



FOXTROT Mobile Eye Care

Jennifer Stowe, William G. Gensheimer, Gary Legault, Kyle Miller,
& Jeanette Miller

DISTRIBUTION STATEMENT A. Approved for public release; distribution unlimited.

Notice

Qualified Requesters

Qualified requesters may obtain copies from the Defense Technical Information Center (DTIC), Fort Belvoir, Virginia 22060. Orders will be expedited if placed through the librarian or other person designated to request documents from DTIC.

Change of Address

Organizations receiving reports from the U.S. Army Aeromedical Research Laboratory on automatic mailing lists should confirm correct address when corresponding about laboratory reports.

Disposition

Destroy this document when it is no longer needed. Do not return it to the originator.

Disclaimer

The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other official documentation. Citation of trade names in this report does not constitute an official Department of the Army endorsement or approval of the use of such commercial items.

Human Subject Use

In the conduct of research involving human subjects, the investigator(s) adhered to the policies regarding the protection of human subjects as prescribed by Department of Defense Instruction 3216.02 (Protection of Human Subjects and Adherence to Ethical Standards in DoD-Supported Research) dated 8 November 2011.

REPORT DOCUMENTATION PAGE

*Form Approved
OMB No. 0704-0188*

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY) 16-08-2021	2. REPORT TYPE Briefing Charts	3. DATES COVERED (From - To)
--	--	-------------------------------------

4. TITLE AND SUBTITLE FOXTROT Mobile Eye Care	5a. CONTRACT NUMBER
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S) Stowe, J., Gensheimer, W. G., Legault, G., Miller, K., & Miller, J.	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Aeromedical Research Laboratory P.O. Box 620577 Fort Rucker, AL 36362	8. PERFORMING ORGANIZATION REPORT NUMBER USAARL-CNPA-BC--2021-26
--	--

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Medical Research and Development Command 504 Scott Street Fort Detrick, MD 21702-9232	10. SPONSOR/MONITOR'S ACRONYM(S) USAMRDC
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
DISTRIBUTION STATEMENT A. Approved for public release; distribution unlimited.

13. SUPPLEMENTARY NOTES
Stowe, J., Gensheimer, W. G., Legault, G., Miller, K., & Miller, J. (2021). *FOXTROT Mobile Eye Care* [Conference Presentation]. 2021 Aerospace Medical Association Annual Scientific Meeting, Denver, CO.

14. ABSTRACT
The COVID-19 pandemic has highlighted the need to expand telemedicine solutions. FOXTROT prevented the need for aeromedical evacuations by 54% If deployed worldwide an estimated saving could occur every year of \$4.1 million. In future LSCO environments, we will need a virtual health platform that can be used in Denied, Intermittent, or Low-Bandwidth Communications Environments. Meaning future build-outs of FOXTROT would require the need for Artificial Intelligence (AI).

15. SUBJECT TERMS
telemedicine, aeromedical evacuation, artificial intelligence

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 21	19a. NAME OF RESPONSIBLE PERSON Loraine St. Onge, PhD
a. REPORT UNCLAS	b. ABSTRACT UNCLAS	c. THIS PAGE UNCLAS			19b. TELEPHONE NUMBER (Include area code) 334-255-6906

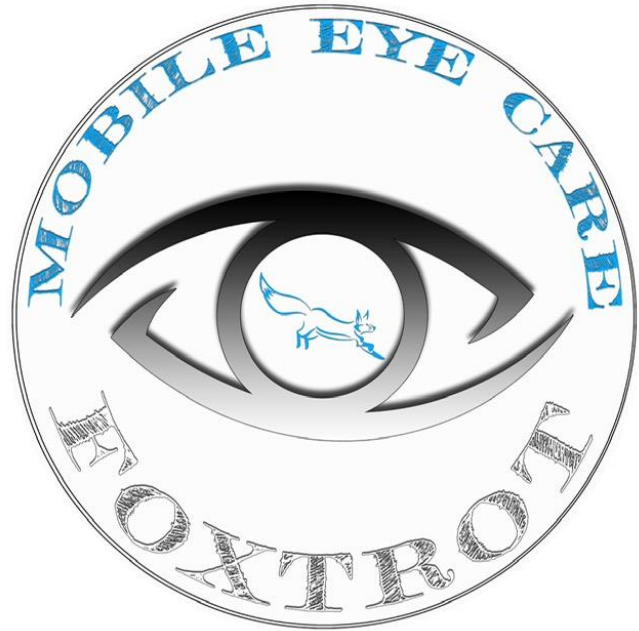
This page is intentionally blank.



U.S. ARMY



"Conserve the Flying Strength!"



FOXTROT Mobile Eye Care

Presented by: Jennifer Stowe, O.D.^a

William G. Gensheimer, M.D.^b, Gary Legault, M.D.^c, Kyle Miller, M.D.^d, Jeanette Miller, M.S.^e

^aUnited States Army Aeromedical Research Laboratory, Fort Rucker, AL USA;

^bWarfighter Eye Center, Malcolm Grow Medical Clinics and Surgery Center, Joint Base Andrews, MD, USA,

^cDepartment of Ophthalmology, Brooke Army Medical Center, San Antonio, TX, USA,

^dDepartment of Surgery, Division of Ophthalmology, Uniformed Services University, Bethesda, MD, USA,

^eTelemedicine and Advanced Technology Research Center, United States Army Medical Research and Development Command, Fort Detrick, MD, USA



"Conserve the Flying Strength!"

Official Disclaimer

The views, opinions, and/or findings contained in this paper are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other official documentation. Citation of trade names in this paper does not constitute an official Department of the Army endorsement or approval of the use of such commercial items.



"Conserve the Flying Strength!"

Human Use Statement

Human subjects participated in these studies after giving free and informed voluntary consent. Investigators adhered to Army Regulation 70-25 and U.S. Army Medical Research and Development Command Regulation 70-25 on Use of Volunteers in Research.



"Conserve the Flying Strength!"

Agenda

- Shift in Operational Doctrine
- Problem Statement
- Mission/ Team
- Designing the Application
- Fielding the Application
- Path Forward
- Summary





"Conserve the Flying Strength!"
Shift in Operational Doctrine

Counterinsurgency (COIN) Operations	Large Scale Combat Operations (LSCO)*
Low numbers of casualties relative to the available medical resources	High numbers of casualties relative to the available medical resources
Methodical/ Sporadic Tempo	Hyper Active Chaos
Domain Superiority	Contested In All Domains
Infrequent (if ever) relocations	Frequent relocations
Uninterrupted Communication	Interrupted Communication
Air Dominance	No Air Dominance

*LSCO can also be referred to as Multi-Domain Operations (MDO)



"Conserve the Flying Strength!"

"Golden Day" Challenge in Multi-Domain Operations Mass casualties overwhelm medical support

- Operations in a Multi-Domain Operations contested environment could potentially increase the number of U. S. casualties, medical complexity, timeline for evacuation, and demand for supplies.

1 medic / 75 casualties

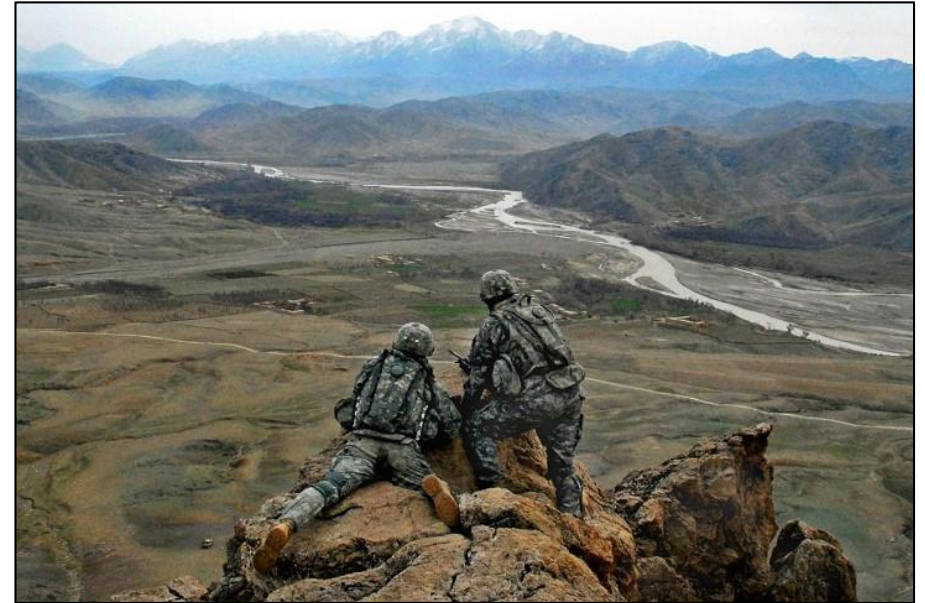




"Conserve the Flying Strength!"

Problem Statement

In future LSCO environments, we will need a virtual health platform that can be used in Denied, Intermittent, or Low-Bandwidth Communications Environments.





"Conserve the Flying Strength!"

Solution

Forward Operating Base Expert Telemedicine Resource Utilizing Mobile Application for Trauma (FOXTROT) is a mobile secure virtual healthcare application developed within the military health system. It is designed for asynchronous and synchronous provider-to-provider consults for when a specialist is not in the location of the patient.



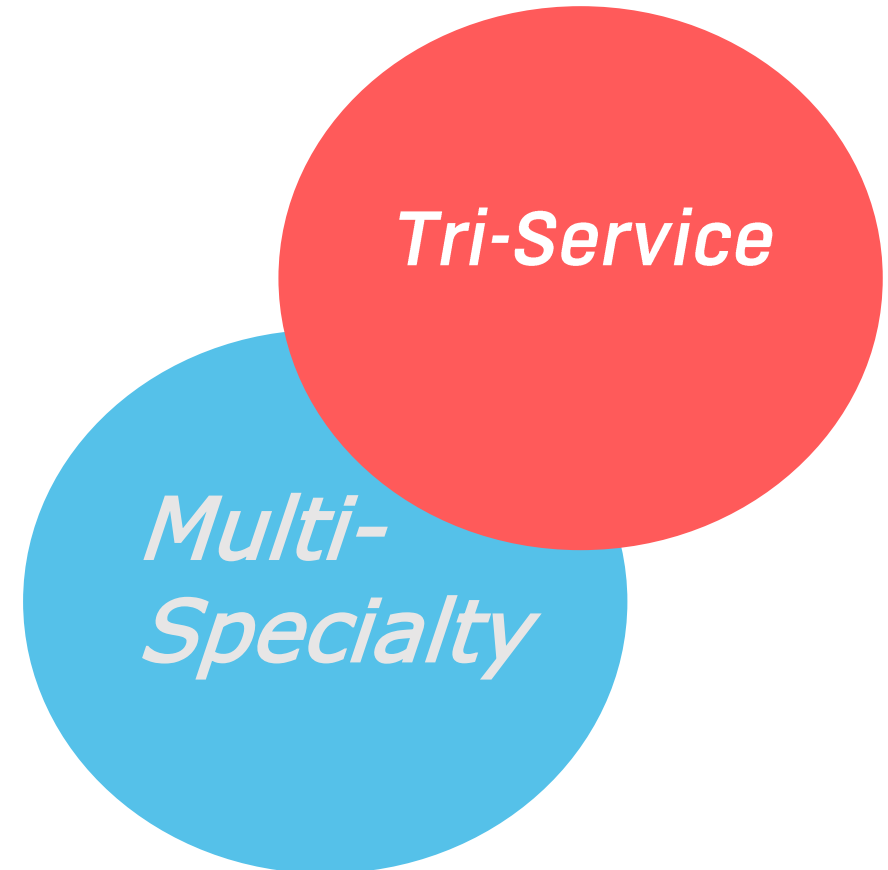
"Conserve the Flying Strength!"

Mission/ Team

Mission: Improve and extend eye trauma care to any deployed location using a secure, HIPAA, compliant mobile application (mApp).

Team:

- Maj William Gensheimer, MC, USAF, JBA
- MAJ Gary Legault, USA, MC, BAMC
- COL Jennifer Stowe, USA, USAARL
- CDR Kyle Miller, MC, USN, NMCP
- Jeanette Little, MS, MHIC, TATRC



*Telemedicine &
Advanced
Technology
Research Center
(TATRC)*

*Mobile Health Care Environment
(MHCE) System
Secure Mobile Application, mCare*





"Conserve the Flying Strength!"

mCare and MHCE

- **MHCE is a secure mobile communication environment**
 - Modified COTS/GOTS technologies from mobile banking
 - HIPAA-compliant
 - Leverages end user mobile device (cell phone or tablet) in manner distinct from text messaging or email
 - Operates all major cell phone platforms
 - Two-factor authentication
 - NIST certified encryption (FIPS 140-2) for both data at rest and in transit
 - Functions both synchronous and asynchronous modes



"Conserve the Flying Strength!"

Building FOXTROT

Step One: Assemble team of subject matter experts (SMEs).

Step Two: Align the goals of FOXTROT with the design.

Step Three: Design a prototype.

Step Four: Beta-test the application (and possibly repeat earlier steps).

Step Five: Ensure regulatory compliance.

- Valid Authority to Operate (ATO)
- Security Software has a Certificate of Networkiness (CON)
- Valid Privacy Impact Statement (PIA)
- Internal Review Board (IRB)
- Health Insurance Portability and Accountability Act (HIPPA)

Step Six: Test in the environment we want it to function in.





"Conserve the Flying Strength!"

Testing FOXTROT

- Distributed FOXTROT to military medics and providers at forward operating bases in Afghanistan who placed teleophthalmology consults on their mobile phone devices that were answered by an expeditionary ophthalmologist deployed to a military hospital in country.

Objective: To beta test a secure teleophthalmology mobile application (mApp) called Forward Operating Base Expert Telemedicine Resource Utilizing Mobile Application for Trauma (FOXTROT) in Afghanistan.

Setting: 16 military treatment facilities at diverse roles of care including forward operating bases in Afghanistan and one location outside of Afghanistan.

Participants: 30 point of care medics and medical providers.

Intervention: Users placed teleophthalmology consults on their mobile phone using the FOXTROT mApp and an expeditionary ophthalmologist stationed at a military hospital in Afghanistan responded. Users graded the mApp using a 1 to 5 rating scale, with 1 being very dissatisfied and 5 being very satisfied.



"Conserve the Flying Strength!"

Testing FOXTROT

Main Outcome Measures:

- Mean initial response time
- Agreement between the teleophthalmology diagnosis and final diagnosis
- Treatment and management following recommendations outlined in the Joint Trauma System (JTS) Clinical Practice Guidelines (CPG)
- Prevention of the need for aeromedical evacuation
- User satisfaction
- Security and Health Insurance Portability and Accountability Act (HIPAA) compliance of consult



"Conserve the Flying Strength!"

Results

- 28 consults placed over 6 weeks by 18 different users that were received by the expeditionary ophthalmologist.
- Mean initial response time was 3 minutes 58 seconds \pm 3 minutes 48 seconds.
- There was agreement between the teleophthalmology diagnosis and final diagnosis in 24 (86%) consults.
- The treatment and management followed recommendations outlined in the JTS CPG for Eye Trauma: Initial Care in 28 (100%) consults.
- The patient returned to duty in 15 (54%) consults.
- Overall satisfaction was 4.79 ± 0.56 , satisfaction with ease of use was 4.75 ± 0.51 , satisfaction with the treatment and management plan was 4.96 ± 0.19 , and satisfaction compared with other teleophthalmology methods was 4.70 ± 0.66 .
- All 28 (100%) consults were secure and HIPAA compliant.



"Conserve the Flying Strength!"

Awards

FEDERAL HEALTH IT (FEDHEALTHIT) INNOVATION AWARD 2020

February 2020

- Forward Operating Base Expert Telemedicine Resource Utilizing Mobile Application for Trauma (FOXTROT)
- Awarded to Federal Programs driving innovation and results that are making a difference

ARMY MODELING AND SIMULATION (M&S) AWARD 2019

November 2019

- Forward Operating Base Expert Telemedicine Resource Utilizing Mobile Application for Trauma (FOXTROT)





"Conserve the Flying Strength!"

Path Forward

Virtual care and modernization is the future of the MHS - We must prepare and train our healthcare team for success!

The future of warfare is changing. Demand for consulting specialties will increase. We will see less Aeromedical evacuations and more ground evacuations. Higher casualties.

The defense of this nation will require modernizing the of military medicine

In the future, military medicine will need a secure AI platform for virtual health in the battlefield

Medical training traditionally centered around in-person care, BUT that will need to change.

Build FOXTROT out with more specialties and AI for DILL environments.

We must fund research dedicated to innovation and the science behind that innovation.

We must teach and support our medical staff to master virtual care delivery, AI driven healthcare and the communication skills for effective patient interactions needed with these modernizations.



"Conserve the Flying Strength!"

Discussion

- The COVID-19 pandemic has highlighted the need to expand telemedicine solutions.
- FOXTROT prevented the need for aeromedical evacuations by 54%. If deployed worldwide, an estimated savings of \$4.1 trillion could occur yearly.
- In future LSCO environments, we will need a virtual health platform that can be used in Denied, Intermittent, or Low-Bandwidth Communications Environments. Meaning future build-outs of FOXTROT would require the need for Artificial Intelligence (AI).



THE U.S. WARFIGHTER

DEPENDS ON US TO GET IT RIGHT



"Conserve the Flying Strength!"

Questions, Comments?

Thank you for your attention.

Data presented were drawn from these reports:

Gensheimer WG, Miller KE, Stowe J, Little J, Legault GL. Military Teleophthalmology in Afghanistan Using Mobile Phone Application. JAMA. Published online August 27, 2020. doi:10.1001/jamaophthalmol.2020.3090

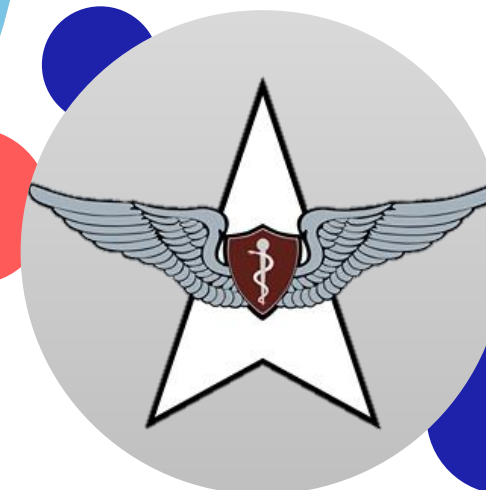


"Conserve the Flying Strength!"



Jennifer Stowe, OD, MBA, MHA

*Researcher, United States Army
Aeromedical Research
Laboratory (USAARL)*



U.S. Army Aeromedical Research Laboratory Fort Rucker, Alabama

All of USAARL's science and technical
information documents are available for
download from the
Defense Technical Information Center.

<https://discover.dtic.mil/results/?q=USAARL>



**Army Futures Command
U.S. Army Medical Research and Development Command**