



Microsoft Windows Mobile Customer Solution

Case study

U.S. Military Improves Medical Care, Tactical Advantage with Wireless Point-of-care Handheld Assistant

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Major Richard Hartman

U.S. Special Operations Command's Surgeon's Office

Military medics save lives in the field, and now get some high-tech help with a critical part of that job—tracking medical information on the troops under their care. This traditionally time-consuming, paper-based task has been required by law since veterans returned from the 1990 Persian Gulf War with undocumented illnesses, injuries, and exposures. One former medic took up the challenge of improving both medical care and record-keeping by creating a point-of-care handheld assistant based on Microsoft Windows Mobile software. The solution gives medical providers an all-in-one tool for diagnosing and treating conditions and capturing patient information. Snapshots of unit health improve tactical advantage, which can result in a more agile military force.

CUSTOMER PROFILE	SITUATION	SOLUTION	BENEFITS
With dual goals of enhancing the quality of military healthcare while reducing costs, the U.S. Army's Telemedicine and Advanced Technology Research Center develops, evaluates, and demonstrates new technologies and concepts with a focus on using emerging technologies in health care and health-care support.	The conditions and circumstances of military deployment, especially war, can make recording illnesses and injuries with paper-based methods difficult or impossible. As a result, some illnesses, injuries, and environmental exposures are not recorded in the service person's official medical record, inhibiting or limiting follow-up care and benefits.	The Telemedicine and Advanced Technology Research Center developed a point-of-care handheld assistant. First responders use the all-in-one solution to store and retrieve patient records, record and transmit clinical information, and help diagnose and treat medical conditions.	<ul style="list-style-type: none"> ⌘ Quicker and better care as a result of anytime, anywhere access to patient records and medical references. ⌘ All-in-one device improves medical responder's agility. ⌘ Ensures compliance; delivers better, more complete patient records as a result of streamlined data capture and reporting. ⌘ A more agile, better informed military force.

"My own personal experience with BMIS-T is very positive. The nice thing about BMIS-T is that I can document care on the fly that I otherwise would not. I know I am capturing more data."

Captain Daniel Irizarry

Surgeon
325th Airborne Infantry Regiment, by
e-mail from Operation Iraqi Freedom

Situation

The Telemedicine and Advanced Technology Research Center (TATRC), part of the U.S. Army Medical Research and Materiel Command, manages testing and evaluation of core research and congressionally mandated projects in telemedicine and advanced medical technologies.

Responding to the problem of incomplete medical records for those who served in the Persian Gulf, Congress mandated accurate military medical records before and during deployment. The importance of a correct record is two-fold: it guides follow-up care and determines eligibility for medical benefits after discharge from the military. Tommy Morris, TATRC project manager, puts it this way:

"Essentially, if medical information from an injury, illness, or exposure wasn't captured and documented, then it didn't happen, and that service member isn't able to get follow-up medical benefits."

Pen-and-paper methods require time that a medical first responder may not have when treating multiple casualties. Says Morris, "All too often for medics on the front line, it comes down to a choice—either write a record or treat a patient, and the choice is obvious."

Another challenge is the need to keep numerous medical references on hand. Although well trained, medics sometimes treat illnesses and injuries they have never encountered, or haven't handled for a long time. Some Special Forces medics serve in remote geographic regions, where carrying heavy medical reference manuals can slow progress. Says Morris, "These medics, who are war fighters first and medics second, given the choice, would rather carry bullets or bandages and not encumber their units with books and medical forms."

Based on his more than 15 years' experience as a medic, Morris knew there

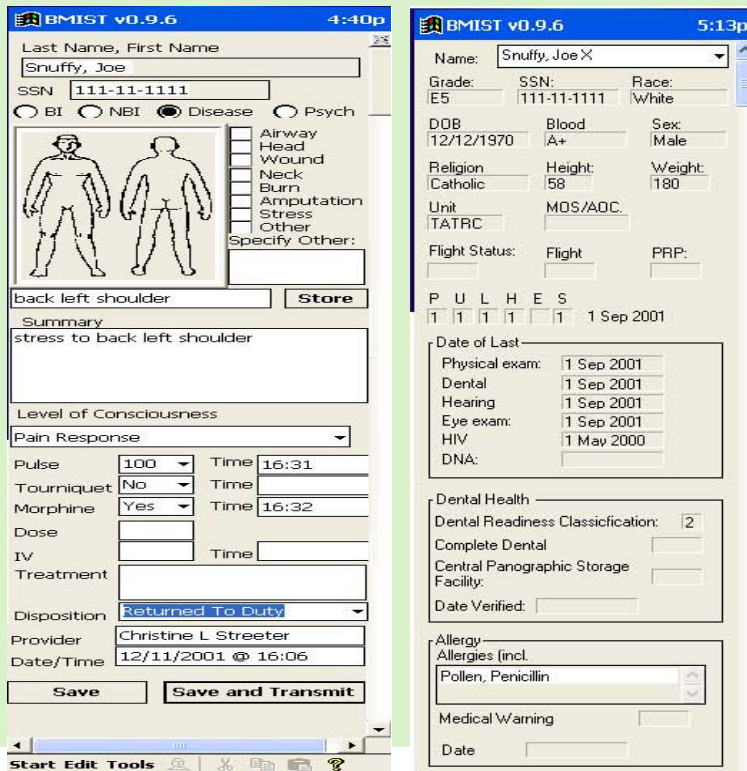
had to be a way to make a first responder's job easier and improve record-keeping, and thus provide better, faster care.

Solution

A point-of-care handheld assistant based on Microsoft® Windows Mobile™ software was the realization of Morris's vision. Called Battlefield Medical Information System-Tactical (BMIS-T), the solution developed by his TATRC team assists medical personnel—deployed, on military bases, or at military medical centers—with diagnosis and treatment. Medical personnel also use the solution to record patient clinical encounters and transmit those records to a central repository.

Running on Windows Mobile-based Hewlett-Packard iPAQ Pocket PCs, BMIS-T holds service members' complete medical records, including immunization status, dental and ophthalmic records, and known drug allergies. Medical care providers enter information by tapping on the screen and using menus. To simplify input, BMIS-T uses natural language processing to turn stylus taps on anatomical figures on the screen into textual clinical notes. The handheld assistant standardizes how signs, symptoms, and assessment are recorded and helps ensure that the correct treatment course is followed. BMIS-T suggests a diagnosis and treatment plan that is based on the user's skill level. It also provides a full array of healthcare reference manuals.

Developed in C++ using embedded Microsoft Visual Studio® 3.0 development system, BMIS-T currently writes XML files into folders, which are stored on the device until the device is synchronized. Upon synchronization, the files are passed up to repository databases, where patient records are stored. To improve performance, future devices will use



Screen captures of the BMIS-T solution.

Microsoft SQL Server™ Compact Edition to store patient records on the device. Devices can be synchronized through a cradle, wirelessly, or through a direct wired connection to the Internet. BMIS-T also can store updates on a personal information carrier tag (P-tag)—a flash memory device issued to some soldiers, with a backup saved to the central database. Data is encrypted by means of a conventional secret-key block encryption algorithm. Congressionally funded, the entire BMIS-T development program for two years cost a mere \$245,000.

More than 1,000 devices have been deployed and TATRC is starting a major acquisition program. This represents one of the first times within the military healthcare system that a technology has made the transition from research and development into an acquisition program. The White House medical staff uses BMIS-T for the president and his staff. The Special Forces command received approval

and funding from the Secretary of Defense to deploy BMIS-T to all care providers within its headquarters special operations command, which includes all military branches. Medical providers in the Army alone number around 50,000, according to Morris.

Multiple Modules

TATRC has additional Windows Mobile-based modules either in use or in development. Following is a partial list.

Veterinary Module: Aids diagnosis and treatment of animals when occupying troops must care for animals belonging to indigenous people.

Behavioral Health Module: Gathers mental and behavioral information used to determine stress levels and the need for referral to a psychiatric care specialist.

Veterinary Food Inspection Component: Captures the veterinary food inspection information required for certification of food supply facilities, and returns a

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Tommy Morris

Project Manager
Telemedicine and Advanced
Technology Research Center
U.S. Army

pass/fail on the spot, along with a list of deficiencies and the text of the associated federal guidelines. In the past, this process took two weeks to a month.

Preventive Medicine Component: Records environmental conditions and informs troops regarding air and water quality, sanitation, and related issues.

Benefits

BMIS-T gives medical providers an all-in-one tool for medical readiness, clinical information capture, diagnosis, and logistics to improve patient care and record keeping and contribute to a better informed, more effective military force.

Enhanced Agility, Productivity

BMIS-T speeds the work of deployed medical responders by reducing volumes of medical books, boxes of patient histories, and stacks of paper forms to a single, hand-held assistant. Medics in the field are freer to move wherever and whenever they need to, quickly. In addition, BMIS-T tracks the use of medical supplies and medicines and automatically places an order when supply runs low. This feature automates a burdensome administrative task, letting the medical professional provide care rather than track and order supplies.

Better Care and Patient Records

Because it contains crucial medical history information such as drug allergies, BMIS-T can serve a critical role in patient care. By streamlining data capture and reporting, BMIS-T helps to ensure more complete patient records. Says Morris, “Using BMIS-T, a medic can tap out a field medical card in 15 seconds instead of the three to five minutes it once took using pen and paper. BMIS-T takes a 10-page health surveillance form that typically required 10 to 15 minutes to complete and

reduces it to drop-down menus that can be completed in a fraction of the time.”

Experience from the field confirms BMIS-T’s success. Captain Daniel Irizarry, a surgeon with the 325th Airborne Infantry Regiment, reports by e-mail from Operation Iraqi Freedom, “My own personal experience with BMIS-T is very positive. The nice thing about BMIS-T is that I can document care on the fly that I otherwise would not. I know I am capturing more data.”

Adds Major Richard Hartman of the U.S. Special Operations Command’s Surgeon’s Office, “BMIS-T is much more than a simple record-keeping device; it’s an advanced medical tool that helps healers heal and military personnel get the care they need. Having a certifiable record of an illness or injury can help ensure that service personnel will receive the right follow-up care and ongoing medical benefits up to, and beyond, retirement.”

A Familiar Platform, Greater ROI

Most people in the Defense Department use Microsoft Windows®-based programs, so Windows Mobile software for the Pocket PC was a natural choice. The fact that BMIS-T was developed in C++ means that Morris and his team can simply re-compile the application to run on desktops, laptops, and other devices without incurring significant additional cost, further leveraging the BMIS-T development effort.

A More Agile, Informed Military

Because information is captured and compiled more rapidly than with pen-and-paper methods, commanders can use BMIS-T to take a snapshot of troop health, discover and intervene early in disease outbreaks, and plan movements and maneuvers accordingly, thereby turning health information into a tactical advantage. Additional modules and components that are either in use or under development can help soldiers consume,

manage, and work with information more easily and quickly, helping make the vision of a more agile, better informed military force a reality. Morris concludes, "Now that the core solution is in the hands of service personnel, we can easily add new

features and functionality that can dramatically affect the power, responsiveness, and impact of our military, using mobile computing solutions."

Windows Mobile puts the power of Windows software into a single mobile device, either a Smartphone or Pocket PC, which helps you to stay in touch and do more with the people and things that matter. Now you can keep everything you use up-to-date and in sync. To keep things simple and consistent, Windows Mobile runs the pocket versions of the software you already know, like Microsoft Outlook® messaging and collaboration client, Internet Explorer, MSN® Messenger, and Windows Media® Player, and Pocket PCs even include pocket versions of Microsoft Word and Excel. Powerful software combined with the familiarity of the Windows experience, so you're up and running right away, without having to learn something new. And, depending on which Windows Mobile-based device or additional products and services you choose, you can make calls, send e-mails, instant message, surf the Web, or access the information you need, the way you need it, even when you're on the go.

For more information about Windows Mobile, go to:
<http://www.microsoft.com/windowsmobile/>

Software and Services

Microsoft® Windows Mobile™ 2003 software
Microsoft® Windows® Pocket PC 2002
C++ developer tools (embedded Microsoft Visual Studio® 3.0)
Microsoft SQL Server Compact Edition

Hardware

Hewlett-Packard iPAQ

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For more information about the Telemedicine and Advanced Technology Research Center, go to:

www.tatrc.org

For more information about Microsoft Windows Mobile 2003 software for Pocket PC Phone Edition, visit the Website at:

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