TATRC TIMES
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TATRC's Innovation Spurs Dedicated Open House for AMEDD General Officers

On 12 January, USAMRMC, through TATRC, were honored to host a large number of General officers, Command Sergeants Major, and SES's at the newly renovated TATRC Innovation Campus as part of a Command Team Leader Development and Training Session (CTLDTS). This group included LTG Nadja West, US Army Surgeon General and Deputy Surgeon General, MG Bob Tenhet, as well as 75 other distinguished general officers and senior NCOs from across the spectrum of Army Medicine. The VIPs spent several hours at TATRC engaged in in-depth conversations with TATRC researchers and partners as to how to improve the quality of care for our Warfighters through advance technologies and telehealth initiatives.

As a result of the resounding success of TATRC's 2nd Annual Spring Open House held last May, TATRC opened its doors again for a Special Winter Open House and Technology Demonstration for the senior AMEDD leadership during their CTLDTS, which is a three-day quarterly training conference. An entire half day was dedicated to TATRC and this Winter Open House.

TATRC's Staff continued to weave the theme of "Supporting Military Readiness Through Innovative Technologies" into each of the projects which allowed these distinguished visitors to experience firsthand, TATRC's unique skill sets and expertise. With over 54 hands-on demonstrations and exhibits from each of TATRC's labs, the Virtual Health Support Office, as well as success stories from the AMEDD Advanced Medical Technology Initiative program, the visitors were highly engaged and interested and expressed their appreciation to the staff and partners.

MG Robert Tenhet, Deputy Surgeon General for the Army, who spent over two hours meeting with TATRC Subject Matter Experts and learning

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LTG Nadja West, US Army Surgeon General, Deputy Surgeon General, MG Bob Tenhet, along with MG Barbara Holcomb, CG, USAMRMC were among the 75 distinguished general officers who visited TATRC on 12 January.

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about TATRC's many initiatives, was the proponent behind the scheduling of this event, specifically calling for a dedicated Open House for all AMEDD General Officers, after visiting TATRC last May. He said he was amazed with the innovative research taking place at TATRC and commented, "TATRC is truly a hidden gem within Army Medicine and our folks out there need to know that these capabilities exist."

"This particular AMEDD General Officers Open House is the first of its kind, and is a powerful knowledge management event to educate the military medicine community of our current focus areas," said COL Dan Kral, TATRC's Director.

TATRC's work continues to support military readiness across the military health system, and events like the Open House highlight the range of our competency areas and research portfolios. The 3rd Annual Spring Open House will be conducted on May 5th, and will be open to the MHS and our extramural research partners.

Our thanks to all the General Officers who took the time and came out to Visit TATRC! One Team … One Purpose! Conserve the Fighting Strength!

LTG West and CSM Gerald C. Ecker learning about one of the mHIC projects

LTG West and CSM Ecker interact with a young Soldier talking about Operational Telemedicine while MG Holcomb observes the feedback.

Reminder!

AAMTI Pre-Proposals are Due April 12th!

Just a reminder AAMTI Pre-proposals are due by April 12th this year. The TATRC website, http://www.tatrc.org/www/labs-and-programs/aamti/, contains updated Program Instructions for FY18 and step-by-step instructions for obtaining an account and submitting a prepro-posal. Please check it out and get those pre-proposals rolling in!

Additionally, the AAMTI Program Management team has recently stood up an AAMTI SharePoint portal, where Investigators past, present and future, can gain a wealth of information! The site provides access to timelines, reference documentation and detailed templates that may be helpful to Investigators. The AAMTI SharePoint Site is only open to potential and previous AMEDD Investigators who have an active CAC card. To request access to the AAMTI SharePoint Site, email the AAMTI administrators at: usarmy.detrick.medcom-usamrmc.list.aamti-pm@mail.mil. Once permission has been obtained, the AAMTI SharePoint site can be accessed at https://mrmc-connect.amedd.army.mil/sites/AAMTI/. Ms. Holly Pavliscsak, the AAMTI Program Manager, is available to answer any questions you may have about the AAMTI Rapid Innovation Fund program. She can be reached at 240-566-2378 or holly.h.pavliscsak.ctr@mail.mil.

"As a former AAMTI submitter, I know how valuable it is to have current and up to date information when submitting an AAMTI proposal. The AAMTI Sharepoint Site is built with Investigators in mind and provides them with the resources they will need to both submit their projects for funding, and execute them if awarded," said Ms. Holly Pavliscsak, AAMTI Program Manager.

TATRC Staff Participates at 2017 HIMSS Conference

This February, representatives from team TATRC attended the 2017 Healthcare Information and Management Systems Society (HIMSS) Conference in Orlando, Florida. The annual HIMSS conference is the largest health IT educational program and exhibition center in the industry, bringing together 45,000 health IT professionals, clinicians, executives and vendors from around the world. The conference itself spanned 37 city blocks and featured more than 300 educational seminars as well as sentinel keynote speakers.

This year's opening keynote speaker was IBM President and CEO Ginni Rometty, who proclaimed the arrival of the "cognitive era" in healthcare in which new cognitive systems, capable of learning on their own, will facilitate, not replace, clinician and healthcare professionals' expertise.

It's a fair question to wonder what a military agency is doing at such a commercially focused event, like HIMSS. TATRC's Virtual Health Support Office Lead, Dr. Fran McVeigh, stated, "attending HIMSS provides the opportunity for TATRC personnel to gain knowledge on current and future health IT focus areas both within the military and civilian environments; and meet with military and civilian leaders and innovators to discuss TATRC's interests and possible collaborations going forward."

Also in attendance from TATRC was Health Technology Innovation Center's Senior Research Support Administrator, Mr. Robert Connors. Bob attended several key educational seminars and met with academic, think-tank, industry, and other government leaders, with the goal of forming new partnerships to engage in emerging health IT research prototypes and advanced concept demonstrations. He found the ability to meet with so many industry leaders and subject matter experts to be the highlight of the week. Mr. Connors stated, "new emerging technologies like 'Blockchain' are set to powerfully transform healthcare delivery over the next 10 years. Events like HIMSS are truly the only place to see all of industry discussing it at one time."

A crowd of more than 45,000 attended the HIMSS conference.

Mobile Health Innovation Center (mHIC) Deputy, Mr. Ron Yeaw, also appreciated the ability to meet with key leaders from industry. "For TATRC's mHIC Lab, it's not so much about current technology, but getting a head start for laying the foundation for tomorrow. Seeing the convergence of mobile, telemedicine, and remote patient monitoring technologies is one thing; knowing how they will all come together in such a way that a provider care team can leverage it in a meaningful way, is another. Our civilian partners serve as a great 'canary-in-the-coal-mine' for us in this regard, allowing TATRC to make the most informed decisions possible."

HIMSS comes at a critical time for the Military Health System (MHS). With the successful go-live last week at Fairchild Air Force Base of MHS Genesis, the new joint $4.3 Billion DoD & Leidos/Cerner electronic health record system, MHS has entered a new era of unprecedented DoD and commercial market partnerships. As DoD begins to bring in more healthcare vendors and integrators, the value of such mixed military and commercial vendor events, like HIMSS, will mean more to the MHS, and TATRC, than ever before.

'Fitbit fatigue' notwithstanding, the TATRC team found HIMSS 2017 to be a great success, and are looking forward to applying all they learned to both current and future TATRC projects. The 2018 HIMSS Conference will be March 5th – 9th in Las Vegas, Nevada.

Team TATRC poses outside HIMSS Conference.

Virtual Health Research: Results of a Feasibility / Usability Assessment for Diabetic Remote Home Monitoring

TATRC has partnered with key leaders from the Patient Centered Medical Home (PCMH) and an extramural partner, the Clemson University Department of Public Health Services on a multi-phased research project funded by the Joint Program Committee (JPC-1) to monitor diabetic patients in their homes using patient's personal cell phones, and home biosensors. The primary goal of this research project is to improve the capabilities of current mHealth technology for use in the PCMH environment, and to provide chronic care patients (i.e. Type-2 diabetes) the capability to improve self-management of their disease.

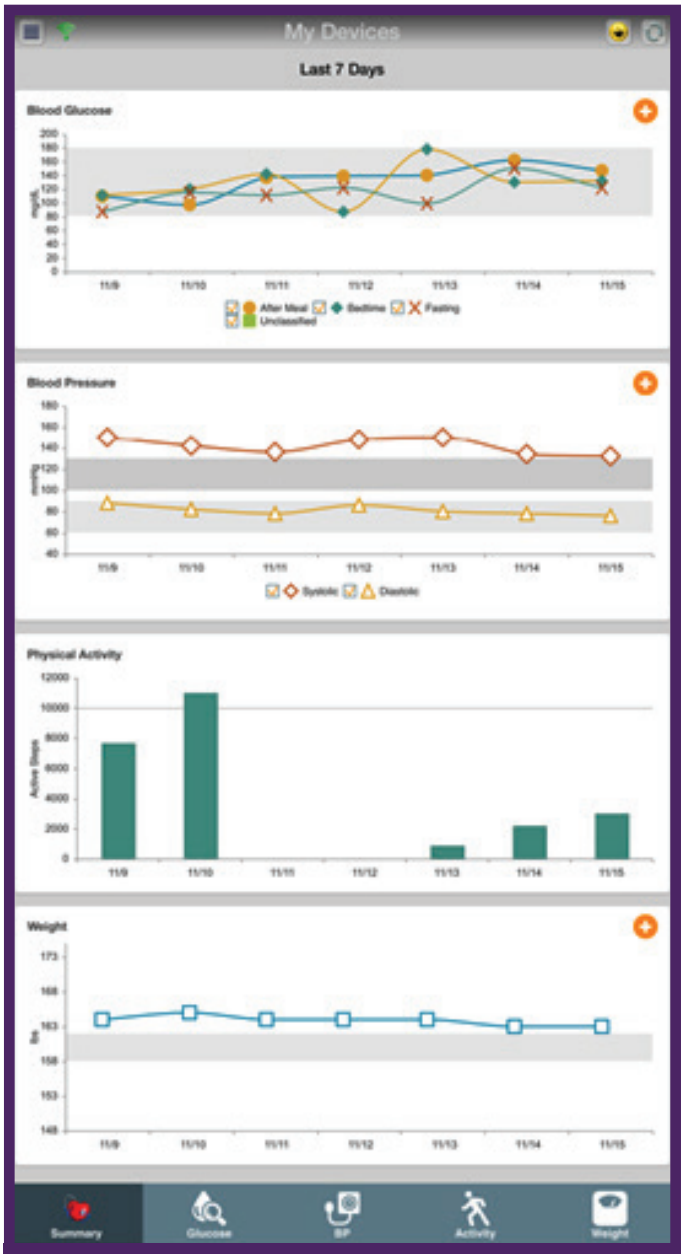

Figure 1. Patient 7-Day Summary View on a Mobile Device

Both the mobile application and the web-based portal allow for home monitoring data to be viewed as a seven-day summary (see Figure 1), comparing blood glucose, blood pressure, activity and weight. In addition, each data type can be viewed as a single day, a seven-day or a 30-day view. Patients can add notes to their readings on their mobile devices, and providers can roll over the data points on the graphs to view the notes, or access them in a text-based summary below the individual graphs via the web-based portal. 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 as a comparison. Safety mechanisms are embedded into the system, alerting patients to either treat incidences of dangerously low or high blood glucose levels, or seek medical assistance with sustained high blood pressure readings. These interface features were designed by TATRC, based on an assessment of industry best practices, input from clinical champions in the PCMH community, and actual patients.

To validate these features, it was important to have users engage with the Virtual Health software in a systematic fashion, so that any end user issues could be identified, refined and resolved prior to launching a larger scale deployment. Phase 1 of this research project focused on this feasibility and usability assessment; where consenting patients and providers were introduced to software features. Patients also reviewed the FDA-approved home monitoring devices: a glucometer, blood pressure cuff, and weight scale.

Members of the research team were onsite at Nellis Air Force Base (AFB), Las Vegas, NV in mid-November 2016, where they conducted focus group assessments with patients and health care team members. These focus groups interacted with the equipment and graphical user interfaces developed for this pilot research project. Users were systematically asked to complete specific tasks with the application, and their engagement and reaction to the system features was noted by the researchers. Patients were also asked to complete a vali-

mHIC *Continued on page 5*

mHIC

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dated instrument, known as the System Usability Scale (SUS), to quantitatively assess the user interface. Identical group interviews were completed at Madigan Army Medical Center (MAMC) in Tacoma, WA at the beginning of December 2016.

In January 2017, a multi-disciplinary research team completed an analysis of the Phase 1 effort; looking at the feasibility and usability of the current system features in accordance with PCMH user design principles and clinical workflow integration. The qualitative focus group data was organized into themes, and the SUS scores were analyzed against published scoring benchmarks for mobile technology interfaces to determine the refinements and adjustments that will be implemented prior to launching the Phase 2 study with 240 patients from the PCMH communities at Nellis AFB and MAMC.

Results of the quantitative scoring revealed that the usability factor of patient facing system features scored in the 99.8% percentile against published benchmarks for mobile devices as shown in Figure 4.

mHIC Research Program Manager, Ms. Amanda Schmeltz remarked that "while we felt the application was already intuitive and well thought out, the overwhelmingly positive feedback by end-users during Phase 1 testing, was both encouraging and validating of a project that has been under careful development for over two years. We can't wait to deploy the final product for the large scale second phase randomized controlled trial."

From a qualitative perspective, the major themes from the structured focus group interviews revealed:

- 100% of Phase 1 participants felt that the mobile app and home monitoring devices would help them manage their diabetes.
- 100% of these patients felt that the mobile app would give their healthcare provider a better report of what's going on with their health.
- Clinicians were pleased with the mCare system and optimistic about both the backend portal and the patient application.
- Requests for alterations and additions to both the application and the provider portal were minimal and mainly aesthetic (e.g larger interactive buttons, color changes).

As a result of the Phase 1 analysis, minor adjustments are currently being implemented for both the patient and provider interfaces to this remote home monitoring project. mHIC Lab Manager, Ms. Jeanette Little, stated, "Once completed in the Spring of 2017, Phase 2 of the research project will explore the technical feasibility for 240 patients focused on improving the activation, quality of life, and clinical indicators of PCMH-empaneled complex diabetic patients. Outcomes for Phase 2 will evaluate self-management behaviors, medication adherence, patient satisfaction, quality of life, clinical measures, system usability, and usage statistics and will provide valuable lessons learned for the future of patient monitoring between clinical encounters."

Figure 2. Case Manager Alerts on the Portal View

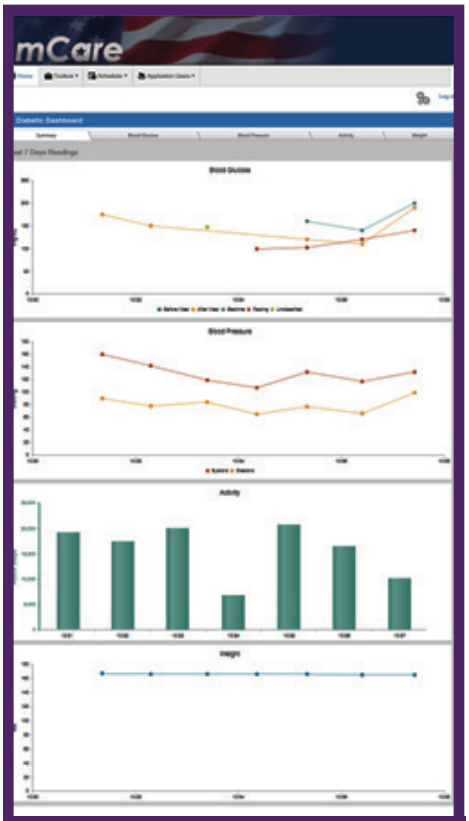


Figure 3. Provider - 7 Day Summary – Portal View

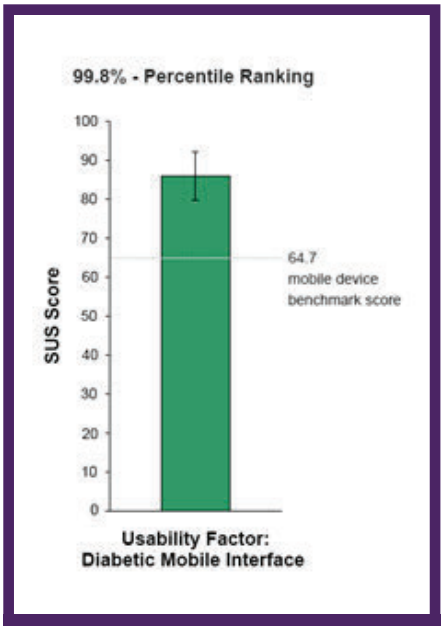


Figure 4. Phase 1 SUS Usability Factor Score

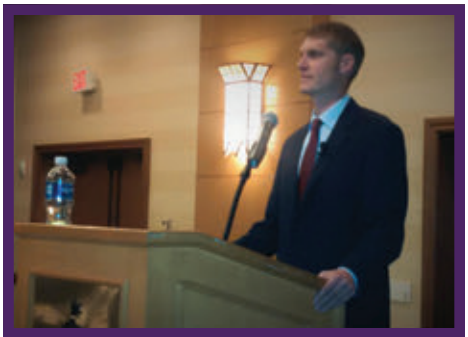
Engaging the Community: Robotics and Autonomous Systems for Medical Missions

At the end of last year, TATRC was requested to participate in a "Joint Mission Thread" workshop which was held at the Johns Hopkins University Applied Physics Lab (APL), commissioned by the Joint Staff Operational Plans and Joint Force Development, J7s, Joint Concepts Division, to inform the implementation of the recently published Joint Concept for Robotics and Autonomous Systems (JCRAS). Since this invitation afforded TATRC the opportunity to engage with both academia and the broader defense community in discussions of how emerging Robotics and Autonomous Systems (RAS) could provide additional resources in support of medical missions in future operating environments, Mr. Nathan Fisher, TATRC's Operational Medicine Lab Project Manager for Medical Robotics and Autonomous Systems, was designated to attend.

During this two-day workshop, which took place in January, Mr. Fisher presented the potential benefits that RAS might afford future medical operations, as well as research challenges that need to be overcome at the J7 APL workshop. APL analysts created several Joint Mission Threads (JMTs) based on feedback from subject-matter experts which consisted of a baseline mission describing today's operational practices. Two alternative threads were developed based on analysis of how RAS capabilities may be utilized in the year 2035 timeframe for each of the JMTs. During the workshop, a diverse group of participants, with representation across all the Services, discussed these JMTs and provided valuable feedback regarding potential operational benefits as well as the challenges of applying emerging RAS technologies to different mission threads. One of the JMTs was Casualty Management, which was unique among the JMTs in that no RAS capabilities are currently being used operationally in today's battlefield. The alternate mission threads for casualty management incorporated some of the concepts outlined in the JCRAS, which included leveraging emerging unmanned air and ground vehicles for casualty evacuation when conventional assets are not available. The potential for using limited autonomy and artificial intelligence to aid in human planning and decision making was also explored in the alternate mission threads. This discussion was captured during the workshop, and is currently being used to inform the implementation strategy for the Joint concept.

Mr. Fisher sharing exciting research in the field of UAS.

Mr. Fisher also had the opportunity to present the research challenges associated with leveraging RAS for future medical missions to the Defense Science Study Group (DSSG) during their visit to USAMRMC in late March. The DSSG is a group of prominent science and engineering professors that have been brought together to apply their talents to the rapidly evolving needs of the nation's security sector. The DSSG was started in 1986 and is directed by the non-profit Institute for Defense Analyses, and is sponsored by the Defense Advanced Research Projects Agency. During their visit, the DSSG gained a greater understanding of MRMC's core areas and learned more about ongoing research efforts in areas of interest identified by the group, including research related to the use of robotic/autonomous vehicles during medical resupply and casualty evacuation missions. "Learning how to effectively utilize RAS capabilities for medical missions will become increasingly more important as the future fleet of vehicles becomes increasingly unmanned as a response to maneuver challenges imposed by future operating environments," stated Mr. Fisher. "Overcoming the science and technology hurdles inherent to this application of RAS will require engaging groups like the DSSG to help forge relationships between the defense community and S&T leaders from academia."



Mr. Nate Fisher speaking at the 2016 TRADOC Mad Scientist Conference.

Virtual Medical Concierge App to Provide Indoor Navigation at WRNMMC Beginning March 2017

Imagine using your own Apple or Android-based mobile phone or tablet to easily navigate the complex Walter Reed National Military Medical Center (WRNMMC), with turn-by-turn, text-based directions! Heron Systems, Inc., recipient of a nearly $1M Small Business Innovative Research (SBIR) Phase II award, will release such a prototype in March 2017. Patients, visitors, and staff will be able get to their WRNMMC destinations without getting lost. Users will be able to access the mobile application, starting at nearly any location within the medical center, and proceed to their destination for clinic, lab, pharmacy, or radiology services. The route between the America and/or Arrowhead garages to various clinics will be given the first implementation priority. The application should prove particularly useful given the increasing amounts of construction and detours being established for patient traffic. Ms. Ollie Gray, TATRC's Health Technology Innovation Center (HTIC) Lab Manager, serves as the Contracting Officer Representative (COR) overseeing the project.

Note that in SBIR Phase II, Release I, the initial implementation will not interact with the .mil or with hospital systems. As such, Release I of the SBIR Phase II will provide only patient navigation and way-finding. If additional funding is approved beyond Phase II, SBIR Phase II Enhancement, Phase III, or Rapid Innovation Program funding, the project could then examine integration of the Virtual Medical Concierge Application with .mil and hospital and consumer health portal systems. Linking the Virtual Medical Concierge application to hospital appointment, scheduling, and Electronic Health Record and Consumer Health Portal Systems, opens the door to additional powerful functionality in the Virtual Medical Concierge Application. As such, the Virtual Medical Concierge Application could make personalized recommendations which are context-sensitive and location-based:

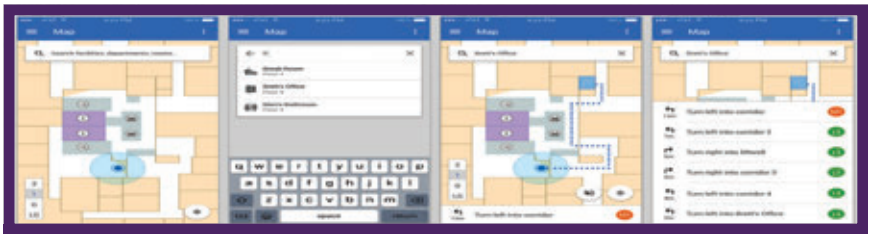
- For example, it might know that your clinician is running 30 minutes behind schedule, and also know that flu vaccines have arrived, wherein, it might suggest you get a flu shot, and direct you to that location.
- Or, the application may know that it is near noon, and inquire as to whether you would like to be directed to WRNMMC Main Street food court, or to the main WRNMMC cafeteria.
- The Virtual Medical Concierge Application might also remind you to pick up your refills and/or your spouses' refills, as you walk by the pharmacy.
- Or, as you wandered off to get a coffee while you were waiting for your eye drops to dilate your pupils, the Optometry Clinic could determine your location and alert you to return to the clinic.
- On a more basic level, patients will be able to complete any required clinic intake forms on their mobile phone/tablet, wherein they would be integrated with the hospital Electronic Health Record.

All of this is made possible by the use of Low Energy Bluetooth 4.0 Beacons that will be placed throughout the WRNMMC, which will communicate with users' own mobile devices. Personal tracking information is not stored in the beacons, or the application as users navigate the facility. Users only need Wi-Fi to download the application from a mobile application store. Wi-Fi is not used during the navigation process.

From a staff perspective, the Virtual Medical Concierge Application has the ability to track hospital operations statistics such as patient arrival times, locations, and average appointment times, and can then generate statistics on patient through-put in the clinics. Identifying bottlenecks may help reengineer work flows or re-arrange clinic spaces. The beacons might also be put to use to help staff locate critical patient care equipment such as wheelchairs throughout the facility.

Heron's system uses a lightweight, low cost, highly configurable physical infrastructure enabling accurate indoor location tracking. It leverages the context provided by this knowledge to deliver a suite of innovative improvements to the traditional medical care service delivery model. Phase 1 activities focused on development and enhancement of architecture modules to support rapid development of web services responsive to specific facility and patient requirements. A detailed requirements analysis was conducted to fully understand the WRNMMC requirements.

Mr. Robert Connors, HTIC's Senior Health Research Administrator, is helping the COR, Ms. Gray, to coordinate necessary communications between Heron Systems, Inc. and multiple staff at WRNMMC. Mr. Connors stated, "It has been a real pleasure to work with WRNMMC Public Affairs, Consumer Experience, Information Management, Facilities Management, and the Office of the Director of Hospital Administration, along with Mr. Brett Darcey, VP at Heron Systems, Inc., to execute this SBIR Phase II project. By working together, we are confident that we can significantly enhance the patient, visitor, and staff experience at WRNMMC, and set a model consumer focused, prototype application deployment for other MTFs to consider."



Four screens from the Medical Concierge App.

HTIC's Prototype Team Fitness Tracker to be Piloted by the 48th CSH & Army National Guard-Maryland in Summer 2017

TATRC's Health Technology Innovation Center (HTIC) continues to develop the Team Fitness Tracker prototype application for pilot in the summer of 2017 by the 48th Combat Support Hospital, and selected Army National Guard (ARNG) Units in Maryland and Florida. The project is funded by Joint Program Committee-1, with oversight by the Congressionally Directed Medical Research Program Office. TATRC also continues to collaborate closely with the Uniformed Services University Health Sciences (USUHS), Consortium for Health and Military Performance (CHAMP) office and the System for Health Directorate, Deputy Chief of Staff for Public Health, Office of the Surgeon General on various aspects of this research.

Despite their proliferation in the market, the value proposition for physical activity trackers is still evolving, with high abandonment rates of 50% or more published. This TATRC-led research will investigate whether the use of personal activity trackers by service members, combined with an activity/fitness dashboard on a web portal, can encourage users to be more active and sustain their activity levels. Investigators are working from the premise that sustained levels of individual optimal activity will lead to improved fitness and readiness. Researchers will also pay close attention to overexercise, as that may cause injury and result in less readiness. By introducing software that allows Command Leadership, Master Fitness Trainers, and/or Unit Fitness Coordinators to monitor their unit's activity, researchers propose that this will help the individuals and the unit to stay, which is one component affecting readiness to deploy.

Ms. Ollie Gray, HTIC's Lab Manager, collaborates closely with the TATRC software developers, Mr. Kirit Raja, and Mr. Chrisjan Matser to adapt an existing Team Fitness Tracker application that was originally developed for use by TATRC staff, for use in the pilot study. Functional stakeholders providing input on the Team Fitness Tracker application design include: Ms. Ashley Simon, Research Associate, USU CHAMP Office, and formerly Performance Triad Coordinator, System for Health Directorate, Deputy Chief of Staff for Public Health, Office of the Surgeon General, Sergeant First Class (SFC) David Rosen, USA, and SFC Brian Darden, also of the Office of the Surgeon General staff.

LTC Kathleen Genest, Nurse Coordinator, US Army Reserves, 48th Combat Support Hospital, Fort Meade has agreed to identify approximately 100 active reservists for participation in the study on a totally voluntary basis. Captain Faith Courville, ARNG-MD, will also identify approximately 100 additional ARNG-MD members for voluntary participation in the study.

TATRC is collaborating with Dr. Patricia Deuster, Director of the CHAMP Office, USUHS, to finalize the study design and submit the necessary human subject protection applications to the USU Institutional Review Board for 1st level review and approval. Second level review will take place at the Office of Human Research Protections, Fort Detrick, MD.

During the Team Fitness Tracker pilot, the PI, Ms. Ollie Gray, in conjunction with USU CHAMP, will assess the impact of the Tracker on various activity and fitness outcomes over time. Although the final study design is being refined at this time, the Research Team will determine if a Team Fitness Tracker prototype can help the DoD to understand how individual activity tracker data can be interpreted, used, and grouped to help inform Unit Fitness Commanders on the activity, readiness, and performance of their personnel, and intervene, where necessary, to optimize individual and team fitness levels.

The study intends to provide users with the Fitbit Charge HR activity tracker, if they do not already have an activity tracker. Baseline data will be collected initially without giving users access to the Team Fitness Tracker portal application. After a period of time, researchers will introduce various Team Fitness Tracker application portal features to the user community. The study will determine which activity tracker features, when combined with associated activity tracker monitoring software, contribute to continued sustained use and improved activity levels. As one example, do software features that promote healthy competition among users, such as team competitions, leaderboards, gaming, and access to

Fitness Tracker *Continued on page 8*

A screen shot from the new HTIC Fitness Tracker Website

Fitness Tracker Continued from page 7

specific educational content on activity, sleep, and nutrition, lead to increased activity and thus improved physical fitness and readiness?

The pilot study will also help TATRC researchers determine if Unit Fitness Coordinators, Master Fitness Trainers, or other Command leadership, who monitor group activity, fitness, and readiness data, can benefit from the Team Fitness Tracker application, by monitoring individual and team activity, and by sending motivational messages to persuade individuals or groups to optimize their activity levels. The study will also examine how often messages should be sent and what type of content best motivates individuals to perform at an optimal level (just the right amount of activity to enhance fitness, and not over-exert or cause injury).

Ms. Ollie Gray, recently stated, "It has been a real pleasure and honor to collaborate with the Army Surgeon General's office and USUHS CHAMP on this research project. TATRC also wants to express its sincere appreciation and gratitude for the willingness of the 48th Combat Support Hospital and the ARNG-MD to participate in this research effort. We are confident that this research will yield significant knowledge to determine how we can improve and sustain physical activity and contribute to overall greater readiness to deploy."

Questions regarding the Team Fitness Tracker Study may be directed to Ms. Ollie Gray, ollie.b.gray.civ@mail.mil.

AAMTI Project Spotlight: Using Real-Time Feedback to Alter Running Biomechanics: A Randomized Controlled Trial

An anterior foot strike pattern during running has been suggested to reduce injuries. A mobile feedback system may assist in transitioning to this style of running. The purposes of this AMEDD Advanced Medical Technology Initiative (AAMTI) funded project were to assess the short and long term effectiveness of a mobile feedback system on transitioning runners from a rearfoot strike pattern to a non rearfoot strike pattern, and to prospectively compare injury incidence rates at one year, between rearfoot strike and non rearfoot strike runners.

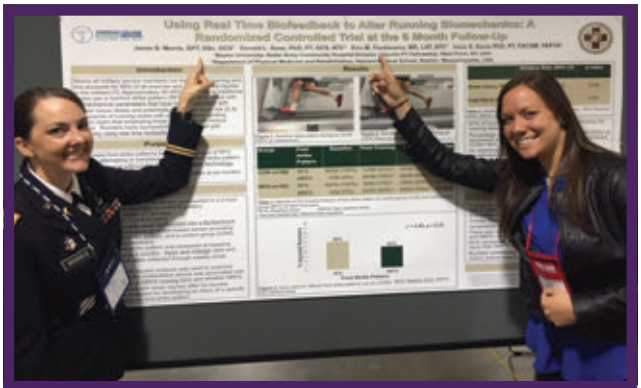
LTC Don Goss, MAJ Jamie Morris, and Ms. Erin Florkiewicz at the Baylor University – Keller Army Community Hospital Division 1 Sports Physical Therapy Fellowship, partnered with Irene Davis, PT, PhD, FAPTA, FACSM, FASB, from the Spaulding National Running Center at Harvard Medical School. Industry partners who participated were Nike, I Measure U, and Runkeeper.

There were 114 rearfoot striking runners who participated in this study. They all completed a two-hour training session to learn a non rearfoot strike pattern. Participants were then randomized into a control group with no additional training, and a biofeedback group where they received an ankle sensor and iPod to provide real-time biofeedback to augment the transition to a non rearfoot strike pattern. Foot strike pattern and cadence were assessed at baseline, post-training, six months, and one year. Injury and mileage data were collected through weekly email surveys over a one-year period.

Eighty percent of runners demonstrated a non rearfoot strike pattern following the two-hour training session (91/114, $p < 0.001$). Injury rates were similar between rearfoot strike runners (37% injured) and non rearfoot strike runners (30% injured) after one year ($p = 0.47$). Rearfoot strike runners were at six times greater risk for knee injury than the non rearfoot strike runners.

Both groups had a significant number of participants transition from a rearfoot strike pattern to a non rearfoot strike pattern immediately after training and maintained a non rearfoot strike pattern at the one-year follow-up. However, compliance with the sensor in the biofeedback group was very poor. Regardless of foot strike pattern, runners sustained one-year injury incidence rates between 30-37%. However, rearfoot strike runners had nearly a six times greater risk for developing a knee injury than non rearfoot strike runners.

This project would not have been possible without the support of TATRC through the FY 2014 AAMTI funds. The study is completed now and has been submitted for publication in peer reviewed literature.



AAMTI-funded researchers MAJ Jamie Morris and Ms. Erin Florkiewicz share project results.

Employee Spotlight

NEW IA Manager Joins the Team! Welcome Mr. Dana Hudnall

Mr. Dana Hudnall, Information Assurance Manager

Mr. Dana Hudnall has joined our TATRC team as the Information Assurance Manager primarily supporting the Early Stage Platform (ESP) within the Health Technology Innovation Center. He comes with 30+ years of Cyber, Physical, and Personnel security experience within the Government Intelligence Community serving as Deputy Director of Information Assurance (IA), IA Manager, IA Officer, Special Security Officer, and Facility Security Officer at various government organizations in the Metropolitan/DC area of operations. He served 22 years on active duty with the United States Navy as a Cryptologist, Cryptologic Resource Coordinator, Intelligence Analyst/Officer, Special Security Officer, and Director of IA as well as many collateral duties to include Equal Opportunity Officer and Family Readiness Officer.

Dana has a Bachelors Degree in Management (University of Phoenix) and Masters in Executive Leadership (Liberty University). He is currently in the dissertation phase of a Doctorate in Cyber Security with the University of Fairfax. He is also a Cyber Security Adjunct Professor with Mission Critical Institute under Concordia St Paul. Qualifications include IAM Level III GSLC and NISPOM 8 Certifications.

In his new role as Information Assurance Manager, Dana will be assisting the ESP and TATRC teams with ensuring information systems are properly secure, working systems through the Assessment and Authorization cycles, conducting continuous monitoring of systems, and keeping management abreast of emerging IA threats, trends, and technology.

Dana is married to Susan Cole, an IA Manager at JMLFDC. He has a son on active duty with the Marine Corps (Chris), one 17 year old son Sean, and two 12 year old girls who are his world, Grace and Kathryn. His number one hobby is spending time with family but he also enjoys fishing, woodworking and anything that has to do with nature. Dana is very excited to be a part of the team and looks forward to learning as much as possible and contributing wherever needed. The TATRC Family is excited to have Dana join the Team!

This Quarter's TATRC TRIVIA...

Question: What previous USAMRMC Commander has been called "the Father of Army Telemedicine?"

(Answer in Next Issue!)

Answer to Last Issue's TATRC TRIVIA...

Q: What Army General directed the creation of the original TATRC organization and coined the Army Motto, "Be All That You Can Be?"

A: General Maxwell Thurman, Vice Chief Staff of the Army, directed the creation of the original TATRC organization.

TATRC's HTIC Welcomes NEW Software Developer, Mr. Kirit Raja, to the Team!

Mr. Kirit Raja is HTIC's newest Software Developer to join this diverse and multifaceted team. Kirit has over 25 years of experience in the I.T. industry working on complete System Development Life Cycle on various frontend and backend platforms, as well as on web based and client-server applications. His last 12 years of experience include working as a System Architect, a Technical / Team Lead and Lead Developer. As a Technical Lead, he led teams ranging from three to 18 staff members. Kirit follows best practices recommended by Microsoft in the software development process and has strong experience on the latest Microsoft technologies such as Model View Controller, Entity Framework, SQL Server, Web Forms, Team Foundation Server and SharePoint.

Mr. Raja has worked for the following clients over the last 15 years including: the National Institutes of Health (NIH), the Health Resources and Service Administration (HRSA), the National Institutes of Standards and Technology (NIST), and Montgomery County (Finance).

Mr. Kirit Raja, Software Developer

Mr. Raja holds a bachelors degree in Electrical Engineering and a masters degree in Computer Science. He recently completed the PMP Boot camp, which was a five day training on PMP Certification. He received the "Outstanding Consultant" award twice while working at the NIH.

In his leisure time Mr. Raja enjoys hiking, biking, photography and music. TEAM TATRC welcomes Kirit to the HTIC Lab!

Congratulations to TATRC's Q2 Employee of the Quarter, Ms. Donna Lightner!

Congratulations are in order for TATRC's Senior Executive Administrative Assistant, Ms. Donna Lightner for being named Q2's Employee of the Quarter. Donna's support to headquarters and the rest of TATRC is nothing short of phenomenal. She maintains visibility of the TATRC calendars and often anticipates potential problems and implements plans to avoid them. She is our conduit and link to our higher headquarters, as well as to outside personnel and agencies in helping them connect with TATRC. She is always ready to lend a hand to support all of TATRC when it comes to administrative requirements, or to offer her secretarial support when needed. Her knowledge of proper administrative formatting and protocol has guided many to the extent that their end products are professionally done. She also assists many of our outside visitors and internal staff in establishing and managing VTCs. Donna is the 'Face of TATRC' as she is usually the first and last person our visitors and collaborators interact with. One never has a second chance to make a good first impression and we at TATRC should be thankful of Donna — because she always makes a good first impression — which favorably reflects on all of us. Congratulations, Donna on your well-deserved recognition!

Ms. Donna Lightner, Senior Executive Administrative Assistant

Employee Spotlight

Lead Project Officer Achieves SCRUM Certification

Stephanie Hutson, one of TATRC's Lead Project Officers, has achieved her Certified SCRUM Master Certification through the SCRUM Alliance. SCRUM is an Agile framework for completing complex projects. SCRUM originally was formalized for software development projects, but it works well for any complex, innovative scope of work. SCRUM is a framework (principles and practices) that helps teams deliver products through incremental iterations. The Health Technology Innovation Center (HTIC) uses SCRUM for multiple projects to include its Team Fitness Tracker and Linked Problem List. Stephanie will be a vital asset for the daily SCRUM meetings and management of user stories, product backlog and testing cycles, as well as product demonstrations and planning the next iterations. As a certified SCRUM Master, she assists the team and helps work through impediments that block our development team's progress. Her achievement will continue to make sure that the HTIC's practices align with SCRUM in addition to coaching team members on SCRUM practices. Congratulations to Stephanie on this well-deserved achievement!

Ms. Stephanie Hutson, HTIC Project Officer

TATRC Welcomes New Project Officer, Khiya Canadiate

Ms. Khiya Jeannette Canadiate has joined our TATRC team as Project Officer primarily supporting the Operational Telemedicine Lab. She comes with 2 years of test experience and 3 years of electrical design experience.

Born and raised in Prince George's County Maryland, Khiya attended the University of Pittsburgh Swanson School of Engineering and received a Bachelor's of Science degree in Electrical Engineering in 2012. Khiya also has a Master's in Business Administration from University of Maryland University College in 2016.

While living in Pittsburgh, PA, she worked as a Test Engineer for the electrical power & energy meters division at Eaton Corporation. She later relocated back to Maryland and worked as an Electrical Design Engineer for Stulz, a cooling technology company, designing control panels for energy efficient temperature and humidity equipment for commercial and industrial applications.

Khiya has a 4 year old Shih Tzu dog named Simba who hates the rain and loves to cuddle. She enjoys activities such as Bikram yoga, indoor cycling, Zumba, occasional hiking, bowling, and karaoke. 2017 will be a big year for Ms. Canadiate, for this fall she will be getting married to her best friend of 9 years in their hometown of Beltsville, MD. Congratulations, Khiya and Welcome to the Team!

Ms. Khiya Canadiate works to repair one of Op-TMed's drones.

AAMTI Program Manager, Ms. Holly Pavliscsak (Pictured far right) with her hosts and colleagues at Tripler AMC

In Search of Innovation: AAMTI PM Visits Tripler Army Medical Center

The Army Surgeon General, through TATRC, provides a special Defense Health Program, Operations and Maintenance (DHP O&M) appropriation to enable technology proofs of concept/demonstrations throughout the MEDCOM. TATRC created the AMEDD Advanced medical Technology Initiative (AAMTI) Program to solicit and fund these projects. The fundamental goals of the AAMTI are: to demonstrate medical technologies and their impact on cost, access, quality, and safety of care, and medical readiness; to provide senior MEDCOM leadership with medical tech-watch capabilities; and, to encourage medical technology entrepreneurship by funding MEDCOM technology innovators through a 'bottom-up' (provider/Medical Treatment Facility level) approach. In search of meaningful, innovative projects, Ms. Holly Pavliscsak, AAMTI Program Manager, has been a road-warrior, traveling around to sites within the AMEDD, to promote the AAMTI program and hear first-hand about AAMTI success stories and note suggestions for improvements to the program for the future. This particular site visit from 23 - 24 February 2017 took her to the Regional Health Command-Pacific, where she spoke to interested investigators at Tripler Army Medical Center (TAMC) about the AAMTI program. TAMC currently has 10 active AAMTI projects and while there, Holly had the opportunity to meet with several of the investigators onsite to get an update on their projects.

She also traveled to Schofield Barracks and met with former TATRC Deputy Director, COL Deydre Teyhen, who is now the Commander of U.S. Army Health Clinic-Schofield Barracks, and several other members of her staff to discuss AAMTI past, present and future projects.

Ms. Pavliscsak's adventures have taken her far and wide. She would love to visit your facility and learn more about the innovative technologies and projects that you feel have the potential to make an impact on patients, providers, and/or the Military Heath System as a whole. Please contact her if you would like to learn more about the AAMTI program, and she would be happy to schedule a visit.

DHA Director, Vice Admiral Bono Visits MRMC & TATRC!

On 13 March, MRMC and TATRC had the honor of hosting Vice Admiral Raquel C. Bono, Director of the Defense Health Agency, for a Command-wide briefing and medical products tour. While Vice Admiral Bono was able to see many of MRMC's command products and demonstrations, there were three TATRC-specific projects that were highlighted and featured during the tour. Those included: the AAMTI Program, the APPRAISE system from the BHSAI Lab and Unmanned Systems from the Operational Telemedicine Lab. TATRC would like to give a big shout out to Vice Admiral Bono and her team for taking time out of their busy schedules to visit us and hear about the many exciting initiatives taking place here at Ft. Detrick! A special thanks to our TATRC SMEs, Dr. Jaques Reifman, Ms. Holly Pavliscsak and Mr. Nathan Fisher for sharing their knowledge & expertise.

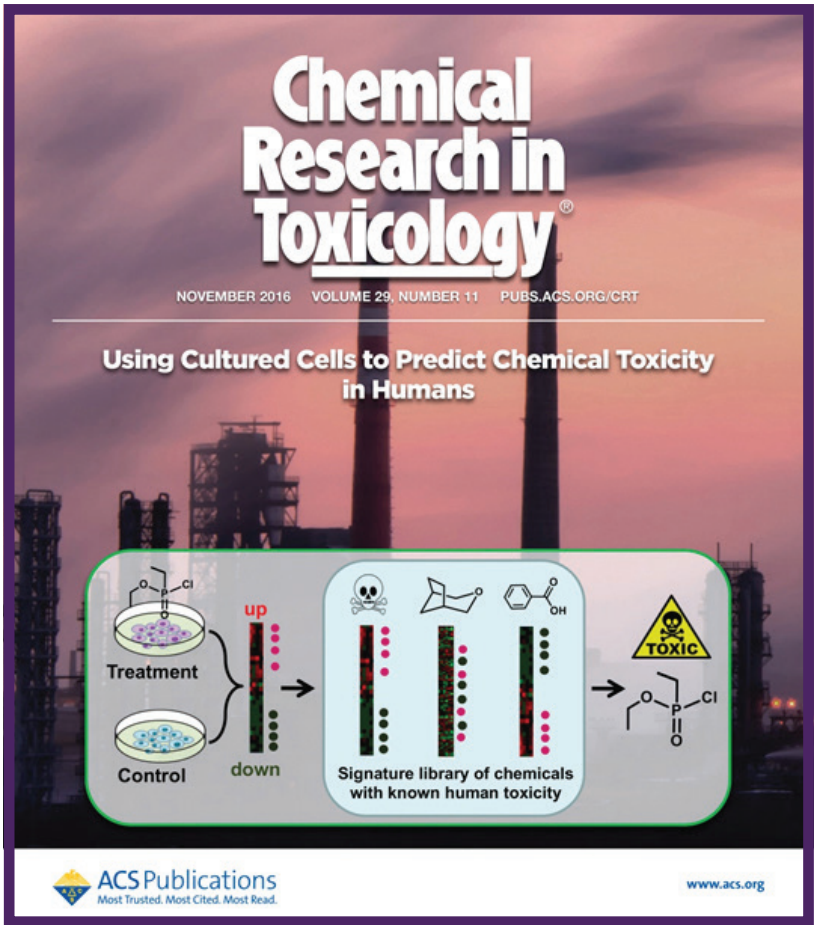
(Pictured Clockwise) Mr. Nate Fisher, Ms. Holly Pavliscsak and Dr. Jaques Reifman each brief VADM Bono, Director DHA during TATRC visit.

TATRC's BHSAI is Predicting Chemical Toxicity Threats to the Warfighter

Warfighters are increasingly at risk from environmental health hazards during deployment, where exposure to an accidental or intentional release of chemical toxicants can cause both acute and long-term health problems. Threats from common chemicals and industrial toxicants are heightened by their high level of availability from many different sources and relative ease of handling compared with biological warfare agents, nerve agents, and other highly controlled substances. The high potential for accidental or deliberate chemical and toxicant release makes it critical for us to understand the short- and long-term health consequences of such threats.

Given the large number of chemicals on the market, it is impractical to perform any in-depth laboratory characterization or animal testing to evaluate any potential health effects of all commercially available chemicals. Scientists at TATRC's Biotechnology High Performance Computing Software Applications Institute (BHSAI; www.bhsai.org) are developing alternative computational methods to rapidly assess and gauge potential health effects of chemical exposures.

BHSAI's Deputy Director , Dr. S. Anders Wallqvist



The research of Dr. Wallqvist and his colleagues on predicting chemical toxicity threats was featured on the cover of the November 2016 issue of Chemical Research in Toxicology.

Sponsored by the Defense Threat Reduction Agency, the BHSAI work focuses on developing models that directly relate to human responses and diseases. Dr. Sven A. Wallqvist and his team developed an alternative method for assessing chemical toxicity. They based their modeling efforts on large-scale toxicogenomics data generated by the US National Institutes of Health Library of Integrated Network-Based Cellular Signatures program. By analyzing data from over 15,000 chemical compounds tested in cultured human cells, they developed a novel model to predict the potential of a chemical to cause specific liver, kidney, or heart injuries in humans. To validate their approach, they showed how model predictions of toxicity for drugs and dietary supplements, which are not formally recognized as injurious, were corroborated in independent case reports of cholestasis (liver disease), interstitial nephritis (kidney disease), and long QT syndrome (heart disease).

Dr. Wallqvist commented that, "The developed technology provides a robust technique to model human exposure to chemicals and may serve as a promising alternative to animal-based chemical toxicity assessment." The findings of this study were recently published in Chemical Research in Toxicology*.

*Liu R., Yu X., Wallqvist A. Using Chemical-Induced Gene Expression in Cultured Human Cells to Predict Chemical Toxicity. Chem Res Toxicol. 2016; 29(11):1883-1893. DOI: 10.1021/acs.chemrestox.6b00287

Operation Cancer Warrior Surveillance Project

The diagnosis of cancer can be a life altering moment for many patients. Beating cancer involves not only surviving the initial treatments but remaining vigilant for recurrence for at least five years. Depending on the type of cancer and the frequency of doctor visits, labs and scans vary, not only by the cancer subtype, but also by year.

Cancers can affect the entire spectrum of Defense Health Agency beneficiaries including, young, "healthy," active duty service members. In this patient population specifically, and relating to some of the more common cancers, such as breast cancer or melanoma, it can be challenging to recognize that cancer survivorship is dependent on a longitudinal surveillance plan.

Instead, the more common perception is that their cancer care is an isolated episode and they can be cured after initial treatment. In addition, these active duty patients are often moving to various installations with different military treatment facilities (with different cancer capabilities and treatment teams) and are solely responsible for establishing their own surveillance. Adhering to the National Comprehensive Cancer Network (NCCN) guidelines is a daunting task for a service member who is constantly dealing with the challenges of career progression, deployments, field exercises, and lack of continuity of care.

Recognizing the critical importance of follow-up planning on improving survival for cancer patients, the Commission on Cancer, the accreditation body of the American College of Surgeons, began requiring institutions to provide a survivorship plan to patients starting in January 2015. However, at present, the Military Healthcare System is struggling to provide adequate and uniform follow-up for cancer patients at the enterprise level.

To address this issue, LTC Vance Sohn, at Madigan Army Medical Center (MAMC) wanted to create a means to reach these patients and keep them on track with the appropriate follow up over time, regardless of their current duty station. Using funding provided by TATRC's AMEDD Advanced Medical Technology Initiative (AAMTI) program, he partnered with TATRC's Mobile Health Innovation Center (mHIC) to design and implement a pilot project focused on providing alerts to patients on the steps they need to take to follow their cancer survivorship plans, as defined by their oncology team for the long term. This pilot study is called the Operation Cancer Warrior Surveillance Project.

LTC Sohn stated, "Cancer surveillance is challenging in any health care system, but definitely for our military population. With the generous support of AAMTI, my goal is to enable our cancer survivors to not only adhere to cancer surveillance, but also, give them the freedom to continue to contribute to the military in meaningful ways. Since everyone has a smart phone, I wanted to use this technology to help Soldiers excel in their jobs while they battle cancer!"

The Operation Cancer Warrior Surveillance Project allows the oncology team to develop a customized survivorship plan for each of their patients at MAMC, which will then provide long term (up to 5 years) text message and email alerts to these patients, as required. These alerts will help to remind patients of the need for follow-up exams and testing, even if they are no longer assigned to a duty station serviced by MAMC.

"The mHIC team is honored and privileged to be part of the team that can help patients stay on track of monitoring their health as a part of long term cancer survivorship," said Jeanette Little, Lab Manager of TATRC's mHIC.

Each patient profile is based on the national standards determined to best suit the patient's condition, usually following the NCCN or American Society of Clinical Oncology guidelines.

Presently, the profiles and alerts are being finalized for four clinical conditions (e.g. breast; colon; lung; and prostate cancers). These will be piloted by focus groups of cancer survivors at MAMC prior to being implemented later this calendar year.

The goal is using email and texts alerts to help the Soldier keep up with follow-up care no matter where they are in their military career.

TATRC Establishes its Virtual Health Support Office (VHSO) to Support Army Medicine

When the Army's Surgeon General decided to implement the Army's Virtual Health Business Plan in 2016, the Surgeon General's Virtual Health Office quickly reached out to TATRC to help accomplish several of the Plan's objectives. This was not a surprise as TATRC is recognized worldwide as Virtual Health (VH) Subject Matter Experts (SME) because they have long been involved in the successful delivery of virtual health (aka "telehealth") research and operational solutions. In the 1990s, TATRC developed and deployed the Special Medical Response Capabilities Set (SMRC). TATRC developed and deployed the AKO asynchronous email teleconsultation program in 2004, and the CENTCOM Theater tele-Behavioral Health initiative in 2010, and both remain active today. Furthermore, TATRC led the successful expansion of telehealth throughout the Army's fixed facilities from 2010-2015, increasing both the number of telehealth sites from a few to over ninety, and the number of telehealth encounters by over 300%. This telehealth expansion spanned 18 time zones in 30 different countries and encompassed over 30 diverse clinical specialties. TATRC's newly assigned mission will focus on virtual health capabilities mainly in the operational (deployed) environments.

On January 1, 2017 TATRC established the Army's Virtual Health Support Office (VHSO) and reassigned Dr. Francis McVeigh to lead the VHSO Team to accomplish this mission. Dr. McVeigh is the former TATRC Chief Scientist who before serving as Chief Scientist, led the 2010-2015 Army Telehealth Expansion Initiative. He is supported full time by two Senior Project Officers, Ms. Tabitha Waldrop and Dr. Rob Baumgardner, and part time by Mr. Larry Markins as well as other SMEs throughout the Army.

One of the first actions of the VHSO Team was to quickly establish strong working relationships with the Office of the Surgeon General's Virtual Health Office staff, as well as, with key virtual health leaders and innovators throughout the Army Medical Command. Next, the VHSO Team began gathering information by interviewing key individuals. Additionally, Dr. McVeigh participated in two separate tiger team site visits: first to Germany (RHC-Europe) and then to the CENTCOM Area of Operations (Qatar and Kuwait). During these site visits, the tiger team met with countless individuals (medical, IT, Signal, commanders and their staffs); obtained information of ongoing and planned virtual health initiatives; discovered challenges to virtual health implementation; and identified areas that could benefit from virtual health. In FY18, the VHSO staff is projected to increase six-fold.

The term virtual health (VH) in the Joint Health Services Support Enterprise, (JHSSE), is equivalent to the term telehealth. Both terms refer to the use of telecommunications and information technologies to connect people to health care and health care systems across a distance. Technically defined in the JHSSE, virtual health is the use of telecommunications and information technologies needed to provide health assessment, treatment, diagnosis, intervention, consultation, supervision, education and/or information across distances.

Dr. Francis McVeigh, Lead for Virtual Health Support Office

The Army's Virtual Health Business Plan states that, "all of the Army's past successes and future plans in virtual health revolve around one core concept: connecting people and Soldiers to health care globally to increase readiness, access, quality, and patient safety. Using virtual health leverages the best Army Medicine across the world that can be brought to the patient whether they are deployed or in garrison."

Other sayings that you may have heard expressing this strategic concept are: "Anywhere, at Any time" and "Virtual when possible and Live as needed." The plan also states that an existing Army Medical Center will be designated as a Virtual Medical Center which can serve as a coordinating entity for VH and a catcher's mitt for teleconsultations. The Virtual Medical Center concept developed by the OTSG VH staff, will have clinicians and staff that specialize in delivering healthcare remotely to patients wherever the patients are in the world. This selection should be announced in the coming months.

Although the VHSO's main focus is assessing and recommending VH capabilities for the operational environment, the overall comprehensive Plan summarized in the above paragraph spans Roles I-IV. Therefore, the VHSO will address both the VH environments' capabilities, as well as, the interoperability capabilities required to connect the operational and garrison VH environments.

TATRC was specifically asked to accomplish one of the four overall Army's Virtual Health Business Plan's goals, Goal 1: Deliver Telehealth Solutions to support Mission Readiness and Operational Medical Capabilities. The sub goals are as follows: Objective 1-1: Enhance and mature a single asynchronous teleconsultations capability (garrison and operational); Objective 1-2: Stand up a global system of synchronous teleconsultations capabilities (garrison and operational); and Objective 1-3: Examine synchronous provider-patient care in operational environments.

To elaborate further, objective 1-1 will commence when

VHSO *Continued on page 17*

VHSO *Continued from page 16*

the Defense Business Certification (DBC) Packet is approved. The DBC Packet addresses the development of an asynchronous portal solution and the follow on capability build / acquisition. Once approved and funded, developers will leverage and modify the current Pacific Asynchronous Telehealth Platform (PATH) and incorporate other asynchronous programs such as, the existing tele-email and tele-dermatology into a single platform. The DBC approval decision is expected to be rendered this summer. Once the portal development is completed, the other Services will be given the opportunity to pay their fair share for their providers' involvement. Eventually, the goal is to use the Cerner tele-consultation capabilities when available.

Objective 1-2, consists of evaluating ongoing synchronous pilots / programs, and to eventually provide centralized management support to develop an integrated synchronous consultation capability. Some of the pilots / programs being evaluated are as follows: Regional Health Command-Atlantic - working with the 5th Special Forces Group using the Telemedicine Exam Station; RHC-C – Virtual Critical Care Consultation Service (VC3); and RHC-E – all-specialty provider hotline and support of the United States Army Africa (USARAF) with the Telehealth in a Bag set. Additionally, some asynchronous programs will be looked at such as, the RHC-P – PATH and the RHC-C – Ask A-Doc/AKO tele-consultations program.

> "… all of the Army's past successes and future plans in virtual health revolve around one core concept: connecting people and Soldiers to health care globally to increase readiness, access, quality, and patient safety. Using virtual health leverages the best Army Medicine across the world that can be brought to the patient whether they are deployed or in garrison."

Lastly, objective 1-3 includes continued involvement of TATRC leading the monthly CENTCOM tele-Behavioral Health telecons, and coordinating the resolution of identified issues and concerns amongst multiple players such as DHA, OTSG, and CENTCOM. Secondly, this objective includes looking at medical-legal questions related to VH such as Joint Commission guidelines when communicating between accredited and non-accredited facilities, Federal Tort Claims Act, liability of medical facility commanders, state medical board guidelines, and the standards of care requirements. The intent is to address the above issues through research studies and pilot programs over the next several years. The answers to these questions will help with the development of policies that can guide individuals involved in VH and others when supporting the Warfighters.

VHSO hit the ground running by launching a series of clinical, administrative and technical interviews and dialogue with all the known Army VH POCs who have developed and/or deployed virtual health demos, pilots and programs, and with those individuals who are actively engaged in related activities. To date, Ms. Waldrop has conducted over a dozen clinical and administrative interviews; has cross-trained with the tele-email and tele-dermatology program leads in order to serve as back up if needed; and provided administrative support to the VC3 demonstration project. Dr. Rob Baumgardner is leading the monthly CENTCOM Tele-Behavioral Health Coordination Telecons and has conducted countless technical interviews and conversations with all known VH demos, pilots and programs' personnel and others who are involved with VH. The collected administrative, clinical and technical data will be evaluated and culminate in a comprehensive report that will include recommendations on the best ways forward. The final report will be given to the Surgeon General's Virtual Health Office, with the intent that it will serve as a guide for their staff in making informed decisions on which capabilities to leverage and/or build.

Virtual health can prove lifesaving by connecting medics far forward on the battlefields who are not collocated with specialty providers and who are in an environment in which they are expected to hold onto patients longer, a concept known as Prolonged Field Care. Needless to say, the benefits of using VH are not limited to the operational space, as the ability to remotely connect providers to providers, patients to providers, patients and providers to healthcare systems, and the ability to monitor patients with chronic diseases in their homes can also prove extremely beneficial. Civilian hospitals and providers are using VH more and more every day, leaving the DoD lagging behind, which is disappointing, as the DoD has historically led the way in VH. Future virtual health capabilities usage will only be limited by our imagination and what solutions the enterprise purchases; and oh yes … policies.

Dr. McVeigh, VHSO lead, stated that, "Selecting and deploying the right VH capabilities to medics on point so that they can have bidirectional communication capabilities to and from the virtual medical center, as well as, throughout the enterprise, reduces the medical knowledge disparity levels across Roles I-IV; enhances access, patient safety, and the quality of care; keeps Soldiers in the formation; and thereby increases readiness." He further stated that, "Without a doubt, TATRC has the right people across all of its laboratories to leverage support and assist the VHSO staff in accomplishing their mission." Lastly, he said, "It is an honor to continue to serve the men and women in uniform and their families."

TATRC's Senior "teleHealth Tiger Team" Visits Qatar & Kuwait

Recently, members of TATRC's Leadership Team had the opportunity to travel to portions of the CENTCOM Area of Responsibility (AOR), at the request of the Army's Office of the Surgeon General, in order to better assess the current state of teleHealth on the ground and look for opportunities to potentially increase this capability across additional specialties in support of current operations. The TATRC teleHealth Tiger Team consisted of COL Dan Kral, Director, Dr. Gary Gilbert, Lab Manager for TATRC's Operational Medicine Lab, and Dr. Francis McVeigh, lead for TATRC's Virtual Health Support Office. This team was both sponsored and supported by the US Army Central (USARCENT) Surgeon, who not only facilitated the team's ability to travel into the CENTCOM AOR, but also put forth a much-appreciated agenda of organizations and individuals to visit with.

The team linked-up in Qatar, as their first stop, with MAJ Keva Brown from USARCENT Forward Command Post. MAJ Brown acted as escort throughout the visit, ensuring the team was able to meet with all key medical and Signal personnel relevant to the teleHealth initiatives. While in Qatar, meetings were conducted with staff officers from the 3rd MC(DS), the OIC for Camp As Sayliyah Troop Medical Clinic, and the entire team at US Army Medical Materiel Center (USAMMC) Southwest Asia (SWA).

The second leg of the Tiger Team's visit consisted of several meetings on Camp Arifjan, Kuwait over the span of nearly a week. While on Camp Arifjan, the team participated in a series of very productive meetings and discussions with the 31st Combat Support Hospital, Division Surgeon and staff for Task Force Spartan (29th Infantry Division ARNG), Corps Surgeon for Combined Joint Task Force - Operation Inherent Resolve, and Commander for 335th Signal Command, who owns responsibility for the strategic networks.

Overall, the visit was extremely successful and beneficial. The general consensus of the team members was that while we have made tremendous progress over the past 15 years of sustained conflict, there still remains much work to be done both on the ground, as well as at the enterprise level, so that the progress we have gained can be sustained and incrementally built upon for future generations. The team will follow up the visit with a more detailed report, articulating several opportunities for improvement as well as a series of recommendations for more immediate results.

(Pictured L to R) Dr. Gary Gilbert, COL Dan Kral, Dr. Fran McVeigh at US Army Medical Materiel Center (USAMMC) Southwest Asia (SWA).

Dr. Gary Gilbert made the following observation, "This trip made three things crystal clear: First and foremost, America is well served by those AMEDD men and women currently serving in SWA and Operation Inherent Resolve; secondly, in terms of operational medical research opportunities, the CENTCOM AOR is a "target rich environment"; and last but not least, in terms of medical information management and its integration with military communications networks, the AMEDD would do well to empower its hard charging medical providers in Theater by providing them with both the human expertise and the technical resources they need to accomplish their mission."

You're Invited!

TATRC's Annual

Open House & Technology Demonstration

"Supporting Military Readiness through Innovative Technologies"

What: An informal Open House to highlight & feature TATRC's ongoing research & managed programs. Guests will be able to see & experience our technologies & engage in open dialogue with the research leads.

Who: Thought Leaders & Collaborative Partners in Military Medicine

Why: To provide broad awareness of TATRC's core competency areas & current **research portfolios & to highlight TATRC's unique capabilities firsthand.**

When: Friday, 5 May 2017
10:00 am - 3:00 pm

Where: TATRC, Bldg. 1054, Patchel St. & TATRC Innovation Center (TIC)

RSVP: Advanced Registration is required NLT: Thursday, 20 April 2017, via e-mail to: anna.k.hagarman2.ctr@mail.mil or lori.a.debernardis.ctr@mail.mil

Crowd Sourcing Innovation: A Vision for the Future of Medical Modeling and Simulation: Open Source, Open Architecture, Open Standard … and Why You Should Care.

Medical modeling and simulation (MM&S) has a very old (dating back over 1000 years), rich and complicated history, full of stops and starts. In its current iteration, the "modern age" of MM&S, we have witnessed an explosion in the types of simulators and simulations, the technologies driving them, and our understanding of how to best use them to improve the acquisition, retention and transfer of critical medical and healthcare knowledge, skills and behaviors to students, professionals, and the research and development community. A fundamental problem persists however, despite this wide range of devices and technologies, none offer a "complete solution," and few if any, are truly interoperable, or scalable to new and emerging healthcare simulation needs. This single problem creates significant challenges and limitations to realizing many MM&S needs, and in some cases may be rate limiting to innovation, research and development.

The MM&S industry is not unlike many other technology industries. Imagine though if we were a bit more like the mobile smartphone market, where common, open source, standard and architecture allows for literally hundreds of thousands of "apps for that" (whether you are an iOS or Android user). Ironically, MM&S is relieved of competing operating system concerns as we all share a common operating system – human physiology. Though there are variations across the span of ones life, the essential "Human Operating System (HumanOS)" is common to all. This is a distinct advantage to MM&S research and development communities (academic, government, commercial, etc.) if a common, open source, standard, architecture approach can be realized and implemented across the largest possible community of interest. "The concept of a common, open 'HumanOS' would allow for interoperability, modularity and scalability of MM&S research and development and usher in a new capability and capacity to evolve advanced simulation efforts across a wide array of platforms, manufacturers and research efforts by developing thousands of new 'sims for that'", says Mr. Geoffrey Miller, Research Scientist and Lab Manager at TATRC's Medical Modeling and Simulation Innovation Center.

The DoD, through the Medical Simulation and Information Sciences Research Program, has made significant investments into science and technology research for the Joint Military community, including a strong focus on this very issue. The goal of open source, architecture and standard is embedded into several key military MM&S initiatives such as the advanced modular manikin, virtual tissue, and open source human physiology research engine. These projects have begun the vision of developing a common operating system environment and encourage the realization of a truly common operating system (HumanOS) to support the inclusion of any medical model or simulator into a fully interoperable system.

To achieve this goal is not to simply embrace the idea. An effort to convene the communities of interest both inside of medical modeling and simulation, and with organizational bodies familiar with the development of relevant standards should be made. A short (but certainly not inclusive) list comes to mind to help shape this possible future, including DoD MM&S, the Society for Simulation in Healthcare, the International Nursing Association for Clinical Simulation and Learning, Simulation Interoperability Standards Organization, Institute of Electrical and Electronic Engineers, International Organization for Standardization, just to name a few.

The future of medical modeling and simulation research, development and implementation has two potential pathways at present, 1. It can continue to develop and function as it is, with many different systems, standards, platforms and developers, unable to interoperate and leverage the best across many developers, or 2. It can promote, develop and adopt this envisioned open source, standard, and architecture where the research, development and commercial communities can "crowd source" the future of medical modeling and simulation, allowing an entirely new ecosystem of interoperable medical models and simulators.

Upcoming Events:

23 - 25 April: ATA Annual Conference; Orlando, FL

5 May: TATRC 3rd Annual Spring Open House; Ft. Detrick, MD (Registration Required)

18 May: Pentagon Lab Days; Pentagon, Arlington, VA

19 May: Bike to Work Day

20 May: Armed Forces Day

21 - 25 May: SOMA Annual Conference; Charlotte, NC

29 May: Memorial Day

TATRC Participates in World's Biggest Medical Simulation Conference

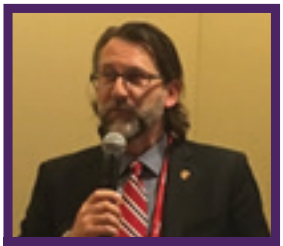
For more than a decade, TATRC has contributed to the growth and success of the International Meeting for Simulation in Healthcare (IMSH). Again in 2017, TATRC's Medical Modeling & Simulation Innovation Center (MMSIC) leaders planned and executed special events. The IMSH 2017 meeting was held in Orlando, Florida, 29 January through 1 February 2017; with the theme of "Patients: the Heart of Simulation." More than 2,800 people from 54 countries attended.

The IMSH is the annual meeting of the Society for Simulation in Healthcare (SSiH). Fueled by growing national interest in improving patient safety and quality of care, as well as reducing healthcare costs, the IMSH reflects the emergence over the last two decades of Medical Modeling & Simulation (MM&S) as an entirely new professional field. The IMSH conference is the main educational event for SSiH members and non-member attendees. The SSiH also publishes a peer-reviewed journal (Simulation in Healthcare) and manages the Certified Healthcare Simulation Educators program for medical simulation educators.

This conference featured more than 300 education sessions led by more than 700 top faculty leaders in the field. The Exhibit Hall, the world's largest medically focused Simulation Exhibition, featured more than 110 exhibitors for healthcare simulation professionals.

So why were two TATRC and dozens of other Army healthcare personnel involved? In short, participation in the IMSH conference advanced the Army's mission. The US Army Medical Command's mission includes providing safe, high quality care — as effectively and as efficiently as possible – to its military, dependent and retiree personnel. One key is effective training. This includes educating and training for care "from the foxhole to the operating room", from first responders / combat medics / special operations medics through fixed facility Graduate Medical Education programs, including physicians, nurses, ancillary providers, and health care administrators. It is critical that Military Health System healthcare providers remain abreast of the latest teaching and training strategies, as well as Medical Simulation Center management and operation. The conference's educational sessions added value to Army attendees in many mission-relevant areas such as assessment and outcomes, certification, instructional methods, leadership, learning theory, program administration, Research and Development (R&D), and technical operations.

MMSIC's Mr. Geoff Miller, Research Scientist and Laboratory Manager, along with Mr. Harvey Magee, Technical Director, planned and executed two special events. Mr. Miller chaired a Department of Defense (DoD) Academic Program on 1 February, which consisted of an eight presentation academic program.



Geoff Miller Kicks off DoD Academic Session

Mr. Magee coordinated and executed the DoD "Government Row," an Interactive Exhibit Area of thirteen (13) maturing R&D prototypes. These represented research in progress conducted by government, academic, and industry research groups, with funding from various sources as well. The purpose of this "Government Row" Exhibit was to inform the public, educate civilian & military healthcare professionals about MM&S R&D funded by the DoD, to facilitate feedback among government managers and researchers seeking to improve their prototypes, to build & maintain bridges for exchange of information and technology between federally funded R&D managers and, ultimately, to improve patient care, safety, quality of care, and outcomes.

"Government Row" drew hundreds of attendees. The DoD prototypes created a buzz of excitement, due to their maturity and developing capabilities. One of the exhibitors commented, "I visited the exhibition hall last year as an attendee and this year as an exhibitor. This experience has been extremely beneficial to our research. The dialogue with attendees from academia, industry, and government was like a mini-conference of information exchange. This was an extremely collaborative event. Our only complaint was that we were too busy at times and weren't able to talk to everyone who was at the booth."

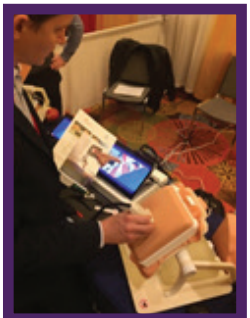
Mr. Harvey Magee, noted "IMSH '17 was fantastic! The "Government Row" was the 'Best Ever' in terms of quality of visitors, engaging conversations, and excitement about the cutting edge technologies funded by the DoD. Both the research teams and government managers present gave 'thumbs up' about the value of their discussions. The entire conference was high energy, and the IMSH leadership was superbly supportive of DoD events!"

The next IMSH meeting will be held in Los Angeles, CA from 13-17 January 2018.

Harvey Magee welcomes the crowd to 13 DoD Government Row Research Exhibits

Attendee practices surgical Procedure using Purdue University's telementoring technology

Moulage Tattoo is Wildly Realistic, notes Ms Betsy Weissbrod of Uniformed Services University



Univ of Florida's Augmented Reality Technology, Ultrasound Demonstration

TATRC Hosts Eight-Nation Delegation from NATO

On 8 March, TEAM TATRC hosted a large, eight country delegation of NATO Nations that included a stop at TATRC's Innovation Campus. The two-part visit consisted of a high level TATRC Overview & Command briefing given by TATRC's Director, COL Dan Kral, who stated "TeleHealth involves the whole enterprise." He was followed by Dr. Francis McVeigh, Lead for the Virtual Health Support Office (VHSO) who gave an extensive briefing on our successes in TeleHealth over the years, and how it's evolved, plus, his new role in heading up the Surgeon General's VHSO. The final briefing of the day was given by Mr. Carl Manemeit, Deputy Director of the Operational Telemedicine Lab, who focused on TATRC's many initiatives in operational field environments.

The second part of the visit culminated with five interactive, hands-on demonstrations in each of the key areas listed above.

The countries that were represented included: France, UK, Norway, Czech Republic, Germany, Lithuania, Netherlands, Belgium and a NATO Lessons Learned Branch, and was coordinated through the Medical Communications Information System group, a support element of the Military Medical Structures Operations Procedure at NATO HQ in Brussels, Belgium and the Defense Health Agency.

This NATO delegation, which is part of the NATO Telehealth Workgroup, had a particular interest in our TeleHealth & Operational Telemedicine initiatives and its efforts to support the health and wellbeing of battlefield Soldiers. There was a robust and fruitful discussion on the many benefits of TeleHealth & Operational Telemedicine and how it can, and is, helping our Warriors. Thank you to our NATO allies who took part in this visit.

(Pictured Clockwise) Mr. Larry Markins, Mr. Carl Manemeit and MAJ Daniel Yourk demonstrate and brief current technologies and answer questions from the NATO delegation during visit.

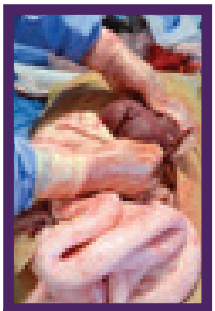
COL Dan Kral (left) explains TATRC's mission and role in operational telemedicine, while Dr. Fran McVeigh (right), briefs advancements in telehealth and TATRC's new role in virtual health.

TATRC SBIR PI Receives Prestigious Tibbetts Award at White House

On 10 January, Operative Experience Inc. (OEI) was among select Small Business Innovative Research (SBIR) performers honored at the White House. The Small Business Administration honored OEI, whose founder and Principal Investigator is Dr. Robert F. Buckman Jr., with a 2016 Tibbetts Award for creating significant economic and social impact through SBIR funding. This marks almost a decade of research and development by OEI in response to an SBIR Topic on Rapid Trauma Training Skills. That topic was authored by Mr. Harvey Magee, TATRC's Medical Modeling Simulation & Innovation Center (MMSIC), Technical Director and co-authored by Dr. Tim Broderick, MD. Mr. Magee stated, "In my 17 years at TATRC, I've been honored to work with some world-class research groups; OEI is clearly one of them. The SBIR program incentivizes innovation, and OEI's approach to training is innovative for sure! A number of surgical simulators and training programs resulting from one single SBIR are now available commercially, with potential for world-wide impact."

Dr. Robert Buckman, Jr. receives Tibbetts Award from former Small Business Administration Associate, Administrator Mark Walsh.

So what problem was TATRC trying to address? Deployed military surgeons, especially those with specialized training, (e.g., ob-gyn, ophthalmology, orthopedics), are often required to perform general surgical and trauma surgical procedures during wartime, with "open surgery" techniques, more often than the procedures they perform in their civilian or even peacetime military practice, which may be performed with "minimally invasive surgery" techniques. As a result, surgeons may be unprepared to perform them proficiently. Also, their specialty skills are prone to deteriorate during deployment. The US Army (as well as other DoD medical training programs) has a need to rapidly refresh skills of physicians going to and returning from forward based assignments. Previous simulation training methods are low fidelity with unrealistic tissue properties, and the DoD is actively working to refine, reduce, and, when appropriate, replace the use of live animals in medical education and training. The goal is to develop simulation-based methods to rapidly train trauma-naive, deploying surgeons in critical combat surgery skills. Because of their outstanding performance in Phases 1 and 2 of their contracts, OEI was selected for additional Phase 2 funding as well as the Joint Program Committee-1 (JPC-1), Medical Simulation and Information Sciences. This was to develop additional simulation technologies to train combat medics in point-of-injury procedures. With innovative technologies that allow surgical training with real surgical instruments but on synthetic tissue, OEI's surgical simulators allow training of major hands-in-the-body surgical operations in a fully simulated manner.



Damage Control Laparotomy

Dr. Robert F. Buckman, MD, founder of OEI and Principal Investigator, reflected, "The simulation research enabled by TATRC and JPC-1 is at the cutting-edge of a revolution in the training of combat surgeons and medics. It offers a way to maintain the readiness of the military medical force and will probably influence civilian surgical training in our country and around the world."

Simulators developed include:

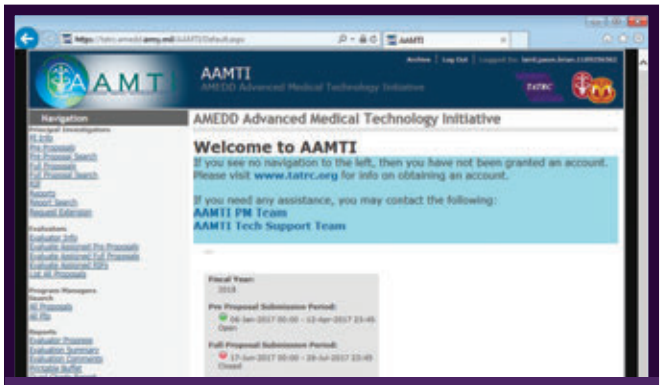
- Damage control laparotomy (in current research);
- Resuscitative endovascular balloon occlusion of the aorta (REBOA) (in current research);
- Set of soldier-form manikins with wound patterns consistent with an Improvised Explosive Device detonation followed by an ambush enabling hemorrhage control training including tourniquets, junctional tourniquets and wound packing, fracture stabilization, and airway management;
- Two-incision, four-compartment fasciotomy of the lower extremity;
- Craniectomy for relief of a subdural hematoma;
- Extensile exposure of the femoral vessel, shunting of the femoral artery and proximal control of the femoral artery at the groin;
- Canthotomy;
- Emergency thoracotomy and emergency bi-lateral thoracotomy with an artificial beating heart.

All models have been commercialized and some customers include Special Operations Forces, U.S. Marine Corps, and State Department security, to name just a few.

The damage control laparotomy and REBOA simulators were demonstrated to LTG West, Army Surgeon General, during TATRC's 12 January AMEDD General Officer's Open House at the TATRC Innovation Campus. Because of OEI's success, Mr. J.R. Myers noted, "This project is a great example of the cutting-edge impact small business innovators can bring to military health through the Defense Health Agency SBIR Program."

New, Secure Process for AAMTI RIF Submissions is Up & Running

The AMEDD Advanced Medical Technology Initiative (AAMTI) Program's Rapid Innovation Fund (RIF) proposals for small scale demonstrations of commercial off the shelf (COTS) or government off the shelf (GOTS) technologies are now able to be submitted through the AAMTI Submission System! RIF submissions can now be made via a secure website accessible from: http://www.tatrc.org/www/labs-and-programs/aamti/ObtainingAccount.html. AAMTI RIF proposals may be submitted by anyone who meets the submission eligibility requirement: the PI must be an AMEDD employee (military or civilian). TATRC Senior Programmer, Mr. Jason Laird, developed this new, well-organized capability within the AAMTI System that allows for the smooth and seamless submission and tracking of all RIF proposals sent in. According to Ms. Holly Pavliscsak, AAMTI Program Manager, "The ability to have submitters enter their RIF proposals directly in the AAMTI Submission System allows for a much more efficient process and quantification of the RIF program."



The homepage for the AAMTI website where pertinent information about process and submissions can be found.

RIF proposals will be reviewed and evaluated based on the following criteria: innovative concept, military relevance, metrics for success and potential return on investment. All RIF proposals will be assigned an identification number after receipt. A copy of the electronic RIF Submission forms can be found in the FY18 Program Documentation at: http://www.tatrc.org/www/labs-and-programs/aamti/. RIF Proposals are accepted on an ongoing basis and funded based on availability of resources. Ms. Holly Pavliscsak, AAMTI Program Manager, is available to answer any questions you may have about the AAMTI RIF program. She can be reached at 240-566-2378 or holly.h.pavliscsak.ctr@mail.mil.

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