current information. However, communication and situational awareness are often "named" problems at major incidents. This study used Social Network Analysis (SNA) to analyze emergency medical organizations' communication during a large-scale, mass-casualty Chemical, Biological, Radiological, and Nuclear (CBRN) exercise.

Background: Social Network Analysis (SNA) focuses on the relationship and resource (eg, information) sharing between actors in a given system. SNA can provide graphs of information transferred between actors and measure aspects such as sociometric status (how much "activity" an actor has in relation to others) and betweenness (how much interaction one actor has with all other actors).

Methods: The exercise scenario was a collision between a train carrying acrylonitrile and an excavator at a railroad crossing. Audio data were collected through microphones worn by the Ambulance Incident Commander (AIC) and the Medical Incident Commander (MIC), and also through radio recordings. The audio was transcribed, and meaningful utterances were entered into a social network matrix to produce social network statistics and graphical networks.

Results: The SNA showed that the four actors with the highest sociometric status were the MIC (11.83), AIC (9.97), RSC1 (4.66), and IC (2.59). The actors with highest betweenness were MIC (534.67), AIC (195.75), RSIC1 (47.25), and the train company representative from Veolia (5.00). A graphical representation is shown in Figure 1.

Conclusion: The SNA showed that the MIC and AIC had high information-sharing activity and interactions with other actors, as expected, given the organizational command structure. In Figure 1, it indicates several information-sharing structures, including pathways from higher command (DDO and Emergency Dispatch) to AIC, into a mostly interconnected network (bottom right) and several peripheral actors such as police officers. Overall, SNA appears to be a useful tool to analyze communication during major CBRNE incidents.

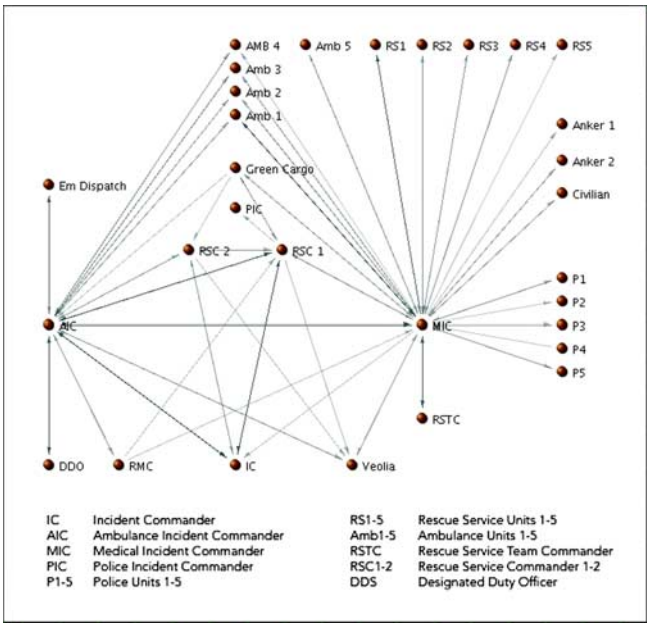

Figure 1. Communication flow.

Prehosp Disaster Med 2017;32(Suppl. 1):s223–s224
doi:10.1017/S1049023X17005787

System Dynamic Simulation for Medical Needs in the Great East Japan Earthquake

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Study/Objective: The aim of this study is to create a system-dynamics model simulating the medical needs in a disaster for the assessment of medical needs and decision making.

Background: In the Great East Japan Earthquake (GEJE) of 2011, the medical response team faced less patients with injury than expected, but an excess of patients with non-communicable disease (NCD), infectious disease, rehabilitation, mother and child health, and mental health needs in different time courses. It is crucial for the medical response team to predict the needs according to type of hazard, vulnerability, and capacity of the community. Besides precise analysis of real data, system dynamic simulation will enable us to postulate the dynamic change of inter-related medical needs in disaster.

Methods: Using Stella Architect software (Isee Systems, NH USA), the system dynamics model was built to represent each module of different medical needs. Japanese national average values of a crude birth rate (8.8/1,000), inpatient (1,090/100,000), outpatient (5,376/100,000), and mental health problems (8.8/100) were used in a model of a given community (+65-old ratio is 32%). Time-dependent ratio of injuries, locomotive syndromes, rehabilitation, mental health problems, NCD, and infectious disease were assumed according to the experience of the GEJE. Time starts from 30 days before onset and goes through 365 days after onset.

Results: The model successfully simulated the time course of the total medical needs in a town devastated by GEJE, where all the health facilities were destroyed by a Tsunami. The simulation model does not include the relief capacities; the time-dependent occurrence ratio was manually set. However, the total outcome became realistic and the relationship of various aspects of health needs in the time frame were visualized. Validation using the real medical needs data is necessary.

Conclusion: System dynamics model of medical needs in a disaster gives us a new insight in assessment and decision making.

Prehosp Disaster Med 2017;32(Suppl. 1):s224
doi:10.1017/S1049023X17005799

A Comparison of PC Screen Based vs High Fidelity Simulation Supported Instruction in terms of Learning Outcomes and Cost

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