T3 Pursuit: Triage, Transport, & Track Combat Health Support Board Game

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ABSTRACT

Medical officers in the US Department of Defense are required to develop facility with Health Service Support (HSS) doctrine and medical planning for military operations. JP 4-02 Health Service Support provides basic doctrine and guidance for HSS planning and traditional military education in this arena has done a fairly good job of providing the basic knowledge outlined in this and other relevant publications through traditional lecture format. Lecture based methods do not, however, do an adequate job of teaching the thought process involved in regulating and moving casualties on the battlefield. Courses often include complex medical planning exercises which help students apply this knowledge to realistic scenarios that replicate expected planning considerations in actual operations. These exercises usually, however, are time consuming and suffer from complexity which often interferes with student learning and still fail to impart the understanding of changing dynamics with patient movement and placement on the battlefield.

The USU Combat Health Support Board Game is a low-cost table-top exercise (board game) that teaches real-time decision making in a medical regulating simulation of the battlefield. Students are required to process randomly generated casualties through a representative Combat Health Support structure including fixed medical facilities and patient movement assets as they apply the tenets of HSS and other critical learning objectives in this interactive game. This paper will describe in detail the methodology, lessons learned, and initial outcomes assessment of USU Combat Health Support Board Game for military medical student education at the Uniformed Services University of the Health Sciences. This methodology has applicability across the full spectrum of military, governmental, and civil organizations for training and preparation for medical and logistics disciplines and is feasible approach to effective training in today's cost-constrained training environment.

ABOUT THE AUTHORS

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BACKGROUND

The Uniformed Services University of the Health Sciences (USU) is the Nation's federal health sciences university and its F. Edward Hébert School of Medicine provides a traditional four year medical school curriculum with the unique mission of preparing graduates for careers as military medical officers. The School of Medicine delivers a standard medical curriculum but superimposes on it a unique four year syllabus that focuses on operational military medicine, officership, and organizational challenges unique to the military. The graduate of the School of Medicine is expected to be a balanced and competent physician, officer, and medical operator.

In continuing efforts to increase interactivity and engagement in this higher education environment and to combat student apathy and cognitive overload in a saturated curriculum, the Military Emergency Medicine Department faculty have been experimenting with various learning activity designs in order to depart from traditional lecture based methods which have proven to be sub-optimal in this environment (Woodson, 2011). The *T3 Pursuit: Triage, Transport, & Track* Combat Health Support Board Game was a targeted effort to fill a specific curriculum void with an interactive game format which as a teaching method is rarely used and has been shown to be more effective than other methods in teaching problem solving skills, gaining participant acceptance, and achieving knowledge retention (Shoenfelt, 1991; National Survey of Student Engagement, 2010).

As one core competency addressed in the USU Operational Military Medicine curriculum, medical officers in the US Department of Defense (DoD) are required to develop facility with Health Service Support (HSS) doctrine and medical planning for military operations. *Joint Publication (JP) 4-02: Health Service Support* provides basic doctrine and guidance for HSS planning. The US Federal Emergency Management Agency (FEMA) describes six levels of exercises (including the table-top exercise) which increase in complexity from informational seminars that minimally exercise response capacities to simulations that mimic reality and exercise participants' capacity to implement emergency response functions (FEMA, 2012). Individual service doctrine also provides training guidance and requirements for addressing HSS competencies.

Using primarily lecture based methods, traditional military education in this arena has done a reasonable job in USU and other military medicine classrooms of providing the basic knowledge outlined in JP 4-02 and other relevant publications. These lectures have not, however, done an adequate job of teaching the thought process and problem solving skills involved in regulating and moving casualties on the battlefield. Military courses do often include complex medical planning exercises which help students apply this newly acquired knowledge to realistic scenarios that replicate expected planning considerations in actual operations. These exercises usually, however, are time consuming and suffer from excessive complexity which often interferes with student learning resulting in failure to impart the understanding the critical nature of the changing dynamics with patient movement and placement on the battlefield.

The USU Combat Health Support Board Game is a low-cost table-top board game that teaches real-time decision making in a medical regulating simulation of the typical battlefield. Students are required to process randomly generated casualties through a representative Combat Health Support structure including fixed medical facilities and patient movement assets as they apply the tenets of HSS and other critical learning objectives in this interactive game.

Purpose

The purpose of this paper is to describe in detail the methodology, lessons learned, and initial outcomes assessment of the USU Combat Health Support Board Game *T3 Pursuit* for military medical student education at the USU. This methodology has applicability across the full spectrum of military, governmental, and civil

organizations for training and preparation for medical and logistics disciplines and is feasible approach to effective training in today's cost-constrained training environment.

Table-Top Exercise Design Philosophy

The challenge in creating effective education on HSS is designing learning activities that transfer the complexity of patient movement system interactions and the consequent decision making dynamics involved in moving patients on the battlefield to the student. To get to this end, the learning activity must get beyond the basic HSS system knowledge which is routinely taught and move into the process of "medical regulating" which is normally reserved for dedicated medical regulating officers. Medical Regulating is defined as "The actions and coordination necessary to arrange for the movement of patients through the levels of care. This process matches patients with a medical treatment facility that has the necessary health service support capabilities and available bed space." (JP 1-02, JP 4-02) If a table-top exercise could put the student in the position to make decisions about patient placement, bed utilization, and patient movement asset employment, the student could begin to understand how the system interacts. Saks et al introduced the idea of "constraint trespassing" in the context of patient evacuation highlighting the problem of HSS system elements inadvertently placing constraints on other elements within the system by their decisions on patient placement and the underlying processes--each agent's solution to its demands having major impact on the problems presented to the other agents (Saks, 1997). Understanding this dynamic is critical to the success of the medical officer making clinical evacuation decisions in real time.

In developing the *T3 Pursuit* table-top exercise, we strove to create an experience that would get to this core decision making lesson. The Center for Applied Strategic Learning designs national security exercise in support of the National Defense University's academic mission (Center for Applied Strategic Learning, 2012) and publishes regularly on lessons learned in exercise design for military education and claims that while there are limitations on the utility of tabletop exercises, their strengths include the ability to identify and weigh factors which shape decision making in the targeted arena (Center for Applied Strategic Learning, 2009a). Furthermore, the Center for Applied Strategic Learning offers the observation that games should ask the question "What's going on here?" and write games that explore the answer to this question (Center for Applied Strategic Learning, 2009a). These observations resonate with our need at the USU to build learning activities that focus on long-term retention and systems-based learning. By focusing efforts in this arena of decision making in HSS, we hoped to achieve a higher level of educational utility in our table top exercise.

With this goal at the forefront, we turn to instructional design. It is well established in the literature that simulation is preferable to lecture. (Shoenfelt, 1991; Van Ments, 1999; Lake, 2001; Williams, 2001; Behar, 2008, National Survey of Student Engagement, 2010) The use of games can be traced to the war games of 1700's and various military planning exercises of the 19th and 2oth centuries (Gredler, 2004). More specifically, simulations are learner centered and teacher enabling (Ziv, 2000) and bypass problems with creating systematic training in real settings (Ziv, 2003; Bochennek, 2007). Ziv argues that beyond real settings, we indeed have an ethical imperative for using simulation in medical education (Ziv, 2003) as failure to employ this strategy has the potential to result in increased risk of harm to actual live patients (first do no harm). Certainly medical regulating decisions can carry the gravity of life and death for those casualties requiring urgent medical care. Improving the acquisition of confidence and proficiency in decision making is an established benefit of simulation. (Ziv, 2003) Moreover, simulations provide additional motivation for learning (Bochennek, 2007). Incentives are important in education (McCown, 2010) and by turning to the game format, we hoped to motivate and engage our learners in what has traditional been very mundane material. More importantly, learners would be placed in an environment where "mishaps in the course of learning can be reviewed openly without concern of liability, blame, or guilt—even decisions and actions that result in the death of the simulated patient." (Ziv, 2003)

Game theory then provides useful insight for table-top exercise design, providing a means to think systematically about complex, multistage, interdependent decision making and the factors that go into it (McCown, 2010). In this table-top design, it was important to build an accurate representation of the real world HSS system (Center for Applied Strategic Learning, 2009b) we were trying to familiarize our students with--this being one of the core learning objectives. While every HSS system is certainly unique in the real world, a basic doctrinal HSS system could be built as a game environment. The rules of the game provide a description of the state of the world within the game (McCown, 2010) and were crafted in *T3 Pursuit* to reflect joint HSS doctrine and real-world dynamics and decision points when working within the HSS system in the combat theater. Attention to interaction,

narrative, place, and emergent culture can provide for dynamic "crucible experiences" which change attitudes and learner acceptance of lessons learned in the learning activity (Raybourn, 1999).

Attitude changing educational exercises are rooted in the inherent value of experiential learning (Van Ments, 1999; Center for Applied Strategic Learning, 2009b, Woodson, 2011) which provides the opportunity for emotional reactions as students experience frustration, conflict, or pride during the activity (Raybourn, 2007). Targeted, time-limited, and forced decisions further enhance emotional responses and subsequent educational success (Dausey, 2007). Accordingly outcomes feedback should be provided which enhances this opportunity. The game is for students to determine the choices which get them the biggest payoff (McCown, 2010) and shapes the emotional impact of each decision in the game. In *T3 Pursuit*, outcomes were reframed as polar opposites to this end. Patients in the game system have two possible outcomes: 1) successfully reaching "definitive care" or 2) ending up in "the morgue." By changing (simplifying and amplifying in this case) the descriptions of available outcomes, changes in student decision making behavior can be achieved (McCown, 2010). Furthermore, by providing students a "visceral feel" for the decision making environment, theoretical lessons become more concrete (Center for Applied Strategic Learning, 2009b).

Ideally, the simulation will require students to make responses to sudden developments, the more unexpected the better (Center for Applied Strategic Learning, 2009b). To reach towards this goal, we introduced randomization through simple multi-sided dice which determine the number and type of casualties encountered in the game and provides for random resource-related events (see exercise description for details). Because, we have constructed this timeline in a short time span, events in the game are more likely to be plausible representations of real world events (Center for Applied Strategic Learning, 2009a) enhancing realism and student acceptance of the game.

Table 1. Design Characteristics of Social-Process Simulations (Adapted from Gredler, 1992)

Characteristics	**Task**	**Focus**	**Problem**	**Actions**	**Feedback**
Description	Interact with others to address challenge	Effects of one's own assumption, goals, strategies on action	Arises from conflict in roles, goals or actions	Use of social interaction, i.e. negotiation, persuasion, mediation	Reactions of other participants and self-assessment evoke change
T3 Pursuit Rationale	Learners work in teams and negotiate decisions for collective benefit	Learners' assumptions of resource capabilities are challenged as the outcomes of their game choices unfold	Conflict in decision making is generated by students actions and the inherent constraints of the game environment	Learners negotiate with other team members to arrive at best solutions to presented problems	Teammates challenge each others' decisions. Casualty outcomes provide performance feedback

Table 2. Essential Design Criteria for Educational Games (Adapted from Gredler, 2004)

	1	**2**	**3**	**4**	**5**
Criterion	Winning should be based on knowledge or skills, not random factors.	The game should address important content, not trivia.	The dynamics of the game should be easy to understand and interesting for the players but not obstruct or distort learning.	Students should not lose points for wrong answers.	Games should not be zero-sum exercises.
T3 Pursuit Rationale	While random factors are used to improve student engagement, those who more efficiently manage available resources should end up with fewer casualties in the morgue.	The game system is simplified to represent critical elements and dynamics in the HSS doctrinal system.	Rules are limited to one page, and easily explained in the conduct of the game (5 min intro and a dynamic example during the first game turn)	Poor decisions will provide feedback in the form of deceased casualties, but there are no specific right or wrong answers.	There is no absolute winner in this game, although relative outcomes in casualty counts provide performance feedback.

T3 Pursuit was designed to achieve the limited objectives (Dausey, 2007) of conceptual system design and regulating decision making and focuses on the issue of resource employment for the purpose of casualty movement rather than on complex patient scenarios (Dausey, 2007) in order to avoid distraction (Dausey, 2007) from the primary learning objectives.

Taken together these design elements are consistent with Gredler's design characteristics for social-process simulations (See table 1) and educational games (see table 2). Through the table-top exercise design students' preconceived ideas of HSS resources capabilities (e.g. air vs. ground evacuation times) are challenged and students interact to make decisions and take actions that create conflict or cognitive dissonance among participants. Feedback provided through casualty outcomes help to cement learning in the decision making arena (Raybourn, 2007). Collectively, all elements of this design philosophy lead to a memorable high value educational experience which engages students in interactive learning.

DESCRIPTION OF THE EXERCISE

Overview

The *T3 PURSUIT: TRIAGE, TRANSPORT, & TRACK* table-top exercise is a board game designed to teach principles involved in HSS planning and medical regulation. The intent of this board game is to provide a simulation of realistic system constraints and dynamics in a deployed HSS system which will allow students the opportunity to apply basic HSS knowledge while forcing them to make real-time decisions.

Prior to the game sessions, students are provided the rule sheet and asked to read over it at least once. This facilitates initiation of the game and saves time in the game session. The game session is one hour long, though it could be easily extended to up to two hours. A longer session would provide more time for development of the scenario, but one hour has proven sufficient for our students. Any less than an hour would compromise the quality of the game as very few turns could be completed.
The following is a detailed description of each major component of the *T3 Pursuit* table-top exercise.

Scenario (from rules sheet)

The 1/32 IN BN is responsible for securing AO ALTA to include manning 3 Border Checkpoints. Intel expects enemy activity to increase along the border with specific targeting of manned checkpoints and main supply routes (MSR). You have been assigned as the Medical Regulating Officer for the theater (see map overlay).

Game Objective (from rules sheet)

Utilizing the Medical Regulating Worksheet, you are to manage casualty movement and care from point of injury through definitive medical capability by moving casualties with the available medical evacuation assets to the appropriate MTF. The objective of the game is to minimize the number of fatalities.

Set-up

At the beginning of the game session, students are verbally walked through the set-up process which is described in step-wise manner on the rule sheet. This set-up time along with initial explanation of the rules takes approximately five minutes with a prepared faculty facilitator.

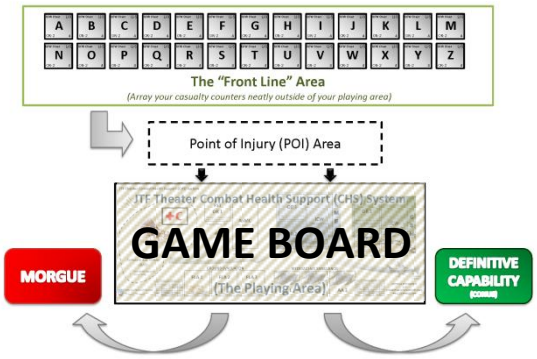

Figure 1. Playing Area Layout

The playing area is set-up as depicted in Figure 1. The casualty counters are arrayed neatly in alphabetical order at the top of the table. This is the *"Front Line" area*. The game board (see Figure 2) is placed in the center of the table with the container marked *"Morgue"* on the left and the container marked *"Definitive Capability"* on the right of the game board leaving a space in the middle which serves as the *Point of Injury (POI) area*. The system is then "primed" with three casualties which are represented on the game board with counters and on the medical regulating worksheet. ("X" on ASMC, "Y" on FLA 3, "Z" on CSH OR2). This was done to facilitate explanation and visualization of the game flow and serves to save time in the explanation of the game rules. Students are able to visualize with minimal explanation the mechanism of accountability of patients on the worksheet.

The Game Board

The *T3 Pursuit* game board is a graphical representation of a conceptual HSS system in a standard theater of operations. It is prepared on two pieces of 8.5"x11" card stock and taped together. The game board serves as a visualization tool for patient flow as learners manipulate casualty counters on the board as the game scenario unfolds. The game board layout depicts characteristic medical treatment facilities and ground and air patient movement assets in a theater HSS system. Hospital beds and operating rooms are represented within each Medical Treatment Facility (MTF) and are limited in number to simplify game play. Basic constraints including patient holding capacity and specialty medical services and capabilities are annotated directly on the game board to eliminate the need for reference to complex tables elsewhere.

The Game Board is completed with two bowls that are labeled "morgue" (red) and "definitive capability" (green). These two points are the placed on either side of the board and represent the two end points for casualties (which must either be cured or die). The color-coding serves specifically to dramatize the end points and outcomes of collective decisions made throughout the game to add to the emotional response as described earlier.

Casualty Counters

Casualty counters (Figure 3) are simple 1.25" square cards which represent combat casualties encountered on the battlefield. There are 29 of them labeled with unique alpha codes (A-Z) for easy identification. (Patients X, Y, and Z are duplicated and are the pre-loaded casualties referred to previously.)

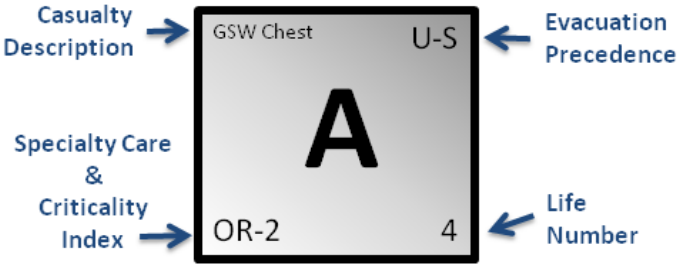

Figure 3. Casualty Counter Key

Casualties are present in three categories: 1) combat trauma, 2) Disease and Non-battle Injury (DNBI), and 3) Combat Stress. Each counter has four codes (see Figure 3) which define its behavior.

- *Description* – general injury description
- *Evacuation Precedence* – indicates the priority for movement (U-S=Urgent Surgical, U=Urgent, P=Priority, R=Routine, C=Convenience)
- *Life number* – indicates the number of hours (turns) the casualty has to reach definitive care before expiring
- *Specialty Care – Criticality Index*: a two part code indicating a required medical capability (See Table 3) and number of hours the casualty has to reach it (will expire if it fails to make it in time.)

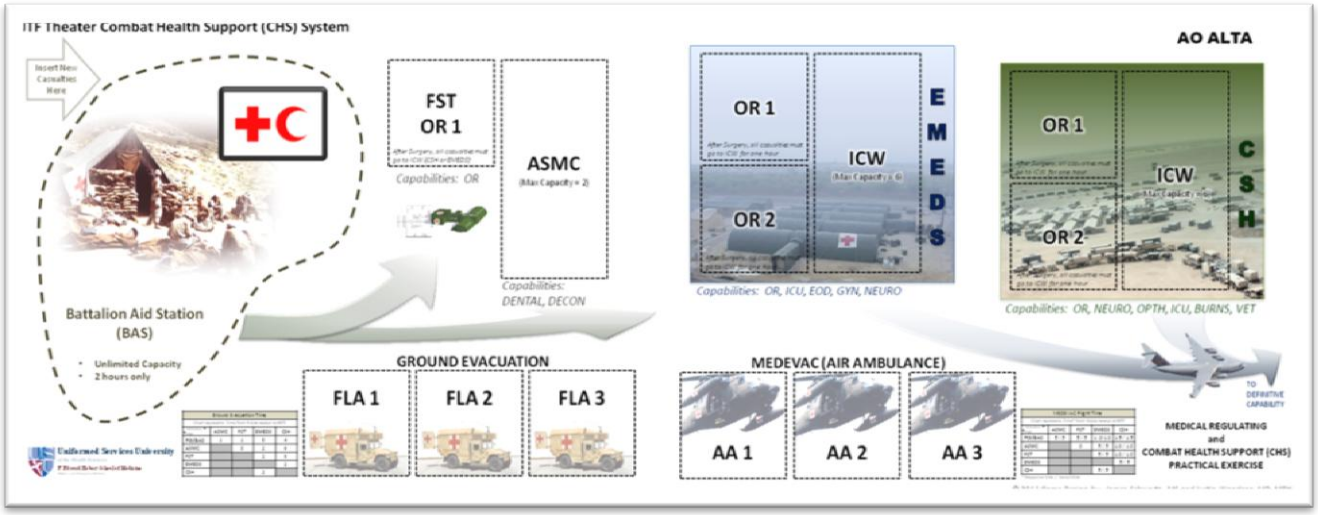

Figure 2. The T3 Pursuit Game Board

Table 3. Specialty Care Codes for Casualty Counters

OR = Surgery	*DENTAL = Dental*	*DECON = CBRNE Decontamination*
GYN= OB/GYN	*ICU = Intensive Care Unit*	*EOD = Explosive Ordinance Disposal*
VET = Veterinary	*OPTH = Ophthalmology*	*NEURO = CT and Neurosurgery*
BURNS = Burn Unit		

Sequence of Play

Each turn of the game represents one hour on the battlefield. Students use the worksheet to track the casualties in the system and account for them through every step of the movement to definitive care (or the morgue). The first few turns are facilitated by a faculty member who narrates the process. These take a bit longer, but after the second turn, students have the hang of it and play with minimal assistance. During EACH hour (or turn) the students perform each of the following steps in sequence:

Step 1: *Casualty Movement.* Students will transfer all existing casualties from the previous column to the determined evacuation platform or MTF in the current hour column. Casualties may remain in the same row, but every casualty must be carried over to the next hour column. All casualties must move out of POI area.

Step 2: *Assess Life*. Verify that all casualties have not exceeded their Life Number or Criticality Index in the system. (Do not include the initial hour in POI when calculating the total life.)

Step 3: *Determine Casualty Load*. The facilitator will roll a die (d4) to determine the number of casualties called in on the 9-line MEDEVAC Request.

Step 4: *Identify Casualties.* Roll the alphabet die (d30) once for each casualty identified in Step 1. If a "WILD" is rolled, then roll a d6 to determine the effect from the WILD CARD EFFECTS table and then roll the die (d30) again to identify a casualty. Ignore subsequent "WILDs" during the same turn.

Step 5: *Point of Injury.* Pull the corresponding casualty counter into the POI area and write the casualty identifier (letter) into the POI Block on the worksheet. If a casualty is not available with the corresponding identifier (i.e. it has already been used) then roll the die (d30) again until an available casualty is selected.

Step 6: *Accountability.* Add all casualties in the column and annotate in the "Total" block at the bottom of each hour column to verify you have accounted all casualties (the total in the new column should equal the total in the old column plus the new casualties.

Casualty Rules

There are a handful of additional rules which help to clarify game play and eliminate ambiguity about game dynamics and decisions:

- **Point of Injury (POI).** During the movement phase (step 1), casualties may be transferred from POI directly to BAS or placed on an evacuation asset for transport to any facility of choosing.
- **Battalion Aid Station (BAS).** Casualties can only remain in the BAS for two turns – if not moved out of the BAS after two turns the casualty must be transferred to the morgue.
- **Specialty Care.** Each facility has specific capabilities for specialty care (Table 3). Casualties must get to a facility with this capability in the allotted time.
- **Criticality Index.** If the casualty does not make it to the specialty care within the number of turns indicated by the Criticality Care Index, the casualty must be transferred to the morgue.
- **Life Number.** If the casualty does not make it to Definitive Medical Capability within the Life Number the casualty must be transferred to the morgue.
- **Surgery.** All surgeries take 2 hours. The OR may immediately be used for a new casualty.

Evacuation Rules

When moving casualties, students will determine time requirements (see Table 4) for the chosen movement asset (ground or air) and immediately occupy the required time blocks on the medical regulating worksheet. In this manner, students are able to account for transit time and how this affects asset availability.

Three basic rules apply when moving casualties:

- All evacuation transports must conform to evacuation timetable (see Table 4).
- Evacuation platforms (ground and air) are unavailable for one turn after off load of patient. Shade that box to account for this.
- Casualties may only be transferred to definitive care from the ICW (EMEDS or CSH).

Wild Card Effects

Random effects are introduced to challenge decision making with unexpected developments. There are four "Wild" faces on the d30 dice. If a "WILD" is rolled while identifying casualties, a single 6 sided dice (d6) is rolled to determine the effect. These effects are balanced so that half are favorable and half are unfavorable. This prevents random effects from taking control of the game flow, but provides enough unpredictability to keep students thinking about contingency planning. Effects are as follows:

1 Air Ambulance Sortie at the BAS
An extra Air Ambulance has arrived at the BAS this turn. You may transport one additional casualty from the BAS by air. The flight time rules for MEDEVAC still apply.

2 Mishap in the OR
A mortar round has hit the OR. If you have any casualties in the EMEDS or CSH OR, select one and transfer him to the Morgue. That OR will be out of commission for the next 2 hours (shade it out on your tracking sheet)

3 Favorable winds
Weather conditions are in your favor today. If you have any casualties on air ambulances, then you may place them in their destinations immediately. If the casualty was bound for an OR and it is not available, he may wait in the ICW until the OR is free.

4 Helicopter crash
Your helicopter got shot down. If you have any casualties en route on an Air Ambulance, then you must select one and transfer him to the morgue.

5 Ground Ambulance (FLA) at the BAS
An extra FLA has arrived at the BAS this turn. You may transport one additional casualty from the BAS. The ground evacuation time rules still apply.

6 Forward Surgical Team (FST) Jump
The FST has been ordered to move to support another mission. It will be unavailable for the next 3 hours. If you have a casualty in the FST OR, he must be transferred immediately (even if his surgery is incomplete).

Medical Regulating Worksheet

While the game board provides the physical representation of the HSS system, the medical regulating worksheet (Figure 4) provides a structured accountability and tracking mechanism for casualties as they flow through the system. It is intended to teach the framework of decision making in medical regulating and serves as the workhorse of the *T3 Pursuit* game. As casualties enter the HSS system, they are recorded in the corresponding bed, operating room, or ambulance with time progressing towards the right with one game turn per column. As reflected by the three pre-loaded examples in casualty X, Y, Z time requirements for transport, surgery, etc can be immediately recorded when a placement or movement decision is made. This worksheet provides the means to apply the rules previously described. While it does take the student a moment to "learn" the system, provided the given examples and minimal faculty facilitation, s/he becomes facile with this accountability process within the first couple of game turns. The worksheet then forces the students' thought process into the correct decision tree addressing asset availability and situation awareness of the dynamic HSS system represented in the game.

Debriefing and Reflection

At the end of the game session, the faculty member facilitates a brief discussion emphasizing key conceptual teaching points and providing a brief moment for student reflection and discussion during which students explore the educational value of the game experience and cement lessons learned.

Table 4. Evacuation Time Tables

MEDEVAC Flight Time				
Chart represents Time* from 9-Line receipt to MTF				
Destination ⇨ ⇩Origin	**ASMC**	**FST**	**EMEDS**	**CSH**
POI/BAS	.5 /.5	.5 /.5	1 .0/1.0	1.5 / 1.5
ASMC		0	.5 /.5	1.0 / 1.0
FST			.5 /.5	1.0 / 1.0
EMEDS				.5 /.5
CSH			.5 /.5	

** Response time / transit time*

Ground Evacuation Time				
Chart represents Time from 9-Line receipt to MTF				
Destination ⇨ ⇩Origin	**ASMC**	**FST**	**EMEDS**	**CSH**
POI/BAS	1	1	3	4
ASMC		0	2	3
FST			2	3
EMEDS				2
CSH			2	

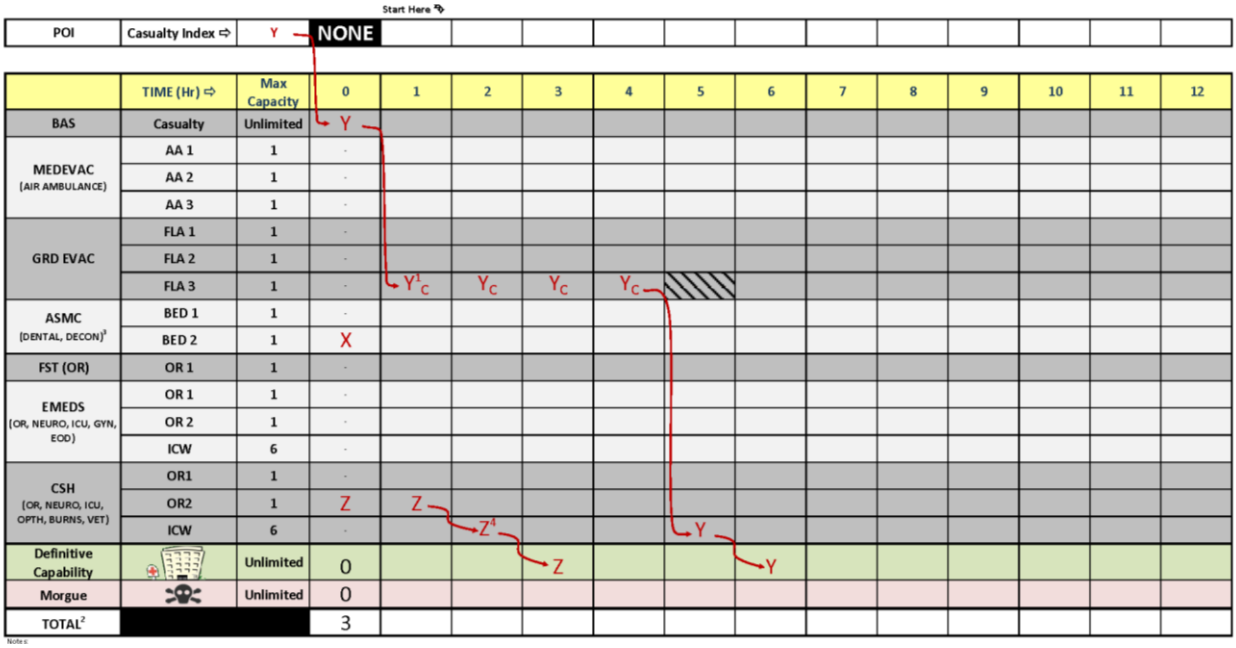

Figure 4. The T3 Pursuit Medical Regulating Worksheet

CONCLUSION

We believe that this exercise goes a long way towards addressing the specific void in HSS education at USU and is preferable to the complex staff exercises frequently used for the purpose of introducing HSS principles. The use of a simple and inexpensive board game is an attractive option when compared to costly computer based simulations which may have higher fidelity but in reality may have less dramatic educational efficacy.

Faculty observations and student responses to the exercise substantiate that the *T3 Pursuit* board game is successful in imparting critical thought process and systems knowledge in desired HSS learning objectives. Students are engaged and enthusiastic about this learning activity at levels rarely seen in our student body. More importantly, as the game progresses, students can be seen *wrestling* with decisions that are targeted by the educational objectives of this exercise and accurately reflect those seen in real-world medical operations. Experience in the military medical classroom has proven that this level of application is difficult to achieve and is rarely seen in more traditional methods of HSS teaching. As a result of the challenge of the game for the student at an emotional level, students walk away claiming a better understanding of the HSS system dynamics. While formal outcomes assessment still needs to be accomplished, there is no question from the initial observations that this methodology has been extraordinarily effective in teaching the systems-thinking of the patient movement problem in a combat theater.

Important also, is the question of efficiency. In the context of increasing demands on curriculum, and the resultant decrease in available contact time with students, learning activities that address a greater number of learning objectives with increasing permanence are highly favorable over less efficient learning activities. Two key lessons learned in T3 pursuit both involved time management. Contact time pressure drives faculty members to attempt to do more in less time—often to the detriment of the learning activity. When allotting time to the simulation, there must be balance between letting the simulation go long enough to cement the learning and cutting it off when the expected learning has been achieved. Additional time will allow the scenario to develop more and will likely result in less student frustration, but clearly there is a point where the game turns into empty motions and the threshold of learning has been crossed. Maintaining sensitivity to this dynamic is an important task for faculty members and training schedules must evolve. The second important lesson learned is how to "teach the game." As discussed, a significant commitment in the design of our game was to brevity and simplicity of the rules. Still a significant amount of time was initially required to teach the rules of the game. After several iterations, we were able to devise an almost scripted first round using the "primed" patients to demonstrate the flow of the game, introducing different elements at the correct times so as to keep the game moving forward with minimal delays. Rehearsing this presentation is absolutely critical each time the game is played.

It is similarly important for course directors and curriculum designers to insure that learning activities are relevant to learner context and that they engage

learners in an effective way that in addition to adequately teaching the material also has the effect of securing learner buy-in, engagement, and acceptance of the material. This type of table-top exercise is particularly adept at collating expert knowledge and stimulating discussion (McCown, 2010) which encourages learners to explore the meaning of their decisions within the context of the imposed system.

Moreover, the focus should be on process rather than content. A constantly changing operational environment, technology, and resource pool dictates this focus and emphasizes the need for conceptual educational activities that aim to establish long-term retention rather than short-lived factual recall. These are the lessons that are more likely to make an impact on graduates' practice and efficacy in their follow on assignments after leaving the classroom. Table-top exercises have the advantage over other teaching methods in that participants' lessons learned have more to do with process (Center for Applied Strategic Learning, 2009b) and help to identify for learners the difficulties in decision making and areas that may need further study in their own professional development.

Table top exercises such as *T3 Pursuit* address broader educational goals as stated in the Accreditation Council for Graduate Medical Education (ACGME) core competencies. This methodology has the advantage that it simultaneously addresses all six of the core competencies, where other methods are less likely to do so:

- Work effectively in various health care delivery settings and systems relevant to their clinical specialties (in this case military medicine)
- Coordinate patient care within the health care system
- Incorporate considerations of cost awareness and risk-benefit analysis in patient and/or population-based care as appropriate
- Advocate for quality patient care and optimal patient care systems
- Work in inter-professional teams to enhance patient safety and improve patient care quality
- Participate in identifying systems errors and implementing potential solutions (ACGME)

It is not clear what the net educational outcome of the *T3 Pursuit* table-top exercise is. As discussed previously, it is expected that table-top exercises such as this one *should* produce greater student engagement, better student acceptance, and probably better retention of the material, particularly when compared to lecture format. However, very little has been said about the ultimate effect on student preparedness for the mission. One literature review of 243 citations on educational exercises for disaster preparedness found none that specifically addressed effectiveness of table-top exercises in preparing its participants for disaster response (Hsu, 2004). Similarly, assessing the effect of *T3 Pursuit* on student preparedness for their HSS and medical regulating roles is confounded by the difficulty in assessing decision outcomes in the real world, the ambiguous nature of many of these decisions, and the broad spectrum of responsibilities in many domains that our learners carry upon graduation from the USU.

One additional challenge in assessment of this and other table-top exercises is in determining whether the designers have introduced the *correct* independent variables (Center for Applied Strategic Learning, 2009b) to teach the needed lessons. By and large, these design decisions are based on anecdotal experience of the designers (in addition to practical limitations imposed by the exercise framework and environment). While, one expected role of the curriculum designer/course director is to bring subject matter expertise and personal experience to the curriculum design, s/he must also do due diligence in analytically and objectively assessing these decisions and their applicability to the learner's context. This is a question that warrants further study. Independent variables, decision outcomes, and lessons learned from the exercise must not only be identified but must also be linked to operational demands identified from the field.

Further evaluative efforts will focus on establishing links between lessons learned during the table-top exercises in the USU Operational Military Medicine curriculum and outcomes based educational needs identified in the deployed setting.

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