# Covid-19

## Assessing the risk to the lives of healthcare workers

All healthcare workers in hospitals and in the community are at increased risk of Covid-19 infection and subsequent risk of fatality. In the US, 10% of deaths are in healthcare workers. International data shows that individual risk of death varies widely related to age and comorbidities. Hospital managers and clinical directors are now making decisions about work patterns to mitigate risk for those with greater risk of fatality. It is possible that there will be variations in how this is handled between DHBs and within and between departments. At times there may be little choice regarding who needs to be working with patients due to limited staff availability. Where choices can be made, however, it is important that everyone is using the same dataset for setting policy and that staff feel reassured that decisions are appropriate.

To aid this process, ASMS has summarised available data with statistician help, so that individual staff can visualise their own risk to help make personal decisions and so that this can be available for discussions with management when required.

The data below comes from the countries which have the earliest and largest experience of Covid-19 so far. The data is relatively crude and unadjusted for the interactions between factors such as age, sex and the various comorbidities, but the datasets are large which helps to give low variability for each parameter reported. As more in-depth reports on risk of death are published, the graphs and tables will be updated. Current sources of information are taken from the following: Adams & Walls, 2020; Eurosurveillance Editorial, 2020; Jordan, Adab, & Cheng, 2020; Onder, Rezza, & Brusaferro, 2020; Shi et al., 2020; Verity et al., 2020; Young et al., 2020.

It is important to note that data is not yet available to differentiate risk in those with good versus poor disease control in conditions such as diabetes, hypertension, heart failure etc. It is also not yet known whether the medications used in these conditions could be contributing to mortality, so only presence or absence of each co-morbidity can be used to evaluate risk at this stage.

Figure 1 depicts risk of death from Covid-19 related to age, from several countries. The raw data available in usually presented in 10-year age brackets (Table 1). These numbers have been placed at the half-way point for each age bracket on the graph and a curve drawn through this so that individuals at the upper and lower end of each age bracket can get a more realistic impression of where their risk lies. Risk is higher at all ages for males, with a ratio of between 1.6:1 and 2.4:1 (see Table 2). Therefore, the lines on the graph will actually be higher for males and lower for females. Gender strongly confounds with obesity, smoking and cardiovascular disease which is one possible explanation for the ratio.

It is important to note that mortality risk starts to rise sharply from around age 50-55 years.

Around 99% of patients who have died have had co-morbidity, and so it is possible that the increased co-morbidity that is associated with age is as important as age per se.
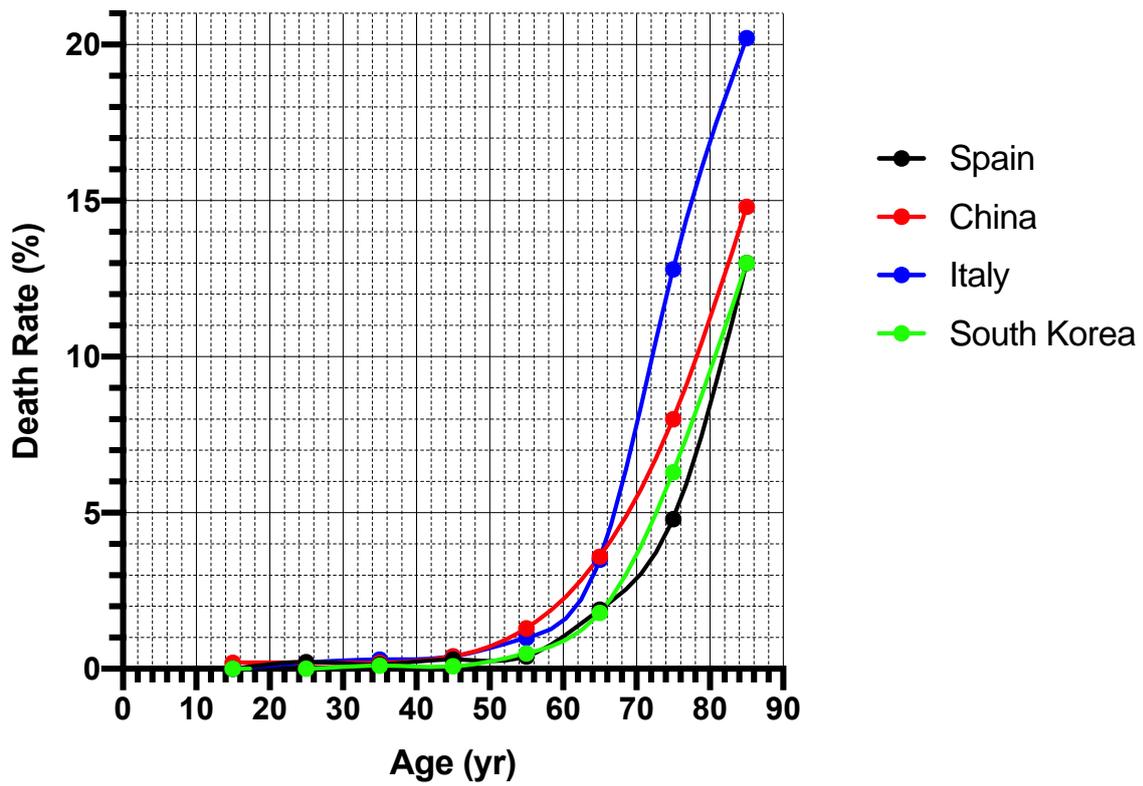
**Figure 1: Age versus Death Rate**

**Table 1: Age versus Death Rate**

| Age bracket (years) | South Korea | Spain | China | Italy |
|---|---|---|---|---|
| 0-9 | - | - | - | - |
| 10-19 | 0% | 0% | 0.20% | 0% |
| 20-29 | 0% | 0.22% | 0.20% | |
| 30-39 | 0.11% | 0.14% | 0.20% | 0.30% |
| 40-49 | 0.08% | 0.30% | 0.40% | 0.40% |
| 50-59 | 0.50% | 0.40% | 1.30% | 1% |
| 60-69 | 1.80% | 1.90% | 3.60% | 3.50% |
| 70-79 | 6.30% | 4.80% | 8% | 12.80% |
| 80+ | 13% | 13% | 14.80% | 20.20% |

**Table 2: Sex ratio of Covid-19 deaths**

| Risk based on country data | Male to Female ratio of Covid deaths |
|---|---|
| Italy | 2.4:1 |
| Germany | 1.6:1 |
| Overall death rate confirmed cases | 4.7% Male, 2.8% female |

## Co-Morbidity and Death Rate

In all reported populations, co-morbidity strongly associates with death date from Covid-19 and is reported in >99% of deaths. Summary Table 3 shows that, compared with having no co-morbidity, rate of death is **6-12 times higher** in the presence of **heart disease, diabetes, hypertension, lung disease** or **cancer**. As above, it is not yet known how disease severity or control relates to risk of death, so at present risk can only be related to presence or absence of each co-morbidity.

**Table 3: Age and co-morbidities related to Covid death rate, using existing data**

| Variable | Risk of death |
|---|---|
| Age | Risk rises by 10% (relative) per year of age from 30 up to 75 years, so e.g. the risk at age 35 is approximately 0.20%, then at 36 it is 0.22% |
| Gender | Males higher risk but strongly confounds with obesity, smoking and CVD |
| Heart Disease inc. CHF | 10.5% |
| Diabetes | 7.3% |
| Hypertension | 6.0% |
| Chronic lung disease | 6.3% |
| Cancer | 5.6% |
| Without above | 0.9% With each condition above, 6-12 times more likely to die |

## Also to note:

Chronic obstructive pulmonary disease (COPD), cardiovascular diseases, and hypertension have been identified as strong predictors for ICU admission.

Higher ACE2 (angiotensin converting enzyme II) gene expression may be linked to higher susceptibility to SARS-CoV-2.

ACE2 expression in lung tissues increases with age, tobacco use and with some types of antihypertensive treatment.

Smokers may also be a potentially vulnerable group for COVID-19 [54,58-60].

In summary, it is clear that some healthcare workers have a far greater risk of death from Covid-19 than others. Where possible, workers at increased risk should not be working with Covid-19 infected patients, and the highest risk group should probably be working from home rather than in the hospital, or at the least should not be working with patients.

## Full reference for data sources:

Adams, J. G., & Walls, R. M. (2020). Supporting the Health Care Workforce During the COVID-19 Global Epidemic. *JAMA*. doi:10.1001/jama.2020.3972

Eurosurveillance Editorial, T. (2020). Updated rapid risk assessment from ECDC on coronavirus disease 2019 (COVID-19) pandemic: increased transmission in the EU/EEA and the UK. *Euro Surveill, 25*(12). doi:10.2807/1560-7917.ES.2020.25.12.2003261

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Young, B. E., Ong, S. W. X., Kalimuddin, S., Low, J. G., Tan, S. Y., Loh, J., . . . Singapore Novel Coronavirus Outbreak Research, T. (2020). Epidemiologic Features and Clinical Course of Patients Infected With SARS-CoV-2 in Singapore. *JAMA*. doi:10.1001/jama.2020.3204