AirWaves

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Big Sky – Small World!

On September 8, 2019, West Michigan Air Care (WMAC) received a flight request originating from Ascension Borgess Health (ABH) in Kalamazoo for a patient transport to Spectrum Health Butterworth in Grand Rapids. Upon arrival in the Cardiac Intensive Care Unit (CICU) the duty crew, consisting of Communication Specialist, Craig Nixon, Flight Nurses Sara Sturgeon and Darby Brauning, and Pilot Brian Vanderberg, made contact with the sending facility staff. As the medical crew was obtaining report from Dr. Richard Lovy on 56 year old Ken Fouts, an immediate personal connection was made between two of Ken's family members, who were among several people gathered outside of the room, and Brian. Ken's sister in law, Joan (his wife, Jan's, sister) and her husband John, greeted Brian after recognizing him as their former neighbor.

Mr. Fouts initial complaint, that began the cascade of necessitating critical care air medical transport, was shortness of breath that he noticed on September 6th. Ken had always been healthy and active as a runner and avid cyclist. His previous medical history included viral pericarditis, cardiomyopathy, and hypertension. Despite his bout with pericarditis, Ken enjoyed being active and was out for an anticipated three mile run on September 7th when he realized his difficulty in breathing had become more debilitating. After resting once he'd arrived home Ken realized his symptoms were not improving and he took himself to a local urgent care.

Upon arrival at the urgent care, Ken was given steroids and a nebulizer treatment, and sent to ABH Emergency Department (ED) where he was admitted after he was found to be hypoxic and required supplemental oxygen. A chest computed tomography angiography (CTA) was completed. This test was performed as a way to rule out a pulmonary embolism (PE), which was confirmed as negative for a PE, but he was diagnosed with right upper and lower lobe loculated pleural effusions and multi-lobular pneumonia. Ken was placed on bi-level positive airway pressure (BiPap) at that time which aided in maintaining his oxygen saturations in the mid 90% range. He was admitted to the CICU where treatments included antibiotic therapy, removal of over 100 ml of fluid via thoracentesis, and chest tube placement in interventional radiology under fluoroscopy. During this procedure, tissue plasminogen activator (tPA) was instilled to attempt to deloculate the area. After the procedure, Ken's respiratory status continued to deteriorate to the point of requiring endotracheal intubation. The goal was to improve his oxygenation and ventilation status, and take away the work of breathing that was taxing Ken's heart and lungs.

Sara Sturgeon, Darby Brauning, Ken Fouts, and Brian Vanderberg

When WMAC arrived at ABH and took over Ken's care, he was sedated and chemically paralyzed while on the ventilator with 100% fractured of inspired oxygen (Fi02) and pulse ox readings of 84-86%. After some adjustment to Ken's ventilator settings including increasing his positive end-expiratory pressure (PEEP), and a change in position to maximize lung aeration, Ken's oxygen levels were again up to the mid 90's. His lung sounds were coarse throughout all lung fields. His chest tube that was attached to a chest tube drainage system was maintained on water seal during the transport. Pain and sedation medications were continued, along with ventilator support, and the transport was completed to Spectrum.

Shortly after arrival to Spectrum, Ken was placed on extracorporeal membrane oxygenation (ECMO) therapy as a bridge to support his oxygenation needs during his treatment. It was determined during this time that Ken had a ruptured mitral valve and he underwent surgery to repair his condition. Ken does not remember anything until he "woke up in ICU a couple weeks after surgery" on September 23rd. After surgery, he was weaned off the ventilator recalling that is was "not a fun experience". Ken shared that he didn't know where he was and waking up every day, he thought he was in a different place which was "the most bizarre thing", as he also tried to remember all that had happened to him.

Ken had to go through the whole process of learning how to eat and walk again and said, "The first steps I took were with a walker on the cardiac floor and took 10 steps. It was furthest I had walked but was hard for me with my background". Ken was quite a conditioned athlete and states he was mostly running and walking just prior to this illness, but in the height of his

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Medical Director's Corner

By Chris Milligan, DO
Medical Director
West Michigan Air Care

It's time for another Medical Director's Corner. Typically we would talk about a topic related to our current education quarter, however with the COVID-19 pandemic and ever changing information, this is a topic we cannot avoid.

Early in the spring when numbers of critical cases first started to increase in our area, particularly related to the outbreaks in Hillsdale and Branch counties, no flight program was transporting known COVID-19 positive patients or highly suspected COVID-19 patients. This was initially a mandate from Metro Aviation (MAI), our aviation vendor, to prevent spread to the pilots in the close confines of the aircraft. Certainly our medical crews were a consideration too, but with a very limited number of pilots and FAA requirements for duty hours, a single pilot being out for an extended period of time can have detrimental effects on the availability of a program for other missions. As a point of reference, MAI also includes Memorial Medflight (South Bend) and Survival Flight (U of M in Ann Arbor). Together, MAI programs make up the vast majority of air service in southern Michigan.

MAI recognized the need to be able to transport these critical patients and asked for help in developing a safe protocol. Dr. Mark Lowell (Survival Flight) and I were two of the three medical directors that participated in this work group. Together with aircraft and safety engineers from MAI, we created the initial protocol to allow us to fly COVID-19 patients safely. The safety measures we initially had in place included: requiring the patient to be intubated (this selected the patients with the most critical need) which allowed for a closed system to prevent aerosol generation in the aircraft, utilizing inline suction on the endotracheal tube with a viral filter attached between the suction and the ventilator circuit, not opening side window vents which would create turbulent airflow but instead use the vent in the rear of the aircraft to create front to back flow of air, N95 masks on all personnel in the aircraft, closing the curtain between the cockpit and the patient compartment to decrease any potential respiratory droplets from escaping the patient care area, and using the flight suits on a rotation (washed after every mission) instead of gowns. This protocol was later adopted, as originally written, by the Air National Guard to be used by their fleet of EC145s (same aircraft as WMAC flies) for their medical response during the pandemic. This protocol has been updated to allow the use of high flow nasal cannula (HFNC) to be transported. Currently the protocol does not allow for bi-level positive airway pressure/ continuous positive airway pressure (BiPAP/CPAP) to be transported, but we are in the process of updating this as well.

Figure 1. Pharmacologic Management of Patients with COVID-19 Based on Disease Severity

Doses and durations are listed in the footnote.

DISEASE SEVERITY	PANEL'S RECOMMENDATIONS
Not Hospitalized, Mild to Moderate COVID-19	There are insufficient data to recommend either for or against any specific antiviral or antibody therapy. SARS-CoV-2 neutralizing antibodies (**bamlanivimab** or **casirivimab plus imdevimab**) are available through EUAs for outpatients who are at high risk of disease progression.[a] These EUAs do not authorize use in hospitalized patients. **Dexamethasone** should not be used **(AIII)**.
Hospitalized[a] But Does Not Require Supplemental Oxygen	**Dexamethasone** should not be used **(AIIa)**. There are insufficient data to recommend either for or against the routine use of **remdesivir**. For patients at high risk of disease progression, the use of remdesivir may be appropriate.
Hospitalized[a] and Requires Supplemental Oxygen (But Does Not Require Oxygen Delivery Through a High-Flow Device, Noninvasive Ventilation, Invasive Mechanical Ventilation, or ECMO)	Use one of the following options: • **Remdesivir[b,c]** (e.g., for patients who require minimal supplemental oxygen) **(BIIa)** • **Dexamethasone[d] plus remdesivir[b,c]** (e.g., for patients who require increasing amounts of supplemental oxygen) **(BIII)[e,f]** • **Dexamethasone[d]** (e.g., when combination therapy with remdesivir cannot be used or is not available) **(BI)**
Hospitalized[a] and Requires Oxygen Delivery Through a High-Flow Device or Noninvasive Ventilation	Use one of the following options: • **Dexamethasone[d,f] (AI)** • **Dexamethasone[d] plus remdesivir[b,c] (BIII)[e,f]**
Hospitalized[a] and Requires Invasive Mechanical Ventilation or ECMO	**Dexamethasone[d] (AI)[g]**

Rating of Recommendations: A = Strong; B = Moderate; C = Optional
Rating of Evidence: I = One or more randomized trials without major limitations; IIa = Other randomized trials or subgroup analyses of randomized trials; IIb = Nonrandomized trials or observational cohort studies; III = Expert opinion

[a] See the Panel's statements on the FDA EUAs for bamlanivimab and casirivimab plus imdevimab. These EUAs do not authorize use in hospitalized patients.
[b] The remdesivir dose is 200 mg IV for one dose, followed by 100 mg IV once daily for 4 days or until hospital discharge (unless the patient is in a health care setting that can provide acute care that is similar to inpatient hospital care). Treatment duration may be extended to up to 10 days if there is no substantial clinical improvement by Day 5.
[c] For patients who are receiving remdesivir but progress to requiring oxygen through a high-flow device, noninvasive ventilation, invasive mechanical ventilation, or ECMO, remdesivir should be continued until the treatment course is completed.
[d] The dexamethasone dose is 6 mg IV or PO once daily for 10 days or until hospital discharge. If dexamethasone is not available, equivalent doses of other corticosteroids, such as prednisone, methylprednisolone, or hydrocortisone, may be used. See the Corticosteroids section for more information.
[e] The combination of dexamethasone and remdesivir has not been studied in clinical trials.
[f] In the rare circumstances where corticosteroids cannot be used, baricitinib plus remdesivir can be used **(BIIa)**. The FDA has issued an EUA for baricitinib use in combination with remdesivir. The dose for baricitinib is 4 mg PO once daily for 14 days or until hospital discharge.
[g] The combination of dexamethasone and remdesivir may be considered for patients who have recently been intubated **(CIII)**. Remdesivir alone **is not recommended**.

Key: ECMO = extracorporeal membrane oxygenation; EUA = Emergency Use Authorization; FDA = Food and Drug Administration; IV = intravenous; the Panel = the COVID-19 Treatment Guidelines Panel; PO = orally; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2

Over the last several months, there has been much hype regarding potential therapies for COVID-19. Unfortunately after some initial positive anecdotal reports, few therapies have shown any benefit. This is the case with most any respiratory viral infection we know. Currently the only recommended therapies for COVID-19 infection, outside of supportive care including oxygen therapy, HFNC (high flow nasal cannula), NIPPV (noninvasive positive-pressure ventilation), and endotracheal intubation, are glucocorticoids and remdesivir. Glucocorticoids have been shown in the RECOVERY trial to decrease 28 day mortality in patients requiring supplemental oxygen or mechanical ventilation. There was no benefit in patients who did not require supplemental oxygen, therefore the National Institute of Health (NIH) does not currently recommend glucocorticoids in these patients. Remdesivir is an antiviral medication which was just approved by the FDA in October for treatment of COVID-19 and is currently recommended by the NIH for patients who require admission to the hospital. Remdesivir was shown in a single study (ACTT-1) to decrease the duration of symptoms in the subgroup of patients requiring supplemental oxygen with having a trend towards decreased mortality in this group, however this did not reach statistical significance. Remdesivir was not shown to decrease duration of symptoms or decrease mortality in other subgroup including those not requiring hospitalization or in those requiring mechanical ventilation. Remdesivir was also not shown to decrease the overall mortality in all patients. In other studies, remdesivir was not shown to have mortality benefit, but was shown to have a trend towards decreasing duration of symptoms by 1-2 days however this did not reach clinical significance. In all studies, remdesivir was shown to have increased adverse effects, specifically more GI adverse effects than placebo alone.

Other therapies that have been discussed include zinc, vitamin D, vitamin C, azithromycin, and chloroquine/ hydroxychloroquine. None of these have shown a benefit and in some cases there has been a trend towards worse outcomes and therefore none of these are currently recommended by the NIH. There

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Winter Safety at Hospital Helistops

The challenging winter season brings many potential hazards for the operation of our aircraft. Of particular interest is the Hospital Landing Zone (LZ). Help us keep everyone safe by following these important winter tips:

- Snow blown by helicopter rotor wash can cause an unsafe condition known as "white out." A white out can cause near zero visibility in the LZ, and surrounding, until the snow settles. Hospital LZs are often co-located with parking lots and a white out could cause traffic problems with the drastically reduced visibility. As helicopter travel times to your facility are often short, keeping the landing area clear will reduce the chance of significant white out. At the same time, conditions will be much more tenable for both the ground and air crews as well as any pedestrians nearby. Observing best practice snow removal procedures will help eliminate any delays to patient care.
- The aircraft requires more space than just the footprint of the aircraft for safe operation. For this reason please advise your snow removal personnel to avoid "snow stacking" within the landing zone. A snow pile of even 14 inches creates a ground strike hazard to our aircraft. A general rule is to have a completely clear area of 100' x 100.' Additionally, markers that are placed in the ground to denote perimeters can damage the aircraft if contact with one occurs. Please have these removed prior to aircraft arrival. Lastly, have snow removal personnel clear and de-ice a path from the LZ to your facility for patient cart transport
- Ice is a fact of life during the winter. While it is also a slip and fall hazard to personnel on the helipad, so is excessive build up of de-icing products. Having your snow removal personnel stay ahead of icing issues by routine application of measured amounts of de-ice products will help manage slip and fall risks and control de-icing costs by avoiding over applications. Excessive de-icing product accumulating on the ground can also become hazardous as the rotor wash of the helicopter turns the material into flying debris. This, in turn, creates a projectile hazard to personnel and nearby vehicles. Additionally, too much material can be difficult to walk on or push the patient cart over.
- The cold winter temperatures and wind chills can create frost bite hazards to personnel assisting at the LZ. The winds created by the rotor wash can be quite high, in the range of 80 mph, and cause an especially low wind chill in the immediate vicinity of the LZ. Please insure your helipad personnel are dressed properly for the conditions with hands and face covered. Remaining outside of the predetermined safety area at your LZ will help protect your LZ personnel from these high winds and the associated wind chill. A distance of 100' from the edge of the landing area is a good rule if no other procedures are in place.

As always, if you are outdoors near the helipad (or scene landing zone) during landing of the helicopter, please keep your own safety paramount and use proper precautions to include maintaining a safe distance until the rotors have come to a complete stop, and utilizing eye protection. Thank you for all your hard work and diligence maintaining an area for air operations. The crews of West Michigan Air Care appreciate all your efforts to keep safety and quality patient care at the highest level.

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physical fitness in 2004, he had been an Ironman triathlete, and his training regimen included swimming 10 miles a week, biking 200-250 miles a week, and running 50 miles a week. He continued to maintain a high level of fitness and also enjoyed backpacking and for him, "completing an 18-mile hike with a 30 pound pack on my back was no big deal". All of these things Ken now believes served him well as his condition unfolded. Ken was eventually transferred from the ICU to the cardiac floor for a week until he was discharged to Mary Free Bed (MFB) to begin rehabilitation, crediting his Cardiothoracic Surgeon, Marzia Leacche, MD and the excellent care he received from the cardiac team as a whole during his time at Spectrum.

The staff at MFB were also instrumental as they guided him through his occupational, physical and speech regimen. Ken said the "first two weeks were very tough" but he went from being "barely able to walk to being 100% independent in my room the last week I was there." Ken stayed at MFB for three weeks and was discharged home on November 13th.

Brian and Ken at Al Sabo Land Preserve (October 2019)

Once back in the Kalamazoo area, Ken continued cardiac rehab three days per week initially at Bronson Athletic Center with a primary focus on biking and treadmill that was enjoyable for him.

Mentally and emotionally, Ken said overall he was, "Pretty good when I was in hospital because I was really motivated to get better. I wanted to get back to what I knew. The challenge was really when I first got home – because I was still very weak". Ken's overall muscle strength had been impacted as well as a weight loss of over 40 pounds (to date he has gained back nearly 30 pounds that were lost). "I am a pretty busy, active person and I couldn't do stuff. I have everything I need to work out at home but it was a huge effort to just get down the stairs to the treadmill, and only being able to walk 5-10 min at 1.5 mph was a challenge, and then to get back up the stairs. I just didn't have strength or endurance, which caused a lot frustration."

Ken's daughter was in graduate school at the time for rehabilitation counseling that provided him with some much needed help, "It was hard and I was happy to have her there in retrospect, because she got me off the edge a few times. She slowed me down and said 'one step at a time, dad'".

Ken's routine now includes walking five days per week, cycling 2-3 days per week, and lifting three days a week. After four months off work, Ken went back full time to his position as a commercial banker after the first of the year in 2020. His company was very flexible and accommodating working with his needs as he transitioned back, even allowing co-workers to donate their sick time while he was off on disability. Despite the onset of COVID only months after Ken returned to work, he was able to continue working in the office two days a week and from home the other days.

After the transport, John expressed to Brian the family's gratitude for the care and safe transport WMAC provided to Ken that day, and offered occasional updates on Ken and his progress. Several months into his recovery, Ken himself reached out to Brian with the message "Thanks for the ride!". It was at that time they realized they had a lot of mutual acquaintances through the local cycling circuit, in which Brian is also very active. A reunion with the crew that was involved in Ken's care (not pictured is Air Communication Specialist, Craig Nixon), and a tour of the hangar and helicopter was arranged in July 2020. Ken has had an interest in aviation from a young age and despite some personal experiences, he has never pursued it much beyond that, which made a visit to WMAC intriguing.

In spite of the unorthodox way they crossed paths, Ken and Brian share a passion for the outdoors, and recently were able to enjoy time together on a two hour hike at Al Sabo Land Preserve in October. Other than some residual neuropathy in his toes and feet as a result of his prolonged illness that gives him some balance issues from time to time, and is anticipated to continue to improve, Ken has made a remarkable recovery. We are grateful for the opportunity to reconnect with him, and wish him well!

By Sara Sturgeon
Flight Nurse
West Michigan Air Care

Medical Director's Corner (continued from page 2)

are currently no medications which have been shown to decrease transmission in either pre-exposure or post exposure prophylaxis.

For patients who have acute viral syndrome, which would include influenza-like illness (ILI) or covid-like illness (CLI) among others, and do not require hospitalization, the recommendation is still supportive care. This includes using acetaminophen (Tylenol) and NSAIDs such as ibuprofen (Advil, Motrin) to control fever and body aches. Initial media reports of NSAIDs leading to worse outcomes have been shown to have no merit. Both the FDA and NIH have stated there is no evidence to support this and currently recommend continuing to NSAIDs as you normally would.

The best way to keep yourself, your loved ones, and your patients safe is still to utilize safe physical distancing guidelines, using masks, and frequent handwashing. Masks have previously been shown to decrease rate of transmission of influenza and other viral respiratory infections which are droplet spread, including SARS-COVID-1. While masks decrease the rate of transmission, they have not been shown to prevent and therefore decrease the overall volume over time. This is what lead to the initial recommendations about "flattening the curve" to prevent unexpected deaths due to an overwhelmed healthcare system. As we enter the usual respiratory virus season where our regional hospitals are usually near or at capacity, we will undoubtedly see increased cases again of both COVID-19 and influenza. It will remain imperative that these measures continue to be followed.

For a full list of current and updated recommendations, please check out the NIH COVID-19 treatment guidelines website (covid19treatmentguidelines.nih.gov).

At WMAC, we continuously monitor the latest recommendations, based on scientific data, in order to provide the best optimal care to our patients while doing this in a safe manner for our staff and communities. We would like to thank all of our regional healthcare partners and colleagues for continuing to do a great job in all that you do to care for our families and communities. We wish you all a very safe and healthy Holiday season.

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