Background: Climate change, emerging infectious diseases, global terrorism, and world conflict are increasing the likelihood that disasters in the 21st century will have greater catastrophic consequences than what was experienced in prior epochs. Innovative technologies must be devised and exploited to address these challenges. Unmanned Aerial Vehicles (UAV) have the potential capabilities to be used in preparation for, and response to, disaster situations in an expeditious and safe manner. However, this potential has not been fully explored.
Methods: Within a 3-hour semester Environmental Health course, a disaster exercise (floods) was created to explore how temperature changes, water contamination, infectious diseases, and bites and stings impact uniquely vulnerable populations. Within that scenario, students, employing the Incident Command System (ICS), used an UAV to survey that disaster area - searching for stranded victims and then ferrying needed resources (nutritional, cover, communications, etc.) to them. The UAV had visual capabilities to locate "victims" within the classroom (60x50x20), and then returned to base to be outfitted with paper "supplies" for the return trip. A questionnaire was completed by the learners.
Results: Within a 3.5-hour Environmental Health class, learners not only explored the severe environmental issues seen with disasters, but became ICS players using the drone to locate victims and to provide life-sustaining resources. The majority of the class indicated simulation training using UAVs was educational and instructive and should be included in global and disaster medicine curricula.
Conclusion: UAVs in limited fashion have been deployed in disasters. We have demonstrated that knowledge of this resource can be presented in a classroom setting using innovative simulation techniques. The learners' positive review has reinforced the opinion to expand this simulation to additional students in other related courses.

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Modeling Fear-Related Behaviors as Vectors of Transmission in the West Africa Ebola Pandemic

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Study/Objective: Describe/model Fear-Related Behaviors (FRBs) that exacerbated viral transmission during the Ebola pandemic, and analyze potential for intervention.
Background: Diminishing the multinational spread of infectious diseases is an international health priority. The West Africa Ebola Virus Disease (EVD) pandemic was the largest, longest, deadliest, and most geographically expansive ever. Fear-Related Behaviors (FRBs) were drivers of viral transmission. Cascades of escalating risk occurred as EVD provoked fear and associated FRBs that propelled disease spread; rising case counts then triggered more waves of FRBs.
Methods: A team of infectious diseases, complexity sciences, and psychiatric experts are modeling the contribution of FRBs to infectious disease spread, based on retrospective analysis of the West Africa outbreak. This is a critical endeavor because behavioral risks for infectious disease transmission may potentially be prevented or mitigated. In the West Africa outbreak, behaviors such as avoiding or fleeing treatment units, caring for patients at home, and performing secret burials facilitated direct contact viral transmission.
Results: Preliminary analysis indicate that a high proportion of early cases in the West Africa Ebola outbreak were potentiated by FRBs. The serial nature of person-to-person infectious disease transmission, amplified the effects of FRBs on epidemic dynamics. Modeling results will be presented that estimate the proportion of the 28,600 cases that were either directly or indirectly triggered by FRBs.
Conclusion: This multi-disciplinary approach, incorporating spatio-temporal modeling of disease spread, on-scene observation of behavioral contributions to the risk of EVD spread, and the "lens" of complex systems thinking, has enriched the process of explaining the role of FRBs. Infectious diseases generate fear of contagion and associated FRBs that may paradoxically increase transmission risks. The West Africa Ebola outbreak serves as a laboratory for examination of FRBs, in relation to transmission and the potential for prevention and mitigation. These investigations have relevance for healthcare surge and related disaster medicine applications.

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The Use of Table-Top Simulation for Team Training in Disaster Events

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Study/Objective: A pre- and post-intervention study was conducted to find out if a table-top team training program would positively affect perception towards teamwork and their ability to recognize the presence and quality of team skills in disaster events.
Background: Since disaster training involves coordination and communication between various units of treatment, training this coordination and communication necessitates involvement of the whole chain of response simultaneously. To do this as a full-scale exercise is expensive and time consuming. Table-top simulation training modules gives us the advantage of a reflective, experiential, repetitive, and safe learning environment. By using the table-top simulation module, we believe we could train teamwork competency for disaster medicine providers.
Methods: The educational intervention consisted of a half-day workshop (lecture, table-top simulation, and debriefing) for a selected 48 health care providers from the emergency department. A Teamwork Perceptions Questionnaire (TPQ) was performed using tools developed by the TeamSTEPPS® Project (5-point Likert scale). Team Performance Observation Tool (TPOT) was used to evaluate the performances of the participants. The questionnaire and tool were modified to fit our institutions' culture. All pre-to-post differences within

subjects were analyzed with paired tests. The statistical level of significance was set at 0.05.
Results: Pre- and post-intervention differences for the five sections of the TPQ, which consists of team structure, communication, leadership, situation monitoring, and mutual support were 3.1 to 4.2, 3.0 to 4.2, 3.3 to 4.3, 3.1 to 4.1, and 3.2 to 4.1, respectively. Pre- and post-intervention differences for the same five sections of the TPOT were 1.8 to 4.2, 1.4 to 3.9, 1.6 to 4.3, 1.3 to 3.6, and 1.4 to 3.8, respectively. All results were statistically significant.
Conclusion: This table-top team training program positively affected perception toward teamwork and their ability to recognize the presence and quality of team skills in disaster events.
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Burn Disaster Planning and Simulation Event in Quebec, Canada

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Study/Objective: The goal of this presentation is to discuss the making of a Burn Disaster Plan at the *Centre Hospitalier Universitaire de Montréal* (CHUM), a university environment that is not part of a trauma center, as well as describe the participation of the Montreal Burn Unit in a major live simulation event.
Background: Several burn disasters have occurred in the province of Quebec (Canada) in the last couple of years. These events have triggered a reflection on disaster preparedness among medical and other allied healthcare personnel at the Montreal Burn Unit.
Methods: The Montreal Burn Unit disaster plan required two-years of committee meetings and was designed around checklists for all involved personnel. On October 9, 2014, the Montreal health agency coordinated a major "Code Orange" drill to test the responsiveness of the health network to a simulated plane crash. In doing so, it evaluated the efficacy of the Montreal Burn Unit to receive disaster victims. This event was analyzed on site by personnel from Académie CHUM with expertise in simulation exercises.
Results: Participants were evaluated using direct observation, online survey, as well as debriefing sessions. The evaluation report from Académie CHUM revealed that the simulation exercise was greatly appreciated by all personnel involved. It helped validate the Montreal Burn Unit Disaster Plan including 1) pre-triage of burn victims in the emergency department, and 2) the designation of a triage physician-leader. Several areas for improvement were identified including 1) patient tracing, and 2) operating room availability.
Conclusion: Disaster planning and participation in a large scale, live disaster simulation exercise are demanding. For the CHUM, this investment brought priceless benefits: although not measured, the teams seemed strengthened and the coordination between departments and the culture of continuous improvement and learning appeared reinforced. Simulation of disaster events will continue within the framework of the transformation process towards our new mega hospital NCHUM in 2017-18.
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Implementing Best Practice to Critical Patients from Disaster Events Through Simulation-Based Learning Program

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Study/Objective: To develop a standardized High-Fidelity Medical Simulation (HFMS) training curriculum focusing on specific assessment and treatment of disaster-related severe injuries presenting to the emergency department.
Background: Evidence suggests that most prehospital and hospital providers are inadequately prepared to manage a multiple-casualty incident. For hospital health care providers, it is critical for them to develop competency in managing patients injured from disaster events. Unfortunately, some of these patients could be really critical, and understanding the pathophysiology of the injury progress is important for good quality care for the patients. Although existing disaster training systems emphasize non-technical skills, there has not yet been an in-depth analysis in identifying the competency of clinical skills for disaster personnel. HFMS is being used in rare but critical clinical events to enhance the competencies of health care providers.
Methods: The educational intervention consisted of a half-day workshop (lecture-HFMS-debriefing) for selected 24 emergency residents (six teams). The objective of the scenario was to develop performance competency in managing critically injured patients in a disaster events, specifically, blast, radiation, and crush injuries. A checklist was developed to assess the performances of the participants. All pre-to-post differences within subjects were analyzed with paired t tests. The statistical level of significance was set at 0.05.
Results: The content validity index of performance checklist was 0.9. Pre- and post-intervention differences (percentage) for the six team performances were 67.7 to 84.6, 58.1 to 80.8, 51.6 to 84.6, 61.3 to 80.8, 51.6 to 65.4, 61.3 to 76.9, respectively. All results were statistically significant.
Conclusion: HFMS training program focusing on critically injured disaster victims positively affected performances of the participants.
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Evaluating, Learning and Simulation Exercise for Efficacy, A Course on Advanced Prehospital Trauma Care

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