**Prognosticating in Covid-19**

Epidemiology**:**

* Approx 14% of patients have severe disease (dyspnea/hypoxia/>50% lung involvement within 24-48h) and 5% have critical disease (resp failure/shock/multiorgan dysfunction)
  + Though estimated case-fatality rates (CFR) are likely inaccurate, U.S. county-based CFR range from 0.5-3.6%, with an estimate of 1.3% overall for symptomatic cases
* Most critically ill patients require mechanical ventilation; outcomes are poor:
  + - Italian study of 1591 critically ill pts: need for mechanical ventilation was 88%
    - In a study of 5700 admitted patients in NY:
      * 14.2% required ICU admission
      * 12.2% received mechanical ventilation
        + As of early April, 3% of ventilated pts had been discharged alive, 24.5% died and 72% remained hospitalized
        + Mortality rates for pts requiring mechanical ventilation aged 18-65 and >65 were 76.4% and 97.2%, respectively
        + For those who did not receive mechanical ventilation, mortality rates were 19.8% and 26.6%, respectively
    - Preliminary data on survival rates for ventilated patients at BIDMC/MGH appears comparatively better thus far.
  + Fatality rate for patients with Covid-19 who develop ARDS is approx. 50%

Demographic factors:

* Older age (>60 yo) is the most consistent demographic factor associated with worse prognosis

|  |  |  |
| --- | --- | --- |
|  | CFR: China | CFR: Italy |
| Age 60-69 | 3.6% | 4-6.6% |
| Age 70-79 | 8% | 12% |
| Age 80+ | 15% | 20% |

* Comorbidities associated with increased mortality are: cardiovascular disease, diabetes mellitus, hypertension, chronic lung disease, cancer, chronic kidney disease. Immunocompromising conditions and liver disease may also raise risk, though data is limited
  + In 355 patients who died of Covid-19 in Italy, the mean number of pre-existing comorbidities was 2.7, and only 3 patients had no underlying condition
  + Hypertension is the most common comorbidity seen in deceased Covid-19 patients
  + A Chinese study comparing 105 COVID+ cancer patients to COVID+ patients without cancer found:
    - Cancer patients were 2.8x more likely to be admitted to the ICU and 2.3x more likely to die. Patients with metastatic cancer were 5.5x more likely to die
    - Patients with non-metastatic cancer were not more likely to die than patients without cancer
    - Pts with hematological cancers, lung cancers and lung mets fared the worst
* History of smoking and male sex also associated with worse outcomes
* Disproportionately high hospitalization and mortality rates are being seen in black and Latino patients, which may reflect the effects of socioeconomic disparities

Laboratory markers of severe disease:

* Laboratory markers portending a worse prognosis: Lymphopenia, elevated liver enzymes, elevated LDH, elevated inflammatory markers (eg, C-reactive protein, ferritin, IL-6), elevated D-dimer (>1 mcg/mL), elevated prothrombin time, elevated troponin I (>0.05 ng/mL), elevated creatine phosphokinase, acute kidney injury, elevated pro-BNP, CD3+CD8+ T cells ≤75 cell·μL−1
  + In particular, in-hospital mortality was associated with higher SOFA score on admission (OR 5.65; 2.61-12.23; P <.0001) and elevated D-dimer >1 mcg/mL (OR, 18.42; 95% CI, 2.64-128.55; P =.0033)
  + Early markers can be similar to mild disease, but elevated procalcitonin and lymphopenia may be more pronounced in pts who end up developing severe disease

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