STANDARD DEVIATIONS: IFAQ, In-Frequently Asked Questions

Greetings,

I couldn't find the answer to my questions in the FAQ section.

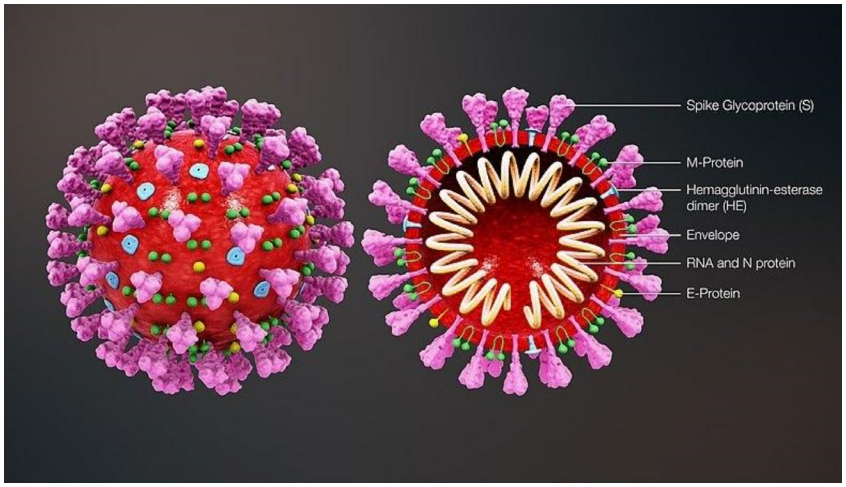
- What the heck is going on with this virus in China?
- What are the clinical characteristics?
- What should I expect to see on the bench when this virus shows up in our patients?
- How does it affect me in the lab and as a healthcare worker?
- Am I at risk?

These are my IFAQs (In-Frequently Asked Questions). We've only gone a short distance of a long trip into understanding and controlling this outbreak but there are some things we see that tell us about the path ahead.

Here are some answers that may help us navigate the murky waters of response. They are based on a small sample of cases (Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus–Infected Pneumonia in Wuhan, China, February 7, 2020. doi:10.1001/jama.2020.1585). It's a snapshot of the situation, so far. The numbers will change with larger data to draw on, but the information is already pointing to important clues that can give us an idea of where we're headed, what markers to look for, and obstacles in the road.

What the heck is going on with this virus in China?

2019-nCoV is the name for the virus, a coronavirus that infects respiratory epithelial cells and lymphocytes causing illness that is now labelled **Novel Coronavirus Infection Pneumonia (NCIP).**



It's an ss(+)RNA virus that selectively binds to epithelial cells in the respiratory tract. The S (spike) protein loves the particular acidity and proteases around this population of cells, making it like a skeleton key for entry into those cells. The S protein also works like a key for lymphocytes, too, and allows virus to attack them.

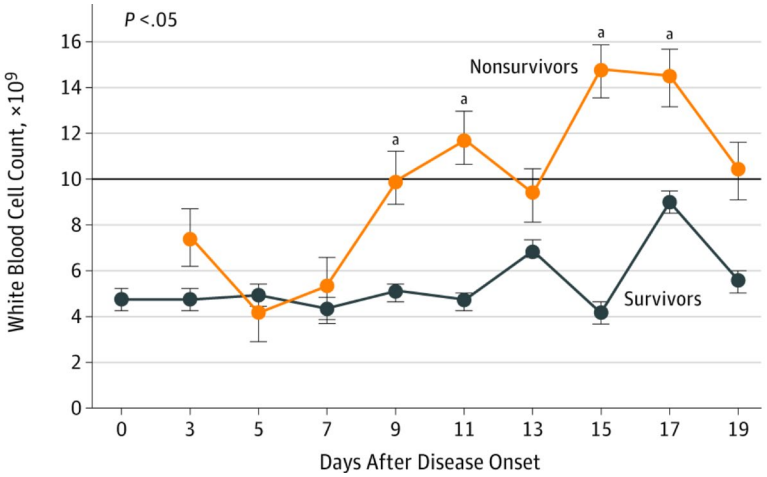
What are the clinical characteristics?

Because we lack immunity to this "novel" agonist, it swarms the tissues and causes a pneumonia. All of the 138 enrolled patients showed bilateral involvement of chest CT scans, 100%, with bilateral distribution of patchy shadows and ground glass opacity a typical hallmark. So *everybody gets pneumonia*.

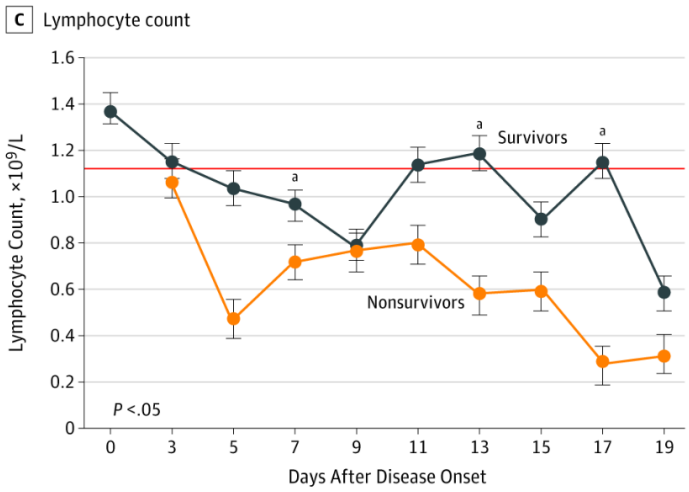
Some pneumonias are worse than others. In this group of 138, 34% have been discharged, 60% are still hospitalized, and 6% died. Some folks just got better, some needed invasive therapies, 4 ended up on ECMO (extra corporeal membrane oxygenation).

Because the virus shows an affinity for lymphocytes, infected people with under-lying immunity issues get sicker than healthier patients. This affinity is similar (very) to HIV and different than SARS or MERS-CoV. Those with other complications fare worse.

All cases show inflammatory response. **WBC** numbers go up but really **climb** for the poorer prognosis:



But lymphocytes don't do what they usually do in a viral response, they **went down** significantly:



{Viruses that destroy lymphs are bad news.}

And there are other lab markers that are indicative of infection and outcomes. So, what else can we expect to see on the bench? Typical of subsequent organ involvement, we see changes in values that point at specific sequalae. Patients experience shock, cardiac injury, kidney problems, and respiratory distress.

- CK and Troponin go up.
- Creatinine and BUN climb.
- PT and DDimer are elevated
- Total Bili, Alk Phos and ALT increase.
- Blood Gases are needed for these patients, regularly.

What should I expect to see on the bench when this virus shows up in our patients?

We have ideas about the orders we'll see; CBC, CMP, Micro, Blood Bank, blah, blah, the workup you all know. Then the funky serologies and send-outs, mandatory rule-outs and tail-chasing. Then it settles into a routine. How many, how sick? Are labs Q8, Q12, more often? Does your lab offer blood gas testing (vs Respiratory)? That could skyrocket. Those kinds of thing we still can't predict.

We'll likely find some other analytes that are altered by the disease. But even without the help of clinical studies, **I can tell you some other numbers that will start to rise:**

The number of STAT pages for phlebotomy will go up, as will

The number of samples that get accessioned,

The tubes that get labelled,

Centrifuges opened,

Tubes opened,

Aliquots made,

Pipette tips used,

Reagent kits opened,

And gloves changed (hopefully).

These go up, too: redraws, mis/un-labelled tubes, spills, broken tubes, clotted CBCs, mistakes, Kim Wipes used, waste generated, DAPs, amended reports, droplets, and aerosols.

I predict, with confidence, you'll answer more phone calls,

Comment on more critical values,

Troubleshoot more often,

Pay more attention,

And consider the value of hand hygiene more.

Not everything increases. You're going to find that tempers shorten,

As does patience,

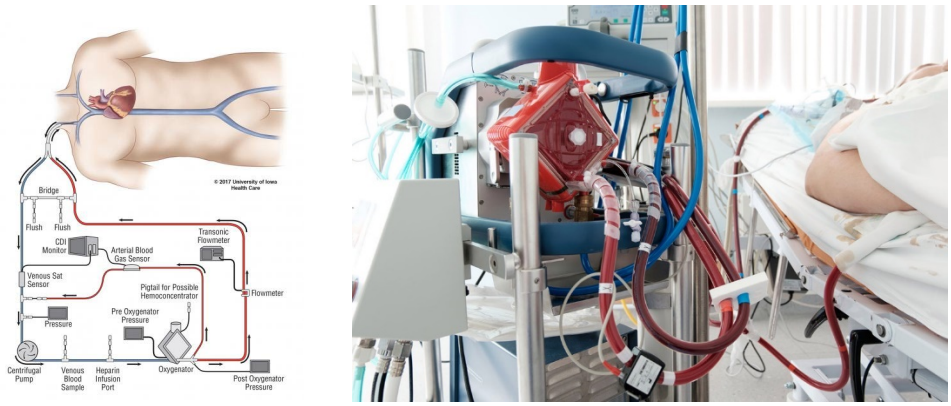
And the minutes in a day. (Curiously, turn-around-times will lengthen.)

How does it affect me in the lab and as a healthcare worker?

That one little PCR swab you collected and sent out for the diagnostic confirmation now becomes a single test in a cascade of orders and blood coming through the door (or tube system).

We know that workflow in the lab changes by season. Flu season, RSV, kids out of school, etc., all change the testing we see and do. An epidemic or pandemic outbreak will only exacerbate the volume of testing we'll see ordered.

Those who have ECMO at their hospitals understand how just one patient can increase the burden for blood bank, micro, blood gases, and the general lab. Hey, it's hard enough finding nursing trained for ECMO. What happens when several patients are in treatment? Or, if one of those nurses get infected?



{ECMO requires a ton of maintenance from the lab.}

Because being busier isn't the only worry. **In this study, 40% of the cases happened in the hospital to patients and staff who were not there for coronavirus.**

Of the 138 patients, **57 (41.3%) were presumed to have been infected in hospital**, including 17 patients (12.3%) who were already hospitalized for other reasons and **40 health care workers** (29%). Of the hospitalized patients, 7 patients were from the surgical department, 5 were from internal medicine, and 5 were from the oncology department. Of the infected health care workers, 31 (77.5%) worked on general wards, 7 (17.5%) in the emergency department, and 2 (5%) in the ICU.

The inability to identify, isolate, and prepare for a respiratory virus with high transmission leads to hospital acquired infection (HAI). This is especially true for those with underlying conditions or compromised immunities. While laboratorians may be more aware of risk, they are still challenged with the risk of infection and the consequence of HAI.

Am I at risk?

The outbreak of 2019-nCoV is underway. It's been declared a Public Health Emergency of International Concern (PHEIC). Tens of thousands have been confirmed to have virus and who-knows-how-many are transmitting it. NCIP is the condition we will be treating and monitoring with our labs, and several cases will originate right under our masked noses. The patients will present with, or develop, abnormal CT scans of their lungs. Their CBC's will show elevated WBCs but lymphopenias. Expect to be seeing blood gases and abnormal chemistries and coags. Microbiology will see blood cultures, swabs, and sputum from floors, and patients, and staff that shouldn't have infections. Patients will crump and need invasive respiratory therapies, even ECMO. Some will die.

As long as we still have unanswered questions, we will all be at risk.

Have a great week and be safe,

Bryan

p.s. This report is the largest case series to date of hospitalized patients with NCIP. As of February 3, 2020, of the 138 patients included in this study, 26% required ICU care, 34.1% were discharged, 6 died (4.3%), and 61.6% remain hospitalized.