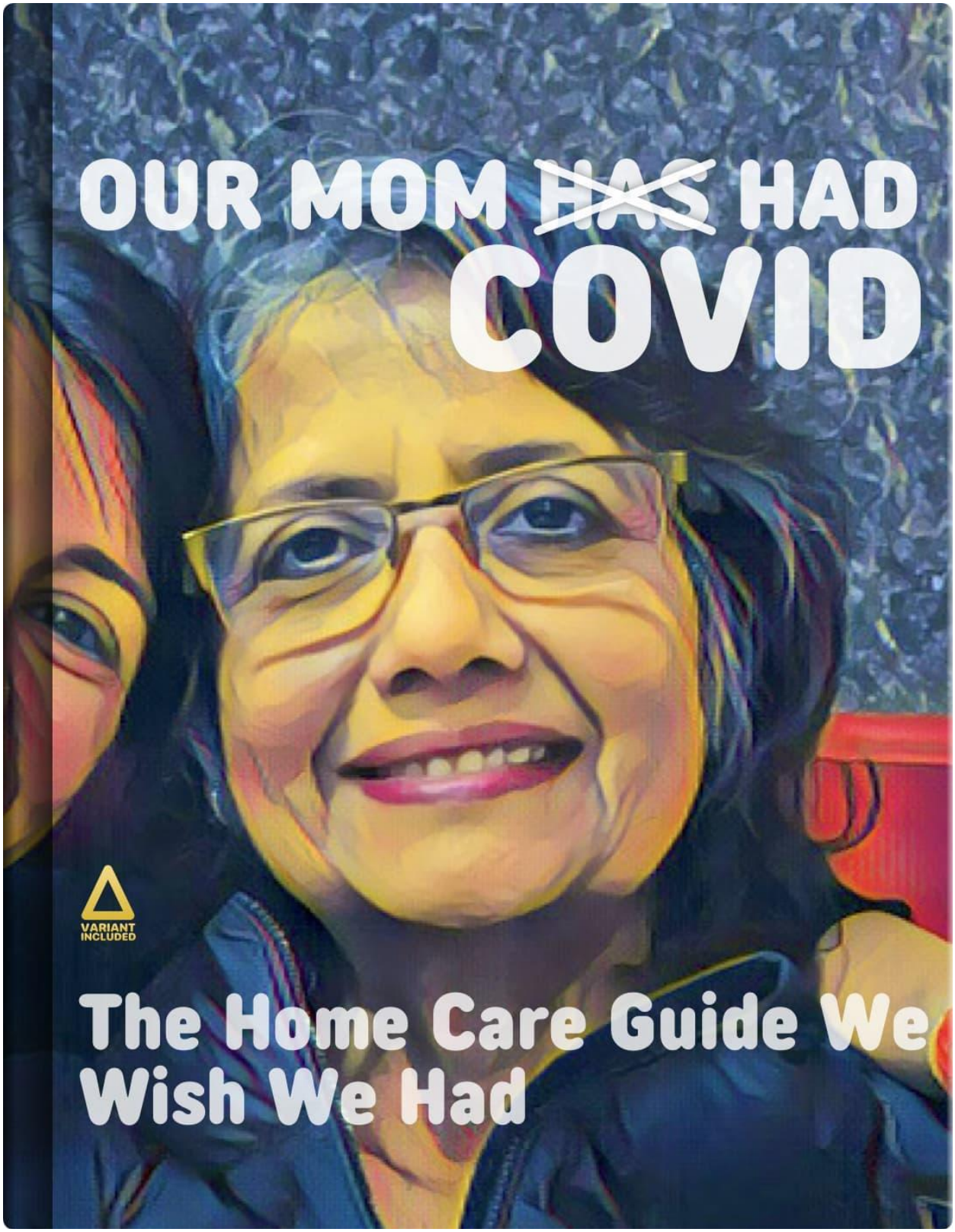

OUR MOM ~~HAS~~ HAD
COVID
VARIANT
INCLUDED
The Home Care Guide We
Wish We Had

# Prologue

This guide was written by a U.S. citizen living in America caring for a loved one living in Pune, Maharashtra, India during the COVID-19 outbreak of April 2021. He wasn't alone in caring for his mother: his wife and younger brother helped with some heavy-lifting, and numerous family members and friends generously lent a hand through the arduous weeks from diagnosis to recovery, to post-COVID care. It is worth calling out the contribution of a very talented doctor in their family whose tireless advice and guidance influenced every aspect of this case.

In an effort to reflect the collective effort of their group, they use the pronoun "*our*" whenever referring to their mom.

It takes a village.

# Disclaimer

The authors of this content are not doctors or mental health professionals. This content reflects information, experiences, opinions, and medical advice from friends, family, strangers, the Internet, and doctors we spoke to over the duration of mom's infection. While the content is deeply influenced by the clinical approach of a talented doctor in the author's family, the views presented in this guide can only be attributed to the authors.

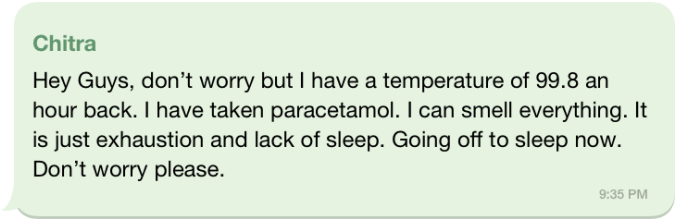
Suffice to say, this content is not a substitute for professional medical or mental health advice, its diagnosis, or treatment. It's simply what worked for our mom—a single individual in the great sea of COVID-19 patients—but won't necessarily work for you and yours. Always seek the advice of a qualified health provider with any questions you may have regarding a medical or mental health condition, including, and especially, COVID-19.

# Table Of Contents

Chapter 1

# Getting Started

Our 70-year old, diabetic, cancer-surviving mom, ચિત્રા (Chitra), lives in Pune, India: a city near Mumbai that recently earned the moniker, *India's Covid Capital*. On Monday, April 19, 2021, she sent us this message on our family's WhatsApp group:




At the time, she was unvaccinated due to vaccine shortages in India, and the escalating and very real risks of contracting COVID-19 at vaccination sites. But she had been strictly quarantining in her apartment for 14 months: she's one of those rare individuals who had not socialized in over a year. Aside from accepting deliveries at her door in an N95 mask, and the odd quick interaction, fully-masked, to sign a bank document brought to her home, she'd been waiting out the pandemic in her apartment.

So when we received this message from her, we didn't think too much of it. We told her to get some rest, and check back in the morning. She'd had a couple of colds in the past year after all.

Over the next few tumultuous days, her symptoms slowly but surely mutated. A red eye, unrelenting fatigue, and eventually, *anosmia*: she lost her sense of smell. For our part, we became progressively more worried as our feeds and group threads filled up with horrifying stories playing out in India, many among our own family and friends, and we finally entertained the idea that she may have contracted COVID-19 without ever having left her home. We had a lab administer an RT-PCR test at her home, and the result confirmed our worst fears: she was COVID-positive. We can't know for certain, but considering the timing, her geographic location, the nature of transmission, and how her case developed, we would be willing to bet that she had contracted the formidable Delta variant.

Since then we've spent almost every waking minute caring for our mom remotely from our homes in the American cities of Kirkland (indeed, the very city where COVID-19 kicked off its U.S. tour), Portland, Charlotte, and New York. We learned much of what we share here the hard way, and at times under severe duress. We hope that by presenting it clearly and (as) concisely (as possible, but no more so), it might help someone else.

## Is This Information For You?

We can't answer this question for you. But ***we implore you to not follow any advice you come across without triaging it yourself*** (including what's in this guide).

If there's one thing we've learned going through this it's that COVID-19 often acts very predictably, and at other times in entirely mysterious ways. Also, COVID-19 symptoms resemble the symptoms of other viruses and infections like sinusitis making it that much harder to diagnose and treat. It sometimes acts slowly, and at other times escalates in severity with dizzying and unforgiving speed. There is no set pattern for how this virus affects humans (this is not to say that there aren't patterns).

With that said, we will attempt to give you a clear picture of the medical and symptom profile of our mom as it may help you determine how similar or dissimilar her case is to you or your loved one's. Here goes.

### Our Mom's Medical & COVID-19 Symptom Summary

**Demographics**

- 70 years old
- 62kg/137lbs
- Female

**Comorbidities/Risk Factors**

- Severe Type II Diabetic (HbA1c 10.1%, average blood glucose 240 mg/dL)
- Cancer Survivor (full thyroidectomy to resolve papillary carcinoma)
- Obesity
- Mild Hypertension

**Pandemic Lifestyle**

Fully isolated in a large apartment building, in a multi-building society, in Pune, India since April 2020. Masked (first generic KN-95 masks, and since April 2021, Respokare® N95 NIOSH masks) interactions were limited to:

- Accepting deliveries at her door
- Taking elevator down to the garage to charge her car battery every few weeks
- Accepting a delivery a couple of times at the front gate of her apartment building
- Signing bank documents brought to her home

**COVID-19 Symptoms Observed**
In order of appearance:

- Persistent low-grade fever for the first 7-10 days (around 100° on average, with a peak at 102°)
- Some nasal congestion early on (within first week), and sinus pressure/heaviness during the same period
- Redness in one eye on day 7 after onset of symptoms
- Body ache and fatigue with fatigue getting progressively worse through the progression of the disease
- Anosmia (loss of smell) presenting around 10 days after first symptoms appeared, and persisting into the 4th week
- Ageusia (loss of taste) presenting shortly after anosmia, and persisting into the 4th week of infection
- Elevated IL-6, CRP, D Dimer, & Ferritin
- Brain fog and some delirium appearing during week 2
- Intense fatigue for a month during the acute phase, and higher-than-usual fatigue levels persist to present day
- Recurring post-COVID sequelae caused by mild to moderate exertion

**COVID-19 Symptoms *Not* Observed**

- No shortness of breath or other respiratory symptoms whatsoever; RER presented as normal throughout infection
- Blood oxygen saturation (Sp02) was always $\geq$ 92% and never dipped below that level, once we started measuring it

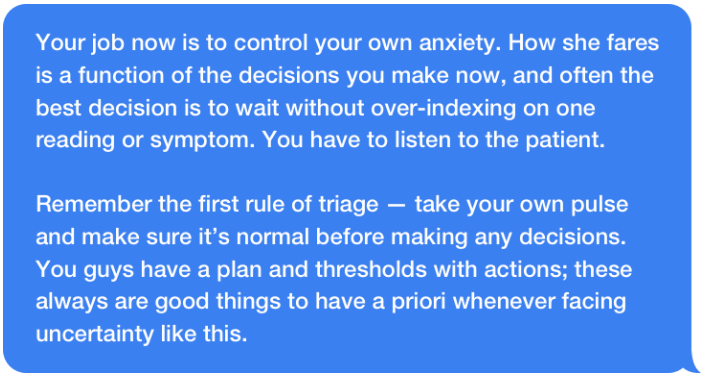
Given the above clinical profile, we suspected her case was mild-moderate during the early days of the infection, and made a plan to treat her accordingly.

## Our High-Level Approach

It's important to have a plan for a plan, and an approach for both. Our approach developed organically, and could roughly be described as follows:

### First, Check Your Own Pulse

We almost lost our minds when my mom's RT-PCR test came back positive. It's hard to articulate the sheer panic we felt, especially against the backdrop of the devastating outbreak that was (is) going on in India and the fact that we were so far away. The panic only got worse as we started talking to friends and reaching out to folks—people's faces have this way of betraying their own panic even as their mouths are saying, "It'll be OK". It was early on during this panic that an incredible doctor in our family returned our call and gave us this early advice. Its contribution to our mom's recovery is hard to overstate.




### Second, Understand Your Escalation Thresholds

Our goal was to keep our mom out of the hospital. We realized this pretty early because of both terrifying news reports of hospital mishaps, but also first person accounts from friends and family who lost loved ones due to the chaos in Indian hospitals at the time. We also remembered stories of North American & European hospitals being overwhelmed last year and doctors having to prioritize who gets care; we did not feel that our mom would fare well in such an equation. Keeping someone infected with COVID out of the hospital is only really possible for mild and (closely-managed) moderate cases. But since nobody gets to pick the severity of their case, you just have to assume the severity of the disease is mild, and then escalate appropriately.

With the help of our doctor we identified two key thresholds for our mom, i.e. if either of these conditions were to ever become true, we would need to rush her to a hospital. They were as follows:

1. **High Fever That Doesn't Respond To Acetaminophen.** If we can't bring the fever down from 103° with 3g of Acetaminophen administered within 8 hours.

2. **Blood Oxygen Saturation Levels (Sp02) That Are Consistently Less Than 90%.** If we can't maintain the Sp02 above 90, we need to escalate the level of care. That said, some of that care may be escalated at home (e.g. with a concentrator, proning, etc.) and the real threshold is closer to 85%.

He was also helping us reason about her erratic blood work, and guiding the decision to escalate or modify her treatment if any of the blood markers suddenly became worrisome.

### Third, Make The Plan

With escalation thresholds in place, it was time to make the actual plan. Roughly, here's what we mapped out:

1. Set up contingencies (back-up plans, people on the ground, transportation, hospital contacts, etc.)
2. Organize food, water, and other supplies
3. Organize medications and supplements
4. Start tracking everything, and,
5. Transform into a micro-managing, tele-medicine intern operating in the Indian time zone

### Finally, Execute, Execute, Execute

We created a virtual patient chart in Google Sheets to coordinate our execution plan. We tracked everything.

## Digging Into The Details

Our approach, now validated by Tamil Nadu's Official COVID Guidance (which we think is excellent), was simply to give my mom's body and immune system whatever it needed to stand a fighting chance against COVID-19 without prematurely inhibiting its optimal function.

Most importantly, we focused on two things:

1. **Medication.** An allopathy, supplement, and homeopathy regimen that helps relieve symptoms like fever, coughing, etc. and also boosts the immune system.

2. **Diet & Hydration.** A balanced, anti-inflammatory diet that has a variety of nutritious ingredients, and achieves a sufficient caloric intake for the patient based on their size and other characteristics. At least 2 liters of water a day. We added electrolytes, too.

The above were informed deeply and adjusted frequently by two things:

3. **Blood Tests.** We did blood work frequently (anywhere from every 48 hours to every 120 hours) to ensure no internal alarms were going off, and to also establish trends across relevant blood markers as well. Note: In Pune, labs can collect blood safely at home.

4. **The Virtual Patient Chart.** As mentioned earlier, our virtual patient chart is something that came into existence to help our core group coordinate telecare from across the world, but it quickly became our command center. We used it to track things like temperature, heart rate, %Sp02 (blood oxygen saturation), blood glucose (for diabetics), a series of symptoms (self-reported by the patient on a scale of 0-10), and some derived averages to monitor trends. You want to see things like blood sugar staying level, %Sp02 high or trending higher (ideally > 95%), fever trending lower, and respiratory symptoms reducing.

   One side-effect of using this spreadsheet was that it quickly exposed action

items: Did we need more food? Did we run out of medications? Do we need to call someone? How do we organize an oximeter? And so on.

Let's dive right into each.

Chapter 2

# Medication

Before we share our medication protocol with you, let's answer the question: *How long should this protocol be followed?*

We provide the number of doses, etc. where possible to help answer this question. But the real answer is: *it depends*. Indeed, the answer should be determined on a case by case basis and with the help of a medical professional. And it will likely differ from individual to individual. Answering this question is a judgement call even for a doctor—this is why you will find such a huge variance in treatment protocols being shared online, via WhatsApp, etc.

Our recommendation is to take a deep breath, trust the medical professional you're working with, take ownership of the final decision yourself, and act on it. Time is of the essence when dealing with COVID-19, and you will likely have better success executing on *any* protocol than just sitting on your hands. Of course, like most things, there is a big caveat here—you want to be careful to not let your own panic run amok and prematurely bring out big guns like steroids and powerful anticoagulants that can do far more harm than good.

Here's some more context about our mom's case so you have a reference point as you make similar decisions for the person you're caring for.

## Our Mom's Case

In no particular order:

- We determined that our mom had COVID 9 days after the onset of first symptoms. During that period, our mom was taking a couple of Acetaminophen 500mg per day, zinc, resting, and doing neti pot (with mineral water) a couple of times a day. In fact, her fever peaked well before we started her on the protocol we share later in this section, so it's fair to say that our mom may have beaten the worst of Covid without assistance from what follows. For those of you who are panicking for your loved ones right now, *this is good news*.

- We didn't take chances and we treated any symptom we anticipated. For example, we stayed laser-focused on ensuring our mom's temperature remained normal. In line with that, she remained on a protocol of

500-1000mg of Acetaminophen on average for 40 days since onset of symptoms. She took a week break, and then suffered an exertional COVID sequelae incident that caused a fever of 100°, so we put her back on 1000mg Acetaminophen, morning and evening, for a few days.

- We've kept our mom on all the supplements and also added things like Ashwagandha, Chawanprakash (for diabetics), etc. into the mix. There's no reason to stop those things.

- There are a few things in our toolbelt that we kept on hand and brought out as needed. For instance, nausea was a sporadic but persistent issue that presented itself every few days. So our mom took an anti-nausea pill as needed.

- She has remained on baby aspirin since we started treating the infection. We have no idea how long our mom will present with post-COVID acute episodes and/or whether this will turn into long COVID for her. So until the coast is clear, we're going to do at least the minimal necessary to ensure she doesn't develop blood clots.

- It's worth mentioning that Tamil Nadu's mild COVID at-home care guidance specifies 5 days of treatment. But this is a best-case scenario. In our experience, COVID's relationship status with every person it infects is "it's complicated".

Again, this is just context so you have a reference point. The key takeaway is that specific duration and dosing is a judgement call best made in consultation with a good doctor.

## Dosage Key

The dosage key indicates how many times a day and when in the day the patient should be taking the corresponding medication. For example: `1-0-1` implies (once in the morning, nothing in the middle of the day, once in the evening). Another example: `1-1-1-1-1` implies 5 times per day (morning, mid-morning, noon, afternoon, evening).

## Allopathy

You'll notice that our allopathy list is fairly sparse. We passed on adding in things like Ivermectin, Hydroxychloroquine, etc. even though many of these medications are a very core part of the protocols most people are following in India and other countries. Our philosophy in treating our mom was to take a minimal approach, and favor repeatable science until we had no options but to take a road less traveled.

| Name | Dose | Notes |
|---|---|---|
| Sinarest (course of 20) | 1-0-1 | This is similar to Tylenol Flu. Helps with respiratory congestion (which our mom did not have, but better safe than sorry) but also packs in 500mg of Acetaminophen to help reduce fever. |
| Acetaminophen 500mg (see note above) | 0-1-0 | The advice from her doctor was to keep the fever down. So even when her fever seemed to have resolved, we continued the Acetaminophen for a few days. Remember, Acetaminophen has other benefits like reducing body aches, etc. |
| Emetrol or your favorite anti-nausea pill | As needed | This is an anti-nausea medication. Covid seems to hit many folks with nausea which reduces the desire to eat. Of course, this can be swapped out with your favorite anti-nausea medication. |
| Aspirin (81mg) | 1-0-0 | Colloquially known as "baby aspirin", you can usually pick up 75mg in India. This was added because our mom was not already on blood thinners or anticoagulants. |

## Supplements

Surprisingly, supplements remain a controversial issue for many even today. But even institutions like Harvard acknowledge the anecdotal benefits of many not just in helping fight viral infections, but specifically for COVID. Additionally, there aren't too many downsides to adding supplements into the protocol as long as your dosing is judicious. This is what we did.

| Name | Dose | Notes |
|---|---|---|
| Zinc 20mg | 1-0-0 | Zinc may have antiviral activity. It either |

| | | |
|---|---|---|
| | | improves immune cell function or reduces the ability for a virus to multiply. It's hard to find lozenges in many places but that's the best way to take it (each lozenge is around 13mg, and you can take one every 2-4 hours). In hindsight, we could have given our mom far more Zinc. |
| Vitamin C 1000mg | 1-0-0 | A well-known antioxidant that promotes immune function. |
| Vitamin D 5000IU | 1-0-0 | If the person you're caring for is deficient in Vitamin D (only way to tell is through a blood test), you can increase the dosage to 10,000IU during the acute phase of the infection. |
| Electrolytes | Daily | Get a sugar-free (preferably Stevia as other sweeteners can cause insulin to spike) pack that can be mixed into the daily drinking water. We've linked to what we bought her so you can check out the ingredient list. |

## Homeopathy

If homeopathy is not your thing, feel free to skip ahead. But if the person you're caring for considers homeopathy to be an effective approach to treating disease (and you're on the other end of the spectrum), it would behoove you to at least consider the scientific benefits of the placebo effect. A great homeopathic doctor in Rajkot, a friend of someone in our family, was kind enough to send us the following protocol. Our mom followed it until the bottles were empty (approximately 2 weeks), except for Five Phos, which she took for a little over 4 weeks.

| **Name** | **Dose** | **Notes** |
|---|---|---|
| Get 2 drachm bottles of Globules No. 30. This may sound weird to the uninitiated but it'll make sense to a homeopathic pharmacist if you just communicate it exactly as written. | | |
| Aconite 200 (6 pills/dose) | 1-1-1-1-1* | For fever |
| Euphatorium 200 (6 pills/dose) | 1-1-1-1-1* | For fever |
| Ipecac 30 (6 pills/dose) | 1-1-1-1-1* | For nausea |

| | | |
|---|---|---|
| Nat Mur 30 (6 pills/dose) | 1-1-1-1-1* | For throat pain |
| Five Phos (4 pills/dose) | 1-1-1 | An immunity booster |

* This dose is for moderate to severe patients. For mild patients, you can go with 1-1-1. We elected to treat our mom as a moderate patient, as there was no harm in doing so.

Chapter 3

# Diet & Hydration

## Diet

Diet is deeply specific to an individual's age, health conditions, allergies, and goals. As such, we can't be prescriptive here, but we'll share with you how this has played out for our mom, provide some tips and tricks, and some landmines to look out for.

Again, in no particular order:

- Our mom lives alone in an apartment building in Pune, India. Unlike most people in India, she hasn't had any household help since the dawn of the pandemic last March. While a lot of folks have retained or even introduced new household help into their homes during COVID, we decided it was extremely important that our mom remain isolated. But if you've experienced COVID (some of us got a taste of it from vaccine reactions), you know well that the fatigue it brings with it is incredibly hard to combat. Add on symptoms like nausea and anosmia, comorbidities like diabetes, and advanced age, and you have the perfect storm that shatters the will of the infected individual to eat and stay alive. Keeping our mom fed was (and still easily remains) the most dizzying part of this roller coaster ride.

- We quickly realized that she would rather die than make herself food: that is the severity of a "mild" COVID case of Delta in an elderly individual. So for the first few days, we organized food for her from a relative (picked up and delivered via the excellent Dunzo service). This bought us time to order enough snacks (nuts, etc.) and organize the logistics to get her nutritious meals that also account for her severe diabetes. The search eventually led us to Food Darzee, a daily home-delivery food service that can supply up to 4 meals a day (3 meals + a snack) and can tailor it to fit the nutritional needs of each client (they have options like keto, low carb, etc.) While the service is not perfect and very expensive by Indian standards, we consider this find to be one of the key reasons our mom made a strong recovery.

- We switched between home-style and low-carb meal plans for our mom on Food Darzee. Our general process was:
    a. Food is delivered at 8am.
    b. Mom calls one of us and opens each container so we can log what she has received for the day.

c. We reorganize all the dishes to create a detailed meal plan for the day that is as nutritious and appetizing as possible. We type it up and send it to her on a dedicated WhatsApp thread that she can easily refer to throughout the day.

- During the acute phase of her infection, it was exceptionally hard to get our mom to eat. The time difference between the West Coast of the U.S. and India is 12.5 hours, so there were legitimate logistical issues exacerbating things as well. But we realized quickly that the only way this was going to work was if one of us woke up during her meal times (3 meals + 2 snacks) and directed her exactly what to do on FaceTime. So that's what we did for 2 months.

- Our mom is a picky eater who is also deeply in touch with her feelings. A great cook, she delights in critiquing others' cooking (#sorrynotsorry if you're reading this, mom!) This sounds trivial, but her attitude toward food—specifically, her insistence that every bite of every meal of her life approach some mythical and impossible level of perfection—was the culprit in keeping her well-fed early in the infection. It was eventually a heart-to-heart talk (read: I, her eldest son, breaking down in tears) that served as an inflection point in the nutritional aspect of her recovery.Exasperated, I exclaimed something on the lines of, "Mom, right now food is not food. Food is *medicine*!". It apparently made an impression. We share this story with you because we wish we'd learned this quicker ourselves. And in the event the person you're caring for happens to be anything like our mom, we encourage you to think outside of the box (the way you would to motivate a picky child). Don't underestimate the power of a change in mindset, and the underrated but judicious use of an occasional scolding and tears.

- Most of us have experienced being sick and having to work through it for a deadline. We had to tap into how we felt during those times to empathize with our mom. It also opened us to the idea of employing myriad creative tactics to address the goal of sustenance for our mom.

It's hard to overstate the importance of good nutrition and a sufficient caloric intake in the recovery process from not just Covid, but any illness. How much and what the

person eats can make the difference between a full recovery and escalation of a mild case to moderate or even severe.

## Hydration

Needless to say, hydration is the lifeblood not only of a healthy life, but especially of recovering from illness. And it is no different for COVID-19. A few finer points worth sharing from our own experience:

- If you can afford it, switch to mineral water. We switched to mineral water due to fears that my mom may have contracted Covid through a water contamination issue in her apartment building, but the switch to mineral water proved beneficial on many levels:
    - It eliminated a significant vector of secondary infection (waterborne illness is legitimately a big problem in India).
    - It's ready-made. What we mean by this is that a case is delivered to mom, and she's good to go—otherwise she has to boil the filtered water, cool it, store it, serve it to herself, etc. It's a small thing but small psychological barriers like this add up quickly and anything that can reduce cognitive load which is already very high during an illness goes a long way over time.
    - It's safe to use in the neti pot—something that we still encourage our mom to do every few days.
    - You can leave a bottle everywhere so you always have water on hand: one near the bed, one on the dining table, one near the sofa, one in the kitchen, and even one in the bathroom.

- Add in electrolytes. We use Ketofy and allow our mom to supplement it with some Stevia for taste. We gave her the goal of drinking 2 liters of total fluids per day, with 750ml of it being electrolyte water.

Our mom is good about staying hydrated, so this was one thing we didn't have to micromanage. But if the person you're caring for is like most people, you need to pay special attention to keeping them hydrated. Not only does this really help recovery, but dehydration can introduce a whole new set of complications that you'd rather avoid.

Chapter 4

# Blood Tests

Blood tests have been, and continue to be, an important tool in managing our mom's recovery. Our doctor advised us that there is a propensity to give too much importance to a reading like blood oxygen saturation or CRP (an understandable irrationality considering the devastating effects of Delta) since these are all measurable. There's a technical term for this bias: McNamara's Fallacy. Even the official AIIMS guidance circulating in India recommends that individuals be rushed to a hospital if their oxygen drops below 93%. But panicking over blood oxygen saturation without fully considering the patient's own baseline and her overall symptom profile is like calling the fire department when the smoke alarm goes off in the house while you're roasting papad.

Interpreting blood results in context of the overall clinical picture of a patient is both a science and an experiential art form. It differentiates a good doctor from an incredible one. We were fortunate to have an incredible one helping us make sense of the often erratic blood test results, and hopefully we can pass along some of the things we learned.

Additionally, we share the blood work we ordered for our mom, and her actual blood reports, along with a quick summary of how we interpreted each against her overall clinical picture.

## "Treat The Patient, Not The Lab Result"

One of the things our doctor repeated the most to us was, "Treat the patient, not the lab result". Blood test results can be notoriously alarming if you don't fully internalize the following three points:

1. **Blood markers fluctuate, often wildly.** Like weight, blood markers can be very moody and fluctuate wildly. Anyone who has been on a weight-loss program, into fitness, or simply owns and uses a weighing scale daily knows that you can step on the scale on two consecutive days and receive readings that are a kilo or two apart without any material change in diet and hydration. Blood work can be the same way.

2. **Some markers change in hours, others take months.** Many blood markers, like CRP, change rapidly (a half-life of 18 hours in the case of CRP), and others

change very slowly (HbA1c is a running average of 3 months, for instance).

3. **Results can be error-prone.** It's important to remember that lab tests are conducted by humans, and all humans, by nature, make mistakes.

To get the most out of blood tests, avoid focusing on a specific reading unless that number is just wildly out of range (read: 100x or more; in such a case, repeat that test, and if it confirms the previous result, and there are other symptoms that confirm the anomaly, act on it). But if you're not dealing with wildly abnormal results, the better approach is to take frequent samples to establish a trend much like you'd do with weight changes. Trends are excellent at accounting for the above three points, and they meaningfully answer the question most important to caregivers: *Are things getting better, staying the same, or getting worse?*

## The Blood Tests We Ordered

During the acute phase of the infection we treated our mom like an ICU patient—an ICU would have kept tabs on the following blood markers on a 48-hour cadence. We moved to a 72-120 hour cadence once she tested negative, and finally switched to an as-needed basis for her acute sequelae (post-COVID) incidents.

It's worth mentioning the cadence and our protocol could certainly be considered overkill; Dr. KK Aggarwal, whose videos proved to be a beneficial resource for us, would likely have ordered nothing more than a CRP test every few days after the negative Covid test (in fact, that's what he recommends in one of his videos). There's no objectively correct answer here. We recommend you make the call based on the comfort level of the person you're caring for, your level of confidence (or lack thereof) around the progression of their infection, and your finances. And of course, your doctor's recommendations.

| Name | Notes |
|---|---|
| We link each test type to a YouTube video by Dr. KK Aggarwal. Unfortunately, he switches between English and Hindi, and we haven't found a way to provide a good translation yet for those who don't understand Hindi. | |
| CBC | This is the Complete Blood Count. It'll give you a high-level view into the most important blood markers. The most important |

| | |
|---|---|
| | markers we paid attention to were: Platelet Count, WBC count, Lymphocytes, and Absolute Lymphocytes |
| CRP | C-Reactive Protein is a measure of inflammation in the body. |
| D DIMER | A measure of blood clotting that is age-specific. |
| FERRITIN | A measure of anemia and inflammation. |
| IL 6 | Another inflammation marker. |
| LDH | A measure of the amount of tissue damage. |

## Our Mom's Reports

As we wrote earlier, determining whether a blood marker is outside its normal range is not very useful. Test results need to be carefully interpreted against the patient's overall clinical profile by an experienced medical professional. We hope that our mom's reports and a corresponding interpretation summary will give you a better feel for the kinds of questions that need to be answered, and how these questions were answered for one specific patient. Our goal isn't to provide an objectively correct answer—there is often no such thing in matters of interpretation—but rather, to give you a reference.

### Blood Test 1: Day 16

**Date: May 4, 2021 • Days since first symptoms: 16 • Days since positive PCR test: 6 • Biomarkers: CBC, Ferritin, Lipid Profile, HbA1C, Plasma Glucose, LDH, T3, T4, TSH, Thyroglobulin Antibody, D-Dimer, Urine, CRP, IL-6**

| Date | Day | CRP | IL-6 | D Dimer | Ferritin |
|---|---|---|---|---|---|
| Normal Range | | < 10 mg/L | < 7 pg/mL | 0-500 ng/mL | 4.63- 204 ng/mL |
| Tue, May 4 | 16 | 10.25 | 20.5 | 531.3 | 214.14 |

View Full Results →

#### Summary

This was the first blood test we ordered and we definitely felt like we'd ordered it too late. Ideally we'd have ordered this the day of or the day after the positive

RT-PCR test. However, we were still playing catch-up at this point: learning as much as we could about the infection online, through friends, etc., working on setting up her meals remotely, acquiring things like an oximeter (they were sold out in India) and thermometer (hers had malfunctioned), etc. Additionally, we hadn't communicated to our doctor that it was easy to order blood tests at home in India (our fault), so he hadn't requested them; after all, given the dire outcomes folks were seeing in the overwhelmed hospitals in India, our collective priority was to keep her isolated at home for as long as we could.

### Interpretation

The tests showed that her `D-Dimer`, `IL-6`, and `CRP` were moderately elevated, and we expected her doctor to focus on that. However, when we spoke to him, he was alarmed about her diabetes markers: `HbA1c` & `Plasma Glucose`. To be sure, so were we—we knew an `HbA1c` of `10` is dangerously poor. But we'd forced ourselves to focus on COVID for now: one battle at a time. Our doctor redirected our attention to the diabetes and impressed upon us that it was imperative we found a way to stabilize her blood sugar. During acute infections, blood sugar regulation naturally goes haywire—my mom's glucometer observed wild swings between `175` and `300`. But for a diabetic those swings become particularly dangerous and put them at high risk of things like ketoacidosis, strokes, Mucormycosis, etc. Not to mention, such swings and extreme blood sugar readings are hard on the individual and exacerbate the already terrible symptoms of COVID. The upside was that he was pleased with how her body was handling COVID.

### On Her Elevated TSH

Her blood tests also include a thyroid panel: `T3`, `T4`, `TSH`, `Thyroglobulin Antibody`. These are the blood markers monitored by her endocrinologist in Mumbai as they inform her Thyroid Replacement Therapy. My mom underwent a full thyroidectomy a few years ago to treat her Papillary Carcinoma (Thyroid Cancer). Her thyroid panel results showed some irregularities, particularly, her `TSH` was elevated 100x (her baseline is around 0.25). We tabled this irregularity for the moment, but agreed it was time to reach out to her Endocrinologist to modify her therapy and address her acute thyroiditis (a now well-known, even if rare side-effect of Covid in many people).

## Blood Test 2: Day 20

**Date: May 8, 2021 • Days since first symptoms: 20 • Days since positive PCR test: 10 • Biomarkers: CBC, Ferritin, LDH, D-Dimer, CRP, IL-6**

| Date | Day | CRP | IL-6 | D Dimer | Ferritin |
|---|---|---|---|---|---|
| Normal Range | | < 10 mg/L | < 7 pg/mL | 0-500 ng/mL | 4.63- 204 ng/mL |
| Sat, May 8 | 20 | 2.52 | 4.61 | 454.1 | 147.43 |

[View Full Results →]

### Summary

These results confirmed the trend we wanted to see: inflammation and clotting markers going down. It aligned with her symptoms as well: temperature was within normal range without Acetaminophen, fatigue was improving even if ever so slightly, some sense of smell was returning, etc. Worth noting, however, we did a repeat RT-PCR test alongside this blood panel, and she was still COVID-positive.

## Blood Test 3: Day 23

**Date: May 11, 2021 • Days since first symptoms: 23 • Days since positive PCR test: 13 • Biomarkers: CBC, Ferritin, LDH, D-Dimer, CRP, IL-6**

| Date | Day | CRP | IL-6 | D Dimer | Ferritin |
|---|---|---|---|---|---|
| Normal Range | | < 10 mg/L | < 7 pg/mL | 0-500 ng/mL | 4.63- 204 ng/mL |
| Tue, May 11 | 23 | 1.83 | 17.31 | 614.6 | 118 |

[View Full Results →]

### Summary

We set this blood test up as a routine 72-hour check even though our mom's clinical picture was starting to look very promising: her nausea was diminishing, she was experiencing less fatigue, no fever, and so on. The blood test results, however, were actually worse on several axes as compared to blood test #2. Specifically, both `IL-6` and `D-Dimer` were elevated, and we felt a bit anxious about what this meant. Could it mean a symptomatic regression was imminent? Was her COVID case about to become more severe?

We discussed our concerns with her doctor, and he reinforced that these are exactly the kinds of ambiguous results that could cause us to react irrationally. It was a reminder to, "Treat the patient, not the lab results". So we did the hardest thing we've had to do during the entirety of this ordeal: wait, watch, repeat, and re-evaluate.

### Blood Test 4: Day 26

**Date: May 13, 2021 • Days since first symptoms: 26 • Days since positive PCR test: 15 • Biomarkers: CBC, Ferritin, LDH, D-Dimer, CRP, IL-6**

| Date | Day | CRP | IL-6 | D Dimer | Ferritin |
|---|---|---|---|---|---|
| Normal Range | | < 10 mg/L | < 7 pg/mL | 0-500 ng/mL | 4.63- 204 ng/mL |
| Thu, May 13 | 26 | 1.48 | 4.06 | 581 | 105 |

View Full Results →

#### Summary

Lo and behold, these results canceled out the anxiety of the previous one. IL-6 was significantly reduced (to the extent that we questioned the accuracy of the IL-6 from the previous results). We repeated the RT-PCR test alongside this blood work, and much to our delight, she was now Covid-negative! All of this aligned with her clinical picture which remained consistently good day-to-day. Other than intermittent bouts of fatigue and body ache, she was trending well across all symptoms including loss of smell and taste.

### Blood Test 5: Day 30

**Date: May 17, 2021 • Days since first symptoms: 30 • Days since negative PCR test: 4 • Biomarkers: CBC, Ferritin, Lipid Profile, LDH, T3, T4, TSH, Thyroglobulin Antibody, D-Dimer, CRP, IL-6**

| Date | Day | CRP | IL-6 | D Dimer | Ferritin |
|---|---|---|---|---|---|
| Normal Range | | < 10 mg/L | < 7 pg/mL | 0-500 ng/mL | 4.63- 204 ng/mL |
| Mon, May 17 | 30 | 0.85 | 2.74 | 523.8 | 76.45 |

**View Full Results →**

Summary

These results confirmed the ongoing positive trend. Every blood marker we cared about was trending in the right direction: IL-6, CRP, Ferritin, D-Dimer. We repeated her thyroid panel in this round of testing, and her TSH was still severely elevated (even if lower than what it was in blood test #1). Given her consistently improving clinical profile, we felt we could now start to address any necessary changes to her thyroid replacement therapy protocol, and subsequently reached out to her endocrinologist.

## Blood Test 6: Day 37

**Date: May 24, 2021 • Days since first symptoms: 37 • Days since negative PCR test: 11 • Biomarkers: CBC, Ferritin, LDH, D-Dimer, CRP, IL-6 • Related: Sequela Incident 1, Conversation Around Sequela Incident 1**

| Date | Day | CRP | IL-6 | D Dimer | Ferritin |
|---|---|---|---|---|---|
| Normal Range | | < 10 mg/L | < 7 pg/mL | 0-500 ng/mL | 4.63- 204 ng/mL |
| Mon, May 24 | 37 | 36.4 | 7.63 | 542.9 | 93.18 |

**View Full Results →**

Summary

Notice, this blood work was ordered a week after the last one. We had decided to ease up on the blood test frequency, given her promising clinical picture, a promising Zoom call with the endocrinologist, and the all-clear from her doctor to move her from the "ICU" to the "hospital floor" and get ready for a "discharge". But unfortunately, a series of events led to her first Covid sequela (also known as post-Covid syndrome where some patients experience Covid-like symptoms for weeks to months after the acute infection). You can read about the exact series of events here.

Her blood work was in line with her clinical picture due to the sequela incident: all her critical blood markers were elevated with CRP clocking in around 36.4, the highest yet since the start of her symptoms. This incident created some of the highest levels of anxiety we'd experienced since her negative COVID test, with

questions about re-infection, escalation of severity, sudden blood clotting, etc. presenting themselves again in our minds. We messaged our doctor, who calmed us down, and told us there was a high likelihood that this was an exertional COVID sequela incident, i.e. overexertion that led to a recurrence of symptoms. But he also told us to be vigilant and "put her back on the floor", i.e. treat her case with more caution, including scheduling follow-up bloodwork in a couple of days. You can read the full exchange between us here.

### Blood Test 7: Day 40

**Date: May 27, 2021 • Days since first symptoms: 40 • Days since negative PCR test: 14 • Biomarkers: CBC, Ferritin, LDH, D-Dimer, CRP, IL-6**

| Date | Day | CRP | IL-6 | D Dimer | Ferritin |
|---|---|---|---|---|---|
| Normal Range | | < 10 mg/L | < 7 pg/mL | 0-500 ng/mL | 4.63- 204 ng/mL |
| Thu, May 27 | 40 | 6.63 | 2.9 | 529.3 | 57.49 |

View Full Results →

#### Summary

Her blood work fell back into the promising pre-sequela trend. While IL-6 and CRP were still elevated, they both dropped dramatically from the previous blood test results. As our doctor had suspected, she bounced back quickly after the acute incident. For our part, we learned a tremendous amount about post-COVID care, and as a bonus, we learned that we can't ever leave our mom's dosing to chance (read about what went wrong with her thyroid medication here). We've since put a process in place where she has to WhatsApp us a picture of the pharmacy bottle/package for any new medication that enters her home.

### Blood Test 8: Day 51

**Date: June 7, 2021 • Days since first symptoms: 51 • Days since negative PCR test: 25 • Biomarkers: CBC, Ferritin, LDH, D-Dimer, CRP, IL-6**

| Date | Day | CRP | IL-6 | D Dimer | Ferritin |
|---|---|---|---|---|---|
| Normal Range | | < 10 mg/L | < 7 pg/mL | 0-500 ng/mL | 4.63- 204 ng/mL |
| Mon, Jun 7 | 51 | 0.82 | 4.2 | 515.6 | 43.13 |

View Test →

Summary

This was follow-up blood work we ordered around 2 weeks after the previous tests. Everything was still normal and in line with her overall clinical picture.

## Blood Test 9: Day 77

**Date: July 3, 2021 • Days since first symptoms: 77 • Days since negative PCR test: 51 • Biomarkers: CBC, Ferritin, Lipid Profile, HbA1C, Magnesium, Sodium, Potassium, Chloride, Alkaline Phosphatase, Bicarbonate, Urea, Calcium, Phosphorus, T3, T4, TSH, B12, Folic Acid, Microalbumin, Creatinine, Albumin/Creatinine Ratio, Thyroglobulin, Thyroglobulin Antibody, LDH, D-Dimer, CRP, IL-6**

| Date | Day | CRP | IL-6 | D Dimer | Ferritin |
|---|---|---|---|---|---|
| Normal Range | | < 10 mg/L | < 7 pg/mL | 0-500 ng/mL | 4.63- 204 ng/mL |
| Sat, Jul 3 | 77 | 11.2 | 31.86 | 483 | 36.08 |

View Test →

Summary

This was a beast of a test run. We did an all-up marker check-up because in a couple of days our mom was about to make a 36-hour journey to rendezvous with us in Mexico City, and we wanted to catch anything suspicious before she put herself through such stress. We expected her inflammation markers, IL-6 and CRP, to clock in higher because the week of packing and closing down her home had led to another sequela incident complete with fever, chills, and intense fatigue. We controlled our own anxiety when we saw the elevated markers and reminded ourselves that there was a clear clinical explanation, and that both markers have short half-lives. She bounced back fairly well from the fever and exertion just in time for her cab ride from Pune to Mumbai.

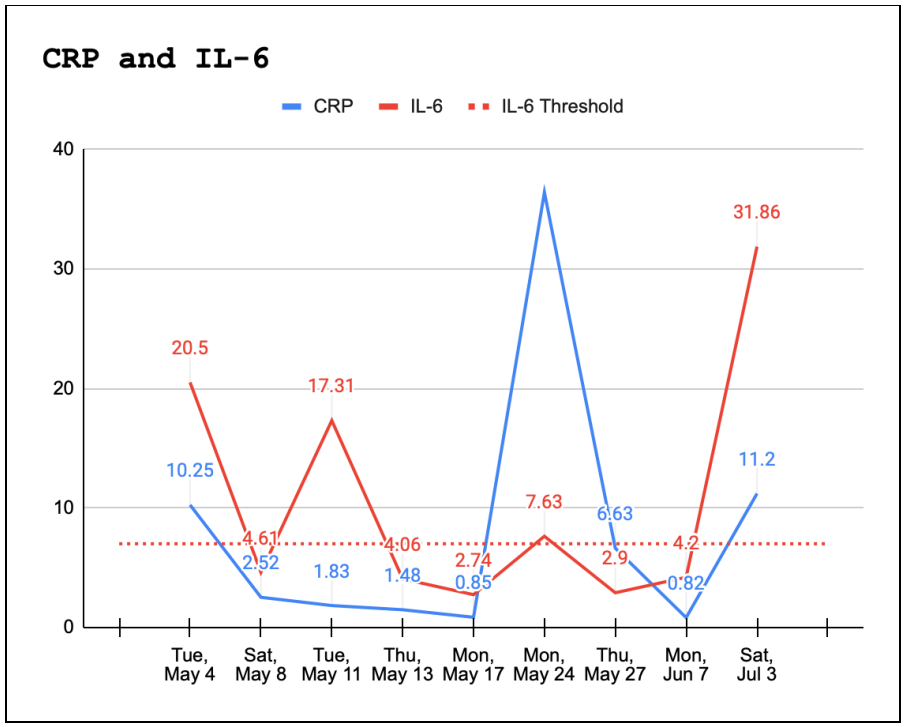
Panning away from the inflammation markers showed quite a bit of good news, though. Her thyroid markers were back to normal, thus confirming that COVID caused pretty severe acute thyroiditis. In her case, if those markers remained elevated, we'd have to worry about recurrence of her thyroid cancer.

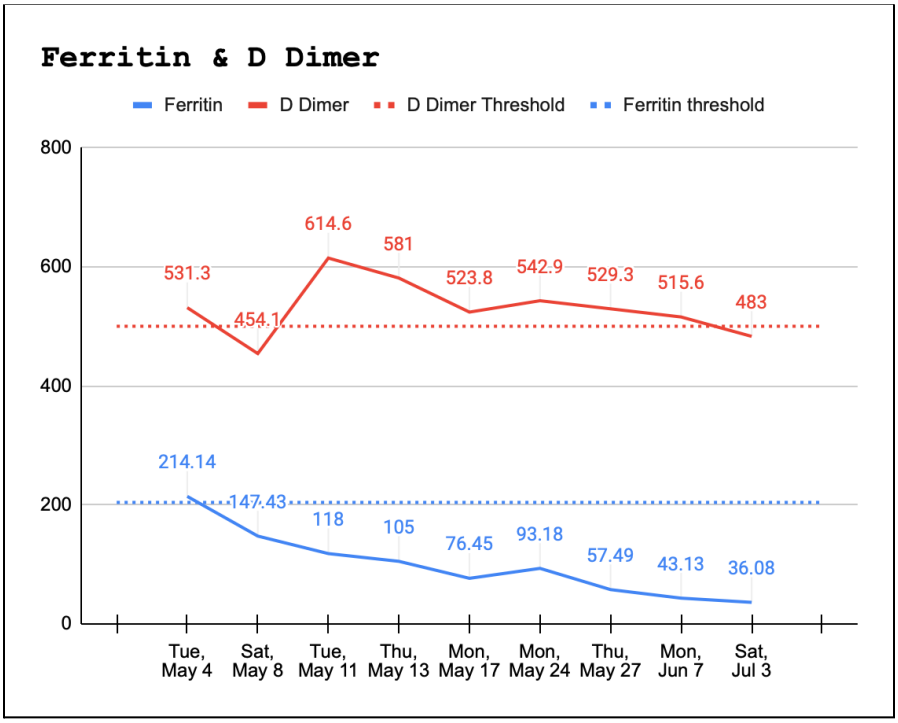
In other good news, her diabetes improved dramatically. Her HbA1C was 7.3%: close to a 3 point improvement, a small miracle! A low-carb diet full of variety and healthy fats did wonders. All in all, even with a few things off here and there, we felt our mom was faring very well considering her state just four weeks prior.

## Key Marker Summary

As mentioned in the previous sections, the key blood markers we watched on our mom's tests were: `CRP`, `IL-6`, `D-Dimer`, and `Ferritin`. Zooming out and looking at them at a distance confirms that even when markers were wildly anomalous (for instance when her CRP almost hit 40 during her first sequela incident *after* she'd tested negative), they fell back into the longer term trend. Jul 3 shows another similar sequela incident that elevated her `CRP` and `IL-6`, and this aligned with her clinical profile: she was fatigued, had a low grade fever, and some chills brought on by the exhaustion of getting ready for [her trip to Mexico City to rendezvous with us](#).

| Date | Day | CRP | IL-6 | D Dimer | Ferritin |
|---|---|---|---|---|---|
| Normal Range | | < 10 mg/L | < 7 pg/mL | 0-500 ng/mL | 4.63- 204 ng/mL |
| Tue, May 4 | 16 | 10.25 | 20.5 | 531.3 | 214.14 |
| Sat, May 8 | 20 | 2.52 | 4.61 | 454.1 | 147.43 |
| Tue, May 11 | 23 | 1.83 | 17.31 | 614.6 | 118 |
| Thu, May 13 | 26 | 1.48 | 4.06 | 581 | 105 |
| Tested negative for COVID-19 | | | | | |
| Mon, May 17 | 30 | 0.85 | 2.74 | 523.8 | 76.45 |
| Mon, May 24 | 37 | 36.4 | 7.63 | 542.9 | 93.18 |
| Thu, May 27 | 40 | 6.63 | 2.9 | 529.3 | 57.49 |
| Mon, Jun 7 | 51 | 0.82 | 4.2 | 515.6 | 43.13 |
| Sat, Jul 3 | 77 | 11.2 | 31.86 | 483 | 36.08 |


CRP and IL-6
CRP
IL-6
IL-6 Threshold
40
30
20
10
0
20.5
17.31
4.61
4.06
2.74
7.63
2.9
4.2
31.86
10.25
2.52
1.83
1.48
0.85
6.63
0.82
11.2
Tue, May 4
Sat, May 8
Tue, May 11
Thu, May 13
Mon, May 17
Mon, May 24
Thu, May 27
Mon, Jun 7
Sat, Jul 3


Ferritin & D Dimer
Ferritin
D Dimer
D Dimer Threshold
Ferritin threshold
800
600
400
200
0
531.3
454.1
614.6
581
523.8
542.9
529.3
515.6
483
214.14
147.43
118
105
76.45
93.18
57.49
43.13
36.08
Tue, May 4
Sat, May 8
Tue, May 11
Thu, May 13
Mon, May 17
Mon, May 24
Thu, May 27
Mon, Jun 7
Sat, Jul 3

Chapter 5

# The Virtual Patient Chart

Our virtual patient chart came into existence as we tried to juggle telecare from across the world, and it quickly became our command center. While the data and trends helped inform triage with our mom's doctor, the hidden benefit of this chart was that it drove our family to be fully present for my mom.

Around three weeks into the infection, our mom admitted to us that there was a 3-4 day period where she'd entirely given up. But it was our FaceTime calls and WhatsApp check-ins every 3-4 hours during her waking hours that pulled her out of those negative thoughts.

If your case can be managed at home, we can't emphasize enough how important it is for you to find a way to be present for the person you're caring for. And by this we mean that you need to be like a medical intern: frequently checking in, logging data, monitoring trends, adjusting your course of action, testing, motivating the individual to eat and drink, and whatever else it takes to keep the patient alive.

## About The Chart

We created the chart in Google Sheets so all of us could access it at all times on any computing platform. This allowed us to do check-ins even when we didn't have our laptops handy, but also gave us the ability to quickly look through prior readings and notes on the go. And, of course, Google Sheets is a full-blown spreadsheet application, so it gave us the ability to do any analysis and charting we could think of.

It's worth mentioning that we moved our mom's diet and vitals to a separate Sheet fed by a form, and taught her how to fill it out herself (by installing the form as a home screen icon on her iPhone) around 30 days after onset of symptoms.

We are providing both, our mom's virtual patient chart, and also a copy that you can utilize to start from scratch.

### Get The Chart

**View Our Mom's Chart →**

This is exactly our mom's chart for the first 45 days since onset of symptoms. This should serve as a good reference point.

**Make Your Own Copy →**

For those of you who find this useful, we've created a fresh copy to get you started.

## Understanding The Chart & Graphs

While most of the columns in the chart are self-explanatory, here's a quick description of each:

- **Day.** This is the number of days since onset of the first symptoms (fever in our mom's case).
- **Date/Time.** These are captured in her local time.
- **Temperature.** Her body temperature as measured by a digital thermometer (self-administered by mouth).
- **SpO2.** The blood oxygen saturation percentage.
- **Pulse (device).** The pulse as reported by her oximeter (initially it was a dedicated oximeter in her case, and later an Apple Watch 6).
- **Pulse (manual).** Her oximeters at the start weren't very reliable, so we had her do her pulse manually a few times. Unfortunately, we found her ability to take her own pulse accurately during COVID to be fairly poor.
- **Blood Sugar.** As measured by her glucometer. Note: the ranges we used were much higher than what is advisable for a diabetic. We decided that attempting to drastically reduce her blood glucose during a COVID recovery would exacerbate her risk factors.
- **Medications.** These columns tracked all the medications she was taking. You'll see many blanks because she wasn't taking the medication at the time (e.g. she wasn't taking baby aspirin early on) or it wasn't time for another dose (e.g. homeopathy was 3 to 5 times a day).
- **Food & Hydration.** We tracked this closely to map back to blood sugar fluctuations. Eventually we migrated this to a Google Form that she filled out by herself (the sheet feeds another sheet where we monitor her overall health profile).
- **Symptoms.** Our symptom list is a combination of various symptoms our doctor told us to monitor and things we learned organically, e.g. headaches are often precursors to blood clots or elevated heart rate at rest can be a precursor to silent hypoxia. We used a pain scale from 0-10 where 0 was non-existent, and 10 was most severe. So for a symptom like Shortness of

Breath, a rating of 3 implied that there was some shortness of breath, but it was pretty mild.
- **Average Score.** This is the average of all symptoms. We found charting this column to be extremely helpful in following her overall clinical picture.
- **Grade.** This was a subjective grade applied after the last check-in of the day.
- **Verbally Reported Feelings & Notes.** We logged anything notable here, and this proved to be very useful over time. For instance, we noticed that constipation was a precursor to a sequela incident for our mom.

Additionally, you'll see 5 simple line graphs at the top of the virtual patient chart that convert five important columns into trends: blood sugar, fever, %Sp02, fatigue, and average symptom score. Ideally, we were looking for the following:

- The blood sugar needed to be trending down toward 80-140, and its range needed to be narrowing over time (i.e. instead of a range of 100-200, we wanted it to be more like 100-140).

- The fever needed to be going down and staying down between 97° and 98.6°.

- The blood oxygen saturation needed to be going up. Ideally, it needed to be 100%, but of course, everyone is slightly different and age and comorbidities do affect baselines. For our mom we were fine with anything around 92%, and happy with anything above 95%.

- Fatigue score needed to be going down and staying down.

- Average symptom score needed to be going down and staying down.

## Some Finer Points About Virtual Tracking

In no particular order, here are a few lessons we learned along the way:

- Get on a schedule. We tracked at least four times a day: once before breakfast and once after, once after lunch, and after dinner.

- Track all the symptoms that are relevant to your case. As mentioned above, our symptom list is a combination of various symptoms our doctor told us to monitor and things we learned were important.

- Allow the patient to self-report. Don't lead (but it's OK to ask clarifying questions). Remember, the point of these ratings is to establish a trend, and the underlying data for the trend must be determined by the person who is sick.

- In our experience, the most important measurements were: blood oxygen saturation, pulse, fever, and shortness of breath. Each of these were part of our escalation threshold.

- If a reading looks really off don't panic. Take a deep breath, have the patient repeat the reading 2-3 times, and log the average. For example, our mom initially reported a couple of `Sp02` readings around `85` because diabetes causes blood circulation issues which prevent the oximeter from getting accurate readings. Whenever this happened we'd have her warm up her hands over some heat or lead her through some upper body exercises to get her blood flowing.

- It's OK to skip a symptom check every once in a while if you haven't seen a dramatic change since the last one. But try your hardest not to skip temperature, oxygen, and pulse checks, because they are important and easy to do.

- Be patient with the patient. COVID-19 fatigue is no joke, and it is not an exaggeration to say that the person you're caring for probably feels like they're dying or is actually wishing death upon themselves.

- Be patient and encouraging to yourself and your team. Nursing someone through a scary illness, especially remotely, is difficult and frustrating. It's best to accept that it's going to be hard and remind yourself that **you can do hard things**.

Chapter 6

# Post-COVID Care

## Our Mom's Covid Sequelae Incidents

*sequela (noun): a condition which is the consequence of a previous disease or injury.*

Many illnesses often have longer-term consequences. COVID is no different. According to the CDC's Post-COVID Conditions web page:

> *Although most people with COVID-19 get better within weeks of illness, some people experience post-COVID conditions. Post-COVID conditions are a wide range of new, returning, or ongoing health problems people can experience more than four weeks after first being infected with the virus that causes COVID-19. Even people who did not have symptoms when they were infected can have post-COVID conditions. These conditions can have different types and combinations of health problems for different lengths of time.*
>
> *CDC and experts around the world are working to learn more about short- and long-term health effects associated with COVID-19, who gets them, and why.*

The translation of that last sentence is: *medical science doesn't exactly know what causes post-COVID conditions (yet)*.

In this section, we describe our mom's sequelae, what we believe caused them, and how we managed through them.

## Her Post-COVID Symptoms & Some Theories

Our mom has experienced the following post-COVID symptoms:

- Sporadic low-grade fever (at the time of this writing on July 28, she has not had a fever for close to a month, other than for a few days after her vaccinations)
- Some days of higher fatigue & brain fog. She complains about a persistent low-level brain fog, and her motor skills have definitely gotten slower
- Chills (this happened once)

We are still trying to understand the stimuli that lead to "bad days", and our best guesses right now are the following:

1. **Exertion.** There seems to be a pretty strong correlation between overexertion and a relapse of some combination of the symptoms listed above. Refer to our summary of the first sequela.

2. **Thyroid Replacement Therapy and Type II Diabetes Medication Dosing Changes and Errors**. As you'll read in Sequela 1, our mom incorrectly quadrupled her Thyronorm dose for a few days.

3. **Randomness.** As frustrating as this feels to us, there may be no discernible stimuli causing the sequelae. It could very well be a viral reservoir in her body or just opaque post-infection inflammatory issues that are causing the flare-ups.

4. **Showers in India.** We have low confidence in our hypothesis here, but each incident in India has followed a shower. Recall, we had concerns about our mom contracting COVID via the water supply. We'll never know for sure if the local water supply had anything to do with her case. Additionally, consider that taking a shower is itself an act of exertion (particularly for someone who just endured something like COVID-19), so it could very well be the exertional aspect of a shower that is bringing on the sequelae.

# Sequela 1

**Date:** May 22, 2021 • **Days since first symptoms:** 34 • **Days since negative PCR test:** 8 • **Symptoms:** Low-grade fever (peaked at 100°), chills, tachycardia for an hour (110bpm), intense fatigue and brain fog • **Related:** Conversation Around Sequela Incident 1

## Sequence Of Events

### Day 32

We met with our mom's endocrinologist over Zoom on May 20, 2021 (day 32). He adjusted her thyroid replacement therapy protocol. Specifically, he increased her Thyroxine dose from 50mcg to 100mcg per day.

### Day 33

The next day (day 33) we put the new dosing in place. That same day, we cleared our mom to exert herself a little more than usual in the form of two 5-minute walks (inside her apartment) after breakfast and lunch, a shower, a long phone call with a family member, and a small project to extract some legal documents from her bed storage (this required moving her mattress askew). This was a significant jump in exertion as compared to her average for the last 30 days, which had been laying in bed or sleeping for most of the time with walks to-from the kitchen to get food. She did well, and remained energetic until bed.

### Day 34 (Around 1AM)

At around 1AM that night, however, our mom FaceTimed us and her teeth were chattering. She'd taken her temperature which was `99.2°`, and was suffering from chills (this was a first). We instructed her to take 500mg of Acetaminophen before returning to bed, and to call us if things didn't resolve. The Acetaminophen seemed to clear things up because we didn't hear back from her.

### Day 34 (7AM)

She woke up, took Thyronorm 100mcg, and had her breakfast. She reported feeling better, didn't feel feverish, but was still very fatigued. We watched and waited.

### Day 34 (8:30AM)

She called us. The chills were back, the fever was at `100.2°`, and her pulse was elevated at rest (109 bpm). We instructed her to take another 500mg of

Acetaminophen, and sent her to bed. Her blood sugar was tracking well above 200 as well.

### Day 34 (9:30AM)

Her fever and tachycardia (heart rate over 100bpm) started resolving around 9:30 AM. Her blood sugar was still very elevated. It took another couple of days for her to start feeling better again (even though her vitals, other than blood sugar, normalized on Day 34).

## Post Mortem

Had we been writing this post mortem on Day 34, we'd have attributed this entire sequela incident to COVID. However, we discovered one critical piece of information on Day 35, and that was that our mom had been mistakenly taking the wrong dose of Thyronorm: instead of switching from 50mcg to 100mcg, she'd increased it to 200mcg! A mistake by the pharmacy followed by lack of due diligence on her and our part had resulted in a sudden quadrupling of her synthetic thyroid replacement hormones. It's beyond the scope of this text to delve into the side-effects of sudden changes, but suffice to say, chills, tachycardia, and even elevated blood sugar, are well within the typical symptom profile.

A postmortem is much harder to conduct once this dosing mishap is factored in. Our best guess is that both COVID and the dosing issue were to blame. In any case, the treatment plan was the same: treat symptoms like fever with Acetaminophen, rest, eat and drink well, and watch. And of course, rectify the dosing mistake. This plan slowly but surely put our mom back on her prior promising trajectory.

# Sequela 2

**Date: May 29, 2021 • Days since first symptoms: 42 • Days since negative PCR test: 15 • Symptoms: Elevated temperature during evenings (98.8° peak), intermittent feeling of "feverishness", higher levels of fatigue and brain fog**

## Sequence Of Events

### Day 42 (Daytime)

Our mom took a shower on Day 42, and also played Mahjong online with her friends for a couple of hours.

### Day 42 (Evening)

She called us and told us her temperature was 98.8°. She normally runs around 97.2°, so we consider 98.8° elevated and the beginnings of a low-grade fever. Additionally, she also complained that she was "feeling feverish" which is a good confirming indicator that something was indeed off. She also felt some nausea on this day after a long time, and was also experiencing higher levels of fatigue. We gave her 500mg of Acetaminophen and sent her to bed.

### Day 43(Morning)

Her temperature was 98.1° when she woke up: higher than her 97° morning average. We let her have breakfast, and measured her temperature again which came in at 98.4°. She wasn't feeling great, so we gave her 500mg of Acetaminophen and let her rest.

## Post-Mortem

Over the next day or two, her temperature went between 97.2° and 98.8°—notably, the temperature seemed to be the highest during the evening. Many folks recovering from mild COVID cases like our mom seem to be reporting exertional low-grade fevers in the evening that aren't present during the day. We treated this episode with Acetaminophen and rest. Our Acetaminophen criteria is that we administer 500mg only when one of the following two conditions are true:

1. Her fever crosses 99°
2. She "feels feverish" even if it's in the 98's

Chapter 7

# A Conversation With Our Mom's Doctor

Much of what we've shared in this short guide is a retelling of lots of things happening in parallel: our own research, conversations with family and friends, conversations with her doctor, etc. We think that it's worth sharing the "raw feed" of one of our conversations with her doctor as these dramatically influenced our thought process, anxieties, and of course, the outcomes of her cases.

In hindsight so many things seem obvious, but in real-time you really don't know what you don't know. This conversation highlights the ambiguity of the situation, and we think it would be beneficial to other caregivers or even COVID patients to have this as a reference point as they work through the complicated process of triage for themselves.

## Conversation Around Sequela Incident 1

This is the text message exchange around the first sequela incident our mom suffered. It's worth mentioning that through the entirety of this exchange that lasted over a day, we had not yet determined that our mom had overdosed on Thyronorm. In fact, we still hadn't realized it even after the blood results had come in. We add a note wherever necessary in the message exchange to highlight what we learned later and how reality differed from our perception at the time.

**Us:**

Sorry to bug you but we're going over a bit of a speed bump with my mom again.

She was doing really well the last few days, and the endocrinologist confirmed that the TSH was just acute thyroiditis and adjusted her synthroid. Yesterday mom walked for 5 mins each after breakfast and dinner, and also moved some stuff around in her room to locate some documents. It seems that exertion was too high, because at around 1:00am (her time) she called us with chills and a fever of 99.2°. We had her take a Acetaminophen and then she went back to bed (that resolved the chills). She just woke up, and her chills started back up, and the fever was back at 99°. So I've given her another Acetaminophen, and asked her to rest a bit.

We looked at a bunch of cases online (Indian cases), and it seems like lots of folks are suffering with exertional low grade fever. There's a local doctor who has been posting accounts like this on YouTube and he's seeing such patients testing higher on CRP and

ESR and often having recurring low grade fevers for 3 months. He suggests treating the inflammation using medication.

The other symptom my mom is complaining about during this latest acute episode is pain in her legs (6/10). This one worries me because I thought I'd read there's a correlation between that and blood clots. Recall, mom's D-Dimer was slightly elevated in even the last blood work. But then again, she walked for 10 minutes yesterday, so it could just be soreness.

Honestly we're not sure what to make of this. I assume we keep treating the fever, but should we repeat blood work and the PCR test?

**Doctor:**
Ok, so the acute thyroiditis makes some sense so I'm going to argue that that's what that is for the TSH readings until otherwise proven.

For the low grade fever and lower extremity pain, I agree with you that even if it's exertional in nature, that you need to just be cautious that it's nothing else like a DVT. I'd honestly go back to just putting her on a standing dose of Tylenol, checking pulse at some standard interval (high pulse rate can indicate embolus which is what can happen with DVT), and just maintain that approach for the next 48 or so hours.

I highly doubt it's infectious in nature but re obtaining blood work (if you want you can PCR again but I'm really tilting towards this not being COVID) is a good idea with the coagulation and inflammation metrics (ie D dimer) being foremost on the list of things to check.

I tend to still agree with the analysis that this is exertional - if she can just sort of chill and not move stuff or whatever (ok to walk around but nothing unduly physical) that would be helpful. Normal glucose control stuff obviously doesn't change as we don't want that variable to get out of whack.

**Us:**
Thanks! Really appreciate your messaging at 3am (but also concerned you're up lol).

I'll give you the update below but of course don't feel the need to respond urgently. We've stabilized her for now and I'm back on close watch duty.

After we messaged you, I had her do her pulse, and she's been running at 100-110 all morning. Her blood pressure was low 83/56, but she's on a beta blocker *and* telmisartan 40 mg. Her sp02 is back at 98ish, however. I'm going to wake up at 2:30 PM (her time) to run her through a bunch of checks.

The one thing that changed drastically was that her at synthyroid was doubled yesterday. So she went from 50mcg to 100mcg **(author's note: in fact, she had administered 200mcg at this point by mistake)**, and she's had two doses so far. Her elevated heart rate started after her dose of synthroid today. That said, her pulse was a solid 74-78 through all the samples we took yesterday after she'd had her first dose . Maybe synthyroid takes some time to build up?

The Acetaminophen cleared up her leg pain entirely. Btw, I thought it was below her knees, but she said it felt like someone was really pulling on her "back thigh muscles" (hamstrings, I presume). She said she'd never had that sort of a sensation before.

She's definitely going to be going back to a very sedentary lifestyle for the next few weeks with only gradual escalation of physical exertion. And I've ordered her blood tests. I'll let her decide about the RT-PCR since that's something she was worried about more than us (and maybe seeing a negative will help her psychologically...)

Could there be a couple of things going on? Exertional stuff but also sudden change in synthyroid. So many of the symptoms she's exhibiting seem to map to thyroid issues: chills, fever, sinus tachycardia. She has a history of being sensitive to it (which is why she was on such a low dose), and she also recounted a couple of friends whose systems went haywire during dose changes. I'm almost tempted to drop it down to 75mcg tomorrow for a few days just to give her body a break given the acute issue. The endocrinologist actually said 75mcg once and then later 100 (and my mom had to clarify on the zoom call and he said he meant 100).

**Doctor:**

Yes, so I think that part of this might be that her metabolism has spiked after the addition of synthroid - so you'll get elevated pulse and broad spikes in blood glucose in patients who are diabetic and already have dysregulated glucose metabolism.

What I think should happen is to continue your measures for at least 48 hours (pulse checks, glucose checks, etc), and then likely get another blood draw in the near future.

I really do think most of this is due to post Covid related sequelae (read: not COVID itself), and the fact that synthroid can have some odd short term effects like the ones you're seeing. I'm pretty sure it'll start to calm down in a few days but for me the key aspect is to basically act as if she's still on the floor.

**Us:**
Ok, will do. Thanks! Was just talking to her, and vitals have stabilized well through the day (pulse too). Blood sugar is still in the low 200's, though, but I'm hoping that fades with the acute flare-up dissipating.

I'm going to be up for her synthyroid dose when she wakes up, and I can make a call on just easing back to 75mcg depending on how she's feeling (pulse, blood sugar). In the past the endocrinologist has always gradually changed her dosing but the night he met us he said that every patient of his that day had Covid (8 patients through the day). He was definitely a little worried and perhaps that coupled with her insane numbers (both A1C and TSH), really made him double up instantly. We already know she was doing well on 50mcg (but that didn't suppress her TSH adequately). Just thinking out loud.

I totally forgot to mention this, but the first night she called me with chills and low grade fever was shortly after she ate some mushroom/bean salad. She said that didn't sit well with her, and she was belching non-stop for 20 mins or so. Our initial assumption was that she had a mild case of food poisoning (and that may very well be playing into things too). There are just too many variables in play right now, so like you said, we're just going to scale some things back. I'm thinking back to when she was in the eye of the storm, and I think your encouraging us to delay the endocrinologist appointment was spot on. Trying to disambiguate these symptoms while she was Covid-positive would have been a nightmare.

Anyhow, thanks, again. I'll keep you posted if anything changes 10x or whatever, but I'm optimistic that this calms down (it's already on a promising trajectory). We'll have the blood test results Monday morning (our time).

**Us (next day):**
Not urgent but her blood work is back so I wanted to give you an update. IL-6 is mildly elevated (7.63), D Dimer is mildly elevated (542.9), and CRP is very, very elevated (36.4). In fact, her CRP clocked in at 20x of her average for the previous 4 blood tests (1.67)—I wanted to point that out since you taught us to think about orders of magnitude when it comes to blood marker anomalies. As a curiosity, I added ESR to her blood work and that came back as normal (31).

Her blood glucose began stabilizing today. I dropped her back to 50mcg synthyroid yesterday while I waited for a response from the endocrinologist **(author's note: in fact, we were mistaken and while we thought we'd dropped her to 50mcg, it was in fact 100mcg because each pill was 100mcg instead of the 50mcg she thought it was)**. And her other symptoms have almost completely stabilized. She's energetic again, and other than waves of minor fatigue, she's good. Her fever and aches disappeared shortly after the acute issue a couple of days ago, so I let her miss her morning/afternoon doses of Acetaminophen today. I did however have her take one before bed today because there's so much acute inflammation in the blood work so I figured at least some NSAID would help?

I've charted all her important blood markers (attached) in case that helps you zoom out. It certainly seems like this is Covid sequelae as you suspected, and she's going to have to take it easy for the next few weeks. I was wondering if there's anything we need to do for the acute inflammation or do we just let this play out? We were a little worried about DVT, etc. because of the severe leg pain she had as a part of this incident. Anything we can do to mitigate this turning into long Covid?

—
p.s. still a huge vaccine shortage, but we think we might be able to score her AstraZeneca or Covaxin (likely Covaxin). Think we should plan for that a week or two from now if we can get her a hook-up?

p.p.s. as an aside, we've received a bunch of protocols over the weeks from locals who've been dealing with Covid in their families, and this is roughly what we're seen (it's pretty easy to have someone come over and inject her with a blood-thinner, etc. too):

1. Post-covid inflammation is being treated with one or a combination of the following: Colchicine, Hydroxychloroquine, Mefenamic Acid, Baricitinib, Tocilizumab
2. Clot prevention is being done with one or more of the following: Warfarin, Acitrom, Dabigatran, Rivaroxaban, Apixaban
3. Lots of information being passed around about anti-inflammatory diets (she's kind of already on a bunch of that)

**Doctor:**

So the elevated crp is high but again I'd surmise it was all post COVID right now. At this point you could consider putting her on some kind of anticoagulant but more like aspirin instead of those big guns like warfarin (which needs INR monitored and can lead to internal bleeding if not appropriately watched) or colchicine (which is a really strong med in general).

Frankly, I'd stick with doing something like aspirin 81 (unless she's already on it, in which case just watch) if you get concerned first instead of those really strong meds. Remember a rule of thumb of any medicine - what you're treating sometimes is better than the side effect of the med you're giving. In this case, things like tocilizumab, colchicine, warfarin, apixaban are all super strong meds and whenever patients are on a subset of those, I often have to watch their retinas bleed. Need to have a REALLY good indication to start those and take those risks. As an aside, warfarin I believe was created at the university of Wisconsin and was used initially as rat poison, to give you a sense of the potential side effect profile.

Also if you want an NSAID, remember that Tylenol doesn't exactly qualify - but something like aspirin/ibuprofen/excedrin can and can be taken in conjunction, so consider taking that as a pseudo standing order (so, just give aspirin 81 daily and tylenol the way we discussed for the next 3-4 days). If you are ever concerned about blood clots CLINICALLY (so she starts having difficulty breathing or the leg pains get worse), THEN we move to considering things like warfarin. So you need a SUSTAINED CLINICAL metric (say persistent Lower leg pain, persistent uncontrolled fever, persistent difficulty breathing,

persistent increased pulse rate, or some combination thereof) plus those lab values to move on this and justify risking internal bleeding or a massive anti-inflammatory gun that paradoxically increases the chance of another infection.

But some studies show that low dose aspirin just taken daily can reduce the risk of things like dvt and has the added bonus of helping prevent cardiac issues in diabetics.

I would again follow her clinically and ensure she's not overdoing anything, get ANOTHER blood draw Maybe in 48 hours if possible to confirm that crp rise (or disconfirm it), take pulses and oxygens as usual, and control the sugar.  Don't overreact.

And of course, and not to belabor the point, never forget rule 1: treat the patient clinically, not the lab value, and confirm lab values when they're out of whack.  I'm less concerned about the crp despite it being super high in light of her clinical picture.

Chapter 8

# Finally

An update written on August 12, 2021: approximately 3 months after our mom contracted COVID-19

It's July 29, 2021. As I, our mom's eldest son and the author of this document, write this in the basement of our home in Kirkland, I can hear my wife and mom upstairs talking about the Delta variant picking up steam here in the US. Indeed, my mom is physically with us now, in the flesh and blood (complete with COVID antibodies of questionable efficacy). Since she's not a permanent resident or citizen of the US, the travel ban applied to her. But thanks to the creativity of Sreesanth Pillai, we found her a path in. Three weeks ago, my wife and I travelled to Mexico City to receive her. The three of us quarantined at an AirBnb for two weeks, and flew back together via Salt Lake City just a few days ago.

The journey from her apartment in Pune to being wheeled through Door 1, Terminal 1 at the Aeropuerto Internacional Benito Juárez took approximately 36 hours. She wore a well-fitted, Respokare N95 mask for over 35 hours of that journey. A day before the trip she suffered an exertional post-COVID sequela incident from trying to pack and wind down her apartment all by herself. But she muscled through, and made it.

It feels surreal that I'm writing this the same week CDC is doing a much-needed about-turn on COVID precautions as Delta begins tearing through America. I write surreal because it feels like déjà vu. For the past few months, my wife and I have been living in America but operating in India as my mother's primary caregivers. But even though we're all physically and mentally in America now, all of us feel like we're back in India as we watch our consciousnesses mutate into denial, pragmatism, or terror, depending on our individual proclivities.

When Delta hit India, most of the country hadn't had a single vaccine dose. This variant has yet to pick a fight in as large a petri dish of partially vaccinated immune systems as America. If you have your ear to the ground, or worse, you or a loved one are currently in the throes of COVID-19, then you know that the only certainty one can bet on right now is that the number of known unknowns keeps steadily growing. And this is in spite of scientists and healthcare providers doing their absolute best to stay ahead of the curve. But there is one known known that we do have going for us: getting two doses of most any permutation of any vaccine almost certainly tilts the odds in your favor that you will avoid a serious infection. Yet, against the backdrop of the worldwide vaccine shortage plaguing poorer countries, and the reality that

millions of children and immunocompromised don't even have the choice to protect themselves with vaccines, a disturbingly sizable share of Americans with two, even three doses waiting for them, remain unvaccinated by choice.

So, here we are again: torn between denial, pragmatism, and terror.

## Some Parting Takeaways for My Fellow Americans

Let's look at the upside first: my mom is alive.

We didn't have to say goodbye to her on FaceTime like countless other people. I don't have the words to express what it feels like to prepare for something like that. And I don't have the words to express my gratitude that my family was spared that eventuality. I am aware of that in every cell of my body through every tick of time. I feel a never-ending high right now punctuated by the paradoxical but persistent guilt, anger, and despair of my having gotten so lucky.

But I need to face it, my mom *is* different. She's slower. She's more forgetful. She tires easily. She is worn down. We're always worried we'll give her an exertional fever. And sure, I suppose it is unknowable in the Kantian sense of the word whether COVID mutated my mom or it was merely the work of the passage of time—getting old. Or maybe it's the heavy toll of not having physical human contact for over a year. But you know when you *just know*? That.

Anyhow, I'm not here to debate or convince. I just want to share a handful of things that we've learned in the past month with a little distance from the trauma of acute disease. So here goes:

- My mom was suicidal during the acute phase of the infection. Many of the details are blurry to her because of the kind of fatigue COVID seems to cause, but she can give a pretty detailed and consistent account of the moments where she'd quietly given up. It was my snapping at her, unknowing but intuitively in those very moments, that she credits to pulling her out of that sunken place.

- Juxtapose the above against the fact that her case is classified as "mild", and you really wouldn't wish a mild, symptomatic case of Delta on anyone.

Particularly someone elderly with comorbidities.

- We watched her entire apartment building contract COVID in the span of two weeks. I have entire text message threads from back in April between friends and family as well as the doctor I've referenced all over this document where we hypothesized that Delta was "far more airborne" for a lack of a better mental model. Dr. Angela Rasmussen takes issue with this framing for good reason and provides a more accurate technical explanation (read the whole thread).

- Given how little contact our mom had had with other people prior to contracting COVID, we'd also hypothesized that Delta could likely be contracted in a matter of seconds. This is something that is being confirmed now, and Céline Gounder explains it well here.

- The stories of fully-vaccinated doctors and individuals in India who contracted Delta are easy to find on Twitter and otherwise. The protection that vaccines provide can never be 100% and many people do not understand this.

- The point of mentioning the previous three points is this: as someone who saw a loved one go through the worst with this variant, I absolutely support the belts and suspenders approach we're (unfortunately, slowly) starting to bring back here in the U.S. In other words, for your benefit and that of your beloved community, mask up around people not in your bubble and pay attention and adapt to emerging science.

- Mainstream news and government policy (with a handful of exceptions) has trailed reality since the beginning of the pandemic—in many ways, this is not a bug, but a feature. But Delta is faster, stronger, and harder in many ways, so if you're someone who wants to avoid becoming the statistic that serves as the catalyst for change in public health policy, you are kind of on your own. My mom became that statistic in India.

- Then again, if you take a broader view, you're not exactly alone. There are a tremendous number of incredible thinkers who are agile and have remained

ahead of the curve. I've already linked to several, but here's another if you just want to follow one: Zeynep Tufecki. The discussions on Tufecki's tweets are often as informative as her tweets as well. Another thing we all have going for us: we can learn from what happened in India. In other words, you can inform yourself ahead of time and avoid being caught by surprise.

- I would *not* mess around with cloth, surgical, or double masks. Get yourself an N95 or a KN95 if you can afford it. If you can't, double-mask and dial up other precautions, e.g. social distancing, avoiding indoor maskless hangouts, etc.

- Finally, let's end on some good news. My mom's acute thyroiditis and thyroid markers completely resolved after 3 months. As an added bonus, thanks to COVID and our renewed focus on her diet (and her new desire to get her diabetes in check), we managed to bring her HbA1C down to 7.3 in a span of 6 weeks. For anyone familiar with diabetes, modern medicine would consider this a small miracle. There was a silver lining in this tragedy, after all.

That's about it.

Take care of yourself. Take care of others. Wear a mask. Get vaccinated. This is a marathon, not a sprint. And we only win when everyone learns how to run long distances.

*-Nishant*

Appendix 1

# FAQs

Have a question we haven't covered? Email momhascovid@gmail.com and we'll do our best to answer it (and if applicable, add it to this guide)

## Why did it take 10 days to diagnose our mom with COVID-19?

Three days after a low-grade fever and some nasal congestion, our mom bounced back and was feeling "normal" again for a day. Despite being in complete isolation, she had actually contracted a couple of colds in the past year with similar symptoms. We always watch her illnesses very closely but given no explainable known source of transmission, we felt it was likely just a common virus. Additionally, she had no discernable COVID-19 symptoms until April 26th when she lost her sense of smell (anosmia). That was the first time we felt that despite the lack of an obvious theory for how she could have contracted COVID-19, we should get her an RT-PCR test. Due to the outbreak, it took over a day for the lab to send a technician but by then the fatigue had intensified, some redness had appeared in her left eye, and nausea set in (all consistent COVID-19 symptoms). A day later her test came back positive.

## Why wasn't she vaccinated?

India has been facing vaccine shortages for the better part of the year despite being the second-largest vaccine supplier in the world. So we did have legitimate vaccine supply issues to contend with in India. But the main reason she wasn't vaccinated was out of choice—we couldn't find a foolproof way for our mom to get the vaccine without, paradoxically, putting her at significant risk of contracting COVID-19. We'd received several reports from her friends and family about the protocols being followed by vaccine sites, and concluded that the odds of contracting COVID-19 in the waiting room were pretty high (particularly with Delta). In fact, we are pretty sure that at least one of our family members contracted COVID-19 the waiting room of the clinic where he and his mom got the vaccine.

Our mom did get the first dose of Covishield (AstraZeneca) a few weeks after her infection. Her building owners' organization partnered with a local hospital to organize a vaccine drive in the common, outdoor area of her apartment building. Some incredible volunteers in her apartment building—they were the designated "COVID Warriors" helping the vast number of cases in the apartment building recover—put it together, and managed to vaccinate a little over 400 tenants! Most of it was outdoors, but despite the great management, it was our mom who had to inform the organizers that the waiting room chairs were placed only a couple of feet apart (something they rectified quickly).

## How on earth did she contract COVID-19?

We don't have evidence to present a definitive vector of transmission in mom's case, but here are the known possibilities:

1. **Through a bank employee visit:** A bank employee visited mom to get signatures related to her bank account 5 days before her first symptoms presented themselves. He was masked, she was in an N95 mask (she was using one of these Respokare masks that are considered the gold standard for NIOSH N95 masks). She remained 10 feet from him for a total of maybe 10-15 mins, only getting close for a few seconds to hand off papers. She followed her normal sanitization procedure: wash hands, hand sanitizer, sanitize surfaces, etc.

   After she developed symptoms, we checked with the employee twice over a span of a week if he had COVID: he reported that he didn't. However, he hadn't had a COVID test, so he could very well have been asymptomatic.

2. **Through the "lightwell":** The bathrooms of every apartment in mom's building look onto a lightwell (exhaust fans and ventilators from every apartment push their extracted air into this channel that runs all the way from the ground to the sky). There is one well-publicized report of COVID-19 transmission in an apartment building in Hong Kong that followed exactly this pattern. This would explain infection cases of completely isolated individuals among other things.

3. **Through the water:** Our mom's apartment building had a massive COVID-19 outbreak. Over 60 apartments had a COVID-19 case. A few days before her symptoms presented themselves, the building facilities notified tenants that they'd suffered a "water contamination issue" (several people were sick with diarrhea and other symptoms and that's how the issue got raised). If you haven't lived in India, "water contamination" is a euphemism for "some sewage or pathogen got into your drinking water". Doctors we've spoken to have said that this could be a plausible transmission vector in India (viruses naturally attempt to become as transmissible as possible, after all) even though it's something that isn't very common here in the U.S.

4. **Her upstairs neighbor:** We learned that the apartment above our mom's had 5 residents who were all infected. One of them had been sleeping on the balcony above her own balcony and coughing uncontrollably (neighbors from a tower across from our mom's had been monitoring and complaining about it). While this felt implausible until India's recent outbreak because of what we've known about how

the virus disperses outdoors, we think this isn't out of the realm of possibilities with the Delta variant.

Today we know enough to conclude that it could have very well been any one of the above reasons that led to her infection especially when coupled with the inevitability of human error even among the conscientious.

Appendix 2

# Resources

There is an overwhelming amount of information on COVID-19 online growing at an overwhelming rate. When we started the journey, all we really knew was the seriousness of COVID-19, and the various probabilities for recovery and long-term complications across demographics. We kept up on the news diligently across various media and social media channels, and that informed our family's approach to COVID-19 from the start: isolate, sanitize, protect yourself, protect others. As we've mentioned several times, my mom has been isolating in her apartment since April 2020. Unfortunately, this wasn't enough to spare her from a pandemic supercharged by politics and misinformation.

We will let you go on your own information-gathering journey if you are caring for someone (or yourself), and will refrain from providing an in-depth glossary of all the articles, studies, messages, forum threads, comments on subreddits, etc. we've pored over. We encourage you to be curious, use your common sense, employ the best of your critical thinking skills, try to have an open mind, and try to remain rational as you draw your own conclusions and seek whatever knowledge you might need to help yourself or yours—a tall order, no doubt, but certainly achievable.

Instead, what we will leave you with here is a single resource that we found to rise above all others in answering very specific questions about treating COVID. And that resource is the late Dr. KK Aggarwal's YouTube Channel. His channel has close to 6000 videos, and we've found his FAQs to be some of the most economical and clearest explanations anywhere on the web on treating COVID-19 in the real world. Dr. Aggarwal passed away exactly a month after my mom contracted COVID because he didn't stop seeing patients even through the devastating wave in India—a huge loss of a true legend. We found his videos to be an incredible complement to the guidance of our mom's doctor and our own research.

(Fair warning: many of his videos are in Hindi)

Appendix 3

# RT-PCR Test Results

We ordered three RT-PCR tests for our mom. They were administered by a local lab in her city who sent a lab technician to her home. Our mom and the technician were both masked (with the exception of our mom removing her mask for a minute to allow collection of samples from her nose and mouth), and the tests were administered on her open-air balcony. We provide all the results in this appendix.

# RT-PCR Test 1

This was the first test that confirmed our mom was COVID-19 positive. It was conducted 9 days after onset of first symptoms. It's worth noting that newer science suggests that the Ct score (cycle threshold) can predict severity of infection. The lower the Ct score, the higher the severity of the infection. Our mom's Ct score, according to Indian heuristics, suggested a mild-moderate infection.

**REPORT** Age:70.90 Years Sex:FEMALE | Report Date: 28-04-2021 12:12 AM

**Real Time PCR for CoViD-19 / SARS CoV2 detection**

**(QuantStudio 5 appliedbiosystems Automated RT PCR System)**

| | |
|---|---|
| ICMR Id | **264870906** |
| Kit | **CoviPath COVID-19 RTPCR kit (Thermofisher)** |
| Specimen | **Nasopharyngeal and Oropharyngeal swab** |
| ORF1ab gene | **Detected Ct - 21.207** |
| N gene | **Detected Ct - 21.706** |
| Interpretation | **Assay Positive for CoViD-19 / SARS CoV2** |
| Advisory if any | . |

Comments: 1. Results from RT PCR assay should be interpreted with other laboratory & clinical data.
2. Negative results do not preclude CoVid-19 & should not be used as the sole basis for patient management decisions.
3. Viral nucleic acid may persist in vivo independant of virus viability. Detection of analyte target does not indicate that the viruses are infectious or are the causative agents of symptoms.
4. Presence of E gene only indicates Sarbecovirus/Beta corona virus other than SARS Cov 2
5. This test cannot rule out diseases caused by other bacterial & viral pathogens etc.
6. False negative results may be due to improperly collected, transported, handled specimen, inadequate organisms in the specimen, treatment administered, PCR inhibition etc.
7. The results of this test are from the sample as received.
8. All specimen testing reports are notifiable to ICMR New Delhi & IDSP, Maharashtra state.

References:1. Guidelines for sample collection & handling of Human clinical sample for lab test of CoViD-19 / SARS CoV2.
2. SARS CoV2 CoViD-19 Qualitative PCR kit insert. RNA extraction kit insert.
3. QuantStudio 5 appliedbiosystems user manual.

Note : The patient is advised to follow local, regional, national, & international guidelines for travel, quarantine etc. As per ICMR guidelines D.O.No.VIR/4/2021/ECD-1 Dtd 5 Apr 2021, Samples with Ct values > 35 will be interpreted as negative.

*** A.G Diagnostics Pvt Ltd, Pune is approved by ICMR for COVID 19 testing as per ICMR Reg Id AGDIA001**

*** NABL Certificate No MC-3143 valid upto 05-March-2022**

End of Report

# RT-PCR Test 2

Conducted 15 days after onset of first symptoms. She tested positive (and this aligned with her symptom severity at the time as well as her overall clinical profile).

**REPORT** Age:70.90 Years Sex:FEMALE | Report Date: 04-05-2021 04:38 PM

**Real Time PCR for CoViD-19 / SARS CoV2 detection**

**(QuantStudio 5 appliedbiosystems Automated RT PCR System)**

| | |
|---|---|
| ICMR Id | **275913522** |
| Kit | **CoviPath COVID-19 RTPCR kit (Thermofisher)** |
| Specimen | **Nasopharyngeal and Oropharyngeal swab** |
| ORF1ab gene | **Detected Ct - 21.566** |
| N gene | **Detected Ct - 20.931** |
| Interpretation | **Assay Positive for CoViD-19 / SARS CoV2** |
| Advisory if any | . |

Comments: 1. Results from RT PCR assay should be interpreted with other laboratory & clinical data.

2. Negative results do not preclude CoVid-19 & should not be used as the sole basis for patient management decisions.
3. Viral nucleic acid may persist in vivo independant of virus viability. Detection of analyte target does not indicate that the viruses are infectious or are the causative agents of symptoms.
4. Presence of E gene only indicates Sarbecovirus/Beta corona virus other than SARS Cov 2
5. This test cannot rule out diseases caused by other bacterial & viral pathogens etc.
6. False negative results may be due to improperly collected, transported, handled specimen, inadequate organisms in the specimen, treatment administered, PCR inhibition etc.
7. The results of this test are from the sample as received.
8. All specimen testing reports are notifiable to ICMR New Delhi & IDSP, Maharashtra state.

References:1. Guidelines for sample collection & handling of Human clinical sample for lab test of CoViD-19 / SARS CoV2.

2. SARS CoV2 CoViD-19 Qualitative PCR kit insert. RNA extraction kit insert.
3. QuantStudio 5 appliedbiosystems user manual.

Note : The patient is advised to follow local, regional, national, & international guidelines for travel, quarantine etc. As per ICMR guidelines D.O.No.VIR/4/2021/ECD-1 Dtd 5 Apr 2021, Samples with Ct values > 35 will be interpreted as negative.

*** A.G Diagnostics Pvt Ltd, Pune is approved by ICMR for COVID 19 testing as per ICMR Reg Id AGDIA001**

*** NABL Certificate No MC-3143 valid upto 05-March-2022**

End of Report

# RT-PCR Test 3

Conducted 24 days after onset of first symptoms. She tested negative.

**REPORT** Age:70.90 Years Sex:FEMALE | Report Date: 13-05-2021 04:34 PM

**Real Time PCR for CoViD-19 / SARS CoV2 detection**

**(QuantStudio 5 appliedbiosystems Automated RT PCR System)**

| | |
|---|---|
| ICMR Id | **291403867** |
| Kit | **CoviPath COVID-19 RTPCR kit (Thermofisher)** |
| Specimen | **Nasopharyngeal and Oropharyngeal swab** |
| ORF1ab gene | **Not Detected** |
| N gene | **Not Detected** |
| Interpretation | **Assay Negative for CoViD-19 / SARS CoV2** |
| Advisory if any | . |

Comments: 1. Results from RT PCR assay should be interpreted with other laboratory & clinical data.

2. Negative results do not preclude CoVid-19 & should not be used as the sole basis for patient management decisions.
3. Viral nucleic acid may persist in vivo independant of virus viability. Detection of analyte target does not indicate that the viruses are infectious or are the causative agents of symptoms.
4. Presence of E gene only indicates Sarbecovirus/Beta corona virus other than SARS Cov 2
5. This test cannot rule out diseases caused by other bacterial & viral pathogens etc.
6. False negative results may be due to improperly collected, transported, handled specimen, inadequate organisms in the specimen, treatment administered, PCR inhibition etc.
7. The results of this test are from the sample as received.
8. All specimen testing reports are notifiable to ICMR New Delhi & IDSP, Maharashtra state.

References:1. Guidelines for sample collection & handling of Human clinical sample for lab test of CoViD-19 / SARS CoV2.

2. SARS CoV2 CoViD-19 Qualitative PCR kit insert. RNA extraction kit insert.
3. QuantStudio 5 appliedbiosystems user manual.

Note : The patient is advised to follow local, regional, national, & international guidelines for travel, quarantine etc. As per ICMR guidelines D.O.No.VIR/4/2021/ECD-1 Dtd 5 Apr 2021, Samples with Ct values > 35 will be interpreted as negative.

*** A.G Diagnostics Pvt Ltd, Pune is approved by ICMR for COVID 19 testing as per ICMR Reg Id AGDIA001**

*** NABL Certificate No MC-3143 valid upto 05-March-2022**

End of Report

Appendix 4

# Pulse Oximetry

The pulse oximeter has become a household name, and for good reason because it's one of the most important tools in the treatment of COVID. Pulse oximeters are as affordable as thermometers and shed light on the metric that plays the key role in predicting the severity of a COVID infection: blood oxygen saturation. That said, pulse oximeters can be extremely temperamental, and notoriously inaccurate at times because of poor hardware sensors and calibration.

Our initial experience with pulse oximeters was particularly frustrating, and it took us some time to realize that it had a lot to do with our mom's diabetes. Diabetics frequently have poor blood circulation especially in extremities (i.e. fingers): the arch nemesis of a pulse oximeter. Professional grade oximeters work around this with better sensors and software, but mileage can truly vary with off-the-shelf oximeters. We bought three oximeters, and all of them consistently had trouble getting us reliable readings (coupled with our mom's fatigue, it was incredibly difficult to get readings—some readings took 45 minutes). We provide some tips below on getting good readings if the individual has poor circulation issues.

We eventually gave up and bought our mom an early Mother's Day present: the Apple Watch 6. The Apple Watch 6 has as close to a medical grade pulse oximeter as one can get; not to mention, it provides tons of other features including pulse measurements. We understand that this is hardly an option for most people, but if it's an option for you and you're in India, it's worth noting that we bought ours from a reseller on Amazon.in—it arrived in 2 days (our top priority).

## Some Tips On Getting Good Readings

These tips may be useful to anyone dealing with poor circulation issues. In no particular order:

- The goal is to get a good supply of blood oxygen into the area making contact with the sensor (the fingertip and fingernail). You can try various hand and finger warm-up exercises to increase circulation (search on YouTube to get some ideas).

- You can warm your hands by cupping a warm coffee mug filled with hot water.

- Place your hand below your heart level when you take the measurement. You can even hang it off the couch.

- Take the measurement in a darker environment (like a bathroom). The sensors can be hypersensitive to ambient light which can leak in from the sides if the fit isn't perfect.

- Clip on the oximeter and let it hang off the finger (don't hold onto it with your other hand as that can often cause tiny movements that are noticeable to the sensors and can interrupt the measurement cycle).

- Take the average of multiple readings to normalize the margin of error.