



TRENDS-in-MEDICINE

BULLETIN: UPDATE ON CORONAVIRUS 5/20

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by Lynne Peterson

Be careful, be safe, and be well.

Worldwide cases of Covid-19, the disease caused by the SARS-CoV-2 virus, have nearly reached 5 million (4,995,712), and U.S. cases are more than 1.5 million (1,551,853), which is 31% of the worldwide total. Deaths have reached 328,095 worldwide, and U.S. deaths (93,431) are 28% of the worldwide total.

The worst appears past for European countries, but there are still hot spots in the world:

- **Daily cases** have peaked and come down dramatically in France, Italy, and Spain. While cases are also coming down in the U.K. and Germany, the daily rates are still much higher than in other European countries.
- **Daily deaths** have dropped substantially in France, Italy, and Spain. Though they are coming down in the U.K. and Germany, they are still pretty high.
- **Russia** has moved to the No. 2 spot in the world behind the U.S., with 308,705 cases, but total deaths (and daily deaths) are suspiciously low (2,972).
- **Brazil** is in the No. 3 spot, and the situation there appears to be worsening, not improving. Total cases reached 291,579 and are still climbing. Deaths also are continuing to increase daily.
- **India** (in 11th place) needs to be watched. Cases and deaths are still on a steep increase, and there is the potential for this to become a disaster.
- **China** has a second, so-far small outbreak (cases) in Jilin province (the city of Shulan), which borders Russia and North Korea, but the government is taking swift and rather drastic action, locking down 108 million there. Chinese researchers have suggested that the Jilin virus may be different from the Wuhan virus, with patients taking longer to show symptoms and taking longer to recover (test negative), raising questions about possible mutations.
- The **United States** has the second highest per capita *case* rate among the countries monitored (0.47% vs. 0.49% for Spain), but in Europe only Germany's per capita *fatality* rate (10 per 100,000) is lower than the U.S. (28 per 100,000).

In the U.S., all 50 states have now re-opened their economies, at least to some extent. This report does not include our usual detailed coronavirus numbers for countries and states. Those will be in the next report, along with a review of vaccines and other Covid-19 news.

Up to now, the focus in this pandemic has been on preventing, diagnosing, and treating Covid-19 – on ventilators, testing, and masks. However, as the number of hospitalized coronavirus patients drops in the U.S., shelter-at-home orders are

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being gradually lifted, and the economy is slowly re-opening, two other topics deserve some attention: (1) The outlook for elective surgery procedures, and (2) the long-term consequences (if any) for Covid-19 survivors.

ELECTIVE SURGERY

As many as 40 states are likely to have met the criteria for starting elective procedures by May 20, but exactly when – and how – each will do that will vary. And it may be August 1st before all states can restart elective procedures. Various medical specialties as well as hospitals/hospital systems have been discussing how to go about re-starting elective procedures and the issues involved.

Henry Ford Hospital in Detroit was the first hospital to perform a heart transplant since the onset of the Covid-19 outbreak in the U.S. The recipient was a 68-year-old great-grandmother. Prior to that transplant, on April 25, transplants were theoretically available at Henry Ford, but none happened because of limited hospital bed space. Now, the hospital has created sections dedicated to non-Covid-19 patients.

Among the trends that appear to be developing related to elective surgery:

- **Testing-testing-testing.** Doctors do not want to operate on Covid-19+ patients, so prospective patients will get tested, likely with multiple tests.
- Hospitals/health systems will move away from just-in-time **inventory**.
- There will be an acceleration in procedures moving from hospitals to **ambulatory surgery centers** (ASCs).
- More routine checkups will be done through **telehealth**.
- The **timing** for office hours, procedures, and surgeries are likely to be expanded to include nights and weekends.
- Perhaps more emphasis on **anesthesiology** staffing because that has been a barrier to resuming elective surgery.
- If **blood donations** don't pick up, the blood supply could become a limiting factor.

Unanswered questions include:

- Will **patients be afraid to** come to the hospital?
- How will procedures be impacted by patient **unemployment** and loss of health insurance?
- How to use **testing** not only for patients but also for staff – and how often to test?
- Will **sales reps** still be allowed in operating rooms? Surgeons certainly hope so, seeing it as a necessity in some cases.
- Will infection concerns give a boost to **robotic surgery**?
- Will insurers extend prior authorizations for surgeries that were postponed because of Covid-19, or will they need to be re-approved, which would cause another delay?

According to a study of data from 51 healthcare delivery systems in 40 states, including 228 hospitals, by Strata Decision Technology, from March 22-April 4, 2020 (compared to March 24-April 6 in 2019):

- 55% fewer Americans sought hospital care due to Covid-19.
 - Ophthalmology procedures were down 50%, with cataract visits/surgery off 97%.
 - Cardiology patient encounters were down 57%, with percutaneous coronary interventions down 44% and diagnostic catheterizations down 65%.
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- Sleep apnea visits/procedures were down 91%.

Pent-up demand for elective surgery

Health and Human Services Secretary Alex Azar said that colonoscopies are down 90%, vaccinations are down 60%, and mammograms are down 80%. That means there is likely to be a bolus of testing done as lockdowns lift across the country, and that, in turn, should lead to procedure demand.

Older patients. Two surveys – one by the SCAN Foundation and another by the John A. Hartford Foundation – found that more than half of older Americans, many with chronic conditions, put off medical treatment during the first month of social distancing. And that trend does not appear to have changed in the second or third month of lockdowns.

The SCAN survey found that 1 in 6 adults age >70 delayed or canceled essential medical treatment in March, nearly 40% put off non-essential treatment, and ~33% skipped preventative care. So, there is likely to be demand, even among the elderly when elective surgery is possible again.

Acute care patients. It is not just elective procedures that decreased during the coronavirus pandemic. [Data](#) from Cigna show that from February to March 2020 hospitalizations for *acute care* also decreased, a trend that is likely to continue:

- 35% for atrial fibrillation
- 31% for transient ischemic attacks
- 22% for aortic aneurysm and dissection
- 13% for acute appendicitis
- 11% for acute coronary syndromes

Ambulatory practices

A study by Phreesia and Harvard University, looking at visit volumes for 50,000 providers, found that patient trips to ambulatory practices decreased by 60% in mid-March and remained low through April. The significant decrease in visits is being driven both by providers who want to avoid transmission in their practices and patients who are seeking to avoid exposure.

The report concluded, “The Covid-19 pandemic has dramatically changed how outpatient care is delivered in healthcare practices.” Those changes include:

- Large declines in in-person visits nationwide, with the largest drops in New England and the mid-Atlantic states.
- The biggest drop in in-person patient visits was in specialties like ophthalmology, which saw a 79% drop as of early April. The decline in adult primary care was smaller, offset by telehealth.
- Telemedicine visits increased in tandem with the drop in in-person visits. By April 12, in-person visits were down 67%, and overall visits for care were down 54%. By mid-April 30% of ambulatory practice visits were being delivered via telehealth.

Another [study](#), by Avalere Health, found that a third of physician services are eligible for reimbursement via telehealth, with 191 physician procedure codes eligible to be billed via telehealth as of late April. And the rates under Medicare and Medicaid are the same as for in-person visits during the coronavirus pandemic.

Physicians are taking advantage of the expanded coverage of telehealth. A [survey](#) by Merritt Hawkins found that nearly half of doctors had started using telehealth to treat patients, up from 18% in 2018.

Blood supply and elective surgery

A national survey of regional blood centers in late April 2020 by Premier and Bloodbuy (which uses cloud-based technologies to help in distribution of blood products across the country) found that there has not been a shortage of blood products during the Covid-19 outbreak, even though blood collections have dropped ~75% during the same period.

However, the supply may not be able to keep up with demand as elective surgeries resume. The estimate is that blood supply needs may increase up to 50% as elective procedures and other suspended inpatient/outpatient services resume. The survey found:

- A 50% decrease in blood drives in March, and a 75% decrease in April.
- With elective procedures canceled, hospital blood supply needs decreased 40%-50%.
- Hospitals and blood centers will need to coordinate in four ways to ensure an adequate response to increased blood needs:
 - Coordination between healthcare providers and blood centers on regional plans for elective surgery increases.
 - Promotion and coordination of blood drives.
 - Managing inventory on hand. It may be unsustainable for hospitals to carry more than three days of inventory on their shelves.
 - Hospitals sharing information with blood centers about any changes in transfusion guidelines.

Medical Societies/Groups Speak Out

Some medical societies and groups have organized webinars and virtual conferences to talk about the challenges in re-starting elective surgery – and to share ideas on how best to do this.

The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES)

SAGES hosted a webinar on “Returning to Operations after Covid-19,” with ~900 people tuned in. There was some interesting information on what these surgeons see happening as elective surgeries re-open. Among the points they made:

The new normal. Gretchen Jackson, MD, PhD, vice president/ chief science officer for IBM Watson Health and an associate professor of surgery, pediatrics, and biomedical informatics at the Vanderbilt University Medical Center, said, “How do we get back to normal? I feel pretty strongly we won’t. The world before Covid-19 is gone, and we won’t be going back.” She said crises tend to accelerate changes that are already happening, and she pointed to these changes as likely to accelerate after Covid-19:

- Online shopping, remote work, and remote education.
 - Virtual conferences. “A virtual option will be a part of our future.”
 - Telehealth. “Once patients have had telehealth, they won’t want to give this up...and delivery of care across state lines may be a market differentiator for healthcare institutions.”
 - Increased and faster scientific collaboration on research.
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Time to open, carefully. Mohammad Abu Hilal, MD, PhD, chief of the Department of Surgery at Fondazione Poliambulanza Istituto Ospedaliero Multispecialistico in Brescia (Lombardy), Italy, a hospital that was overrun with Covid-19 patients, said that Covid-19 basically turned everything upside down.

- He predicted, “The beast will come back... While we normalize, we have to be ready for it to come back again, to fight again.”
- “We see some light at the end of the tunnel. Our numbers are coming down... So, for us, it is time to re-open, with a lot of care, but patients with chronic disease, oncologic disease, have the right to be treated, and leaving them a long time is not the right thing to do.”

Not the time to re-open. Andrea Pietrabissa, MD, a surgeon from the University of Pavia, Italy, and president of the European Association for Endoscopic Surgery (EAES), said re-opening shouldn't be rushed:

- “Everyone in the world has the expectation that now that the peak is gone, we are out of trouble... They are wrong because that is not the graph that matters.... There is no peak in ventilator patients. The pressure on many hospitals remains very high and will continue to do so for weeks.
- “For my hospital, the estimated recovery time is the end of June... It is risky to protect your surgical patients today in a Covid-19 hospital.... When is it time to re-open? I don't know, but it is not tomorrow or next week.”
- *Asked how his hospital handles the fear of Covid-19-positive patients transmitting the virus to non-Covid-19 patients,* he said they have an early warning system based on repeated testing, temperature, and oxygen rates.

Which patients? Linda Zhang, MD, a surgeon from Mount Sinai Hospital in New York City, said her hospital still has a substantial number of Covid-19-positive (Covid-19+) patients, and elective surgeries were starting to begin – but not on Covid-19+ patients:

- “We do not operate on Covid-19+ patients... All patients undergoing surgery should have an RT-PCR test [24-48 hours before the scheduled surgery], but that test has a 10%-30% false negative rate... Then, there is a video conference with the provider a week prior... And we ask patients specific symptom questions... And we are working on how to send these patients for a quick CT before surgery.”
- “Serology testing is not good before surgery.”
- Why not operate on Covid-positive patients? Dr. Zhang said the experience in Wuhan showed that 100% of Covid-19+ patients who had surgery developed post-op pneumonia, 33% required a ventilator, and 6% required ECMO (extracorporeal membrane oxygenation), with mortality 20% vs. 1%-2% without surgery.
- “Precautions, even for Covid-negative patients are intense: Operating rooms need to be negative pressure with 12 cycles for full air clearance between cases, deep cleaning after every case, limiting who is in the room during intubations and extubations, decreasing aerosolizing procedures, and keep non-essential people and equipment out of the room.

The industry perspective

- Brian Dunkin, MD, vice president of medical affairs for Boston Scientific and a past president of SAGES, said his company:
 - ✓ Temporarily reduced the work week to 4 days across the board, scaled back research and education grant support – but is continuing fellowship support – reduced expenditures, and “ruthlessly” prioritized research and development.
 - ✓ “For the most part” has not had supply chain interruptions.
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- ✓ People coming back to work will have temperature checks, thermal scans, social distancing.
- ✓ He emphasized that “testing is the most misunderstood aspect of this pandemic...From our take, at best RT-PCR is 70% sensitive...That means 3 of 10 negatives will be positive...So, we can’t make decisions about individual employee suitability to be on our priority based on that...If the prevalence [of Covid-19] in your community is <10, then it is unlikely for our campus that an immunity certificate or immunological testing will be useful...We will set our own standards.”
- ✓ “We fully expect there will be additional waves of this pandemic.”
- Chad Evans, a technology consultant at Stryker Endoscopy, said:
 - ✓ “One of the challenges for all industry partners is there are a lot of organizations and societies coming out with various protocols... We will be hoping to find the common best practices.”
 - ✓ “All representatives will be required to have a test every two weeks – at a cost of \$120/week each.”
 - ✓ “We already sent out a lot of N95 masks.”
 - ✓ “Physical product experts will still be needed in the OR.”

Restoring hospital operations during the transition. Steven Schwaizberg, MD, chairman of the department of surgery at the University at Buffalo (New York) and a past president of SAGES, said the impact has been severe on his hospital:

- “We shuttered 18 operating rooms across four hospitals...Our volume went down to 10%...Any case not immediately life-threatening required [special] approval...Our hospital was not over-run [with Covid-19 cases]... We only opened one of 11 planned ICUs... We had empty beds in our hospitals, and we still had the ICU capacity...Our hospital has been financially hemorrhaging.
 - “We may never operate again in New York City if the governor has his way...In the meantime, all the cases we put on the sideline, those diseases are percolating.
 - “We will not trach a Covid-positive patient. The risk in the OR and to the nurses is too great. These are not closed circuits. There is a lot of leakage. They become dislodged. We consider a trach in a Covid-positive patient to be unsafe.”
 - He explained that the plan is for:
 - ✓ Phase I to be elective procedures, including urgent surgeries where not operating in the next few weeks would cause irreparable harm.
 - ✓ Phase II to include bariatric surgery, asymptomatic hernias, etc.
 - “We need to get the message to patients that hospitals have never been cleaner and are safe.
 - “We are really strict on RT-PCR testing. Everyone is using a different test...Our test takes 8 hours and many times has to be redone internally. If the test results are not back, we cancel.
 - “We [surgeons] make the schedule...We are controlling the schedule. The message is not business as usual...and the list of what we are not doing is longer than what we are doing...If there is a second wave, we can shut this down in 24 hours or less.
 - “We plan to open our ambulatory surgery centers because they may be safer for priority cases.”
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Other issues

Asked about **operating on Covid-19+ patients with a life-threatening condition that needs surgery**, Dr. Zhang said, “That is something we struggle with here in New York City all the time...When doing elective surgery, the goal is not to operate on Covid-positive patients...If a Covid-positive patient has a surgical emergency, you have to weigh the risk:benefit. If there is a life-threatening [colonic] obstruction, you have to operate...but you have to talk to the patient’s family about the chances of a bad outcome because of their Covid-19 status...Maybe there is another way where they don’t have to get general anesthesia...being a little more creative and not doing what is generally considered standard of care in those situations.”

Asked if there should be **non-Covid-19 hospitals and Covid-19 hospitals**:

- Dr. Schwaitzberg said, “In some places, they can practically do a heart transplant in an ASC...It is really state by state...but we are pushing to re-open ASCs...We could have a Covid-19-positive hospital, but anyone can be Covid-19+, so there really is no such thing as a Covid-19-negative hospital.”
- Dr. Pietrabissa added, “It would be ideal to have Covid-19-free and Covid-19+ hospitals, but that is not feasible where one hospital serves a large community. An alternate solution is to have a Covid-19-free path within a hospital for patients who test negative and have no symptoms, and Covid-19+ areas. That is what we are lining up in our hospital.”
- Dr. Abu Hilal said, “That could be a strategy for the second wave, where a big hospital handles Covid-19-positive patients, and smaller hospitals are non-Covid-19...but it is not easy to convince hospitals to become Covid-19-positive unless they are owned by the same entity.”

Hospital **union rules** can also impact operations. Dr. Schwaitzberg said that masks – not a lack of supply but union sterilization requirements that go above and beyond FDA requirements – have had an impact, “The reprocessing of N95 masks has been a game-changer for us...But that created some new issues. We were very unionized...N95s are sterile, and each can be sterilized 20 times. But we can’t do that because...the nursing union said they didn’t want a reprocessed mask from someone else...So, nurses write their name and department on their masks, and they get their mask back 5 times [that is, it can only be re-sterilized 5 times].”

The International Symposium on Endovascular Therapy (ISET)

ISET hosted a webinar on re-opening endovascular procedures.

How were endovascular practices affected by the virus?

- Sonya Noor, MD, a vascular surgeon from Buffalo NY, said her group pulled out of the hospital and moved to an outpatient center when elective surgeries were stopped at her hospital. Importantly, her group offered to partner with the hospital on emergency care, by offering to do labs, screening patients to lower the traffic in the hospital’s emergency room, “That has been an unbelievable outlet for us. It makes us feel more normal...We adopted telemedicine very early, but keeping our lab open and alternating staff...The hospital became like a graveyard...People weren’t showing up...To go from as busy as we all are, to have like a tap shut off, is unbelievable...I don’t know what we would have done if we didn’t have some telehealth or angiograms.”
- Bret Wiechmann, MD, an interventional radiologist from Gainesville FL, said his city avoided a big coronavirus wave, “We temporarily closed a couple of our sites...We rotated closures...The first week of the lockdown we had 3 CLI [chronic limb ischemia] patients that I felt I couldn’t wait to treat.”
- William Gray, MD, an interventional cardiologist from Main Line Health in Philadelphia, said, “Our cardiology department is four hospitals and 90 cardiologists, half in private practice. We were able to get support money from the federal government that kept them whole and the staff whole, so they didn’t suffer too badly...We did re-deploy most of

the staff into non-cardiovascular roles. Cardiologists did not have to go to the emergency department or the ICU, but many others did.”

- Alex Powell, MD, an interventional radiologist from Miami Cardiac & Vascular Institute, said, “We canceled vacations and split into two non-overlapping teams in case one or many of us got infected, except we come into the office for telehealth...Our case volume...was a little different...There was an immediate blood shortage, and that changed a lot of attitudes toward open surgery...But we maintained a fairly decent outpatient practice because of a lot of cancer patients...Our interpretation was we could do anything life- or organ-sparing that involved a low potential for blood...Claudications went to zero, but we were still fairly busy.”
- Richard Neville, MD, a vascular surgeon from Inova Heart and Vascular Institute, said, “We had a huge financial impact. We had to furlough 400 non-clinical employees.”

How is endovascular surgery recovering? With testing-testing-testing everyone agreed.

- Barry Katzen, MD, chief medical executive for Miami Cardiac & Vascular Institute, said, “Recovery will be to a new normal that no one can define.”
- Dr. Neville: “Our logjam right now is our post-operative beds because [Covid-19] patients coming out of ECMO and ICU are filling up beds...They are using 350 of the 900 beds in the hospital...So, capacity will be an issue.”
- Carol Melvin, chief operating officer for Miami Cardiac & Vascular Institute, said the initial focus will be on patients who can have a procedure and leave the same day.
- Dr. Gray predicted: “I don’t think we will get back more than two-thirds of patients, and we may have to consider [working] nights and weekends.”
- Benjamin Starnes, MD, a vascular surgeon from the University of Washington: “We have 250 cases that are backlogged, and we’re going to have to catch up eventually, and that’s going to require working after hours, working on weekends, extending our time into the late hours, and just trying to get the cases done. I have 20 aneurysm patients that I put on hold, one of which ruptured and died during the interim...Emergency is something that can’t wait more than 90 days, which is what our governor has instituted, without significant risk to life or limb.”

What kind of volume do they expect in six months?

- James Benenati, MD, an interventional radiologist from Miami Cardiac & Vascular Institute: “I think we all thought it would be all systems go when we came back...We will probably never quite get back this year to quite where we were.”
 - Dr. Gray: “Clinical and non-invasive procedures will struggle to get back to volume, but...we can operate in a little bit of a bubble...I believe we can get back up to speed in a couple of months.”
 - Dr. Noor: “We’re starting to plan for the resurgence, and that will include trying to handle what we perceive to be a pent up demand...Reinstituting studies in our vascular laboratory system, but then also dealing with capacity issues across the system...One of the positive things that may come out of all this in our system is a move towards telemedicine, which we were very slow to embrace, and now we’re rapidly embracing it. We’re doing 80% of our clinic visits by telemedicine now. And then, we are also looking across the system...to really take advantage of capacity and areas in each of the hospitals, and not just focus on any one individual hospital, so we’re trying to increase capacity for the demand, and then trying to address the future needs if a resurgence occurs.”
 - “Now that we’re kind of re-opening elective procedures, there will be an initial bump of cases, perhaps...People talked about V-shaped curves and U-shaped curves, but I think this is going to be a longer curve to ramp back up than most people anticipate. Whether it will ever get back to the kind of ‘normal’ state remains to be seen.”
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Asked if he would feel comfortable putting in a port or doing anything else on a patient who had not been tested for the coronavirus, Dr. Powell said, “At this point, probably no... We don’t have the capacity to wear an N95 or greater mask for every patient. And right now, just to give our experience... [In the first week and a half] we had two outpatients test positive... When you talk to [those patients] further, they definitely had risk factors... But we’re definitely seeing asymptomatic patients come in from the community. And this is one of our fears. And one of the big unknowns of ours is putting a port in. Could I do it, even on a Covid+ patient and be safe? I think the answer is we don’t know at this point. And given our experience with testing, my answer is that we’re going to continue to test everybody. I admit it’s nice that we have the capacity to do so, and we’re going to continue that.”

How are hospitals separating Covid-19+ patients and non-Covid patients?

- Dr. Neville said his hospital is using separate doors – and separate floors – for positive and negative patients.
- Ms. Melvin said they have set up barriers in waiting rooms, so there is staggered seating, and they’re limiting the number of patients per day in order to make patients feel safe.
- “I don’t think that we’ll get more than two-thirds or three-quarters of our pre-Covid activity back in place on a daily basis, which means that, assuming patients do feel comfortable coming back, and that we start to see an increase in activity to something that looks like a pre-Covid demand, we’re going to have to start thinking about extending days or moving into weekends.”
- Despite physical space limitations, “you have to stagger [patients]. You have to spread out the visits a little bit longer in between, so you don’t have people waiting in the waiting area.”

The Society of Interventional Radiology (SIR) and the Society of Interventional Oncology (SIO)

SIR and SIO held a joint webinar on what Covid-19 has meant for interventional radiology and oncology procedures. These doctors reported much the same issues as the ISET doctors:

- Testing-testing-testing.
- Anesthesiology is a bottleneck.
- Interventional oncology was less affected than some specialties.
- Telehealth is catching on with doctors as well as patients.
- Patients are reluctant to come in even for imaging studies.

How has the coronavirus affected their practices/hospitals?

- Kari Nelson, MD, an interventional radiologist from the University of California Irvine:
 - ✓ “We have not been as hard hit as some other parts of the country. Our overall volume is lower... The hardest part for us is it has been a moving target... With the surge, we had anesthesia resources significantly reduced... We were down to 1-2 teams a day instead of 3-4, and that has been an ongoing challenge... Most of the patients we are doing are oncology... Our patients are significantly limited.”
 - ✓ Dr. Nelson said her hospital set up committees by specialty, with an internal interventional radiology review of cases: “The intent was not just to put a roadblock in the way of cases, but to make sure you actually review the case and see if it can be postponed... We have never had any real conflicts... Procedures got on the schedule and procedures were done.”

- Ryan Hickey, MD, an interventional radiologist from NYU Langone Health:
 - ✓ “There was a government mandate that no elective procedures could be done, initially for the OR but then for interventional radiology as well. So, we reduced our staff to a cohort staffing model to try to minimize the number in the hospital at any time.
 - ✓ “From an interventional radiology standpoint, we actually ended up creating a bedside procedure service...to help intensivists who were dealing with a deluge of patients, helping with dialysis access, central access, and helping physicians who were not used to doing procedures.
 - ✓ “We benefit from having a separate outpatient facility adjacent to the hospital, so we could do all the port biopsies, radioembolization, etc., there.
 - ✓ “We have a policy that any patient coming into the hospital for a procedure requires Covid-19 testing beforehand.”
 - Robert Lewandowski, MD, an interventional radiologist from Northwestern Medicine:
 - ✓ “Oncology has been deemed time-sensitive, so we are still doing those procedures...We reduced our angiogram suites, but we didn’t change the volume until April – and then because of issues with anesthesia support for ablations.
 - ✓ “We do a lot of radiofrequency ablations, and we went to a same day approach for patients where we can...We really changed our approach.
 - ✓ “Our consultation service increased telemedicine and remote consults.”
 - Kamran Ahrar, MD, an interventional radiologist from MD Anderson Cancer Center, said his hospital is 90%-95% interventional oncology, but elective, non-emergency surgeries were stopped.
 - ✓ “We debated about what is really urgent in cancer...Cancer cannot wait...and the president of the hospital said we have to treat patients – give chemotherapy and put in ports. Interventional oncology was left to the discretion of our facility, in consultation with the referring physician.
 - ✓ “The things we stopped were renal ablations. Those probably can wait...Bone mets [metastases] we do, based on symptoms and necessity...The government has eased up on elective procedures – if they can be done without significant hospital capacity or PPE [personal protective equipment] issues.”
 - Matthew Callstrom, MD, PhD, chair of radiology at the Mayo Clinic:
 - ✓ “We really weren’t prepared when [the coronavirus] hit our shores...We started by reducing the timeline for care...Initially, that didn’t change any part of our practice...Then a couple of Covid-19+ patients came through, and a couple hundred staff were quarantined and 50 of our radiology staff were quarantined for exposure...So, we reacted too far...and almost shut down...[Mayo] typically sees 5,000 patients a day, and that was reduced down to 500/day – really only emergency patients.
 - ✓ “Radiation stayed pretty much open.
 - ✓ “We instituted platoons like Singapore did...That was effective. We also put pods together, so teams worked in small groups. Most important, we pushed through PPE training.
 - ✓ “We dropped to about 10% of our normal volume...but the interventional oncology practice operated essentially as normal...We stopped doing ablations and catheter-directed work...and were only doing emergency work...That was relaxed after 1.5 weeks, and we restarted those.
 - ✓ “Part of what we did was partner with anesthesiology.”
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What has been the biggest challenge so far?

- Dr. Hickey: “We were limited in terms of **anesthesiologists**... We are waiting for anesthesia to ramp back up for some procedures.”
- Dr. Callstrom said:
 - ✓ **False negatives** on Covid-19 tests have created some issues: “We find the screening questions of limited value... If patients are motivated, they can get past a cough or take ibuprofen to get past fever... We were trying to protect our surgical practice with aggressive testing... We did a three-step test – RT-PCR five days before surgery, then again two days before... Then CT... Our PCR test is 70%-80% sensitive, so there are false negatives. Once a patient is admitted to the hospital, we test, and again after surgery. It turned out the CT... was not very good at picking up asymptomatic patients, so we dropped that and went to a single-step PCR. But we had one patient PCR-negative on Day 5, and then positive, and we lost 10 members of our staff to quarantine.
 - ✓ “We are adding **antibody testing** to all patients who get a PCR test... We are assuming antibody positive individuals are safer patients, and they will be positioned as low-risk exposure in our practice.
 - ✓ “Though we have a lot of testing, we **can’t test everyone**... So, we are using stewardship to manage testing... We will limit testing to anesthesia cases, anything aerosol-generating, and when a patient can’t wear a mask... The rest of the patients will be universally masked, and so will staff... We will manage patients coming through as if they are Covid-possible and restricting Covid-positive patients to a single hospital.
 - ✓ “We are trying pretty hard to re-open the practice... It is challenging... We started with delayed and more urgent cases... Expanding this is a little bit intimidating... We hope to be at 4,000 patients/day by the beginning of June... Our surgical practice was at **50% of volume** a week after opening.”
- Dr. Ahrar: “We tested 500 *asymptomatic* patients pre-operatively, and zero were positive. Of all the *symptomatic* patients tested, only 5% have tested positive, so there is **no value in testing every single asymptomatic patient**. At least at our hospital, we are not routinely testing asymptomatic patients... It depends on the screening questionnaire and the travel and exposure history.”
- Dr. Hickey: “It is remarkable how many are diagnosed with Covid-19 **incidentally**. Patients come in for an auto accident, and ground glass is seen on CT. These are people sitting in the ER without a mask. That is one reason our hospital implemented testing for any patient coming for any procedure.”
- SIO president William Rilling, MD, a radiologist from the Medical College of Wisconsin, said: “We will test all pre-operative patients... We shut down as hard as the Mayo Clinic... We still have a PPE shortage... Managing that is a huge challenge. That will be pretty challenging... We got a huge shipment of KN95 masks from China, but we tested them, and they were not up to specifications, and we had to throw them away... We are told we will have a **PPE shortage for a year or more**.”
- Dr. Lewandowski: “We have a backlog of thyroid biopsies and drain checks... but I don’t know when we will get to cases that require **anesthesia**... At first, it will potentially be outpatient heavy... and we will still be dealing with Covid-19+ patients... One of the challenges will be convincing outpatients that it is safe to come to the hospital for procedures.”
- Dr. Callstrom said: “**Travel** is also a real issue. We have people dying at home because they feared leaving home... We are working with our public relations group to make sure people understand it is safe to come out.”

How are ablations being handled?

- Dr. Callstrom: “We had a 6-week backlog... Small renal masses are **on hold**. We are treating others... We could wait a year before starting renal ablations again... Patients understand it is not critical. Anything >3 cm we are treating.”
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- Dr. Lewandowski: “In the hepatocellular cancer (HCC) world, we are used to **waiting** on those patients...If it is 1.5 cm, we wait until it is 2.0 cm...Small HCC we are pretty comfortable sitting on...It is a little more challenging in metastatic patients.”
- Dr. Ahrar: “We didn’t stop doing ablations...but they can **wait** a month or two. Initially, we postponed them...and I hope we don’t have to postpone them again.”

Will patients be willing to come back for imaging studies?

- Dr. Callstrom: “When we started back, about 30% of patients didn’t want to come in. Seventy percent were willing to travel, but **30% deferred** care...One of the big things we’ve seen is clinicians becoming enthralled with telehealth.”
- Dr. Rilling: “There is a lot of imaging that has been **deferred**...We are trying to get patients to go to outpatient imaging instead of our main campus.”

Orthopedics

According to the Strata Decision Technology comparison of March 22-April 4, 2020 vs. March 24-April 6, 2019:

- Overall orthopedic procedures – down 43%
- Hospital spine procedures – down 45%
- Primary knee replacement – down 99%, with total knees off 68%
- Primary hip replacements – down 79%, with total hips down 52%
- Lumbar/thoracic spinal fusion – down 81%

Joseph Bosco, MD, president of the American Academy of Orthopaedic Surgeons (AAOS) and an orthopedic surgeon at NYU Langone, pointed out in an interview with *Becker’s SpineReview*, that shelter-in-place orders have reduced orthopedic injuries, “For those of us in sports medicine and trauma, a lot of what we do is taking care of people injured during activities. There’s no high school, college, or professional sports and no adult recreation leagues, so there’s not too many people in need of our services at the moment.”

Dr. Bosco said a study of ~200 of the NYU Langone joint replacement patients scheduled for surgery – but whose surgery was canceled due to Covid-19 – found that about one-third wanted their surgery as soon as possible, another third wanted surgery in 3-6 months, and the last third were undecided...I think a lot of people are still undecided about when they’re going to have surgery. Patients are justifiably skittish.”

He said his hospital is starting to address the backlog of surgical patients. In a recent 6-week period, 1,200 scheduled surgeries were canceled, and those need to be addressed.

Some of the issues that need to be addressed in order for orthopedic surgery to increase:

- There needs to be access to physical therapy because that is a key part of many if not most orthopedic surgeries.
 - Incorporating telehealth may be a little more difficult than for some other medical specialties, but holographic imaging could change that if it catches on.
 - As with other specialties, office distancing and testing protocols need to be established.
 - Significantly more procedures will likely need to be done at ambulatory surgery centers. *What will that mean for robotics?*
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- One surgeon suggested there might be fewer frivolous lawsuits because of gratitude to healthcare providers for their work during Covid-19. *Patients might be grateful, but personal injury attorneys are not likely to cut them any slack.*
- There appears to be agreement that surgical volumes will not return to normal any time soon, and probably not until there is a SARS-CoV-2 vaccine.

THE COVID-19 PATIENTS

When Covid-19 patients are discussed, it is generally just in terms of survivors vs. fatalities, but with >1.5 million Americans diagnosed as Covid-19 positive – and likely many, many more asymptotically infected and recovered – the question is whether there will be long-term sequelae from the virus in patients who recover. There actually have been very few reports on the long-term consequences of the virus, but it is looking more and more likely that the virus is creating conditions that may haunt some patients (and just how many is unknown) for years if not a lifetime.

If the first SARS is an indication, some Covid-19 patients may face long-term issues. A 2017 study of SARS patients found that survivors suffered from a range of health issues – including lung infections, high cholesterol, and a lowered immune system – that lasted for many years. The authors of the study wrote, “The recovered SARS patients had a poor quality of life 12 years following recovery and were susceptible to inflammation, tumors, and glucose and lipid metabolic disorders.”

U.K. Prime Minister Boris Johnson’s doctor reportedly called Covid-19 “this generation’s polio.”

To understand the possible longer-term or permanent effects of Covid-19, it is important to look at all of the bodily systems – digestive, heart, kidney, lung, neurologic – that can be affected. Because the focus so far has been on transmission, diagnosis, and treatment, there are mostly unanswered questions about long-term effects on each of these.

Lungs. The manifestation of Covid-19 that gets the most attention is the lung inflammation. The ground glass appearance on x-ray or CT scan is a definitive sign. Patients often develop pneumonia and acute respiratory distress syndrome, which is why so many need a ventilator. That lung damage is mostly, but not necessarily completely, reversible. Breathing issues can haunt Covid-19 patients for weeks and months, but most eventually breathe easily again at some point.

The first warning about possible long-term lung sequelae came from Ralph Baric, PhD, an epidemiologist from the University of North Carolina Chapel Hill, who, speaking at the virtual meeting of the Conference on Retroviruses and Opportunistic Infections (CROI) in early March 2020, warned that Covid-19 survivors are *likely* to get pulmonary fibrosis. Pulmonary fibrosis is a lung disease which, on its own, has a high mortality rate, killing ~75,000 Americans each year.

After recovery, experts recommend that patients with any cardiac symptoms during Covid-19 should have a follow-up examination with a cardiologist to see if there is any continuing heart damage.

Blood clots. The risk of blood clots is 3- to 6-fold higher for Covid-19 patients vs. general patients, and a clot is often the cause of a Covid-19 patient’s death. An expert who studies clotting disorders said that Covid-19 is one of the most clot-causing diseases he’s ever seen. Of course, patients with underlying thromboembolic issues are more at risk, but clots occur in patients with no underlying risk factors. Thus, Covid-19 patients are often started on blood thinners to prevent clots.

The clots can affect the peripheral arteries, the lungs (pulmonary embolism), the heart, and the brain (stroke). In fact, strokes are not uncommon in Covid-19 patients, including patients age <50, and this is one side-effect of the virus that definitely can (and often does) have long-term effects.

Cancer. There is no evidence that the coronavirus causes cancer, but the prevalence of cancer among Covid-19 patients may be higher than previously thought, as much as 3%, suggesting cancer is a risk factor for contracting Covid-19.

Cardiovascular. It is now clear that the coronavirus can affect the heart. It can cause heart failure, myocarditis, stress cardiomyopathy, and arrhythmia. After recovery, experts recommend that patients with any cardiac symptoms during Covid-19 should have a follow-up examine with a cardiologist to see if there is any continuing heart damage.

Digestive. Nausea, vomiting, and diarrhea can be symptoms of Covid-19, and studies suggest that up to half of Covid-19 patients experience GI issues. A study, published in *Science Immunology*, found that the intestine is a potential site of viral replication. So, no, the virus is not restricted to the airways as experts initially insisted.

There also can be longer-lasting effects. An imaging study, published in *Radiology*, found bowel abnormalities in hospitalized Covid-19 patients. Many of these were severe and linked with blood clots and impairment of blood flow, with areas of bowel ischemia.

There is lots of information on the digestive symptoms and effects of Covid-19, but there is almost nothing on how those symptoms resolve and any long-term impact of those digestive effects. Thus, the question is whether the gut inflammation from Covid-19 will lead to long-term digestive problems.

Neurologic. The virus can affect the brain, causing seizures, hallucinations, loss of smell and/or taste, and cognitive deficits. A Chinese study published in *JAMA Neurology*, found that 36% of 214 patients in Wuhan, China, had neurologic symptoms during their Covid-19 infection. Another study found a higher-than-usual incidence of Guillain-Barre syndrome in Covid-19 patients, an affliction that can lead to temporary paralysis, plus instances of confusion and severe agitation. It is unclear whether any of these or other neurological effects are long-lasting.

Kidney failure. According to one report, up to 40% of Covid-19 patients in the ICU suffer from kidney failure, requiring emergency dialysis. The question is whether these patients, if they recover, will have permanent kidney function reduction, even if they don't require permanent dialysis.

Pediatric multi-system inflammatory syndrome (PMIS). More than 100 children in the U.S. have developed this rare but very serious condition as a side effect of Covid-19, and at least 3 have died. Most of these children were in New York, but cases have also been reported in at least 14 other states. Instead of the respiratory symptoms generally seen in adults with Covid-19, the children are presenting with a high-spiking fever, rash, eye redness, unusual lethargy (asthenia), digestive issues (severe abdominal pain, vomiting, disarray), swollen lymph nodes (adenopathy), and/or circulatory problems. The syndrome appears similar to Kawasaki disease, a rare childhood illness that can lead to inflammation of the blood vessels, particularly the coronary arteries.

A 35-patient European study concluded that myocardial involvement with acute heart failure is likely due to myocardial stunning or edema rather than to inflammatory myocardial damage. That study also found that, even in patients who present with severe symptoms requiring circulatory and respiratory mechanical assistance, most have a rapid recovery with the use of immune globulin and steroids.

Likewise, research published in *Circulation* found that PMIS children are generally responding to treatment, generally immune globulin and steroids. Yet the question remains: Will these children have long-term consequences, particularly cardiac consequences?

Reproductive. Initially, it was thought that the virus wasn't a risk for a fetus, but data are building that suggest that Covid-19 is associated with a higher rate of Caesarean sections and pre-term births. In one study, 63 of 247 babies born to Covid-19-positive women were preterm. And a Swedish study found that 91% of babies born to Covid-19-positive women were delivered by caesarean section, though it is not clear whether that was choice or necessity.

Chinese data on 9 pregnant women with Covid-19 didn't show any transmission of the virus to the fetus, but, again, new data suggest that, in some but not most cases, the virus can cross the placenta to the fetus. There was a report in the *Journal of the American Medical Association* of a Covid-19+ woman who miscarried in her second trimester and whose placenta tested positive for the virus and showed signs of inflammation. And Covid-19+ mothers can pass the virus to their newborn, even immediately after birth.

The good news is that SARS-CoV-2 does not appear to be as dangerous in pregnancy as SARS. About 25% of pregnant women who got SARS died.

Unlike Zika, there do not appear to be any long-term issues in the babies born to Covid-19-positive women, but it could be too early to know that for sure.

For men, though, as we've previously reported, a study in India suggests that the testes may be able to harbor the coronavirus. This raises questions about (1) possible sexual transmission through seminal fluid and (2) the efficacy of any vaccine. *Will the virus cause any long-term effect on men as a result?*

Vision. Conjunctivitis is often an early sign of coronavirus infection, but it can also occur later, during hospitalization in more severely affected patients. The virus also can cause ocular complications such as conjunctive hyperemia, chemosis, epiphor, or increased secretions. And Italian researchers have reported finding the virus present in eye fluids. *Will there be any long-term effects on vision, the risk of an eye disease?*

The bottom line: Covid-19 infections may be creating long-term health problems that, so far, are being ignored in the press of dealing with treatment of pandemic patients.

