |
| <p>Level of protection</p> | <p>A surgical mask is an infection control device designed to help prevent the spread of infection from the wearer’s exhaled breath to potentially susceptible persons. A surgical mask may help reduce contamination of the environment by providing a barrier for large droplets expelled by the wearer. However, since surgical masks are not tested in the same way as respirators, any “filtration efficiency” claims cannot be directly compared to those for a respirator.</p> <p>In a few cases, a protective respirator may also have the attributes of a surgical mask. These are sometimes referred to as “Surgical N95 Respirators.” These products can help block large droplets expelled by the wearer, but also have been shown to have efficacy at filtering smaller particles and are designed to fit tightly to the face. Because of the additional use as a respirator, this type of surgical mask/respirator combination must also be fit tested.</p> <p>A respirator is a device designed to help provide the wearer with respiratory protection against inhalation of a hazardous atmosphere. For bioaerosols, particulate-removing respirators are often recommended to help reduce exposure (a respirator filter will remove bioaerosols in a similar manner as it removes non-biological aerosols from air that passes through it).</p> <p>The testing required for respirators, and the various types of respirators are defined and AS/NZS 1716:2012. This includes the “P2” respirator. Internationally, the US N95 mask has similar criteria to the P2, as does the FFP2 (defined in European standards). The requirements for respirators for micro-organisms are further defined in Table 4.2 (of AS/NZS1716), and dependent on the Risk Group. The Risk Group for SARS CoV-2 is considered to be Group 3, indicating P2 or P3 respiratory protection, although authorities have generally limited requirements for use of P2 (or N95) protection to “aerosol generating activities”.</p> |
| <p>Additional Options</p> | <p>Different type respirators will offer the same or an increased level of protection based on the efficient in fit (for example a facepiece that allows less air infiltrating around the mask will provide a better the level of protection).</p> <p>The selection of respiratory protection can also include other attributes that one type of respiratory protection can provide over others. For example, loose type hoods with Powered Air Purifying Respirators (PAPR) can be used when facial hair is potential an issue as well as when the worker requires to wear glasses to be able to do his/her task. This combination offers eye/face protection in regard to exposure by contact with the hazard. These respirators are also provide a cooler breathing environment and do not require the effort</p> |

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| | <p>needed to draw air through the filter. The disadvantage of this type of respiratory protection is that they require a clear protocol for removing and decontamination of the entire unit. Supplied air respirators are another option, where clean air is drawn to the wearer from an external source. These can be sterilized and there are no filters to be contaminated.</p> |
| Respiratory Protection Programme | <p>Use of respirators should be associated with development and implementation of a respiratory protection programme, including clear guidance on when respirators are required, training, maintenance, fit testing, replacement of filters/masks, donning/doffing and disposal.</p> <p>Note: Half or full face re-usable respirators may be sterilized and re-used, although most filters are disposable. Some research is being carried out internationally into sterilization of disposable masks (and filters), however, there is insufficient evidence to support this at this time.</p> <p>Fit testing should be carried out prior to use and regularly (usually annually) for each individual and each type of mask that they will use. There are both qualitative and quantitative fit testing methods available. Fit testing can be time consuming and a barrier to use of respirators. Some PAPR combinations do not require fit testing.</p> <p>It is noted that a respirator that is not fit tested has an unknown seal on the face (as per surgical masks). NIOSH (US) have produced some guidance to help ensure that fit testing can be carried out in the Health Sector in the current pandemic, including a slightly relaxing of requirements (e.g., removal of strict requirement for annual testing). A qualitative “self check” (facial fit check) is also always completed to help ensure a reasonable fit (no equipment required, but some training).</p> |
| International advisory | <p>The British Occupational Hygiene Society (BOHS), are working on development of guidance for and with the UK National Health Service (NHS). Their initial commentary endorses “any move to prioritise the use of powered respiratory protective equipment as most effective protection for health workers in critical risk areas.”</p> <p>http://www.bohs.org/bohs-statement-on-respiratory-protective-equipment-for-the-protection-of-nhs-staff/</p> <p>The American Industrial Hygiene Association (AIHA) have developed a specific Coronavirus Outbreak Resource Center and are working to appeal to Congress in the protection of Healthcare and other workers – https://www.aiha.org/public-resources/consumer-resources/coronavirus_outbreak_resources?utm_source=Twitter&utm_medium=social&utm_term=AIHA+Main&fbclid=IwAR3-CaeKZBHVpXV0zh5nMsygn9B4Qwo3Cle2wSGpumqbxQVU9AJSn3yLZ4o</p> <p>The Australian Institute of Occupational Hygiene (AIOH) have been working to develop a certification scheme for fit testing of respirators, as well as working on a position statement regarding COVID-19 risk – https://www.aioh.org.au/resp-fit/resp-fit-testing-training</p> |

Further Resources and References

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| <p>Nature of the risk (COVID -19)</p> | <p>University of Minnosota – Center for Infectious Disease Research and Policy - COMMENTARY: COVID-19 transmission messages should hinge on science. http://www.cidrap.umn.edu/news-perspective/2020/03/commentary-covid-19-transmission-messages-should-hinge-science?fbclid=IwAR2l5t3Mf07TZHVrWzYtJQcOdwwTUL6C0smQhjDxkNHnSM8Y_uX4TvtMrZA</p> <p>- COMMENTARY: Masks-for-all for COVID-19 not based on sound data http://www.cidrap.umn.edu/news-perspective/2020/04/commentary-masks-all-covid-19-not-based-sound-data</p> <p>US NIH Research Matters (summary of research relating to aerosol and surface retention and activity times) https://www.nih.gov/news-events/nih-research-matters/study-suggests-new-coronavirus-may-remain-surfaces-days?utm_source=dlvr.it&utm_medium=twitter?utm_source=Facebook&utm_medium=social&utm_term=AIHA+Main&fbclid=IwAR26gtAGKc2QX-3YLuhZrbJrzWNB6ElhwGkhpE5hZkXbXs5yJ9VDIKZ3DCs</p> |
| <p>Effectiveness and use of Respiratory Protection</p> | <p>AS/NZS 1716:2012 Respiratory Protective Devices AS/NZS 1715:2009 Selection, Use and Maintenance of Respiratory Protective Equipment WorkSafe NZ Respiratory Protection - https://worksafe.govt.nz/topic-and-industry/personal-protective-equipment-ppe/respiratory-protective-equipment/ BOHS Breathe Freely RPE Guidance https://www.breathefreely.org.uk/rpe-guidance.html NIOSH guidance on Fit Testing for SARS CoV-2 https://blogs.cdc.gov/niosh-science-blog/2020/04/01/fit-testing-during-outbreaks/</p> |

Addendum: Specific Information from Members (available on request)