DIGITAL SURGERY – TELEMENTORING AND BEYOND

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Chair and Navy Lead,
DHA Surgical Services Clinical Community
San Diego, Calif.

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1345-1445 ET

Presenter

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CAPT Gordon G. Wisbach, MD, MBA

CAPT Gordon Wisbach is an active duty general surgeon in the United States Navy stationed at the Navy Medicine Readiness & Training Command - San Diego (NMRTC-SD), where he serves as Surgical Director of the Simulation Center and Telesurgical Director in the Virtual Medical Center. He was awarded his Medical Degree from Jefferson Medical College in Philadelphia, Pennsylvania and completed his residency training at NMRTC-SD. CAPT Wisbach was fellowship trained in Advanced Laparoscopic/ Bariatric Surgery at Brigham & Women's Hospital in Boston, Massachusetts and specializes in robotic surgery. He holds the title of Associate Professor of Surgery at the Uniformed Services University of the Health Sciences in Bethesda, Maryland. CAPT Wisbach earned his MBA from the Naval Post-graduate School and serves as the Immediate Past Chair of the DHA Surgical Services Clinical Community. His active research interests are in surgical education using simulation and advancing surgical tele-mentoring on a trajectory towards tele-surgery.

Disclosures

- CAPT Gordon Wisbach has no relevant financial or non-financial relationships to disclose relating to the content of this activity.
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Learning Objectives

At the conclusion of this activity, participants will be able to:

1. Summarize Surgical Telementoring efforts in the Defense Health Agency (DHA).
2. Identify early adopters that would benefit from virtual health in surgery in garrison and operational settings.
3. Describe the benefits and challenges of establishing a surgical telementoring program in the DHA.

Outline

- Background and Terminology
- Military Health System Advantages
- Methods & Technology Demonstrated
- Metrics & Deliverables
- Military Relevance
- Impact to Military Health System
- Return on Investment
- Milestone Goals

Assumption

- **Surgical Telementoring** will establish the foundation upon which Telerobotic Surgery can be integrated to project surgical expertise remotely with the goal of improving delivery of surgical/invasive medical treatment in the austere environment.

Background

- Puma 560 (1985) -> AESOP (1994) -> Zeus Surg. Robot (2001)
- Lindbergh Operation (2001)
- TS da Vinci then “Connect”
- Modern Wide Adoption of da Vinci Robotic Surgery Technique
- First Operational deployment on United States Naval Ship (USNS) Mercy -T-AH-19 (2018)
- Telesurgical Robotic Operative Network (TRON) FY19
- Military Health System (MHS) – Quadruple Aim
- Telehealth and Virtual Mission Operations Center (VMOC)

Terminology

- **Robotic Surgery**: surgery performed using mechanical arms controlled by a surgeon via a computer assisted platform.
- **Tele-mentoring**: use of information technology to provide real-time guidance and technical assistance for surgical procedures from an expert physician at a different geographic location.
- **Tele-presence**: use of virtual reality technology, especially for remote control of equipment or for apparent participation in geographically different locations.
- **Tele-surgery:** surgery performed by a surgeon in a different geographic location from the patient, using medical robotics and multi-media image communication.
- **Tele-robotic Systems:** the area of robotics concerned with semi-autonomous and autonomous robots controlled from a geographically distant location.
- **Tele-robotic Surgery:** field of surgery that involves surgery performed by geographically remote surgeon as well as use of semi-autonomous and autonomous robotic systems.

Military Health System Advantages

- World-wide health care system
- Lack of provider competition
- Ease of privileging
- Decreased Medical-Legal ramifications
- Emphasis on Enterprise-wide capabilities

Successful Program Characteristics

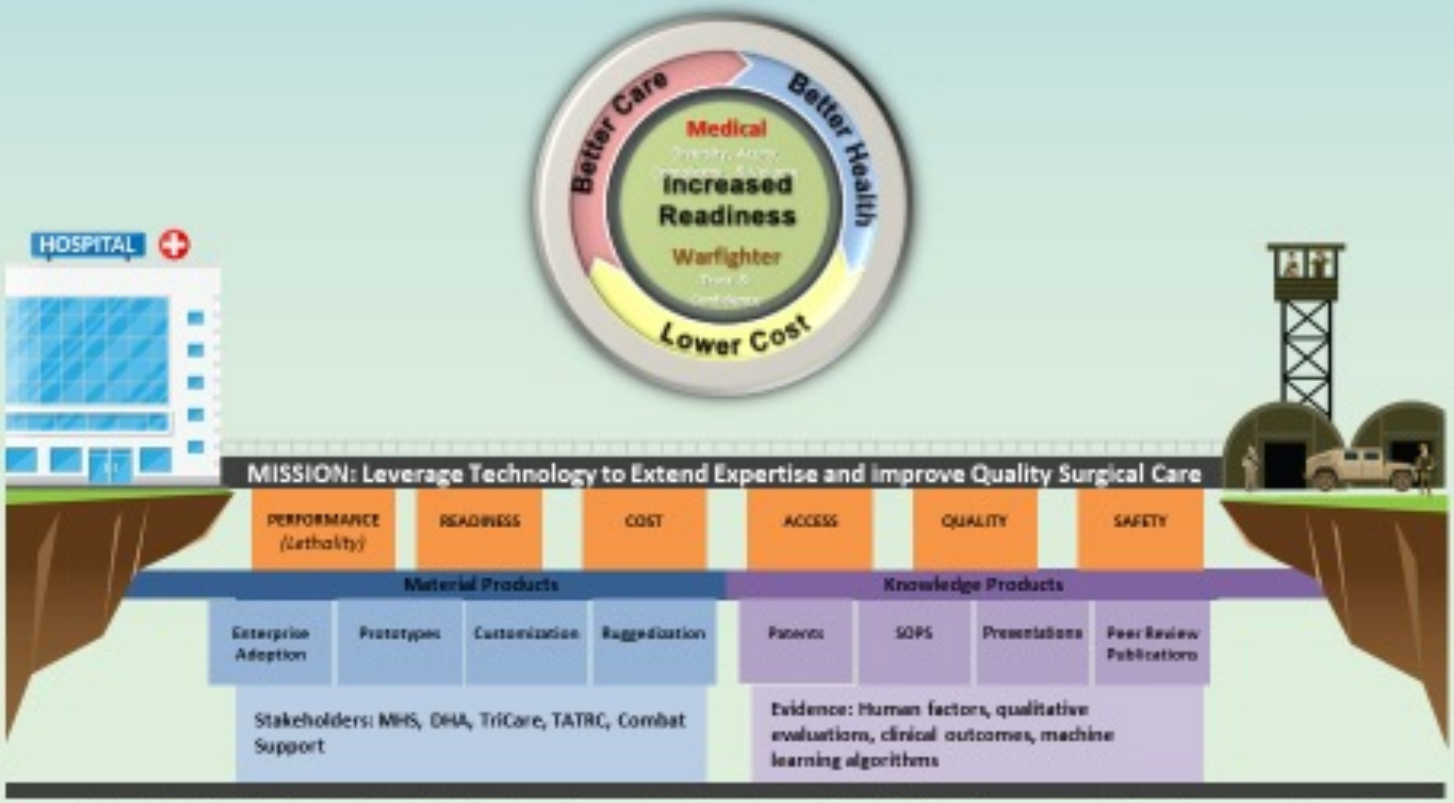
- A successful surgical telementoring session involves:
  - ❑ Standard Operating Procedure
  - ❑ Mentor and Mentee meet prior to the first session
  - ❑ Determine rules of engagement
  - ❑ Expectation management, like role of mentor
  - ❑ Continuity of Operations Planning
    - loss of connectivity
    - Latency
    - Patient condition

Ethical Considerations

Telehealth and telemedicine span a continuum of technologies that offer new ways to deliver care. Although physicians' fundamental ethical responsibilities do not change, the continuum of possible patient-physician interactions in telehealth/telemedicine provide differing levels of accountability of physicians.

- Inform users about the limitations of the relationship and services provided.
- Advise site users about how to arrange for needed care when indicated.
- Abide by protocols to prevent unauthorized access to protect the security and integrity of patient information.
- Be proficient in the use of relevant technologies and comfortable interacting with patients, surrogates or healthcare providers remotely.

SURGICAL TELE-MENTORING



VISION: Establish Surgical Tele-Mentoring between MTFs and operationally to enhance combat readiness and training

Graphic courtesy of TATRC – modified to apply to this project

Research & Development

Defense Health Agency

Surgical Telementoring, Telepresence and Telesurgery using a Robotic Platform in a Virtual Health Center

Principle Investigator

Advanced Medical Technology Initiative (AMTI)-funded Project FY21

Telemedicine & Advanced Technology Center

Goal

Develop the capability to provide surgical tele-mentoring on a path towards remote tele-surgery to improve patient care from a VMOC without geographic limitations during times of peace, war and pandemic outbreaks.

Methods

- Institutional Review Board (IRB)-approved protocol
- Cooperative Research and Development Agreement (CRADA) with Industry partner
- Demonstration of surgical telementoring using simulation
- Equipment for video and audio
- Emphasis on Human factors - Evaluations and feedback
- Specialties – general surgery, urology, gynecology, thoracic surgery, otolaryngology (ENT)
- Video and data capture

Technology Demonstrated

- Xi robotic surgery platform and stand-alone remote console
- Video teleconferencing equipment
- Telecommunication device
- Robotic surgery simulator
  - Hardware – SimNow
  - Software – Gateway
- Video and Data recorder

Metrics to Prove Efficacy

- Qualitative evaluations
  - Team feedback, effectiveness of session, reliability of communication
- Video and data capture -> compile metrics
  - Procedure segments, instrumentation, critical steps, efficiency
- Machine Learning -> Artificial Intelligence
  - report, look at, evaluate and make predictions
  - Computational statistics
  - Predictive analytics
  - Support Vector Algorithms and SUPR

Deliverables

1) Reliable communication with bi-directional audio and 3-D video
2) Effective Telestration with Virtual Tools or “ghost tools”
3) Enhanced Machine Learning and Analytics
4) Protocols and Guidelines for Training and Education

Military Relevance

- DHA: Support of Medically Ready Force and Ready Medical Force
- Force multiplier with potential to limit “boots-on-ground” surgeons
- Graduate Health Science Education
  - Train and mentor military trainees and staff surgeons
- Deliver Surgical Expertise to Remote Locations
  - Small military treatment facilities (MTF)
  - Austere environment/resource-limited
  - Afloat on a hospital ship
  - Field hospital
  - Operational Expeditionary Medical Units
- Addresses Identified Capability Gaps
  - Shortage of experienced surgeons
  - Application of rapidly evolving technology

Virtual Medical Centers in DHA

- Brook Army Medical Center
  - In 2018, the Army Medical Command established the first Virtual Medical Command
- Navy Medicine Readiness and Training Command (NMRTC) San Diego - increased Tele-Critical Care support
- Landstuhl Regional Medical Center (LRMC) - Europe - support EUCOM, CENTCOM & AFRICOM
- Planned – Walter Reed National Military Medical Center

Virtual Medical Center @ NMRTC – SD

- 1st in DHA at Navy Medicine Readiness & Training Center – San Diego
- Launched Spring 2021
- State-of-the-art telemedicine and telementoring center
- Centralized tele-critical care monitoring
- Mixed-reality telemonitoring suite
- Secret-internet protocol router network (SIPRNet)
- Audio-visual communications

Program Accomplishments

- Launch of clinical IRB-approved Surgical Telementoring project
- Telemedicine and Advanced Technology Research Center (TATRC)/AMTI FY21 Funded - $250K
- Research Agreement and Partnership with Industry
- Multi-site Surgical Telementoring Demonstrations
- Inaugural Telerobotic Surgery Symposium – DoD focused
  - ❑ Sponsored by TATRC on Wed, 26MAY2021
- Live demonstration from education Hub – NMRTC-SD
  - ❑ Spoke – Landstuhl Regional Medical Center – June 2021
  - ❑ Spoke – Eisenhower Army Medical Center – July 2021

Military-Academic-Industry Partnership

- Cooperative Research and Development Agreement
- Communication battle rhythm
  - Biweekly sync conference calls
  - Quarterly in-person visits
- Share vision for advancement of digital surgery
- Technology research & development

Maximizing Return on Investment

- Demonstrate Capability value and necessity
- Identify Key Technology requirements
- Determine Research and Acquisition Priorities
- Impedance of new technology adoption
  - ❑Assess cultural, business and clinical challenges
- Unified Stakeholders
  - ❑Gov’t agencies, industry & academia
- Multiple Complex Factors
  - ❑Cybersecurity, connectivity, training, metrics…
- Future applications for Operational Expeditionary Medical Units

Milestone Goals of Adoption

- Short term 1-3 years
  - Local MTF
  - Regional MTF
- Mid-term 3-5 years
  - DHA Enterprise-wide – including CONUS
  - Operational environment – role three and two
- Long-term 5-10 years
  - DHA Enterprise-wide – including OCONUS
  - Operational environment – role one, field hospital, afloat platform

Key Takeaways

- The ultimate goal is to improve patient care from a VMOC without geographic limitations during times of peace, war and pandemic outbreaks with surgical tele-mentoring and ultimately remote tele-surgery.
- Specialty healthcare providers would benefit from virtual health in surgery in garrison and operational settings.
- There are currently three Virtual Medical Centers in the DHA, with plans for expansion.

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Save the Date!

Defense Health Agency

Surgical & Invasive Procedure Telementoring
Live Demonstration

30 September 2021

1300-1500 (ET)

Presenter

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Telesurgical Director, Virtual Medical Center
Navy Medicine Readiness & Training Command – San Diego

Learning Objectives

1. Summarize Surgical Telementoring efforts in the DHA.
2. Identify use case scenarios that would benefit from surgical telehealth in the military.
3. Describe the benefits and challenges of establishing a telementoring program in the DHA.

Event Details Subject to Change

Target Audience

Physicians (ACCME) • Physician Assistants (AAPA) • Nurses (ANCC) • And other health care professionals

Earn 2.0 Continuing Education/Continuing Medical Education (CE/CME) Credit Provided by the DHA, J7, CEPO
For more information, please visit the following link: www.dhaj7-cepo.com

Participation Costs:
There is no cost to participate in this activity.

Cancellation Policy:
You will be notified via email if the activity is cancelled.

Commercial Support:
There is no known commercial support for this activitiy.

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How to Obtain CE/CME Credits

To receive CE/CME credit, you must register by 0745 ET on 27 August 2021 to qualify for the receipt of CE/CME credit or certificate of attendance. You must complete the program posttest and evaluation before collecting your certificate. The posttest and evaluation will be available through 9 September 2021 at 2359 ET. Please complete the following steps to obtain CE/CME credit:

1. Go to URL: https://www.dhaj7-cepo.com/content/aug-2021-ccss-exploration-innovations-health-care
2. Search for your course using the **Catalog**, **Calendar**, or **Find a course** search tool.
3. Click on the REGISTER/TAKE COURSE tab.
   a. If you have previously used the CEPO CMS, click login.
   b. If you have not previously used the CEPO CMS click register to create a new account.
4. Follow the onscreen prompts to complete the post-activity assessments:
   a. Read the Accreditation Statement
   b. Complete the Evaluation
   c. Take the Posttest
5. After completing the posttest at 80% or above, your certificate will be available for print or download.
6. You can return to the site at any time in the future to print your certificate and transcripts at: https://www.dhaj7-cepo.com/
7. If you require further support, please contact us at: dha.ncr.j7.mbx.cepo-cms-support@mail.mil

Questions

Connectivity

- ATM – Asynchronous Transfer Mode
  - Constant rate transfer of 54 bytes
- Ethernet
- XI robotic surgery platform
  - Fiber optic cord tether limit of 100 meters
  - Operates with control loops with frequency of 90 nanoseconds
- 5G vs 4G – 100x faster
  - Speed 10 gigabites per second vs 14 Milibites per second

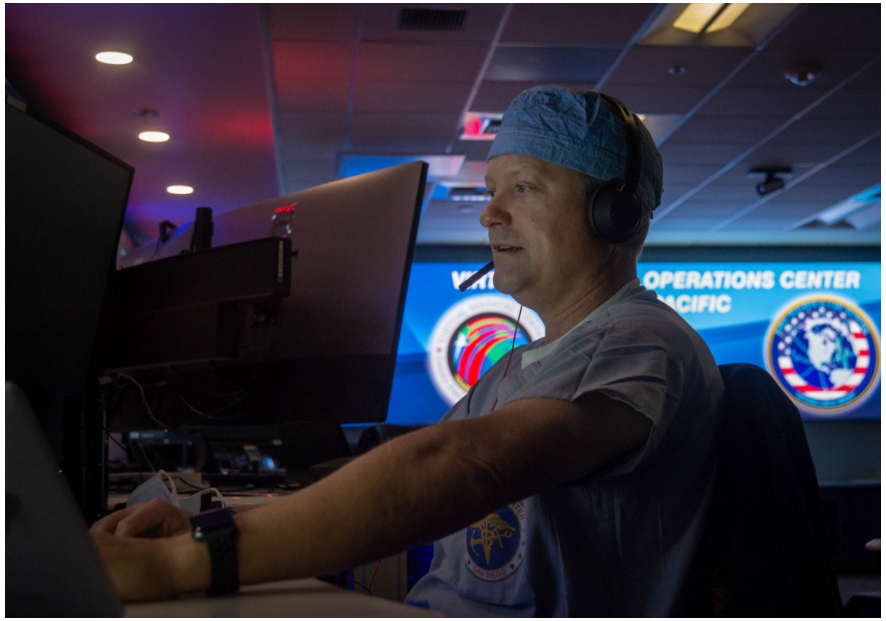
Demonstration:
Remote Presence Surgery

- **SAGES** 2012 Annual Meeting; Use of Remote Robotic Surgery-Live demonstration – TeleMentoring and Remote Battlefield Surgery session; Telesurgery in 2012: Live Demonstration of Remote Presence Surgery; **https://www.sages.org/video/use-of-remote-robotic-surgery-live-demonstration-telementoring-and-remote-battlefield-surgery/**

Surgical Tele-education

(https://www.dvidshub.net/news/376261/usuhs-interns-train-fls-units)

Multi-site Demonstrations



(https://www.dvidshub.net/news/396729/nmcsds-vmoc-hosts-first-multi-site-surgical-telementoring-session)