TATRC TIMES
December 2016 • Volume 2, Qtr. 1

A Holiday Message from the Director

COL Dan Kral

"Oh the weather outside is frightful,
but the efforts underway are delightful,
and with so many challenges to go,
let us go, TATRC in tow,
let us go!"

Another year has flown by filled with challenges, opportunities, and new partnerships, and the level of excitement all throughout the halls of TATRC remains as high as ever.

Our entire team remains grateful for the opportunity to continue serving the ever-changing needs of military medicine, while also mindful of the responsibilities we have to our medical warfighters and the challenges they face every day. This is something we take very seriously and you have my word that we will never rest on our laurels!

On behalf of all the dedicated men and women of the Telemedicine & Advanced Technology Research Center, we wish you a Happy Holidays and a Wonderful New Year.

Happy Holidays!
Dan

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TATRC's HTIC Team Hosts Mr. Chris Lynch, Director Of Defense Digital Service

Mr. Chris Lynch, SES III, Director of the DDS, visited with TATRC's Lab Managers on 3 November 2016 to learn about TATRC's mission and to brief TATRC on his DDS's mission and goals. Mr. Lynch was accompanied by Ms. Reina Staley, DDS Operations Director. The meeting genesis was in follow-up to an earlier engagement between Mr. Lynch and TATRC's Health Technology Innovation Center (HTIC) at Madigan Army Medical Center in July 2016.

The DDS (www.digital.mil), is an agency team of the US Digital Service with a mission "... to drive a giant leap forward in the way DoD builds and deploys technology and digital services." DDS operates from the perspective that DoD's progress may be hindered by outdated tools and practices that lag behind private sector standards. They were formed to change the way DoD builds and deploys technology and digital services

DDS Visit to US Army TATRC, 3 Nov 2016 (from left to right, Dr. Francis McVeigh, TATRC Chief Scientist; Ms. Reina Staley, Director, DDS Operations; Mr. Chris Lynch, SES, Director, DDS; Ms. Betty Levine, Senior Research Scientist, TATRC HTIC; Ms. Ollie Gray, Lab Manager, TATRC HTIC; Mr. Tim McCarthy, Deputy Director, TATRC)

Per his LinkedIn profile, Mr. Lynch is a self-described "private serial technology entrepreneurial" and "techno-geek with style", having co-founded start-up companies KCBMedia, Flypaper, Lynch-Seattle, North by Nine, and Thoughtful.Co. He previously worked as a software engineer and product developer at Daptiv, DataLoom, and Microsoft. At DDS, Mr. Lynch now heads a team of about 25 software engineers (or "nerds"), product developers, designers, and policy staffers. Mr. Lynch's team typically works with existing contractors to turnaround troubled DoD software development projects in about 90 days. As he describes his team, "they have special superpowers that they can use to do things that seem impossible". Mr. Lynch's team is working to secure Global Positioning Systems and to improve the Defense Travel System. They traveled to Afghanistan to discuss requirements for tracking engagement with locals in conflict areas. They also created "Hack the Pentagon" competition, which is still ongoing, and while at US Digital Service, led a team to troubleshoot and fix Healthcare.gov when it first launched.

Attending the meeting were TATRC's COL Dan Kral, Director, Mr. Timothy McCarthy, Deputy Director, Dr. Francis McVeigh, Chief Scientist, Ms. Cheryl Merritt, Chief of Business Operations, Ms. Ollie Gray, Lab Manager HTIC, Ms. Betty Levine, Senior Research Scientist, HTIC, Mr. Robert Connors, SME Support, HTIC, Dr. Gary Gilbert, Lab Manager, Operational Telemedicine Lab, Ms. Jeanette Little, Lab Manager, TATRC Mobile Health Innovation Center, Dr. Anders Wallqvist, Deputy Director TATRC Biotechnology High Performance Computing Software Applications Institute, Ms. Lori DeBernardis, PAO, Joint Program Committee - 1 (JPC-1)'s Mr. Dave Thompson, Deputy Director, and USAMRMC HQ's COL Colin Greene.

While at TATRC, Mr. Lynch expressed his keen interest in the integration of DoD, VA, and Civilian electronic medical records, AHLTA-T and how it is used in theater, and the Big Data and analytic work being done at BHSAI. He stated that his group likes to "work on things that matter", and that "small groups can achieve significant accomplishments." TATRC wholeheartedly agrees with this vision. TATRC's HTIC will continue to collaborate with Mr. Lynch regarding how to best collaborate on medical records interoperability, including potential roles for the TATRC Early Stage Platform, which provides a fully-virtualized, remote access, software development, integration, and test environment for early exploration of novel ideas.

HTIC … The Times They Are A Changin'!

The Health Technology Innovation Center (HTIC) is poised to see some major personnel changes after the start of the new year. Ms. Betty Levine is retiring after almost 7 years as an IPA to TATRC and more than 29 years as a research faculty member at Georgetown University (GU). Betty served as a Senior Research Scientist and HTIC Lab Manager while at TATRC. Her primary areas of focus at TATRC and at GU were the application of technology to the delivery of clinical care to improve access and outcomes. Betty is excited to start on the next phase of her life which includes travel, spending time with friends and family, volunteering, and long periods of sailing her sailboat on the Chesapeake Bay.

Ms. Levine taking a "tender" out to her sailboat

Ms. Levine plans on traveling during her retirement

Ms. Ollie Gray has taken over as the Lab Manager for the HTIC. She brings over 25 years of service to the military as both an Army Officer and a Government Civilian employee. Ms. Gray is a registered nurse with her master's degree in nursing and multiple years of experience with the management and development of applications for the electronic health record used by the military health system. She has been the manager of the Early Stage Platform, as well as project manager for numerous other IT projects. She will also take over as Principal Investigator for the Linked Problem List for Joint Legacy Viewer and Team Fitness Tracker funded research efforts.

Congratulations to BOTH Betty AND Ollie! Betty for her long awaited Retirement and the fun that lies ahead, and to Ollie for this well deserved appointment as HTIC's Lab Manager! Your TATRC Family wishes you BOTH the very best!

Ms. Ollie Gray: The new TATRC HTIC Lab Manager

MMSIC Lab Manager and Senior Research Scientist Published in the *Journal of Surgery*

Mr. Geoff Miller, TATRC's Medical Modeling and Simulation Innovation Center Lab Manager and Senior Research Scientist, was recently published in the Journal of Surgery. Mr. Miller was part of a ten-person panel who authored the article, "Using Simulation for Disaster Preparedness." This was based on the work of a multidisciplinary group that was formed at the 8th Annual Meeting of the Consortium of the American College of Surgeons – Accredited Education Institutes, to determine how simulation can be used to prepare the surgical community for high risk events.

This publication looks at how simulation based training can be used to enhance both technical and nontechnical based skills for the surgeon. Using a simulation based training environment, the surgeon can practice and attain competencies that will be useful in what can be termed as high risk, low frequency events. The three main types of situations that the article studied were: mass casualties, dealing with disease outbreaks and preparing for wartime missions. To access the publication, please visit: *http://dx.doi.org/10.1016/j.surg.2016.03.027*.

Congratulations to Mr. Miller on his contributions to this publication.

Mr. Geoffrey Miller, MMSIC Lab Manager

AAMTI Project Spotlight: Lower Musculoskeletal Injury Research at WAMC Yields Rapid Results

Lower musculoskeletal (MSK) injuries are one of the leading causes of healthcare utilization and disability in the US Army. Now, through a project funded by an FY 15 AMEDD Advanced Medical Technology Initiative (AAMTI) grant, a collaborative effort between Womack Army Medical Center (WAMC), Fort Bragg, NC and Stanford University is producing very interesting data regarding this important topic. What's notable is that this was funded just this past April, and results are already available for analysis.

The focus area addressed by the WAMC-Stanford team was the timing and frequency of lower MSK injuries. Specifically, they targeted the effects of body mass index (BMI) and tobacco use on lower MSK injuries and additionally evaluated gender differences. Previous work has shown that women are more likely than their male counterparts to sustain injury during basic combat training. This was the first study to systematically evaluate MKS injuries beyond the initial training period.

The investigators conducted a descriptive, retrospective cohort study utilizing data from the Stanford Military Data Repository (SMDR). The SMDR is a longitudinal dataset organized at the person-month level on the total active-duty US Army population. From the SMDR, electronic health encounter records, administrative data, and electronic profiles were evaluated. There was data available on persons who served at any time between January 2011 and December 2014.

The first study evaluated BMI and tobacco use. Of the 210,088 male enlisted Soldiers evaluated, 44.5% suffered at least one MSK injury. For female enlisted, male officers and female officers, the numbers were 38,611 and 66.5%; 17,378 and 29.7%; and 4,673 and 35.1%; respectively. There is a greater likelihood of suffering a lower MSK injury among underweight, overweight, or obese enlisted men. Lower Army Physical Fitness Test scores were associated with injuries in enlisted Soldiers but not officers. Additionally, tobacco use is consistently associated with injuries except in female officers, who generally have lower overall numbers and low prevalence of smoking.

The second study evaluated gender differences. The study population consisted of 152,749 new Soldiers, including 15.5% females. Total follow-up time was 4,566,290 months. For those initiating service in 2013, the probability of lower extremity MSK injury leading to limited duty days in the first 12 months was 26% compared to 14% for males. This increased probability was true for each of the lower extremity body regions, especially in hips and thighs. Furthermore, secondary analysis showed a consistent gender gap across occupational specialties. Altogether, 4.6 million person-days out of a total of 3.5 million person-months, or approximately 4.4% of service time among the new Soldiers studied, were lost to lower extremity MSK injuries; females averaged 2.7 days per person-month service while males averaged 1.3 days per person-month of service limited by lower extremity MSK injury.

The investigators are excited about their continuing analysis of this dataset and the implications for this and future studies. According to the Principal Investigator, Dr. Y. Sammy Choi, WAMC, "These findings may be particularly important because of the prevalence of obesity (13%) and tobacco use (32%) in the military and the recent DoD policy of gender integration in previously male only occupational specialties, e.g., Special Forces and Infantry. Additionally, they demonstrate the power of big data analytics and the vast potential of the military health system to provide valuable analysis that can affect not only military, but civilian health care."

Dr. Sammy Choi and staff from WAMC met with Holly Pavliscsak, AAMTI Program Manager on 2 November 2016 to discuss the upcoming AAMTI Program for next year.

Both research projects were presented by LTC Sheryl Bedno, MD, DrPH, at the 2016 Military Health System Research Symposium held 15-18 August in Kissimmee, Florida.

Dr. Choi is the Chief, Department of Clinical Investigation, WAMC, Fort Bragg, NC and is the recipient of the FY 15 AAMTI grant.

HTIC Conducts Assessment of BioFire FilmArray

TATRC's Health Technology Innovation Center (HTIC) recently assisted the Next Generation Diagnostics System (NGDS) Program of the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD) to conduct an independent assessment of the BioFire Defense's FilmArray (Figure 1) Laboratory Results Interface (LRI) for Health Level (HL) 7 compliance.

BioFire FilmArray (FA), part of NGDS Increment 1 Deployable Component, is a Food and Drug Administration-cleared diagnostic system capable of detecting and identifying the presence of nucleic acids of biological warfare (BW) agents and infectious diseases. This system provides military healthcare providers with timely and accurate information to guide individual patient treatment, as well as provides battlefield commanders with BW threat information for situational awareness to support Force Protection.

HTIC's software developers assisted JPEO-CBD in defining appropriate requirements for an HL7 LRI Module that will allow the BioFire FA to easily integrate with DoD Military Health Systems, a primary objective of NGDS Increment 1, and align with DoD Healthcare Management System Modernization interoperability and sharing health information efforts using HL7 standards.

The HTIC team set up a secured HL7 Integration Server platform, (Figure 2) in its Early Stage Platform (ESP) Laboratory. HTIC's ESP is a high-tech Cloud based platform that supports a variety of services for advanced health information technology (HIT) research and development software initiatives, and provides BioFire with an HL7 integration testing environment to support Johns Hopkins University Applied Physics Laboratory (JHU/APL) with its efforts in developing test cases to verify BioFire FA HL7 electronic reporting capabilities.

This platform consisted of an open source Mirth Connect to relay all incoming HL7 messages from BioFire FA, to a replica of Composite Healthcare System (CHCS) located at the Joint Information Technology Center network in Hawaii, and vice versa relaying all outgoing messages from that CHCS, back to BioFire FA and a Secure Sockets Layer (SSL) / Transport Layer Security (TLS) proxy tunnel with mutual authentication providing the security for non-TLS backend applications.

Figure 1: FilmArray System

BioFire, JHU/APL and TATRC successfully demonstrated the HL7 capabilities of the FA to JPEO-CBD at a Dry Run Test Event in Salt Lake City, Utah and a formal Scored Test Event at Laurel, Maryland using the aforementioned ESP secured platform.

HTIC Lab Director, Ms. Ollie Gray, stated "the successful testing of the FA among multiple partners, highlights the capabilities of the ESP and the opportunities for potential collaborative partnerships."

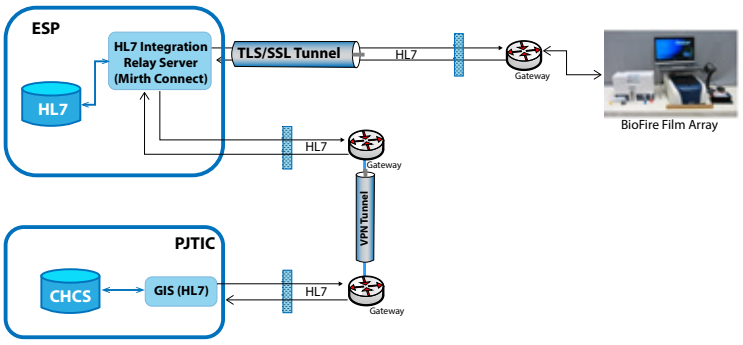

Figure 2: A diagram outlining the performance of the Integration Server Platform

TATRC TRIVIA...

What Army General directed the creation of the original TATRC organization in the early 90's and coined the Army Motto, "Be All That You Can Be?"
(HINT: Non-medical General)
Stay tuned for the answer in our next issue!

Answer from Our Last Trivia Question in Q2:

Q: How many Directors have led the TATRC organization since its inception in 1993?

A: Six Directors have led the TATRC organization since its inception in 1993.

mHIC and BUMED Team Up to Expand MHCE's Reach

In the 3rd and 4th quarters of FY16, the TATRC Mobile Health Innovation Center (mHIC) team worked tirelessly in partnership with the Navy Bureau of Medicine and Surgery (BUMED) to establish the necessary agreements to achieve a Navy "branded" instance of the Mobile Health Care Environment (MHCE) system and secure mCare mobile application. The purpose of this research partnership was envisioned to create mutual efficiencies and synergistically advance Military Health System capabilities through the sharing of expertise, technology, research material, products and facilities.

The Chief Digital Officer for BUMED, Mr. Mark Beckner, spearheaded a Memorandum of Understanding (MOU) with TATRC to establish an mCare presence for demonstration purposes with an interface look and feel that is specific to the US Navy. TATRC and BUMED have common goals of collaborating to enhance and facilitate research on healthcare information technology. This pilot will be used to show how the Navy may leverage the same technology for home monitoring, activity tracking and other established features within the MHCE system as a means of using personal mobile devices in a secure fashion in the future.

The MOU between TATRC and BUMED was signed on 23 September 2016. In the next quarter, TATRC's mHIC will ensure that BUMED has access to both the secure mCare app and web portal with a Navy look and feel for demonstration purposes only.

TATRC's mHIC Lab Manager, Ms. Jeanette Little stated, "Having a collaborative environment like this, for Army and Navy Connected Health projects is a critical first step towards identifying tri-service requirements."

If successful, this could lead to a more in-depth partnership between TATRC and BUMED with regard to connected health projects in the future.

New Partnership with Clemson University to Assess Diabetic Home Monitoring Usability

TATRC mHIC has partnered with Clemson University School of Public Health to pilot a home monitoring assessment for diabetics under case management care at both Joint Base Lewis McCord (JBLM) and Nellis Air Force Base (AFB). The goal of this research project is to determine the impact of home monitoring on patient activation and practical implications of this form of virtual health monitoring in the Patient Centered Medical Home (PCMH) environment.

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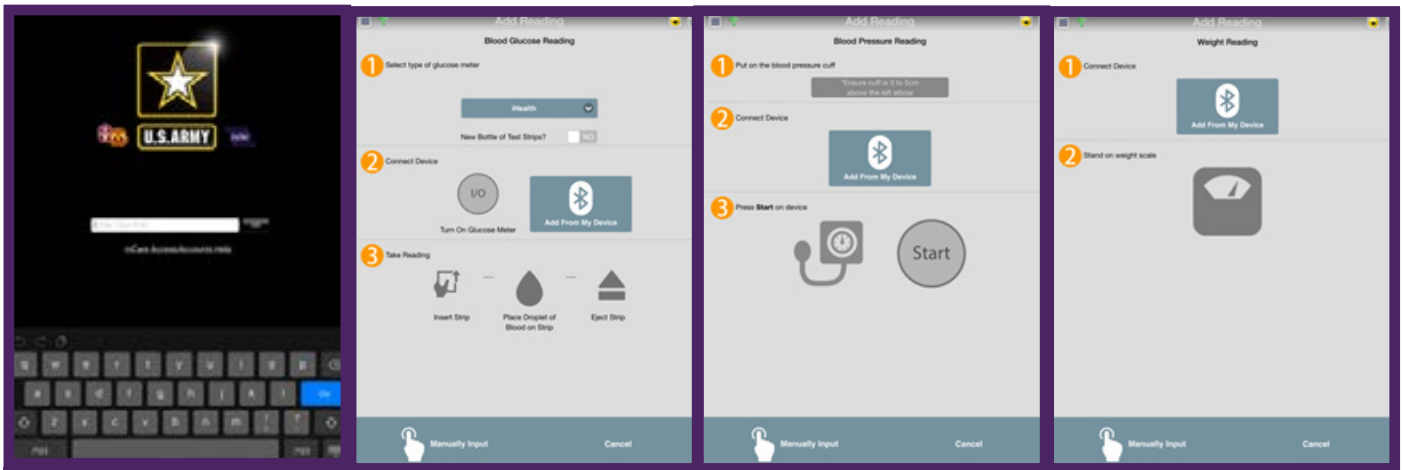


Screen captures of the current mobile version of the patient monitoring application

Clemson, Continued from page 6

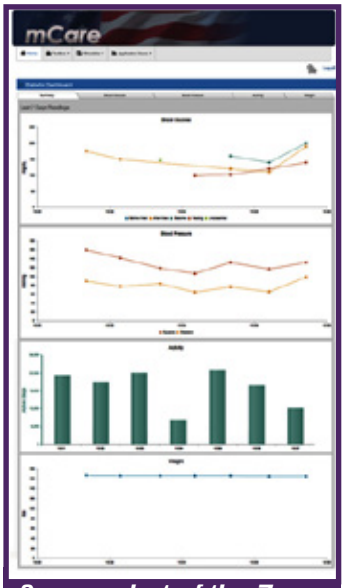
"Both the mobile application and the web-based portal allow for home monitoring data to be viewed as a 7 day summary, comparing blood glucose, blood pressure, activity and weight. In addition, each data type can be viewed as a single day, a 7 day or a 30 day view. Patients can add notes to the readings they take in their homes, and providers can roll over the data points on the graphical views to see the notes, or view them in a text-based summary below the individual graphs. Both patients and providers can sort the graphs by turning on and off data elements, so they can quickly see trends such as blood glucose levels before and after meals, in isolation, or in a comparison manner. "A safety mechanism is imbedded into the application, which alerts patients to either treat incidences of dangerously low or high blood glucose levels, or seek medical assistance with sustained high blood pressure readings," said Amanda Schmeltz, one of TATRC's mHIC Research Project Managers.

The first phase of this two-phase project, which received funding from Joint Program Committee -1, involves a usability assessment of the mobile and provider interfaces for the diabetic home monitoring interfaces within the Mobile Health Care Environment Research (MHCE-R) system. The patients will engage with enhancements to the MHCE-R system and its secure mobile application, mCare. Providers, specifically PCMH Case Managers, will be able to review each patient's progress at home using the MHCE-R secure portal interface.

Screen shot of the Blood Glucose 30 Day Summary on the Provider Portal View

To prepare for the launch of this Phase 1 effort, TATRC's mHIC team was onsite at Clemson University on 21 October conducting the final quality review of the mobile application interface and secure provider portal features with the facility from the School of Public Health who will be conducting the usability assessments at Nellis AFB on November 17th and 18th. Additional usability assessments will be conducted at JBLM on December 1st and 2nd.

"The TATRC mHIC team has been working diligently with the subject matter experts at Clemson University School of Public Health, and the embedded research associates at JBL and Nellis AFB for the past 6 months, and we are excited to finalize the technology solutions for use in the Phase 2 effort. The lessons learned from Phase 1 will allow us to provide the most effective solutions to both patients and providers in the spring of 2017" said Jeanette Little, TATRC mHIC Lab Manager.



Screen shot of the 7 Day Summary on the Provider Portal View

During the usability assessments, consented patients and providers will be introduced to the mobile/portal software features, and the patients will also review the Food and Drug Administration-approved home monitoring devices themselves. Both groups will be systematically asked to complete specific tasks with the applications, and the results of these targeted assessments will be the basis for any adjustments prior to the launch of the Phase 2, randomized controlled research trial in the spring of 2017.

mHIC's Diabetic Home Monitoring Research Project Featured at AMSUS

Two posters were selected for presentation at the 2016 AMSUS Annual Continuing Education Meeting featuring the TATRC's Diabetic Home Monitoring Research Project funded by JPC-1. The event took place in National Harbor, Maryland, 29 November - 2 December 2016. Both posters are a collaborative submission between Clemson University School of Public Health and TATRC mHIC, and showcase their joint efforts and contributions.

The first poster is entitled "Enhancing mHealth technology in the DoD's PCMH environment to activate type-2 diabetes patients" and the second is "New Type-2 diabetes patient tools for the DoD's Mobile Health Care Environment."

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Employee Spotlight

NEW P.O. to Join the Team!

Welcome Stephanie Hutson

Ms. Stephanie Hutson (Steph) has joined our TATRC team as Project Officer primarily supporting the HTIC Lab. She comes with 8 years of experience in outpatient/ambulatory healthcare services with Faculty Physicians Inc., under the University of Maryland Medical System. She supported multiple physicians and midwives within the Department of Obstetrics and Gynecology (OBGYN) with backend and business functions of their EPIC EMR system, CDI issues, served as a liaison for Revenue Cycle Management, participated in the growth of the OBGYN office at University of Maryland Community Medical Group Women's Health, served on Centering Pregnancy© Steering Committee as financial/ insurance expert, and worked as part of the group alongside Anne Arundel County Health Department to pilot the first electronic version of DHMH form 4850 Prenatal Risk Assessment with internal fax capabilities. Stephanie helped manage transportation logistics for the Republican National Committee in 2008 as a Project Manager. She worked with the United States Secret Service on security measures for transportation related vendors, recruited and assigned volunteers, communicated hotel routes, and managed the volunteer mobile phone project.

Stephanie has her Associates Degree in Healthcare Management from Howard Community College and is currently enrolled in the Healthcare Management and Administration program from University of Maryland, University College (UMUC). She has received multiple certifications through the American Academy of Professional Coders to include: Certified Professional Coder, Certified Obstetrics and Gynecological Coder and Certified Professional Biller. Steph plans on pursuing a Project Management Professional certification when she completes her courses at UMUC.

In her new role as Project Officer, Steph will be assisting HTIC Lab Manager, Ms. Ollie Gray with the AGILE Scrub Management for LINKED Problem List and Team Fitness Tracker. She is one of the end user / testers for the Fitness Tracker and provides day to day project management. Additionally, she is supporting TATRC's Chief Scientist, Dr. Francis McVeigh, in the start-up of the new Virtual Health Support Office.

Ms. Stephanie Hutson, Project Officer

Stephanie has a 3 year old pup named Abby who she saved from a rescue. She enjoys visiting Deep Creek Lake in the Summer, water skiing, hiking, and interior decorating. Ms. Hutson eats gluten free (because she has to!) so she ventures out to find accommodating restaurants and the occasional gluten free beer. Stephanie looks forward to learning as much as possible and working with everyone in TEAM TATRC! The TATRC Family is excited to have Steph join the Team!

TATRC 'Stacks the Deck' with Tabitha Waldrop in the New Virtual Health Support Office!

Ms. Tabitha Waldrop will be joining the team and performing project management duties on the newly established Virtual Health Support Office, as well as providing back up support to the Teledermatology, VC3, and MHS Critical Illness and Injuries Network programs. Tabitha holds a Bachelors of Media Arts Degree from the University of South Carolina with a concentration in video and photography; and a MS Degree from Boise State University in Organizational Performance and Workplace Learning. She maintains two professional certifications: the Professional of Human Resources, earned through the Human Resources Certification Institute; and the Project Management Professional, earned through the Project Management Institute. She has an extensive project management background with experience in health care, Department of Energy and DoD environments.

Most recently, Tabitha was the Training Development Supervisor for the LandWarNet School at Fort Gordon, on a contract managed by General Dynamics Mission Systems to train the Warfighter Information Network-Tactical System. There, she led a team of instructional designers, multimedia developers, and simulation designers who spent the last five years redesigning curriculum and creating interactive training content in accordance with the new learner-centric Army Learning Model. Tabitha transferred to this position from General Dynamics Information Technology, where she was the training content developer supporting a contract for Robins Air Force Base, in Warner Robins, GA.

Prior to this opportunity, she worked in Media Services at University Health Care System, in Augusta where her role evolved over time from media specialist, to human resources consultant and later, to computer-based training coordinator. There, she led and supported clinical and corporate projects and daily operational functions of the hospital with photography, video production and graphic design and e-Learning development. Her first job out of college was working as an audiovisual technician at Westinghouse Savannah River Company, Savannah River Site, in Aiken, SC where she led the planning and technical audiovisual element of site-wide events, meetings and conferences; as well as provided one of the site's main labs with photography, video and graphic arts support.

Ms. Tabitha Waldrop, Project Officer for the Virtual Health Support Office

During most weekends in the Spring, early Summer and early Fall months, Tabitha can be found fishing with some of her family and friends at Lake Thurmond, near Augusta. Additionally, Tabitha enjoys nature photography, reading a good mystery novel, watching movies, and spending time on any one of South Carolina's many beaches. But her favorite is Hilton Head Island.

TEAM TATRC Welcomes Tabitha to the Virtual Health Support Office!

Dr. Rob Baumgardner Returns To TATRC to Lead Virtual Health Support Office

Dr. Rob Baumgardner has over forty years of relevant experience with the last 18 in the DoD's Electronic Medical Records (EMR) efforts. He spent 5 years with MHS setting up their IT Architecture group and working on various IPTs and validating several thousand Health Care requirements. Later, he transitioned to the Medical Communications and Combat Casualty Care (MC4) program where for almost ten years, he managed the engineering team and designed, developed and staffed an internal research team that replaced John Hopkins Applied Laboratory as MC4s trusted agent. The last three plus years, were spent with TATRC in support projects under the Operational Telemedicine Lab. His varied career prior to DoD was eclectic as he worked in the Department of Energy (DOE) as a Health Physicist in the area of environmental remediation of nuclear weapons. Additionally, he spent over four years in Commercial Nuclear Power where he managed plant start up, maintenance, and remediation. During this period he was part of the Three Mile Island Recovery Team. He has run a genetics lab, provided executive coaching and organization growth to a wide range of industries. He has managed projects as high as $100 million dollars and as little as $10,000. He has received recognition for his work from the Secretary of the DOE and the Vice President of the United States. He has 5 degrees with the last one a terminal degree. After three days of retirement, COL Dan Kral asked him to come back as a contributor to the new Virtual Health Support Office, maintain the ongoing support of the Tele Behavioral Health Prototype, currently deployed in theater, and to provide support in the implementation of the Army Virtual Health Expansion initiative. When asked what he does his reply is that he is "an Organization Scientist with a broad technical background who wants to help the soldier. "His favorite sayings are; "If you can't measure it, why are you doing it?" and "It's only engineering, we can make this work."

Welcome Back, Dr. Baumgardner!

Dr. Rob Baumgardner, Project Officer for the Virtual Health Support Office

TATRC mHIC Welcomes Mr. Ronald Yeaw to the Team!

The TATRC mHIC team expanded their group just last week with the addition of a new Deputy Lab Manager, Mr. Ronald Everest Yeaw in a civil service position. Ron comes to TATRC mHIC from Northrop Grumman, where he served as the Mobile Health Solutions Manager working with Walter Reed National Military Medical Center to pilot a mobile electronic health interface platform. Ron also has previous experience with Northrop Grumman as part of the development, deployment, and training team of AHLTA, the DoD's recently updated Electronic Health Record system.

Prior to working for Northrop Grumman, Ron was a civil servant assigned to Landstuhl Regional Medical Center as a clinical workflow lead. Mr. Yeaw was a key contributor to the Army's MEDCOM AHLTA Provider Satisfaction (MAPS) program; which received the US Army Surgeon General's Excalibur award in 2010, naming it the most effective new program in Army Medicine. Mr. Yeaw utilizes his background in clinical workflow and process efficiencies to ensure technology is always utilized to enhance the clinical experience, never replace it. For his body of work, Ron was recognized with a Department of Army Superior Civilian Service Award in 2014, the third highest award a civilian can receive in the Army.

Mr. Yeaw is a graduate of James Madison University, with a B.S. in Integrated Science and Technology (ISAT) and has a rich experience in integrating mobile health projects with enterprise systems. Ron's diverse technical and functional background allows him to support both ends of the software spectrum, from software architecture to end-user training and support. Ron has supported military medicine training and deployment missions

Mr. Ron Yeaw, mHIC Deputy Lab Manager

YEAW *Continued on page 11*

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TATRC TIMES

Ms. Courtney Kentrus is TATRC's Q1 Employee of the Quarter!

A heartfelt Congratulations to Ms. Courtney Kentrus who was named, TATRC's Employee of the Quarter for Q1. Ms. Kentrus serves as a Human Resources & Manpower Support Specialist within TATRC's Resource Management Division. While others from the TATRC team also make very important daily contributions to mission success, Ms. Kentrus's untiring efforts are the primary reason that TATRC has been able to execute its's critical personnel requirements. Ms. Kentrus embodies the TATRC mindset of dedication and support.

During this period, Courtney worked diligently to support TATRC's mission by working numerous personnel and manpower requirements. She handled these actions flawlessly insuring they were staffed appropriately and managed to successful completion. She supported TATRC staff with all of their personnel requirements, including in-processing, security and all other administrative needs. She responded to taskers, prepared for PBACs and always kept TATRC's leadership apprised of any personnel or manpower issues. Courtney provides exceptional customer focused support which is epitomized by her support of a recent key civilian hiring action. In this case, she worked tirelessly over the last quarter to assist TATRC's mHIC lab with their new civilian position. This required far more work than should be necessary including: position description classifications, justifications, tracking of transcripts and other tedious details to ensure that the direct hire packet was successfully processed. At one point, the civilian personnel office claimed they did not have the official college transcripts for the prospective candidate, despite having specific tracking records from the university. Courtney was able to personally step in and work out a process to get the sealed transcripts from the University, and then hand carried them over to the civilian personnel office in order to meet the deadline. She truly went the extra mile on this. On another occasion, she worked with the university to hand carry an official memo from the Department Chair at the university to break down the course credits, so that the civilian personnel office could understand why the applicant's degree met the requirements of the position. In each of those instances, Courtney could have sent emails to address the issues, but instead, she took the initiative to personally engage and ensure that nothing fell through the cracks. Courtney's painstaking efforts were a major factor in helping to achieve a goal of expanding the government staff in the mHIC intramural lab. As with all of her work, she never complained about taking on the extra workload, and did all she could to not let this action drop. She became very personally invested to ensure that this action was successful. This effort typifies her dedication to her duties and represents the conscientious and extremely professional support she provides on a daily basis to all TATRC personnel.

Ms. Courtney Kentrus, *Human Resources and Manpower Support Specialist*

Congratulations to Ms. Courtney Kentrus for going "above and beyond!"

YEAW *Continued from page 10*

all over the world, from Alaska to Hawaii to Korea to all corners of the Army's European Medical Command.

Ron is an avid adventurist, looking for new challenges and tests of spirit wherever he can find them. He's taken on the bulls of Pamplona, the summits of Mt Fuji, and most recently the trials of the Marine Corps Marathon. This summer he'll be joining several Army Docs and his twin sister in taking on his toughest test yet, a 76 mile hike from Kathmandu to Everest Base Camp. Mt. Everest has a special place in Ron's family, as his great, great grandfather was George Everest; the man for whom the mountain takes its name. Every member of the Yeaw family since his Grandmother, Grace Everest, has taken Everest as their middle name. Ron's goal will be to place the Everest family crest on the mountain.

Ron is resident of Ashburn, Virginia and is joined by his wife of twelve years, Rachel, and his two young daughters Anna and Kara Everest. After a lengthy hiring process, Ron is excited to roll up his sleeves and get to work supporting TATRC and the Mobile Health Innovation Center.

TATRC Collaborates with USAARL on Drone Medical Mission Research

Can Drones be used to support combat casualty care? With the help of researchers from the US Army Aeromedical Research Laboratory (USAARL), the TATRC Operational Telemedicine Lab is about to find out. From November 7 - 9, Mr. Nathan Fisher and Ms. Rebecca Lee traveled to Fort Rucker, Alabama to kick off the Emergency Medical Resupply and Enroute Care Unmanned Air System (UAS) Research Platform project. The Joint Program Committee - 6 funded the project which is intended to leverage a small twin rotor UAS (initially prototyped under a TATRC SBIR project) to develop a UAS research platform capable of conducting medical operations such as medical resupply and simulated casualty evacuation and to support other medical research, development, test and evaluation initiatives. These efforts are intended to fill research gaps identified in the 2012 NATO Report on "Safe Ride Standards for Casualty Evacuation Using Unmanned Aerial Vehicles," to address future operational concepts included in the Vice Chair, Joint Chiefs of Staff, October 2016, Joint Concept for Robotic & Autonomous Systems, and to inform the military medical community on the potential of emerging UAS technologies for supporting combat casualty care and force health protection missions.

Mr. Fisher tours USAARL's Black Hawk Simulator

The project is a phased research effort that initially focuses on near-term capabilities such as emergency medical resupply, but the platform will be developed to also be capable of supporting long-term research efforts involving unmanned patient transport. During Phase I, TATRC will be the lead systems integrator and will lead the development of a UAS Emergency Medical Resupply Concept of Operations for the field demonstration. USAARL will lead the design and development effort of the Environmental Factors Data Acquisition System (DAS), a research payload that would enable data acquisition of in-flight conditions of the interior cargo area of the aircraft pertinent to future medical missions focused on utilizing unmanned systems, to include environmental effects important during patient transport (e.g. peak acceleration, temperature, barometric pressure, shock and vibration). At the end of the Phase I research, TATRC will lead the integration, test, and demonstration of the DAS-equipped UAS research platform at a future field evaluation.

During their visit to Fort Rucker, TATRC researchers conducted project planning activities with collaborators at USAARL for the first phase of the project. USAARL provided a tour of their facilities to demonstrate their core competencies which included a multi-axis ride simulator to replicate ride signatures of ground and air vehicles, medical equipment testing and evaluation facilities, acoustics research chambers, and a Black Hawk flight simulator. The team was introduced to the different divisions and researchers whose expertise will be instrumental to the success of the project.

Mr. Nathan Fisher, TATRC's Principal Investigator, said, "It is important to have a rigorous method of quantifying the environmental conditions in the interior space of UAS platforms to fully understand the implications of utilizing emerging UAS platforms for medical operations. USAARL has both the required engineering expertise and laboratory facilities to design and verify a robust environmental factors data acquisition system for this purpose. We are very glad to have USAARL on the project team."

USAARL's Multi-Axis Ride Simulator (MARS) being tested.

Moulage Tattoos: A New Innovative, Alternative to Traditional Moulage

The AMEDD Advanced Medical Technology Initiative (AAMTI) is proud to announce its first ever AAMTI Rapid Innovation Fund recipient! Dr. Joseph Lopreiato submitted a proposal for a project entitled "Temporary Tattoo Rapid Application Moulage Kits." These moulage tattoo kits are based on illustrations created by Medical Illustrator, Elizabeth Weissbrod at the Val G. Hemming Simulation Center at Uniformed Services University of the Health Sciences (USUHS). This project demonstrates how creating realistic, rapid application and cost effective moulage tattoos can fully engage learners and personnel for medical training exercises and courses.

An actual example of a burn Moulage tattoo.

Moulage is the art of applying mock injuries for the purpose of training Emergency Response Teams and other medical and military personnel. Moulage may be as simple as applying pre-made rubber or latex "wounds" to a healthy "patient's" limbs, chest, head, etc., or as complex as using makeup and theatre techniques to provide elements of realism (such as blood, vomitus, open fractures, etc.) to the training simulation. The practice dates to at least the Renaissance, when wax figures were used for this purpose.

Training scenarios often require the application of moulage and traditionally, they are created using various types of stage makeup and/or silicone prosthetics. The process requires a trained moulage artist(s) on staff and each application can take up to 20 minutes of application time per patient. If moulage artists are not adequately trained, the applied moulage may be poor and detrimentally affect the quality and effectiveness of the training.

There are many courses offered to military personnel that could be enhanced and improved if temporary tattoo moulage packets were provided. Advanced Traumatic Life Support and Tactical Combat Casualty Care courses are examples where excellent moulage can really enhance the learner's experience. Inadequate or poorly applied moulage can greatly decrease the efficacy of training for learners even if the medical training portion is superb. This project demonstrates how issues with traditional moulage can be alleviated through the use of pre-made moulage tattoo packets that correlate directly and consistently with the scenarios associated with the course. The creation and implantation of using temporary tattoos for use with moulage application has the potential to create a significant impact on the quality, application time and cost of training for military service members.

"It's exciting to see the advances and improvements to the traditional moulage kits and how having something like

Tattoos *Continued on page 14*

Pictured from Left to Right are Ms. Elizabeth Weissbrod (USUHS), Mr. Geoff Miller (MMSIC Lab Manager), Ms. Holly Pavliscsak (AAMTI Program Manager), Dr. Joe Lopreiato (USUHS) and Ms. Sharon Garlena (AAMTI Project Officer) on tour of Val G. Hemming Simulation Center.

2B-Alert Web: An Open-Access Web Tool for Predicting Alertness!

We are constantly bombarded with information about the value of a good night's sleep. The benefits of sleep range from improved performance and alertness to reduction in the incidence of heart disease, diabetes, and obesity. But is there a way to plan our sleep so that we can optimize our performance during desired periods? Thanks to the efforts of Dr. Jaques Reifman and his colleagues at TATRC's Biotechnology High Performance Computing Software Applications Institute now there is a free web-based tool that can do just that.

In a publication that appears in this month's December issue of the scientific journal *Sleep**, Reifman describes how his team developed a publicly available computational tool, called *2B-Alert Web*. This tool not only predicts the effects of daily sleep on alertness, but goes further than that to account for the beneficial effects of caffeine intake on alertness. It incorporates the latest scientific findings on sleep restriction, sleep extension, and recovery sleep, and how they affect alertness. In practical terms, the web-based tool allows an individual to input their sleep and caffeine intake history and then uses powerful algorithms to predict alertness into the future. Furthermore, the user can input hypothetical future sleep and caffeine events and examine how they would affect their alertness. This way, the user has the flexibility to test how different sleep and caffeine scenarios might fit their specific alertness requirements. For example, a shift worker might try different sleep and caffeine scenarios so that his alertness would be optimized during his shift period. *2B-Alert Web* combines the validated Unified Model of Performance and caffeine models to form a single, integrated framework. These models provide group-average predictions of neurobehavioral performance based on psychomotor vigilance tasks.

2B-Alert Web is accessible at: ***https://sleep.bhsai.org***, where interested users can register for a free, password-protected account. The tool allows for simultaneous display of up to seven different sleep/caffeine schedules. The schedules and corresponding predicted alertness outputs can be saved as Microsoft Excel files, while the corresponding plots can be saved as image files. All schedule and prediction data are erased when the user logs off, thus ensuring privacy and confidentiality. This tool should be of interest to any member of the public who wants to know how to plan their sleep and caffeine intake to optimize their alertness and performance. In particular, air traffic controllers, shift workers, and health professionals, who need optimized duty-time alertness and minimized fatigue-related errors or accidents, might find it particularly beneficial. Furthermore, this tool will hopefully enhance public awareness of the beneficial effects of sleep on alertness and performance.

Users input their sleep and caffeine schedules in the two tables on the right side of the screen and then hit the "Predict" button. The software then returns a graph on the left side of the screen that shows predicted alertness statistics. The user can select from three different alertness statistics to be displayed: mean response time, mean speed, or number of lapses (where a "lapse" is defined as a response time equal to or greater than half a second). A "Help" button offers concise information on model assumptions, alertness statistics, and instructions on how to use the tool.

*Reifman J., Kumar K. Wesensten N.J., Tountas N.A., Balkin T.J., Ramakrishnan S. 2B-Alert Web: An Open-Access Tool for Predicting the Effects of Sleep/Wake Schedules and Caffeine Consumption on Neurobehavioral Performance. *Sleep*. 2016; 39(12):2157-2159.

Tatoos, *Continued from page 13*

this is enhancing training experiences for medics," stated Mr. Geoff Miller, TATRC's Medical Modeling and Simulation Innovation Center's Lab Manager.

AAMTI Program Manager, Holly Pavliscsak and AAMTI Project Officer, Sharon Garlena recently visited Dr. Lopreiato and Ms. Weissbrod at the Val G. Hemming Simulation Center at USUHS along with Mr. Geoff Miller, to discuss this project.

TATRC Supports Air Casevac Telemedicine Evaluation At AWA 17.1

"Following B Company, 1/6 Infantry's air assault to seize and secure an air field, a soldier received multiple gunshot wounds while repelling a mounted enemies' counterattack. The medics provide the first medical response and transport the casualty to the Battalion Aid Station. The Battalion Surgeon immediately requests for aerial evacuation to the Forward Surgical Team, co-located with C Company ('Charlie Med'), 47th Brigade Support Battalion for additional stabilization. Upon arrival of Dustoff 36, the flight medic employs his Tempus Pro Patient Monitor to capture the patient's vital signs and document care provided on a DD Form 1380. The flight medic uses text chat capabilities augmented with pictures and streaming medical telemetry to receive additional guidance from Charlie Med company clinical personnel while the patient is enroute. Upon arrival at Charlie Med, the patient is transported immediately into the Forward Surgical Team's operating room that has been thoroughly prepared to provide the appropriate level of stabilization care that was informed by the patient's medical situation obtained during the transport."

This was one of the scenarios played out in real time during the concluding week of the Army Warfighter Assessment (AWA) exercises which was conducted from 11 September to 28 October 2016 at Fort Bliss, Texas and White Sands Missile Range, New Mexico. At the AWA exercise, TATRC supported the US Army Program Executive Office (PEO) Aviation evaluation of the impacts of Aviation Wide Network Waveform (WNW) communications for Army Aviation Platforms on the communications capability within Brigade Operations. TATRC supplied equipment and technical support to provide a representative telemedicine capability to inject medical information flows from a UH-60L Blackhawk Helicopter to a Ground Station located at a Brigade Medical Company through the network by providing medical telemetry, chat, and still imagery from a Tempus Pro Physiological Monitor with Telemedicine Reachback capability. Army AWA exercises are performed annually in the Autumn, opposite the Spring-time Army Network Integration Evaluations, by Army PM Systems Of Systems Integration, Army Test & Evaluation Command (ATEC), and the TRADOC Brigade Modernization Command supported by the 1st Armored Division 2nd Brigade Combat Team (BCT).

With Mr. Larry Markins' support as the

Combat Medic uses TEMPUS Pro in flight to send patient information via the DD form 1380.

TATRC subject matter expert to Army PEO Aviation and Aviation Applied Technology Directorate, the engineering team successfully completed pre-integration, setup and validation for Tempus Pro patient monitor into the Aviation Communications and Aircraft from 11-24 September 2016. Two UH-60L Blackhawk Helicopters were equipped with Tele-Medicine systems, consisting of a Tempus Pro with a tactical encryption device, which was required in order to transmit unclassified medical information through the Brigade's classified tactical radio network to an unclassified ground station.

The telemedicine capabilities on the UH-60L Blackhawk helicopters were exercised in support of Casualty Evacuation missions on 14, 19, 23 and 27 October 2016. During these missions, Flight Medics SFC Barnes, SGT Black and SGT Munro from the 2nd BCT 47th Brigade Support Battalion (BSB) completed Tactical Combat Casualty Care (TCCC)(DD-1380) medical records, sent operational relevant pictures and used the two-way Chat features provided by the Tempus Pro over an onboard WNW Radio that provided reliable air to ground communications with range extension up to 142 kilometers. WNW is the Army's mid-tier (Battalion/Brigade) wave form for implementation of Joint Tactical Radio System software defined tactical radio systems. Additionally, Mr. Markins provided technical support at the 47th BSB Medical Company C during the Air Assault Mission conducted on 27 October 2016. "Charlie Med" had ac-

Air Casevac *Continued on page 16*

Air Casevac *Continued from page 15*

cess to the live vital signs data, still imagery, chat capabilities, and the TCCC card prior to the patient's arrival. As a result of these modifications to the aircraft, a BCT Medical Company can provide teleconsultation to the flight medic and have full patient situational awareness to facilitate the proper medical response upon arrival of the patient.

While medical video capability was not exercised during the AWA, video capability for Mission Command and Control was exercised by providing inflight video of the Air Assault Landing Zone from AH-64 Apache Attack Helicopters to the leaders and Soldiers approaching in the Blackhawk UH-60L helicopters. The onboard WNW capabilities provided a high-bandwidth solution that facilitated the use of video. According to Al Abejon, the lead integrator from PM Aviation Systems, "These high-bandwidth communication systems onboard the Army Aviation Platforms will not only enhance Aviation's ability to communicate, but also provide the Unit Commanders in-flight planning and execution capabilities while conducting Air Ground Operations. These systems will also facilitate better decision-making during a casualty's aerial evacuation to improve patient treatment outcomes."

This tactical telemedicine capability could potentially fill a key operational medicine gap identified by the Surgeons of the 75th Ranger Regiment and 160th Special Operations Aviation Regiment in air-to-ground-to-air medical information exchange among medics on the ground and those in the air during CASEVAC missions.

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lori.a.debernardis.ctr@mail.mil

Upcoming Events:

11 - 14 December: PCHA Connected Health Conference, National Harbor, MD

28 January - 1 February: IMSH Annual Conference; Orlando, FL

19 - 23 February: HIMSS Annual Conference; Orlando, FL

16 January: Martin Luther King Day (Observed Holiday)

20 February: President's Day (Observed Holiday)

12 March: Daylight Savings Time Begins (Spring Ahead!)

mHIC and HTIC Join Forces with T2 to Put Behavioral Change Coach into Production

On October 12, 2016 a face to face meeting took place at Ft. Detrick on the Behavioral Change Coach (BCC) Project to kick off active production. This Joint Program Committee – 1 funded project is a unique and collaborative partnership between the National Center for Telehealth and Technology (T2) and two of TATRC's intramural labs, the Mobile Health Innovation Center (mHIC) and the Health Technology Innovation Center (HTIC).

The BCC project is a readiness enhancing technology effort designed to help Service Members change any behavior or condition they are struggling with. It is based on the Transtheoretical Model of Change.

The goal of the BCC project is to address the lack of motivation and unsuccessful attempts to change behaviors of mental health concerns in US military personnel. Some examples are: attempting to quit smoking, lose weight, reduce alcohol use, be a better parent, spouse, employee, or improve depression. These behaviors or conditions have a high impact on the healthcare costs for the DoD. Development of an empirically supported technology application focused on assisting military personnel to change any problem or behavior will likely increase readiness and reduce overall DoD healthcare costs.

The BCC Mobile App product allows the user to identify one or several behaviors to change, then assesses their stage of change, and routes the user to the appropriate readiness enhancement exercises based on their motivation to change.

This is an example of a preliminary screen capture for BCC

There are three major phases to the BCC project:

Phase 1: Development of a native (e.g. stand alone) mobile application called "BECOME"

Phase 2: Integration of the "BECOME" mobile app into the Mobile Health Care Environment – Research (MHCE-R) Center to provide a bi-directional version of the content that can allow assigned behavioral health providers to track their patient's progress between clinical encounters.

Phase 3: Expansion of the MHCE-R system to request and retrieve synthetic patient data related to the ICD-10 codes which are key to the "BECOME" functions.

At this time, the T2 team is actively developing the native BECOME application. To prepare for phase 2 and 3 of the project effort, the mHIC team is jointly designing the provider portal interfaces to view patients' progress on the BECOME app exercises and view their progress graphically through the transtheoretical stages of change. In addition, the HTIC team is preparing the necessary synthetic patient data so that the objectives of phase 3 of the project can be realized.

Ms. Jeanette Little, TATRC's mHIC Lab Manager stated, "The TATRC Team is excited about the BCC project because of its utility, but also because of the collaborative nature of the effort, as it will connect the expertise of T2, HTIC and mHIC on one project, which will strengthen the functions of the resulting connected health product."

AAMTI Announces the FY 18 Schedule:

6 JANUARY 2017 – Open for Pre-proposal submissions

12 APRIL 2017 - Closed for Pre-proposal submissions

21 JUNE 2017 - Open for Full proposal submissions

28 JULY 2017 – Closed for full proposal submissions

30 SEPTEMBER 2017 - AAMTI Award Notifications

For more information on the AAMTI Program and how to submit your proposals, please visit: ***http://www.tatrc.org/www/labs-and-programs/aamti/***.

Integration of Secure Point-Of-Care Physiologic Data via Ultra-Wideband Communications for Special Operations Forces

"During a Foreign Internal Defense Special Operations Mission, a United States Special Forces Medic at a makeshift hasty clinic finds himself treating four coalition casualties as a result of direct actions against a subversive force. As he provides treatment, the medic is able to monitor the most severely injured casualty with a TEMPUS-Pro patient monitoring and telemedicine device while simultaneously monitoring the other three casualties with telemetry data generated on smaller Visi Mobile monitors and displayed on the TEMPUS-Pro screen. Likewise, he is able to post physiological monitoring data from all four patients to individual electronic DD1380 Tactical Combat Casualty Care cards on his Android Tactical Assault Kit (ATAK) End User Device (EUD). Noticing a significant change on the TEMPUS-Pro screen from one of the patients monitored with the Visi Mobile devices, the medic refocuses his efforts on that patient and generates an updated DD1380 on his ATAK EUD. Recognizing his unfamiliarity with the medical complications of the patient, the medic switches this patient to the TEMPUS-Pro device, sends the updated DD1380 to a surgeon, initiates remote telemonitoring through the Virtual Combat Critical Care program, and conducts a tele-consultation with the surgeon, augmented with medical telemetry and still images of the patient."

The Operational Telemedicine Lab has partnered with the Product Manager, Special Operations Forces Survival, Support, and Equipment Systems (SOF SSES) to develop an integrated capability to enable Special Operations Medical Personnel to monitor patient status and document healthcare rendered for multiple casualties. Through a new Phase III SBIR contract with a small Ultra-WideBand (UWB) communications company, the Tempus Pro Monitor fielded through the SOF SSES Casualty Evacuation Tactical Combat Casualty Care (TCCC) program, will be integrated with up to four Visi-mobile medical devices and the US SOCOM ATAK EUD through an UWB network to facilitate bi-directional data sharing between devices. TATRC's Project Manager, James Beach, stated "The networked medical devices are an incremental step towards augmenting the capabilities of the on-ground SOF medical personnel with remote monitoring and may provide the opportunity for decision support in the triage management of casualties." The secure wireless capabilities will help preserve the freedom of movement of the on-ground clinical personnel. The light-weight portable capability is easily transportable and well-suited for use in vehicles and fixed operational bases. The patients' information from the medical devices would be automatically populated into the DD Form 1380 with the SOF Medic's treatment notes as described in the above scenario. Previous research has established the feasibility of importing the DD Form 1380 into the currently fielded deployable electronic health record. Future efforts would be geared toward the integration of medical decision support capabilities, as well as evaluating the feasibility of transferring the DD Form 1380 into the future electronic health record. The most significant challenge is monitoring the commercial partners' willingness and ability to support the current and future integration of the product.

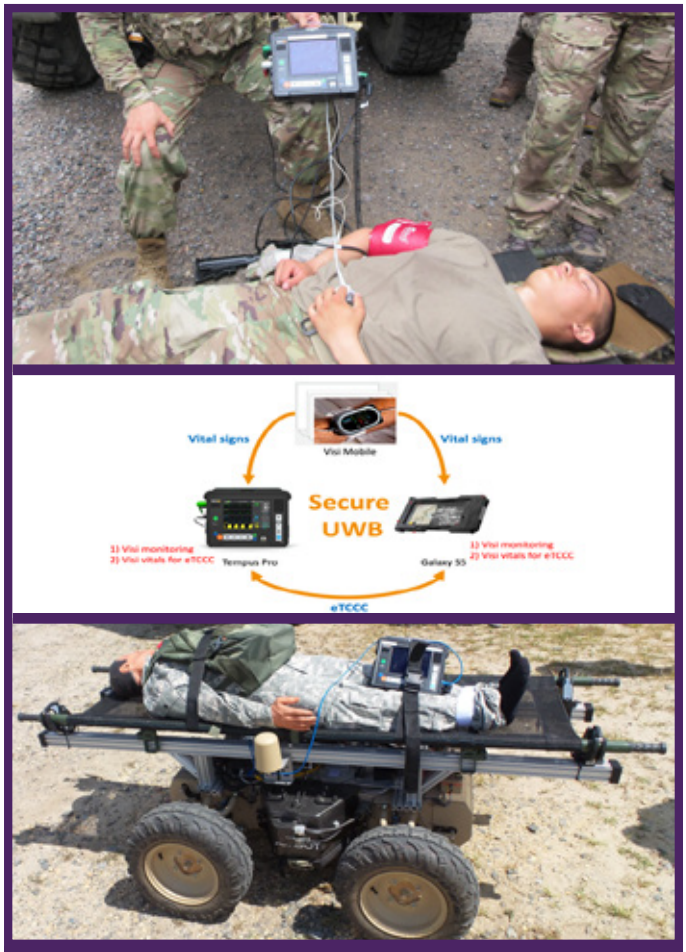

Figure 1, Secure Point of Care Physiologic Data Via UWB

Lives Forever Altered by Effects of Drunk Driver

Fort Gordon Public Affairs Office

Behind every drunk driving statistic are several lives affected by one person's bad decision making. As the community immerses itself in the holiday season, one local man is making a plea: Celebrate the season, but do so in a responsible manner.

According to Centers for Disease Control and Prevention, one person in the United States dies every 53 minutes in a motor vehicle crash involving an alcohol-impaired driver. That's 28 deaths every day in accidents that could have been prevented. It's a statistic Edward Kensinger never expected he'd have a close connection to. Kensinger, a senior project manager with TATRC's mHIC Lab in Fort Gordon, GA, lost his daughter, Alaina, to a drunk driver March 3, 2013. Alaina, 28, was on her way home from a concert in Athens, Georgia, when the car she was riding in left the road and hit a guardrail. She left behind a son, 9 at the time, and a brother who was two years younger than her.

Results from the Georgia Bureau of Investigations Crime Lab showed that the driver, Alaina's boyfriend and close friend of the Kensingers', had a blood alcohol level of 0.165; twice the legal limit of 0.08. He suffered minor injuries and was released from the hospital, then arrested and charged with vehicular homicide. He was sentenced to 10 years in prison plus five years of probation.

"You never think it could ever happen to you," Edward said. "It was something I only saw on the 6 o'clock news."

Edward described the driver as a "very good kid" who prior to the accident never had any run-ins with the law. But a decision to drink then get behind the wheel caused a series of repercussions that cannot be undone.

"He made one life-altering mistake that affected dozens and dozens of people; not only my family, but his family has suffered through the fact that he has been a prisoner," Edward said.

Reflecting on the day he had to say "goodbye" to his daughter, Edward said it became clear that the impact of Alaina's death hit hard across the community.

"At Alaina's funeral, literally the line of family, friends, and acquaintances stretched out of the building, and completely around the building," Edward recalled. "It was just … it was devastating, not just for us."

From the financial impact stemming from medical bills, lawyer fees, and an adoption to the immeasurable emotional impact of losing one's child, Edward and his family's lives have been altered in ways they had never imagined possible.

Edward and his wife, Nancy, have since adopted Alaina's son, who is now 13. And although life for the Kensingers has regained a sense of normalcy, there is a pain and feeling of incompleteness that simply doesn't go away.

And perhaps the worst part about the incident is knowing it could – and should – have been prevented.

"The reality of this is his situation is not uncommon," said Michael Reed, Army Substance Abuse Program prevention coordinator manager.

Edward is teaming up with Reed to get the word out that driving after drinking is NOT OK. It only takes one standard alcoholic drink for a person to be considered impaired. Reed said people need to wait a minimum of 45 minutes before getting behind the wheel of a vehicle after they've had a standard drink.

"You may not be drunk, but you could be impaired enough to throw your reflexes – your reaction time – off enough to where something bad happens," Reed said. "People get behind the wheel and they have a tolerance built up, and they can function pretty well, but that doesn't mean they're not impaired."

Reed provides mandated alcohol and substance abuse training for the Fort Gordon community. Yet despite sharing statistics and stories of those who have been affected by impaired driving, people continue to get behind the wheel when they should not.

"I'm not here to tell you not to drink," Reed said. "What I am here to tell you is that if you choose to drink, do so in a manner that protects you as well as the things and people you value, because it doesn't take but a split second to change your life forever."

With holiday parties and festive gatherings happening all around, Edward urges people to plan ahead. Have a designated driver you can count on to stay sober, call a cab, make arrangements for staying overnight. Take advantage of one of the Smartphone apps, such as Uber or similar.

"They can hit the app on their phone and get a ride in a matter of minutes," Edward said. "Then you've taken what could have been a bad situation, made a sound decision, and you're going to get home safe and everyone else is going to be safe."

The main message Edward hopes to get across is to not drive impaired. Period.

"You can't control someone else, but you can control your own actions," Edward said. "The challenge to everyone reading this is to exert that control positively and to not give control to a substance."

Edward shared more of his personal story during the Cyber Center of Excellence Holiday Leave Safety Show at Alexander Hall and reminds everyone to be safe.

TATRC Assisting in the Development of New Medical Simulation Training Center (MSTC) Advancements

This article is adapted from a presentation on "Developing, Sustaining and Assuring Technical/Procedural Readiness in Military Medical Personnel," given by Mr. Geoffrey Miller, Telemedicine and Advanced Technology Research Center (TATRC) Medical Modeling and Simulation Innovation Center (MMSIC) Lab Manager and Research Scientist, provided at the Medical Simulation Training Center (MSTC) Working Group Meeting To Develop A New MSTC Increment II Capability Production Document (CPD), hosted at the AMEDD Center & School/HRCoE, 27-29 SEP16.

**This is the first article of a three part series on enhancing training effectiveness, sustainment and transfer to practice of military health healthcare personnel. These articles will provide the reader with evidence-based and informed rationale for developing future military education and training effectiveness.*

1. Acquisition – How We Develop Technical/Procedural Skills

Introduction

The main goal of any training program is to prepare trainees to perform effectively on post-training tasks in a real-world setting. A fundamental problem is ever present however, that acquisition of a skill does not provide evidence that the learner will be able to perform in contexts that differ from the training context or altered versions of the training task, which may arise in real-world settings. Simply, learning and performance are not the same… at a later time the learner may perform quite differently and that performance may be at an inadequate level. Further, the MHS spends significant time and resources training its personnel to provide them with the knowledge and skills necessary to perform life-saving tasks, both on the battlefield and at home. However, personnel may fail to retain specialized knowledge and skills if they are not applied during the typical periods of nonuse within the military deployment cycle, and retention of critical knowledge and skills is crucial to the successful care of military personnel (Perez 2013).

To achieve educational excellence and assure readiness of military medical professionals, we must first carefully consider a systematic approach to knowledge, skill and behavioral development (Figure 1).

There is substantial literature focused on the science of skill acquisition, retention and transfer. For our purposes

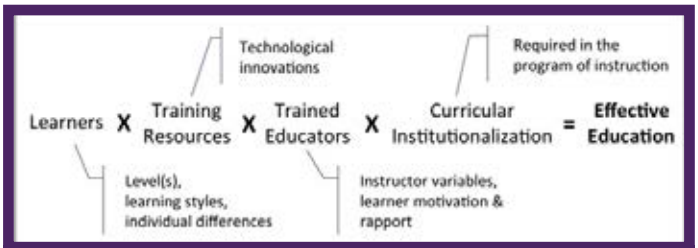

Figure 1. Formula for effective simulation-based education (adapted from Issenberg, SB (2006).

in this article, these terms are defined as follows: 1) acquisition – developing and gaining new knowledge, skills or behaviors, 2) Retention – the durability of flexibility of the acquired skills, and 3) transfer – the ability to apply these skills to new contexts, situations and environments (Figure 2). The following outlines key points from this body of knowledge, which the TATRC MMSIC is employing to assure and advance the effectiveness of simulation-based training and assessment, and readiness of military medical personnel.

Figure 2. Acquisition, retention and transfer continuum.

Acquisition

Acquisition of knowledge, skill or behavior can be broken down into three distinct stages: the cognitive, associative and autonomous. In the cognitive stage of acquisition, the focus is on the early identification and understanding of the skill to be learned. Here, the main focus of learners' effort centers on what they need to know or know how to do. This typically involves a range of instructional and learner activities such as watching, thinking, analyzing, reasoning, judging, and visualizing rather than hands-on practice.

To begin the acquisition or learning process, learners need to develop an in-depth understanding of the skill to be acquired. As this is usually the first experience a learner has with the skill, they require simple, frequently algorithmic instruction with active guidance and instruction. One might think of this as the "coaching" phase of instruction,

MSTC *Continued on page 21*

MSTC *Continued from page 20*

where the instructor is much more actively engaged in the learning process, actively mentoring, breaking complex skills down into smaller sub-skills, and providing corrective feedback and accurate demonstration for performance improvement. This stage is characterized by learners making many mistakes, engaging in "trial-and-error" and actively thinking about each step of a procedure, at times leading to jerky movement patterns, pauses, uncertainty, or poor fluency of actions. Instructors should look for these indicators to aid in providing specific feedback, but should also allow the learner to experience them and work to resolve them.

The second phase of acquisition is the associative, where the focus shifts to practice, specifically "deliberate and repetitive practice", with frequent active extrinsic, accurate feedback for performance improvement and precision of skill development. Practice at this stage increases the learners' ability to perform the skill or task. Frequently learners will remain in this stage for a longer period of time, though the specific length of time is specific to: the standards setting for error-free performance, complexity of the skill or task to be performed, and individual differences between learner's ability to accomplish the skill or task. AP

The importance of deliberate and repetitive practice is very important during this stage. Many are familiar with the maxim – "practice makes perfect", however there is substantial evidence that it is rarely this simple, and that practice only creates "permanence". Imagine a learner approaching a new task or skill, which requires development of psychomotor tasks. If the learner is not fully prepared to take on the task, is not mentored and supervised in the performance of the task with frequent corrective feedback, they may engage in "imperfect practice" leading to incorrect or inappropriate procedural skill development and worse incorrect use or implementation of a procedural skill in the operational environment leading to poor outcomes. To counter this undesired performance outcome a deliberate and repetitive practice model (Ericsson 2004) must be employed with frequent, active and accurate feedback to the learner to blunt the development of incorrect procedural skill development (Figure 3).

This deliberate and repetitive practice aids in increasing the learners ability to perform the skill or task, smoothing actions required to synchronize mind and muscles in movement. Ideally, over time errors become less frequent, and though feedback is still essential for skill precision, internal feedback (from the learners self-reflection of performance) becomes more reliable and accurate in the skill development process. These skills are important in transitioning the learner from step-wise, algorithmic thinking to more fluid action and motor sequences.

Figure 3. Ericsson's Deliberate and Repetitive Practice Model.

The final stage of acquisition is the autonomous, which revolves around the automaticity of procedural skills, without the need to stop and think about what to do, or what to do next. This stage is the advanced level of performance development, where the learner can perform the skill fluently and instinctively, where outside influences do not affect the desired outcome. This stage also involves the re-construction of sub-tasks and subroutines to develop fluent and efficient performance of complex procedures in conditions approaching the actual operational situations and concerns. This stage frequently requires a longer period of time to achieve, especially in complex procedures with multiple sub-tasks. Again, rigorous assessment and accurate feedback are essential in determining the procedural skill proficiency of the learner.

A central and essential theme to each of these stages is the use of frequent, rigorous formative assessment (assessment for learning), followed by summative assessment (high-stakes, certification-level assessment) to demonstrate procedural skill performance. Simply stated says Mr. Miller, "assessment drives learning, and must be thoughtfully and frequently applied to support full and completed development of procedural skills". Rigorous assessment will also have a significant effect of retention and transfer, which will be described in the next two installments of this series.

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Operational Medicine Lab Expands Scientific Reach with New Contract Task Orders

The TATRC Operational Medicine Lab's three key research focus areas, as posted on the TATRC web site are: *Medical Intelligent Systems, Tactical Edge Telemedicine,* and *Special Operations Forces Medical Technology.* Until now the lab has had no biomedical engineers and no health care providers with recent military experience on its staff. With a recent modification to TATRC's Geneva Foundation support contract, the previous gaps in those research disciplines are now filled.


Ms. Rebecca Lee

Ms. Rebecca Lee, formerly an administrative project manager supporting numerous TATRC projects, was hired to fill a new Biomedical Engineer task order. In this new role, Ms. Lee will provide subject matter support for research in the integration of biomedical engineering and Unmanned Systems, Robotics, and Autonomous Devices. She is a 2014 Cum Laude Biomedical Engineering graduate of the George Washington University, and since being employed at TATRC soon after graduation, has picked up new skills in robotics and unmanned systems through active contributions and diligent participation in ongoing TATRC robotics projects. Her addition to the TATRC Operational Medicine Staff adds both expertise and enthusiasm in this brave new world of research in military medical applications of technologies from converging scientific and engineering domains.

For several years TATRC has depended on leveraging support contracts of collaborating organizations like the US Army Medical Materiel Agency, the AMEDD Medevac Proponency Division, and TATRC's Biotechnology High Performance Computing Software Applications Institute to acquire extended support from military experienced health care providers in training combat medics or developing and conducting field medical treatment scenarios as part of field evaluations of prototype medical information and telemedicine technologies developed by or under the oversight of the TATRC Operational Medicine Lab. The new Geneva Foundation Task order provides for part-time, as needed, services of a physician, a nurse, and a medic with recent combat or theater deployment experience in carrying out those tasks. Leading the new "Experienced Provider Support Team" is Ms. Theresa Lynn DiFato, a retired Air Force Nurse Corps Lieutenant Colonel who develops medical scenarios that address the way medics operate in the field today, but then moves the thinking into future operations to identify gaps in the doctrine, organization, training, materiel, leadership and education, personnel and facilities that will need to be addressed as technology moves forward. She is supported by Mr. Mike Jenkins, a retired Air Force Senior Master Sergeant and medic with over 24 years of experience in areas spanning both in Garrison and deployed operations, Emergency Medical Training, and patient movement in Theater. And lastly, the team will be supported by Dr. Steven Swann, formerly the US SOCOM Surgeon, who expands the experience for the medics participating in the events while pressing the issues of future operations. This is a formidable military medical provider support team with impeccable integrity and should therefore add a high level of credibility to future medical technology prototype evaluations.


Mr. Steve Swann


Mr. Mike Jenkins and Ms. Theresa Lynn DiFato

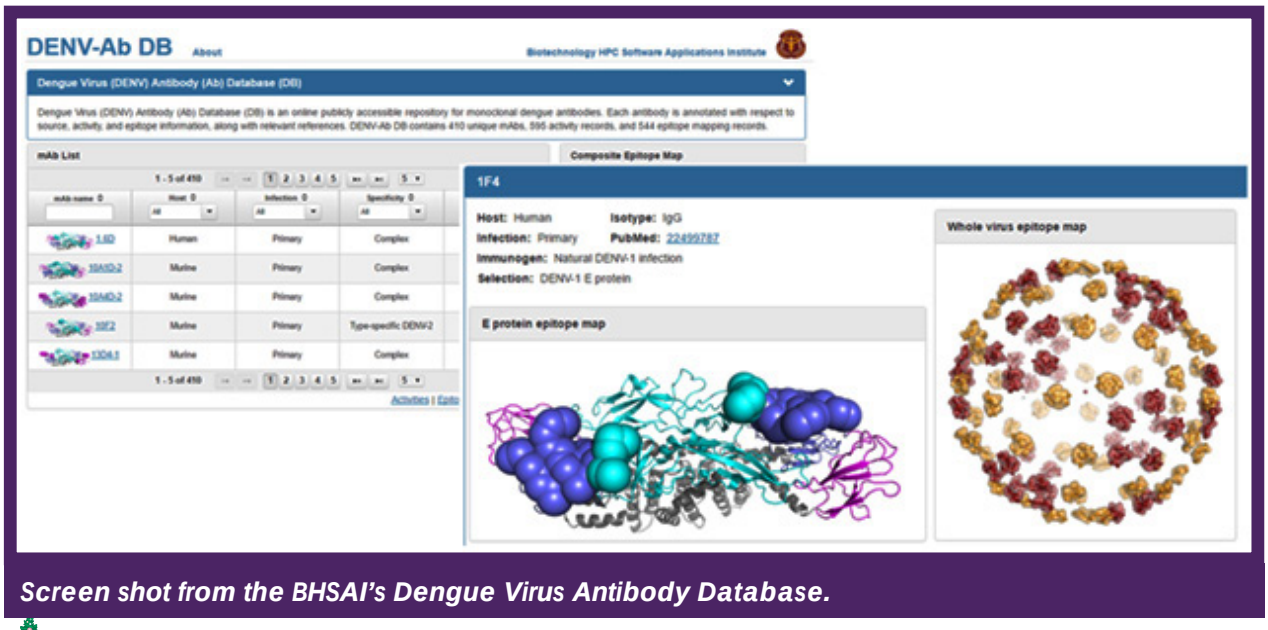
BHSAI Team Builds Dengue Virus Antibody Database to Aid in Vaccine Research

Dengue fever is a mosquito-borne tropical illness that afflicts over 100 million people each year worldwide, and is endemic to large regions of Central and South America, Africa, and South Asia. In recent years, climate change and other factors have led to an increase in the spread of dengue virus and other closely related viruses in the flavivirus family, including yellow fever and, most recently, Zika virus. The US military has long been an active participant in dengue virus research, and extensive efforts are underway to develop a dengue virus vaccine that would serve to protect Warfighters stationed in regions of the world where dengue fever is endemic.

Dengue fever has long fascinated virologists and vaccine researchers because of its peculiar etiology. A first-time infection by dengue virus, termed a 'primary' infection, is typically asymptomatic or results in a mild fever. The body's immune system produces antibodies that successfully fight off the viral infection. However, when an individual is infected again, by a different variant of dengue virus, termed a 'secondary infection,' there is a heightened risk of developing severe disease symptoms such as dengue hemorrhagic fever, despite pre-existing immunity acquired from the primary infection. Paradoxically, the antibody response in a secondary infection not only seems incapable of effectively fighting off the infection, but in some cases actually *enhances* the infection. Determining how the antibody response changes between primary and secondary infections may provide the key to understanding the pathogenesis of dengue fever and developing effective dengue vaccines.

Scientists at TATRC's Biotechnology High Performance Computing Software Applications Institute (BHSAI), have developed the Dengue Virus Antibody Database, an online repository that stores information on hundreds of dengue virus antibodies. This includes information on the type of dengue infection from which the antibody was isolated, the regions of the dengue virus that the antibody binds to, and the neutralizing activity of the antibody to all four variants of dengue virus.

By carrying out large-scale analysis of the antibody data, Dr. Sid Chaudhury and his team were able to identify how the antibody response in secondary infections shows a systematic shift in terms of its binding activity and neutralization. This database serves as an invaluable tool to dengue virus researchers, allowing them to search for particular dengue virus antibodies, map where on the dengue virus surface those antibodies are binding, and determine which antibodies are best suited for experimental studies on dengue infection and pathogenesis. Further analysis of the information in the Dengue Virus Antibody Database may provide insight into dengue immunity and guide future dengue vaccine research efforts.



Screen shot from the BHSAI's Dengue Virus Antibody Database.

USAF Research Lab Demonstrates BATDOK at the 2016 Annual TATRC Field Evaluation

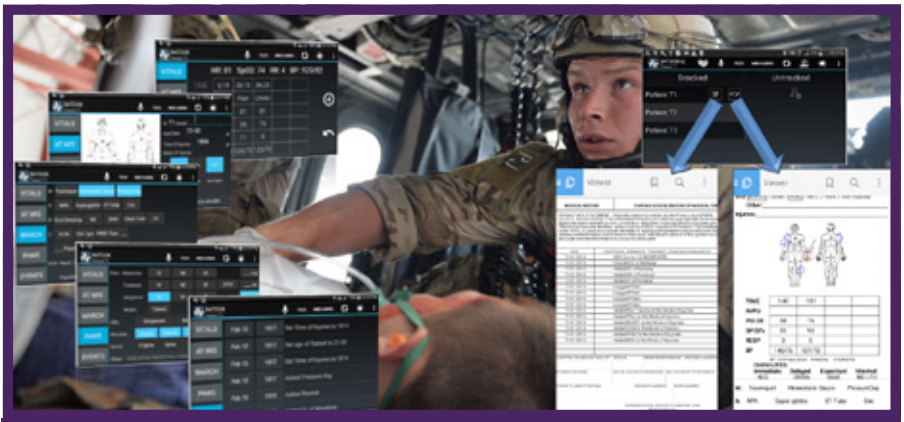
The US Air Force Research Laboratory (AFRL) was invited to demonstrate their Android application for patient encounter and tracking called the "Battlefield Assisted Trauma Distributed Observation Kit" (BATDOK) at the 2016 Annual TATRC Field Evaluation at the Communications-Electronic Research, Development and Engineering Center Ground Activity located at Joint Base McGuire-Dix-Lakehurst, NJ.

During the evaluation, the AFRL staff demonstrated BAKDOK's ability to monitor up to three patients simultaneously using a wireless Bluetooth pulse oximeter, 3-lead echocardiogram, and a Zephyr Bio-patch physiologic monitor, as well as a Wi-Fi Athena GTX Wireless Vital Signs Monitor. Data collected by the BATDOK application was captured into the Smartphone and generated a digital DD Form 1380 / Tactical Combat Casualty Care (TCCC) card that could be printed out on a small light thermal printer.

During the US Army Medics evaluation of collecting data at the point of injury, and during pre-hospital casualty evacuation, the BATDOK application was readily accepted due to its' ease of use and outstanding graphical user interface (GUI). SSG Benjamin Garfin, a member of the 75th Ranger Regiment stated, "The BATDOK's capability of longitudinal tracking of multiple patients and their vital signs with this GUI was outstanding and would greatly aid the Medic in providing prolonged field care."

A major concern with the BATDOK application was its' inability to transfer the digital DD 1380 from the Smartphone to the DoD Theater electronic health record (EHR). During the demonstration, TATRC agreed to work with the AFRL and assist them in addressing the data transfer problem. In September 2016, Mr. Todd Poling, an Android Software Engineer and Communications Technician from the Operational Telemedicine (OpTMed) Laboratory traveled to the Air Force Research Lab in Dayton, Ohio to work with their software engineers to address the data transfer integration. They successfully tested the BATDOK application to transmit the digital DD Form 1380 / TCCC card over tactical radio networks to a Product Manager Medical Communications for Combat Casualty Care laptop running the AHLTA-Theater tactical EHR system used at deployed Military Treatment Facilities (MTFs).

After the successful modification and testing of BATDOK, the OpTMed staff, with AFRL permission, introduced the improved BATDOK application to the Naval Surface Warfare Center – Dahlgren Division (NSWCDD). Mr. Poling was sent to Dahlgren to work with NSWCDD and their support contractors in integrating BATDOK into the Navy/Marine Corps tactical radio network. Mr. Larry Markins, a Senior Field Support Engineer from the OpTMed Lab, joined Mr. Poling in setting up a point-to-point connection between a Nett Warrior End User Device (EUD) / Smartphone to an AHLTA-Theater tactical EHR system laptop. OpTMed staff, working with NSWCDD staff, conducted transmission tests of the digital DD Form 1380 encounters from the simulated point of injury to the EHR. Additionally, the OpTMed staff provided information on how the digital DD Form 1380 encounters were created, authorized/signed, transmitted, and stored with the EUD, as well as how to process the records into the AHLTA-T EHR system. By the end of the visit, the staff from NSWCDD and support contractors felt confident in the operation of data collection and transmission of a casualty's medical encounter and how it is incorporated with the Theater EHR. Ms. Mila Marchosky, the NSWCDD Project Manager working with TATRC stated, "I'm very pleased with the new relationship we have with TATRC and the support they are providing as we move into providing digital support to the Navy corpsman for future patient care." TATRC is working with NSWCDD to integrate wireless medical sensors and devices for En Route casualty care on the Navy/Marine Corps tactical radio network with the possibility of these technologies being evaluated by the Marine Corps Warfighting Laboratory in the 2017 Bold Alligator Exercise.



Medic using the US Air Force's BATDOK interface while in flight.