

Modeling and Simulation Tools

Modeling and Simulation Group

Medical Mission Support

The Naval Health Research Center's Department of Medical Modeling and Simulation creates tools that equip military and civilian medical planners, providers, trainers, and logisticians with tools that examine various courses of action before, during and after deployment. The tools can be used to allocate resources, assess risks, estimate casualties, and determine mission readiness. Civilian planners can apply these resources to humanitarian assistance, disaster relief, or homeland security missions. All the tools can be downloaded, along with tutorials and more information, at <http://www.tmlsim.com>.

Tactical Logistics Modeling Program

The Tactical Medical Logistics Planning Tool (TML+) models resource usage, simulating patient flow through a network of care. The program prioritizes patient treatment and evacuation, models transportation asset usage and routing, personnel needs, and the time it takes to perform tasks, wait for transportation, and complete evacuation. The program can be used pre-deployment to determine optimal readiness and during deployment to respond to crises.

As a research tool for systems analyzers and field medical planners, TML+ generates various patient outcome metrics that assess risk and help plan the best course of action given a user-defined set of parameters and finite resources. TML+ can determine whether a particular treatment facility can successfully handle a specified patient stream and reveal how a facility's relocation affects patient outcomes. It can compare different combinations of care facilities to see which configuration is more efficient, and ascertain which and how many transportation assets are needed to optimize their use. Such research can help configure and employ those assets already secured and/or justify procuring additional ones, all while ensuring a high standard of medical care.

Estimating Supplies Program

The Estimating Supplies Program (ESP) uses substantial underlying data to calculate medical consumables, durables, and equipment items for a given patient stream. Supply quantities can be generated for military operational deployments, training exercises, civilian humanitarian missions, homeland station response, or disaster relief.

Existing inventories can be examined for readiness by comparing them with inventories constructed using a simulated patient stream. Baseline quantities are established by linking those injury and illness conditions to tasks, and then the task profiles are linked to appropriate supplies. ESP signals which treatment options are affected by supply shortfalls – and if a supply is eliminated, it shows which injuries or illnesses are affected by its removal. Navy, Marine Corps, and Air Force medical capability supply systems use ESP to configure new medical capabilities, manage supply usage, and track audit trails.

ReSupply Validation Program

A companion program downloaded with ESP, the ReSupply Validation Program (RSVP), is also a patient-driven tool. Using ESP patient streams, it simulates supply usage over time, showing when supplies run out, and allowing users to vary resupply arrival schedules accordingly. Medical contingency files can be submitted using RSVP.

Patient Condition Occurrence Frequency Tool

The Patient Condition Occurrence Frequency (PCOF) tool generates patient streams from the wounding patterns evidenced from Operation Iraqi Freedom, and based on the various types of weaponry. The PCOF tool illustrates the potential application for generating patient streams for future operations in support of the global war on terror.

FORECAS, PKCAS, SHIPCAS

The casualty projection system (FORECAS) was developed to estimate the injury and illness incidence rates and patient condition distributions for ground combat operations. Similarly, the peacekeeping ground casualty projection system (PKCAS) estimates the same statistics but is based on data from peacekeeping and peace enforcement by US and UN forces. Both FORECAS and PKCAS projections are based on medical admission rates and patterns from previous operations. Summary reports present the expected daily and total number of wounded-in-action, killed-in-action, disease, battle fatigue and nonbattle injury cases.

The shipboard casualty projection system (SHIPCAS) assists planning for naval combat operations. Casualty projections are calculated by projecting a likely number of ships that might be hit, ship type and type of weapon, and then estimating resulting casualties.

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