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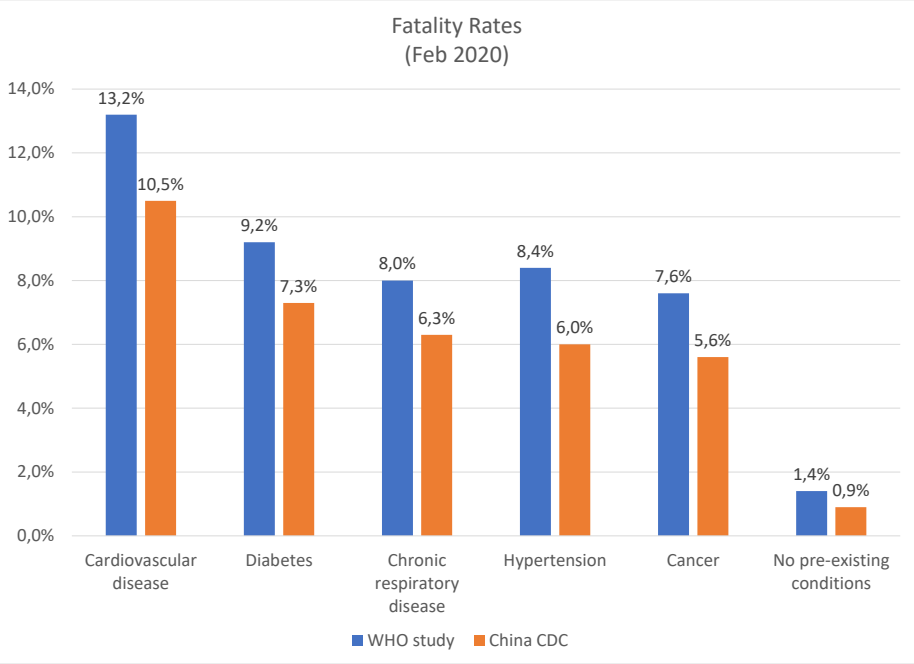
Data in the time of COVID-19: Managing underlying health conditions matter

Comorbidity is the co-occurrence of one or more underlying health issues in an infected person. The impact of comorbidities have been well studied globally. Various studies have shown the impact of comorbidity in the context of various diseases. For example, in a 2017 published study in Nature Scientific Reports, patients with comorbidities were found to have higher mortality rate than the average population infected by the Middle East respiratory syndrome-related coronavirus (MERS virus, which is different from the novel coronavirus resulting in COVID-19). Similar findings for patients infected with HIV, severe acute respiratory syndrome, tuberculosis and other diseases were reported.

International Data

Early studies by the World Health Organisation (WHO) and the Chinese Centre for Disease Control (CCDC) found the case fatality rates for COVID-19 patients with comorbid conditions to be higher than those without any underlying medical condition (shown in the graph below).



Data source: http://weekly.chinacdc.cn/ and World Health Organisation

Data from the graph show that patients with cardiovascular disease were at least nine times more likely to result in fatal outcomes than those without pre-existing medical conditions. Similarly, presence of other comorbidity resulted in significantly more fatalities than for COVID-19 patients without comorbid conditions. However, this study does not discuss the impact on case fatality rates for those with multiple comorbidites. Given the interaction between various health conditions, certain combination of underlying health issues may result in higher fatality rates. For example, past studies have shown that patients with diabetes and hypertension were twice the risk of cardiovascular disease as those without

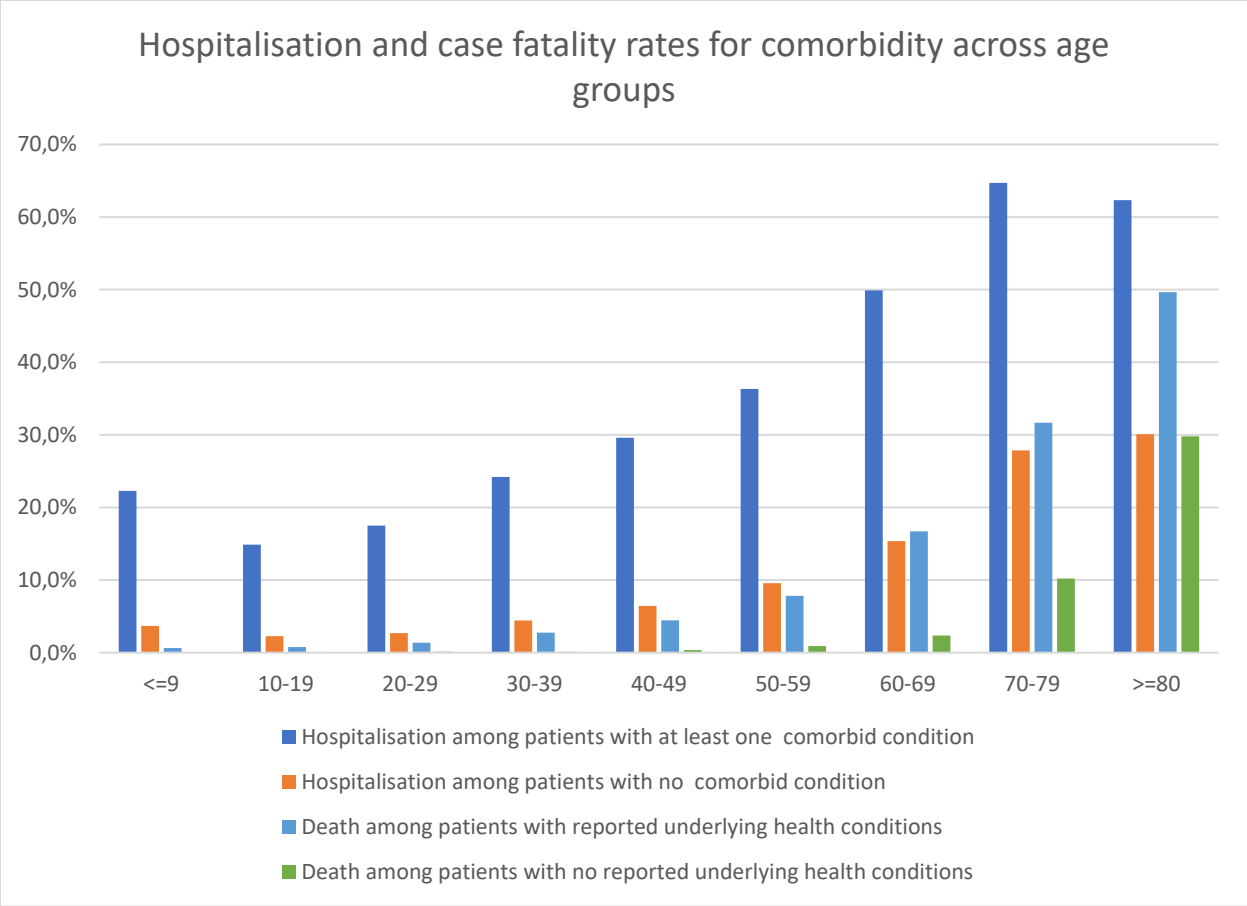
diabetes but with hypertension. Similarly, some specific combinations of comorbidity may result in worse outcomes for COVID-19 patients. Therefore, patients with such combinations may require special care from the onset of the disease.

An early study in April by the New York State Department of Health reported 86% of COVID-19 related deaths involved patients with at least one comorbid condition. In a study published by the Centers for Disease Control and Prevention (CDC) in the United States in June, it was reported that patients with comorbid conditions were six times more likely to be hospitalized than those without any comorbid conditions, with the most common underlying comorbid conditions being cardiovascular disease (32%), diabetes (30%) and chronic lung disease (18%). The case fatality rates for those with underlying conditions vs with no underlying conditions were 19.5% and 1.6% respectively. In other words, fatal outcomes were 12 times more likely in patients with comorbid conditions.

A different study in China published in the European Respiratory Journal found that those with hypertension, cardiovascular diseases, cerebrovascular diseases, diabetes, chronic obstructive pulmonary disease, chronic kindey diseases and malignancy were more likely to result in admission to intensive care, invasive ventilation or death. Data from the Chinese study also showed that patients with two or more comorbid conditions were more likely to result in admission to intensive care, invasive ventilation or death than those with single comorbid conditions and significantly more compared with those with no comorbid conditions.

In England, 26% of COVID-19 patients who died in hospital had diabetes. The prevalence of diabetes (both type 1 and 2) in England is 7.2%, significantly lower than percent of COVID-19 related deaths involving patients with diabetes. Other comorbidities were dementia, respiratory diseases and chronic kidney disease. The England study does not discuss whether comorbidity leads to a higher chance of being infected.

Results from the CDC indicating the impact of comorbidity on COVID-19 patients in various age groups is presented below.

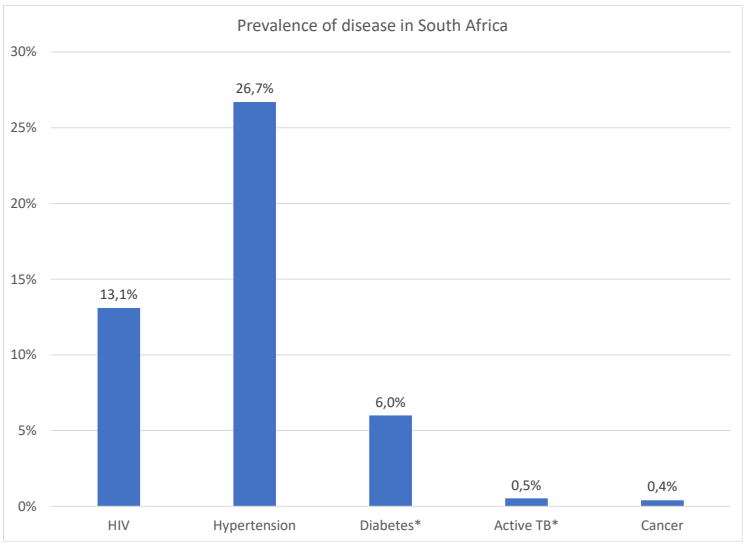


Data source: CDC

Results indicate that hospitalization and fatality is higher among those with at least one underlying health condition regardless of age. However, the data also shows that age matters, with higher fatality rates among older age groups. In general, children have lower rates of comorbid conditions. Given hospitalization is significantly higher in all age groups as a result of comorbidity, policy makers should, as part of the flattening the curve strategy, help individuals with underlying medical condition manage their health. Such proactive strategy will result in lower need for hospital bed, and hence, less crowding. The data also shows that those with underlying medical conditions should manage their conditions and take more care in social distancing.

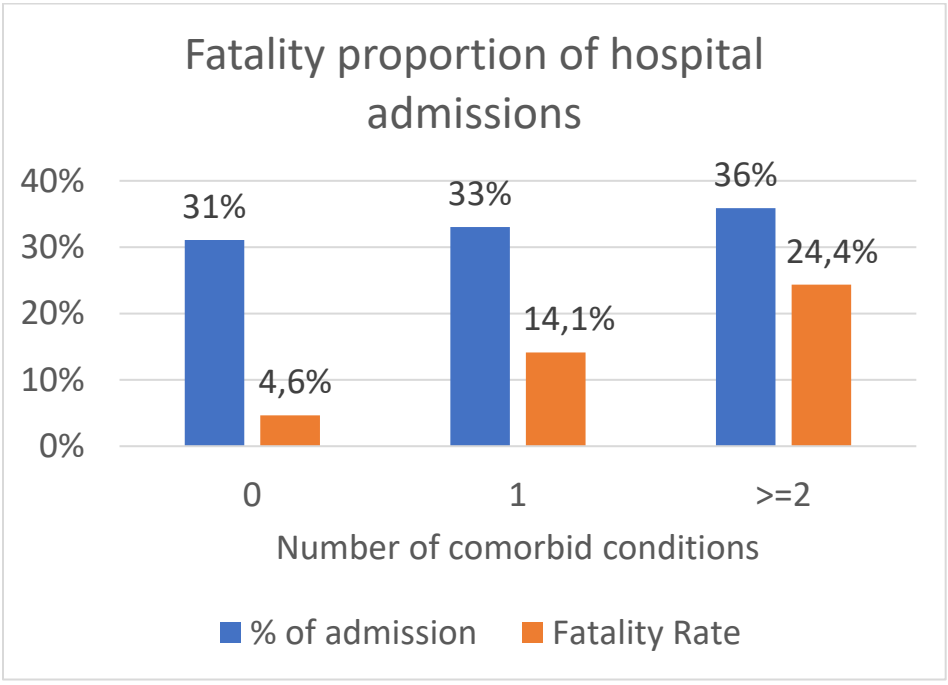
South Africa

Cormobidity is especially important for South Africa given the country has high incidence of many underlying health conditions.



Data sourced from various public sites.

While the above graph summarizes comorbid incidence in South Africa, individuals may present with multiple underlying health issues.

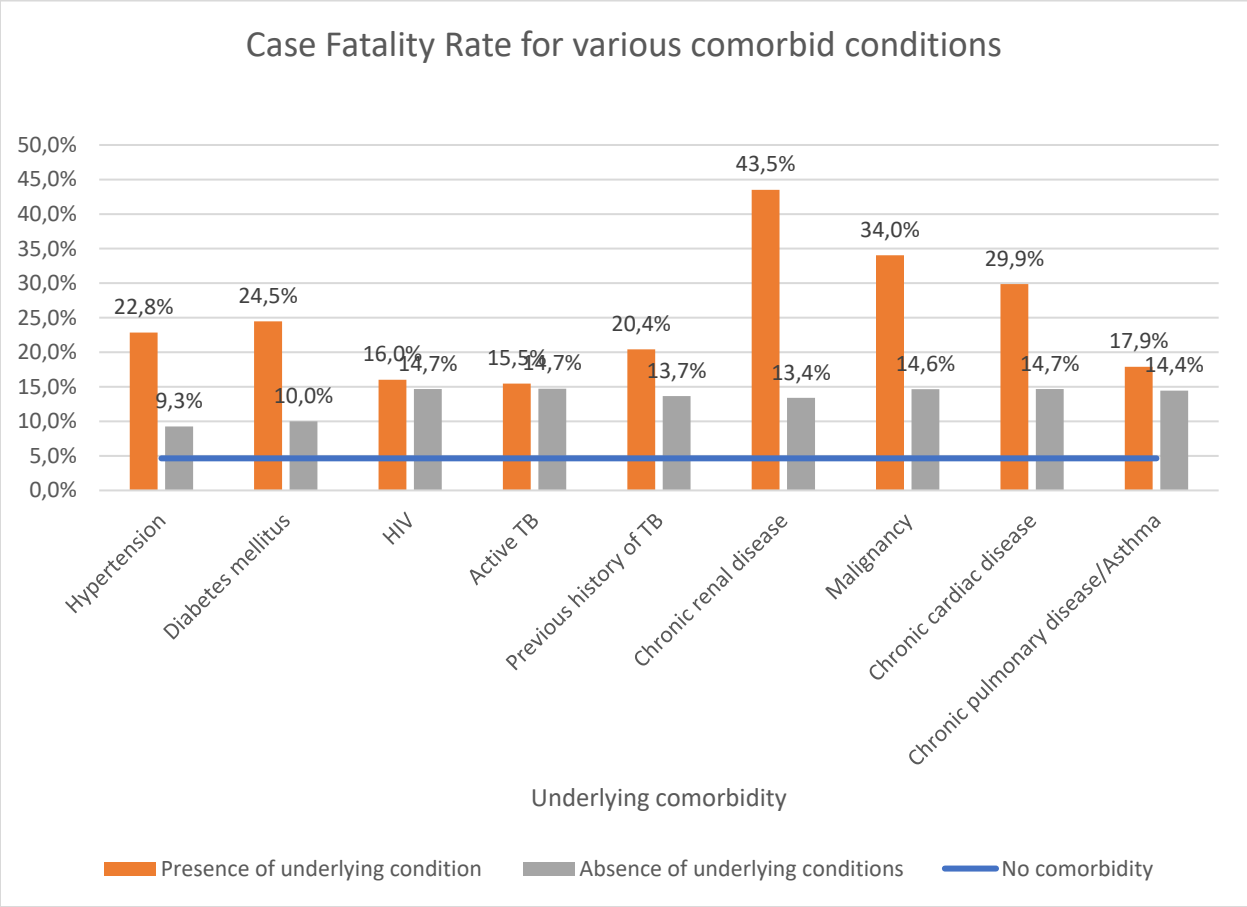


Data source: National Institute of Communicable Diseases of South Africa

The above graph shows patients admitted with no comorbidity (31%), one comorbidity (33%), and more than one cormobodity (36%) were relatively evenly split in each group. However, the fatality rates increased significantly among those with one comoribidity compared to those with no comorbid

conditions. The increase in fatality rates were significantly higher if a patient was found to have multiple comorbidities. Fatality rates among the group with multiple comorbidities was 5.3 times those with no underlying health issues. This underlines the importance of individuals with underlying health issues managing their conditions in order to reduce the risk of poorer clinical outcomes if infected with the novel coronavirus.

NICD studied the impact of various comorbid conditions on case fatality rates in South Africa.



Data source: National Institute of Communicable Diseases of South Africa.

The line indicates the case fatality rates for patients with no comorbidity. The orange bar shows the case fatality rate for a COVID-19 patient with a particular underlying disease. This includes patients who had a particular underlying disease (shown on the horizontal axis) but potentially with other comorbidities. For example, the fatality rate for patients with hypertension was 22,8%, but these patients may potentially have had other underlying conditions together with hypertension.The grey bar shows the estimate of the case fatality rate for a COVID-19 patient without the specified medical condition but potentially with other medical conditions. As an example the case fatality rate of 9.3% for patients without hypertension may potentially include patients with other comorbidities, such as diabetes. In other words, the data shows the presence of hypertension resulted in a case fatality rate of 22,8%, and the absence of hypertension but potentially including other comorbidties resulted in case fatatlity rate of 9,3%. Both these fatality rates were significantly higher than those presenting without any comoribidities (4.6%).

Using public hospital data, researchers from Bhekisisa Centre for Health Journalism showed that fatality rates in the Western Cape are 4.65, 8.99 and 13.55 times those without diabetes for patients with well controlled, poorly controlled and uncontrolled diabetes respectively. This shows the importance of continuing treatment for individuals with existing health issues.

As in international data, South African data shows that the fatality rate is higher for patients with one comorbid condition and even worse for patients with multiple comorbid conditions.

Summary

US data indicate that comorbid condition is a factor in hospitalization and both international and local data show that existing comorbid conditions result in poorer clinical outcomes. US data shows that young people, regardless of comorbid conditions are less likely to have poorer clinical outcomes than older populations. Such an age analysis with respect to comorbid condition is needed for South Africa, particularly given the country's young demographic advantage.

The high incidences of HIV and TB as comorbid conditions presents a serious health threat in South Africa. While data shows higher fatality rates for COVID-19 patients with HIV and TB, more detailed analysis is required. The difference in fatality rates for those presenting with and without these diseases is less than 1.3% (16.0% vs 14.7% for HIV and 15.5% vs 14.7% for Active TB). However in the NICD dataset, patients without TB or HIV infections may have had higher rate of other comorbid conditions. It would be important to isolate the impact of HIV and TB on fataility rates on COVID-19 patients without other underlying issues such as diabetes, hypertension, etc. In order to understand this threat a more detailed data of the comorbidity incidence of HIV and TB is required.

Recently, the national health department reported a decline in initiation of TB testing and treatment. This may be a result of the patient's fear of being infected by the novel coronavirus at health facilities. It will lead to an increase in TB related deaths due to delayed and/or no treatment. It is therefore important for South Africans to test for and manage TB and any underlying health issues they may have. This will lead to a substantial decrease in hospitalization.

The School for Data Science and Computational Thinking at Stellenbosch University, as part of its social responsibility, analyses COVID-19 related data and disseminates the resulting conclusion. We are analysing the impact of age, comorbidity and number of deaths in order to understand this pandemic better, and to help policy makers and communities make better decisions.