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Message from the TATRC Director



COL Jeremy C. Pamplin,
Director TATRC

I hope this message finds each of you and your loved ones safe and healthy. We remain at war with an invisible foe that has caused more death of our fellow citizens than the past nearly 20 years of conflict, more than Vietnam and the Korean War combined. The world, particularly the scientific community, is uniting in many ways never before seen to combat this common enemy and working together to achieve a shared vision.

We dedicate this issue of our TATRC Times Newsletter to the fight against COVID-19, to the scientists working to find treatments and cures, to the healthcare workers on our front lines, and to the people struggling to heal from illness or those struggling to recover from loss. Within this special issue of the TATRC Times, we hope to articulate our evolving TATRC response to this worldwide pandemic and our unique technical capabilities to assist in the future.

COVID-19 presents a situation where critical healthcare resources can be overwhelmed by patient volume. Even if enough equipment is made available, there are not enough critical care trained clinicians to manage all of the critically ill patients during a national emergency, especially in rural and austere locations. Even early in this pandemic, hospital systems in NYC, Texas, and abroad had already been forced to begin triaging patients in ways that only military medical providers have had to do in recent memory. While the disaster struck earliest in NYC, the rest of the nation has felt these effects as hot-spot surges have occurred in nearly every state.

It's for these reasons that TATRC and the work we have been doing for years is so needed right now. TATRC is uniquely positioned to support the technology response to this disaster through our extensive work in digital health, telemedicine, our knowledge of information technologies and how to adapt them to austere medical environments, bringing them together into one intelligent medical system, and ultimately to increase capability and capacity of the healthcare system at the point of need to optimize patient/casualty outcomes.

In support of the COVID-19 response, we established a new Technology in Disaster Environments (TiDE) research portfolio. The portfolio is broken into three lines of effort intended to develop and study: 1) digital health ecosystems (DHEs) for disaster medicine, 2) delivery of hospital-like capabilities to the point of need using telemedicine support, remote control, and automation of medical devices to relieve task saturation, and increase capability and capacity in resource-limited care contexts, and 3) cloud enabled big data solutions that incorporate disparate data sources – many from the DHEs and medical devices we develop in this portfolio – into decision support visualizations and dashboards using artificial intelligence and machine learning.

The foundational innovation for this portfolio has been the rapid development, deployment and testing of the National Emergency Tele-Critical Care Network (NETCCN), a DHE for care of patients with severe COVID-19 illness. You can read more about the

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TATRC & WRAIR Team Up on New Device to Shield Surgeons While Treating COVID Patients

An old English proverb says, “Necessity is the mother of invention.” That never proved to be more true than now, while we witness our Nation striving to adapt and fight against the invisible enemy known as COVID-19. It’s that necessity that drove TATRC and Walter Reed National Military Medical Center (WRNMMC) to innovate and invent the “COVID-19 Airway Management Isolation Chamber,” or CAMIC.

The simple device, conceived,

designed, built and tested by TATRC and Military Health System personnel from WRNMMC, Madigan Army Medical Center in Washington State, and Ft. Belvoir Army Community Hospital in Virginia, may be the answer to protecting health care workers from COVID-19 and other viruses during patient care.

The CAMIC is a three-dimensional airway ‘tent’ designed to contain the respiratory droplets of COVID-19 patients during intubations and non-invasive ventilation as a way to protect operating

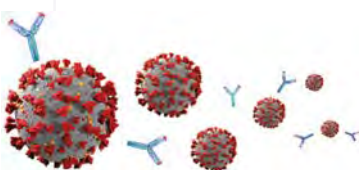
room staff. This rectangular device is a 2 ft wide by 1.5 ft tall frame made from PVC piping, complete with a clear plastic covering made from a standard polyethylene bag that is placed over a patient’s head to isolate the particles that could spread from coughing or sneezing. The chamber cycles air out through holes in the piping — pushing in fresh oxygen on one side, and vacuuming out viral particles through the other side.

A letter from the FDA to the U.S. Army stated, “There are no FDA-approved



Army Maj. (Dr.) Steven Hong, chief of Head and Neck Surgical Oncology at Walter Reed National Military Medical Center, tests the effectiveness of the CAMIC in late March. Hong was one of the device’s inventors. (Photo by Capt. [Dr.] Timothy Blood Jr.)

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Director's Message

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solutions developed under this effort starting on page 8.

Overall, our challenge has been to identify, prioritize, and synchronize new and ongoing technology development efforts for this crisis but also in a manner that, when this crisis is over, can be transitioned for use in the context of multi domain operations. We focus on technology that aids patient care – casualty assessment, medical decision making, and patient treatment, all in the context of available resources and the need to synchronize care across its continuum. It is worth noting that we do not make healthcare systems, and we are not investing in technologies within this portfolio to treat only one disease or one problem – we don't make systems to treat diabetes alone, or gunshot wounds alone, or even COVID-19 alone – we make healthcare systems that are flexible, adaptable, and resilient to whatever problems they are presented with. Similarly,

as we develop technology for use in a disaster, the tools we create must be equally usable for COVID-19, other medical problems, and trauma, even combat trauma!

This new portfolio, along with Army Futures Command priorities related to maximizing soldier potential and convergence of data across the battlefield – from sensor to shooter (or sensor to medic!), to any command and control node, in near-real time, with appropriate authorities (or for appropriate medical decisions) – is evolving programmatic priorities in the midst of this national crisis. As we move forward, we must be radically inclusive of our partners, customers, and other stakeholders across the command and indeed the enterprise, to achieve success by ensuring necessary perspectives, requirements, and ideas are included, that we prioritize appropriately our work, and, perhaps most importantly, to maintain awareness of what we are doing and how we can help each other.

Our three lines of effort account for care across the continuum of medicine from health-at-home to pre-hospital/outpatient

care to inpatient/hospital contexts including critical care and surgical care. To make ONE system for all of that, we need an infrastructure, a digital health ecosystem. This ecosystem is ever present, continuously monitoring the Warfighters' health status, nudging them when appropriate to make better, healthier choices, and, when there is a problem, connecting the doctors, nurses, health coaches – whatever is needed – from wherever they may be in their home, office, hospital or even the battlefield. A mesh of connected persons who need healthcare advice and experienced healthcare professionals who can provide it. We are creating a medical intelligent system that maximizes capability and capacity at the point of need.

TATRC is dedicated to supporting the fight against COVID-19 through our continuing mission to forge the future by fusing data, humans, and machines into solutions that optimize Warfighter performance and casualty care. Please stay safe, stay healthy, and stay positive. ■■■

CAMIC *continued from page 2*

or -cleared devices for use as an extra layer of barrier protection in addition to PPE to prevent [Health Care Providers] exposure to pathogenic biological airborne particulates of patients during the COVID-19 pandemic." As a result of this, the newly developed CAMIC device received FDA emergency-use approval and authorization.

Army MAJ (Dr.) Steven Hong, an Assistant Professor of Surgery at the Uniformed Services University and Chief of Head and Neck Surgical Oncology and Reconstructive Surgery at WRNMMC, is credited as the inventor of the CAMIC, who worked with TATRC's own Mr. Nathan Fisher from the Medical Intelligent Systems Lab to build the first prototype of the device.

"It has been a whirlwind of ideas and countless hours of validation and testing. We have been able to go from concept to design, build, validation, redesign, rebuild, revalidation x 10, IRB process, patent process, and FDA Emergency Use Authorization clearance in less than six weeks. It has been

truly remarkable to see the dedication and motivation of my team," said Dr. Hong. "I spent the last couple of years in one of the most innovative environments, Silicon Valley, and the mantra that this team has carried throughout this process reminds me of that time."

Mr. Nate Fisher, echoed Dr. Hong's sentiments. "I'm inspired by how fast our CAMIC team, under Dr. Hong's leadership, was able to move from a rough concept sketch to a FDA Emergency Use Authorization and beyond. We relied heavily on the support of TATRC, other MRDC organizations, and the Defense Health Agency to keep the forward momentum going to meet this urgent need."

Nate Fisher worked tirelessly from his basement workshop during the initial concept phase while remotely staying in constant communications with the team members from Walter Reed. At the end of March, the CAMIC prototype was ready and delivered to our colleagues at Walter Reed for testing and further design changes.

"The beauty of this device is how simple it is," Mr. Fisher said, noting its use of "parts that are cheap and easily sourced."

The device is currently being used at Walter Reed, Fort Belvoir, Fort Hood, Fort Bliss, Madigan, U.S. Central Command, Kapiolani Hospital in Honolulu, and INOVA Alexandria and Fairfax.

"Although we are dealing with the COVID-19 pandemic now, I am absolutely certain that the military will be called on in the future to battle other pandemics," said Dr. Hong. "One of our main objectives will be to develop a more operational-friendly CAMIC that could be used downrange or for transport of infectious patients."

The development of the CAMIC is an example of how tools developed by the MHS and USAMRDC's TATRC can ultimately play a larger role in the Nation's fight against the coronavirus pandemic.

The U.S. Army has applied for a patent on the CAMIC and the Army's technology transfer community is working to broaden its availability and use. ■■■



TATRC Rises Up and Aids the “Front Lines” in the Battle Against COVID-19

COVID-19 has spread rapidly across the world, leaving despair and isolation as a feeling that many are trying to grow accustomed to. However, with all trials that Americans have faced, we have risen up and shown the world there are always helpers standing by, waiting to assist.

MAJ Steven Hong, Chief of Head and Neck Surgical Oncology and Reconstructive Surgery at Walter Reed National Military Medical Center (WRNMMC), is a long-standing partner of TATRC's and has worked with us in developing Tele-Robotic surgery capabilities. MAJ Hong, having worked with TATRC in the past, turned to us in a time of crisis. WRNMMC, like so many other hospitals in the country trying to fight this pandemic, was faced with a shortage of face shields necessary for personal protection of healthcare professionals from droplets formed by patients with COVID-19 infection who cough and sneeze.

MAJ Hong reached out to Mr. Nathan Fisher, Program Manager within TATRC's Medical Robotics and Autonomous Systems Innovation Center, about WRNMMC's shortage. Mr. Fisher and TATRC's MEDRAS team went to work, partnering with Mr. Mark Brown from the U.S. Army Medical Materiel Development Agency (USAMMDA) and rapidly identified a publically available, open source design for 3D printing that was able to be tweaked to make it work with TATRC and USAMMDA's tools and materials. This allowed our team to get to work to make frames to which clear plastic shields could be attached. Once design specifications were finalized and a successful prototype printed, Mr. Fisher mobilized a



A healthcare provider at WRNMMC sporting one of the 3D printed face shields engineered in part by TATRC's dedicated team of volunteers!

network of friends who had access to 3D printers to rapidly produce nearly 250+ frames in less than 48 hours. These frames were then outfitted with plastic shields and hand-delivered to WRNMMC.

MAJ Hong stated, “these masks were put to immediate use so that we could continue to see and treat our soldiers safely.” Because these face shields are extremely durable and can be appropriately disinfected, they are reusable, which is huge during this time of limited materials for our healthcare

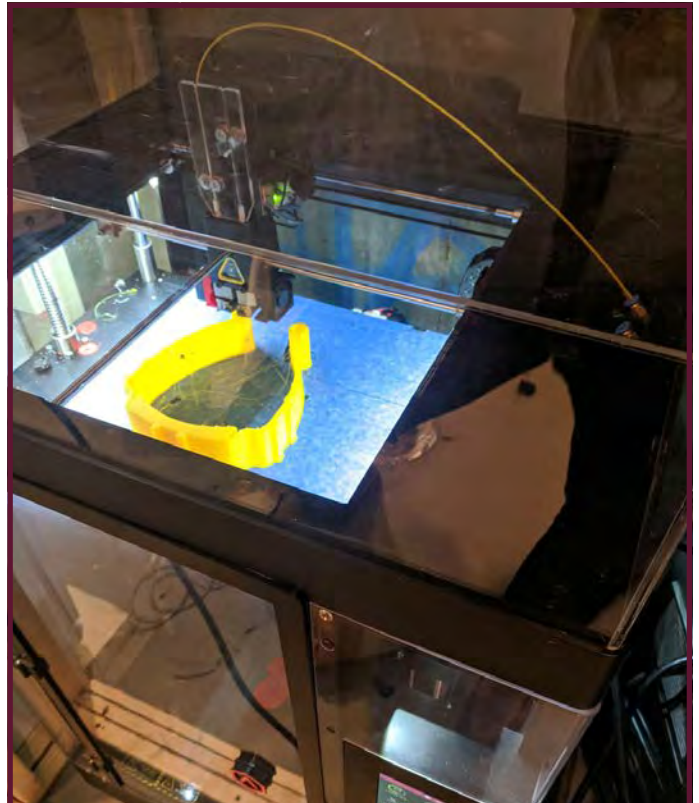
workers. “To accomplish this in 48 hours’ time is the definition of going from bench to bedside in record time.”

The majority of this work was performed from home and in off-duty, volunteer time. Mr. Fisher, Mr. Brown, and Mr. Scott Walters from USAMMDA, manned the 3D printer at Fort Detrick, but there were also volunteers at home who stepped up to the call. Mr. Ken Wood, a TATRC Alumni, assisted with some of the printing, and a good Samaritan, Mr. William Fecke, provided almost 60! This





Mr. Nate Fisher demoing a sample prototype of a face shield produced in-house.



Thanks to collaboration between multiple volunteers with personal 3D printers, TATRC was able to help get the job done!

was a tremendous effort from this community to support our healthcare workers at Walter Reed.

Dr. Dan Gallagher, Deputy Chief of Surgery at WRNMMC, remarked that this was an “Awesome job!” and said “Thanks very much Steve and kudos to the entire team at TATRC [and USAMMDA] for coming together to help. This is great!”

MAJ Hong further commented by saying, “Thank you so much for your efforts in going above and beyond to help us out during this critical time period. This is a nationwide crisis and as such, critical shortage of supplies hit every hospital. The timing of your efforts in answering the call has saved lives. My colleagues and the leadership here at WR are beyond grateful.”

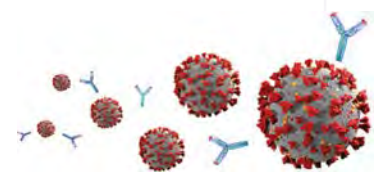
TATRC has a long standing reputation for building connections. Whether it’s connecting patients to providers via mobile health, or ensuring our Warfighters are connected to surgeons and medics wherever they may be, TATRC has shown that connection is vital, and has done as much as possible to ensure it exists everywhere it can. As our role of connecting people comes into the light in the battle against COVID-19, it is a privilege to see our organization using its extensive network of partners to join the fight and be part of

the solution, as TATRC has done so many times before.

Through this pandemic, it’s easy to be reminded what kind of social creatures we are. Even though some of us may be introverted, others extroverted, we thrive on interaction with each other. Our connections to each other when we need assistance, when we need strength, those things can keep us going, and ultimately save lives.

On a more personal note, MAJ Hong added, “Once the dust settles and we have won the fight against COVID-19, you will be considered one of the heroes in this battle. You gentlemen are certainly one of mine.” To MAJ Hong and the rest of the hard working staff at Walter Reed, we at TATRC say that you are our heroes. You, and every healthcare worker involved in this grueling fight across the country are showing us what bravery and heroism truly is. We thank you for your heart, your dedication, and your spirit keeping us all safe, and as healthy as possible.

TATRC was proud to answer the call and step up to aid WRNMMC as they battle hard against COVID-19. Together, we can achieve anything and together, we will overcome this latest war against our well-being both at home, and in the world. ■■■



Many Hands, One Team: TATRC Tackles COVID-19

Throughout the COVID-19 pandemic, stories of selflessness, sacrifice, and coming together for the greater good have been told the world over. Here at TATRC, we're privileged enough to be able to highlight just a few instances of our very own team members pitching in and going the extra mile to help out during a time when everyone could use an extra hand. From tireless IT tech support and COVID-proofing our facilities, to sewing masks and 3D printing face shields for frontline healthcare providers, Team TATRC has truly shown what it means to be a team in these trying times.

As many of you will be familiar, the shift to long-term telework was not without its challenges. Limited VPN access, new software deployment, and more created quite a few obstacles in the workday. Building bridges over all of them, though, was our beloved Mr. Joe Farabaugh, Tech-Titan and Support-Superstar! Joe has been ever-present and always willing to help. With his daily morning check-in emails to the team, phone calls and remote support to folks at home, he has handled it all with his characteristically friendly service. Thanks to Joe's never-ending efforts, the team has been able to remain connected and as productive as ever!

The pandemic also brought with it plenty of changes to facility safety protocols. Luckily for us, our "fabulous facilities folks," Mr. Joe Barrick and Ms. Tanya Rexrode, are never ones to back down from a challenge! Joe and Tanya jumped to the task, making sure our building was properly cleaned and sanitized, by installing over 20 automatic hand sanitizer units throughout the office, and putting together individual cleaning kits for each lab area and



Ms. Tanya Rexrode hard at work creating "COVID cleaning kits" for our buildings



'You missed a spot!' Despite the extra hours and protocol changes, spirits remain high around the office!





Seamstress extraordinaire, Ms. Ollie Gray, fashioned some very chic TATRC-branded face masks!



Mr. Brandon Grimes and family donated masks to folks in need around their hometown.



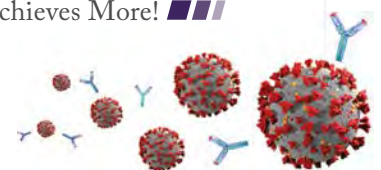
Ms. Cheryl Merritt and her K-9 crew crafted some 'pawfect' masks of their own!

common space. Their hard work ensures not only that our areas meet and exceed the high standards recently put in place, but more importantly the safety of each and every member of our team who visits the office.

Even outside of the office, Team TATRC's volunteer efforts were on full display! As many will know, Mr. Nate Fisher of our MISL Lab, collaborated early on with MAJ Steven Hong, of the Walter Reed National Military Medical

Center, and the U.S. Army Medical Materiel Development Agency, to help 3D print more than 250 face shield frames for healthcare providers on the frontlines of the COVID crisis. Lending their own time, materials and talents, superb seamstresses Ms. Cheryl Merritt, TATRC's Chief of Staff, and Ms. Ollie Gray, Project Manager, set to work sewing and distributing cloth face masks to those in need! Additionally, Mr. Brandon Grimes, TATRC's Multi-media specialist and his family, in response to a call for help from their local Mayor, crafted cloth face masks and donated them to the local town shelter for those who didn't have the means to make their own.

Throughout this entire pandemic, it has been inspirational hearing about all these stories of our TATRC Team members helping out however they can. A big thank you goes out to everyone mentioned here, as well as anyone else who went out of their way to lend a hand to someone in need. Way to demonstrate the true spirit of what it means to be a part of Team TATRC! TEAM - Together Everyone Achieves More! ■■■



TATRC Builds the National Tele-Critical Care Network

TATRC Director COL Jeremy Pamplin received the Warning Order from MRDC Headquarters in early March: What can TATRC do to advance the fight against COVID-19?

COL Pamplin assembled the Command Team and lab leads to discuss some ideas. As BG Michael Talley, the MRDC Commanding General, had instructed many times, “Start from the foxhole and work backward.”

While there are many opportunities to apply digital health technologies and information and communication technologies more broadly to COVID, the TATRC team needed to constrain ideas

to those that would both impact COVID, and be available in time and build on its labs’ capabilities and competencies.

Soon, a concept emerged that, although since refined many times, would launch TATRC’s work for the next several months: Rapid and interactive development and deployment of a National Tele-Critical Care Network, otherwise known as ‘NETCCN.’ In broad strokes, NETCCN addresses a fundamental problem: Where there are no intensive care unit (ICU) beds, there are no critical care trained clinicians. As a map from Kaiser

Health News reveals, vast swaths of the United States lack a single ICU bed. And, sadly, many COVID patients require intensive care.

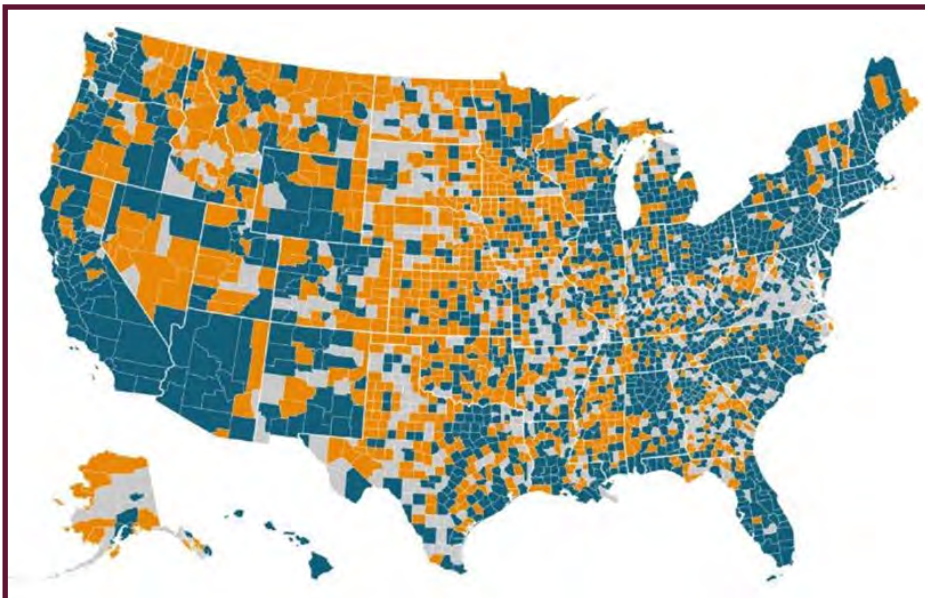
Another demand of the COVID pandemic is the need to protect caregivers from infection. Attrition of scarce clinical professionals like critical care experts could further risk the ability to care for COVID patients. Distance critical care experts should not need to travel to the bedside to support patient care, or even to a hospital or clinic. Further complicating this challenge is that many of the places that lack ICUs (or even hospitals), also lack adequate broadband. So, as at least a minimum, tele-critical care capability for NETCCN would need to operate from “anywhere to anywhere” and under minimal network requirements.

In the early days of the pandemic, the New York tristate area was hardest hit. There are, of course, plenty of hospitals and ICU beds in New York, but the response was still falling short. The team soon began to sketch out a model for supporting not only local but community-wide, regional and even national care through a network of virtual critical care providers. Clinicians from California or Texas or Kansas could help in the COVID fight in New York. And those in New York could return the favor in others’ times of need. NETCCN would truly need to be a national capability.

Assembling these concepts into a real plan was greatly aided by COL Pamplin’s past thought leadership in the area of tele-critical care, through his participation in the Society of Critical Care Medicine (SCCM) and his operational and garrison experiences as a practicing Intensivist. Soon, clinicians from

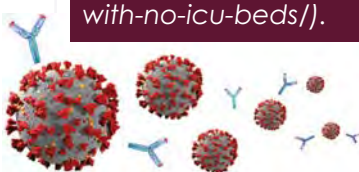
Building NETCCN

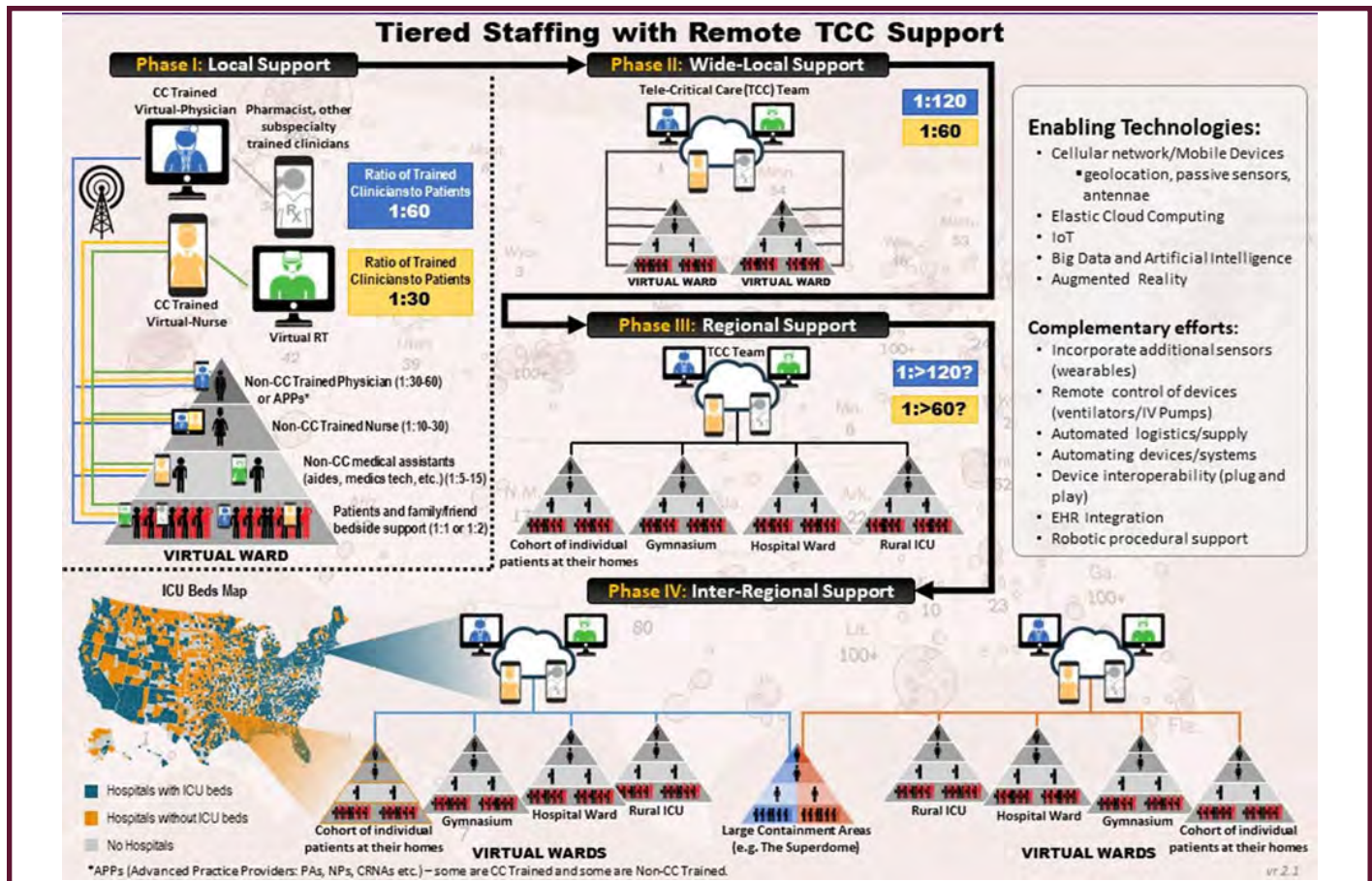
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This analysis includes the most recent reports, from FY 2018 and 2019. Some hospitals may have closed since then. Some hospitals may have made errors in their reporting, and in several cases KHN has manually adjusted the data. In some cases, beds in small satellite hospitals are reported in the main hospital’s filing. Hospitals for Veterans run by the Department of Defense are not included in this analysis.

Source: Kaiser Health News analysis of hospital cost reports filed to the Centers for Medicare & Medicaid Services (<https://khn.org/news/as-coronavirus-spreads-widely-millions-of-older-americans-live-in-counties-with-no-icu-beds/>).



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NETCCN can be tiered to support a multitude of environments.

Before the COVID pandemic, TATRC Director COL Jeremy Pamplin and colleagues at SCCM have been thought leaders and trailblazers in the area of tele-critical care. In 2018, COL Pamplin led a group that created a task force in the SCCM to study and make recommendations on how technology, specifically Tele-Critical Care (TCC), could be leveraged to expand capability and capacity during natural or man-made disasters. In 2019, SCCM created the task force and in 2020, right before the COVID crisis, the group began work. Read "Building a Case for Tele-Critical Care" in Critical Connections: <https://www.sccm.org/Communications/Critical-Connections/Archives/2019/Building-a-Case-for-Tele-Critical-Care-to-Improve>

SCCM and from around the nation, many of whom were grappling with the same challenges, were willingly volunteering their expertise and insights to help shape the rough concept for the NETCCN into a program for which TATRC could seek and receive funding, and ultimately execute. The TATRC team, with co-authors from esteemed clinical care experts from around the nation soon published, "Advanced Medical Digital Technologies for COVID-19 and Future Emergencies" in the Telemedicine and e-Health Journal (<https://www.liebertpub.com/doi/10.1089/TMJ.2020.0140>).

What is a NETCCN?

At its most basic level, NETCCN is a cloud-based, low-resource, stand-alone health information management system for the creation and coordination of flexible and extendable "virtual critical care wards." These high acuity, virtual wards would bring high-quality critical care capability to nearly every bedside, be it a healthcare facility, field hospital, or gymnasium. Based on cellular communication networks, mobile technologies and cloud computing,

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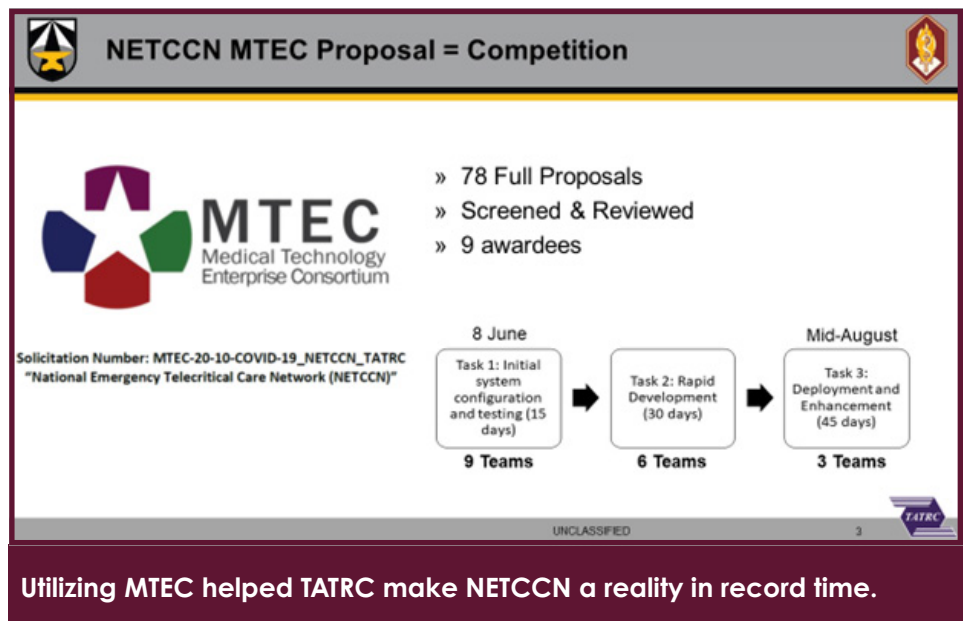
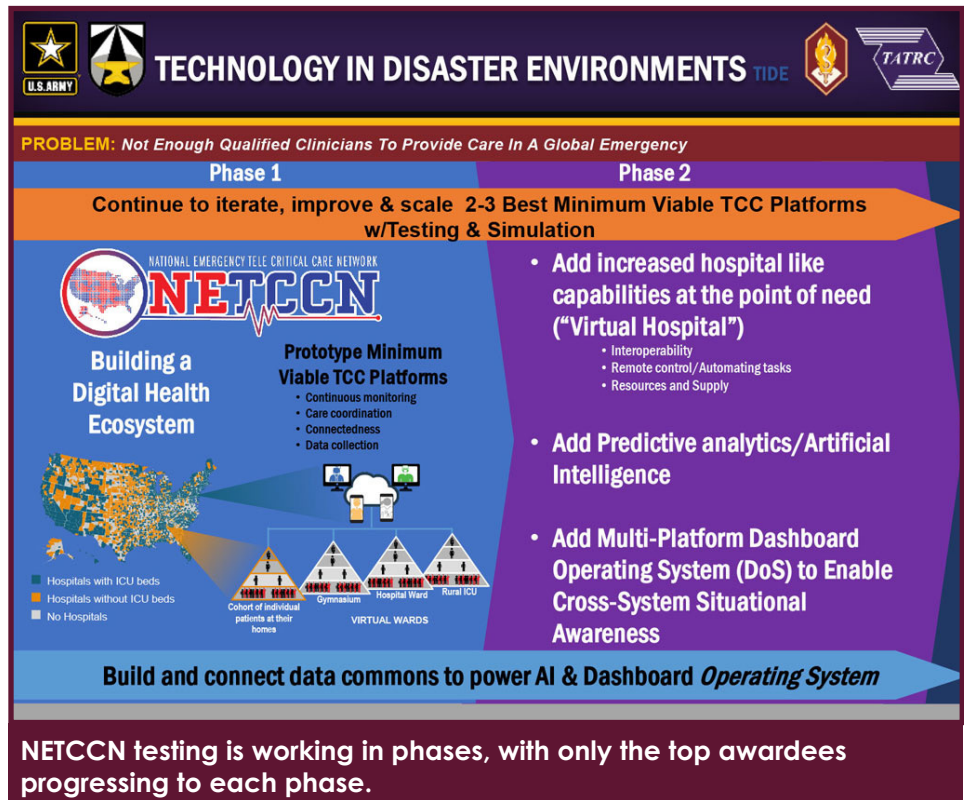
the NETCCN will support the extension of high-quality intensive care to places which lack adequate critical care expertise and resources necessary for care of COVID-19-related illness.

While NETCCN requires technology, it also requires the incorporation of technology and expertise into a model of care in which distance intensive care clinicians support non-critical care clinicians, patients and, in some cases, their families. Ultimately, teams using NETCCN platforms should be able to care for individual patients and groups of patients but also scale to the regional and national level. Based on the work of the SCCM, TATRC developed a tiered staffing model and path for scaling NETCCN.

Adding Capabilities to Extend the Scope and Reach of NETCCN

The care that COVID patients receive in hospital intensive care units (ICUs) often involves an array of medical devices like ventilators, infusion pumps and other advanced technologies. While NETCCN platforms support a basic capability for clinicians to interact with local caregivers and patients “from anywhere to anywhere,” based on insight from SCCM and early COVID response, the TATRC team sought to add “virtual hospital” capabilities to NETCCN to allow distance clinicians the ability to control and see data from ventilators and other medical devices from a distance.

Realizing the vision of NETCCN as a network that supports regional and national response will require the addition of multiple levels of



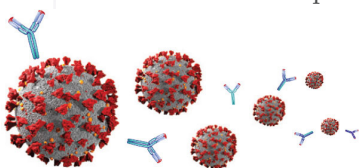
dashboards to assist clinicians and other civilian and military leaders using NETCCN platforms to share information and to receive information

to help them make decisions.

Finally, in order to learn from

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the care delivered through NETCCN – to both inform research and to build algorithms for artificial intelligence – the TATRC team sought to incorporate these dashboards into a situational awareness architecture.

From NETCCN Concept to Reality

The COVID pandemic – and the CARES Act funding – required TATRC to move quickly in turning NETCCN from concept to reality. Three key factors allowed the TATRC team to fund and initiate work on NETCCN in a matter of weeks (and not months or years, as is typical with many federal acquisitions). First, TATRC used Other Transaction Authority (OTA) through the Medical

Technology Enterprise Consortium (MTEC) in place of regular contracting to reach potential offerors for NETCCN. The TATRC team, led by the Sponsor's Office Technical Representative (SOTR) and the Lab Director of the Mobile Health Innovation Center, Ms. Jeanette Little, developed a Request for Prototype Proposal (RPP) and – through MTEC – released the RPP and held a proposers' conference that attracted a record 600 participants. Instead of full proposals, MTEC's OTA required the prospective clinical and technical teams to submit a 10-page "enhanced whitepaper" and draft budget. With the receipt of 78 enhanced whitepapers, TATRC was ready to screen, review and select the 'performers' to begin work on NETCCN.

Another key factor that allowed TATRC to move so quickly was the establishment of a virtual team. TATRC developed evaluation criteria and screened dozens of whitepapers in under one week because it leveraged the assistance of a virtual team consisting of experts like Dr. Peter Pappas from the University of Central Florida, SCCM, members of TATRC, but also federal employees from other parts of MRDC and the Department of Health and Human Services who agreed to assist. A proverbial village assisted TATRC in narrowing the field in conducting the full reviews.

Finally, TATRC structured the NETCCN project as a series of "sprints" – each followed by evaluation and potential down-selection – to ensure that the NETCCN performers deliver.

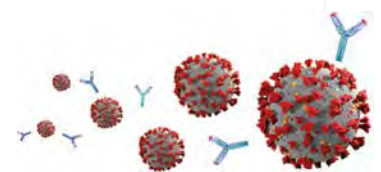
TATRC awarded 9 clinical / technical teams to perform Task 1 of NETCCN, which was a 15-day-sprint consisting of the initial system configuration and testing of NETCCN's minimum viable platforms for the care of a single virtual patient.

What's Next for NETCCN?

In the next issue of the TATRC Times, TATRC will report on the progress of the NETCCN project, including the results of the Task 1 evaluation, goals of NETCCN Task 2, and exciting developments regarding the acceleration of NETCCN to care of critically-ill COVID patients and transition with multiple partner agencies. For more information on our NETCCN efforts, please visit our new "Resources" Page at www.tatrc.org/www/resources/covid-19.html ■■■

TATRC awarded the following nine teams for Phase 1 of the NETCCN project:

- Avera Health with VitelNet and DocBox
- Deloitte Consulting, LLP with AWS GovCloud, Decisio Health, Elsevier, Qventus, T6 Health System, Verizon, Zyter
- Expressions Network, LLC with Mercy ACO Clinical Services, Active Innovations, and SDSE Networks
- The Geneva Foundation with Omnicure, Society of Critical Care Medicine (SCCM) Discovery Network, DocBox, MD PnP Program at Massachusetts General Hospital, and Madigan Army Medical Center (MAMC)/Telemedical Research for Operational Support (TR4OS)
- Oregon Health and Science University with GE Healthcare and Microsoft
- Medical University of South Carolina with Advanced ICU Care, Doxy.me, General Electric, Masimo, Medtronic, Microsoft, Mushroom Networks, SmileCDR, Ventec, ViaSat, Carnegie Mellon University, Case Western Reserve University, Clemson University, Dartmouth University, Mass General Hospital, and University of California, San Diego
- Phillips North America with Emory Healthcare
- Unissant, Inc with ISeeYouCare, T-Mobile, Dr. Jay Sanders, Dr. Craig Goolsby, and Dr. Herb Rogove
- University of Pittsburgh with UPMC Health System and Microsoft



From the Desk of the Science Director...

Beating COVID Requires Radical Inclusion



**Mr. Matt Quinn,
Science Director TATRC**

Since joining TATRC in March, I have been immersed, mostly virtually, in The National Tele-Critical Care Network (NETCCN) project and other efforts to assist in defeating COVID. The pace and scope of our work has pushed just about every member of the TATRC team to the limit. Conceptualizing, planning and executing a project of the scale and importance of NETCCN has required TATRC to lean on not just our own staff but to

work across other labs and with outside public and private partners in ways that we haven't before. We call it "radical inclusion" - a concept that TATRC first heard about at the MRDC Leadership Conference that we adopted wholeheartedly. We could not have made the progress that we have in such a short time without fundamentally challenging our organizational structures, internal and external relationships.

NETCCN has required TATRC to work across labs. While Jeanette Little and her team at the Mobile Health Innovation Center (mHIC) have led the core NETCCN platform work, Mr. Geoff Miller and the Medical Modeling, Simulation & Visualization (MMSV) team led the development and execution of the clinical simulation work at the heart of NETCCN evaluation and down-selection. Rebecca Lee of TATRC's Medical Intelligent Systems Laboratory (MISL) has worked closely with the Joint Artificial Intelligence Center, Johns Hopkins University Applied Physics Lab (JHU-APL), and Jeanette Little to inform the requirements and development of a research data commons to which NETCCN performers will contribute data. Moving forward, development of coherent and synchronized programmatic, evaluation of performance, the addition of further capabilities and other aspects of the project will continue to require working together in ways that our individual labs have not in the past. Some days it can be frustrating. But I'm proud of everyone's hard work in focusing on this new mission and initiative.

NETCCN has required TATRC to leverage additional expertise and help from outside organizations. After the retirement of Dr. Gary Gilbert, two prominent staff from the Army Institute of Surgical Research (ISR) have played key roles on the NETCCN effort. Dr. Jose Salinas stepped in to lead the "virtual hospital" portion of the NETCCN initiative and work with the other labs in formulating and planning the integration of this important addition to the "core" NETCCN platform. MAJ Patty Schmidt of ISR has led the Data and Research Team, or 'DART,' for the NETCCN project. TATRC has needed the



close coordination and insight from the MRDC Human Research Protection Office, Dr. Perrin Cobb of UCLA and the Society of Critical Care Medicine, JHU-APL and other entities. MAJ Schmidt has seamlessly managed this complex task - from Hawaii - with skill and resilience.

Dr. Peter Pappas of Central Florida Regional Hospital and Dr. Ben Scott of University of Colorado Hospital, have brought positive energy, insight and precious time split between delivering critical care - during the COVID pandemic no less - to lead NETCCN metrics and governance workgroups. We could not have done it without them. Our clinical partners from the Naval Medical Center San Diego, Ft. Leonard Wood, Missouri and the University of Colorado have also served and participated in simulation testing of 9 different NETCCN platforms each - a herculean effort to say the least.

Because the work of NETCCN, a digital health ecosystem, does not fit neatly into any single MRDC Program Area Directorate, TATRC has included not only Joint Program Committee (JPC-1) but also JPCs 5 (Military Operational Medicine Research Program) and 6 (Combat Casualty Care) in its weekly NETCCN meetings and other activities.

Finally, from the start, TATRC has included potential transition partners, including staff from the Department of Health and Human Services, in planning, evaluating and executing the NETCCN project. Staff from the Health Resources and Services Administration (HRSA), the Office of the Assistant Secretary for Preparedness and Response, Indian Health Service, the Office of the National Coordinator for Health IT have all contributed their insights and assistance (like the use of the HRSA-funded Telehealth Resource Centers) to advance NETCCN. Radical inclusion has paid off. Because of radical inclusion, TATRC received a record number of prospective performers at the performers' conference that Medical Technology Enterprise Consortium hosted for its NETCCN project. TATRC truly had the pick of the proverbial litter because so many good performers knew about and applied for the NETCCN project. Because of radical inclusion, TATRC assembled a multi-faceted and incredibly diverse team to rapidly develop and refine extensive criteria and screened, reviewed and awarded dozens of applications in a matter of days. Because of radical inclusion, TATRC and its performers received actual clinical feedback on the performance of NETCCN platforms as part of the Task 1 evaluation. So many others have assisted on this journey and there is simply not enough space to list them all. That's radical inclusion! ■■■



TATRC Launches National Tele-critical Care Program

This past April, TATRC, in collaboration with the Medical Technology Enterprise Consortium (MTEC), issued a Request for Project Proposals (RPP), and subsequently, nine awards for a new national tele-critical care program.

In support of the COVID-19 response, the goal of this new program is to aid in the rapid development, deployment and testing of the National Emergency Tele-critical Care Network (NETCCN) - a cloud-based, low-resource, stand-alone health information management system for the creation and coordination of flexible and extendable “virtual critical care wards.” These high acuity, virtual wards will bring high-quality critical care capability to nearly every bedside, be it a healthcare facility, field hospital, or gymnasium.

Based on cellular communication networks, mobile technologies and cloud computing, NETCCN will support the extension of high-quality intensive care to traditional (i.e. critical access hospitals and clinics) and non-traditional and temporary healthcare facilities (i.e. field hospitals and gymnasiums) which lack adequate critical care expertise and resources necessary for care of COVID-19-related illnesses.

“COVID-19 presents a situation where critical care resources can be overwhelmed by patient volume. Even if enough equipment is made available, there are not enough critical care trained clinicians to manage all of the critically ill patients during a national emergency, especially in rural and austere locations. The NETCCN project seeks to deliver this capability from anywhere to anywhere leveraging our existing mobile networks,” said COL Jeremy Pamplin, TATRC Director.

Through a step-wise approach, the NETCCN project will fund an initial Phase 1 cohort of nine teams consisting of healthcare organizations and technology vendors to rapidly, iteratively and collaboratively prototype, test and refine tele-critical care and data visualization solutions to support local, regional and ultimately national COVID-19 care and situational awareness.

Phase 1 of the NETCCN project consisted of a 15-day sprint in which teams conducted initial system configuration and alpha testing. Teams that successfully complete this phase may move forward to Phase 2 of the project, which is another 15-day sprint of rapid development and beta testing of the platforms with healthcare providers and patients. Teams who successfully complete Phase 2 of the project, may move to Phase 3, in which teams will field their platforms to actual users and experience real world use at scale.

Through the MTEC, Other Transaction Authority (OTA),

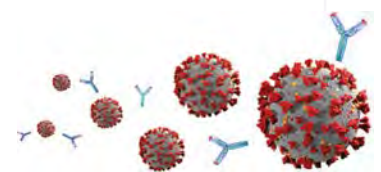
TATRC awarded the following nine teams for Phase 1 of the NETCCN project, which commenced on June 15, 2020:

NETCCN Phase I Teams:

- Avera Health with VitelNet, and DocBox
- Deloitte Consulting, LLP with AWS GovCloud, Decisio Health, Elsevier, Qventus, T6 Health System, Verizon, and Zyter
- Expressions Network, LLC with Mercy ACO Clinical Services, Active Innovations, and SDSE Networks
- The Geneva Foundation with Omnicure, Society of Critical Care Medicine (SCCM) Discovery Network, DocBox, MD PnP Program at Massachusetts General Hospital, and Madigan Army Medical Center (MAMC)/Telemedical Research for Operational Support (TR4OS)
- Oregon Health and Science University with GE Healthcare, and Microsoft
- Medical University of South Carolina with Advanced ICU Care, Doxy.me, General Electric, Masimo, Medtronic, Microsoft, Mushroom Networks, SmileCDR, Ventec, ViaSat, Carnegie Mellon University, Case Western Reserve University, Clemson University, Dartmouth University, Mass General Hospital, and University of California, San Diego
- Phillips North America with Emory Healthcare
- Unissant, Inc with ISeeYouCare, T-Mobile, Henry M. Jackson Foundation (HJF), Dr. Jay Sanders, Dr. Craig Goolsby (Uniformed Services University), and Dr. Herb Rogove
- University of Pittsburgh with UPMC Health System and Microsoft

MTEC is an enterprise partnership in collaboration with industry and academia to facilitate research and development activities, in cooperation with the U.S. Army Medical Research and Development Command (USAMRDC) and other DoD agencies in the biomedical sciences (including but not limited to drugs, biologics, vaccines, medical software and medical devices) to protect, treat and optimize the health and performance of U.S. military personnel.

Please stay tuned for our Quarter 4 edition of the TATRC Times for details regarding significant updates on Phase 2 and Phase 3 of the NETCCN initiative! ■■■



TATRC Director Featured in Combat & Casualty Care Magazine for Efforts to Fight COVID



USAMRDC Commanding General, BG Michael Talley, and TATRC Director, COL Jeremy Pamplin, were both prominently featured in the Summer 2020 issue of Combat & Casualty Care Magazine!

The USAMRDC and several of its affiliate labs were prominently featured in the Summer 2020 issue of Combat & Casualty Care Magazine.

The centerpiece of multi-page spread is a lengthy interview with Brigadier General Michael J. Talley, Commanding General of MRDC and Fort Detrick, MD, regarding the Command-wide efforts to combat COVID-19.

Additionally, the magazine featured and highlighted an in-depth interview with COL Jeremy Pamplin, Director of TATRC, on a wide variety of topics related to medical simulation and technology, as well as our new NETCCN initiative. The article entitled: "Managing a Crisis, Targeting Better Healthcare" can be found on Page 14, or by clicking the link here: <https://lsc-pagepro.mydigitalpublication.com/publication/?i=667283&ver=html5&p=16>

The magazine also featured two other articles focusing on the various achievements by our colleagues at the Walter Reed Army Institute of Research and the U.S. Army Medical Research Institute of Infectious Diseases in the battle against COVID-19.

MRDC continues to undertake efforts to make its stakeholders, media partners, and the general public aware of its vital and integral role in combatting the novel coronavirus. ■■■

TATRC Unveils New COVID Resource Page

TATRC has launched a special addition to the TATRC.org website specifically dedicated to telemedicine as it relates to the COVID-19 pandemic. This new TATRC COVID-19 Resource page is a clinically and technically curated reference tool for official COVID-19 specific guidance and websites; as well as a reference for emerging digital health and advanced medical technology research, focused on current trends, processes, and future directions.

Within this dynamically streamlined page, you will find up-to-date information on official government COVID-19 guidelines, available support, as well as both internal and external key resources to support providers, clinics, and yourself through this troubled time.

Additionally, the TATRC COVID-19 Resource page also features a collated news feed, called the TATRC Tech-Watch Weekly. This section is a weekly collection of COVID-19 focused Telemedicine articles, emerging technologies, clinical guidelines, and workflows from across industry, academia, medical research, and government.

All of this is brought to you by the USAMRDC's Telemedicine & Advanced Technology Research Center. We hope you find this useful and informative. ■■■



To visit the new TATRC COVID-19 Resource page, either type in the link below, or use your phone to scan the pictured QR code above.
<https://www.tatrc.org/www/resources/covid-19.html>

TATRC's mHIC Brings the “BOOM”

Known internally to TATRC as “Project BOOM,” the Mobile Health Innovation Center (mHIC) team is developing a weapons firing log, mobile application and a web portal within the mCare / Mobile Health Care Environment (MHCE) system to help environmental health professionals track longitudinal Warfighter exposures to blast overpressure during live fire weapons training. The effort is in support of the Joint Health Risk Management Enhanced Capability Demonstration (JHRM ECD) program which is a research collaboration between the Defense Health Agency (DHA), the Joint Program Executive Office for Chemical Biological Radiological and Nuclear Defense (JPEO CBRND) and U.S. Special Operations Command (USSOCOM). Furthermore, the project aligns with recent FY18, FY19 and FY20 NDAA (sections 734, 253, 717 & 742, respectively) mandating a study of the effects of blast overpressure on armed services members and longitudinal recording of exposures.

The mCare Blast Exposure Monitoring (BEMO) Weapons Firing Log app enables an operator, or an observer of a group of operators, to rapidly record information such as weapon system, munition type, body position, and crew position after firing heavy weapons or explosives. This information, when combined with blast overpressure gauge measurements within the MHCE BEMO web portal, and provides a complete picture of blast overpressure exposures. Commanders and environmental health professionals will use this information to reduce and mitigate repetitive and potentially excessive blast overpressure exposures which may adversely affect Warfighter performance. TATRC recently received additional funding totaling \$1 million to support the continued development and operational assessment by JHRM ECD.

This increased scope will consist of additional software programming and development and extended mHIC IM/IT support over the course of FY21 and FY22, to include a practical demonstration with up to 2,000 study participants. Features of the system will include a range of user roles for varying access to the system; the ability to create complex shot plans and firing logs within the web portal, in addition to the mobile app; blast overpressure gauge assignment and return; visualization and easy navigation of individual longitudinal exposure records; and rapid generation of training feedback reports for groups by activity and location. Project BOOM expands the capabilities of mCare and MHCE beyond the current Remote Health Monitoring

BEMO is accessible both by desktop and mobile app for iOS and Android.

The BEMO interface where users can rapidly enter information after firing heavy weapons or explosives.

(RHM) paradigm to increase its value to the Warfighter and MHS enterprise. Team mHIC is excited to work on this project with Adam Becker, JHRM ECD Demonstration Manager and the JHRM ECD team. Per Mr. Becker, “This project serves an important role in fulfilling our national obligation to our Warfighters by improving the documentation of individual environmental health hazard exposures, and we are glad to be working with TATRC to develop it.” . ■■■



Dr. Gary Gilbert, TATRC's "MISL Man," Blasts Off into Retirement

Tuesday, 23 June 2020 marked the end of an era as COL (R) Dr. Gary Reed Gilbert, TATRC's renowned thought-leader, pioneer, and innovator known throughout the world of military medicine, said farewell and officially began a well-earned retirement! Having served his country for more than 50 years, first as a Soldier and then as a GS Civil servant, Dr. Gilbert has led a storied career which has impacted military medicine in ways that will continue to be realized for years to come.

Dr. Gary R. Gilbert distinguished himself, the U.S. Army Medical Research and Development Command, and the Telemedicine and Advanced Technology Research Center (TATRC) with his exemplary service and unparalleled achievements while serving as the PM for Medical Intelligent Systems and Capability Area Manager for Medical Robotic & Autonomous Systems from June 1999 to June 2020. During several challenging and tumultuous periods in the history of the organization, he was exactly the leader needed to propel TATRC forward and help chart a new course and direction for this unique Department of Defense (DoD) asset. His untiring efforts provided the framework to expand collaborative medical research and development in both National and International arenas. He is a natural born leader who spent his career providing guidance and direction, and energizing his team to develop and execute innovative programs and projects. As a seasoned leader with extensive operational experience in military medicine, Dr. Gilbert provided a solid foundation to launch revolutionary telehealth technology solutions both at TATRC and across the MHS. A dynamic and passionate



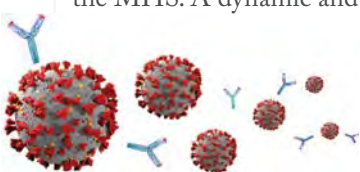
Dr. Gary Gilbert, and wife Dr. Trinka Coster, celebrated the occasion with more than 90 attendees!

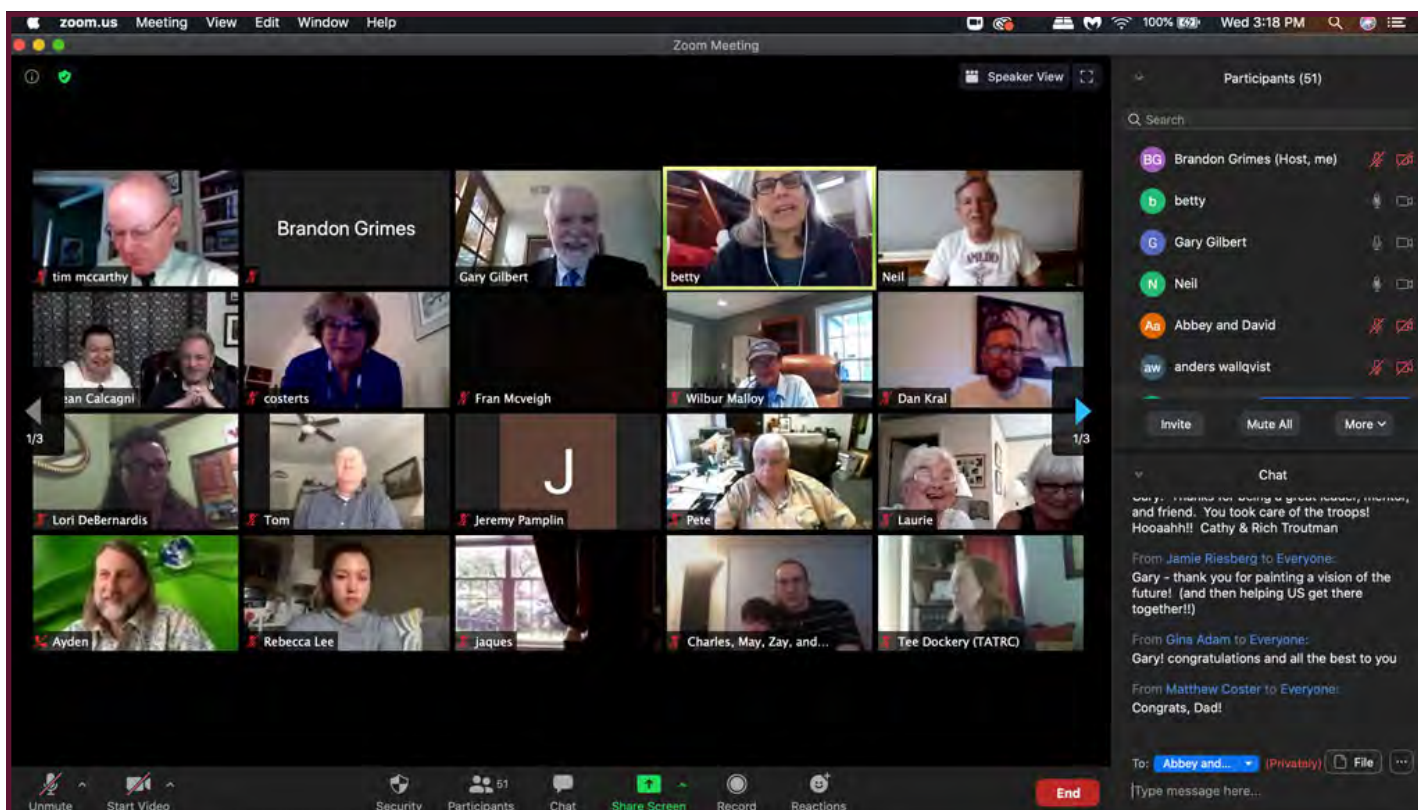
leader, who understands the requirements and the gaps which must be addressed to meet the needs of our forward deployed forces, he established and managed a strategic plan for TATRC to become a laboratory for medical intelligent systems. The driving force in directly reshaping TATRC, Dr. Gilbert is a pioneer and visionary in Artificial Intelligence, Robotic and Autonomous Systems, and Telemedicine, innovating these fields to maximize the delivery of healthcare services. His pervading influence was reflected in policy and operational medicine initiatives. Always pushing the envelope to explore new solutions, his tireless efforts and unwavering commitment breathed new life into TATRC and, because of his insightful leadership, is a thriving and vibrant laboratory today.

In what proved to be a fitting format for the event, Dr. Gilbert's official retirement ceremony utilized technology and was held virtually, due to the COVID-19 pandemic, which allowed for more

than 90 "Gilbert Groupies" across 7 states to gather and thank him for his devoted, loyal, and stellar performance over the years. TATRC Leadership presented over 8 official DoD and Army awards and certificates, while close friends and family sent in well wishes and told fantastic stories of years past with heartfelt video testimonials, and so many who love and respect Dr. Gilbert were able to participate and give him the farewell he most certainly deserved.

From his early days at West Point and Cornell's ROTC program, to his time as a 70D Biomedical Information Systems Officer serving as CIO at Tripler Army Medical Center, Walter Reed, and eventually as TATRC's (or MATMO, as it was then known) 2nd Director, on to his civilian capacity as PM and Lead for TATRC's Medical Intelligent Systems Lab (MISL), Dr. Gary Reed Gilbert has truly done it all. And many of those he interacted with along the way remember their time together fondly. As Mr. Carl Manemeit, close friend and coworker of





Even amidst the isolation, friends, family, and colleagues from across the country were able to send well wishes and congratulations!

11 years recalls, “We’ve gone to some really exciting places, like Ft. Dix, El Paso, the lovely garden spots of the world. But at least you did send me to Paris for one day.”

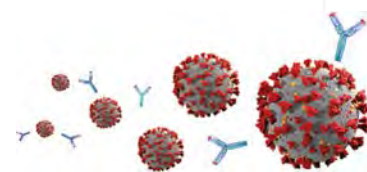
Lori DeBernardis, TATRC’s Public Affairs Officer stated, “Dr. Gilbert is our “Rock-of-Gibraltar executive,” who is unflappable, even in the midst of the most trying circumstances. Gary is not afraid to push back especially when he believes in something, in fact, he enjoys it! He is fearless, persistent, passionate about his work and is never afraid to push the envelope or to stand up for what’s right, even when it’s “not popular” or goes against the grain, something I have witnessed on countless occasions over the last 24 years. He’s the embodiment of integrity, a fair and unbiased voice of reason, a loyal and dedicated servant to his fellow soldiers and staff, and who leads by example. He raises the bar and pushes himself, and in turn, has inspired his team to do the same. He is the gold standard and he will be sorely missed.”

Dr. Gilbert’s commanding and powerful presence, both around the office as well as around the MHS at large, will be greatly missed. Whether it’s his eclectic presence in staff meetings, brilliant digressions in email threads, or simply the inspiration that knowing someone who’s had such a profound impact on the world is in his office just a short walk

away continuing to break ground in the name of America’s Warfighters, TATRC is surely better off for having had the chance to give a platform to Dr. Gilbert’s genius.

As Mr. Nathan Fisher, PM and protege under Dr. Gilbert in TATRC’s MISL lab put it, “It’s a bit of a surreal experience sitting here thinking about trying to summarize what Dr. Gilbert has contributed not only to me personally, but to TATRC as a whole, because his impact was so large and multifaceted. He was TATRC’s thought leader and he was the visionary who gave us direction, always full of ideas and contagious enthusiasm.”

You would be hard pressed to find anyone who has had the privilege of working with Dr. Gilbert at some point along the way who did not echo those same sentiments. Thankfully for all of us, Dr. Gilbert’s legacy is one that will continue in perpetuity, benefitting our great Nation and its Warfighters for generations to come. Although it’s surely impossible to put into words, we’d like to give another round of thanks and the utmost gratitude to Dr. Gary Gilbert; a TRUE PATRIOT, without whom, life for those who have the great fortune of knowing him would be less in every way. Congratulations on your retirement and a legendary career, Sir, and Godspeed! ■■■



Employee Spotlight

TATRC's SIM Lab Continues to Expand & Grow

TATRC's Medical Modeling, Simulation and Visualization (MMSV) lab has added yet another resource and asset to its growing team. Ms. Christen Phillips joins us as the new Medical Simulation Specialist for MMSV. Christen is a Certified Healthcare Simulation Educator (CHSE), Certified Healthcare Simulation Operations Specialist (CHSOS), and an experienced healthcare simulation professional with 16 years of experience within healthcare education and research. Prior to joining TATRC, she oversaw operations and research for a grant evaluating communications in trauma team activation at Walter Reed National Military Medical Center. She also worked as a research assistant and curriculum designer for an en route care study grant evaluating the formative process of novice to expert performance in areas of

cricothyroidotomy and fasciotomy at the Uniformed Services University of the Health Sciences.

Before working full-time in education and research, Christen stood-up and operationalized the simulation center at Joint Base Andrews in support of the Nation's Warfighters. While there, she integrated and designed simulations for the Operating Room (OR); Emergency Room (ER); pharmacy; dental residency training; mass casualty exercises; Emergency Medical Technician training; Readiness Skills Verification (RSV) for nurses and techs; Advanced Cardiac Life Support (ACLS) and Pediatric Advanced Life Support (PALS); code blue program, and more.

Christen is also an ACLS and PALS instructor with both the American Red Cross and the American Heart Association. In the past she worked as a birth doula and ran rescue as an NREMT Intermediate. When she is not with her



Ms. Christen Phillips, Medical Simulation Specialist for Modeling, Simulation, Informatics & Visualization Lab.

brood of teenagers (ages 13, 15, 17), she can be found on a river whitewater kayaking or in a classroom pursuing her academic endeavors.

TATRC is proud to welcome Christen to our growing team, and is excited for all she has to offer! ■■■

TATRC SIM Team Welcomes Mr. Eric Briggs!

Mr. Eric Briggs joins Team TATRC as our new Combat Medic for the Medical Modeling, Simulation and Visualization (MMSV) lab. Mr. Briggs was most recently with the U.S. Department of State and is an 18 year veteran of the U.S. Army and Pennsylvania Army National Guard. He has served as a Combat Medic in front line units, Special Operations Support, and Field Hospital units. He has also served as an AMEDD Center and School instructor, 28th ID Medical Sustainment Training NCO for the Division, and was involved in various medical research programs. He brings an incredible wealth of knowledge to TATRC's MMSV team

with his operational experience as a medic from multiple deployments to Iraq and Afghanistan while serving in the Army and while contracting with the Department of State Diplomatic Security Services. Currently, Eric is the First Sergeant of a medical company for his National Guard unit and oversees the operations of his Treatment Platoon and Evacuation Platoon.

Eric has a significant background in Medical Simulations from his time in the military and while contracting. He has nearly 15 years of experience working and running Medical Simulations Programs and training facilities and his vast knowledge in military medicine and medical simulations makes him an



Mr. Eric Briggs, Combat Medic for Modeling, Simulation, Informatics & Visualization Lab.

invaluable asset to the team.

We are honored to welcome Mr. Eric Briggs and are excited to see how he helps shape this new, emerging Simulation asset here at TATRC! ■■■



TATRC Announces its Q3 Employee of the Quarter: James “Jimmy” Gaudaen

TATRC Junior Project Officer (PO) James “Jimmy” Gaudaen is TATRC’s Q3 Employee of the Quarter! Jimmy has served in an increasingly challenging and enhanced capacity since coming on board in the Fall 2018. Besides being the PO assigned to the exponentially expanding Medical Modeling, Simulation, Informatics & Visualization (MMSIV) Lab here at TATRC, he currently serves as a critical staff member of the National Emergency Tele-critical Care Network (NETCCN) Leader Dashboard, Manuscript, Metrics, and DART working groups; as well as providing Human Factors and Usability subject matter expertise and, in some cases, Test Protocols support, to the MAST Research Roadmap, MAST Multi-Domain MSVE for Virtual Health solutions, AI Medic, and the Joint U.S. Army Medical

Material Development Activity / TATRC project. According to MMSIV Program Manager, Ms. Ollie Gray, “Jimmy has demonstrated amazing skills as a human factors engineer to enhance TATRC research. His superb contributions to research initiatives were recognized early in his tenure at TATRC, and have been utilized by every TATRC lab.”

Jimmy’s willingness and confidence to step forward into new tasks has been exemplified time and time again, and is the reason he has emerged quickly as the ‘must-have’ PO voice to be in the room when planning out new research. Whether it’s jumping in to help write research proposals, learning how to apply test protocols to Artificial Intelligence, or camping out in the woods of Tarboro, North Carolina to monitor 4th Battalion / 3rd Special Forces Group soldiers performing Prolonged Field Care Training for 18 hours straight, he is always willing to be there for TATRC.



Mr. James “Jimmy” Gaudaen, Junior Project Officer for Medical Modeling, Simulation, Informatics & Visualization Lab.

Congratulations on being named Employee of the Quarter, Jimmy! Your TATRC team sends you virtual “high-fives.” ■■■

Let’s Get Social!

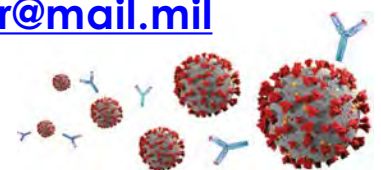


For more information on TATRC and its many initiatives, visit: www.tatrc.org or call 301.619.7927

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Sign up and get the TATRC Times every Quarter!

To Subscribe and be added to our mailing list, please e-mail Lori DeBernardis at: lori.a.debernardis.ctr@mail.mil



mHIC Senior Developer, Zaheir Razak, Earns a Second Master's Degree

Zaheir Razak, a senior developer supporting TATRC Mobile Health Innovation Center (mHIC) at Fort Gordon, Georgia is one of their rising stars! In May 2020, while working full time, he graduated from Georgia Tech with a second Master's Degree. His most current concentration of study was Computer Science. While an enormous accomplishment in and of itself, what is most significant about this achievement is that Zaheir earned this degree while working full time for TATRC, and teaching night courses at the local technical school. Mr. Razak is also married with 5 children, and is a very actively engaged parent.

When asked how he would leverage his newest educational accomplishment to support and enhance his work at TATRC, Zaheir responded "My degree from Georgia Tech has impacted me on a multitude of levels. The rigor and efficiency involved in not only learning and adapting to new software and systems but also in working with different cultures and nationalities, within different time zones from around the world has been incumbent upon my success. I have had to holistically work on the documentation of processes, development, and testing while collaborating with teams built around full-time jobs and families. Beyond the incredible knowledge base that I have amassed, the time management and interpersonal skills developed will ultimately help me in my job at TATRC with respect to designing and developing robust software as I have focused on interactive intelligence. I also know how to more effectively design databases and modularize code while employing the best security practices. I aspire to see further professional growth utilizing the skills and knowledge I have acquired."

It has been challenging to recognize Zaheir's accomplishments appropriately due to the COVID-19



Zaheir achieved this impressive feat on top of working full time, teaching night courses, and being a devoted husband and father to 5 kids!

pandemic, but his TATRC team at Fort Gordon was able to have a drive by graduation car parade for him in early June, where the team drove by with signs, streamers and yelled accolades along with virtual hi-fives as Zaheir smiled from ear to ear from the front yard! Congratulations and job well done to Mr. Razak, we hope you get some well-deserved rest and relaxation after such a busy schedule for the past few years! ■■■

TATRC-Clemson Partnership Continues to Thrive and Yield Results in Telehealth

The long awaited publication of TATRC's partnership with Clemson University on assessing the impact of mCare on the Patient Activation Measures (PAM scores) of Diabetics based out of Nellis Air Force Base (NAFB) and Madigan Army Medical Center (MAMC) was officially published in the Journal of Medical Internet Research (JMIR) this May.

The article entitled, "Enhancing Patient Activation and Self-Management Activities in Patients With Type 2 Diabetes Using the U.S. Department of Defense Mobile Health Care Environment: Feasibility Study" can be accessed at the following link: <https://www.jmir.org/2020/5/e17968/> and provides an excellent summary of the various impacts, perceptions and ongoing recommendations for

the mCare and MHCE platform. This randomized controlled trial paved the way for what is now leveraged by the Defense Health Agency at Brooke Army Medical Center (BAMC) and Walter Reed. Local medics at Ft. Gordon's Dwight D. Eisenhower Army Medical Center (DDEAMC) also use the platform for their cardiology and nephrology patients.

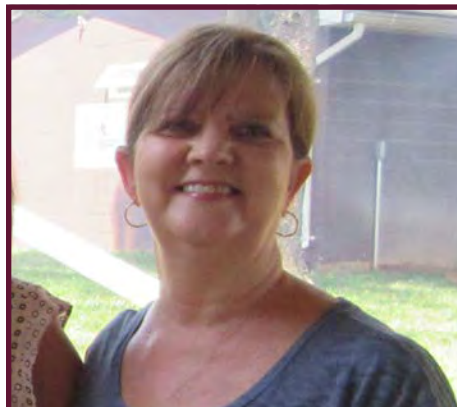
This TATRC-Clemson partnership has led to additional collaborations in response to various calls for enhancing rural communities' access to telehealth platforms during the COVID-19 pandemic, employing the same capabilities outlined in this aforementioned publication while encompassing the feedback and lessons learned to further enhance the platform. ■■■



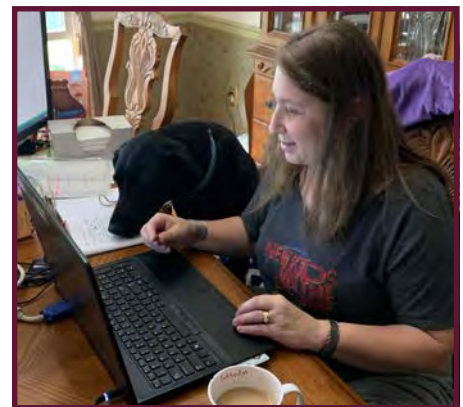
Awesome Admins Deserve Accolades and Appreciation



Ms. Donna Lightner, Executive Admin Command Team.



Ms. Martha "Marty" Wagner, Biotechnology High Performance Computing Software Applications Institute.



Ms. Marne Tragert supporting the Medical Intelligent Systems lab.



Ms. Tanya Rexrode for her outstanding assistance in Logistics.

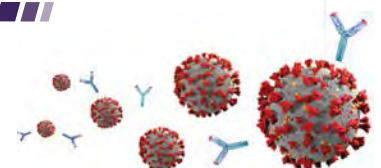


Ms. Tiffany Williamson who supports the entire Mobile Health Innovation Center down at Ft. Gordon!

As we all know and experienced first hand, life during the COVID-19 pandemic has been anything but normal. With multiple daily teleconferences, remote meetings, desktop VTC's and overall disconnection becoming the norm, the ability to build and maintain connections became more important than ever. Luckily for us here at Team TATRC, we have an outstanding team of Office Administrators who stepped up to the challenge and have continued to save the day, every day, keeping our team up and running and ready to tackle the many challenges of life during COVID.

From establishing extra teleconference lines, to getting the entire team set up on MS Teams, to keeping track of numerous calls and complex schedules, and sitting in on meetings and taking notes, to juggling competing events, our Office Admin team did it all, and did it fabulously, and seamlessly without missing a beat. No virus could get in the way of these powerplayers! The TATRC team would like to give a HUGE shout out and **THANKYOU** to all our admins, including Ms. Donna Lightner, Executive Admin for our Command Team, Ms. Martha "Marty" Wagner for her support

of the Biotechnology High Performance Computing Software Applications Institute, Ms. Marne Tragert supporting the Medical Intelligent Systems lab, Ms. Tanya Rexrode for her outstanding assistance in Logistics, and Ms. Tiffany Williamson who supports the entire Mobile Health Innovation Center down at Ft. Gordon! You ladies are the unsung heroes who keep our team well organized, effective, and running efficiently at full speed and we couldn't appreciate you more! Thanks for everything you do, keep up the great work! ■■■





PROJECT SPOTLIGHT

Let the COMPASS® Guide the Way: Optimizing REBOA for the Austere Combat Environment

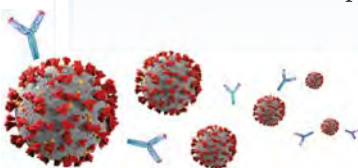
Resuscitative endovascular balloon occlusion of the aorta (REBOA) for hemorrhage control after severe traumatic injury is rapidly gaining use in both civilian trauma centers and in the deployed environment. This minimally invasive technique allows for occlusion of the aorta using an inflatable balloon placed through percutaneous access of the common femoral artery. A team at Madigan Army Medical Center (MAMC) have extensive research and clinical experience with the REBOA technique, utilized to control non-compressible truncal bleeding and to raise the blood pressure to the heart and brain during the early treatment of hemorrhagic shock. MAJ Jason Bingham and LTC Matthew Eckert along with the Madigan Surgical Research Program, have recently investigated a novel technique to guide the application of REBOA in a hemorrhagic shock model, through the support of TATRC's Advanced Medical Technology Initiative (AMTI).

REBOA is commonly directed utilizing an arterial pressure monitoring line, however, this configuration requires time and resources to establish, presenting a limitation in the deployed environment. The MAMC team, along with collaborators from Naval Medical Center San Diego including COL(R) Matthew Martin, investigated the use of an existing compact, disposable pressure monitor called the COMPASS® device, from Centurion Medical Products, in Williamston, MI (Figure 1). The device provides a simplified and expedient method to monitor the mean arterial pressure of the patient, thus limiting total resource requirements and providing critical information more rapidly to the treating team.



Figure 1. The COMPASS® device from Centurion Medical Products. Compact, disposable, battery powered mean arterial pressure monitor.

Utilizing a hemorrhagic shock model with vascular injury at the iliac artery, the COMPASS® device was used to monitor blood pressures above and below the aortic balloon in comparison to a standard arterial pressure line. The COMPASS® device pressures were utilized to titrate inflation of the REBOA balloon and a specialized prototype balloon allowing for partial occlusion of the aorta. The investigating team is exploring the effects of partial aortic occlusion



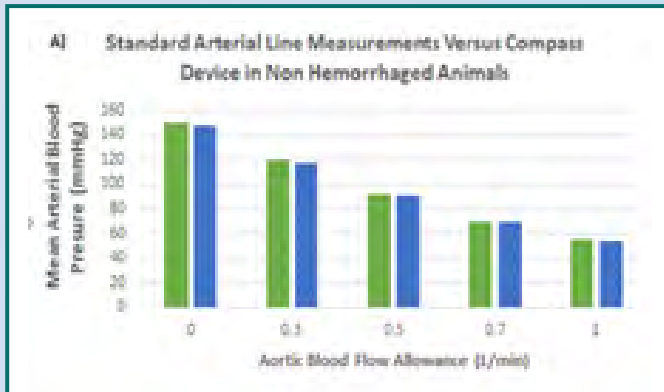


Figure 2a. Comparison of arterial line versus COMPASS® in non-hemorrhage controls.

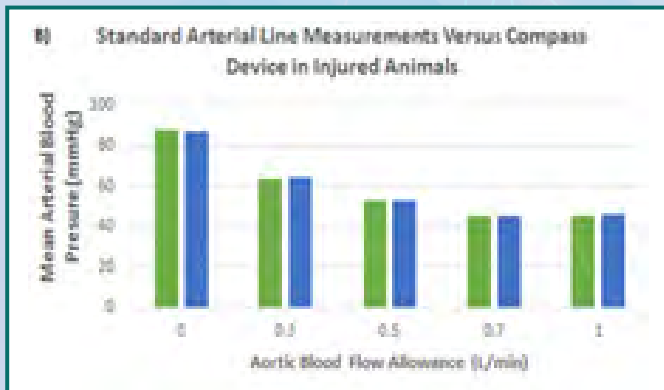


Figure 2b. Comparison of arterial line versus COMPASS® in hemorrhage groups.

and trying to determine optimal aortic flow that both supports the heart and brain and limits distal uncontrolled bleeding while not creating lethal ischemia to the gut- the major limiting factor of prolonged REBOA use. The team found no significant difference between the traditional arterial pressure line and COMPASS® measurements at both full inflation and no inflation, as well as at each partial inflation increment tested. When using the COMPASS® to guide volume resuscitation and titration of balloon inflation, there was also no significant difference compared to the traditional arterial pressure line measurements. Mean pressure difference between the traditional method and the COMPASS® device was 4mmHg up to a mean arterial pressure of 100mmHg, suggesting that for almost all clinically relevant blood

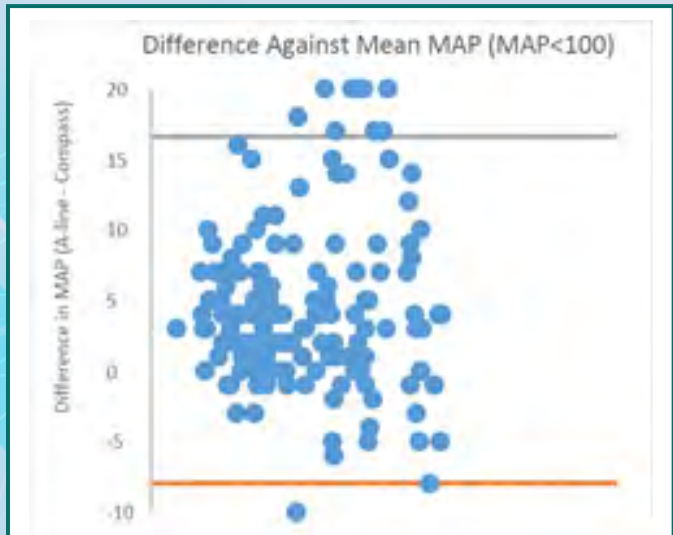
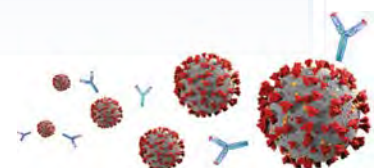


Figure 2c. Comparison of means for MAP in arterial and COMPASS® groups.

pressure ranges, the COMPASS® device represents an equivalent method of monitoring blood pressure (Figure 2).

Results of these projects have been submitted to the annual Western Trauma Association for presentation. According to Dr. Bingham, “The COMPASS® device gives providers a rapid and reliable method to determine the patient’s mean arterial blood pressure without having to set up an arterial pressure line with all of its required resources, which is a major time saver in critical situations when minutes count.” Dr. Eckert added, “We greatly appreciate TATRC’s AMTI funding support that enabled this exciting endeavor.” The AMTI support of this project was critical and necessary to the completion of this important work as forward providers have already begun using the COMPASS® in the deployed setting, but without data supporting its efficacy and comparison to the standard arterial pressure line. These results will be sent to the JTS for review prior to general distribution. The Madigan Surgical Research Program includes Drs. Bingham and Eckert, and 2019-20 research residents, CPT Tori Holtestaul, CPT Jeff Connors, and CPT Ian Jones. ■■■





PROJECT SPOTLIGHT

An Endometrial Classifier for the Early Detection of Ectopic Pregnancy

Nearly 16% of active component U.S. military members are women, and the majority are reproductive age. As the number of military servicewomen and their operational scope increase, it is important to understand and mitigate the prevalent health issues that uniquely impact their readiness. Ectopic pregnancy accounts for 1-2% of all pregnancies in the United States and remains the leading cause of maternal death in the first trimester. An ectopic pregnancy can present with bleeding and / or pelvic pain. A serologically confirmed pregnancy that cannot be reliably delineated as intrauterine or ectopic by ultrasound is defined as a 'pregnancy of unknown location' (PUL). Because 20% of women with a PUL will actually have an ectopic pregnancy, careful follow-up of these patients is initiated when a PUL is detected. Nearly half of patients with a PUL require more than three clinic visits over a seven-day interval to definitively resolve pregnancy location. This process risks loss to follow-up and delay in treatment of an ectopic, which can result in tubal rupture and its associated morbidity and mortality.

The absence of a reliable method for the early detection of

ectopic pregnancy has important readiness implications for military servicewomen. Not only does the current PUL management algorithm translate to lost time from work and training, but the psychological stress associated with the uncertainty during this interval may negatively impact performance. Early detection of ectopic pregnancy allows intervention at a time when medical management has a better chance of success, thereby obviating the need for surgery, surgical risks and more lengthy convalescence requirements.

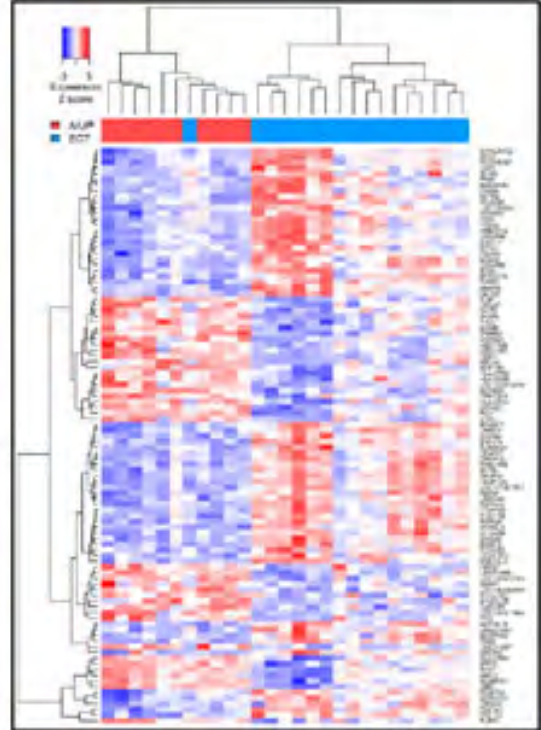
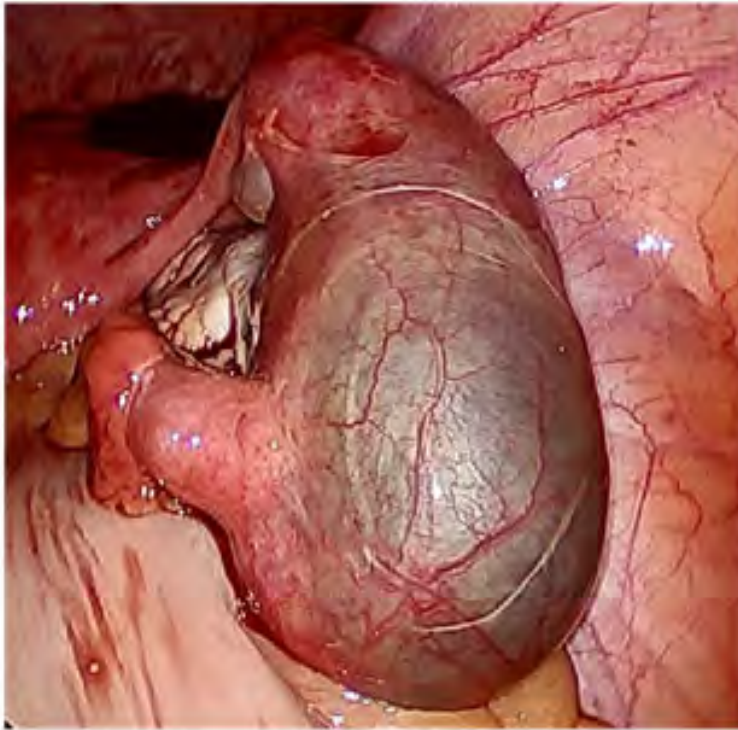
A biomarker or classifier is a molecular analyte or panel of analytes used to diagnose a particular disease condition. Actuarial studies reveal that a biomarker for ectopic pregnancy would save approximately \$1880 in healthcare costs per patient. By abbreviating the number of visits required to diagnose pregnancy location, a biomarker frees up appointments and improves overall access to care. Most importantly, a biomarker that allows the early detection of ectopic reduces the likelihood of tubal rupture associated with diagnostic delay, thereby improving patient safety.

The past decade has witnessed remarkable advances in high throughput molecular techniques

and bioinformatics approaches culminating in more personalized diagnostics and treatments. At Madigan Army Medical Center (MAMC), Precision Medicine Research is facilitated by the Department of Clinical Investigation's (DCI) core laboratory that includes biobank, proteogenomic and bioinformatic services. A team from the Department of Obstetrics and Gynecology led by Dr. Gregory Chow hypothesized that detectable molecular differences in women with ectopic pregnancy compared to women with intrauterine pregnancy exist, and the most reliable differences could be harnessed in a molecular classifier for the early detection of ectopic pregnancy in women with clinically abnormal PUL.

For this project, endometrial samples were collected from 96 women undergoing surgery for an abnormal pregnancy, a cohort which included non-viable PUL, miscarriage or ectopic pregnancy. Of these, 65 samples were selected for global gene expression analysis. A total of 101 genes were found to be differentially expressed in the endometrium of women with ectopic compared to women with an abnormal intrauterine pregnancy. The five most reliably different genes were combined





An ectopic pregnancy can result in tubal rupture which accounts for the mortality associated with this condition. Gene expression profiling of the endometrium from women with ectopic compared with that of women with miscarriage, revealed a 5-gene classifier that reliably delineated pregnancy location.

to form a classifier for pregnancy location that was 96% accurate in diagnosing ectopic pregnancy. Importantly, the five-gene classifier revealed consistent performance (91% accuracy) in an independent test set of specimens collected by a team in Edinburgh, Scotland.

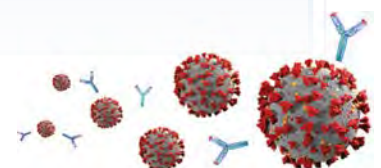
Working with a team at the University of Washington-Tacoma, the MAMC team used the classifier data to develop a software tool that containerized the bioinformatic workflows to optimize reproducibility of results (Almugbel et al, JAMIA 2018). The study results were presented by REI Fellow, Dr. Jessica Lentscher, at the 2019 meeting

of the Society for Reproductive Investigation, winning the Best Investigator Award. This successful Advanced Medical Technology Initiative (AMTI) funded project was selected for a full patent application titled, "Ectopic Pregnancy Kits and Methods" and filed in March 2019.

"Funding from the AMTI program made this go - military GME in partnership with local academic collaborators addressing a gap with patented innovation," commented Dr. Rick Burney, Chief of DCI and a co-investigator. "Given the cost of resources, the refinement and demonstration of this molecular classifier would not have been

possible without the support of the AMTI." To build on these successes, the team will solicit funding to prospectively test the five-gene classifier in a large, multi-site trial.

"COL Burney's project represents the AMTI program's capability to fund small investments in great ideas that have the potential to make a much larger impact on cost, quality, safety, access and readiness," said Ms. Holly Pavliscsak, TATRC's AMTI Program Manager. ■■■



BHSAI's 2B Alert Now Available in the App Store as "Peak Alert"

As you may recall from reading the Q1 edition of the TATRC Times, TATRC's Biotechnology High Performance Computing Software Applications Institute (BHSAI) has successfully licensed the groundbreaking 2B-Alert fatigue-management artificial intelligence (AI) tool, a software system that aims to counteract the negative effects of sleep deprivation and fatigue.

The licensing for the 2B-Alert technology, which was originally developed at TATRC's BHSAI, spearheaded by Dr. Jaques Reifman, BHSAI Director, and licensed via the USAMRDC Medical Technology Transfer Office and TechLink, was ultimately awarded to Integrated Safety Support, a company focused on fatigue training, analysis, and management, as well as solutions that enhance future workforces.

This licensing of '2B-Alert,' has led to its availability for FREE public download in both the Apple App and the Google Play Store as "Peak Alert."

The smartphone app contains proprietary algorithms that predict current and future alertness and cognitive performance based on a series of psychomotor vigilance task (PVT) tests and the individual's sleep and caffeine intake data.

Potential applications for those outside of the U.S. Army

1. Input sleep history (caffeine history optional) manually or automatically with a wearable sleep monitoring device to receive alertness predictions.
2. Occasional completion of short reaction time tests on the smartphone allows the program to "learn" how you respond to variations in nightly sleep duration, and thus generate individualized performance predictions.
3. If there is an upcoming period of time during which maximum alertness is desired, 2B-Alert can provide a caffeine dosing schedule to maximize and sustain alertness and performance during that period.



and military include student exam preparation, scheduling for the transportation industry (truckers, air traffic controllers, pilots, etc.), clinical and research studies involving sleep and caffeine, and planning for any activity where an individual or team needs to be performing at peak cognitive levels during a particular time period.

Through the ten years of development behind 2B-Alert, BHSAI collaborated and partnered with additional scientists from USAMRDC's Walter Reed Army Institute of Research (WRAIR) to further develop the technology, and was also recently featured in WRAIR's Investigative Dispatch on Sleep. ■■■

mHIC's FOXTROT Awarded the 2020 Federal Health IT Innovation Award

The 2020 Federal Health IT Innovation Awards were announced in early June, and TATRC was one of the awardees!

This year's event, originally scheduled for March, moved to a virtual platform on 3 June due to the COVID-19 pandemic and featured an interactive and engaging online event. This annual event recognizes and honors the Federal Health innovation, technology and consulting community to celebrate programs nominated and selected by their peers for driving innovation and results across the Department of Veterans Affairs, Centers for Medicare and Medicaid Services, Military Health, the Department of Health and Human Services.

This year, TATRC's Mobile Health Innovation Center (mHIC) was selected to receive this prestigious award for their work on the Forward Operating Base Expert Telemedicine Resource Utilizing Mobile Application for Trauma (FOXTROT) project.

TATRC partnered with U.S. Air Force 59th Medical Wing to develop a secure mobile application to treat ocular trauma in remote deployed locations. This exciting project intends to develop and test an operationally secure, HIPAA compliant



application to treat combat-related eye trauma injuries. Secure, convenient, and interactive, it provides a streamlined personalized interface. The triage survey feature provides tele-mentoring to correctly perform a basic ophthalmic examination and photograph the eye. The consultation feature of FOXTROT directs users to collect relevant information to generate a consult. The provider at the point of injury routes consultations according to patient's acuity.

A big hearty Congrats to our Team in the mHIC lab and our outstanding colleagues at the USAF 59th Medical Wing for their diligent efforts on this innovative project!

Team TATRC wishes to thank Federal Health IT for this noteworthy recognition. ■■■

