How do I make sense out of the numbers and graphs I’m seeing about COVID-19?

What’s my personal risk?
Out of 100 people infected with COVID-19...
80% of cases are likely to be mild, and can be treated at home.
But, 15-20 of those infected are likely to need hospitalization,
and 1 of those 15-20 infected are likely to die.
(Note: severity does not necessarily happen in the order that infections occur, it is random.)
So how likely are you to be among the 15-20 people infected who experience a severe case?
It depends.
It depends on:

- Age
It depends on:

- Age
- Chronic illness

**COVID-19 Fatality Rate by COMORBIDITY:**

*Death Rate = (number of deaths / number of cases) = probability of dying if infected by the virus (%). This probability differs depending on pre-existing condition. The percentage shown below does NOT represent in any way the share of deaths by pre-existing condition. Rather, it represents, for a patient with a given pre-existing condition, the risk of dying if infected by COVID-19.*

<table>
<thead>
<tr>
<th>PRE-EXISTING CONDITION</th>
<th>DEATH RATE confirmed cases</th>
<th>DEATH RATE all cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular disease</td>
<td>13.2%</td>
<td>10.5%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>9.2%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Chronic respiratory disease</td>
<td>8.0%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>8.4%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Cancer</td>
<td>7.6%</td>
<td>5.6%</td>
</tr>
<tr>
<td><strong>no pre-existing conditions</strong></td>
<td></td>
<td><strong>0.9%</strong></td>
</tr>
</tbody>
</table>

*Death Rate = (number of deaths / number of cases) = probability of dying if infected by the virus (%). The percentages do not have to add up to 100%, as they do NOT represent share of deaths by condition.*

Source: [worldometers.info](http://worldometers.info) March 16, 2020
But those two data sets are independent of each other.
What else do we know?
In a pre-print manuscript (not yet peer reviewed), data from 1,590 patients is used to assess the potential level of risk of having a chronic illness and COVID-19.

Source: Comorbidity and its impact on 1,590 patients with COVID-19 in China: A Nationwide Analysis
doi:10.1101/2020.02.25.20027664
March 16, 2020
The paper compares a “hazard ratio” of having a chronic illness (comorbidity) compared to those without a chronic condition. It also compares the risk for those with two or more.
Note: the “hazard ratio” is the combined relative risk of being hospitalized, ventilated, or dying.

(This is not just the risk of death, which is what the other data sets show.)
On average, the hazard ratio for having ONE general chronic illness is 1.79, meaning you’re 1.79x more likely compared to your age group to have a severe case.

If you have two or more comorbidities, that means you’re 2.59x more likely than others in your age group to have a severe case.
Summary:

- One chronic illness: 1.79x
- Two or more chronic illness: 2.59x

.. more likely than those in your age group to end up needing hospitalization, ventilation, or dying from COVID-19.
So how do you use this information to assess your risk?
Step 1: Find your age group.
Step 2:

Apply your hazard ratio.

<table>
<thead>
<tr>
<th>Features</th>
<th>Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of comorbidities</strong></td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>2.681</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.586</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1.575</td>
</tr>
<tr>
<td>Malignant tumor</td>
<td>3.501</td>
</tr>
<tr>
<td><strong>Number of comorbidities</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1.789</td>
</tr>
<tr>
<td>2 or more</td>
<td>2.592</td>
</tr>
</tbody>
</table>
Step 3:

Compare to the death rate by comorbidity (that is not broken down by age)

COVID-19 Fatality Rate by COMORBIDITY:

*Death Rate = (number of deaths / number of cases) = probability of dying if infected by the virus (%). This probability differs depending on pre-existing condition. The percentage shown below does NOT represent in any way the share of deaths by pre-existing condition. Rather, it represents, for a patient with a given pre-existing condition, the risk of dying if infected by COVID-19.

<table>
<thead>
<tr>
<th>PRE-EXISTING CONDITION</th>
<th>DEATH RATE confirmed cases</th>
<th>DEATH RATE all cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular disease</td>
<td>13.2%</td>
<td>10.5%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>9.2%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Chronic respiratory disease</td>
<td>8.0%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>8.4%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Cancer</td>
<td>7.6%</td>
<td>5.6%</td>
</tr>
<tr>
<td>no pre-existing conditions</td>
<td>0.9%</td>
<td></td>
</tr>
</tbody>
</table>

*Death Rate = (number of deaths / number of cases) = probability of dying if infected by the virus (%). The percentages do not have to add up to 100%, as they do NOT represent share of deaths by condition.

Source: worldometers.info March 16, 2020
Example 1:

1. 31yo has a 0.2% risk of death from COVID-19, based on age group data

2. With one chronic disease, that 0.2% is multiplied by 1.79x, resulting in 0.36%
   (or by the ratio for the chronic illness of diabetes, which is 1.59x, resulting in 0.32%)

3. The risk of death with diabetes, not accounting for age, in COVID-19 is 7.3-9.2%.
Therefore, while the risk for this individual is increased compared to their age group, their risk is likely not as high as the comorbidity death data suggests, because of their age.
Example 2:

1. 62yo has a 3.6% risk of death from COVID-19, based on age group data.

2. With two chronic diseases, that 3.6% is multiplied by 2.59x, resulting in 9.32%.

3. Not accounting for age: the risk of death with diabetes in COVID-19 is 7.3-9.2%; the risk of death with hypertension is 6.0-8.4%.
Therefore, the risk for this individual is **higher than the average** compared to their age group, and their risk of a severe outcome *is* likely as high as the comorbidity death data suggests.
So what should you do if your risk is low?

And what should you do if your risk is high?

@DanaMLewis
STAY HOME

no matter what your risk is.
STAY HOME no matter what your risk is.

Regardless of YOUR risk of getting a severe case, if infected you are likely to spread to 2-3 people before you realize you are ill, risking giving a case to someone at a much higher risk and risking giving it to someone you love.
Sources:

• Age data, CDC: https://www.cdc.gov/coronavirus/2019-ncov/index.html
• Comorbidity data, worldometers: worldometers.info accessed March 16, 2020

(These sources generally assume a non-overloaded healthcare system. Rates vary country to country. The more people stay home, the less COVID-19 spreads and we are less likely to experience worse numbers.)

Common sense disclaimer and reminder:

• Please speak with your doctor about what you should do regarding COVID-19 and have a plan for seeking care if you need help.
• Many cases of COVID-19 can be treated at home, according to the CDC. Seek care if you have trouble breathing, but alert the paramedics or call ahead to the doctor’s office or emergency room to let them know you are coming if you have, or suspect you have, COVID-19.