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TITLE: TRAUMABASE: A MULTIMEDIA DATABASE SYSTEM FOR COMBAT CASUALTY CARE RESEARCH AND PLANNING

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The aim of the TRAUMABASE project was to assist the gathering, integration, and dissemination of data and information related to combat casualty care, by developing a computer-based, multimedia system for entry, storage, and retrieval of trauma data and information. TRAUMABASE tested and evaluated a number of emerging technologies for this application, selected and implemented a cost-effective software/hardware configuration and placed emphasis on the input of all alpha-numeric data collected and contained in the Wound Data and Munitions Effectiveness Team (WDMET) collection.

The developed prototype system is capable of handling data and information in most forms appropriate to the study of combat trauma; and is sufficiently compact, rugged and practical to permit eventual acquisition and operation by different types of Army medical units engaged in casualty care planning, research and clinical quality assurance.

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Computerization of approximately 8,000 clinical combat cases was achieved. More than 55,000 visual images (35mm color slides) were cataloged and archived and most paper records have been captured on WORM optical media. The project successfully demonstrated the value of an integrated, multimedia data acquisition and retrieval system. Although not the original intention, the prototype system containing WDMET data has been used extensively in research, development and planning.

FOREWORD

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INTRODUCTION

NATURE OF THE PROBLEM

There is a need for a multimedia computer-based system for the entry, storage and retrieval of combat casualty information in a comprehensive, timely and portable manner. Section A (Background) of the Research Proposal, dated 12 March 1987, identified the need for more data and information regarding injury and the variety of forms in which documentation of injury existed. These forms included text, models, pictures and audio data. It further listed the ways that combat trauma data and information could be used and suggested a need for a comprehensive system for its management. The proposal stated that there was no systematic gathering of information within the U. S. military. There was also no standard retrieval methodology or multimedia database for combat casualty information.

BACKGROUND OF PREVIOUS WORK

There is an extensive body of work on combat trauma. One major study is Battle Casualties: Incidence, Mortality, and Logistic Considerations, by Gilbert W. Beebe and Michael E. De Bakey that was published in 1952. In the introduction, several problem areas with data collected during World War II were identified. The authors stated that "Failure to foresee the extensive needs for a wide variety of significant and up-to-date medical and casualty statistics, and to arrange for their collection, either before the war or during its early phases . . . denied . . . data that should form the basis of the present work." Problem areas included lack of uniform definitions and incomplete information. Definitions that were not uniform included the terms: wounded or injured in action, died of wounds, killed in action, and related conditions. Some casualty reporters listed not only victims of direct enemy action but injury while going to, or returning from a combat mission. Others listed all who were wounded, including carded-for-record-only, as wounded. More restrictive reports did not count those superficially wounded who returned to duty from aid stations. Incomplete information hindered analysis when casualty reports lacked information on prevention of casualties (such as body armor), effectiveness of weapons, location of wounds, and tactical circumstances. The lack of this information, especially tactical conditions, was thought to limit the accuracy of battle casualty prediction in future conflicts.

A singularly unique effort at data collection was achieved in Vietnam from 1967 to 1969 by the Wound Data and Munitions Effectiveness Team (WDMET). The team collected information on nearly 8,000 casualties. These data overcame many faults identified by Beebe and De Bakey. For each casualty (when the

report was completely prepared) the file presented body diagrams, wounding agent data, wound tract data, autopsy information, medical evaluation, interview of casualty, interview of others, burn supplement, body armor, tactical scenario, and troop interview. These areas covered information considered to be incomplete in World War II. The WDMET files also included over 55,000 color 35mm slides, artifacts (fragments and bullets removed from wounds), laboratory slides, x rays, and audio tape recordings of WDMET interviews in Vietnam. The combined result of their efforts was a collection of over 200,000 pages of paper, color slides, x rays, artifacts and tapes. Access to this information was limited to reading the records one at a time. There was no index for rapid access and analysis of the data.

After the WDMET materials were used by munitions researchers they were moved in 1984 to the Uniformed Services University of the Health Sciences in Bethesda, Maryland. Researchers and faculty could use the materials for individual reports and teaching, but were required to spend hours examining the files for each individual application. Some databases were compiled to survey the records by injury codes and other selected criteria and these files were transferred to smaller "PC" computers. The slides were found to be losing color from age and the integrity of the collection was suffering from heavy use.

PURPOSE OF PRESENT WORK

The aim of this project was to assist the gathering, integration, and disseminating of data and information related to combat casualty care, by developing a computer-based, multimedia system for entry, storage, and retrieval of trauma data and information. The WDMET data, in its wide variety of media, was used to develop the prototypical capabilities of the system. This resulted in increased access to the WDMET materials, which provided more complete information than the World War II records, and facilitated many different casualty care research efforts. This also allowed the preservation of the WDMET original materials.

METHOD OF APPROACH

The system, named TRAUMABASE, was to be (1) comprehensive - able to handle data and information in most forms appropriate to the study of combat trauma (text, numbers, models, still and motion pictures, sound), and (2) transportable. It was to use existing and *evolving* technology to develop increasingly capable versions of TRAUMABASE. The project was to use both existing and evolving technology because new tools, capable of enhancing the quality and performance of the system, were either in beta testing (final development), or announced to be available during

the course of the project. The research plan required that the technical approach be changed as evolving technology was incorporated. It was proposed that this project be completed in three years with an estimated cost of $533,875.00.

The tasks and objectives of the project were first to define, acquire and configure software and hardware necessary for the task; next, to organize the materials so that data entry and scanning could be done; to enter data and scan images; to organize the resulting files into a unified database; and finally to test the system with researchers. While the project was in progress, constant attention was given to the preservation and integrity of the WDMET materials using up to date archival techniques.

NARRATIVE

DISCUSSION OF CHRONOLOGY

The first quarter, which began on 1 September 1987, was used to define software and hardware for the task. Hypertext, which had just been announced in Hypercard by Apple Computer, Inc., was the first example of evolving technology. It presented tools for the combination of images and data in a unified package and completely new tools for access to data. Hypertext was considered the best way to present casualty data and media to a researcher and Hypercard was the best implementation of hypertext at that time. Guide, a hypercard program for both Apple and IBM style computers was also tested extensively. It was found to be less capable than Hypercard.

This was the first occasion for use of evolving technology to change the proposed methodology that was to use a product based on the Intel 386 microprocessor. This was not a minor decision, for the original work plan had called for IBM PC computers, including 4 interactive videodisc workstations and 2 interactive video authoring stations as available equipment. The hardware was ordered with an AST 286 board to provide IBM compatibility and maximize hardware configuration options during development. Several other transfer program and hardware combinations were also tested to evaluate compatibility between DOS-based and Apple computers. Testing showed that data could be transferred between platforms, but the functionality and advantages of the Macintosh environment could not.

Other procedures started in the first quarter were to begin a subscription to Dialog information services to continue monitoring technology and provide research services to the project. The organization of the slides and files began. The slides needed to be transferred to videodisc and descriptive captions had to be transcribed from the WDMET files for each slide. The files were in remarkable disarray after being

transferred to the University and considerable time and effort were expended in preparing the materials for processing.

The second quarter was devoted to the selection of an archival system for the Macintosh computers. The development of color scanners that would provide better quality images than conventional NTSC videodisc technology presented the opportunity to scan images of the paper files, color slides, and perhaps the artifacts and combine these images into the database without the need for a videodisc player in the data user system. Micro Dynamics, Inc. presented a system of scanners, write once read many-times (WORM) optical data storage, software and Apple computers that was called the Multi-user Archival and Retrieval System (MARS). MARS, or a system that would functionally accomplish the same things, would allow us to have an integrated system for all data entry and use.

A request for proposals (RFP), which listed our requirements was distributed in accordance with accepted procurement practices. It called for a fully functional, integrated system of hardware and software completely supported by the contractor. The system was to be a multistation data input and storage system for the scanning, storage and processing of the data necessary for the completion of the TRAUMABASE Project. The functions performed by the system included scanning images into data to be processed on the network under the direction of the software and storing for further processing. This processing was to include indexing and output for distribution on videodisc. The system was to allow the scanning and input of high resolution scanned images of paper documents, 35mm color slides, and black and white photographs. This system was required to have sufficient work flow to allow 200,000 pages of documents and line drawings, 65,000 slides and about 500 black and white photographs to be entered in approximately two years of production time by Government personnel. The RFP permitted the incorporation of an external database system. It required that the archival system be capable of allowing software programming introduction of hypertext programs, including Hypercard, database programs, including 4th Dimension, and the standard Macintosh II user interface and operating system programs, such as Multifinder. This permitted the archival system to work with various commercial software products functioning in similar operating environments, resulting in a cost effective system.

This RFP was specifically written to allow the acquisition of a system that would enhance the probability of completion of the major objectives of the TRAUMABASE Project in two years. After this period the images would be scanned, the data would be entered, and the system would be ready for testing. It provided for equipment malfunctions and insured that the contractor would be responsible for all equipment and software.

MARS was selected as a project operating system, and Fourth Dimension was selected as the database for data entry. Three Macintosh computers, a Localtalk network, and a printer were acquired. Archival assets for organizing and storing slides were also acquired. One person was hired to work with the data entry process and to help in the development of user interfaces.

Because it was anticipated that the process of acquiring an operating system would take four to six months, a prototype videodisc project was initiated to test data entered in Fourth Dimension and linkage to the videodisc. Utilizing the input from surgeons under the direction of Associate Investigator COL Ronald Bellamy, 252 cases were selected. The data was entered into Fourth Dimension and the images (1565 slides and 445 diagrams) were to be converted into a videodisc.

The third quarter continued the videodisc project. A database of the slides and images was established in Dbase III Plus and the slides were organized into slide trays. United States Video was selected to transfer the images onto one inch videotape. The slides were transported to United States Video in Virginia. To fully demonstrate the system's capability (capacity 54,000 still images), full action video demonstrating surgical techniques in use in Vietnam were also included, along with WDMET audio interviews relating to the selected cases. This process provided source material for the demonstration of a multimedia hypermedia test environment. Major Bickel conducted a site visit in May and reviewed the progress on the one inch tape and prototype database.

The fourth quarter saw the completion of the prototype videodisc. The work flow was organized into completing the prototype (data entry, scanned files, video disc and slide inventory) and the prototype project taskings were expanded into the project tasks. These tasks were to (1) enter data from WDMET files into Fourth Dimension, (2) process the slides and files by scanning and storing on the WORM discs, (3) inventory the slides into a database with captions, and (5) write the required programs to integrate the system. Data entry continued with the completion of the prototype files by 7 August. The slide scanner did not immediately work as expected from a technical perspective and we were advised that additional software was required. However, 1385 documents were scanned by September. The limit to the scanning of documents was the size of the hard disk which held the scanned files until they could be archived onto the WORM disc, a process that took from six to eight hours and was done overnight. The inventory of slides, which included the prototype slides, continued and reached 8,252 slides. Programming directed at constructing data entry screens and configuring Fourth Dimension, was delayed until the arrival of a new programmer who would integrate the system.

The MARS system, which was selected as the best bid, was delivered on 7 July 1988. System training took the rest of July. Random access memory (ram) chips, which had been ordered from Apple Computer on 2 February 1988 had not yet been delivered. In order to complete the system and start production, the Apple order was canceled and an alternative product was procured.

Examination of the prototype video disc indicated that the scanned slides were adequate but lacked in definition. The scanned files were not usable. They were found to lack the definition to be read when seen on the screen and there was no way to enlarge the images for better viewing. It was decided that the best way to preserve images of the paper files was with the Fujitsu scanner at 200 dots per inch for most pages and 300 dots per inch for detailed maps and diagrams. The scanning rate would be measured and projected completion dates could be estimated.

The slide scanner remained a problem. Micro Dynamics had substituted a Sharp Color Scanner, model JX-450, as a replacement for the scanner in the contract because the first scanner was too slow and the Sharp scanner was less expensive. The product literature and programming documentation indicated that a system of mirrors provided with the scanner for slide scanning would allow the slide to be enlarged and scanned over the full screen of the scanner (about 8 by 11 inches) resulting in a resolution of 300 dots per inch (dpi) over this image. Our test indicated that this was not true. The scanned image was only 300 dpi over the size of the slide (1 inch) and the quality was not even as good as the videodisc (480 lines of resolution). We reported that either software for the present scanner (the solution presented by Sharp) or a proper scanner would be provided by Micro Dynamics - who had contracted to provide a fully functional system. If the system could not scan the slides there would not be sufficient funds to produce a videodisc.

The fifth quarter saw continuing progress in data entry (over 400 files entered), slide inventory (over 5,000 slides inventoried), the scanning of prototype files completed, and a programmer working. Fourth Dimension data entry had progressed into the production phase with rates averaging 10 files per person per day or about 100 files per week. Completion date was projected to one and a half years. Scanning was about to enter into a production phase and it was projected that, with two people scanning, it could be completed in a year. The slide inventory had slowed because of the time it took to find and organize the slides (many were not in the right place), but it was expected to be finished by the end of 1989. The project programming team was certified as an Apple Computer developer and gained access to Apple programmers for consultation for programming assistance.

Micro Dynamics, in a letter dated 3 October 1988, stated that: (1) they had proposed the Sharp scanner because they had believed that it would do the work faster and for less money, (2) they had determined that the Sharp scanner would not produce the required image quality required for the project, (3) the required quality could be provided by a BarneyScan slide scanner, but (4) the BarneyScan scanner took four minutes per image. The decision of the Principal Investigator, conveyed to the USUHS Purchasing Office in a 5 October 1988 memo, was to return the Sharp Scanner and that the BarneyScan scanner was too slow to process 54,000 slides in a reasonable time (at 4 minutes per slide and considering time to put the slide into the machine and r move it, the estimated time was over 2.8 person/years). The conclusion was to continue scanning the documents and to return to videodisc storage and publication of the color slides.

While Fourth Dimension was used for data entry, Hypercard was considered to be the major interface for the videodisc. A test version of TRAUMABASE was completed in Hypercard. All slides in the videodisc were identified in the hypercard system with WDMET number, slide number, film roll, and caption. Close cooperation with Apple, including access to beta versions of hypercard, was expected to speed this development. The project programmer had experience in Hypercard video projects and was experienced in working with the Macintosh system. Programming "hooks" which were to be delivered with the system in July, had not yet been delivered. It was stated in the 5 October memo to the USUHS Purchasing office that these hooks were necessary for the complete delivery of the fully functional system required by the contract.

Equipment failures slowed production in the fifth quarter. Two Jasmine 140 MEG hard disks were found to be faulty and were returned for repairs. The repaired versions lasted less than two weeks. Both were returned for refunds and were replaced with GCC disks which performed satisfactorily. In general the reliability of Apple equipment had not been as good as expected. The Principal Investigator decided to decline to exercise option 3 in the contract to continue contractor support for the pe_iod 1 October 1988 through 30 September 1989.

During the sixth quarter, the project production tasks were well defined and had developed into routines, each of which was specifically addressed in the quarterly reports. Data entry entered 900 files, which was less than expected. The files were more detailed than the earlier versions and Fourth Dimension was slower than expected in its data entry functions. Scanning had progressed into a production routine and the projected completion date was August 1990. Slide inventory continued to be slowed by the disorganized nature of the collection as it had been acquired by the University and was projected to be completed in August 1990. Using Hypercard as the major program basis for the system

was evaluated when the test version showed unacceptable delays in search routines designed to filter and select specific data elements. It was determined that Hypercard, an excellent environment for multimedia, did not have the database power required for a system containing the data volume of the WDMET collection. HyBase, a database designed to work with Hypercard was acquired for testing. AppleLink, a direct computer link with Apple Computer, was implemented to allow rapid contact in solving the Hypercard problems and in communicating with other Apple developers - such as Acius, producer of Fourth Dimension. The new version of MARS allowed a direct form of archiving the scanned images. This made it possible to scan and also archive during the business day, instead of archiving over night. TRAUMABASE, with the Hypercard program, had been demonstrated. TRAUMABASE was presented and well received at the annual meeting of the Association of American Archivists in November, 1989.

Because the slide scanner hardware option proved unworkable and because data entry was taking longer than anticipated, the Principal Investigator reported his conclusions that "the original estimates for completion of data extraction and the cost of hardware were low. Data entry will require additional personnel or the project may have to be extended. Additional funding is required for this, and for completion of the videodisc storage of images."

Joshua S. Vayer officially replaced Joseph V. Henderson as principal investigator in April 1990, after Dr. Henderson left the employ of the Government. Consistent with the request made by Dr. Charlie Wade, efforts were directed at production of a functional, computerized version of WDMET, within the project funds originally granted. Scanning continued with the estimated completion date in late July or early August 1990. The slide inventory was slightly better, but there were still problems with the slides. Since the inventory had been for scanning slides, it was less important for the production of a videodisc. In that process, the service company would be responsible for making a database inventory of the slides as part of the transfer process. Upon completion of the videodisc, the slides could be captioned without having to organize them or enter slide identification numbers. This could save as much as half the effort in this area and was under investigation. Data entry rates remained adequate. After completion of Marine files contained in the collection, it was determined that the Army files were sufficiently different in format to require a reprogramming of data entry screens. This process took three weeks.

The programming personnel continued in their search to find an appropriate database to work with Hypercard. HyBase was not satisfactory and HyperHIT, another database designed for Hypercard, was evaluated. The first tests of the program were

promising and HyperHIT was considered for inclusion in the final configuration. Micro Dynamics had not yet delivered the programming hooks, but delivery of Hypercard links was promised, on 1 August 1989.

The eighth quarter found scanning and data entry much the same as in the seventh quarter. Data entry was at a net rate of six hundred files entered in the quarter. There were 965 files scanned. Equipment failures cost 16 days from slide inventory because the computer was in the shop for three weeks. Three hard disks that malfunctioned during the quarter took over four weeks out of production time. Programming continued to test HyperHIT and the beta version of the Micro Dynamics programming hooks was delivered. An improved version (2.0) of Fourth Dimension was also acquired, successfully applied to the database and adopted for inclusion.

The ninth quarter included a site visit by LTCOL Keller in October. He encouraged the staff to model the project in Harvard Total Project Manager, so that a detailed projection of future activities could be reported. Scanning was reduced to 588 files. Equipment malfunctions cost 14 days and 31 days were productive. A new projection that included time for equipment repairs from past experience indicated a completion date of 3 October 1990. More time was spent on slide inventory while the scanning station was repaired. A total of 6,292 slides were processed. Since LTCOL Keller suggested that the videodisc might be funded, an estimate for its completion was made and work on a RFP was completed. As predicted in past quarters, data entry increased (77%) and the quarter ended with the team entering an average of 26 files per day. This increase in speed was also enabled by dividing the work remaining into two phases and delaying the entry of some lesser used fields until later. At the new rate it was estimated that phase I would be completed in September 1990 and all the data by May 1991 (if the project was extended).

Programming was focused on version 2.0 of Fourth Dimension, which actually arrived in September, and was reevaluated and confirmed as the major program to unify the project elements. The failure of HyperHIT to meet our requirements prompted this major shift. Since Fourth Dimension had always been the data entry program, all files were in proper format. The release of version 2.0 solved problems related to speed and programming considerations. The Mars Shuttle, which was Micro Dynamics' implementation of the hooks it had developed for our project was announced for the first quarter of 1990. The programming work required by this approach included reconstruction of the videodisc driver and other system drivers in Fourth Dimension that had originally been developed in Hypercard. Plans for the next quarter, were to (1) maintain work rates, (2) hire an additional data entry person, (3) write RFP specifications for

the videodisc production, and (4) refine the Fourth Dimension version of TRAUMABASE for testing.

The tenth quarter was marked by a hold on the plans to produce the videodisc. The expected fund transfer had not yet occurred and the prospect of finding a better preserved set of the WDMET film appeared. At this point, the slide inventory was placed on hold. Scanning was satisfactory with a total of 4,136 of an estimated 8,000 files scanned. A total of 4,550 files had been entered in data entry. This quarter produced 937 files with an average of 19 files per day. The DOD hiring freeze delayed the hiring of both a third data entry person and the expected replacement of one employee who had resigned in March. Programming consisted of working with Micro Dynamic hooks and Fourth Dimension. Data entered in several files (Marines, Army 67, and Army 68) were combined into a larger single data set to evaluate system capability in handling large data sets with several thousand records and hundreds of thousands of data elements. This quarter was one of steady progress while awaiting further decisions regarding extension of the project in order to complete the original scope.

The eleventh quarter was one of personnel transitions. A new data entry technician was hired under an exemption from the DOD hiring freeze. Plans to hire a third data entry person were abandoned due to the freeze. Expected additional project funds were not transferred. Total scanned files increased to 4,994 and nearly reached the end of the Army files for 1968. This would leave only 2,755 files for the Army in 1969.

Data entry work processed 853 files for a total of 5,403. This was slightly ahead of the scanning effort and left only 2,406 files to enter. This was estimated to take 85 working days. The original color negatives, from which the slides were believed to be copied, were not found. They were reported to be at the Armed Forces Institute of Pathology. However, contacts at AFIP could not find any record of the film. A proposal to make the videodisc in TRAUMABASE II was written in May and submitted for consideration. This plan was to use the database system established in TRAUMABASE to demonstrate its adaptability by using data from Operation Just Cause in Panama. The videodisc would include images from this operation.

The Mars Shuttle, announced for the first quarter of 1990, had not yet been delivered. Repeated contacts with Micro Dynamics, resulted in an agreement setting the delivery date for 10 July 1990, when a training session was to be held. Our concern with the hooks was caused by the information that the Mars Shuttle would not work with Fourth Dimension and would not give access to TIFF images. All of the project images were scanned into TIFF format.

The twelfth quarter brought us to 31 August 1990, the end of the project. Surprisingly, all alpha-numeric data was entered, an estimated 2,406 files. The data were combined into one database and the interface for retrieval was refined to facilitate rapid access. The system was tested by responding to numerous requests for data (including COL Fackler and AFIP) and functioned quite well for searching and retrieving alpha-numeric data elements. The total for scanning reached 5,368 and left 2,441 of the estimated total of 7,809 files. The final set of plans for the project were (1) complete the integration of all Fourth Dimension data and files into a working system, (2) re-enter as many of the problematic files as could be done, (3) scan as many remaining files as could be done, (4) take delivery of the Micro Dynamics hooks and integrate them into the working system, (5) write the final project report and organize the project documentation, and (6) begin the orderly shutdown of the TRAUMABASE Project and termination of staff.

DISCUSSION OF DATA ENTRY

Medical data exist in many forms. We are most used to working with alpha-numeric information and the tools required for the manipulation of such data are readily available (e.g., the science of statistics and microcomputers). However, there is a tremendous richness in the alternative media forms of medical data, such as images and sounds. Traumabase is an initial attempt to provide some of the tools needed for manipulation and assessment of this valuable medical information, structured in a cost effective hardware and software configuration.

Exploring new applications and novel concepts in the study of combat casualties required that the methods used be drawn from existing and evolving technology in an iterative fashion to develop increasingly capable versions of TRAUMABASE. Project development included the identification, selection, acquisition, and testing of technology for its application to serving the goals of the research project as identified in the Research Proposal. The narrative has listed the methods used for identification, selection, and testing. The goals of the Traumabase project were to develop a demonstration of the capability of a computer-based, multimedia system for entry, storage, and retrieval of trauma data and information for casualty care research. The system was to be comprehensive and transportable.

The experimental methods can be divided into four major groups: capture, processing, storage, and use. The capture phase includes data entry at computer workstations, scanning of documents into computer work stations, transfer of images to magnetic tape, and descriptive data generated at the time of capture (such as frame numbers for images). The processing of data, once captured, includes indexing, sorting and grouping of

data sets. It also includes image transformations to color images (color and geometry correction are two), error checking through comparison of data to fixed parameters (marking a blood pressure over 500) and other methods, and the transfer of entered data over the computer network and to storage devices. Storage includes both temporary storage (magnetic disks), transfer storage (magnetic tape), and more permanent storage (WORM discs). Use is defined as the retrieval and manipulation of data at a prototype workstation. It includes testing and demonstration.

Capture of data was designed for the different types of media present in the WDMET materials and to serve the needs of a more generic, multimedia system. The primary data entry station for the alpha numeric database was the Macintosh II workstation. It was selected for its compatibility with Hypercard and its reputation for an operating system that was somewhat easy to learn and use. Programs at this station were modified to present data entry personnel with pull down menus of often selected data elements and with graphic transfer symbols (buttons) to move about in the process. Attachment 1 identifies the data elements included and their linked relationships to each other.

The Research Proposal stated that most of the extraction and entry of text and numerical data from WDMET was to be performed under contract. The WDMET files, as described in USUHS Procedure USUHS-P No. 6406 (MIM), were considered to be original, valuable and irreplaceable documents and artifacts. It was necessary to treat them as archival materials. With this factor, plans for data entry concentrated on systems that would allow data entry to be done on site. This also favored the use of scanners that would allow image capture on site. The complexity of the files and the degree of training required to enable data entry personnel to understand the files (in a medical, military and historical context) and to work with the data entry technology (data entry screens and the Macintosh operating system) made it more economical to have a few full time employees rather than many part time workers. Because the work was to be done on site and because the work was to be done by a few well trained individuals, the decision was made to hire and train rather than to contract for a service.

A tremendous number of unpredictable variables were encountered in the data entry process. The records ranged from one to over a hundred pages, and the normal file had from 25 to 30 pages to be extracted. Many files had two or three observer interviews, many wound tracts, many wounding agents and extensive descriptions of scenarios. The identified trend seems to show that as the program was customized and as the entry screens were adjusted, and as skill increased through practice, there was a constant improvement in entry speed. This is mitigated by the change to entry of the most used portions of the records at the ninth quarter. This helps to account for the improved data entry

rates at the end of the project. Attachment 2 demonstrates the data entry field layouts of the TRAUMABASE system. Due to its design as a multimedia system, no written documentation can adequately convey the effectiveness and power of TRAUMABASE. However, this attachment will give the reader limited understanding of the comprehensiveness of the system.

Data entry should not be measured only by speed. Certainly more important is accuracy. The entered data should be exactly what was found on the form, with no omissions, additions, or distortions. This was one of the reasons for scanning the documents used - to give future investigators an independent path to the data. Data entered could be sorted by various data elements. This would allow extreme values at either end to be examined. Nine hundred year old soldiers would be scrutinized. Unrealistic blood pressures could be assessed and checked against the records. It was planned that data entry software be adjusted to allow a dynamic screening of input, but this was not implemented. A comprehensive examination of data was initiated both as a parallel effort and after the data entry. This included pulling individual files at random and checking the data entered, extensive reviewing of files (a beta test) and complete checking of fields with known entries. For an example, many casualties listed as dead were checked with the Vietnam Veterans Memorial Directory of Names. These types of data verifications were conducted as time and resources permitted.

Training of the data entry staff was a continuous process. Data entry personnel selection was based on both aptitude and work history. As data entry technicians worked with the programmer in designing the data entry screens, they became familiar with the process of entering data and the Macintosh environment. When they had trouble entering scenarios because they were not familiar with military order of battle, Shelby L. Stanton, the author of Vietnam Order of Battle, was consulted and spent several days teaching the organization of military units in Vietnam and helping write sample entries for the database. The CCRC Archivist, who also had experience in Vietnam, served as a daily source of information and training. He worked on map coordinates, weapons information, and other information as required. The goals of the training were to give the data entry staff the skills and knowledge to extract accurately information from the files and enter it into the database. To date, the goals have been met, but a more comprehensive data review remains a recommendation.

DISCUSSION OF IMAGE PROCESSING

To prepare the slides for capture, either by scanning or by a service agency, they were organized and entered in a database. When the WDMET collection was acquired, the slides were maintained in a manner that was considered unacceptable by

archival standards. Appropriate storage and handling plans were implemented to preserve the safety and integrity of the slides.

The first step in creating the image database was to assemble all of the slides for a specific case. All slides were verified against a caption list created by the original photographers. Both missing and extra slides were identified. It is estimated that 97% - 99% of the original slides were recovered. When the slides were correctly organized according to the caption list, they were entered into the database with the WDMET number, film roll number, frame number, and caption (exactly as found in the record) entered. Extra data included a field to show if the slide was to be scanned "TOBEUSED" and a count "HOWMANY" that indicated both missing slides and extra slides. In the example below, frame 2 is a duplicate of frame 1 and is not to be used. If a slide had been missing it would be counted as 0, while 1 or 2 indicated that the slide was in either or both sets and 3 or more indicated extra slides or copies made later.

WDNUMBER	ROLLNUMBER	FRAME	HOWMANY	TOBEUSED	CAPTION
70001-01	67-50025	1	1	Y	caption slate with vest as background
70001-01	67-50025	2	1	N	caption slate with vest as background
70001-01	67-50025	3	1	Y	3/4 length shot showing damage

Next to be evaluated is the scanning of paper files. In this process, original WDMET files were scanned on a Fujitsu scanner with the MARS software and then archived for permanent storage on a WORM disc. Once stored on the WORM disc in a digital image format, the data are available for "publication" on hard disk, CD-ROM discs, or any digital storage system. The reason for scanning these pages was to provide a publishable form of the files that would give researchers access to images of the original source materials. This serves as one of the error correction methods. For the prototype system, WORM disc storage of digital image formats provided part of the multimedia input, storage and retrieval.

Scanning of original source materials was documented in a scanning log for historical, instructional and research purposes. This log record listed each file that was scanned by WDMET number, the number of pages in each record filed, and notes. A typical record wound be "1. 10348-05 112 213 441211" that showed that file 10348-05 had one page in the first section, one in the second, and two in the third. Since the earlier versions of the software did not allow the correction of errors in file

description until after archiving, notes would show which files to examine for correction. Later, this record also recorded the log number at start and end of each day's work and list days that were used for operations other than scanning. This record was the basis of quarterly reports regarding scanning progress.

The scanning process started with the organization of the files in WDMET file order. Any missing file was checked in the records to see if they were in the original WDMET collection (some were not) or if they were misfiled. The pages in each individual file were then places in the same order, exactly as represented in the cover sheet. The pages would then be fed through the scanner. Each individual page would be examined for quality, clarity and exposure when scanned at 200 dots per inch (dpi). When the image was not satisfactory, technical alterations in dpi and exposure would be tried until the best possible image could be preserved. When no legible image was possible, a computer based graphics program was used to recreate the page (more often autopsy forms) and the recreated form would be scanned and placed in the file. After every five to ten files were scanned, the verify - revise phase was initiated. This was to again examine each page, then type in a descriptive caption for each section. This caption would include the WDMET number, a descriptive phrase (cover sheet, body diagram, etc.), document type, and other information needed to retrieve the image in the future. Searching could be done by WDMET number, document type, date, or in the same sequence as scanned. After a scanning period, the process of archiving, would transfer the image to the WORM disc. This was automated by MARS and did not require operator supervision.

When each WORM disc was about to be filled, significant effort was expended to check for errors. The software permits a review of titles sorted by document type. If all of the cover sheets were listed by document type, and the titles examined (title being a combination of WDMET number and descriptive phrase), anything not a cover sheet would stand out. Duplicate files were often caused by two files having the same number. Other combinations of sorting and examination allowed errors to be spotted. Sample files were selected at random and examined in great detail. A sample of body diagrams would be retrieved and examined to verify that they were, indeed, body diagrams and that the image quality was satisfactory. Prints were made on the laser printer and examined by clinicians for usefulness. In many cases the prints were determined to be better than the originals on older yellowed paper. A database of corrections has been maintained. Over the course of the project there has been less than one error per 100 files. In most cases errors were duplication of file numbers, mistakes in typing, or errors in identification. All errors found have been corrected. The error considered most serious, the wrong number on the file, can be corrected by since all files were stamped with the WDMET number.

The goals of scanning pages were to produce a digital data file with images of all of the original WDMET records. The images were to be of sufficient quality as to serve in place of the original records and to allow the publication of the records to make them available with the extracted information at a workstation, although not all records could be entered under the time frame of the original grant (69% entered). It is estimated that the remaining files could be scanned in 25 weeks. Future interest and support of the system development could permit the data to be published on CD-ROM.

Slide scanning was to be the second major scanning procedure managed by MARS. Scanned images of the color 35mm slides were to be stored on WORM discs and later transferred to CD-ROM discs for publication. Because of technical hardware shortcomings, the decision was made to rely on videodisc storage of slide images in the foreseeable future, until an improvement in technology has been demonstrated. The prototype videodisc was made to test the technology and provide a point of comparison with the scanned images. The goal of the research was to show the technology used to create a set of images of WDMET slides that could be used at the TRAUMABASE workstation. This goal has been met.

The prototype videodisc established the conclusions that diagrams on videodisc were not satisfactory, and that images of the slides lacked in definition but were acceptable. Since the prototype disc was made, other vendors have proposed methods that would involve color correction. Only high definition television (HDTV) or high resolution scanning would solve the problems with definition. Estimated cost for video disc production is between $1.50 and $2.00 per slide for a standard videodisc and $4.00 per slide for one in HDTV.

DISCUSSION OF DATA CAPTURE

Data capture was the most critical step in the process of building the database. Mistakes made in the entry phase could be corrected only by re-entering correct data. It was divided into areas of data entry, slide inventory, file scanning and slide scanning. Each of these areas progressed according to the resources allocated. Each of these areas have been evaluated and corrective measures have been listed where needed. Error detection and correction measures, during the entry process, have been described and also evaluated.

Data processing included all manipulations of the data after it was captured and before it reached a final storage destination. This included error correction. Since the database was changed when major differences were found in WDMET printed record formats, the major transformation was to combine smaller databases into one unified TRAUMABASE when all data had been entered.

Most data were entered as in alphanumeric format and it the system has demonstrated capability to capture, store and retrieve both text and numbers. This major goal of the TRAUMABASE project was met. The ability to store and retrieve visual information in a format conducive to planning, teaching and research was clearly demonstrated by the prototype system. While MacSpin, a statistical modeling program, was tested and demonstrated, it presented no advantage to the development of the database. Its use as an analytical tool was deferred.

The WDMET collection included many artifacts - bullets and other fragments from wounds. Currently available technology did not provide a suitable solution for storage of artifact data in the computer database. Methods that were considered included photographs, video image, scanned images, and a reported method to simulate a holograph through multiple scanned images. None were tested, because this was to be done after the capture phase. A large number (estimated at 500) of the cases had original x rays as well as 35mm color photographs of the x rays. Storage of photographic images of the x rays did not provide acceptable quality for diagnostic or research applications. The high cost of other methods proved prohibitive and the resulting product was not worth the extraordinary expense. The decision was made to concentrate limited resources on the major project elements. The scanned files did include battle diagrams and scenario drawings.

Two full motion video segments - one for debridement and the other for thoracic wounds -- were included on the prototype disc. Both were instructional films used during the Vietnam era and were intended to give the TRAUMABASE user a historical perspective on the data being used. Although the reproduction quality and accessibility on videodisc was excellent, it was determined that the cost in disc space for motion video was not worth the benefit, when compared to still and audio storage. It is recommended that full motion video be included in such a database only when doing so meets special needs that require motion imaging to make a specific point. Alternatively, the database could easily contain reference indexes to a videodisc or CDROM library which contained the appropriate video sequence. The random access feature of these media coupled with the benefit of linkage to specific data elements by indexing would make such a library invaluable for the planner and the researcher.

DISCUSSION OF DATABASE EVALUATION

Two segments from the WDMET tapes (estimated at 15 hours) were included on the prototype disc. As an example, a WDMET casualty had been interviewed about his involvement in the Cu Chi Mess Hall bombing, an event which is extensively reconstructed on the TRAUMABASE system. His eyewitness account provides an unusual amount of detail and accuracy uncommon in conventional medical databases. The alphanumeric content of the TRAUMABASE

system allows the user to learn about the bombing, the type of munition, the distance from detonation to each of 46 casualties, and detailed measurements of their wounds and clinical response to treatment. With the click of a computer mouse, photographs of many of the casualties can be instantaneously brought up on the screen. One casualty in particular has a very unusual wounding pattern, with multiple fragment wounds to the left side of the face, the right side of the chest and abdomen and no wounds to the lower extremities. This unusual pattern was not apparent until the photographs were reviewed. With another click of the mouse, the user can listen to the interview which details information about this particular casualty's position and protective clothing. It turns out that the unusual wound patterns are explained by the casualty's position (looking over his right shoulder, while standing in the door frame of the mess hall, which provided some protection from the fragments of the improvised Claymore-type device) at the precise moment of detonation. In the same incident, one of the KIAs presents with an unusual burn injury, which is an unexpected wound from this type of munition. Using the TRAUMABASE resources, we were able to determine that the burn was probably caused by the hot soup that was served in the mess hall that day, not the munition.

The TRAUMABASE project has produced a system capable of processing data using a wide variety of mass storage devices, both magnetic and optical. This fulfills one of the projects major objectives. The previous discussion has indicated the applications of magnetic hard disks, videodisc, optical WORM discs, and proposals for CD-ROM. Not used were Bernoulli Box or tape storage. The Bernoulli box was replaced by the WORM disc. Tape, while useful, was also replaced by the WORM disc. Digital audio tape has been proposed for future storage of WDMET images for either high resolution or high definition images.

DISCUSSION OF PROJECT EXTENSIONS

Further consideration of the proposed goals for data Manipulation gives the following areas for consideration:

- Text - word processor, electronic mail for communications between users
- Numbers - ability to perform cross-tabulations, statistics, with graphic display of the results
- Images
  - Medium and high resolution displays - 512 and 1024 lines per screen
  - Enhance - Delineate, emphasize, superimpose computer graphics and text over video.
  - Audio edit, enhance, mix with other media
- "Electronic Publishing" - when needed for lectures, publication, or further study; hard copy of retrieved data and information provided, including text and

graphics (laser printer), and still pictures (color printer, photos, transparencies), CD-ROM
- Data communications capabilities
  High speed communications

TRAUMABASE data exist as data which can be manipulated by text processors and communicated. All users on the MARS network can use both the scanned data and the Fourth Dimension files. The TRAUMABASE system uses TOPS as a network. Both the Macintosh computer monitors and the scanning process used dots per inch (dpi) rather than lines per screen as a measure of resolution. Scanning and laser printer output is medium to high resolution (from 200 to 300 dpi) and the screen is at a lower resolution (72.5 dpi) with the capability to enlarge the screen image on demand. The videodisc is at NTSC resolution which is 483 lines per screen. A video graphics board for the Macintosh II was obtained from Mass Micro Systems which would allow the manipulation of videodisc images and computer generated text. However, we found its performance unsatisfactory and did not incorporate it into the system.

The goals for storage were to use a variety of systems to store the data as it was entered, more permanent systems to store it after it was processed, and methods to publish the data, to make it available in many copies at a relatively low cost. Magnetic hard disks and floppy disks were used for data entry and some backup purposes, with more permanent storage on the WORM disc. Videodisc was used for the prototype disc and is one method of distributing data. If the entire database were mastered to videodisc, the cost of distribution would be negligible (approximately $28 per copy), however approximately $4,000 worth of hardware (computer, monitor, videodisc player) would be required for independent use at alternative sites. The use of CDROM was investigated and proposed for future application. All of the target media were evaluated in a variety of forms and have been incorporated as part of the final system.

DISCUSSION OF CONCURRENT RESEARCH USE

The final area of consideration is use - the process of a person interacting with the system and making use of its data. The available data has been organized into a system which provides appropriate storage and retrieval. Access to the WORM disc and prototype videodisc has been provided. The number of users who have found TRAUMABASE an asset to their research, planning and teaching is testimony to the success of the format. Future efforts should focus on improving the interface to make is easier for novice or relatively untrained users to negotiate. Attachment 3 contains examples of actual applications of the TRAUMABASE system, including publications researched using TRAUMABASE, some of which were conducted before the prototype system was even fully operational.

CONCLUSIONS

The completed research has demonstrated the usefulness of a multimedia system for the entry, storage and retrieval of trauma data and information. Optimistic estimates of time required to enter data and to scan images, have been proven wrong by experience. This project was, by design as described in the original proposal, an attempt to stretch leading-edge, off the shelf technology to its performance limit utilizing an iterative approach. It was understood that this process would involve extensive testing, evaluation and rejection of numerous hardware and software configurations before the performance goa`s were met. Excellent progress has been made toward a unified and integrated casualty data management system which harnesses the full power and richness of medical data in its many forms. In recognition of this accomplishment, TRAUMABASE, USUHS and USAMRDC were awarded the 1990 Nebraska Videodisc Award for best databank achievement.

Future efforts should focus on three areas. First, the establishment and acceptance of a standardized set of data elements should be a high priority for combat casualty care research. The WDMET collection demonstrates the usefulness of detailed data collected beyond the scope of "normal" clinical and quality assurance records, but it is an anomaly among medical data sets. Such a comprehensive data collection effort, particularly but not exclusively during wartime, would form the basis for validation studies of much basic science and clinical research now conducted. The design of this standardized database should be "nested" in the sense that specialty data to meet particular needs could be sought without completing the full collection instrument, while still preserving linkages to the larger set through certain basic identifier, demographic and outcome elements.

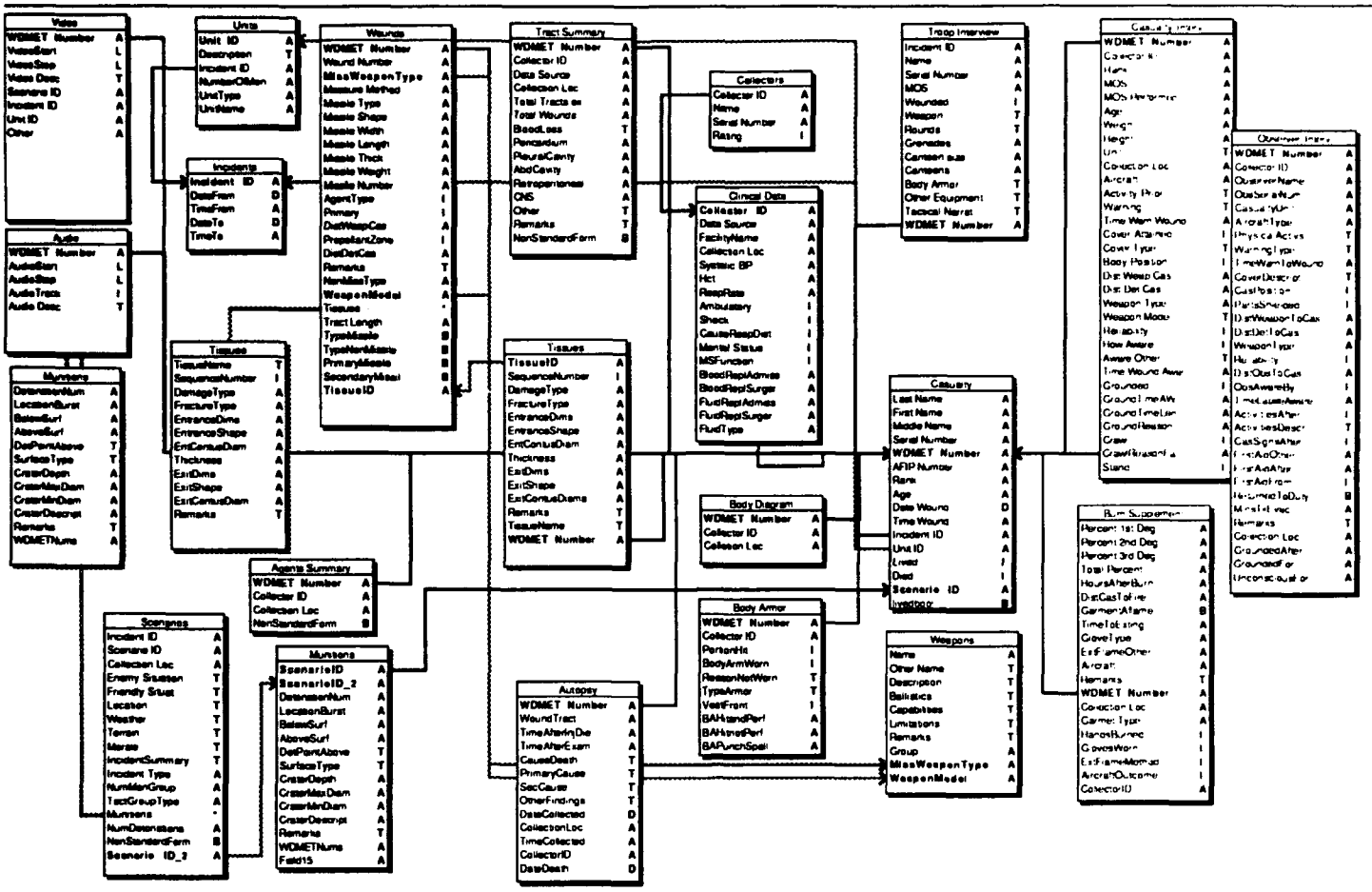
Second, exploration of the emerging technologies should continue. Computer hardware and image capture systems are improving constantly and the military services must keep abreast of these changes to insure that any full service system which is eventually implemented will provide the best possible result. There is a need for data that will allow the selection of image capture, transfer, and retrieval hardware and software that will meet both technical needs and not exceed financial resources. Also, certain technologies which were prohibitively expensive when TRAUMABASE was conceived are considerably more affordable now and should be evaluated.

Finally, there have been considerable market changes in the area of portable, electronic data acquisition and communication. The enhancement of the existing single-station system with remote, field data entry capability would be advantageous,

particularly for real time combat data collection. Computers are now smaller, more powerful and efficient, and easily transported. Communications between computers is faster and more accurate.

TRAUMABASE was developed using a Vietnam era collection of data which has proved valuable to researchers, planners and educators. Despite the fact that it is more than 20 years old, WDMET still represents the best accumulation of recent wartime information and TRAUMABASE has given us a window into that mass of text, numbers, images and recorded sounds. TRAUMABASE has become the tool to effectively access WDMET. If we are to be capable of implementing a productive data acquisition effort during the conflict of the future, we must lay the technological foundation now through continuing research and development.

ATTACHMENT ONE


Video
WDMET Number A
VideoStart L
VideoStop L
Video Desc T
Scenario ID A
Incident ID A
Unit ID A
Other A
Units
Unit ID A
Description T
Incident ID A
NumberOfMen A
UnitType A
UnitName A
Incidents
Incident ID A
DateFrom D
TimeFrom A
DateTo D
TimeTo A
Audio
WDMET Number A
AudioStart L
AudioStop L
AudioTrack I
Audio Desc T
Wounds
WDMET Number A
Wound Number A
MissWeaponType A
Measure Method A
Missile Type A
Missile Shape A
Missile Width A
Missile Length A
Missile Thick A
Missile Weight A
Missile Number A
AgentType A
Primary I
DistWeapCas I
PropellantZone I
DistDetCas A
Remarks T
NonMissType A
WeaponModel A
Tissues *
Tract Length A
TypeMissile B
TypeNonMissile B
PrimaryMissile B
SecondaryMissil B
TissueID A
Tract Summary
WDMET Number A
Collector ID A
Data Source A
Collection Loc A
Total Tracts A
Total Wounds A
BloodLoss A
Pericardium A
PleuralCavity A
AbdCavity A
Retroperitoneal A
CNS A
Other T
Remarks T
NonStandardForm B
Collectors
Collector ID A
Name A
Serial Number A
Rating I
Clinical Data
Collector ID A
Data Source A
FacilityName A
Collection Loc A
Systolic BP A
Hct A
RespRate A
Ambulatory I
Shock I
CauseRespDist I
Mental Status I
MSFunction I
BloodReplAdmos A
BloodReplSurger A
FluidReplAdmos A
FluidReplSurger A
FluidType A
Tissues
TissueID A
SequenceNumber I
DamageType A
FractureType A
EntranceDims A
EntranceShape A
EntContusDiam A
Thickness A
ExitDims A
ExitShape A
ExitContusDiams A
Remarks T
TissueName T
WDMET Number A
Troop Interview
Incident ID A
Name A
Serial Number A
MOS A
Wounded I
Weapon T
Rounds T
Grenades A
Canteen ous A
Canteens A
Body Armor T
Other Equipment T
Tactical Narrat T
WDMET Number A
Casualty
Last Name A
First Name A
Middle Name A
Serial Number A
WDMET Number A
AFIP Number A
Rank A
Age A
Date Wound D
Time Wound A
Incident ID A
Unit ID A
Lived I
Died I
Scenario ID A
Hyperbar B
Body Diagram
WDMET Number A
Collector ID A
Collecon Loc A
Body Armor
WDMET Number A
Collector ID A
PersonHit I
BodyArmWorn I
ReasonNotWorn T
TypeArmor T
VestFront I
BAHandPerf A
BAHitPerf A
BAPunchSpall A
Weapons
Name A
Other Name T
Description T
Ballistics T
Capabilities T
Limitations T
Remarks T
Group A
MissWeaponType A
WeaponModel A
Agents Summary
WDMET Number A
Collector ID A
Collecion Loc A
NonStandardForm B
Scenarios
Incident ID A
Scenario ID A
Collecion Loc A
Enemy Situation T
Friendly Situat T
Location T
Weather T
Terrain T
Morale T
IncidentSummary T
Incident Type A
NumMenGroup A
TestGroupType A
Munitions *
NumDetonations A
NonStandardForm B
Scenario ID_2 A
Munitions
ScenarioID A
ScenarioID_2 A
DetonationNum A
LocationBurst A
BelowSurf A
AboveSurf A
DistPointAbove T
SurfaceType T
CraterDepth A
CraterMaxDiam A
CraterMinDiam A
CraterDescript A
Remarks T
WDMETNums A
Field15 A
Autopsy
WDMET Number A
WoundTract A
TimeAfterInjDe A
TimeAfterExam A
CauseDeath T
PrimaryCause T
SecCause T
OtherFindings T
DateCollected D
CollectionLoc A
TimeCollected A
CollectorID A
DateDeath D
Burn Supplemen
Percent 1st Deg A
Percent 2nd Deg A
Percent 3rd Deg A
Total Percent A
HoursAfterBurn A
DistCasToFire A
GarmentAflame B
TimeToExting A
GloveType A
EstFlameOther A
Aircraft A
Remarks T
WDMET Number A
Collection Loc A
GarmetType A
HandsBurned I
GlovesWorn I
EstFlameMomad I
AircraftOutcome I
CollectorID A

Structure: Casualty

Last Name	Alpha 40	Enterable; Modifiable
First Name	Alpha 40	Enterable; Modifiable
Middle Name	Alpha 20	Enterable; Modifiable
Serial Number	Alpha 15	Enterable; Modifiable
WDMET Number	Alpha 10	Indexed; Mandatory; Enterable; Modifiable
AFIP Number	Alpha 20	Enterable; Modifiable
Rank	Alpha 20	Enterable; Modifiable
Age	Alpha 20	Enterable; Modifiable
Date Wound	Date	Enterable; Modifiable
Time Wound	Alpha 4	Enterable; Modifiable
Incident ID	Alpha 10	Enterable; Modifiable
Unit ID	Alpha 10	Enterable; Modifiable
Lived	Integer	Enterable; Modifiable
Died	Integer	Enterable; Modifiable
Scenario ID	Alpha 10	Indexed; Enterable; Modifiable
livedbool	Boolean	Enterable; Modifiable
diedbool	Boolean	Enterable; Modifiable

Structure: Incidents

Incident ID	Alpha 10	Indexed; Mandatory; Enterable; Modifiable
DateFrom	Date	Enterable; Modifiable
TimeFrom	Alpha 4	Enterable; Modifiable
DateTo	Date	Enterable; Modifiable
TimeTo	Alpha 4	Enterable; Modifiable

Structure: Units

Unit ID	Alpha 10	Indexed; Mandatory; Enterable; Modifiable
Description	Text	Enterable; Modifiable
Incident ID	Alpha 10	Enterable; Modifiable
NumberOfMen	Alpha 20	Enterable; Modifiable
UnitType	Alpha 80	Choices; Enterable; Modifiable
UnitName	Alpha 80	Enterable; Modifiable

Structure: Scenarios

Incident ID	Alpha 10	Mandatory; Enterable; Modifiable
Scenario ID	Alpha 10	Mandatory; Enterable; Modifiable
Collection Loc	Alpha 80	Choices; Enterable; Modifiable
Enemy Situation	Text	Enterable; Modifiable
Friendly Situat	Text	Enterable; Modifiable
Location	Text	Enterable; Modifiable
Weather	Text	Enterable; Modifiable
Terrain	Text	Enterable; Modifiable
Morale	Text	Enterable; Modifiable
IncidentSummary	Text	Enterable; Modifiable
Incident Type	Alpha 80	Choices; Enterable; Modifiable
NumMenGroup	Alpha 20	Enterable; Modifiable
TactGroupType	Alpha 80	Choices; Enterable; Modifiable
Munitions	Subfile	
NumDetonations	Alpha 20	Enterable; Modifiable
NonStandardForm	Boolean	Enterable; Modifiable
Scenario ID_2	Alpha 10	Indexed; Enterable; Modifiable

Structure: Munitions

DetonationNum	Alpha 20	Enterable; Modifiable
LocationBurst	Alpha 20	Choices; Enterable; Modifiable
BelowSurf	Alpha 20	Enterable; Modifiable
AboveSurf	Alpha 20	Enterable; Modifiable
DetPointAbove	Text	Choices; Enterable; Modifiable
SurfaceType	Text	Choices; Enterable; Modifiable
CraterDepth	Alpha 10	Enterable; Modifiable
CraterMaxDiam	Alpha 10	Enterable; Modifiable
CraterMinDiam	Alpha 10	Enterable; Modifiable
CraterDescript	Alpha 40	Choices; Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
WDMETNums	Alpha 60	Enterable; Modifiable

Structure: Wounds

WDMET Number	Alpha 10	Indexed; Mandatory; Enterable; Modifiable
Wound Number	Alpha 20	Mandatory; Enterable; Modifiable
MissWeaponType	Alpha 40	Choices; Indexed; Enterable; Modifiable
Measure Method	Alpha 15	Choices; Enterable; Modifiable
Missile Type	Alpha 40	Choices; Enterable; Modifiable
Missile Shape	Alpha 20	Choices; Enterable; Modifiable
Missile Width	Alpha 10	Enterable; Modifiable
Missile Length	Alpha 10	Enterable; Modifiable
Missile Thick	Alpha 10	Enterable; Modifiable
Missile Weight	Alpha 10	Enterable; Modifiable
Missile Number	Alpha 6	Enterable; Modifiable
AgentType	Integer	Enterable; Modifiable
Primary	Integer	Enterable; Modifiable
DistWeapCas	Alpha 20	Enterable; Modifiable
PropellantZone	Integer	Enterable; Modifiable
DistDetCas	Alpha 20	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
NonMissType	Alpha 40	Choices; Enterable; Modifiable
WeaponModel	Alpha 40	Choices; Indexed; Enterable; Modifiable
Tissues	Subfile	
Tract Length	Alpha 20	Enterable; Modifiable
TypeMissile	Boolean	Enterable; Modifiable
TypeNonMissile	Boolean	Enterable; Modifiable
PrimaryMissile	Boolean	Enterable; Modifiable
SecondaryMissil	Boolean	Enterable; Modifiable
TissueID	Alpha 30	Indexed; Enterable; Modifiable

Structure: Tissues

TissueName	Text	Choices; Enterable; Modifiable
SequenceNumber	Integer	Enterable; Modifiable
DamageType	Alpha 40	Choices; Enterable; Modifiable
FractureType	Alpha 40	Choices; Enterable; Modifiable
EntranceDims	Alpha 20	Enterable; Modifiable
EntranceShape	Alpha 20	Choices; Enterable; Modifiable
EntContusDiam	Alpha 20	Enterable; Modifiable
Thickness	Alpha 20	Enterable; Modifiable
ExitDims	Alpha 20	Enterable; Modifiable
ExitShape	Alpha 20	Choices; Enterable; Modifiable
ExitContusDiam	Alpha 20	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable

Structure: Tract Summary

WDMET Number	Alpha 10	Indexed; Mandatory; Enterable; Modifiable
Collector ID	Alpha 20	Choices; Enterable; Modifiable
Data Source	Alpha 40	Choices; Enterable; Modifiable
Collection Loc	Alpha 60	Choices; Enterable; Modifiable
Total Tracts ex	Alpha 20	Enterable; Modifiable
Total Wounds	Alpha 20	Enterable; Modifiable
BloodLoss	Text	Enterable; Modifiable
Pericardium	Alpha 40	Enterable; Modifiable
PleuralCavity	Alpha 40	Enterable; Modifiable
AbdCavity	Alpha 40	Enterable; Modifiable
Retroperitoneal	Alpha 40	Enterable; Modifiable
CNS	Alpha 40	Enterable; Modifiable
Other	Text	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
NonStandardForm	Boolean	Enterable; Modifiable
NoWindow	Alpha 2	Enterable; Modifiable
Form	Integer	Enterable; Modifiable
HrtChamEnter	Integer	Enterable; Modifiable
HrtRAtrium	Boolean	Enterable; Modifiable
HrtLAtrium	Boolean	Enterable; Modifiable
HrtRVentricle	Boolean	Enterable; Modifiable
HrtLVentricle	Boolean	Enterable; Modifiable

Structure: Agents Summary

WDMET Number	Alpha 10	Indexed; Mandatory; Enterable; Modifiable
Collector ID	Alpha 40	Choices; Enterable; Modifiable
Collection Loc	Alpha 40	Choices; Enterable; Modifiable
NonStandardForm	Boolean	Enterable; Modifiable
NoWindow	Alpha 2	Enterable; Modifiable

Structure: Autopsy

WDMET Number	Alpha 10	Indexed; Mandatory; Enterable; Modifiable
WoundTract	Alpha 20	Enterable; Modifiable
TimeAfterInjDie	Alpha 20	Enterable; Modifiable
TimeAfterExam	Alpha 20	Enterable; Modifiable
CauseDeath	Text	Enterable; Modifiable
PrimaryCause	Text	Enterable; Modifiable
SecCause	Text	Enterable; Modifiable
OtherFindings	Text	Enterable; Modifiable
DateCollected	Date	Enterable; Modifiable
CollectionLoc	Alpha 40	Choices; Enterable; Modifiable
TimeCollected	Alpha 4	Enterable; Modifiable
CollectorID	Alpha 40	Choices; Enterable; Modifiable
DateDeath	Date	Enterable; Modifiable
TimeDeath	Alpha 4	Enterable; Modifiable
AutopsyNum	Alpha 20	Enterable; Modifiable
MorgueNum	Integer	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
NonStandardForm	Boolean	Enterable; Modifiable
NoWindow	Alpha 2	Enterable; Modifiable
PercentBurned	Alpha 20	Enterable; Modifiable
BurnDegree	Alpha 20	Enterable; Modifiable
CauseDeathOther	Text	Enterable; Modifiable
HemorType	Alpha 80	Enterable; Modifiable
HeartFailType	Alpha 80	Enterable; Modifiable
ThrombusOrgan	Alpha 60	Enterable; Modifiable
FatTissueOrgan	Alpha 60	Enterable; Modifiable
AirOrgan	Alpha 60	Enterable; Modifiable
BactFungal	Alpha 60	Enterable; Modifiable
OrganismName	Alpha 60	Enterable; Modifiable
SecCauseOther	Text	Enterable; Modifiable
CNSDiag	Alpha 60	Enterable; Modifiable
CardVasDiag	Alpha 60	Enterable; Modifiable
PulDiag	Alpha 60	Enterable; Modifiable
GasIntestDiag	Alpha 60	Enterable; Modifiable
GenitDiag	Alpha 60	Enterable; Modifiable
PreExOther	Alpha 80	Enterable; Modifiable
PreExOtherDiag	Alpha 60	Enterable; Modifiable
LungBlastInj	Alpha 50	Enterable; Modifiable
GasIntestInj	Alpha 50	Enterable; Modifiable
Form	Integer	Enterable; Modifiable
PrimCauseDeath	Integer	Enterable; Modifiable
HeartDamage	Integer	Enterable; Modifiable
PulDamage	Integer	Enterable; Modifiable
EmbolismType	Integer	Enterable; Modifiable
SecCauseDeath	Integer	Enterable; Modifiable
SecEmbolType	Integer	Enterable; Modifiable
Infection	Integer	Enterable; Modifiable
PreExDisease	Integer	Enterable; Modifiable
BlastInj	Integer	Enterable; Modifiable
PrimBrain	Boolean	Enterable; Modifiable
PrimSpCord	Boolean	Enterable; Modifiable
PrimHeart	Boolean	Enterable; Modifiable

PrimOthVes	Boolean	Enterable; Modifiable
PrimPul	Boolean	Enterable; Modifiable
PrimEmbol	Boolean	Enterable; Modifiable
PrimOther	Boolean	Enterable; Modifiable
PrimUnk	Boolean	Enterable; Modifiable
MassHem	Boolean	Enterable; Modifiable
Tamponade	Boolean	Enterable; Modifiable
CoronaryDam	Boolean	Enterable; Modifiable
PulHemo	Boolean	Enterable; Modifiable
PulPneumo	Boolean	Enterable; Modifiable
PulBldAspir	Boolean	Enterable; Modifiable
FatEmbol	Boolean	Enterable; Modifiable
AirEmbol	Boolean	Enterable; Modifiable
SecHem	Boolean	Enterable; Modifiable
SecHrtFail	Boolean	Enterable; Modifiable
SecEmbol	Boolean	Enterable; Modifiable
SecIntfect	Boolean	Enterable; Modifiable
SecOther	Boolean	Enterable; Modifiable
SecUnk	Boolean	Enterable; Modifiable
EmbolThrom	Boolean	Enterable; Modifiable
EmbolFat	Boolean	Enterable; Modifiable
EmbolBactFung	Boolean	Enterable; Modifiable
InfectGP	Boolean	Enterable; Modifiable
InfectGN	Boolean	Enterable; Modifiable
InfectClos	Boolean	Enterable; Modifiable
InfectBact	Boolean	Enterable; Modifiable
InfectSept	Boolean	Enterable; Modifiable
InfectPara	Boolean	Enterable; Modifiable
InfectFungal	Boolean	Enterable; Modifiable
PEDCNS	Boolean	Enterable; Modifiable
PEDCardVas	Boolean	Enterable; Modifiable
PEDPul	Boolean	Enterable; Modifiable
PEDGasInt	Boolean	Enterable; Modifiable
PEDGenit	Boolean	Enterable; Modifiable
PEDOther	Boolean	Enterable; Modifiable
BlastLung	Boolean	Enterable; Modifiable
BlastGasInt	Boolean	Enterable; Modifiable

Structure: Body Diagram

WDMET Number	Alpha 20	Indexed; Mandatory; Enterable; Modifiable
Collector ID	Alpha 40	Enterable; Modifiable
Colletion Loc	Alpha 40	Enterable; Modifiable

Structure: Collectors

Collector ID	Alpha 20	Mandatory; Enterable; Modifiable
Name	Alpha 30	Enterable; Modifiable
Serial Number	Alpha 15	Enterable; Modifiable
Rating	Integer	Enterable; Modifiable

Structure: Body Armor

VDMET Number	Alpha 10	Indexed; Mandatory; Enterable; Modifiable
Collector ID	Alpha 40	Choices; Enterable; Modifiable
PortionHit	Integer	Enterable; Modifiable
BodyArmWorn	Integer	Enterable; Modifiable
ReasonNotWorn	Text	Choices; Enterable; Modifiable
TypeArmor	Text	Choices; Enterable; Modifiable
VestFront	Integer	Enterable; Modifiable
BAHitandPerf	Alpha 20	Enterable; Modifiable
BAHitnotPerf	Alpha 20	Enterable; Modifiable
BAPunchSpall	Alpha 20	Enterable; Modifiable
HeadgearWorn	Integer	Enterable; Modifiable
TimesHelmitHit	Alpha 20	Enterable; Modifiable
TimesHitnotPerf	Alpha 20	Enterable; Modifiable
PunchSpallHel	Alpha 20	Enterable; Modifiable
TypeHelmetLiner	Alpha 40	Choices; Enterable; Modifiable
BootType	Alpha 60	Choices; Enterable; Modifiable
TimesBootHit	Alpha 20	Enterable; Modifiable
BootHitnotPerf	Alpha 20	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
PortionHitOther	Alpha 60	Enterable; Modifiable
WTNBodyArmor	Alpha 40	Enterable; Modifiable
OtherHeadgear	Alpha 40	Enterable; Modifiable
WTNHelmet	Alpha 20	Enterable; Modifiable
PunchSpallWTNBA	Alpha 20	Enterable; Modifiable
PunchSpallWTNHe	Alpha 20	Enterable; Modifiable
WTNFatigues	Alpha 60	Enterable; Modifiable
CollectionLoc	Alpha 60	Choices; Enterable; Modifiable
WTNBoot	Alpha 20	Enterable; Modifiable
VestHits	Integer	Enterable; Modifiable
HeadHits	Integer	Enterable; Modifiable
BootHits	Integer	Enterable; Modifiable
NoWindow	Alpha 2	Enterable; Modifiable
Source	Alpha 60	Enterable; Modifiable
WTNButBuck	Alpha 40	Enterable; Modifiable
Form	Integer	Enterable; Modifiable
NonStandardForm	Boolean	Enterable; Modifiable
CollarPos	Integer	Enterable; Modifiable
PorHitFat	Boolean	Enterable; Modifiable
PorHitButBuck	Boolean	Enterable; Modifiable
PorHitOther	Boolean	Enterable; Modifiable
PorHitUnk	Boolean	Enterable; Modifiable
BArmWorn	Boolean	Enterable; Modifiable
BArmNotWorn	Boolean	Enterable; Modifiable
BArmUnk	Boolean	Enterable; Modifiable
VFOpen	Boolean	Enterable; Modifiable
VFClosed	Boolean	Enterable; Modifiable
VFUnk	Boolean	Enterable; Modifiable
VHHit	Boolean	Enterable; Modifiable
VHNotHit	Boolean	Enterable; Modifiable
VHUnk	Boolean	Enterable; Modifiable
HGWNone	Boolean	Enterable; Modifiable
HGWHelLin	Boolean	Enterable; Modifiable

HGWLin	Boolean	Enterable; Modifiable
HGWUnk	Boolean	Enterable; Modifiable
HGWOther	Boolean	Enterable; Modifiable
ColPosUp	Boolean	Enterable; Modifiable
ColPosDown	Boolean	Enterable; Modifiable
BootHit	Boolean	Enterable; Modifiable
HeadHit	Boolean	Enterable; Modifiable

Structure: Observer Interv

WDMET Number	Alpha 10	Indexed; Mandatory; Enterable; Modifiable
Collector ID	Alpha 20	Choices; Enterable; Modifiable
ObserverName	Alpha 40	Enterable; Modifiable
ObsSerialNum	Alpha 20	Enterable; Modifiable
CasualtyUnit	Alpha 70	Enterable; Modifiable
AircraftType	Alpha 60	Enterable; Modifiable
PhysicalActivs	Text	Enterable; Modifiable
WarningType	Text	Enterable; Modifiable
TimeWarnToWound	Alpha 20	Enterable; Modifiable
CoverDescript	Text	Enterable; Modifiable
CasPosition	Integer	Enterable; Modifiable
PartsShielded	Integer	Enterable; Modifiable
DistWeaponToCas	Alpha 20	Enterable; Modifiable
DistDetToCas	Alpha 20	Enterable; Modifiable
WeaponType	Alpha 60	Choices; Enterable; Modifiable
Reliability	Integer	Enterable; Modifiable
DistObsToCas	Alpha 20	Enterable; Modifiable
ObsAwareBy	Integer	Enterable; Modifiable
TimeLapseAware	Alpha 20	Enterable; Modifiable
ActivitiesAfter	Integer	Enterable; Modifiable
ActivitiesDescr	Text	Enterable; Modifiable
CasSignsAfter	Integer	Enterable; Modifiable
FirstAidOther	Alpha 60	Enterable; Modifiable
FirstAidAfter	Alpha 20	Enterable; Modifiable
FirstAidFrom	Integer	Enterable; Modifiable
ReturnedToDuty	Boolean	Enterable; Modifiable
MinsTilEvac	Alpha 20	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
Collection Loc	Alpha 60	Choices; Enterable; Modifiable
GroundedAfter	Alpha 20	Enterable; Modifiable
GroundedFor	Alpha 20	Enterable; Modifiable
UnconsciousFor	Alpha 20	Enterable; Modifiable
UnconsciousAft	Alpha 20	Enterable; Modifiable
NormalFor	Alpha 20	Enterable; Modifiable
NormalAfter	Alpha 20	Enterable; Modifiable
IVFluidType	Alpha 30	Choices; Enterable; Modifiable
LandEvac	Alpha 80	Enterable; Modifiable
AirEvac	Alpha 80	Enterable; Modifiable
CoverAttained	Boolean	Enterable; Modifiable
FrontsShielded	Integer	Enterable; Modifiable
BacksShielded	Integer	Enterable; Modifiable
FirstAidType	Integer	Enterable; Modifiable
EvacBy	Integer	Enterable; Modifiable
FirstAidFromOth	Alpha 60	Enterable; Modifiable
ObsAwareOther	Alpha 80	Enterable; Modifiable
Crawl	Integer	Enterable; Modifiable
Stand	Integer	Enterable; Modifiable
Walk	Integer	Enterable; Modifiable
Run	Integer	Enterable; Modifiable
Load	Integer	Enterable; Modifiable
Fire	Integer	Enterable; Modifiable
Throw	Integer	Enterable; Modifiable

lormalDuty	Integer	Enterable; Modifiable
)therActivity	Integer	Enterable; Modifiable
rawlReasonFail	Alpha 20	Enterable; Modifiable
rawlWhyNotAtt	Alpha 20	Enterable; Modifiable
tandReasonFail	Alpha 20	Enterable; Modifiable
tandWhyNotAtt	Alpha 20	Enterable; Modifiable
Valk ReasonFail	Alpha 20	Enterable; Modifiable
Valk WhyNotAtt	Alpha 20	Enterable; Modifiable
lunReasonFail	Alpha 20	Enterable; Modifiable
lunWhyNotAtt	Alpha 20	Enterable; Modifiable
oadReasonFail	Alpha 20	Enterable; Modifiable
oadWhyNotAtt	Alpha 20	Enterable; Modifiable
ireReasonFail	Alpha 20	Enterable; Modifiable
ireReasonNotAt	Alpha 20	Enterable; Modifiable
hrowReasonFail	Alpha 20	Enterable; Modifiable
hrowWhyNotAtt	Alpha 20	Enterable; Modifiable
lormalReasonFai	Alpha 20	Enterable; Modifiable
lormalWhyNotAtt	Alpha 20	Enterable; Modifiable
)therReasonFail	Alpha 20	Enterable; Modifiable
)therWhyNotAtt	Alpha 20	Enterable; Modifiable
)therActivDesc	Alpha 60	Enterable; Modifiable
lHandFor	Alpha 20	Enterable; Modifiable
lHandAfter	Alpha 20	Enterable; Modifiable
HandFor	Alpha 20	Enterable; Modifiable
HandAfter	Alpha 20	Enterable; Modifiable
lArmFor	Alpha 20	Enterable; Modifiable
lArmAfter	Alpha 20	Enterable; Modifiable
ArmFor	Alpha 20	Enterable; Modifiable
ArmAfter	Alpha 20	Enterable; Modifiable
lLegFor	Alpha 20	Enterable; Modifiable
lLegAfter	Alpha 20	Enterable; Modifiable
LegAfter	Alpha 20	Enterable; Modifiable
LegFor	Alpha 20	Enterable; Modifiable
lovedHeadFor	Alpha 20	Enterable; Modifiable
lovedHeadAfter	Alpha 20	Enterable; Modifiable
lovedTrunkFor	Alpha 20	Enterable; Modifiable
lovedTrunkAfter	Alpha 20	Enterable; Modifiable
'omitingFor	Alpha 20	Enterable; Modifiable
'omitingAfter	Alpha 20	Enterable; Modifiable
irstAidFor	Alpha 20	Enterable; Modifiable
lonStandardForm	Boolean	Enterable; Modifiable
loWindow	Alpha 2	Enterable; Modifiable
ireProne	Integer	Enterable; Modifiable
ireStand	Integer	Enterable; Modifiable
ireProneReason	Alpha 20	Enterable; Modifiable
ireProneWhyNot	Alpha 20	Enterable; Modifiable
ireStandReason	Alpha 20	Enterable; Modifiable
ireStandWhyNot	Alpha 20	Enterable; Modifiable
iroundReason	Alpha 80	Enterable; Modifiable
orm	Integer	Enterable; Modifiable
PStand	Boolean	Enterable; Modifiable
PWalk	Boolean	Enterable; Modifiable
PRun	Boolean	Enterable; Modifiable

Crouch	Boolean	Enterable; Modifiable
Sit	Boolean	Enterable; Modifiable
Kneel	Boolean	Enterable; Modifiable
Prone	Boolean	Enterable; Modifiable
Supine	Boolean	Enterable; Modifiable
RSide	Boolean	Enterable; Modifiable
LSide	Boolean	Enterable; Modifiable
Unk	Boolean	Enterable; Modifiable
eldHeadNeck	Boolean	Enterable; Modifiable
eldThorax	Boolean	Enterable; Modifiable
eldAbdomen	Boolean	Enterable; Modifiable
eldPelvis	Boolean	Enterable; Modifiable
eldRLExt	Boolean	Enterable; Modifiable
eldLLExt	Boolean	Enterable; Modifiable
eldRUExt	Boolean	Enterable; Modifiable
eldLUExt	Boolean	Enterable; Modifiable
eldAll	Boolean	Enterable; Modifiable
eldUnk	Boolean	Enterable; Modifiable
eldNone	Boolean	Enterable; Modifiable
‹ShHead	Boolean	Enterable; Modifiable
‹ShThorax	Boolean	Enterable; Modifiable
‹ShAbdomen	Boolean	Enterable; Modifiable
‹ShPelvis	Boolean	Enterable; Modifiable
‹ShRLExt	Boolean	Enterable; Modifiable
‹ShLLExt	Boolean	Enterable; Modifiable
‹ShRUExt	Boolean	Enterable; Modifiable
‹ShLUExt	Boolean	Enterable; Modifiable
ShHead	Boolean	Enterable, Modifiable
ShThorax	Boolean	Enterable; Modifiable
ShAbdomen	Boolean	Enterable; Modifiable
ShPelvis	Boolean	Enterable; Modifiable
ShRLExt	Boolean	Enterable; Modifiable
ShLLExt	Boolean	Enterable; Modifiable
ShRUExt	Boolean	Enterable; Modifiable
ShLUExt	Boolean	Enterable; Modifiable
ınDefinite	Boolean	Enterable; Modifiable
ınPossible	Boolean	Enterable; Modifiable
ınUnk	Boolean	Enterable; Modifiable
sAwImpact	Boolean	Enterable; Modifiable
sAwSaw	Boolean	Enterable; Modifiable
sAwCasTold	Boolean	Enterable; Modifiable
sAwTold	Boolean	Enterable; Modifiable
sAwOther	Boolean	Enterable; Modifiable
ıwlAccomp	Boolean	Enterable; Modifiable
ıwlTry	Boolean	Enterable; Modifiable
ındAccomp	Boolean	Enterable; Modifiable
ındTry	Boolean	Enterable; Modifiable
ılkAccomp	Boolean	Enterable; Modifiable
ılkTry	Boolean	Enterable; Modifiable
ınAccomp	Boolean	Enterable; Modifiable
ınTry	Boolean	Enterable; Modifiable
ıdAccomp	Boolean	Enterable; Modifiable
ıdTry	Boolean	Enterable; Modifiable

FireAccomp	Boolean	Enterable; Modifiable
FireTry	Boolean	Enterable; Modifiable
ThrowAccomp	Boolean	Enterable; Modifiable
ThrowTry	Boolean	Enterable; Modifiable
NormDutyAccomp	Boolean	Enterable; Modifiable
NormDutyTry	Boolean	Enterable; Modifiable
OtherActAccomp	Boolean	Enterable; Modifiable
OtherActTry	Boolean	Enterable; Modifiable
CSFell	Boolean	Enterable; Modifiable
CSUncon	Boolean	Enterable; Modifiable
CSNormal	Boolean	Enterable; Modifiable
CSRHMove	Boolean	Enterable; Modifiable
CSLHMove	Boolean	Enterable; Modifiable
CSRAMove	Boolean	Enterable; Modifiable
CSLAMove	Boolean	Enterable; Modifiable
CSRLMove	Boolean	Enterable; Modifiable
CSLLMove	Boolean	Enterable; Modifiable
CSHeadMove	Boolean	Enterable; Modifiable
CSTrunkMove	Boolean	Enterable; Modifiable
CSVomit	Boolean	Enterable; Modifiable
FABandage	Boolean	Enterable; Modifiable
FATourn	Boolean	Enterable; Modifiable
FASplint	Boolean	Enterable; Modifiable
FAPainMed	Boolean	Enterable; Modifiable
FATracheo	Boolean	Enterable; Modifiable
FAPressure	Boolean	Enterable; Modifiable
FAFluids	Boolean	Enterable; Modifiable
FAOther	Boolean	Enterable; Modifiable
FANone	Boolean	Enterable; Modifiable
FAFBuddy	Boolean	Enterable; Modifiable
FAFSelf	Boolean	Enterable; Modifiable
FAFAidman	Boolean	Enterable; Modifiable
FAFDoctor	Boolean	Enterable; Modifiable
FAFOther	Boolean	Enterable; Modifiable
EvacHelo	Boolean	Enterable; Modifiable
EvacAirOther	Boolean	Enterable; Modifiable
EvacWater	Boolean	Enterable; Modifiable
EvacLandOther	Boolean	Enterable; Modifiable

Structure: Troop Interview

Incident ID	Alpha 40	Mandatory; Enterable; Modifiable
Name	Alpha 40	Enterable; Modifiable
Serial Number	Alpha 20	Enterable; Modifiable
MOS	Alpha 10	Enterable; Modifiable
Wounded	Integer	Enterable; Modifiable
Weapon	Text	Enterable; Modifiable
Rounds	Text	Enterable; Modifiable
Grenades	Alpha 60	Enterable; Modifiable
Canteen size	Alpha 20	Enterable; Modifiable
Canteens	Alpha 40	Enterable; Modifiable
Body Armor	Text	Enterable; Modifiable
Other Equipment	Text	Enterable; Modifiable
Tactical Narrat	Text	Enterable; Modifiable
WDMET Number	Alpha 10	Indexed; Enterable; Modifiable
Wounded_bool	Boolean	Enterable; Modifiable

Structure: Burn Supplement

Percent 1st Deg	Alpha 20	Enterable; Modifiable
Percent 2nd Deg	Alpha 20	Enterable; Modifiable
Percent 3rd Deg	Alpha 20	Enterable; Modifiable
Total Percent	Alpha 20	Enterable; Modifiable
HoursAfterBurn	Alpha 20	Enterable; Modifiable
DistCasToFire	Alpha 6	Enterable; Modifiable
GarmentAflame	Boolean	Enterable; Modifiable
TimeToExting	Alpha 20	Enterable; Modifiable
GloveType	Alpha 80	Enterable; Modifiable
ExtFlameOther	Alpha 80	Enterable; Modifiable
Aircraft	Alpha 40	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
WDMET Number	Alpha 10	Indexed; Mandatory; Enterable; Modifiable
Collection Loc	Alpha 40	Choices; Enterable; Modifiable
Garmet Type	Alpha 80	Enterable; Modifiable
HandsBurned	Integer	Enterable; Modifiable
GlovesWorn	Integer	Enterable; Modifiable
ExtFlameMethod	Integer	Enterable; Modifiable
AircraftOutcome	Integer	Enterable; Modifiable
CollectorID	Alpha 40	Choices; Enterable; Modifiable
NoWindow	Alpha 2	Enterable; Modifiable
TimeWeak	Alpha 30	Enterable; Modifiable
TimeUnableToCon	Alpha 30	Enterable; Modifiable
TimeMedTreat	Alpha 30	Enterable; Modifiable
Form	Integer	Enterable; Modifiable
PosCasToFire	Integer	Enterable; Modifiable
PerfWhileExt	Integer	Enterable; Modifiable
PainWas	Integer	Enterable; Modifiable
PainOnTask	Integer	Enterable; Modifiable
NonStandardForm	Integer	Enterable; Modifiable
HandBurnExt	Integer	Enterable; Modifiable
HBRight	Boolean	Enterable; Modifiable
HBLeft	Boolean	Enterable; Modifiable
HBBoth	Boolean	Enterable; Modifiable
HBUnk	Boolean	Enterable; Modifiable
HandBurnYes	Boolean	Enterable; Modifiable
HandBurnNo	Boolean	Enterable; Modifiable
HandBurnUnk	Boolean	Enterable; Modifiable
GWRight	Boolean	Enterable; Modifiable
GWLeft	Boolean	Enterable; Modifiable
GWBoth	Boolean	Enterable; Modifiable
GWUnk	Boolean	Enterable; Modifiable
	Boolean	Enterable; Modifiable
ExtSlap	Boolean	Enterable; Modifiable
ExtRoll	Boolean	Enterable; Modifiable
ExtSmother	Boolean	Enterable; Modifiable
ExtSmothPon	Boolean	Enterable; Modifiable
ExtSmothDirt	Boolean	Enterable; Modifiable
ExtWater	Boolean	Enterable; Modifiable
ExtOther	Boolean	Enterable; Modifiable
ArCrftFire	Boolean	Enterable; Modifiable
ArCrftCrash	Boolean	Enterable; Modifiable

ArCrftLand	Boolean	Enterable; Modifiable
PosCasCenter	Boolean	Enterable; Modifiable
PosCasEdge	Boolean	Enterable; Modifiable
PosCasOut	Boolean	Enterable; Modifiable
PosCasDis	Boolean	Enterable; Modifiable
PerfNone	Boolean	Enterable; Modifiable
PerfHarass	Boolean	Enterable; Modifiable
PerfComp	Boolean	Enterable; Modifiable
PWNegl	Boolean	Enterable; Modifiable
PWModer	Boolean	Enterable; Modifiable
PWSevere	Boolean	Enterable; Modifiable
PWExcruc	Boolean	Enterable; Modifiable
PainNone	Boolean	Enterable; Modifiable
PainPart	Boolean	Enterable; Modifiable
PainComp	Boolean	Enterable; Modifiable
GWRight	Boolean	Enterable; Modifiable
GWLeft	Boolean	Enterable; Modifiable
GWBoth	Boolean	Enterable; Modifiable
GWUnk	Boolean	Enterable; Modifiable

Structure: Clinical Data

Collector ID	Alpha 40	Choices; Indexed; Enterable; Modifiable
Data Source	Alpha 40	Choices; Enterable; Modifiable
FacilityName	Alpha 40	Choices; Enterable; Modifiable
Collection Loc	Alpha 40	Choices; Enterable; Modifiable
Systolic BP	Alpha 3	Enterable; Modifiable
Hct	Alpha 3	Enterable; Modifiable
RespRate	Alpha 3	Enterable; Modifiable
Ambulatory	Integer	Enterable; Modifiable
Shock	Integer	Enterable; Modifiable
CauseRespDist	Integer	Enterable; Modifiable
Mental Status	Integer	Enterable; Modifiable
MSFunction	Integer	Enterable; Modifiable
BloodReplAdmiss	Alpha 20	Enterable; Modifiable
BloodReplSurger	Alpha 20	Enterable; Modifiable
FluidReplAdmiss	Alpha 20	Enterable; Modifiable
FluidReplSurger	Alpha 20	Enterable; Modifiable
FluidType	Alpha 80	Choices; Enterable; Modifiable
SurgicalProcs	Text	Enterable; Modifiable
Diagnosis	Text	Enterable; Modifiable
Complications	Integer	Enterable; Modifiable
Disposition	Integer	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
WDMET Number	Alpha 10	Indexed; Mandatory; Enterable; Modifiable
Diastolic BP	Alpha 3	Enterable; Modifiable
RespDistOther	Alpha 80	Enterable; Modifiable
WeaknessOf	Alpha 40	Enterable; Modifiable
WeakSecInjOf	Alpha 40	Choices; Enterable; Modifiable
UnableToMove	Alpha 40	Enterable; Modifiable
UnableSecInjOf	Alpha 40	Enterable; Modifiable
BloodInfo	Integer	Enterable; Modifiable
FluidInfo	Integer	Enterable; Modifiable
NatureEngage	Integer	Enterable; Modifiable
CompsPrevInj	Text	Enterable; Modifiable
CompsOther	Text	Enterable; Modifiable
TransferredTo	Alpha 80	Choices; Enterable; Modifiable
TransferredOn	Date	Enterable; Modifiable
HeartRate	Alpha 20	Enterable; Modifiable
DateRecSurgery	Date	Enterable; Modifiable
ReturnDutyOn	Date	Enterable; Modifiable
DischargedOn	Date	Enterable; Modifiable
DiedOn	Date	Enterable; Modifiable
CauseOfDeath	Alpha 80	Enterable; Modifiable
DispositionOth	Alpha 80	Enterable; Modifiable
OutcomeLived	Integer	Enterable; Modifiable
OutcomeDied	Integer	Enterable; Modifiable
PostOpComp	Text	Enterable; Modifiable
Temperature	Alpha 20	Enterable; Modifiable
NonStandardForm	Boolean	Enterable; Modifiable
BloodDurSurg	Alpha 20	Enterable; Modifiable
FluidDurSurg	Alpha 20	Enterable; Modifiable
DateCollected	Date	Enterable; Modifiable
TimeCollected	Alpha 4	Enterable; Modifiable

NoWindow	Alpha 2	Enterable; Modifiable
Form	Integer	Enterable; Modifiable
LocalGeneral	Integer	Enterable; Modifiable
LiveType	Integer	Enterable; Modifiable
DeathType	Integer	Enterable; Modifiable
WalkYes	Boolean	Enterable; Modifiable
WalkNo	Boolean	Enterable; Modifiable
WalkUnk	Boolean	Enterable; Modifiable
ShockYes	Boolean	Enterable; Modifiable
ShockNo	Boolean	Enterable; Modifiable
ShockCanDet	Boolean	Enterable; Modifiable
AirObstruct	Boolean	Enterable; Modifiable
ThorWallInj	Boolean	Enterable; Modifiable
IntraThorInj	Boolean	Enterable; Modifiable
Neurological	Boolean	Enterable; Modifiable
RespDisOther	Boolean	Enterable; Modifiable
MentalNormal	Boolean	Enterable; Modifiable
MentalHyper	Boolean	Enterable; Modifiable
MentalUncon	Boolean	Enterable; Modifiable
MentalUnk	Boolean	Enterable; Modifiable
MentalHypo	Boolean	Enterable; Modifiable
MSNormal	Boolean	Enterable; Modifiable
MSRest	Boolean	Enterable; Modifiable
MSWeakness	Boolean	Enterable; Modifiable
MSInability	Boolean	Enterable; Modifiable
MSUnk	Boolean	Enterable; Modifiable
MSConvulsion	Boolean	Enterable; Modifiable
BldInfoAdeq	Boolean	Enterable; Modifiable
BldInfoInadeq	Boolean	Enterable; Modifiable
BldInfoUnk	Boolean	Enterable; Modifiable
FldInfoAdeq	Boolean	Enterable; Modifiable
FldInfoInadeq	Boolean	Enterable; Modifiable
FldInfoUnk	Boolean	Enterable; Modifiable
Malaria	Boolean	Enterable; Modifiable
Typhus	Boolean	Enterable; Modifiable
Fever	Boolean	Enterable; Modifiable
HeatExhaust	Boolean	Enterable; Modifiable
RecentIllness	Boolean	Enterable; Modifiable
RecentSurg	Boolean	Enterable; Modifiable
PreviousInj	Boolean	Enterable; Modifiable
CompOther	Boolean	Enterable; Modifiable
CompNone	Boolean	Enterable; Modifiable
FriendEngage	Boolean	Enterable; Modifiable
EnemyEngage	Boolean	Enterable; Modifiable
NonBatEngage	Boolean	Enterable; Modifiable
LivedCRO	Boolean	Enterable; Modifiable
LivedNBI	Boolean	Enterable; Modifiable
LivedWIA	Boolean	Enterable; Modifiable
DiedNBI	Boolean	Enterable; Modifiable
DiedDOW	Boolean	Enterable; Modifiable
DiedKIA	Boolean	Enterable; Modifiable
Transfer	Boolean	Enterable; Modifiable
RTDuty	Boolean	Enterable; Modifiable

Discharge	Boolean	Enterable; Modifiable
DiedOn	Boolean	Enterable; Modifiable
DispOther	Boolean	Enterable; Modifiable
ConLocal	Boolean	Enterable; Modifiable
ConGeneral	Boolean	Enterable; Modifiable
LiveTypeCRO	Boolean	Enterable; Modifiable
LiveTypeNBI	Boolean	Enterable; Modifiable
LiveTypeWIA	Boolean	Enterable; Modifiable
DeathDOW	Boolean	Enterable; Modifiable
DeathDOA	Boolean	Enterable; Modifiable
DeathKIA	Boolean	Enterable; Modifiable
DeathHom	Boolean	Enterable; Modifiable
DeathSuic	Boolean	Enterable; Modifiable
DeathNBI	Boolean	Enterable; Modifiable
Lived	Boolean	Enterable; Modifiable
Died	Boolean	Enterable; Modifiable

Structure: Casualty Interv

WDMET Number	Alpha 10	Indexed; Mandatory; Enterable; Modifiable
Collector ID	Alpha 30	Choices; Enterable; Modifiable
Rank	Alpha 20	Enterable; Modifiable
MOS	Alpha 20	Enterable; Modifiable
MOS Performed	Alpha 20	Enterable; Modifiable
Age	Alpha 20	Enterable; Modifiable
Weight	Alpha 7	Enterable; Modifiable
Height	Alpha 6	Enterable; Modifiable
Unit	Text	Enterable; Modifiable
Collection Loc	Alpha 40	Choices; Enterable; Modifiable
Aircraft	Alpha 20	Enterable; Modifiable
Activity Prior	Text	Enterable; Modifiable
Warning	Text	Enterable; Modifiable
Time Warn Wound	Alpha 20	Enterable; Modifiable
Cover Attained	Integer	Enterable; Modifiable
Cover Type	Text	Enterable; Modifiable
Body Position	Integer	Enterable; Modifiable
Dist Weap Cas	Alpha 20	Enterable; Modifiable
Dist Det Cas	Alpha 20	Enterable; Modifiable
Weapon Type	Alpha 60	Choices; Enterable; Modifiable
Weapon Model	Text	Choices; Enterable; Modifiable
Reliability	Integer	Enterable; Modifiable
How Aware	Integer	Enterable; Modifiable
Aware Other	Text	Enterable; Modifiable
Time Wound Awar	Alpha 20	Enterable; Modifiable
Grounded	Integer	Enterable; Modifiable
GroundTimeAW	Alpha 20	Enterable; Modifiable
GroundTimeLen	Alpha 20	Enterable; Modifiable
GroundReason	Alpha 80	Enterable; Modifiable
Crawl	Integer	Enterable; Modifiable
CrawlReasonFail	Alpha 20	Enterable; Modifiable
Stand	Integer	Enterable; Modifiable
StandReasonFail	Alpha 20	Enterable; Modifiable
Walk	Integer	Enterable; Modifiable
WalkReasonFail	Alpha 20	Enterable; Modifiable
Load	Integer	Enterable; Modifiable
LoadReasonFail	Alpha 20	Enterable; Modifiable
Fire	Integer	Enterable; Modifiable
FireReasonFail	Alpha 20	Enterable; Modifiable
Throw	Integer	Enterable; Modifiable
ThrowReasonFail	Alpha 20	Enterable; Modifiable
NormalDuty	Integer	Enterable; Modifiable
NormReasonFail	Alpha 20	Enterable; Modifiable
ActivityTilEvac	Text	Enterable; Modifiable
REyeDisabled	Integer	Enterable; Modifiable
REyeOutFor	Alpha 20	Enterable; Modifiable
REyeOutAfter	Alpha 20	Enterable; Modifiable
LEyeDisabled	Integer	Enterable; Modifiable
LEyeOutFor	Alpha 20	Enterable; Modifiable
LEyeOutAfter	Alpha 20	Enterable; Modifiable
HearLossFor	Alpha 20	Enterable; Modifiable
HearLossAfter	Alpha 20	Enterable; Modifiable

TalkLossFor	Alpha 20	Enterable; Modifiable
TalkLossAfter	Alpha 20	Enterable; Modifiable
DyspneaFor	Alpha 20	Enterable; Modifiable
DyspneaAfter	Alpha 20	Enterable; Modifiable
WeakFor	Alpha 20	Enterable; Modifiable
WeakAfter	Alpha 20	Enterable; Modifiable
VomitedFor	Alpha 20	Enterable; Modifiable
VomitedAfter	Alpha 20	Enterable; Modifiable
PainType	Integer	Enterable; Modifiable
PainFor	Alpha 20	Enterable; Modifiable
PainAfter	Alpha 20	Enterable; Modifiable
PainLocation	Alpha 60	Enterable; Modifiable
FeltNormalFor	Alpha 20	Enterable; Modifiable
FeltNormalAfter	Alpha 20	Enterable; Modifiable
FirstAidAfter	Alpha 20	Enterable; Modifiable
FirstAidType	Integer	Enterable; Modifiable
FirstAidOther	Alpha 40	Enterable; Modifiable
FirstAidFrom	Integer	Enterable; Modifiable
FirstAidFromOth	Alpha 20	Enterable; Modifiable
RTDFirstAid	Integer	Enterable; Modifiable
EvacBy	Integer	Enterable; Modifiable
EvacAirOther	Alpha 80	Enterable; Modifiable
EvacLandOther	Alpha 80	Enterable; Modifiable
EstTimeTilEvac	Alpha 20	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
Run	Integer	Enterable; Modifiable
RunReasonFail	Alpha 20	Enterable; Modifiable
PartsShielded	Integer	Enterable; Modifiable
FrontsShielded	Integer	Enterable; Modifiable
BacksShielded	Integer	Enterable; Modifiable
HearLoss	Integer	Enterable; Modifiable
TalkLoss	Integer	Enterable; Modifiable
Dyspnea	Integer	Enterable; Modifiable
Weakness	Integer	Enterable; Modifiable
Vomited	Integer	Enterable; Modifiable
FeltPain	Integer	Enterable; Modifiable
FeltNormal	Integer	Enterable; Modifiable
CrawlWhyNotAtt	Alpha 20	Enterable; Modifiable
StandWhyNotAtt	Alpha 20	Enterable; Modifiable
WalkWhyNotAtt	Alpha 20	Enterable; Modifiable
RunWhyNotAtt	Alpha 20	Enterable; Modifiable
LoadWhyNotAtt	Alpha 20	Enterable; Modifiable
FireWhyNotAtt	Alpha 20	Enterable; Modifiable
ThrowWhyNotAtt	Alpha 20	Enterable; Modifiable
NormWhyNotAtt	Alpha 20	Enterable; Modifiable
OtherActivDesc	Text	Enterable; Modifiable
OtherActivity	Integer	Enterable; Modifiable
OtherWhyNotAtt	Alpha 20	Enterable; Modifiable
OtherReasonFail	Alpha 20	Enterable; Modifiable
LHandDisabled	Integer	Enterable; Modifiable
LHandOutFor	Alpha 20	Enterable; Modifiable
LHandOutAfter	Alpha 20	Enterable; Modifiable
RHandDisabled	Integer	Enterable; Modifiable

RHandOutFor	Alpha 20	Enterable; Modifiable
RHandOutAfter	Alpha 20	Enterable; Modifiable
LArmDisabled	Integer	Enterable; Modifiable
LArmOutFor	Alpha 20	Enterable; Modifiable
LArmOutAfter	Alpha 20	Enterable; Modifiable
RArmDisabled	Integer	Enterable; Modifiable
RArmOutFor	Alpha 20	Enterable; Modifiable
RArmOutAfter	Alpha 20	Enterable; Modifiable
RLegDisabled	Integer	Enterable; Modifiable
RLegOutFor	Alpha 20	Enterable; Modifiable
RLegOutAfter	Alpha 20	Enterable; Modifiable
LLegDisabled	Integer	Enterable; Modifiable
LLegOutFor	Alpha 20	Enterable; Modifiable
LLegOutAfter	Alpha 20	Enterable; Modifiable
RFootDisabled	Integer	Enterable; Modifiable
RFootOutFor	Alpha 20	Enterable; Modifiable
RFootOutAfter	Alpha 20	Enterable; Modifiable
LFootDisabled	Integer	Enterable; Modifiable
LFootOutFor	Alpha 20	Enterable; Modifiable
LFootOutAfter	Alpha 20	Enterable; Modifiable
FirstAidFor	Alpha 20	Enterable; Modifiable
NonStandardForm	Boolean	Enterable; Modifiable
NoWindow	Alpha 2	Enterable; Modifiable
IVFluidSpec	Text	Enterable; Modifiable
FireProneReason	Alpha 20	Enterable; Modifiable
FireStandReason	Alpha 20	Enterable; Modifiable
FireProne	Integer	Enterable; Modifiable
FireStand	Integer	Enterable; Modifiable
FireProneWhyNot	Alpha 20	Enterable; Modifiable
FireStandWhyNot	Alpha 20	Enterable; Modifiable
Form	Integer	Enterable; Modifiable
Symptoms	Integer	Enterable; Modifiable
BPStand	Boolean	Enterable; Modifiable
BPWalk	Boolean	Enterable; Modifiable
BPRun	Boolean	Enterable; Modifiable
BPCrouch	Boolean	Enterable; Modifiable
BPSit	Boolean	Enterable; Modifiable
BPKneel	Boolean	Enterable; Modifiable
BPProne	Boolean	Enterable; Modifiable
BPSupine	Boolean	Enterable; Modifiable
BPRSide	Boolean	Enterable; Modifiable
BPLSide	Boolean	Enterable; Modifiable
BPUnk	Boolean	Enterable; Modifiable
ShieldHeadNeck	Boolean	Enterable; Modifiable
ShieldThorax	Boolean	Enterable; Modifiable
ShieldAbdomen	Boolean	Enterable; Modifiable
ShieldPelvis	Boolean	Enterable; Modifiable
ShieldRLExt	Boolean	Enterable; Modifiable
ShieldLLExt	Boolean	Enterable; Modifiable
ShieldRUExt	Boolean	Enterable; Modifiable
ShieldLUExt	Boolean	Enterable; Modifiable
ShieldAll	Boolean	Enterable; Modifiable
ShieldUnk	Boolean	Enterable; Modifiable

ShieldNone	Boolean	Enterable; Modifiable
BckShHead	Boolean	Enterable; Modifiable
BckShThorax	Boolean	Enterable; Modifiable
BckShAbdomen	Boolean	Enterable; Modifiable
BckShPelvis	Boolean	Enterable; Modifiable
BckShRLExt	Boolean	Enterable; Modifiable
BckShLLExt	Boolean	Enterable; Modifiable
BckShRUExt	Boolean	Enterable; Modifiable
BckShLUExt	Boolean	Enterable; Modifiable
BckShAll	Boolean	Enterable; Modifiable
FrtShHead	Boolean	Enterable; Modifiable
FrtShThorax	Boolean	Enterable; Modifiable
FrtShAbdomen	Boolean	Enterable; Modifiable
FrtShPelvis	Boolean	Enterable; Modifiable
FrtShRLExt	Boolean	Enterable; Modifiable
FrtShLLExt	Boolean	Enterable; Modifiable
FrtShRUExt	Boolean	Enterable; Modifiable
FrtShLUExt	Boolean	Enterable; Modifiable
FrtShAll	Boolean	Enterable; Modifiable
WpnDefinite	Boolean	Enterable; Modifiable
WpnPossible	Boolean	Enterable; Modifiable
WpnUnk	Boolean	Enterable; Modifiable
AwImpact	Boolean	Enterable; Modifiable
AwTold	Boolean	Enterable; Modifiable
AwSaw	Boolean	Enterable; Modifiable
AwOther	Boolean	Enterable; Modifiable
CrawlComp	Boolean	Enterable; Modifiable
CrawlFail	Boolean	Enterable; Modifiable
CrawlCould	Boolean	Enterable; Modifiable
CrawlCouldnt	Boolean	Enterable; Modifiable
StandComp	Boolean	Enterable; Modifiable
StandFail	Boolean	Enterable; Modifiable
StandCould	Boolean	Enterable; Modifiable
StandCouldnt	Boolean	Enterable; Modifiable
WalkComp	Boolean	Enterable; Modifiable
WalkFail	Boolean	Enterable; Modifiable
WalkCould	Boolean	Enterable; Modifiable
WalkCouldnt	Boolean	Enterable; Modifiable
RunComp	Boolean	Enterable; Modifiable
RunFail	Boolean	Enterable; Modifiable
RunCould	Boolean	Enterable; Modifiable
RunCouldnt	Boolean	Enterable; Modifiable
LoadComp	Boolean	Enterable; Modifiable
LoadFail	Boolean	Enterable; Modifiable
LoadCould	Boolean	Enterable; Modifiable
LoadCouldnt	Boolean	Enterable; Modifiable
FireComp	Boolean	Enterable; Modifiable
FireFail	Boolean	Enterable; Modifiable
FireCould	Boolean	Enterable; Modifiable
FireCouldnt	Boolean	Enterable; Modifiable
FireProneComp	Boolean	Enterable; Modifiable
FireProneFail	Boolean	Enterable; Modifiable
FireProneCould	Boolean	Enterable; Modifiable

irePronеCouldn	Boolean	Enterable; Modifiable
ireStandComp	Boolean	Enterable; Modifiable
ireStandFail	Boolean	Enterable; Modifiable
ireStandCould	Boolean	Enterable; Modifiable
ireStandCouldn	Boolean	Enterable; Modifiable
hrowComp	Boolean	Enterable; Modifiable
hrowFail	Boolean	Enterable; Modifiable
hrowCould	Boolean	Enterable; Modifiable
hrowCouldnt	Boolean	Enterable; Modifiable
lormDutyComp	Boolean	Enterable; Modifiable
lormDutyFail	Boolean	Enterable; Modifiable
lormDutyCould	Boolean	Enterable; Modifiable
lormDutyCouldnt	Boolean	Enterable; Modifiable
)therComp	Boolean	Enterable; Modifiable
)therFail	Boolean	Enterable; Modifiable
)therCould	Boolean	Enterable; Modifiable
)therCouldnt	Boolean	Enterable; Modifiable
ightHandDis	Boolean	Enterable; Modifiable
tHDPart	Boolean	Enterable; Modifiable
tHDComp	Boolean	Enterable; Modifiable
eftHandDis	Boolean	Enterable; Modifiable
HDPart	Boolean	Enterable; Modifiable
HDComp	Boolean	Enterable; Modifiable
ightArmDis	Boolean	Enterable; Modifiable
tADPart	Boolean	Enterable; Modifiable
tADComp	Boolean	Enterable; Modifiable
eftArmDis	Boolean	Enterable; Modifiable
ADPart	Boolean	Enterable; Modifiable
ADComp	Boolean	Enterable; Modifiable
ightLegDis	Boolean	Enterable; Modifiable
tLDPart	Boolean	Enterable; Modifiable
tLDComp	Boolean	Enterable; Modifiable
eftLegDis	Boolean	Enterable; Modifiable
LDPart	Boolean	Enterable; Modifiable
LDComp	Boolean	Enterable; Modifiable
ightFootDis	Boolean	Enterable; Modifiable
tFDPart	Boolean	Enterable; Modifiable
tFDComp	Boolean	Enterable; Modifiable
eftFootDis	Boolean	Enterable; Modifiable
FDPart	Boolean	Enterable; Modifiable
FDComp	Boolean	Enterable; Modifiable
ightEyeDis	Boolean	Enterable; Modifiable
tEDPart	Boolean	Enterable; Modifiable
tEDComp	Boolean	Enterable; Modifiable
eftEyeDis	Boolean	Enterable; Modifiable
EDPart	Boolean	Enterable; Modifiable
EDComp	Boolean	Enterable; Modifiable
ainMild	Boolean	Enterable; Modifiable
ainModerate	Boolean	Enterable; Modifiable
ainSevere	Boolean	Enterable; Modifiable
ABandage	Boolean	Enterable; Modifiable
ATourn	Boolean	Enterable; Modifiable
ASplint	Boolean	Enterable; Modifiable

APainMed	Boolean	Enterable; Modifiable
ATracheo	Boolean	Enterable; Modifiable
APressure	Boolean	Enterable; Modifiable
AFluids	Boolean	Enterable; Modifiable
AOther	Boolean	Enterable; Modifiable
ANone	Boolean	Enterable; Modifiable
AFBuddy	Boolean	Enterable; Modifiable
AFSelf	Boolean	Enterable; Modifiable
AFAidman	Boolean	Enterable; Modifiable
AFDoctor	Boolean	Enterable; Modifiable
AFOther	Boolean	Enterable; Modifiable
vacHelo	Boolean	Enterable; Modifiable
vacAirOther	Boolean	Enterable; Modifiable
vacWater	Boolean	Enterable; Modifiable
vacLandOther	Boolean	Enterable; Modifiable
eturnedDuty	Boolean	Enterable; Modifiable
ved	Boolean	Enterable; Modifiable
ied	Boolean	Enterable; Modifiable
_____	Boolean	Enterable; Modifiable
_____	Boolean	Enterable; Modifiable
_____	Boolean	Enterable; Modifiable
_____	Boolean	Enterable; Modifiable

Structure: Video

/DMET Number	Alpha 10	Indexed; Enterable; Modifiable
ideoStart	Long Integer	Enterable; Modifiable
ideoStop	Long Integer	Enterable; Modifiable
ideo Desc	Text	Enterable; Modifiable
cenario ID	Alpha 10	Enterable; Modifiable
ıcident ID	Alpha 10	Enterable; Modifiable
nit ID	Alpha 10	Enterable; Modifiable
ther	Alpha 20	Enterable; Modifiable

Structure: Tissues

ssueID	Alpha 30	Indexed; Enterable; Modifiable
quenceNumber	Integer	Enterable; Modifiable
mageType	Alpha 40	Enterable; Modifiable
actureType	Alpha 40	Choices; Enterable; Modifiable
tranceDims	Alpha 20	Enterable; Modifiable
tranceShape	Alpha 20	Choices; Enterable; Modifiable
tContusDiam	Alpha 20	Enterable; Modifiable
ickness	Alpha 20	Enterable; Modifiable
itDims	Alpha 20	Enterable; Modifiable
itShape	Alpha 20	Choices; Enterable; Modifiable
itContusDiama	Alpha 20	Enterable; Modifiable
marks	Text	Enterable; Modifiable
ssueName	Text	Enterable; Modifiable
DMET Number	Alpha 10	Indexed; Enterable; Modifiable

Structure: Munitions

enarioID	Alpha 10	Indexed; Enterable; Modifiable
enarioID_2	Alpha 10	Indexed; Enterable; Modifiable
tonationNum	Alpha 20	Enterable; Modifiable
cationBurst	Alpha 20	Enterable; Modifiable
lowSurf	Alpha 20	Enterable; Modifiable
oveSurf	Alpha 20	Enterable; Modifiable
tPointAbove	Text	Enterable; Modifiable
rfaceType	Text	Enterable; Modifiable
aterDepth	Alpha 10	Enterable; Modifiable
aterMaxDiam	Alpha 10	Enterable; Modifiable
aterMinDiam	Alpha 10	Enterable; Modifiable
aterDescript	Alpha 40	Choices; Enterable; Modifiable
marks	Text	Enterable; Modifiable
DMETNums	Alpha 60	Enterable; Modifiable
eld15	Alpha 20	Enterable; Modifiable
eld16	Alpha 20	Enterable; Modifiable

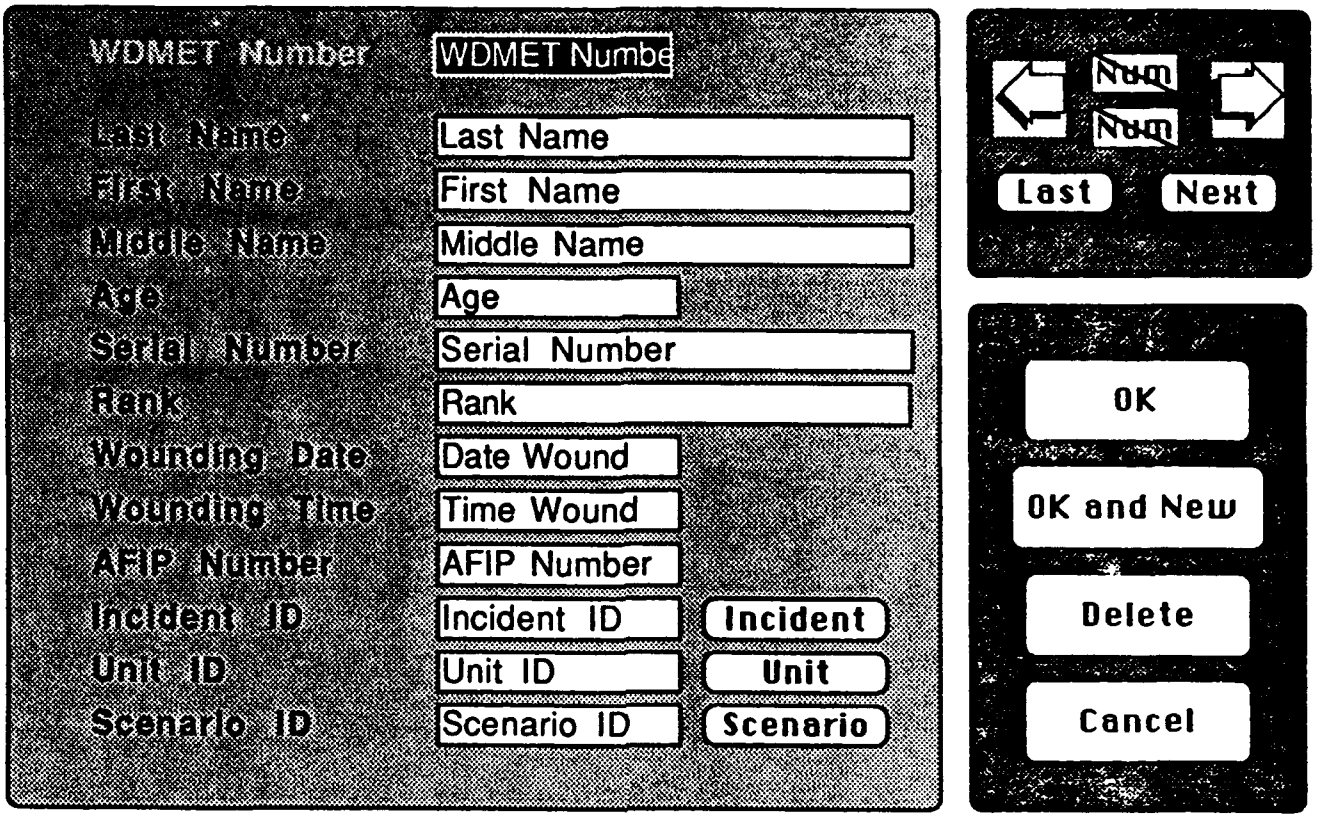
Structure: Audio

DMET Number	Alpha 10	Indexed; Enterable; Modifiable
dioStart	Long Integer	Enterable; Modifiable
dioStop	Long Integer	Enterable; Modifiable
dioTrack	Integer	Enterable; Modifiable
dio Desc	Text	Enterable; Modifiable

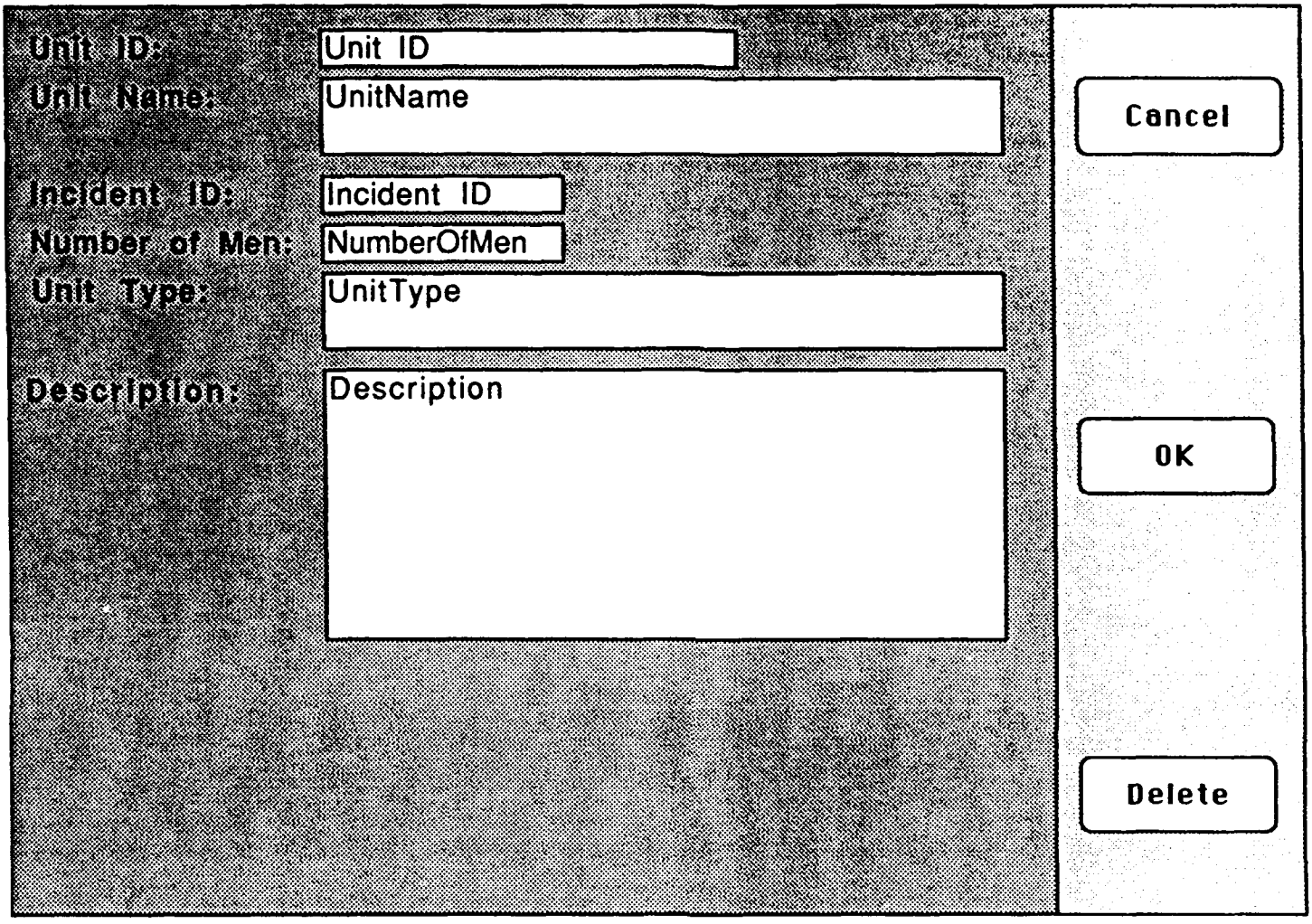
Structure: Weapons

Name	Alpha 80	Enterable; Modifiable
Other Name	Text	Enterable; Modifiable
Description	Text	Enterable; Modifiable
Ballistics	Text	Enterable; Modifiable
Capabilities	Text	Enterable; Modifiable
Limitations	Text	Enterable; Modifiable
Remarks	Text	Enterable; Modifiable
Group	Alpha 20	Enterable; Modifiable
MissWeaponType	Alpha 40	Choices; Indexed; Enterable; Modifiable
WeaponModel	Alpha 40	Choices; Indexed; Enterable; Modifiable

ATTACHMENT TWO


WDMET Number
WDMET Numbe
Last Name *
Last Name
First Name *
First Name
Middle Name
Middle Name
Age
Age
Serial Number
Serial Number
Rank
Rank
Wounding Date
Date Wound
Wounding Time
Time Wound
AFIP Number
AFIP Number
Incident ID
Incident ID
Incident
Unit ID
Unit ID
Unit
Scenario ID
Scenario ID
Scenario
Num
Num
Last
Next
OK
OK and New
Delete
Cancel
Autopsy Supplement
Burn Supplement
Troop Interview
Body Armor
Casualty Interview
Wounding Agents
Body Diagrams
Clinical Data
Wound Tracts
Observer Interview

Unit Description



Tactical Scenario of Incident <IncID> Page 1

Collection Data: ☐ Non-standard form

Scenario ID: Scenario ID Incident ID

Incident Date From: wDateFrom wTimeFrhrs

To: wDateTo wTimeTohrs

Type of Incident: Incident Type

Location of Incident: Location

Location at which data obtained:

Collection Loc

Enemy Situation:

Enemy Situation

Friendly Situation:

Friendly Situat

1 Last

2

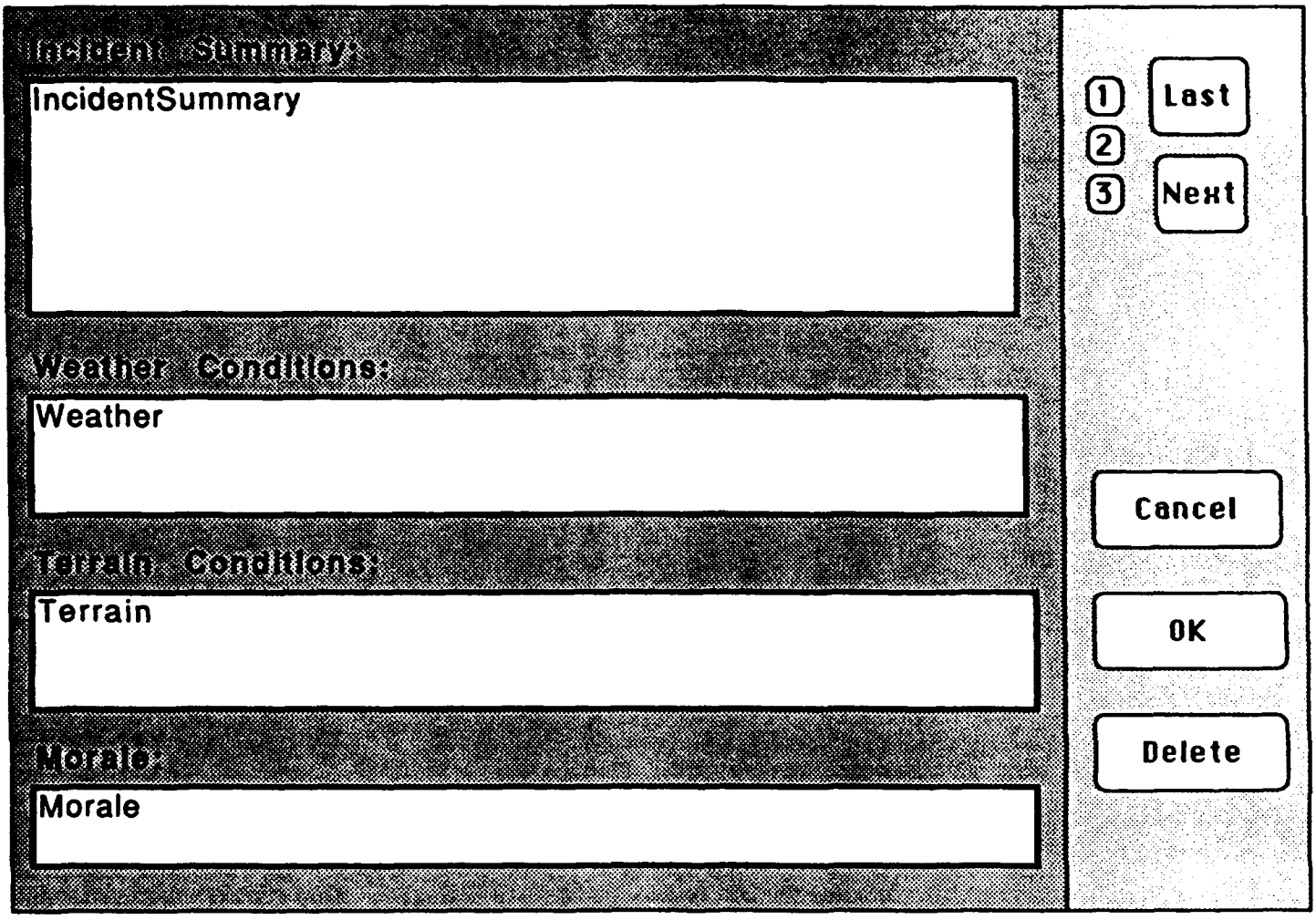
3 Next

Cancel

OK

Delete

Tactical Scenario of Incident <IncID> Page 2



Tactical Scenario of Incident <IncID> Page 3

Number of men in group: NumMenGroup

Type of Tactical Group: TactGroupType

Number of detonations involved: NumDetonations

Munitions Data

Munitions

1 2 3 Last Next

Cancel

OK

Delete


Detona
LocationBu
CraterDescript
WDMETNums

Munitions Data for: vScenID

Detonation Number: DetonationNum

WDMET Numbers involved: WDMETNums

Location of Burst: LocationBurst

If below surface, how many meters?: BelowSurf

If above surface, how many meters?: AboveSurf

If above surface, point of detonation: DetPointAbove

If surface or below, type of surface: SurfaceType

Crater Data:

- Depth: CraterDepth
- Maximum Diameter: CraterMinDiam
- Minimum Diameter: CraterMaxDiam
- Description: CraterDescript

Remarks

Remarks

Autopsy Supplement [N] Page 1

Collection Data: ☐ Non-standard form

Collector ID: CollectorID

Location at which data obtained: CollectionLoc

Date on which data obtained: DateCollecte

Time at which data obtained: TimeCollect

Autopsy Data:

Date of Death: DateDeath

Time of Death: TimeDeath

Autopsy Number: AutopsyNum

Morgue Number: MorgueNum

Wound Tract: WoundTract

Time after injury died (if uncertain give range of time)

TimeAfterInjDie hours.

Time after death examined TimeAfterExan hours.

1 2 Last Next

Cancel

OK

Delete

Autopsy Supplement: Page 2

Cause of death (indicate degree of certainty):

Primary Cause:

PrimaryCause

Secondary Cause:

SecCause

Other Findings:

OtherFindings

Remarks:

Remarks

1 2 Last Next

Cancel

OK

Delete

BodyArmor N

Page 1

Collection Data:

Collector ID: Collector ID

Location at which data obtained: CollectionLoc

Portion of uniform hit:

- ☐ Fatigues (wound numbers from diagram) WTNFatigues
- ☐ Buttons, buckles
- ☐ Other (describe) PortionHitOther
- ☐ Unknown

Body Armor:

○ Worn ○ Not Worn ○ Unknown

If not worn, give reason: ReasonNotWorn

1 2 3 4 Last Next

Cancel

OK

Delete

odyArmor Page 2

worn, type of armor (model number or describe):

ypeArmor

est front: ○ Open ○ Closed ○ Unknown

its on armor: ○ Hit ○ Not Hit ○ Unknown

imes hit and perforated BAHitandPerf

(wound tract numbers) WTNBodyArmor

imes hit and not perforated BAHitnotPerf

imes punching/spalling evidenced BAPunchSpall

(wound tract numbers) PunchSpallWTNBA

1 2 3 4 Last Next

Cancel

OK

Delete

BodyArmor Page 3

Helmet and Liner:

Headgear worn:

☒ None ☐ Helmet and Liner ☐ Liner alone

☐ Unknown ☐ Other OtherHeadgear

Headgear: ○ Hit ○ Not Hit

Times hit and perforated	TimesHelmitHit
(wound tract numbers)	WTNHelmet
Times hit and not perforated	TimesHitnotPerf
Times punching/spalling evidenced	PunchSpallHel
(wound tract numbers)	PunchSpallWTNHe

If hit, type of helmet and liner (model number or describe):

TypeHelmetLiner

1 2 3 4 Last Next

Cancel

OK

Delete

BodyArmor

Page 4

Boot type worn:

- ○ Hit
- ○ Not Hit

Model No. or describe:	BootType
Times hit and perforated:	TimesBootHit
(wound tract numbers)	WTNBoot
Times hit and not perforated:	BootHitnotPerf

A diagram, photographs or armor itself should be included, if possible, to assess the protective effect of the armor.

Remarks:

Remarks

1 2 3 4 Last Next

Cancel

OK

Delete

Burn Supplement [N] **Page 1**

Collection Data:

Collector ID: CollectorID

Location at which data obtained: Collection Loc

Burn Data:

Percent 1st Degree: Percent 1st Deg

Percent 2nd Degree: Percent 2nd Deg

Percent 3rd Degree: Percent 3rd Deg

Total Percent: Total Percent

(Diagram body areas on Diagram Set)

Percent determined [HoursAfter] hours after burn.

Distance of casualty relative to fire [DistCasTo] meters.

☐ Garments caught fire.

Indicate garment: Garmet Type

1 2 3 Last Next

Cancel

OK

Delete

Burn Supplement

Page 2

Time required to extinguish flame [TimeT] seconds.

Hands burned in extinguishing flame:

☐ Right ☐ Left ☐ Both ☐ Unknown

Gloves Worn: [GloveType]

☐ Right ☐ Left ☐ Both ☐ Unknown

Methods of extinguishment of flames:

- ☐ Slapped out with hands
- ☐ Rolled on ground
- ☐ Smothered with dirt/mud
- ☐ Water
- ☐ Other [ExtFlameOther]

1 2 3 Last Next

Cancel

OK

Delete

Burn Supplement

Page 3

If casualty received burns as a result of an aircraft fire, designate type of aircraft.

Aircraft

- ☐ Fire and/or explosion in flight
- ☐ Crashed, then burned and/or exploded
- ☐ Forced to land, then burned and/or exploded

Remarks:

Remarks

1 2 3 Last Next

Cancel

OK

Delete

Casualty Interview Data [Ng] Page 1

☐ Non-standard form

Collection Data:

Collector ID: Collector ID

Location at which data obtained: Collection Loc

Casualty's Vital Statistics:

Military Occupational Specialty: MOS

MOS being performed: MOS Performed

Age: Age

Weight: Weight

Height: Height

Unit to which attached:

Unit

If aboard aircraft, type and model: Aircraft

1 2 3 4 5 6 7

Last

Next

Cancel

OK

Delete

Casualty Interview Data

Page 2

Physical Activities prior to wounding:

Activity Prior

Type of Warning, if present: Warning

Time between warning and wounding Time Warn seconds.

Cover attained: ○ No ○ Yes

Describe type of cover: Cover Type

Casualty's Activities at time of wounding:

Body position at time of wounding:

○ Standing ○ Walking ○ Running ○ Crouching ○ Sitting
○ Kneeling ○ Prone ○ Supine ○ Lying on R side
○ Lying on L side ○ Unknown

1 2 3 4 5 6 7

Last

Next

Cancel

OK

Delete

Casualty Interview Data

Page 3

Body parts shielded from source of wounding:

	Back	Front	
☐ Head and Neck	☐	☐	☐ Unknown
☐ Thorax	☐	☐	☐ None
☐ Abdomen	☐	☐	
☐ Pelvis	☐	☐	
☐ Right lower extremity	☐	☐	
☐ Left lower extremity	☐	☐	
☐ Right upper extremity	☐	☐	
☐ Left upper extremity	☐	☐	
☐ All	☐	☐	

Distance from weapon to casualty: Dist Weap Cas m.

Distance from detonation of munition to casualty: Dist Det Cas m.

Type of attacking weapon: Weapon Type

Model: Weapon Model

Reliability of weapon information: ○ Definite ○ Possible ○ Unknown

1 2 3 4 5 6 7

Last

Next

Cancel

OK

Delete

Casualty Interview Data

Page 4

Casualty's Activities after wounding:

Casualty became aware he was hit by:

☐ felt impact ☐ was told by another ☐ saw or felt signs

☒ Other [Aware Other]

Seconds between wounding and awareness of wounding: [Time W]

Fell/lowered self to ground after [Groun] min. for [Groun] min.

Reason for falling/lowering self to ground:

[GroundReason]

Activities:	Completed	Failed	Could Have Done	Could Not Have Done	Reasons Not Attempted	Reasons Not Accomplished
Crawl	☐	☐	☐	☐	[CrawlWhyN]	[CrawlReasc]
Stand	☐	☐	☐	☐	[StandWhyN]	[StandReaso]
Walk	☐	☐	☐	☐	[WalkWhyNc]	[WalkReasor]
Run	☐	☐	☐	☐	[RunWhyNot]	[RunReason]
Load Weapon	☐	☐	☐	☐	[LoadWhyNo]	[LoadReason]
Fire weapon	☐	☐	☐	☐	[FireWhyNo]	[FireReason]
Throw grenade	☐	☐	☐	☐	[ThrowWhyN]	[ThrowReasc]
Perform normal expected duty	☐	☐	☐	☐	[NormWhyN]	[NormReaso]
Other Activity	☐	☐	☐	☐	[OtherWhyN]	[ierReaso]

Specify: [OtherActivDesc]

*(1) Because of Pain (2) Other effects of wound (3) Reasons other than wounding

1 2 3 4 5 6 7

Last

Next

Cancel

OK

Delete

Casualty Interview Data

Page 5

Briefly describe casualty's activities immediately after wounding and until evacuation. Use time sequence if possible. If tasks were attempted and failed, give reasons.

ActivityTilEvac

Casualty's Symptoms After Wounding:

☐ (R) Hand	○ partially	○ completely	disabled	for/after	RHandOu	/ RHandOu min.
☐ (L) Hand	○ partially	○ completely	disabled	for/after	LHandOu	/ LHandOu min.
☐ (R) Arm	○ partially	○ completely	disabled	for/after	RArmOu	/ RArmOu min.
☐ (L) Arm	○ partially	○ completely	disabled	for/after	LArmOu	/ LArmOu min.
☐ (R) Leg	○ partially	○ completely	disabled	for/after	RLegOut	/ RLegOu min.
☐ (L) Leg	○ partially	○ completely	disabled	for/after	LLegOut	/ LLegOu min.
☐ (R) Foot	○ partially	○ completely	disabled	for/after	RFootOu	/ RFootO min.
☐ (L) Foot	○ partially	○ completely	disabled	for/after	LFootOu	/ LFootOu min.
☐ (R) Eye	○ partially	○ completely	disabled	for/after	REyeOut	/ REyeOu min.
☐ (L) Eye	○ partially	○ completely	disabled	for/after	LEyeOut	/ LEyeOu min.

1 2 3 4 5 6 7

Last

Next

Cancel

OK

Delete

Casualty Interview Data

Page 6

☐ Could not hear for/after HearL/ HearL min.
☐ Could not talk for/after TalkL/ TalkL min.
☐ Had trouble breathing for/after Dyspn/ Dyspn min.
☐ Felt general weakness for/after WeakF/ Weak min.
☐ Was vomiting for/after Vomit/ Vomit min.
☐ Felt pain for/after PainF/ PainA min.
○ Mild ○ Moderate ○ Severe
Location of pain: PainLocation
☐ Felt essentially normal for/after FeltN/ FeltN min.

First Aid and Evacuation:

Received the following first aid for/after FirstAid/ FirstAi min.

☐ Bandaged wound ☐ Tourniquet ☐ Splint ☐ Pain Meds.
☐ Tracheotomy ☐ Pressure to stop bleeding ☐ IV Fluids
☐ Other FirstAidOther ☐ None

1 2 3 4 5 6 7

Last

Next

Cancel

OK

Delete

Casualty Interview Data

Page 7

Received first aid (medical treatment prior to evacuation) from:

☐ Buddy ☐ Self ☐ Aidman ☐ Doctor

☐ Other FirstAidFromOth

Returned to duty after receiving first aid: ○ No ○ Yes

Evacuated by:

☐ Helicopter ☐ Other EvacAirOther

☐ Water ☐ Land EvacLandOther

Estimated time from wounding till evacuation: EstTim mins.

Remarks:

Remarks

1
2
3
4
5
6
7

Last

Next

Cancel

OK

Delete

Clinical Data [Nc]

Page 1

Collection Data: ☐ Non-standard form

Collector ID: Collector ID

Location at which data obtained: Collection Loc

Date on which data obtained: DateCollected

Time at which data obtained: TimeCollected

Name of Facility: FacilityName

Source: Data Source

Clinical Evaluation on Admission:

Blood Pressure [Syst]/ [Dias] mmHg

Respiratory Rate: [Resp] /min.

Heart Rate: [Hea] /min.

Hematocrit: [Hct] %

Temperature: [Tempe]

Ambulatory: ○ Yes ○ No ○ Unknown

Clinical Impression of Shock:

○ Present ○ Not Present ○ Cannot Determine

Cause of Respiratory Distress if present:

☐ Airway Obstruction ☐ Thoracic Wall Injury

☐ Intrathoracic Injury ☐ Neurological

☐ Other RespDistOther

1
2
3
4
5

Last

Next

Cancel

OK

Delete

Clinical Data

Page 2

Mental Status:

☐ Normal ☐ Hyperactive (e.g.) hysterical ☒ Unconscious
☐ Unknown ☐ Hypoactive (e.g. lethargic, mute)

Musculoskeletal Function:

☐ Normal
☐ Restricted because of pain
☐ Weakness of WeaknessOf
secondary to injury of: WeakSecInjOf
☐ Inability to move UnableToMove
secondary to injury of: UnableSecInjOf
☐ Unknown

Treatment:

Blood replacement Prior to: Admission BloodReplAd cc.
Surgery BloodReplSu cc.
Fluid replacement Prior to: Admission FluidReplAd cc.
Surgery FluidReplSu cc.

Fluid Type: FluidType

1 2 3 4 5

Last

Next

Cancel

OK

Delete

Clinical Data

Page 3

Blood replacement During Surgery: BloodDurSur cc.

Fluid replacement During Surgery: FluidDurSurg cc.

Blood Information:
- ○ Adequate
- ○ Inadequate
- ○ Unknown

Fluid Information:
- ○ Adequate
- ○ Inadequate
- ○ Unknown

Surgical Procedures:

SurgicalProcs

Diagnosis:

Diagnosis

Post Operative Complications:

PostOpComp

1 2 3 4 5

Last

Next

Cancel

OK

Delete

Clinical Data

Page 4

Complications or medical conditions existing prior to wounding:

- ☐ Malaria ☐ Typhus ☐ Fever of undetermined etiology
- ☐ Heat Exhaustion ☐ Recent Illness
- ☐ Recent surgery DateRecSurgery
- ☐ Previous injury (describe) CompsPrevInj
- ☐ Other CompsOther
- ☐ None

Nature of Engagement:

- ○ Friendly Action
- ○ Hostile Action
- ○ Non Battle

Outcome:

- ○ Lived
  - ○ Carded for Record Only
  - ○ Non Battle Injury
  - ○ Wounded in Action
- ○ Died
  - ○ Non Battle Injury
  - ○ DOW (After entering care system)
  - ○ KIA (Before entering care system)

1 2 3 4 5

Last

Next

Cancel

OK

Delete

Clinical Data

Page 5

Disposition:

- ☐ Transferred to: TransferredTo
  - on: TransferredOn
- ☐ Returned to duty on: ReturnDutyOn
- ☐ Discharged on: DischargedOn
- ☐ Died on: DiedOn
  - Cause of Death: CauseOfDeath
- ☐ Other: DispositionOth

Remarks:

Remarks

1 2 3 4 5

Last

Next

Cancel

OK

Delete

Observer Interview Data

No

Page 1

Collection Data ☐ Non-standard form

Collector ID: Collector ID

Location at which data obtained: Collection Loc

Observer Data:

Name: ObserverName

Serial Number: ObsSerialNum

Casualty's activities prior to wounding:

If aboard aircraft, type and model: AircraftType

Physical activities prior to wounding:

PhysicalActivs

Type of warning, if present: WarningType

Time between warning and wounding: TimeWarnToWound

Cover attained: ○ No ○ Yes

Describe type of cover: CoverDescript

1 2 3 4 5

Last

Next

Cancel

OK

Delete

Observer Interview Data

Page 2

Casualty's position at time of wounding:

○ Standing ○ Walking ○ Running ○ Crouching ○ Sitting
○ Kneeling ○ Prone ○ Supine ○ Lying on R side
○ Lying on L side ○ Unknown

Body parts shielded from source of wounding:

	Back	Front	
☐ Head and Neck	☐	☐	☐ All
☐ Thorax	☐	☐	☐ None
☐ Abdomen	☐	☐	☐ Unknown
☐ Pelvis	☐	☐	
☐ Right lower extremity	☐	☐	
☐ Left lower extremity	☐	☐	
☐ Right upper extremity	☐	☐	
☐ Left upper extremity	☐	☐	

Distance from weapon to casualty [DistWeapon] m.

Distance from detonation of munition to casualty [DistDetTo] m.

Type of attacking weapon: [WeaponType]

Reliability of weapon information:

○ Definite ○ Possible ○ Unknown

1
2
3
4
5

Last

Next

Cancel

OK

Delete

Observer Interview Data

Page 3

Casualty's Activities after wounding:

Distance from observer to casualty: DistObsToCas meters.

Observer became aware casualty was hit by:

- ☐ saw impact
- ☐ saw signs in casualty's appearance or behavior
- ☐ was told by casualty
- ☐ was told by others
- ☐ Other: ObsAwareOther

Time lapse between wounding and observer's awareness that casualty was wounded: TimeLapseAware

Description of casualty's activities immediately after wounding:

Activities:	Accomplished	Attempted	Reasons Not Attempted	Reasons Not Accomplished
Crawl	○	○	CrawlWhyN	CrawlReaso
Stand	○	○	StandWhyN	StandReaso
Walk	○	○	WalkWhyNo	WalkReason
Run	○	○	RunWhyNot	RunReason
Load Weapon	○	○	LoadWhyNo	LoadReason
Fire weapon	○	○	FireReason	FireReason
Throw grenade	○	○	ThrowWhyN	ThrowReas
Perform normal expected duty	○	○	NormalWhy	NormalReas
Other Activity	○	○	OtherWhyN	OtherReaso

Specify: OtherActivDesc

*(1) Because of Pain (2) Other effects of wound (3) Reasons other than wounding

1 2 3 4 5

Last

Next

Cancel

OK

Delete

Observer Interview Data

Page 4

Briefly describe casualty's activities immediately after wounding and until evacuation to first medical facility. Use time sequence if possible. If tasks were attempted and failed, give reasons:

ActivitiesDescr

Casualty's Signs after wounding:

☐ Fell/lowered self to ground after/for	Ground	Ground	min.
☐ Was unconscious for/after	Uncons	Uncons	min.
☐ Appeared essentially normal for/after	Normal	Normal	min.
☐ Moved right hand for/after	RHandF	RHandA	min.
☐ Moved left hand for/after	LHandF	LHandA	min.
☐ Moved right arm for/after	RArmF	RArmA	min.
☐ Moved left arm for/after	LArmF	LArmA	min.
☐ Moved right leg for/after	RLegFo	RLegAf	min.
☐ Moved left leg for/after	LLegAf	LLegFo	min.
☐ Moved head for/after	MovedH	MovedH	min.
☐ Moved trunk for/after	MovedT	MovedT	min.
☐ Was vomiting (retching) for/after	Vomitin	Vomitin	min.

1 2 3 4 5

Last

Next

Cancel

OK

Delete

Observer Interview Data

Page 5

First Aid Data:

Received the following first aid for/after FirstAid / FirstAid min.

☐ Bandaged wound ☐ Tourniquet ☐ Splint ☐ Pain Meds.
☐ Tracheotomy ☐ Pressure to stop bleeding ☐ IV Fluids IVFluidType
☐ Other FirstAidOther ☐ None

Received first aid from (Treatment before Evacuation):

☐ Buddy ☐ Self ☐ Aidman ☐ Doctor
☐ Other FirstAidFromOth

Evacuation Data:

Returned to duty after receiving first aid: ○ No ○ Yes

Evacuated by: ☐ Helicopter ☐ Other AirEvac
☐ Water ☐ Land LandEvac

Estimated time from wounding till evacuation MinsTilE mins.

Remarks

Remarks

1
2
3
4
5

Last

Next

Cancel

OK

Delete

Troop Interview Data

Incident: qIncident

Interview of Troops in Engagement (Wounded or not):

Name: Name

Military Occupational Specialty: MOS

Serial Number: Serial Number

Wounded: ○ No

○ Yes WDMET Number: WDMET Number

Equipment:

Type of Weapon: Weapon

Rounds: Rounds

Grenades: Grenades

Canteens: Canteens

Body Armor: Body Armor

Other (Munitions, radio, etc.):

Other Equipment

Tactical Narrative:

Tactical Narrat

Cancel

OK

Delete

Agent Summary Data

Page 1

Collection Data: ☐ Non-standard form

Collector ID: Collector ID

Location at which data obtained: Collection Loc

Agent List:

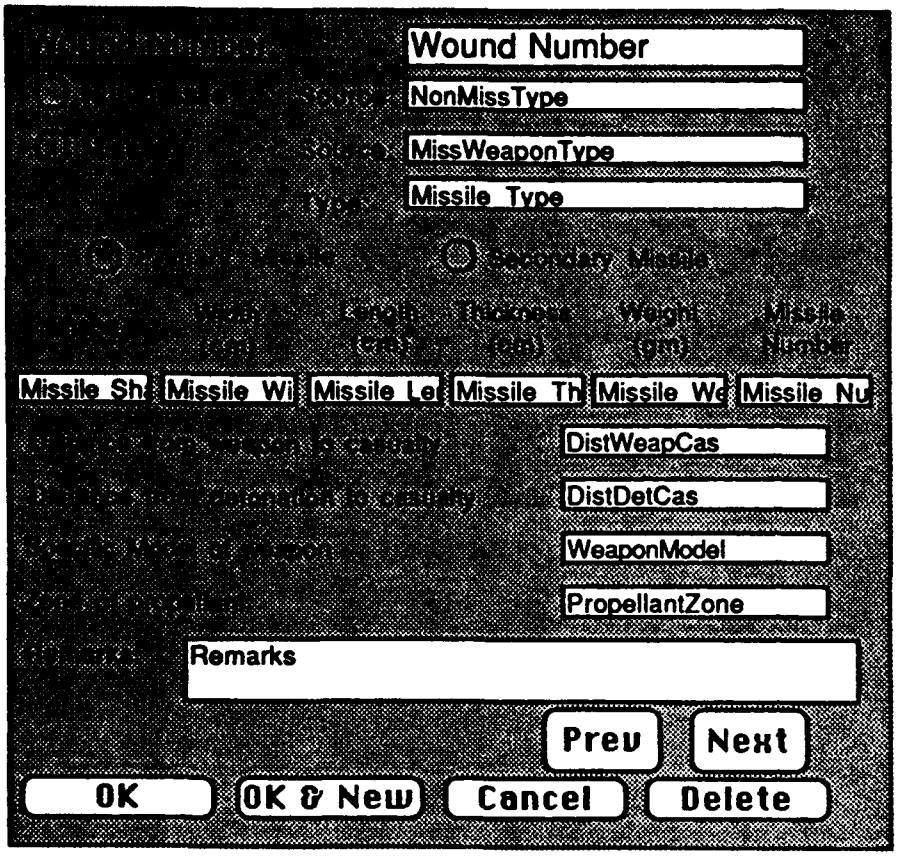
AgentList

Add Agent | Modify Agent

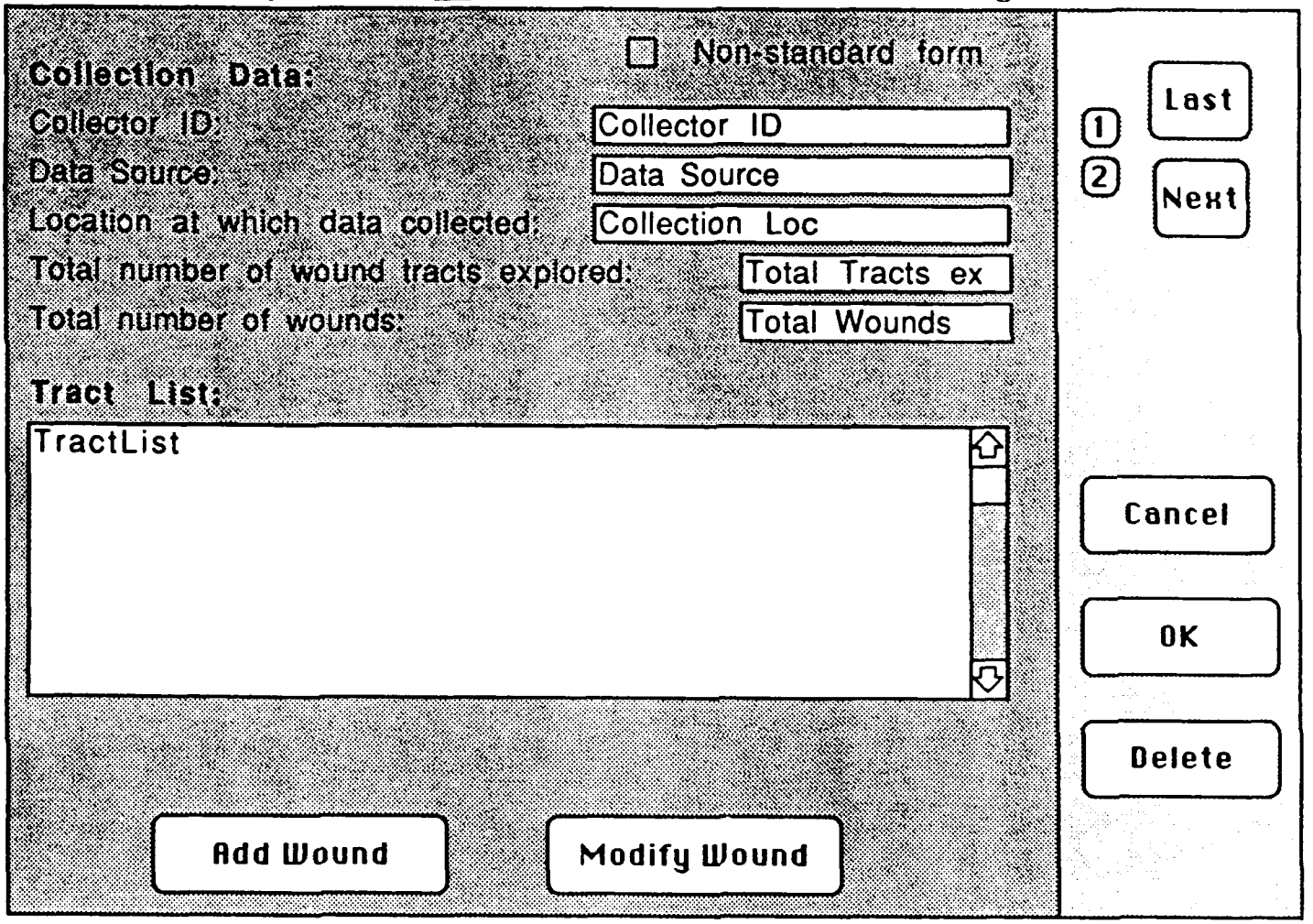
Cancel

OK

Delete


Wound Number
NonMissType
MissWeaponType
Missile_Type
Secondary Missile
Missile Sh
Missile Wi
Missile Le
Missile Th
Missile We
Missile Nu
DistWeapCas
DistDetCas
WeaponModel
PropellantZone
Remarks
Prev
Next
OK
OK & New
Cancel
Delete

Tract Summary Data [N] Page 1



Tract Data

Wound Number: Wound Number

Length of Wound Tract: Tract Length

Measurement Method: Measure Method

Tissues

OK | OK & New | Cancel | Delete

equential / mber	Tissue or Organ	Fracture Type	Damage	Thickness		Dimensions	Shape	Contusion Diameter
equence	TissueNam	FractureType	DamageTyp	Thickness	Entrance	EntranceD	EntranceSh	EntContusD
					Exit	ExitDims	ExitShape	ExitContus

emarks: Remarks

Tissue Data for: WoundNum

Sequential Number: SequenceNum

Tissue or Organ: TissueName

Damage Type: DamageType

Fracture Type: FractureType

Remarks

Remarks

Entrance Dimensions: EntranceDims

Entrance Shape: EntranceShape

Entrance Contusion: EntContusDiam

Thickness: Thickness

Exit Dimensions: ExitDims

Exit Shape: ExitShape

Exit Contusion Diameter: ExitContusDiam

Tract Summary Data

Page 2

Location and quantity of blood loss (if measured):

BloodLoss

Pericardium: Pericardium

Pleural Cavities: PleuralCavity

Abdominal Cavity: AbdCavity

Retroperitoneal: Retroperitoneal

Central Nervous System: CNS

Other: Other

Heart Chambers Entered:

- ☐ Right Atrium
- ☐ Left Atrium
- ☐ Right Ventricle
- ☐ Left Ventricle

Remarks:

Remarks

1 2 Last Next

Cancel

OK

Delete

ATTACHMENT THREE

UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES
F. EDWARD HÉBERT SCHOOL OF MEDICINE
4301 JONES BRIDGE ROAD
BETHESDA, MARYLAND 20814

24 July 1990

ITARY MEDICINE

TEACHING HOSPITALS
WALTER REED ARMY MEDICAL CENTER
NAVAL HOSPITAL, BETHESDA
MALCOLM GROW AIR FORCE MEDICAL CENTER
WILFORD HALL AIR FORCE MEDICAL CENTER

Commander
US Army Medical R & D Command
ATTN: SGRD-ACQ (Dr. Wade)
Ft. Detrick
Frederick, MD 21701-5012

Dear Dr. Wade:

At the direction of Mr. Vayer, Director of the Casualty Care Research Center, we have compiled a selected list of recent TRAUMABASE users, reports compiled from TRAUMABASE research, and publications of TRAUMABASE research. The level of interest in the TRAUMABASE materials has been so high that USUHS Procedure No. 6406 (MIM) has been written to set levels of priority for access to the materials and allow the timely production of the database.

In addition to the above listed use, a study of validation of wound ballistics criteria for the Live Fire Test Program has been conducted with Medlantic Research Foundation for the Secretary of Defense. Also, multiple combat surgery studies have been conducted for the Walter Reed Army Medical Center for the Department of Surgery.

Photocopies of the publications, reports, and letters from the listed researchers, and a copy of the USUHS procedure have been attached to this letter. If we can provide further information, please let me know. We enjoyed meeting with you on the 16th, and appreciate your suggestions.

Regards,

Gary E. Masters, PhD
Research Assistant Professor and
TRAUMABASE Project Leader

DEPARTMENT OF THE ARMY
Headquarters First United States Army
First Army AMEDD Augmentation Detachment (Provisional)
Fort George G. Meade, Maryland 20755-7000

Reply to: AFKA-MD-F

890809

Joshua S. Vayer
Deputy Director
Combat Casualty Research Center
Uniformed Services University of Health Sciences
4301 Jones Bridge Road
Bethesda, MD 20814-4799

DeaR Josh,

I am writing in response to our telephone conversation of last week regarding the Vietnam combat casualty slide collection.

I have been asked to participate in the Combat Medic Medical Training School sponsored by the Maryland and Virginia National Guard. I will address the medical and nursing personnel on combat casualties and combat casualty care, emphasising the difference between civilian and combat environments.

I would appreciate the opportunity to research my presentation by utilizing the slide collection in your office. The slides will be restricted to an official military medical audience. I will gladly acknowledge the source of my material during the presentation.

I appreciate your past cooperation and look forward to working with you on this project.

Sincerely yours,

Jeffery S. Anderson
CPT, MC, USAR

18 July 1990

MEMORANDUM FOR: Dr. Gary Masters

SUBJECT : Utilization of WDMET Data Base

1. I want to express my great appreciation to you for making the WDMET data base available to me. As you know, information from your files has been used in the training programs at the U.S. Marine Corps Basic School, Quantico, and at the Infantry Officers Course at Quantico. In addition, I have used this information in providing in-service training for the Navy corpsmen attached to The Basic School.

2. Please let me know if you computerize the data base. That would improve accessibility of data and might make possible other studies and uses of the information that you and your staff have so carefully and diligently put together.

C. Di Giovanni, Jr., M.D.
Staff Psychiatrist

Aultman Anesthesia, Inc.

6 February 1989

Gary E. Masters, Ph.D.
Assistant Professor
Casualty Care Research Center
Department of Military Medicine
USUHS
4301 Jones Bridge Road
Bethesda, Maryland 20814-4799

Dear Dr. Masters,

Thank you for your personal time on Friday to introduce me to your trauma base project. I found it very stimulating and congratulate those members in your department who are spending the time and effort to organize the data.

I found the data to be extremely interesting and I foresee many great teaching and informational items being developed from the data base. As we discussed, I feel that there is a real wealth of information which can be developed to teach medical personal about trauma, both in the civilian and military arenas.

I will be coming for a week of ACDUTRA during 8-12 May, 1989. On 11 May, I will be giving a lecture at USUHS on delivery of general anesthesia in the field. I would appreciate your help in finding four or five slides to illustrate severe trauma from your Vietnam collection. Perhaps you might run onto something that illustrates thoracic trauma which did not necessarily lead to death. I could use this as part of the opening remarks to stress the kind of patients that are seen.

I will try to come in on the morning of 8 or 9 May to pick up the slides if you are able to find such.

I do hope that in the future we can develop a working relationship and perhaps I might be able to assist you in this very deserving project.

Sincerely,

Clayton Petty, M.D.
Professor and Chairman
Department of Anesthesiology

CP/mh

P.O. Box 80447, Country Fair Station • Canton, Ohio 44708 • (216) 489-6806

MEDICAL COLLEGE GEORGIA

Division of Hospital and Clinics
Section of Urology

April 27, 1990

Dr. Josh Vayer
Department of Military Medicine
Uniformed Services University
of the Health Sciences
4301 Jones Bridge Road
Bethesda, Maryland 20814-4799

Dear Josh,

You may recall that I spent several days at your unit in December. My purpose was to look for slides in the WDMET archives that portrayed simple war wounds. This was for the purpose of developing some course material for the MS-IV Contingency Medicine course.

Earlier this week, Dr. Bellamy forwarded the slides to me. There are a few discrepancies in the inventory of the materials that I received. I was hoping that the 8 missing slides, out of the total of 114 originally selected, could be re-processed and sent to me. I have attached a list of the cases and slide numbers that are missing.

I have also enclosed 11 slides that I did not select, but which were included among those forwarded. As you will notice, these slides are not of any teaching value, and were not recorded on my notes of the slides submitted for duplication.

In any event, if the 8 slides could be re-duplicated and sent to me, it would certainly be appreciated.

Warmest personal regards.

Very sincerely,

Arthur M. Smith, M.D.
Professor of Surgery
(Urology)

AMS:ef
Encl.
List attached

cc: Dr. Craig Llewellyn
Col. Ron Bellamy

SHELBY L. STANTON

B.S., M.Ed., J.D. [redacted]

MILITARY HISTORIAN
CAPTAIN, U.S. ARMY, RETIRED

6020 WILSON LANE • BETHESDA, MARYLAND 20817
301-229-4416

February 8, 1989

Commander Joe Henderson
Dept. of Military Medicine
Uniformed Services of the Health Sciences
4301 Jones Bridge Road
Bethesda, Maryland 20814

Dear Commander Henderson:

I request permission to conduct research utilizing the Wound Data Munitions Effects Team (WDMET) records to help determine the protective levels that Vietnam-era military clothing and equipment afforded the combat soldier. This project is part of a detailed study regarding the development and utilization of individual and organizational equipment within the Vietnam conflict, and a continuation of the historical analysis initiated within the author's U.S. Army Uniforms and Equipment of the Vietnam War, particularly Chapters 3 (Headgear), 5 (Protective Gear), and 7 (Footwear).

The scope of the research will concentrate on the viability of protective armor systems; the fire resistance of natural and synthetic materials utilized in Army and Marine clothing or individual equipment of the period; the capabilities of ground and aviator helmets in preventing or limiting head trauma; the suitability of footwear in providing increased injury protection; and the impact of vehicular or air-frame configurations in shielding human tissue and structure. In addition to the WDMET files, the author will also be surveying existing documentation from the Vietnam-related files of the Defense Supply Agency, the Army Materiel Command, Natick Laboratories, the Marine Historical Center, and the National Archives-housed records of the 44th Medical Brigade, MACV, and Army Concept Team in Vietnam (ACTIV).

The research will not require disclosure of any identified persons and will limit photographic evidence to material and cleared X-Ray images only. Samples of official sources used in previous research, as well as the researcher's published documentation covering this subject, are included with this letter to demonstrate the exact nature of the proposed research and its final presentation in book form.

Sincerely yours,

Shelby L. Stanton

Shelby L. Stanton
Attorney-at-law

SLS/krs
enclosures

Assessment of Penetrating Injury Severity*

Ronald F. Bellamy, COL, MC, USA

Associate Professor of Military Medicine and Surgery, Departments of Military Medicine and Surgery, Uniformed Services University of the Health Sciences, Bethesda, Maryland

Joshua S. Vayer, B.A.

Research Assistant Professor of Preventive Medicine and Biometrics, Departments of Military Medicine and Preventive Medicine, Uniformed Services University of the Health Sciences, Bethesda, Maryland

The assessment of injury severity has received considerable attention over the past 10 years. Any reading of the trauma literature is likely to include some reference to an index of injury severity, and the critical reader should be familiar with the design concepts and applications of the more commonly used indexes. By comparison, relatively little attention has been given to the differences between rating the severity of blunt and penetrating trauma. This results in part from the fact that the earliest and best known anatomic index was developed for studying blunt trauma, and its application to penetrating injury has been a recent development of a rather ad hoc nature.

The goal of this chapter is twofold: first, to present an overview of injury severity assessment, and second, to examine the use of the 1985 Abbreviated Injury Scale (AIS) to assess injury severity in a population of casualties with penetrating trauma. Deficiencies in its application will be identified that suggest that major modifications are necessary.

Overview of Injury Severity Indexes

Introduction

Injury severity indexes may be considered either anatomic or physiologic. Anatomic scales quantify the injury according to the parts of the body

*The opinions and assertions contained herein are the private view of the authors and are not to be construed as reflecting the views of the Department of Defense or the Department of the Army.

Adv Trauma 3:163–182, 1988

0886-7755/88/03-163–182-$04.00

Absence of a Tachycardic Response to Shock in Penetrating Intraperitoneal Injury

The belief that tachycardia is an early and reliable indicator of shock has recently been challenged. We examined 144 battlefield casualties with penetrating intraperitoneal injury to determine whether patients in shock presented with pulse rates that were significantly more rapid than those in patients not in shock. No differences in mean pulse rates were found when using objective operational definitions of shock. In contrast, the only pulse rate difference was noted when shock was defined on the basis of the surgeon's subjective clinical impression and this was attributed to selection bias. The absence of a tachycardic response in battlefield casualties with penetrating abdominal wounds cannot be taken as an indication that serious injury and significant intraperitoneal bleeding have not occurred. Caution should be exercised when using this parameter as a guide for therapeutic interventions, and further study is indicated to determine whether a similar pattern is seen in civilian practice. [Vayer JS, Henderson JV, Bellamy RF, Galper AR: Absence of a tachycardic response to shock in penetrating intraperitoneal injury. Ann Emerg Med March 1988;17:227-231.]

Joshua S Vayer*
Joseph V Henderson, MD, CDR, USNR*
Ronald F Bellamy, MD, COL, USA†
Adam R Galper*
Bethesda, Maryland

From the Department of Preventive Medicine and Biometrics* and the Department of Military Medicine† of the Uniformed Services University of the Health Sciences, F Edward Hébert School of Medicine, Bethesda, Maryland.

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Accepted for publication December 1, 1987.

The opinions or assertions contained herein are the private views of the authors and are not to be construed as reflecting the view of the Department of Defense, the Department of the Navy or the Department of the Army.

Address for reprints: Joshua S Vayer, Department of Military Medicine, Uniformed Services University of the Health Sciences, 4301 Jones Bridge Road, Bethesda, Maryland 20814-4799.

INTRODUCTION

The belief that tachycardia is a consistently reliable, early, and prominent sign of shock has recently been challenged. Adams and Greene[1] reported five cases of young, previously healthy women with documented intraperitoneal blood loss associated with hypotension who did not develop an expected tachycardic response. They suggested that the absence of tachycardia following hypovolemia secondary to intraperitoneal hemorrhage may be more common than previously suggested.

However, it is widely taught that an increased heart rate is part of the classical hypovolemic shock picture.[2-4] This response presumably helps to maintain cardiac output as stroke volume decreases.

The reporting of case studies can be provocative, but is insufficient to substantiate generalizations to any specific population of patients. We studied a group of individuals with penetrating intraperitoneal injury to determine whether shock patients in this subpopulation presented with pulse rates that were significantly more rapid than those not in shock.

MATERIALS AND METHODS

All cases reviewed were drawn from a Department of Defense study conducted by the Wound Data and Munitions Effectiveness Teams (WDMET) in Vietnam. The WDMET study was conducted by Army and Navy medical and ordnance personnel in 1968 and 1969. The study described the tactical circumstances of wounding; the causative agent; the nature of the wound, including wound tract description; battlefield care; fixed medical facility care; and early clinical findings and outcomes. Autopsy reports were available for most casualties who did not survive. The original database was accessible at the Uniformed Services University of the Health Sciences, School of Medicine.

Inclusion in the WDMET study was determined by one of two mechanisms. All casualties in a platoon or company over a fixed period of time or all casualties occurring in a specifically defined engagement were included. An effort was made to gather data on all patients independent of wounding severity or clinical outcome. The site of data collection varied depending on

22-5282/89/2904-0332$02.00/0
THE JOURNAL OF TRAUMA
Vol. 29, No. 3

Cervical Spine Immobilization of Penetrating Neck Wounds in a Hostile Environment

GARY I. ARISHITA, M.D.,* JOSHUA S. VAYER,† AND RONALD F. BELLAMY, M.D.*

Current guidelines concerning trauma suggest that cervical spine immobilization be performed on all patients with penetrating wounds of the neck. This study was undertaken to examine the risks and benefits likely to be found when such care is provided in a hazardous environment, such as the battlefield, or the scene of a terrorist attack or domestic criminal action. Data for casualties from the Vietnam conflict were reviewed to determine the potential benefit of cervical spine immobilization on the battlefield. In this population, penetrating cervical cord injury was always fatal and usually immediately so. Only 1.4% of all casualties who were candidates for immobilization might have benefitted from the care. However, the risk of performing immobilization in a hazardous environment is substantial since about 10% of casualties are incurred while helping other casualties. Mandatory immobilization of all casualties with penetrating neck wounds sustained in an environment hazardous to first aid providers has an unfavorable risk/benefit ratio.

A recent article discussing the prehospital management of trauma stated, "While spinal stabilization has not been proven to alter outcome in this setting, medical logic would mandate it be done (until documented otherwise) in patients who have been shot in the head, neck, shoulders, upper chest, flank, abdomen, buttocks, and upper thighs" (15). While stabilizing the spines of all such patients may be medically logical, when wounding occurs in a hostile environment this approach may be impractical and even dangerous to the health care provider.

Many articles have been written concerning penetrating wounds of the neck (4, 5, 10, 13, 14, 18), but few have considered the indications for cervical spine immobilization when dealing with these injuries. Some authors merely state that all patients with penetrating wounds to the neck should be immobilized until cervical fracture can be ruled out (1, 4). Many authors address the frequency of cervical spine and spinal cord injury associated with penetrating wounds of the neck (5, 9, 10, 13, 14, 18), but none to our knowledge have addressed the issue of the benefit of cervical spine immobilization following a penetrating wound to the neck vis à vis the potential risk of providing this care.

Current Advanced Trauma Life Support (ATLS) guidelines concerning spine and spinal cord injury are that "any patient sustaining an injury above the clavicle or a head injury resulting in an unconscious state should be suspected of having an associated cervical spinal column injury" (1). It is further suggested that all patients with suspected cervical spine injury be immobilized with a properly applied spine board and semirigid cervical collar (1). The United States Army follows similar guidelines concerning neck injuries: when fractures of the neck are suspected, the head and neck of the patient should be immobilized before patient transport (7). The methods of immobilization are essentially the same, whether taught in the ATLS manual or in the Army's Field Manual concerning medical aid for soldiers (1, 7). Both require a minimum of two people to properly immobilize the spine.

In hostile environments, such as during war, medical personnel often endanger their own lives while administering care. Hostile situations can also occur in civilian prehospital care. Examples of such situations include the IBM sniper incident (Bethesda, MD, 1982) (16), the Cokeville school bombing (Cokeville, WY, 1986) (2), the Edmond post office massacre (Edmond, OK, 1986) (2), the Palm Bay mall shootout (Palm Bay, FL, 1987) (3), and the Philadelphia MOVE confrontation (Philadelphia, PA, 1985) (11). Seventeen prehospital providers were killed during violent confrontations in 1987 (17) and these figures may actually represent significant un-

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The opinions or assertions contained herein are the private views of the authors and are not be construed as official or as reflecting the views of the Department of the Army or the Department of Defense.

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CASUALTIES WHILE GIVING AID

David F. Sitler, MS IV

28 April 1989

RESEARCH QUESTION: Of the battle casualties recorded in the WDMET files how many occurred while attempting to render aid?

METHOD: Retrospective study

STUDY POPULATION: All Marine casualties in WDMET (1808)

All cases reviewed were drawn from a Department ofdefense study conducted by the Wound Data and Munitions Effectiveness Teams (WDMET) during the Vietnam conflict. The WDMET study was conducted by army and Navy medical and ordnance personnel in 1968 and 1969. The study described the tactical circumstances of wounding; the causative agent; the nature of the wound, including wound tract description; battlefield care; fixed medical facility care; and early clinical findings and outcomes. The original database is accessible at the Uniformed Services University of the Health Sciences, School of Medicine.

The Marine/Navy WDMET team covered the operations of the 1st MarDiv from July 1968 to April 1969. The initial mission of this team was similar to the other WDMET teams. They tried to cover 100% of casualties from a given unit or a particular engagement. However, because casualties were evacuated to three different hospitals this goal was not always accomplished. The stated reason for adding this team was to further broaden the WDMET study and to obtain better information about the protective gear worn by the Marines.

By using the WDMET files I must accept the bias of the teams in selecting the patients. There may also be further bias incurred by limiting the study population to those cases recorded by one team. This is evident in comparing the percent of KIAs between 5993 army cases to the 1808 Marine cases: Army 16%, Marine 9%. This statistic, although illustrating the differences of the two casualty population, may not affect the study proposed. A study comparing the Army and Marine percent of casualties occurring while giving aid would be very helpful but requires more time than is available for this project. The selection bias may include an interest for extremity wounds, particular wounding agents, "friendly accidents", and offensive operations.

Further bias may also occur by only studying Marines. The difference in operations, missions, corpsman training, and unit policies may differ from other units deployed to Vietnam.

INCLUSION CRITERIA:

The study population is as defined above however, efforts will be made to exclude those casualties which occurred from accidents with friendly munitions and non-battle injuries occurring in areas with no enemy activity.

Definitions:

1. Rendering aid; Any activity required to obtain access, treat, and evacuate a wounded Marine.
2. Casualty; person wounded/killed while rendering aid
3. Patient; person being aided.

TOTAL STUDY POPULATION DATA

TOTAL	1800	100.0%
NUMBER WOUNDED WHILE GIVING AID	135	7.5%
NUMBER WOUNDED IN NON-BATTLE	147	8.1%
NUMBER OF UNKNOWN ACTIVITY	17	8.2%
CASUALTY OUTCOME		
CRO	40	2.2%
WIA	1427	79.2%
DOW	18	1.0%
KIA	148	8.2%
UNKNOWN	167	9.2%
WOUNDING AGENT		
BULLET	617	34.4%
INDIRRECT FIRE	288	16.0%
BOOBY TRAP	611	33.9%
GRENADE NOT USED IN BT	239	13.3%
NAPALM	36	13.3%
UNKNOWN	8	0.4%

CASUALTY DATA

TOTAL NUMBER CASUALTIES	135	100.0%
AVERAGE AGE	21	
NUMBER MARINES	101	74.8%
NUMBER NAVY	33	24.4%
NUMBER ARMY	1	0.7%
CASUALTY OUTCOME		
CRO	0	0.0%
WIA	116	85.9%
DOW	2	1.5%
KIA	17	12.6%
WOUNDING AGENT		
BULLET	84	62.2%
INDIRRECT FIRE	14	10.0%
BOOBY TRAP	26	19.3%
GRENADE NOT USED IN BT	11	8.1%
PROTECTIVE GEAR		
NOT WORN	30	
WORN WITH FRONT OPEN	59	
WORN PROPERLY	45	
ACTIVITY		
GAINING ACCESS TO PATIENT	54	
TREATING PATIENT	36	
EXTRACTING PATIENT	45	
TACTICAL SITUATION		
AMBUSHED	20	
SETTING AMBUSH	6	
ON PATROL	54	
OFFENSIVE ASSAULT	42	
DEFENSIVE	6	

REAR SUPPORTING AREAS	4

PATIENT DATA	
NUMBER OF PATIENTS IDENTIFIED	39
NUMBER OF CARE GIVERS	41
NUMBER OF UNKOWN PATIENTS	94
PATIENT OUTCOME	
CRO	0
WIA	25
DOW	0
KIA	16
TOTAL	41

SIGNIFICANCE: Leaders in a combat situation make many difficult decisions. How and when to deal with the wounded soldiers is a decision which effects the morale, the accomplishment of the mission, and may further endanger the lives of corpsman and soldiers. Awareness of the possible numbers wounded while giving aid may lead to further research. Changes needed in tactical decision making, policies, and corpsman training may be identified.

DATABASE FILES

DBase III plus

1. AIDMS: Initial screen of all Marine files
   structure:
   NUMBER WDMET number
   SERVICE M=Marine
   N=navy
   A=army
   AID Yes=giving aid when wounded
   No=not giving aid when wounded
   UNK=unknown activity when giving aid
   FRIENDLY Yes=wounded in environment with no risk to care givers.
   No=wounded in hostile environment
   UNK=unknown environment
   CASOUT 0=RTD in 24 hours
   1=WHA
   2=DOW
   3=KIA
   CASAGENT 0=bullet
   1=indirect fire (artillery, mortars, rocket, areal bombs)
   2=bobby trap/mine
   3=grenade not use in booby trap
   4=napalm

2. AIDI: Those wounded while giving aid
   STRUCTURE:
   NUMBER=WDMET number
   DTG=date time group of time of injury
   AGE=age of casualty
   RANK=rank of casualty
   MOS=occupational specialty of casualty (number code)
   SERVICE M=Marine
   N=Navy
   A=army
   UNIT=company/battalion/regiment
   CASOUT 0=RTD within 24 hours
   1=WIA
   2=DOW
   3=KIA
   4=Died unknown where
   CASAGENT 0=bullet
   1=indirrect fire (defined above)
   2=booby trap
   3=grenade not use in booby trap
   PATOUT 0=RTD within 24 hours
   1=WIA

2=DOW
3=KIA
4=Died unknown where

PATRPV Patient RPV (numerical score)

PROTECGEAR 0=not worn
1=worn improperly
2=worn properly
3=worn unknown how

ACTIVITY (casualty activity when wounded)
1=gaining access to patient
2=treating patient
3=extracting patient

TACTICAL (tactical situation)
0=ambushed
1=setting ambush
2=on patrol
3=offensive assault
4=defensive
5=rear supporting areas

SITUATION Memo field describing events

3. ARCHIVE: Information obtained from monthly unit reports stored at the Marine Corps Museum on the Navy Yard in Washington DC.

structure

UNIT company/battalion/regiment
MONTH month of report
STRENGTH Average monthly strength of reporting unit
WIA number wounded in action
KIA number killed in action
DOW number died of wounds
NBC number of non-battle injuries
NBD number of non-battle deaths

REFLEX FILES

1. AIDI: Translated directly from DBASE III/AIDI

2. AIDMR: Translated form DBASE III/AIDMS with following changes

1. FRIENDLY field changed to numeric
1=yes
2=no
3=UNK

(This was done to be able to make summary graphs with the program)

This listing of weapons found in the TRAUMABASE files, with selected weapons of current military significance, was compiled by 2LT David Kim, USUHS MS IV student. It lead to his contribution to rewriting a portion of the of the NATO War Surgery Handbook.

A basic understanding of the wound causing mechanisms by military weapons is of interest to the battlefield surgeon.

Penetrating projectile in modern conventional warfare fall under two large categories: fragments and bullets. Although fragments are much more commonly encountered (as reported by WDMET data), but bullets are much more lethal when a soldier is hit. (1)

A missile travelling at sufficient velocity will crush the tissue as it penetrates through, leaving a permanent cavity behind. Furthermore, the nearby tissue can violently stretch radially from the projectile path for a few milliseconds, which may further contribute to the wounding effects of the weapon. (2) Although a sonic shock wave maybe generated at the tissue surface as the missile strikes, significant damage has not been reported from this phenomenon. (2,3)

The interaction between the projectile and tissue will determine the magnitude of the tissue injury. These elements include the projectile stability, projectile shape, projectile velocity, and the properties of the tissue being hit.

Projectiles which are unstable tend to cause greater amount of damage by movements described as yaw (deviation of a bullet in its long axis around the center of mass from the straight line of flight) (9), (Fig 1), or tumbling (180 degrees yawing so that the projectile end up travel base forward) (Fig 2) in tissue. Some projectiles, after in tissue yaw and tumbling, fragment (break into many pieces which act as secondary missiles), which may lacerate additional tissues, further contributing to the damage. (7)

The shape of the projectile will in part determine the degree of the tissue injury. For example, travelling at the same velocity, a smooth, streamlined projectile will result in smaller entrance wound than an irregularly shaped blunt projectile, which is likely to cause more tearing at the entrance site. (5)

Traditionally, the velocity of the projectile has received much attention in its relation to the wounding power. In theory, increasing the velocity will increase the kinetic energy by the relationship $K.E.=mv^2/2g$, and hence greater the tissue damage. However, a review of the recent literature indicates that the above formula is for the kinetic energy, or the wounding potential power in flight, but not the wounding power itself. (6)

Also, given the observation that same amount of kinetic energy deposited can result in markedly different tissue damage depending upon the projectile (12), the concept of "the deposited kinetic energy is directly proportional to the tissue damage" is questioned, by the authors of the recent NATO handbook of Emergency War Surgery. (3)

The anatomic location of the body being impacted by the projectile is another important determinant of wounding effects. At a given velocity, the crushing forces of a projectile remain fairly uniform in different organs, but the stretching effects of temporary cavitation can vary greatly depending upon the viscoelastic properties of the tissue being hit. (8) For example, the liver lacks the capability to stretch as well as muscle, and consequently becomes much more severely damaged by the stretching forces generated. (3, 13) On the contrary, the elastic lung tissue is likely to tolerate the stretching forces much better. When bone is struck by the projectile, (depending upon the velocity of the projectile and the physical properties of the bone) the bone can break into many pieces, which can act as secondary missiles, markedly contributing to the damages. (7)

AK-47

Kalashnikov Assault Rifle

Description: AK-47 is a gas operated, selective-fire weapon which fires Soviet 7.62mm x 39mm M1943 round from a 30 round curved magazine.
It has 2 versions, one with wooden stock, and one with folding metal stock (see AKS). It measures 870mm with the wooden stock,
and weighs 5.2 Kg with the fully loaded magazine.

Ballistics: Soviet 7.62mm x 39mm is a full metal jacketed boat tail bullet that has a copper plated steel jacket, a large steel core, and lead between the two. The muzzle velocity is 710 meters per second. On the average, marked yawing is not seen until the bullet travels 26cm in tissue. Therefore, the average uncomplicated extremity wound is similar to that produced by a low powered handgun: a small punctate entrance and exit wounds with minimal muscle disruption. If a bone is hit and the bone fragments act as secondary projectiles, the damage can be extensive. It has been observed to take erratic paths in body after penetration.

Capabilities: AK-47 can fire in either automatic or semi automatic mode without much recoil. Although the maximum range is 3,000 m, the effective range is about 300m. Rate of fire varies, 600-800 rounds per minute in cyclic mode; 100 rpm in automatic/controlled mode; and 40 rpm in single shot mode. It is a durable weapon, and can be fired normally after total immersion in mud or water. It can be equipped with a grenade launcher and night seeing device.

Limitations: Low muzzle velocity and heavy round result in poor accuracy at ranges beyond 300m. The aiming effectiveness is limited at close ranges, due to short distance between signal blades. The barrel overheats quickly when the weapon is fired for extended periods, making it hard to handle and occasionally causing a round to explode prematurely in the chamber.
The exposed gas cylinder can be dented and malfuction. Changing the selector position is very difficult when wearing gloves.

Remarks: Originally designed in 1947, and referred to as the AK-47, this weapon was adopted in 1949 and entered service in 1951. It was the basic weapon of the Soviet Army until the introduction of the AKM.
The AK-47 is now being replaced with the AKM rifles, and more recently, with the AK-74 rifles.

AK-47 type 56 refers to the models made in the People's Republic of China. The later production models have a spike bayonet permanently attached, which can be folded. The type 56-1 has folding stock of the AKS, but has rivets in the stock arms.

AKS

Kalashnikov Assault Rifle with folding metal stock

Description: AKS measures 645mm with the folding metal stock, and weighs 4.3 Kg without the magazine (5.2 Kg). Aside from the dimensions, it is the same weapon as the AK-47.

Ballistics: Same profile as the AK-47.

Capablities: The folding metal stock allows more compact dimensions.

Limitations: No tool kit available as in the AK-47.
Same profile as the AK-47.

Remarks: Originally issued to the parachutists and armor troops. As AK-47 is being replaced with AKM's, AKS is being replaced with the AKMS.
See AK-47 for other details.

AKM

Kalashnivov Assault Rifle-Modernized

Description: AKM was developed from the AK-47. The metal parts of the AK-47 were machined or cut from solid steel, but the AKM metal parts are stamped or or made from steel poured into molds. Furthermore, laminated wood, rather than solid wood, is used in the handguard, pistol grip, and buttock. The magazines are made from aluminum and plastic. The AKM, as a result, is much lighter. It weighs 4.0 Kg loaded with magazine, and measures 876 mm. Other improvements include straighter stock, better gas cylinder, rate-of-fire alongside the trigger. The folding stock version is called AKMS.

Ballistics: Essentially the same as the AK-47.

Capabilities: The muzzle of the AKMS fits into the swiveling firing ports of the Soviet armored combat vehicle BMP, and the weapon can be fired when the vehicle is moving. The lighter weight theoretically can result in less fatigue by the troops carrying the weapon. Otherwise the same capability as the AK-47.

Limitations: Same limitations as the AK-47, but lighter.

Remarks: It was developed in 1959 and entered service in 1961. Various versions of AKM are produced in East Germany, Romania, Hungary, North Korea, Czechoslovakia, Poland, Yugoslavia, Finland, and China. This AKM is now in the process of being replaced by the newer AK-74.

AKMS

Kalashnikov Assault Rifle-Modernized with folding metal stock.

Description: With folding metal stock, it measures 651mm in length.

Ballistics: Same as AK-47, AKS, AKM.

Capabilities: Can be folded, issued to the same parachutist and armored units as AKS was originally.

Limitations: Changing the selector position when the stock is fully closed is almost impossible. No tool kit. Otherwise, see AKM.

Remarks: AKMS takes the advantage of the light weight of AKM with the compactibilty of AKS.

AK-74

Kalashnikov Assalut Rifle-5.45mm

Description: AK-74 is basically an AKM rechambered and rebored to fire a 5.45mm cartridge. It is a gas operated, selective fire, rotary locked-bolt, 40 round magazine fed weapon. It measures 935mm and weighs 3.95 Kg fully loaded, making it 58mm longer than AKM and a bit lighter. AK-74 has a distinctive, two port muzzle brake which deflects the blast sideways and produces a sharp cracking noise when fired. Its plastic magazine is shorter and less curved than the AKM magazine. It also has horizontal groove cut into each side of the buttock .

Ballistics: Soviet 5.45mm x 39mm is used in the AK-74. This is a full metal copper plate jacketed bullet with a steel core like the Soviet AK-47 7.62mm round. The AK-74 5.45mm round has an air-pocket at its tip, which has been speculated to cause its early yaw by shifting the center of mass of the bullet upon impact. Also, the lead located behind the air-pocket shift asymmetrically, perhaps contributing to the noted peculiar upward path the bullet takes in gelatin ordinace studies. Its early yaw, only after 7cm of tissue penetration, increases the probability of more severe damage in extremity hits. The bullet does not fragment as the U.S. M16 round.

Capabilities: It can fire approximately 600 rpm cyclically and a practical rate of 100 rpm. Although the maximum range is as same as AKM(3,000m) but its effective range is increaed to 450m, 150 m further than AKM.
Its muzzle velocity is increaed to 900meters per second(compared to 700m/s of AKM). Its accuracy is better than AKM, by reducing bullet drift in crosswinds by 35%. AK-74 also can be fitted with grenade launcher.

Limitations: The gas tube is exposed as in the AK-47/AKM series and is easily damaged. The noise level is increased to the operator due to its muzzle brake construction. The plastic magazine is reddish-brown or orange making it hard to camouflage, and is currently hand made, making them expensive to produce.

Remarks: As indicated by the designation, AK-74 was designed in 1974 and entered service around 1977. AK-74 has a greater effective range and is a bit lighter than AKM. It still is durable, simple to maintain, and it did not require the soldier to learn new operating procedures.

Of note is the early yaw in tissue and thus greater tissue damage. See ballistics above.

AKS-74

Kalashnikov Assault Rifle-5.45mm with folding metal stock; AKD

Description: AKS-74 is AK-74 with a Y-shaped tubular metal stock with narrow buttplate. Although its exact legth is unknown, it is estimated to measue between 650 mm to 720mm with stock folded.

Capabilities: Same profile as the AK-74. Can be folded to allow compactability.

Limitations: The selector switch is hard to operate with stock folded.

Remarks: As indicated by the designation, this weapon was designed in 1974, and entered service in 1977. The AKD or AKS-74 was first seen with the Soviet troops in the Red square parade of 7 November 1977.

"Unholy Three"

AK-47/AKM; RPD-LMG; SKS Carbine

Description: These are three separate weapons which are capable of firing the Soviet 7.62mm x 39 mm round.

Remarks: The term "unholy 3" refers to the above mentioned weapons which can fire the 7.62 mm x 39 mm round. The term was first coined by E.F. Donnelly on 31 July 1968, who was identifying the bullet recovered from the WDMET case 27347-126.

M16

US M16 Assault Rifle

Description: M16 rifle is an air-cooled, 20 to 30 round magazine fed, semi or fully automatic U.S. issued weapon which fires from a closed bolt.
It measures 990 mm in length. M16 AR15 weighs 2.94 Kg, but the M16 A1 weighs slightly more at 3.15 Kg without the magazine. M16A1 weighs 3.61 Kg fully loaded with a 30 round magazine.

Ballistics: The M16 fires US 5.56 mm x 45 mm M193 full metal jacketed round. It travels 12 cm in tissue, after which it yaws to 90 degrees, then breaks at the mid section to many fragments that can penetrate 7 cm radially from the bullet path. This fragmentation greatly increases the permanent cavity in impacted tissue which has greater than 12 cm thickness, as has been observed by the surgeons in Vietnam. The entrance and exit wounds would be small and punctate if the thickness of the tissue is less than 12 cm. The bullet fragments to only 2 pieces if shot from 100 meters away, and no longer fragments if shot from 200 meters away.
NATO M855/SS109 5.6 mm x 45 mm is replacing the M193 round as the standard bullet shot from the M16A2 assault rifle. The wound profile is the same as the M193 round, but if M855/SS109 is fired from the M16A1 rifle (M16A2 has 1-in-7in twist, compared to 1-in-12in twist ratio of M16A1), the bullet yaws to 70 degrees in air, and fragments upon contact, though the accuracy maybe lower.

Capabilities: It can fire 700 to 900 rounds per minute in cyclic mode, 150 to 200 rounds per minute, and 45 to 65 rounds per minute in a single shot mode. The maximum range is 2653 meters, but the effective range is 460 meters. (compare to 300 m of AK-47 or to 450 m of AK-74) Its smaller round and the high velocity makes the weapon extremely accurate.
It can be equipped with a bayonet and a grenade launcher.

Limitations: The original M16AR15 has been occasionally reported to jam, but the later versions perform better in this area.

Remarks: M16AR15 was developed by Armalite and manufactured by Colt. It was an excellent jungle fighting weapon and the army had 230,000 in Vietnam by 1969. It was modified to M16E1 (in 1966) and to M16A1 (in 1967).

M16A2 has the capability to fire in "burst" mode. In this mode, the weapon fires 3 rounds per burst, increasing the probability of hitting the target. The health care providers can expect multiple wounds if the weapon is fired in this manner.

The AK-47 and the AKM models can fire the 5.56 mm US rounds, and can duplicate the ballistics characteristics of M16.

M26 Grenade

US M26 Fragmentation Hand Grenade

Description: Most of the fragments come from the serrated wire coil fitted to the inside of the sheet metal body of M26. The filler is made of 5.5 ounces of composition B, which is 60% RDX(cyclonite), 39%TNT, and 1% wax. This composition allows shattering power and high rate of detonation. M26 weighs 16 ounces and has Olive drab body with a single yellow band at the top. The yellow band indicate a high explosive filter.

Ballistics: Upon fragmentation, many blunt or irregularly shaped projectiles are released. This causes them to lose velocity rapidly in air, and decreases the tissue penetration as compared to the streamlined rifle rounds. Although the initial velocity maybe high, striking velocities were less than 600 meters/sec. The wounds are usually multiple, but the crush type of injury predominate and the projectile track will be consistent with its size. Little evidence of temporary cavity is seen.

Capabilities: The average male soldier can throw the grenade 40 meters, but can be projected to 160 meters using the launcher from the service rifle. Its effective casualty radius (distance from the grenade's detonation point in which a minimum of 50% of exposed personnel will become casualties) is 15 meters.

Limitations:Its accuracy varies with the different individual throwing skills. However, given the nature of the weapon, it does not require perfect aiming.

Remarks: This is an extremely versatile weapon, and frequently used in mechanical ambush devices, and booby traps. These are particularly effective for close combat and capable of inflicting multiple casualties without requring perfect aim in or disclosing the soldier's position.

Protective body devices affords good body protection against these weapons, given their low striking velocities.

82mm Mortar

Soviet M1937 82mm Mortar

Description: This was the first battalion mortar model accepted by the Soviet Army. M1937 is a smooth bore, muzzle loaded, high angle of fire weapon which has a fixed firing pin for drop firing. Its bipod mount (supports the muzzle), is equipped with a shock absorber to reduce shock and to protect the sight mechanism. Some have a double load stop to prevent dropping a second round down the tube before the first round has cleared the muzzle.
It measures 122 cm in barrel length, and weighs 56 Kg. It is usually served by a five man crew.

Ballistics: Upon fragmentation, many blunt or irregularly shaped projectiles are released. This causes them to lose velocity rapidly in air, and decreases the tissue penetration as compared to the streamlined rifle rounds. Although the initial velocity maybe high, striking velocities were less than 600 meters/sec. The wounds are usually multiple, but the crush type of injury predominate and the projectile track will be consistent with its size. Little evidence of temporary cavity is seen.

Capabilities: M1937 can fire 15 to 20 rounds per minute. This mortar has maximum elevation of 85 degrees, and a minimum elevation of 45 degrees. The M1937 has a maximum range of 3,000 meters, and a minimum range of 100 meters.

Limitations: This is a heavy weapon and to transport with its ammunition is difficult. It affords the crew no ballistic protection.
This is the standard 82 mm Mortar in the Warsaw Pact countries.

Remarks: Its variations include the Chinese Type 53 and the East German type with two wheeled carriage for trasporting.

The 120 mm has replaced the 82 mm mortar as the battalion level mortar system in most Soviet units.

RPG-7

Soviet Antitank Grenade Launcher RPG-7: RPG-7D

Description: The RPG-7 is the widely used antitank weapon in the Soviet Army. It is a recoilless, shoulder-fired, muzzle loaded, reloadable, antitank grenade launcher which fires an 85 mm rocket assisted HEAT(High Explosive Anti Tank)grenade. The launcher has two grips; a large optical sight; a thick, wooden heat guard around the middle; and a large, flared blast shield at the rear of the tube. The launcher is 953 mm in length without the grenade and 1,340 mm with grenade. The launcher weigh 7.9 Kg and the grenade 2.25 Kg.

Ballistics: If the armored vehicle is penetrated at zero angle, the person directly in front of the path will disintegrate, but the personnel located off to the sides of the projectile path will suffer multiple fragment wounds from the grenade and the vehicle. It has muzzle velocity of 120 m/s, but the maximum velocity can be 300 m/s. Therefore,the wounds will be mostly of the crush type from this low velocity projectile.

Capabilities: This is a light weight weapon which can be fired by one person. The rate of fire is 4 to 6 rounds per minute. The effective range for a stationary target is 500 meters and 300 meters for a moving target. The maximum range is 920 meters, at which point the self-destruct feature of the fuze detonates the warhead. The projectile's shaped charge will penetrate about 320 mm of armor at zero degree angle of impact. It is capable of defeating all known armored vehicles to date. All RPG-7 units have an optical sight which can be illuminated for night sighting, and open sights are provided for emergency use.

Limitations: RPG-7 requires a well-trained gunner to estimate ranges and lead distances for moving targets. Crosswinds, even as low as 7 mph, complicate the gunner's estimate and decrease the first round hit probability to less than 50% at beyond 180 meters. Reloading and re-aiming the weapon requires at least 14 seconds. Firing leaves noticeable amount of noise, flash, and smoke and the unprotected gunner is very vulnerable. As is common to all small antitank weapons, the crucial factor remain the angle of impact, which directly affects the depth of penetration by the shaped charge.

Remarks: The RPG-7 is introduced in 1962 from the RPG-2.
It is employed as the standard squad antitank weapon in motorized units. Airborne units use the RPG-7D, which can be separated to 2 parts.

The current version RPG-7V can be fitted with a telescope and both infrared and passive night sights. It is in use throughout the Warsaw Pact countries, except Czechoslovakia.

The RPG-16 is replacing the RPG-7V series.

An RPG projectile screen of chain link fence will completely neutralize 50% of rounds and degrade the penetrating capability of the remaining rounds.

RPG-2

Soviet Antitank Grenade Launcher RPG-2

Description: RPG-2 is a recoilless, shoulder held weapon, which fired a 82 mm non-rocket assisted grenade for antitank purposes. Compared to the newer RPG-7, RPG-2 had only one grip, smaller, simpler sight, a smaller blast shield, and no heat guards.

Ballistics: Due to its low velocity projectile, and the fragmenting nature of the grenade, the wounds sustained can be expected to be of multiple crush types. However, if the casualty is inside the vehicle which subsequently explodes, obviously the mortality would be much higher.

Capabilities: In process of gathering information, though capabilities are expected to be less than that of RPG-7.

Limitation: Crucial angle of impact which directly affects the depth of penetration.

The in-flight projectile can be affected by high winds. Upon firing, the gunner is very vulnerable due to the noise, smoke, and the flash it creates during the firing of the weapon. Since it lacks the heat guard, the operator is more susceptible to burns.

Remarks: This is the first recoilless antitank grenade launcher, derived from the WW II German "Panzerfaust." It was fielded in the early 1950's. This weapon is now no longer issued in the Soviet Union.

See RPG-7 for more remarks.

PM

Soviet Makarov 9mm Pistol

Description: The PM is a semiautomatic, blowback-operated, magazine-fed weapon fitted with a double-action trigger mechanism.
It fires 9mm x 18mm cartridge and uses a 8 round magazine.
It is issued with a leather holster, an extra magazine, and a cleaning rod.

Ballistics: The wound will be of crush type, with little stretch forces.
There is minimal yaw or tumbling given its low velocity.

Capabilities: Effective range is 50 meters, muzzle velocity is 315 meters per second, and has practical rate of fire of 30 rounds per minute.

Limitations: Low powered round and no automatic option. Because of the numerous components, disassembly must be done with great caution.

Remarks: This 9 mm replaced the 7.62 mm Tokarev pistol (TT-33).

PM is the most widely used pistol in the Soviet Union and the Warsaw pact countries.

Claymore

US M18A1 Antipersonnel Mine

Description:Claymore is an antipersonnel mine which measures 21.6cm x 3.5cm x 8.3cm (legs folded) and 17.2cm (legs unfolded). The outer surface of the mine is a curved, rectangular, olive drab, molded case of fiberglass-filled polystyrene. In the front part of the casing is a fragmentation face containing steel spheres embedded in a plastic matrix. The back portion of the case behind the matrix contains a layer of explosive.

Ballistics: The Claymore is equipped with 0.68 Kg of C4 (91% RDX and 9% Plasticizers). This composition is stable and water resistant. Upon fragmentation, many blunt or irregularly shaped projectiles are released. This causes them to lose velocity rapidly in air, and decreases the tissue penetration as compared to the streamlined rifle rounds. Although the initial velocity maybe high, striking velocities were less than 600 meters/sec. The wounds are usually multiple, but the crush type of injury predominate and the projectile track will be consistent with its size. Little evidence of temporary cavity is seen.

Capabilities: When detonated, the M18A1 mine wil release spherical steel fragments over 60 degree fan shaped pattern that is 2 meters high and 50 meters wide at range of 50 meters. The fragments are moderately effective up to range of 50 meters and can travel to 250 meters forward of the mine. The optimum effective range (the distance at which the most desirable balance between lethality and area coverage) is 50 meters. Danger area consists of a 180 degree fan with a radius of 250 meters centered in the direction of aim.

Limitations: Since the mine can be fired only once, fire discipline is of paramount importance. Ideally, in controlled mode (see remarks), the mine should not be used against single personnel targets, and the responsibilty of timely detonation should rest with squad leaders.

Remarks: The Claymore is used primarily as a defensive weapon, but has its application in the offensive role.

It is of note that when Claymore is referred to as weapon, it implies that it is used in the controlled mode (operator detonates as the enemy approaches). In the uncontrolled mode, when the unsuspecting enemy detonates the mine, it is considered as a boobytrap or land mine.

60 mm Mortar

US 60mm M19 Mortar

Description: The M19 mortar is smoothbore, muzzle-loading, high-angle firing weapons. M19 has firing mechanism which allows selective firing by either drop fire or lever fire. It consist of a tube with a base cap containing a removable firing pin. The mount consist of two units, a bipod and baseplate. The HE cartidges are used against personnel and light material targets. Maximum rate of fire 30 rpm for periods not exceeding one minute, to 8 rpm indefinitely.

Ballistics: HE (high explosive) cartidges cantain a large bursting charge of high explosive which produces blast and fragmentation. M49A 60mm cartidges were used in the M19. The M49A1 had 0.19 Kg of Composition B (60% RDX, 39% TNT,1% Wax), but the M49A2 had 0.15 Kg of TNT as their fillers. Upon fragmentation, many blunt or irregularly shaped projectiles are released. This causes them to lose velocity rapidly in air, and decreases the tissue penetration as compared to the streamlined rifle rounds. Although the initial velocity maybe high, striking velocities were less than 600 meters/sec. The wounds are usually multiple, but the crush type of injury predominate and the projectile track will be consistent with its size. Little evidence of temporary cavity is seen.

Capabilities: M19 can be used for direct fire missions by remiving the bipod and substituting a smaller baseplate for the conventional baseplate. The maximum range was estimated to be 1,800 meters.

Limitations: Excessive pressure may develop at charge 4 below 0 degrees F. Low maximum range and low rate of fire, compared to the Soviet 82 mm M1937 model.

Remarks: Although it was phased out of the army inventory prior to the Vietnam Conflict, the M19 60mm mortar was used by the marine units, and found its way to many army units, because of its light weight and relative easy of transport.

81mm Mortar

US 81mm M29 Mortar

Description: The M29 mortar is smoothbore, muzzle-loading, high-angle firing weapons. M29 has firing mechanism which allows selective firing by either drop fire or lever fire. It consist of a tube with a base cap containing a removable firing pin. The mount consist of two units, a bipod and baseplate. It has barrel with cooling fins on the outer surface and a base plate with one socket for placement of the mortar basecap.
Although the mortar can be used for signaling, training, it was mostly used against personnel and light materials.

Ballistics: The M43A1 HE (high explosive) cartridge was used most frequently, which contained 0.58 Kg of composition B (60% RDX, 39% TNT, 1% wax).
The muzzle velocity was 292 meters per second. The M43A1 produced both blast and fragmentation injuries. Upon fragmentation, many blunt or irregularly shaped projectiles are released. This causes them to lose velocity rapidly in air, and decreases the tissue penetration as compared to the streamlined rifle rounds. Although the initial velocity maybe high, striking velocities were less than 600 meters/sec. The wounds are usually multiple, but the crush type of injury predominate and the projectile track will be consistent with its size. Little evidence of temporary cavity is seen.

Capabilities: The maximum range was 3,700 meters.

Limitations: M29 Mortar was not as light as the 60 mm, making the transport relatively difficult.

Remarks: The long range made this weapon very popular in the Vietnam Conflict.

F-1 Hand Grenade

Soviet F-1 Antipersonnel Hand Grenade

Description: The F-1 is a fragmentation grenade that has a cast iron body which is cut to form cubes on the outer surface. It is 124mm high and 55mm in diameter. It is filled with 60 g of TNT, and weighs 600 g.
Its time delay fuze allows 3.2 to 4.2 seconds.

Ballistics: Upon fragmentation, many blunt or irregularly shaped projectiles are released. This causes them to lose velocity rapidly in air, and decreases the tissue penetration as compared to the streamlined rifle rounds. Although the initial velocity maybe high, striking velocities were less than 600 meters/sec. The wounds are usually multiple, but the crush type of injury predominate and the projectile track will be consistent with its size. Little evidence of temporary cavity is seen.

Capabilities: F-1 can be thrown about 30 meters, and has fragmentation radius of 15 to 20 meters

Limitations: It has a material defect which produces a number of fragments from the base plug and filler which can be lethal to 200 meters.
F-1 in only effective as an anti-personnel grenade.
It should be thrown from good cover due to its above mentioned defect.

Remarks: Various versions of this weapon were used by the Communist Chinese supplied units in Vietnam.

122 mm Howitzer

Soviet 122mm Howitzer Model D-30

Description: The D-30 is a modern, highly mobile, air transportable weapon which uses reliable components. It measures 5.4m long, 1.95m wide, 1.66m high, and weighs 3,200 Kg. D-30 can be recognized by its unique three trail cartidge, the box like shield for recoil-recuperator mechanism mounted above the tube, the multi-baffle muzzle brake, and the small protective shield fitted between the metals.

Ballistics: The muzzle velocity is approximately 700 meters/second, and will penetrate 500 mm of steel plate. Its maximum effective range is 15 km, and can fire 7 to 8 round per minute. Upon fragmentation, many blunt or irregularly shaped projectiles are released. This causes them to lose velocity rapidly in air, and decreases the tissue penetration as compared to the streamlined rifle rounds. Although the initial velocity maybe high, striking velocities were less than 600 meters/sec. The wounds are usually multiple, but the crush type of injury predominate and the projectile track will be consistent with its size. Little evidence of temporary cavity is seen.

Capabilities: This weapon can be towed by a truck at speeds to 80 km/hr and is air droppable. D-30 can be equipped with infrared or passive night vision for direct fire. D-30 is very accurate.

Limitations: D-30 affords the crew minimal protection, so the crew is vulnerable to direct and indirect fire. Also, its ability to change firing position is restricted to the mibility of its prime mover.

Remarks: D-30's role is indirect fire support, and is found in the artillery regiments of the Soviet manuver divisions.

D-30 is supplied to all the Warsaw pact countries and Cuba, and at one time to China and Egypt.

These D-30's will be replaced by self-propelled 122mm Howitzer 2S1.

122 mm Howitzer M1938

Soviet 122 mm Howitzer Model M1938

Description: This 122 mm Howitzer was the standard medium range artillery piece for the Soviet Army until the development of the 122 mm Howitzer D-30. It weighed 2,250 Kg, and fired a High Explosive projectile weighing 21.7 Kg. This weapon was used to destroy personnel, equipment, aerial targets, temporary field fortifications (trenches, etc).

Ballistics: It used TNT,amatol, and RDX mixture as the projectile filler. Although both the blast effects and fragmentation effects can be seen in the casualties, the fragmentation effect dominates in HE shells sized to 122mm. The M1938 122 mm Howitzer had maximum range of 11,796 meters.

Capabilities: The HE projectile is not only capable of penetrating earthwork, but after the penetration, of detonating and producing casualties by the many high-velocity fragments resulting from the detonation.

Limitations: The structure affords the crew limited protection from enemy fire.

Remarks: The majority of the 122 mm Howitzer M1938 used in the Vietnam Conflict were of the Communist Chinese origin. A good portion of these artillery were originally received from the Soviet Union during the Korean War, and were retained in their inventory.

UZI

9 mm UZI Submachinegun

Description: The 9 mm UZI submachinegun is manufactured in Isreal and Belgium and issued in the Israeli, West German, and Netherland Armies.
It is commercially sold in many countries, and can be attached with a grenade launcher (standard NATO 22 mm) and a bayonet, which are rare characteristics for a submachinegun. This weapon can fire automatically or semiautcmatically from the open bolt position. Wooden or folding metal butt can be fitted. Its length is 25 inches, but measures 18 inches with the metal butt folded. Loaded with a 25 round magazine, it weighs 4 Kg.

Ballistics: The wound will be mainly of crush type, with little stretch forces. There is minimal yaw or tumbling given its low velocity.

Capabilities: This submachinegun can be fed with 9 mm pistol ammunition from a 25, 32, or 40 round magazine. Its effective range is 200 meters and can fire at a cyclic rate of 650 rounds per minute. The UZI has an accesory clip for joining two magazines together, allowing rapid reloading and extended firing. It is very light and compact, but maintenance and diassembly are relatively simple.

Limitations: Short range is the main limitation of this weapon. Due to the weapon's short barrel, targets beyond 200 meters is hard to engage.

Remarks: The Uzi has a grip safety which prevents the weapon from firing if accidentally dropped. Furthermore, it has no external moving parts to cause injury when the weapon is being fired. The location of the magazine well in the pistol grip makes loading easier in the dark.

The UZI is a highly efficient, light weight submachinegun which can fire at a high rate for extended periods of time.

Perhaps due to its capabilities, the UZI is seen frequently in small terrorist activities.

.45 cal Pistol

US M1911A1 .45 cal Automatic Pistol

Description:The .45 cal pistol was the standard US army sidearm in Vietnam.

Ballistics: The 11.4 mm full metal jacketed bullet is one of the few that does not yaw to a great degree in tissue. The lack of yaw with the heavy weight (14.9 gm) of the bullet result in deep tissue penetration. The crush force remain fairly constant throughout the bullet path. The temporary cavity effect is minimal with this weapon. No fragmnetation of the bullet is seen.

Capabilities: The .45 cal pistol was dependable in harsh tropical weather and had good stopping power.

Limitations: As is true with all small pistols, the short range is its main limitation.

Remarks: This has been the standard US army pistol until the recent replacement with the Beretta 9 mm.

M79 Grenade Launcher

US M79 40mm Grenade Launcher

Description:M79 40mm grenade launcher was a percussion-type single shot grenade launcher which fired a 40mm round. It was extremely easy to handle, and became popular among the troops. This was the ideal weapon to cover the ranges between the longest reach of a hand grenade and the shortest range of a mortar.

Ballistics: The wounds created were due to the fragmentation effects. Upon fragmentation, many blunt or irregularly shaped projectiles are released. This causes them to lose velocity rapidly in air, and decreases the tissue penetration as compared to the streamlined rifle rounds. Although the initial velocity maybe high, striking velocities were less than 600 meters/sec. The wounds are usually multiple, but the crush type of injury predominate and the projectile track will be consistent with its size. Little evidence of temporary cavity is seen.

Capabilities: Its effective range was 400 meters. Due to its light weight and easy manuverability, this weapon was very widely used.

Remarks: Many of the M79 somehow found its way to the enemy forces in Vietnam.

105mm Howitzer

US M101A1 105mm Howitzer/Cannon

Description:The 105 mm Howitzer cannons are used as field artillery pieces and are mounted on towed carriages or self-propelled vehicles. The ammunition for all these weapons is interchangeable. The 105 mm M101A1 Howitzer was an older weapon which was used throughout the war in Vietnam.

Ballistics: Many different cartridges were available, including M2A1, M2A2, M49, M103 and M137, with various capabilities. The 105 mm Howitzer could be used as anit-personnel or anti-material. These available cartridges could produce both blast and fragmentation effects.

Capabilities: The 105 mm is air transportable, and has an effective range of 11,000 meters.

PPSH-41

Soviet PPSH-41 Submachinegun

Description:This is a blowback operated weapon with select fire (semi or fully automatic). It is fed by a 35 round detachable box magazine or 71 round drum. It has vents on both sides and on top of the barrel. One must insure that the safety slide on the cocking handle is pulled all the way out then the handle can be thrown back. It fires 7.62 mm x 25mm pistol cartridge, and weighs 3.5 Kg unloaded.

Ballistics: Muzzle velocity of 490 meters per second.

Capabilities: Effective range of 200 meters. It can fire 105 rounds per minute on full
automatic and 40 round per minute on semi automatic.

Limitations: It is heavy and clumsy and fires smaller cartridge than the usual submachinegun.

Remarks: Over 5,000,000 were manufactured prior to 1945.

This weapon was used during the Korean War, as well as in the Vietnam conflict.

Chinese type 50, Hungarian type 49, Iranian type 48M, and North Korean typw K50 are all various versions of PPSH.

These are now very rare.

RKG grenade

Soviet RKG-3 Antitank Grenade

Description: Although this is the earliest of the RKG grenades, it is the most efficient made by the Soviets to date. It is stablized in flight by four fabric parachutes which are pulled out from the handle when the grenade is thrown. All RPK grenades measure 362mm in height, and diameter of 55.6 mm. It weighs 567 Kg and 1.07 Kg with instantaneous impact fuze.

Ballistics: It has HE RDX/TNT filling.

Capabilities: It has fragmentation radius of 20 meters, and can penetrate up to 165mm of armor (RKG-3m)

Limitations: RKG is not armored if the parachute (drogue) does not come out of the grenade handle.It can be used as anti personnel as well as anti tank weapon.

Remarks: Various versions were used in the Vietnam War by the Communist Chinese supplied units.

It was extensively used in the 1973 October War.

RPD

Soviet Degtyarev Squad Light Machinegun

Description:RPD is made in the Soviet Union, China, and North Korea. It measures 101cm and weighs 8.6Kg loaded, and fires M1943 7.62 mm cartridge in automatic mode only. It is air-cooled and gas-operated. Two coupled 50 round sections are carried in a drum type belt container the feed mechanism.

Ballistics: See AK-47

Capabilities: RPD has a much longer range than the AK-47 at 800 meters. It is issued with tool kit, fabric sling, night seeing device, and blank firing device.

Limitations: RPD cannot be carried for a long time due to its weight and bulkiness. The weapon must be reloaded link by link due to its nondisentegrating links, which is very time consuming.

Remarks: Although the Chinese and the North Koreans atill use the RPD, The Soviet Union has replaced the RPD with RPK, much lighter and improved weapon.

This weapon, along with AK-47, and SKS carbine is referred to as "the unholy three." -see unholy three.