JMAT 2.0 Operating Room Requirements Estimation Study

Technical Document for the Office of the Assistant Secretary of Defense for Health Affairs, Force Health Protection and Readiness

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Naval Health Research Center

Document No. 11-10J

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This research was conducted in compliance with all applicable federal regulations governing the protection of human subjects in research.

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Summary

The Office of the Assistant Secretary of Defense for Health Affairs, Force Health Protection and Readiness (OASD(HA)/FHP&R) commissioned Naval Health Research Center and Teledyne Brown Engineering, Inc. (NHRC/TBE) to examine the validity of operating room (OR) throughput algorithms used for requirements estimation in the Joint Medical Analysis Tool (JMAT), Version 2.0. OASD(HA)/FHP&R provided the NHRC/TBE team with access to JMAT and a number of documents for study. Unfortunately, the JMAT documentation did not provide sufficient insight into its algorithms and methodologies. When no workaround was found, OASD(HA)/FHP&R redirected the NHRC/TBE team to develop a methodology for estimating OR requirements without regard to JMAT.

NHRC/TBE succeeded in developing a simple, but accurate, method for OR requirements estimation. The method used data from the Common User Database and patient condition occurrence frequency tables. The products developed for the assigned task included three major deliverables: (a) a technical document describing an expected-value methodology for estimating OR requirements in a theater hospital; (b) algorithms for estimating a special case OR table requirement, assuming the probabilities of entering the OR are either 1 or 0; and (c) an Excel worksheet that calculates the special case OR table estimates.

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Background

The purpose of the study was to examine operating room (OR) throughput algorithms used for requirements estimation in the Joint Medical Analysis Tool (JMAT), Version 2.0. This examination sought to verify the appropriateness of the underlying algorithms. The goal was to explain problems with the implementation, identify shortcomings, and if appropriate, make recommendations for updating requirements to enhance JMAT.

The Office of the Assistant Secretary of Defense for Health Affairs, Force Health Protection and Readiness (OASD(HA)/FHP&R) intended to use the results of this study to ensure JMAT OR model throughput is the most representative and realistic method possible. The Department of Defense will use the study findings to enhance medical planning and programming capabilities for all its component organizations.

Assumptions/Limitations

Because this task was designed to examine the algorithms used in JMAT for OR requirements estimation, the research team assumed that

- documentation of all assumptions, model formulation, and algorithms for the requirements estimation OR would be made available;
- an understanding of the JMAT Course of Action Assessment was not required for this task;
- analysis would be restricted to estimations for Level 3 care;
- the JMAT 2.0 requirements estimation OR module was modified and not the same as JMAT 1.0 or the Medical Analysis Tool (MAT);

- Naval Health Research Center and Teledyne Brown Engineering, Inc. (NHRC/TBE) research team would have authority to run JMAT; and
- NHRC/TBE would have ready access to JMAT developers and analysts.

The team recognized that there was a considerable risk that essential documentation would not be readily available, corporate memory may have been lost, and legacy code changes would not be clearly documented.

Methodology

The planned approach for this study was to obtain JMAT supporting documentation, run the JMAT requirements estimation, and assess the algorithms used to determine the OR requirements. The analysis team would develop scenarios to run in the JMAT requirements estimation OR, and the team would analyze the JMAT requirements estimation OR requirements calculation functionality. NHRC/TBE planned to review the algorithmic flows, sequencing, data requirements, and assumptions used by JMAT to generate requirements estimates. After analysis, if the team determined that the methods were not sufficiently representative, they would develop alternative methods and algorithms. If necessary, the team would conduct a comparative analysis.

OASD(HA)/FHP&R provided the NHRC/TBE team with a JMAT user account and all existing documentation for review. The documentation included the technical report *Wartime medical requirements models: A comparison of MPM, MEPES, and LPX-MED* (Levy, May, & Grogan, 1996), the *Joint Operations Planning and Execution System (JOPES) Medical Planning Module (MPM) Users Manual* (Defense Systems Support Organization, 1992), and the *Software Product Specification (SPS) for Medical Analysis Tool (MAT) 2.0* (Booz-Allen & Hamilton, Inc., 2000). In addition, OASD(HA)/FHP&R provided the following JMAT documents (developed by Akimeka, LLC, in 2010):

- JMAT 2.0 Software Users Manual v1.0.;
- JMAT 2.0 Software Users Manual v1.3;
- JMAT 2.0 Database Design Description v1.3;
- JMAT 2.0 Software Architecture Description v1.3;
- JMAT 2.0 Software Requirements Specification v1.6;
- JMAT 2.0 Student Guide, v1.0; and
- DRAFT Technical Manual and Requirements Traceability Matrix.

The team reviewed the documentation to gain an understanding of the estimating methods used by JMAT to determine the OR requirements. Unfortunately, the existing documentation did not provide sufficient insight into JMAT's algorithms or methodologies. The MAT documentation referenced algorithms, but did not include the defining methodology or assumptions used in their development. The team was unable to locate sufficient evidence stating that the MAT algorithms were used in JMAT 2.0. Another workaround would be required to fulfill the study requirements.

The team ran sample scenarios using JMAT, but insufficient documentation caused the team to question the validity of the requirements estimation's inputs and outputs. The team supposed that JMAT estimated OR requirements by multiplying daily admissions by an OR planning factor (by type). If that was true, all wounded in action casualties would be multiplied by the same OR planning factor. This raised several questions that defied scientific examination. Where did the planning factor (0.1 for wounded in action) originate? Was the factor computed as an average over all the patient conditions, and if so, did it still apply? Is it a unit of time, or is it a unit of a table? These uncertainties led the team to question the equation's validity. As a result, OASD(HA)/FHP&R redirected the NHRC/TBE team to their shift focus. The new study direction became the development of a methodology for estimating OR requirements without regard to JMAT.

NHRC/TBE succeeded in developing a simple, but accurate, method for estimating OR requirements. The proposed approach used data from the Common User Data (CUD) and patient condition occurrence frequency tables. The team verified the probability that a patient will enter the OR and the time s/he will spend there is available in the CUD by *International Classification of Diseases*, 9th Revision, code. This information, along with a patient condition distribution, can provide an expected value estimate that will be a reasonable approximation of the OR table demand per day. The calculation is straightforward and is demonstrated in a Microsoft Excel spreadsheet. The algorithms may be implemented in the JMAT code to run quickly. The goal is to provide a theoretically sound and robust estimation methodology that is supported by the CUD, and to supply documentation that could support verification and validation efforts.

Findings

This study resulted in three major deliverables:

1. A technical document describing an expected value methodology for estimating OR requirements in a Level 3 theater hospital, which was a generalized approach using branching probabilities (see Appendix A).

2. Algorithms for estimating OR table requirements for a special case, assuming the probabilities of entering the OR are either 1 or 0 (see Appendix B).

3. An Excel spreadsheet, which calculates OR table estimates for the special case (see Appendix C; electronic version available upon request).

References

Booz-Allen & Hamilton, Inc. (2000). *Software Product Specification (SPS) for Medical Analysis Tool (MAT) 2.0* (Software Product Specification Manual No. MAT SPS-F-r0.doc). McLean, VA: Author (Document requests referred to: 311 HSW/YAMT, 7909 Lindbergh Drive, Brooks AFB, TX).

Defense Systems Support Organization. (1992). *Joint Operations Planning and Execution System (JOPES) Medical Planning Module (MPM) users manual* (Computer Systems Manual No. CSM UM 231-92). Washington, DC: Author. (Document requests referred to: Directors DSSO, Attn: JNCO, The Pentagon, Washington, D.C., 20301-7010).

Levy, R. A., May, L. J., & Grogan, J. E. (1996). *Wartime medical requirements models: A comparison of MPM, MEPES, and LPX-MED* (Report No. CRM 96-67). Alexandria, VA: Center for Naval Analysis. Retrieved from http://handle.dtic.mil/100.2/ADA323932

Appendix A
An Expected Value Methodology for Estimating OR Requirements

An Expected Value Methodology for Estimating Operating Room Requirements in a Theater Hospital (Level 3)

General Approach

Estimating the requirements for Level 3 OR equipment and staff for a future combat operation, with many uncertain events, is of paramount importance for medical planners. The following proposed method, using basic concepts from probability modeling, determines OR requirements. (The method is also applicable for bed and staff requirements, but is not discussed here.) Before proceeding to the Level 3 methodology, a brief description of the casualty flow network, and the notion of estimating the number of casualties present at selected nodes in the flow network, will be helpful background information.

The left side of Figure 1 shows a simplified representation of expected casualty flow from point of injury to a Level 3 medical treatment facility (MTF). The flow begins with N_0 casualties per unit time occurring across a set of patient conditions, or *International Classification of Diseases*, 9th Revision (ICD-9) coded injury types totaling *n* (e.g., wounded in action [WIA] casualties). It is assumed that injuries occur independently, and those of type *i* occur with a probability of p_i where $p_1 + p_2 + \ldots + p_n = 1$, and expect $N_o \times p_i$ casualties of type i to enter the system. Furthermore, a variance (uncertainty) about this expected value can be described with a mathematical formulation (e.g., a Poisson probability distribution).

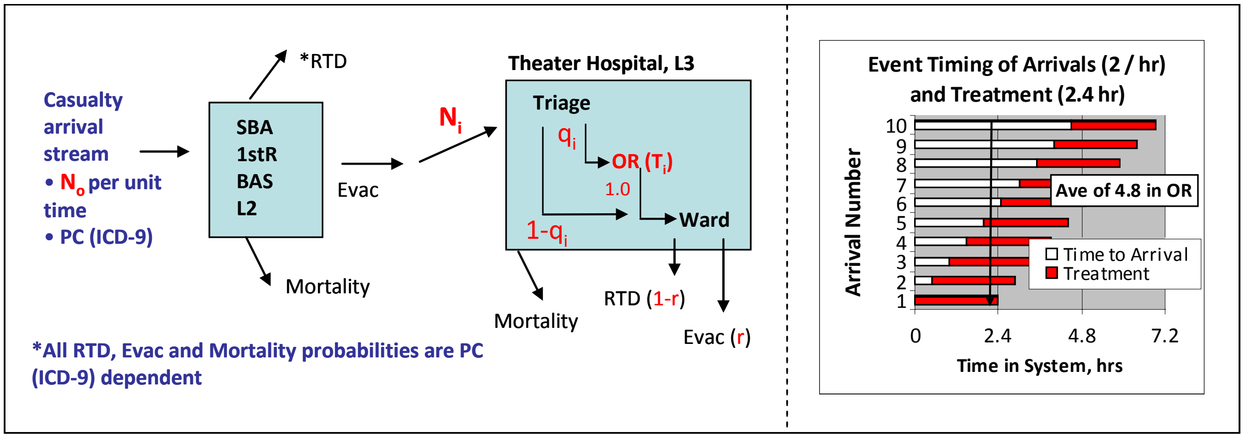


Figure 1. Simplified casualty flow, FA branching, and an example of expected number of casualties in OR.

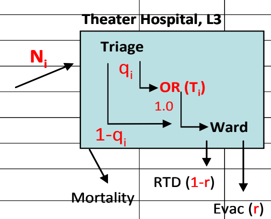
The number of casualties at any node in the flow network can be represented by an expected value (EV) or a probability distribution. For the JMAT requirements estimator, we will use the EV representation. A risk-based methodology (for a 95% estimate) will be explained below (Section 3.0) using a probability distribution. (It was expected that this would provide a better starting point for the course-of-action analysis [COAA] simulation and result in a smaller run matrix for a higher fidelity input estimate.) To finish this section, we briefly discuss the EV methodology proposed to estimate table requirements in Level 3.

In Figure 1, N_i casualties per unit time of an ICD-9 type i casualty are assumed to enter a Level 3 triage functional area (FA) after receiving treatment (and various branching actions) in prior MTFs. In Level 3, we assume that each casualty can branch with conditional probability q_i to the OR or the ward FA, with probability 1 - q_i (depending upon the severity of their injuries). In the OR, the casualty incurs no waiting time and has an expected treatment time of T_i time units. After treatment, the casualty proceeds with certainty to the ward and can be evacuated or returned to duty after a delay, with the notional probabilities shown. Because this level of detail was available in the Joint Readiness Clinical Review Board treatment briefs and Time, Task, Treater files, the research team expects the new CUD to duplicate this detail. Direct evacuation and returned to duty events might also apply from the Triage block, and will be investigated as possible Level 3 branching in the CUD data. The expected secondary impacts of Level 3 mortality events and revisits to the OR for evacuations will also be investigated. This branching notion would also apply to the Level 2 FA and could be used to estimate the requirement for OR tables there.

Arriving casualties routed to the OR incur a treatment time, so the number of casualties treated in the OR at an arbitrary point in time translate into a requirement for tables. From elementary queueing theory (no waiting), the expected number of casualties in the OR at an arbitrary point in time is $(N_i \times q_i) \times T_i$, where the term in parentheses is the input rate per unit time and the second term is the delay time in the same units. (This result is commonly observed in service organizations where items are assumed to enter at a certain rate and exit after a specified time, characterized as self-service.) In reality, casualties would most likely incur some waiting time. This approach, of opening up the OR, can tell us how many tables are needed to service all demands (in an EV sense). The right-hand side of Figure 1 shows an example of $N_i \times q_i = 2$ arrivals per hour to the OR where the treatment time is assumed to be $T_i = 2.4$ hours. The graph shows that most of the time five casualties are in the OR, and a few times four casualties are there, for an average of 4.8. OR shift length, tables assigned to each OR, and a rounding-off scheme could be applied next. For example, for a 24-hr shift, assigning two tables per OR and rounding-up to the next integer, gives a requirement for three ORs. The next section shows a small hypothetical example using Excel to compute table and room requirements.

Example Excel Calculations

The spreadsheet below illustrates how easy it would be to calculate the requirements estimations outlined above, for individual ICD-9 items (e.g., WIA), and the entire set. The NHRC/TBE team believes that mortality effects can be easily added, and expects that bed requirements (in the ward for example) can be estimated in the same way.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
4															
5	Inputs in Gray boxes; output (yellow) for tables														
6	Expected														
7	Casualties														
8	per day, N														
9	(WIAs,say)														
10	96.0														
11										- - - OR --- - -					
12	Expected		L3 Data Entry							Time	Exp				
13	# cas		all prob'l & times cond'l on type			- - - Triage - - -				in OR	Time in			- - Ward - -	
14	per hr=		ICD9	Pr of	pr Survive	Pr	Pr to	(ck)		/cas if	OR /cas, ET	Pr		Pr	Pr
15	4		types	ICD9, p	to L3, ps	to W	OR, q_i	Sum		enter, T_i (hrs)	(T_i*q_i, hrs)	To W		Evac	RTD
16			1	0.20	1.00	0.25	0.75	1.00		3	2.3	1.0		0.90	0.10
17	24		2	0.15	1.00	0.20	0.80	1.00		4	3.2	1.0		0.80	0.20
18	hr		3	0.20	1.00	1.00		1.00		0	0.0	1.0		0.95	0.05
19	operation		4	0.20	1.00	0.50	0.50	1.00		5	2.5	1.0		0.25	0.75
20			5	0.25	1.00	1.00		1.00		0	0.0	1.0		0.30	0.70
21	2		sum=	1.00											
22	# tables									Expected T /cas =	1.43				
23	per OR										(weighted average over types)				
24	room		Calculations for Expected Number in L3 OR and # Tables												
25					Expected	Expected									
26					# Cas / day	# Cas/hr		Expected							
27			ICD9		N*p*ps	to L3, Ni		# in							
28			types		to L3	N*p*ps/24=λ		OR (λ*ET)		* # cas in OR is					
29			1		19.2	0.80		1.8		# of tables					
30			2		14.4	0.60		1.9		required					
31			3		19.2	0.80		0.0							
32			4		19.2	0.80		2.0							
33			5		24.0	1.00		0.0							
34				sum=	96.0	4.00		5.72	A. * Tot tables						
35									req'd across all types						
36							OR rooms	3							

Figure 2. An example of Excel requirements estimations calculated for individual ICD-9s, or entire sets.

Proposed Follow-on Research

While considering that certain casualty flow events in an MTF network can be described by a probability distribution, researchers noted a potential follow-on research topic. This topic is described here as a risk-based OR table estimate to initialize the COAA simulation using a probability model extension of the EV methodology.

A probability distribution of the number of casualties in a particular FA, such as the OR in Figure 1, can be approximated by a set of assumptions concerning the arrival, branching, and treatment processes (e.g., arrivals are due to a Poisson process, branching is due to a Bernoulli process, and treatment is a self-service type queueing system). An assumption-based distribution can be tested against empirical data, or compared to COAA simulation results. The purpose of having a distribution based on assumptions and data is to be able to make OR table requirement estimates with a high level of confidence and in a very quick manner. An EV estimate typically represents approximately a 50% confidence level, but we may desire a higher confidence level as a start for the COAA simulation. If we have to start the simulation with an estimate from the requirements estimation process that is only a rough order of magnitude, then a large run matrix must be considered to determine a confidence based estimate with a small variance. If an accurate table requirement can be obtained from the requirements estimation process, then fewer runs would be necessary for the COAA. It is this idea that the research team would like to explore in a follow-on effort.

The assumptions above (the various chance events, called random variables in probability modeling) are often cited in the literature of network studies.

Section 1.0 illustrated that the expected input rate to the OR FA for ICD-9 injury type i was $N_i \times q_i$ per unit time. With a few assumptions, it can be shown that the distribution for the number of casualties in the OR at a point in time is Poisson distributed (but with an EV of $N_i \times q_i \times T_i$, the average result we showed to be applicable in section 1). This result illustrates how the EV result can be extended to a risk-based approach by using the associated probability distribution.

Figure 3 shows (for the example in Figure 1) an average of 4.8 casualties in the OR, and the distribution about this average. Both the individual probabilities (PDF) and cumulative probabilities (CDF) are shown for the number of casualties in the OR. By referring to the y-axis scale on the right side of the graph, a chosen confidence level can be identified, along with a corresponding number of casualties on the x-axis as an upper limit. In Figure 3, find that where the EV for the number of casualties in the OR is 4.8, there is a 95% confidence level that the upper limit of casualties in the OR is eight. This would be the table value (vice 4.8) used to determine initial OR requirements for COAA.

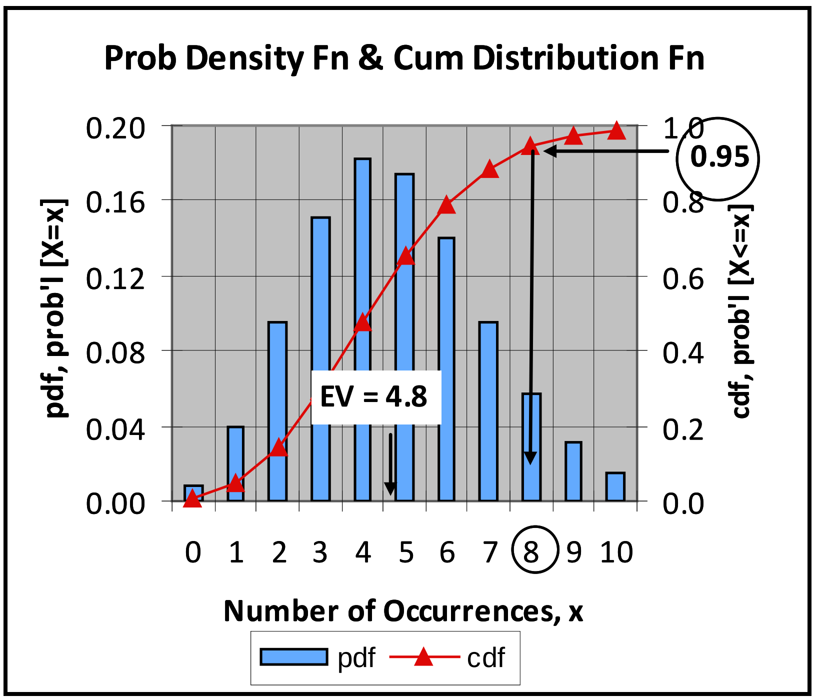


Figure 3. Distribution of number of occurrences in OR (EV and 95% confidence)

Figure 4 shows another example of how well the estimates, using the expected value methodology, matches computer program simulation results. In this example, researchers were interested in the estimate and upper 95% limit for the number of casualties being evacuated in a seabasing scenario (indicated as final evacuations [FE] in the chart). Based on associated network parameters (which are not shown), the average output was estimated to be 0.90 per day—simulated output for a 100-replication analysis in the Tactical Medical Logistics Planning Tool (TML+) model gave an average of 0.86. Comparing the distributions, assumption-based as above with the results for the 100 replications, we get the very nice agreement shown in the Figure 4. The benefit of this approach is that the EV and distributions can be determined using Microsoft Excel, and the calculation speed is almost instantaneous. This approach deserves closer examination.

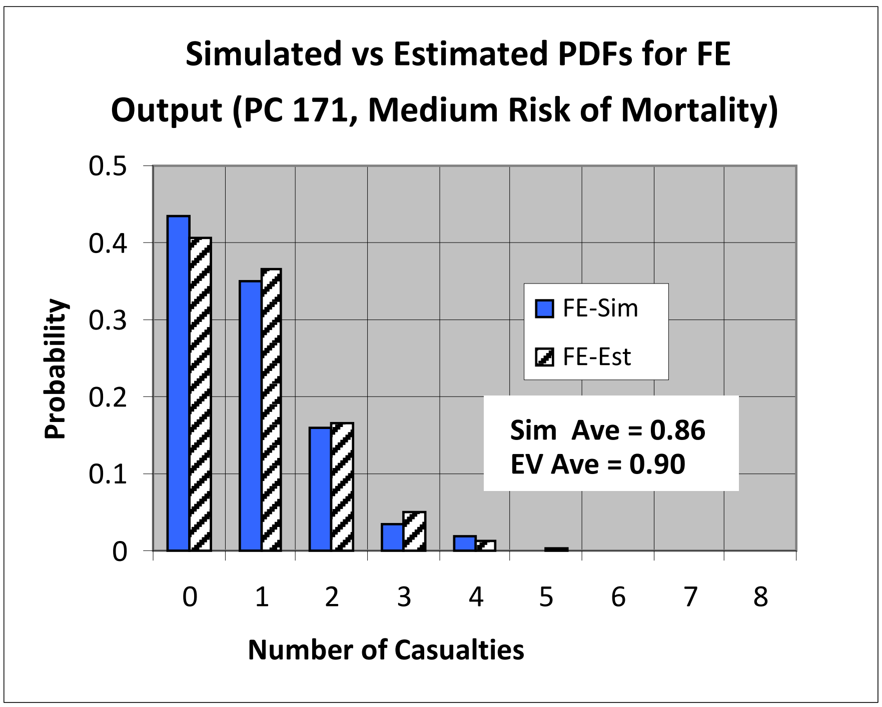


Figure 4. Comparing the assumption-based model with TML+ simulation outcomes.

A Special Case of the Tables Formula for OR Branching Equal Zero or Unity

1. For n types of ICD-9 WIA casualties, a <u>general expression</u> for the expected total tables required in OR is Σ [$N \times p_i \times q_i$] $\times T_i$ where the summation is from 1 to n. (Arrivals to Level 3 are denoted here by $N \times p_i$). If CUD data were not available for the generalized

approach involving q_i branching probabilities as shown in Figure 1, then the following would be a simplified version if subject matter expert results could be used to indicate surgery (yes or no) by ICD-9 type.

2. Consider that $q_i = 1$ for h of the n types and equal 0 for the remainder. Assuming the ICD-9 types are ordered so that $q_i = 1$ for the 1st h types, and $q_i = 0$ for the remaining $n - h$ types, the general expression can be written as $\Sigma\ [N \times p_i \times 1] \times T_i$ from 1 to h plus $\Sigma\ [N \times p_i \times 0] \times T_i$ from $i = h + 1$ to n. This obviously reduces to $\Sigma\ [N \times p_i \times T_i]$ from $i = 1$ to h, and factoring out N, we get $N \times \Sigma\ [p_i \times T_i]$.
    a. This simplified expression, $N \times \Sigma\ [p_i \times T_i]$ summed from 1 to h, could be easily computed. It can also be approximated if we are willing to assume that the OR times are not too varied.
        i. If we can represent the T_i values with a constant, say an average of the T_i values, we could substitute T' for each T_i and write $N \times \Sigma\ [p_i \times T_i] \cong N \times [\Sigma\ p_i] \times T'$ where the $[\Sigma\ p_i]$ terms corresponds to the % of types that go to OR. The term $N \times [\Sigma\ p_i]$ then corresponds to the expected number of casualties per unit time going to OR. Multiplying by the T' value would give $N \times [\Sigma\ p_i] \times T'$ as the expected total number of tables required. A quick estimate would be the number of casualties per unit time, multiplied by the % that go to OR, multiplied by the estimated time in OR if they go (same time units). For T' candidates:
        ii. Use $T' = \Sigma\ [T_i / h]$ or an average of the OR times for the various h types who can go there (with probability 1.0). The estimate of total table

requirements would be $N \times [\Sigma p_i] \times \Sigma [T_i/h]$, or number expected to go to OR, multiplied by their estimated time in OR. Another candidate for *T*' would be to use the patient condition and occurrence frequency values of p_i and take a weighted average of the OR times for those ICD-9 types that have surgery.

iii. JMAT 2.0 appears to use a factor of *T*''= 0.1 of a day or 2.4 hours as an estimate for time in the OR, but their estimate appears to be over all the types, where a time of 0 is taken for those who do not go. Thus they have, it appears, a total table requirement given by $N \times T''$ or total casualties input per unit time to Level 3, multiplied by the average time in the OR (yes or no).

Appendix B
Operating Room Requirement Estimation Methodology

Let ICD-9_i be a 336 × 1 vector of Defense Medical Materiel Program Office ICD-9 codes where 1 ≤ $_i$ ≤ 336

Define a 336 × 1 vector SURG s.t. $SURG_i$ = { if ICD-9_i requires a surgical procedure; 0, otherwise } $\forall i, 1 \leq i \leq 336$

Let $COUNT_{surg} = \sum_{i=1}^{336} SURG_i$ = scalar

As determined from Time, Task, Treater files, (or based on subject matter expert input) define the vector

Define TSURG 1 × 336 s.t. $TSURG_i$ = { The time (in hours) for the surgical procedure, if $SURG_i = 1$; 0, otherwise } $\forall i, 1 \leq i \leq 336$

Then, SURG_T_AVG = $[SURG]^T \times [TSURG] / COUNT_{SURG}$, which is a scalar that is the average time (in hours) for surgery, given that surgery is necessary. Where $[SURG]^T$ is the transpose of SURG and $[SURG]^T \times [TSURG]$ is the inner product of the two vectors.

Define RECUR s.t. $RECUR_i$ = { The recurrence interval (in days) if $SURG_i$ requires follow-up procedure; 0, otherwise } $\forall i, 1 \leq i \leq 336$

Let EVAC be the evacuation policy (in days). Where 0 ≤ EVAC ≤ 15.

Define 336 × 1 FOLLOWUP s.t. $FOLLOWUP_i$ = { 1, if $RECUR_i \leq EVAC$ and $RECUR_i \neq 0$; 0, otherwise } $\forall i, 1 \leq i \leq 336$

Let $COUNT_{FOLLOWUP} = \sum_{i=1}^{336} \text{FOLLOWUPi}$

Then, FOLLOWUP_T_AVG = $[FOLLOWUP]^T \times [TSURG] / COUNT_{FOLLOWUP}$ which is a scalar that is the average time (in hours) for surgery, given that a follow-up surgery is necessary.

Let $PCOFWIA_i$, $PCOFNBI_i$, and $PCOFDIS_i$ be vectors of the probability of occurrence for each ICD-9 diagnostic code (PCOF = patient condition and occurrence frequency) for wounded in action (WIA), nonbattle injury (NBI), and disease (DIS) respectively, such that

$$\sum_{i=1}^{336} \text{PCOFWIAi} = 1, \sum_{i=1}^{336} \text{PCOFNBIi} = 1, and\ \sum_{i=1}^{336} \text{PCOFDISi} = 1$$

Let P_{WIA}, P_{NBI}, and P_{DIS} be the probability of occurrence of WIA, NBI, or DIS respectively in the patient stream, such that $P_{WIA}+P_{NBI} + P_{DIS} = 1$.

Let $P_{S|W} = [PCOFWIA] \times [SURG]^T$ = the probability (scalar) that surgery is required given the patient is WIA.

Let $P_{S|N}$ be similar for NBI

Let $P_{S|D}$ be similar for DIS

Let $P_{F|W} = [PCOFWIA] \times [FOLLOWUP]^T$ = the probability (scalar) that follow-up surgery is required given the patient is WIA.

Let $P_{F|N}$ be similar for NBI

Let $P_{F|D}$ be similar for DIS

Let OPHRS be the time (in hours) that an operating room (OR) can be operated per day.

Where $1 \leq OPHRS \leq 24$.

Let SETUP be the time (in hours) to restore an OR and make it ready for the next patient.

Where $0 \leq SETUP \leq 4$

Let THRUPUT be an integer value of the expected number of patient presentations per day.

Let $P_{SURG} = (P_{WIA} \times (P_{S|W} + P_{F|W})) + (P_{NBI} \times (P_{S|N} + P_{F|N})) + (P_{DIS} \times (P_{S|D} + P_{F|W}))$ = total probability that surgery is needed.

And, the probability that a surgery is the first surgery needed by that patient given there is a surgery is:

$$P_S = (P_{WIA} \times P_{S|W} + P_{NBI} \times P_{S|N} + P_{DIS} \times P_{S|D}) / P_{SURG}$$

While the probability that the surgery is a follow-on procedure given there is a surgery is:

$$P_F = 1 - P_S$$

Then, the expected number of surgeries per day is:

$$E[surgeries] = P_{SURG} \times THRUPUT$$

Thus the expected daily load (in hours) is:

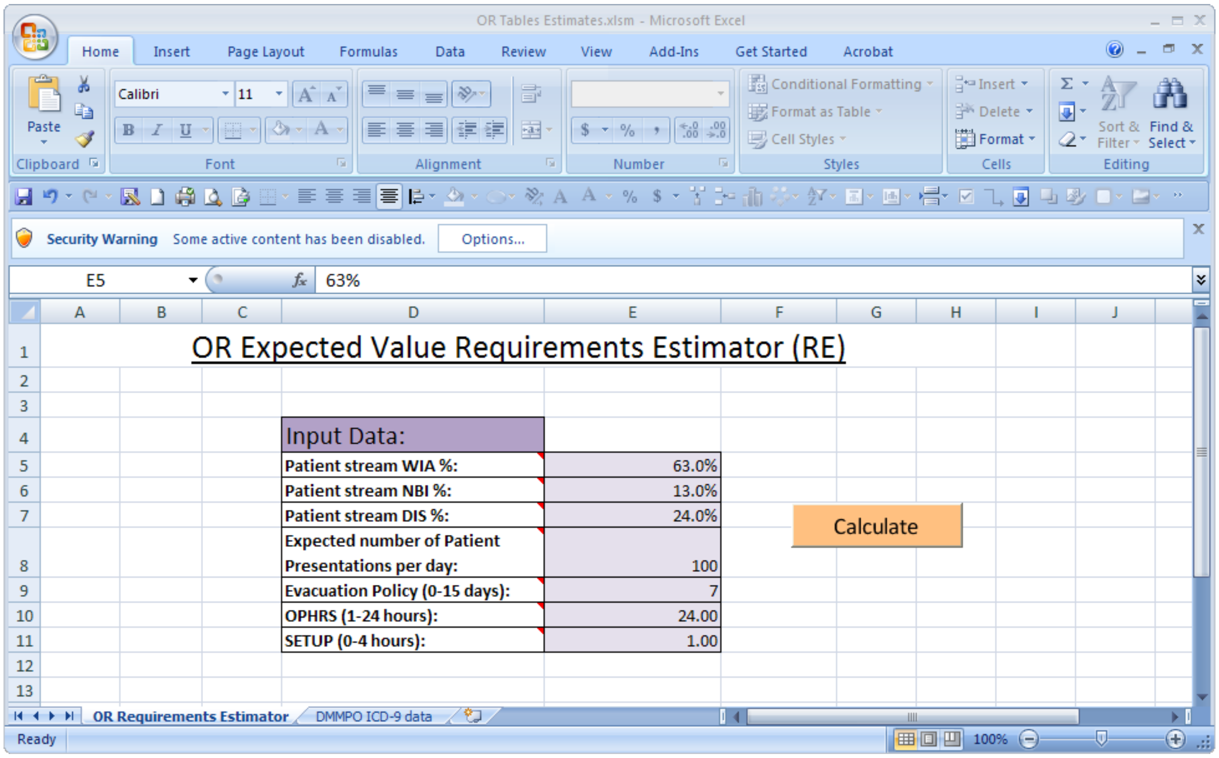
$$DEMAND = E[surgeries] \times [P_S \times (SURG\_T\_AVG + SETUP) + P_F \times (FOLLOWUP\_T\_AVG + SETUP)]$$

$$\text{Let } TIME\_CONSTRAINT = \begin{cases} OPHRS, \text{ if } OPHRS \leq 24 \\ 24, \text{ otherwise} \end{cases}$$

Determine the number of Operating Tables as:

$$\text{Thus, } NUMB\_OR = \begin{cases} 1, \text{ if } DEMAND \leq TIME\_CONSTRAINT \\ ROUND[(DEMAND / TIME\_CONSTRAINT) + .5)], \text{ otherwise} \end{cases}$$

Appendix C
Operating Room Requirements Estimator



Electronic version available upon request.

OR Expected Value Requirements Estimator (RE)

Input Data:	
Patient stream WIA %:	63.0%
Patient stream NBI %:	13.0%
Patient stream DIS %:	24.0%
Expected number of Patient Presentations per day:	100
Evacuation Policy (0-15 days):	7
OPHRS (1-24 hours):	24.00
SETUP (0-4 hours):	1.00

Calculate

$ICD9_i$	$ICD9_i$ DESC	$PCOFWIA_i$	$PCOFDIS_i$	$PCOFNBI_i$	$SURG_i$	$TSURG_i$	$RECUR_i$	$FOLLOWUP_i$	$TFOLLOWUP_i$	$P_{S\|W(i)}$	$P_{S\|N(i)}$	$P_{S\|D(i)}$	$P_{F\|W(i)}$	$P_{F\|N(i)}$	$P_{F\|D(i)}$
890	Open Wound of Hip and Thigh	4.593%	0.00%	0.7%	1	1.000	0	0	0.000	0.0459	0.0068	0.0000	0.0000	0.0000	0.0000
801.76	Open Frature Base of Skull w/Subarach, Subdural, Extradural Hem	3.315%	0.00%	0.3%	1	1.000	0	0	0.000	0.0332	0.0033	0.0000	0.0000	0.0000	0.0000
823.9	Fracture of Unspec Part of Tibia and Fibula Open	3.140%	0.00%	0.4%	1	3.767	0	0	0.000	0.0314	0.0040	0.0000	0.0000	0.0000	0.0000
880	Open Wound Shoulder Upper Arm	2.906%	0.00%	0.3%	1	1.583	0	0	0.000	0.0291	0.0031	0.0000	0.0000	0.0000	0.0000
813.9	Fracture of Unspec Part of Radius w/Ulna Open	2.596%	0.00%	0.7%	1	4.533	2	1	4.533	0.0260	0.0066	0.0000	0.0260	0.0066	0.0000
941	Burn of Face, Head, Neck	2.142%	0.00%	0.7%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
897	Traumatic Amputation of Leg(s) (Complete, Partial)	1.977%	0.00%	0.1%	1	1.567	0	0	0.000	0.0198	0.0006	0.0000	0.0000	0.0000	0.0000
816.1	Phalanges FX, Open	1.762%	0.00%	1.6%	1	4.283	0	0	0.000	0.0176	0.0158	0.0000	0.0000	0.0000	0.0000
863.0	Injury to Stomach w/o Open Wound into Cavity	1.756%	0.00%	0.3%	1	3.150	0	0	0.000	0.0176	0.0029	0.0000	0.0000	0.0000	0.0000
824.9	Ankle FX, Open	1.752%	0.00%	0.3%	1	1.000	2	1	1.000	0.0175	0.0030	0.0000	0.0175	0.0030	0.0000
821.11	FX Femur Shaft, Open	1.698%	0.00%	0.2%	1	3.700	0	0	0.000	0.0170	0.0020	0.0000	0.0000	0.0000	0.0000
826.0	Closed Fracture of One or More Phalanges Foot	1.648%	0.00%	0.8%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
810.1	Clavicle FX, Open	1.455%	0.00%	0.2%	1	1.333	0	0	0.000	0.0145	0.0020	0.0000	0.0000	0.0000	0.0000
904	Injury to Blood Vessels of Lower Extremity and Unspec Sites	1.138%	0.00%	0.2%	1	2.767	0	0	0.000	0.0114	0.0017	0.0000	0.0000	0.0000	0.0000
903	Injury to Blood Vessels of Upper Extremity	1.078%	0.00%	0.2%	1	4.100	2	1	4.100	0.0108	0.0018	0.0000	0.0108	0.0018	0.0000
824.8	Ankle FX, Closed	1.019%	0.00%	5.4%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
944	Burn of Wrist(s) and Hand(s)	0.964%	0.00%	0.8%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
801_802	Fracture of base of skull	0.909%	0.00%	0.0%	1	2.700	0	0	0.000	0.0091	0.0000	0.0000	0.0000	0.0000	0.0000
892.0	Open Wound Foot, except toes, alone w/o Complications	0.859%	0.00%	0.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
865	Injury to Spleen	0.797%	0.00%	0.3%	1	3.350	2	1	3.350	0.0080	0.0033	0.0000	0.0080	0.0033	0.0000
879.2	Open Wound of Abdominal Wall Anterior w/o Complication	0.739%	0.00%	0.2%	1	2.050	0	0	0.000	0.0074	0.0015	0.0000	0.0000	0.0000	0.0000
896	Traumatic Amputation of Foot (Complete) (Partial)	0.729%	0.00%	0.0%	1	1.300	0	0	0.000	0.0073	0.0001	0.0000	0.0000	0.0000	0.0000
817.1	Multiple Open Fracture of Hand Bones	0.684%	0.00%	0.2%	1	3.883	0	0	0.000	0.0068	0.0024	0.0000	0.0000	0.0000	0.0000
810.12	Open Fracture of Shaft of Clavicle	0.672%	0.00%	0.1%	1	3.350	0	0	0.000	0.0067	0.0010	0.0000	0.0000	0.0000	0.0000
861.3	Lung Injury w/Open Wound into Thorax	0.669%	0.00%	0.0%	1	2.583	0	0	0.000	0.0067	0.0004	0.0000	0.0000	0.0000	0.0000
886	Traumatic Amputation of Other Finger(s) (Complete, Partial)	0.669%	0.00%	0.9%	1	3.033	0	0	0.000	0.0067	0.0092	0.0000	0.0000	0.0000	0.0000
887	Traumatic Amputation of Arm and Hand (Complete, Partial)	0.669%	0.00%	0.0%	1	2.717	0	0	0.000	0.0067	0.0004	0.0000	0.0000	0.0000	0.0000
806.1	Open Fracture of Cervical Vertebra w/Spinal Cord Injury	0.659%	0.00%	1.0%	1	2.567	0	0	0.000	0.0066	0.0096	0.0000	0.0000	0.0000	0.0000
802_873	Fracture of face bones	0.606%	0.00%	0.0%	1	2.383	0	0	0.000	0.0061	0.0000	0.0000	0.0000	0.0000	0.0000
959.01	Other and Unspec Injury to Head	0.599%	0.00%	1.9%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
802.9	Open Fracture of Other Facial Bones	0.556%	0.00%	0.1%	1	1.833	2	1	1.833	0.0056	0.0010	0.0000	0.0056	0.0010	0.0000
853.00	Other and Unspec Intracranial Hemorrhage Injury w/o Open Wound	0.543%	0.00%	0.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
864.10	Unspec Injury to Liver w/Open Wound into Cavity	0.488%	0.00%	0.1%	1	1.717	0	0	0.000	0.0049	0.0006	0.0000	0.0000	0.0000	0.0000
884.0	Multiple and Unspec Open Wound of Upper Limb w/o Complication	0.479%	0.00%	0.1%	1	2.383	0	0	0.000	0.0048	0.0012	0.0000	0.0000	0.0000	0.0000
820.9	Femur Neck FX, Open	0.479%	0.00%	0.0%	1	0.000	0	0	0.000	0.0048	0.0002	0.0000	0.0000	0.0000	0.0000
945	Burn of Lower Limb(s)	0.474%	0.00%	0.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
821.01	FX Femur Shaft, Closed	0.459%	0.00%	0.4%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
801_873	Fracture of base of skull	0.447%	0.00%	0.0%	1	1.967	0	0	0.000	0.0045	0.0000	0.0000	0.0000	0.0000	0.0000
802.7	Fracture Orbital Floor Open (blowout)	0.436%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
878	Open Wound of Genital Organs (ext) including Traumatic Amputation	0.429%	0.00%	0.2%	1	4.633	2	1	4.633	0.0043	0.0015	0.0000	0.0043	0.0015	0.0000
823.82	TIB/FIB FX, Closed	0.429%	0.00%	2.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
801.0	Closed Fracture of Base of Skull w/o Intracranial Injury	0.419%	0.00%	0.5%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
813.8	Fracture of Unspec Part of Radius and Ulna, Closed	0.419%	0.00%	3.4%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
811.1	Fracture of Scapula, Open	0.389%	0.00%	0.0%	1	1.733	0	0	0.000	0.0039	0.0003	0.0000	0.0000	0.0000	0.0000
894.0	Multiple and Unspecified Open Wound of Lower Limb w/o Complications	0.389%	0.00%	0.1%	1	0.000	0	0	0.000	0.0039	0.0005	0.0000	0.0000	0.0000	0.0000
800.0	Closed Fracture of Vault of Skull w/o Intracranial Injury	0.379%	0.00%	0.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
860.0	Traumatic Pneumothorax w/o Open Wound into Thorax	0.345%	0.00%	0.1%	1	4.183	0	0	0.000	0.0034	0.0014	0.0000	0.0000	0.0000	0.0000
870.3	Penetrating Wound of Orbit w/o Foreign Body	0.345%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
802.0	Closed Fracture of Nasal Bones	0.335%	0.00%	1.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
866.1	Injury to Kidney with Open Wound Into Cavity	0.321%	0.00%	0.0%	1	2.517	0	0	0.000	0.0032	0.0004	0.0000	0.0000	0.0000	0.0000
808.9	Fracture of Pelvis Unspec, Open	0.310%	0.00%	0.1%	1	4.933	0	0	0.000	0.0031	0.0005	0.0000	0.0000	0.0000	0.0000
822.1	Open Fracture of Patella	0.290%	0.00%	0.1%	1	0.850	0	0	0.000	0.0029	0.0007	0.0000	0.0000	0.0000	0.0000
890_897	Open wound of hip and thigh	0.289%	0.00%	0.0%	1	0.633	0	0	0.000	0.0029	0.0000	0.0000	0.0000	0.0000	0.0000
852	Subarachnoid Subdural Extradural Hemorrhage Injury	0.276%	0.00%	0.1%	1	3.600	2	1	3.600	0.0028	0.0013	0.0000	0.0028	0.0013	0.0000
853.15	Unspec Intracranial Hemorrhage w/Open Intracranial Wound	0.266%	0.00%	0.1%	1	3.400	2	1	3.400	0.0027	0.0012	0.0000	0.0027	0.0012	0.0000
861.0	Injury to Heart w/o Open Wound into Thorax	0.265%	0.00%	0.1%	1	2.217	0	0	0.000	0.0026	0.0009	0.0000	0.0000	0.0000	0.0000
861.2	Lung Injury w/o Open Wound into Thorax	0.260%	0.00%	0.1%	1	3.050	0	0	0.000	0.0026	0.0012	0.0000	0.0000	0.0000	0.0000
851.00	Cortex Contus, w/o Open Intracranial Wound Concus Inspec	0.256%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
851.01	Cerebral Contusion w/o Open Wound No Loss of Consc	0.256%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
959.09	Other and Unspec Injury Face and Neck	0.250%	0.00%	0.5%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
805_860	Fracture of vertebral column without mention of spinal cord injury	0.245%	0.00%	0.0%	1	4.650	0	0	0.000	0.0025	0.0000	0.0000	0.0000	0.0000	0.0000
807_860	Fracture of ribs sternum larynx and trachea	0.245%	0.00%	0.0%	1	3.617	0	0	0.000	0.0025	0.0000	0.0000	0.0000	0.0000	0.0000
897_958	Traumatic amputation of leg(s) complete or partial	0.245%	0.00%	0.0%	1	2.133	2	1	2.133	0.0025	0.0000	0.0000	0.0025	0.0000	0.0000
805.0	Closed Fracture of Cervical Vertebra w/o Spinal Cord Injury	0.240%	0.00%	0.4%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
802_871	Fracture of face bones	0.231%	0.00%	0.0%	1	2.533	0	0	0.000	0.0023	0.0000	0.0000	0.0000	0.0000	0.0000
805_807	Fracture of vertebral column without mention of spinal cord injury	0.231%	0.00%	0.0%	1	1.250	0	0	0.000	0.0023	0.0000	0.0000	0.0000	0.0000	0.0000
802.8	Closed Fracture of Other Facial Bones	0.226%	0.00%	0.7%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
800_802	Fracture of vault of skull	0.216%	0.00%	0.0%	1	3.817	0	0	0.000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000

821_897	Fracture of other and unspecified parts of femur	0.216%	0.00%	0.0%	1	2.183	0	0	0.000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000
860_958	Traumatic pneumothorax and hemothorax	0.216%	0.00%	0.0%	1	1.000	0	0	0.000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000
806_860	Fracture of vertebral column with spinal cord injury	0.202%	0.00%	0.0%	1	4.617	0	0	0.000	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000
851_873	Cerebral laceration and contusion	0.202%	0.00%	0.0%	1	0.633	2	1	0.633	0.0020	0.0000	0.0000	0.0020	0.0000	0.0000
860_897	Traumatic pneumothorax and hemothorax	0.202%	0.00%	0.0%	1	4.550	0	0	0.000	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000
941_944	Burn of face head neck	0.202%	0.00%	0.0%	1	0.367	0	0	0.000	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000
806.70	Open Fracture Sacrum and Coccyx w/Unspec Spinal Cord Injury	0.200%	0.00%	0.1%	1	1.300	0	0	0.000	0.0020	0.0010	0.0000	0.0000	0.0000	0.0000
930	Foreign Body on External Eye	0.200%	0.00%	2.8%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
802_860	Fracture of face bones	0.188%	0.00%	0.0%	1	4.250	0	0	0.000	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000
802_851	Fracture of face bones	0.188%	0.00%	0.0%	1	3.333	0	0	0.000	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000
808_863	Fracture of pelvis	0.188%	0.00%	0.0%	1	1.050	0	0	0.000	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000
852_873	Subarachnoid subdural and extradural hemorrhage following injury	0.188%	0.00%	0.0%	1	4.533	0	0	0.000	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000
860_890	Traumatic pneumothorax and hemothorax	0.188%	0.00%	0.0%	1	4.283	0	0	0.000	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000
891_897	Open wound of knee leg (except thigh) and ankle	0.188%	0.00%	0.0%	1	2.533	0	0	0.000	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000
942_945	Burn of trunk	0.188%	0.00%	0.0%	1	0.783	0	0	0.000	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000
860.5	Traumatic Pneumohemothorax w/open Wound Into Thorax	0.180%	0.00%	0.0%	1	2.033	0	0	0.000	0.0018	0.0004	0.0000	0.0000	0.0000	0.0000
953.4	Injury to Brachial Plexus	0.180%	0.00%	0.8%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
955.0	Injuty to Axillary Nerve	0.180%	0.00%	0.7%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
801_860	Fracture of base of skull	0.173%	0.00%	0.0%	1	1.033	0	0	0.000	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000
802_805	Fracture of face bones	0.173%	0.00%	0.0%	1	0.433	0	0	0.000	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000
823_897	Fracture of tibia and fibula	0.173%	0.00%	0.0%	1	1.450	0	0	0.000	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000
863_902	Injury to gastrointestinal tract	0.173%	0.00%	0.0%	1	0.800	0	0	0.000	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000
881_897	Open wound of elbow forearm and wrist	0.173%	0.00%	0.0%	1	3.633	2	1	3.633	0.0017	0.0000	0.0000	0.0017	0.0000	0.0000
941_945	Burn of face head neck	0.173%	0.00%	0.0%	1	2.983	0	0	0.000	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000
944_945	Burn of wrist(s) and hand(s)	0.173%	0.00%	0.0%	1	4.583	0	0	0.000	0.0017	0.0000	0.0000	0.0000	0.0000	0.0000
812.00	Fracture of Unspec Part of Upper End of Humerus, Closed	0.170%	0.00%	0.7%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
867.0	Injuty to Bladder Urethra wihtout NJURY TO BLADDER URETHRA WIT	0.168%	0.00%	0.1%	1	2.000	0	0	0.000	0.0017	0.0006	0.0000	0.0000	0.0000	0.0000
866.0	Injury Kidney w/o Open Wound	0.166%	0.00%	0.1%	1	4.417	0	0	0.000	0.0017	0.0011	0.0000	0.0000	0.0000	0.0000
802_870	Fracture of face bones	0.159%	0.00%	0.0%	1	1.400	0	0	0.000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000
802_821	Fracture of face bones	0.159%	0.00%	0.0%	1	0.617	0	0	0.000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000
802_880	Fracture of face bones	0.159%	0.00%	0.0%	1	2.700	0	0	0.000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000
807_861	Fracture of ribs sternum larynx and trachea	0.159%	0.00%	0.0%	1	0.967	0	0	0.000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000
813_897	Fracture of radius and ulna	0.159%	0.00%	0.0%	1	1.817	0	0	0.000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000
860_873	Traumatic pneumothorax and hemothorax	0.159%	0.00%	0.0%	1	1.967	0	0	0.000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000
863_897	Injury to gastrointestinal tract	0.159%	0.00%	0.0%	1	1.033	0	0	0.000	0.0016	0.0000	0.0000	0.0000	0.0000	0.0000
941_942	Burn of face head neck	0.159%	0.00%	0.0%	1	0.650	2	1	0.650	0.0016	0.0000	0.0000	0.0016	0.0000	0.0000
867.1	Injuryt to Bladder Urethra w/Open Wound into Cavity	0.150%	0.00%	0.0%	1	4.983	0	0	0.000	0.0015	0.0003	0.0000	0.0000	0.0000	0.0000
956.0	Injury to Sciatic Nerve	0.150%	0.00%	0.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
800_873	Fracture of vault of skull	0.144%	0.00%	0.0%	1	1.883	0	0	0.000	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000
801_805	Fracture of base of skull	0.144%	0.00%	0.0%	1	1.667	0	0	0.000	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000
802_823	Fracture of face bones	0.144%	0.00%	0.0%	1	4.000	0	0	0.000	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000
802_891	Fracture of face bones	0.144%	0.00%	0.0%	1	4.783	0	0	0.000	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000
807_958	Fracture of ribs sternum larynx and trachea	0.144%	0.00%	0.0%	1	4.033	0	0	0.000	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000
812_821	Fracture of humerus	0.144%	0.00%	0.0%	1	0.550	0	0	0.000	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000
823_958	Fracture of tibia and fibula	0.144%	0.00%	0.0%	1	3.883	0	0	0.000	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000
823_860	Fracture of tibia and fibula	0.144%	0.00%	0.0%	1	4.000	0	0	0.000	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000
861_873	Injury to heart and lung	0.144%	0.00%	0.0%	1	4.400	0	0	0.000	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000
861.10	Unspec Injury of Heart w/Open Wound into Thorax	0.140%	0.00%	0.0%	1	3.933	0	0	0.000	0.0014	0.0001	0.0000	0.0000	0.0000	0.0000
879.8	Open Wound(s) (Multiple) of Unspec Site(s) w/o Complication	0.140%	0.00%	0.2%	1	4.750	0	0	0.000	0.0014	0.0017	0.0000	0.0000	0.0000	0.0000
885	Traumatic Amputation of Thumb (complete, Partial)	0.130%	0.00%	0.2%	1	2.500	0	0	0.000	0.0013	0.0017	0.0000	0.0000	0.0000	0.0000
959.7	Other and Unspec Injury to Knee, Leg, Ankle, Foot	0.130%	0.00%	0.8%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
802.6	Fracture Orbital Floor closed (blowout)	0.128%	0.00%	0.5%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
867.2	Injurty to Ureter w/o Open Wound into Cavity	0.118%	0.00%	0.0%	1	4.817	1	1	4.817	0.0012	0.0004	0.0000	0.0012	0.0004	0.0000
895	Traumatic Amputation of Toe(s) (Complete, Partial)	0.110%	0.00%	0.1%	1	3.233	0	0	0.000	0.0011	0.0011	0.0000	0.0000	0.0000	0.0000
820.8	Femur, Neck FX, Closed	0.110%	0.00%	0.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
815.0	Closed Fracture of Metacarpal Bones	0.103%	0.00%	2.5%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
860.4	Traumatic Pneumohemothorax w/o Open Wound into Thorax	0.090%	0.00%	0.0%	1	0.533	0	0	0.000	0.0009	0.0003	0.0000	0.0000	0.0000	0.0000
860.1	Traumatic Pneumothorax w/open Wound into Thorax	0.070%	0.00%	0.0%	1	2.500	0	0	0.000	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000
860.3	Traumatic Hemothorax w/open Wound into Thorax	0.070%	0.00%	0.0%	1	0.800	0	0	0.000	0.0007	0.0002	0.0000	0.0000	0.0000	0.0000
928	Crushing Injury of Lower Limb	0.070%	0.00%	0.6%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
806.3	Open Fracture of Dorsal Vertebra w/Spinal Cord Injury	0.060%	0.00%	0.0%	1	0.867	0	0	0.000	0.0006	0.0002	0.0000	0.0000	0.0000	0.0000
806.4	Closed Fracture of Lumbar Spine w/Spinal Cord Injury	0.060%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
806.2	Closed Fracture of Dorwal Vertebra w/Spinal Cord Injury	0.050%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
810.0	Clavicle FX, Closed	0.050%	0.00%	0.7%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
811.0	Fracture of Scapula, Closed	0.050%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
927	Crushing Injury of Upper Limb	0.050%	0.00%	1.4%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
806.5	Open Fracture of Lumbar Spine w/Spinal Cord Injury	0.040%	0.00%	0.0%	1	1.933	0	0	0.000	0.0004	0.0002	0.0000	0.0000	0.0000	0.0000
807.1	Open Fracture of Ribs	0.040%	0.00%	0.0%	1	0.000	0	0	0.000	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000
822.0	Closed Fracture of Patella	0.040%	0.00%	0.4%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
836.5	Dislocation Knee, Closed	0.035%	0.00%	0.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
829.0	Fracture of Unspec Bone Closed	0.030%	0.00%	1.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

950	Injury to Optic Nerve and Pathways	0.030%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
836.6	Other Dislocation of Knee Open	0.015%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
817.0	Multiple Closed Fractures of Hand Bones	0.013%	0.00%	0.6%	1	1.117	0	0	0.000	0.0001	0.0059	0.0000	0.0000	0.0000	0.0000
860.2	Traumatic Hemothorax w/o Open Wound into Thorax	0.010%	0.00%	0.0%	1	0.950	0	0	0.000	0.0001	0.0003	0.0000	0.0000	0.0000	0.0000
831.04	Closed Dislocation of Acromioclaviular Joint	0.010%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
831.1	Open Dislocation of Shoulder	0.010%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
833.0	Wrist Dislocation, Closed	0.010%	0.00%	0.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
833.1	Wrist Dislocation, Open	0.010%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
835.0	Closed Dislocation of Hip	0.010%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
836.0	Medical Meniscus Tear Knee	0.010%	0.00%	3.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
953.0	Injury to Cervical Nerve Root	0.010%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
807.2	Closed Fracture of Sternum	0.005%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
836.1	Lateral Meniscus Tear Knee	0.005%	0.00%	1.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
836.2	Meniscus Tear of Knee, NOS	0.005%	0.00%	2.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
541	Acute Appendicitis	0.000%	1.78%	0.0%	1	0.467	0	0	0.000	0.0000	0.0000	0.0178	0.0000	0.0000	0.0000
553.1	Umbilical Hernia	0.000%	0.94%	0.0%	1	3.967	0	0	0.000	0.0000	0.0000	0.0094	0.0000	0.0000	0.0000
553.9	Hernia NOS	0.000%	0.16%	0.0%	1	1.917	2	1	1.917	0.0000	0.0000	0.0016	0.0000	0.0000	0.0016
574	Cholelithiasis	0.000%	1.39%	0.0%	1	4.550	0	0	0.000	0.0000	0.0000	0.0139	0.0000	0.0000	0.0000
592	Calculus of Kidney	0.000%	4.31%	0.0%	1	4.050	0	0	0.000	0.0000	0.0000	0.0431	0.0000	0.0000	0.0000
867.3	Injury to Ureter w/open Wound into Cavity	0.000%	0.00%	0.0%	1	4.317	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
867.4	Injurty to Uterus w/o Open Wound into Cavity	0.000%	0.00%	0.0%	1	2.817	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
867.5	Injury to Uterus w/open Wound into Cavity	0.000%	0.00%	0.0%	1	2.533	2	1	2.533	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
925	Crushing Injury of Face, Scalp, & Neck	0.000%	0.00%	0.0%	1	3.450	0	0	0.000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000
E991.2	Injury Due to War Ops from Other Bullets (not rubber/pellets)	0.000%	0.00%	0.0%	1	3.650	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E991.3	Injury Due to War Ops from Antipersonnel Bomb Fragments	0.000%	0.00%	0.0%	1	3.267	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E991.9	Injury Due to War Ops other Unspec Fragments	0.000%	0.00%	0.0%	1	2.733	2	1	2.733	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42	HIV	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
70.1	Viral Hepatitis	0.000%	0.21%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
410	Myocardial Infarction	0.000%	0.70%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
806.60	Closed Fracture Sacrum and Coccyx w/Unspec Spinal Cord Injury	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
807.3	Open Fracture of Sternum	0.000%	0.00%	0.0%	1	0.000	0	0	0.000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
808.8	Fracture of Pelvis Unspec, Closed	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
830.0	Closed Dislocation of Jaw	0.000%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
830.1	Open Dislocation of Jaw	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
832.0	Dislocation Elbow, Closed	0.000%	0.00%	0.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
835.1	Hip Dislocation Open	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
839.01	Closed Dislocation First Cervical Vertebra	0.000%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
926	Crushing Injury of Trunk	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
935	Foreign Body in Mouth, Esophagus, and Stomach	0.000%	0.00%	0.4%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
850.9	Concussion	7.988%	0.00%	4.5%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
891	Open Wound Knee, Leg (except thigh) and Ankle	4.603%	0.00%	1.0%	1	0.933	0	0	0.000	0.0460	0.0104	0.0000	0.0000	0.0000	0.0000
873.4	Open Wound of Face w/o Mention of Complication	2.766%	0.00%	0.7%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
881	Open Wound Elbow, Forearm, Wrist	1.947%	0.00%	0.4%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
874.8	Open Wound of Other Unspec Parts of Neck w/o Compl	1.847%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
882	Open Wound Hand Except Fingers Alone	1.148%	0.00%	1.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
877.0	Open Wound of Buttock w/o Complication	1.068%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
872	Open Wound of Ear	0.919%	0.00%	0.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
883.0	Open Wound of Fingers w/o Complication	0.829%	0.00%	2.4%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
994.8	Electrocution and NonFatal Effects of Electric Current	0.779%	0.00%	0.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
870	Open Wound of Ocular Adnexa	0.689%	0.00%	0.1%	1	0.867	0	0	0.000	0.0069	0.0014	0.0000	0.0000	0.0000	0.0000
870.4	Penetrating Wound of Orbit w/Foreign Body	0.689%	0.00%	0.1%	1	4.600	0	0	0.000	0.0069	0.0014	0.0000	0.0000	0.0000	0.0000
875.0	Open Wound of Chest Wall w/o Complication	0.669%	0.00%	0.1%	1	0.000	0	0	0.000	0.0067	0.0013	0.0000	0.0000	0.0000	0.0000
943.0	Burn of Upper Limb Except Wrist and Hand Unspec Degree	0.639%	0.00%	0.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
825.0	Fracture of Calcaneous Closed	0.599%	0.00%	2.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
876.0	Open Wound of Back w/o Complication	0.559%	0.00%	0.1%	1	0.000	0	0	0.000	0.0056	0.0005	0.0000	0.0000	0.0000	0.0000
922.1	Contusion of Chest Wall	0.529%	0.00%	1.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
802.1	Open Fracture of Nasal Bones	0.516%	0.00%	0.2%	1	0.850	0	0	0.000	0.0052	0.0017	0.0000	0.0000	0.0000	0.0000
873.8	Open Head Wound w/o Complications	0.404%	0.00%	0.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
871.5	Penetration of Eyeball w/Magnetic Foreign Body	0.345%	0.00%	0.1%	1	2.250	0	0	0.000	0.0034	0.0007	0.0000	0.0000	0.0000	0.0000
873.9	Open Head Wound w/Complications	0.315%	0.00%	0.2%	1	0.000	0	0	0.000	0.0031	0.0017	0.0000	0.0000	0.0000	0.0000
942.0	Burn of Trunk, Unspec Degree	0.305%	0.00%	0.2%	1	4.433	0	0	0.000	0.0030	0.0017	0.0000	0.0000	0.0000	0.0000
924.1	Contusion of Knee and Lower Leg	0.280%	0.00%	0.7%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
847.2	Lumbar Sprain	0.260%	0.00%	1.9%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
910.0	Abrasion/Friction Burn of Face/Neck/Scalp/Eye w/o Infection	0.220%	0.00%	0.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
921.0	Black Eye Not Otherwise Spec	0.220%	0.00%	0.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
844.9	Sprain Knee	0.150%	0.00%	4.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
918.1	Superficial Injury Cornea	0.140%	0.00%	0.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
807.0	Closed Fracture of Ribs	0.115%	0.00%	0.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
816.0	Phalanges FX, Closed	0.113%	0.00%	2.8%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
845.0	Ankle Sprain	0.100%	0.00%	2.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
879.6	Open Wound Other Unspec Parts Trunk w/o Complication	0.100%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

920	Contusion of Face, Scalp, and Neck Except Eye(s)	0.090%	0.00%	0.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
831	Dislocation Shoulder	0.080%	0.00%	2.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
922.2	Contusion of Abdominal Wall	0.080%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
916.0	Abrasion/Friction Burn of Hip/Thigh/Leg/Ankle w/o Infection	0.070%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
846.0	Lumbosacral (Joint) (Ligament) Sprain	0.040%	0.00%	0.5%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
924.2	Contusion of Ankle and Foot	0.035%	0.00%	0.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
846	Sprains and Strains of Socroiliac Region	0.030%	0.00%	0.4%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
994.1	Drowning and Nonfatal Submersion	0.030%	0.00%	0.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
840.9	Sprain, Shoulder/Army NOS	0.025%	0.00%	1.9%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
916.1	Abrasion/Friction Burn of Hip/Thigh/Leg/Ankle w/Infection	0.020%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
916.2	Blister of Hip, Thigh, Leg, Ankle, w/o Infection	0.020%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
916.3	Blister of Hip/Thigh/Leg/Ankle Infected	0.020%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
916.4	Insect Bite Nonvenom Hip, Thigh, Leg, Ankle, w/o Infection	0.020%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
916.5	Insect Bite NonVenom Hip, Thigh, Leg, Ankle w/Infection	0.020%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
922.4	Contusion of Genital Organs	0.020%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
924.3	Contusion of Toe	0.015%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
834.0	Dislocation Finger, Closed	0.010%	0.00%	0.7%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
843	Sprains and Strains of Hip and Thigh	0.010%	0.00%	0.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
994.0	Effects of Lightning	0.010%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
840.4	Rotator Cuff Sprain	0.005%	0.00%	1.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
531	Gastric Ulcer	0.000%	0.14%	0.0%	1	2.950	0	0	0.000	0.0000	0.0000	0.0014	0.0000	0.0000	0.0000
532	Duodenal Ulcer	0.000%	0.18%	0.0%	1	3.317	0	0	0.000	0.0000	0.0000	0.0018	0.0000	0.0000	0.0000
540.9	Appendicitis NOS	0.000%	4.50%	0.0%	1	1.700	0	0	0.000	0.0000	0.0000	0.0450	0.0000	0.0000	0.0000
550.9	Unilateral Inguinal Hernia	0.000%	5.83%	0.2%	1	3.350	0	0	0.000	0.0000	0.0021	0.0583	0.0000	0.0000	0.0000
5	Food Poisoning Bacterial	0.000%	0.04%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	Amebiasis	0.000%	0.02%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7.9	Unspecified Protozal Intestinal Disease	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8.45	Intestingal Infection due to Clostridium Difficile	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8.8	Intestinal Infection due to Other Organism not classified	0.000%	0.50%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	Primary Tuberculosis Infection	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
37	Tetanus	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
38.9	Unspecified Septicemia	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
47.9	Viral Meningitis	0.000%	0.39%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
52	Varicella (chickenpox)	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
53	Herpes Zoster	0.000%	0.13%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
54.1	Genital Herpes	0.000%	0.13%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
57	Fifth Disease	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60	Yellow Fever	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
61	Dengue	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
62	Mosquito Borne Viral Encephalitis	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
63.9	Tick-Borne Viral Encephalitis Unspec	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
65	Arthropods-Borne Hemorrhagic Fever	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
66.4	West Nile Fever, Unspec	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
71	Rabies	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
76	Trachoma	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
78	Molluscum Contagiosum	0.000%	0.02%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
78.1	Viral Warts	0.000%	0.10%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
78.4	Hand, Foot, and Mouth Disease	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
79.3	Rhinovirus Infection in Conditions Elsewhere Unspec	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
79.99	Unspecified Viral Infection	0.000%	0.23%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
82	Tick Borne-Reckettsiosis	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
84	Malaria	0.000%	0.02%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
85	Leishmaniasis	0.000%	0.11%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
86	Trypanosomiasis	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
91	Early Primary Syphilis	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
91.9	Secondary Syphilis	0.000%	0.01%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
94	Neurosyphilis	0.000%	0.05%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
98.5	Gonoccal Arthritis	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
99.4	NonGonoccal Urethritis	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
100	Leptospirosis	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
274	Gout	0.000%	0.31%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
276	Disorders of Fluid Electrolyte, & Acid Base Balance	0.000%	2.19%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
296	Bipolar Disorder, Single Manic Episode	0.000%	0.21%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
298.9	Unspec Psychosis	0.000%	2.62%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
309	Adjustment Reaction w/Adjustment Disorder/Depressed Mood	0.000%	3.50%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
309.81	Post Traumatic Stress Disorder	0.000%	3.97%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
309.9	Unspecified Adjustment Reaction	0.000%	1.48%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
310.2	Postconcussion Syndrome	0.000%	1.35%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
345.2	Epilepsy, Petit Mal Status	0.000%	0.01%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
345.3	Epilepsy, Grande Mal Status	0.000%	0.05%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
346	Migraine	0.000%	1.64%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

361	Retinal Detachments and Defects	0.000%	1.41%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
364.3	Uveitis NOS	0.000%	0.21%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
365	Glaucoma	0.000%	0.57%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
370	Corneal Ulcer	0.000%	0.38%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
379.31	Aphakia	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
380.1	Infective Otitis Externa	0.000%	0.19%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
380.4	Impacted Cerumen	0.000%	0.05%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
381	Acute Nonsuppurative Otitis Media	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
381.9	Unspecified Eustachian Tube Disorders	0.000%	0.01%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
384.2	Perforated Tympanic Membrane	0.000%	0.42%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
388.3	Tinnitus	0.000%	0.25%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
389.9	Unspecified Hearing Loss	0.000%	0.51%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
401	Hypertension	0.000%	0.69%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
413.9	Other and Unspec Angina Pectoris	0.000%	0.38%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
427.9	Cardiac Dysrythmia Unspec	0.000%	0.19%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
453.42	Venous Emb/Deep Thrombosis of Deep Vessel Lower Extremity	0.000%	0.20%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
462	Acute Pharyngitis	0.000%	0.44%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
465	Acute URI of Mult or Unspec Sites	0.000%	1.03%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
466	Acute Bronchitis and Bronchiolitis	0.000%	0.21%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
475	Peritonsillary Abscess	0.000%	0.85%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
486	Pneumonia Organism Unspec	0.000%	1.43%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
491	Chronic Bronchitis	0.000%	0.06%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
492	Emphysema	0.000%	0.02%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
493.9	Asthma	0.000%	1.47%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
523	Gingival and Periodontal Disease	0.000%	0.10%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
530.2	Ulcer of esophagus	0.000%	0.05%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
530.81	Gastroesophageal Reflux	0.000%	0.75%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
564	Constipation	0.000%	0.27%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
564.1	Irritable Bowel Disease	0.000%	0.29%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
566	Abscess Anal rectal Regions	0.000%	0.58%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
567.9	Unspecified Peritonitis	0.000%	0.01%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
577	Acute Pancreatitis	0.000%	0.28%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
577.1	Chronic Pancreatitis	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
578.9	Hemorrhage of Gastrointestinal Tract Unspec	0.000%	0.26%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
584.9	Acute Renal Failure Unspec	0.000%	0.51%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
599	Unspec Urinary Tract Infection	0.000%	0.31%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
599.7	Hematuria	0.000%	0.01%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
608.2	Torsion of Testis	0.000%	0.98%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
608.4	Other Inflammatory Disorders Male Genital Organs	0.000%	1.15%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
611.7	Breast Lump	0.000%	1.91%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
633	Ectopic Pregnancy	0.000%	0.53%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
634	Spontaneous Abortion	0.000%	0.46%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
681	Cellulitis and Abscess of Finger and Toe	0.000%	0.94%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
682	Cellulitis and Abscess of Face	0.000%	0.98%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
682.6	Cellulitis and Abscess of Leg Except Foot	0.000%	2.52%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
682.7	Cellulitis and Abscess of Foot Except Toes	0.000%	1.09%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
682.9	Cellulitis and Abscess of Unspec Parts	0.000%	0.17%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
719.41	Pain in Joint involving Shoulder Region	0.000%	1.16%	0.7%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
719.46	Pain in Joint Involving Lower Leg	0.000%	0.86%	1.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
719.47	Pain in Joint Involving Ankle and Foot	0.000%	0.50%	0.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
722.1	Displacement Lumbar Intervertebral Disc w/o Myelopathy	0.000%	2.51%	0.6%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
723	Spinal Stenosis in Cervical Region	0.000%	0.18%	0.5%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
724	Spinal Stenosis of Lumbar Region	0.000%	0.19%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
724.2	Lumbago	0.000%	3.53%	0.8%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
724.3	Sciatica	0.000%	0.35%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
724.4	Thoracic or Lumbosacral Neuritis or Radiculitis Unspec	0.000%	0.43%	0.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
724.5	Backache Unspec	0.000%	2.32%	0.4%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
726.1	Disoreders of Bursae and Tendons in Shoulder, Unspec	0.000%	0.29%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
726.12	Bicipital Tenosynovitis	0.000%	0.02%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
726.3	Enthesopathy of Elbow Region	0.000%	0.28%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
726.4	Enthesopathy of Wrist and Carpus	0.000%	0.01%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
726.5	Enthesopathy of Hip Region	0.000%	0.03%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
726.6	Enthesopathy of Knee	0.000%	0.26%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
726.7	Enthesopahty of Ankle and Tarsus	0.000%	0.32%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
729	Rheumatism Unspec and Fibrositis	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
729.5	Pain in Limb	0.000%	0.98%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
780	Alterations of Consciousness	0.000%	0.43%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
780.2	Syncope	0.000%	2.09%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
780.39	Other Convulsions	0.000%	2.81%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
780.5	Sleep Disturbances	0.000%	2.51%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
780.6	Fever	0.000%	0.35%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

782.1	Rash and Other Nonspec Skin Eruptions	0.000%	0.22%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
782.3	Edema	0.000%	1.67%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
783	Anorexia	0.000%	0.16%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
784	Headache	0.000%	2.34%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
784.7	Epistaxis	0.000%	0.33%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
784.8	Hemorrhage from Throat	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
786.5	Chest Pain	0.000%	5.83%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
787	Nausea and Vomiting	0.000%	0.43%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
787.91	Diarrhea NOS	0.000%	0.56%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
789	Abdominal Pian Unspec Site	0.000%	1.70%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
832.1	Dislocation Elbow, Open	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
834.1	Dislocation Finger, Open	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
847.3	Sprain of Sacrum	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
848.1	Jaw Sprain	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
848.3	Sprain of Ribs	0.000%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
989.5	Toxic Effect of Venom	0.000%	0.00%	1.3%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
989.9	Toxic Effect of Unspec Substance Chiefly Non-medicinal	0.000%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
991.3	Frostbite	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
991.6	Hypothermia	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
992.0	Heat Stroke and Sun Stroke	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
992.2	Heat Cramps	0.000%	0.00%	0.8%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
992.3	Heat Exhaustion Anhydrotic	0.000%	0.00%	0.8%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
994.2	Effects of Deprivation of Food	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
994.3	Effects of Thirst	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
994.4	Exhaustion Due to Exposure	0.000%	0.00%	0.1%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
994.5	Exhaustion Due to Excessive Exertion	0.000%	0.00%	1.9%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
994.6	Motion Sickness	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
995.0	Other Anaphylactic Shock Not Elsewhere Classified	0.000%	0.00%	0.2%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E993	Injury Due to War Ops by Other Explosion	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
V01.5	Contact w/or expoure to Rabies	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
V79.0	Screening for Depression	0.000%	0.00%	0.0%	0	0.000	0	0	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$COUNT_{surg}$	128
SURG_T_AVG	2.472
EVAC	7
$COUNT_{FOLLOWUP}$	16
FOLLOWUP_T_AVG	2.844
$P_{S\|W}$	0.6158
$P_{S\|N}$	0.1331
$P_{S\|D}$	0.1924
$P_{F\|W}$	0.0865
$P_{F\|N}$	0.0201
$P_{F\|D}$	0.0016
P_{SURG}	0.5089
P_S	0.8870
P_F	0.1130

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14. ABSTRACT

The Office of the Assistant Secretary of Defense for Health Affairs, Force Health Protection and Readiness (OASD(HA)/FHP&R) commissioned Naval Health Research Center and Teledyne Brown Engineering, Inc. (NHRC/TBE) to examine the validity of operating room (OR) throughput algorithms used for requirements estimation in the Joint Medical Analysis Tool, Version 2.0 (JMAT 2.0). When a lack of documentation failed to provide sufficient insight into the algorithms or methodologies used by JMAT 2.0, and no work around could be found, NHRC/TBE was asked to develop a separate methodology for OR requirements estimation.

NHRC/TBE succeeded in developing a simple, accurate method for OR requirements estimation. The method uses data from the Common User Database and patient condition occurrence frequency tables. The products developed include three major deliverables: (a) technical document describing an expected value methodology for estimating OR requirements; (b) algorithms for estimating OR table requirements for a special case, assuming the probabilities of entering the OR are either "1" or "0"; and (c) an Excel spreadsheet which calculates OR table estimates for the special case.

15. SUBJECT TERMS
Joint Medical Analysis Tool, JMAT, requirements estimation, Common User Database, operating room, expected value, algorithm, Level 3, medical treatment facility, MTF

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