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.

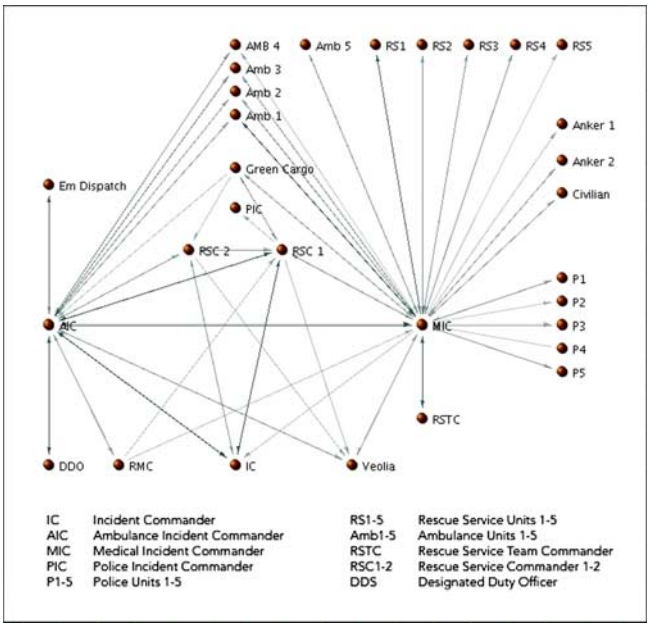

Figure 1. Communication flow.

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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.

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

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Study/Objective: Test a model that was developed to compare PC screen-based vs high-fidelity simulation supported training for basic trauma skills in terms of learning and cost outcomes.
Background: As disasters increase in numbers and intensity, more attention is being paid to trauma skills training for health workers. There is a wide spectrum of simulation types, and while high-fidelity simulation is known to be effective, it is also very costly.
Methods: The Nursing Education Simulation Framework guided the development of a model to compare the two simulation methods in terms of confidence, knowledge, skills, and cost outcomes. Participants (N = 70) were nurses and EMT's from the civilian and military sectors. All underwent pre-testing, random assignment to PC screen-based or high-fidelity simulation training groups, trauma skills training, immediate post and then post-post (6-12-weeks) evaluation. The evaluator was blinded to the simulation training type for each participant.
Results: There were no differences in the learning outcomes between the PC screen-based vs high-fidelity groups. Both groups increased their confidence, knowledge, and skills. However, the cost of high-fidelity simulation was ten times that of PC screen-based instruction per unit.
Conclusion: For basic trauma nursing skills, a less costly method of instruction can achieve the same learning outcome results.
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Self-Assessment of Intensive Care Nurses' Team Performance Compared with Intensive Care Nursing Students

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Study/Objective: The study aims to explore whether there are differences between intensive care nurses' (ICN) team performance and ICN-students, measured by a validated instrument.
Background: Due to lack of ICN-students working experiences, a joint high-fidelity, simulator-based training can bridge the gap between nursing school and appropriate hospital practice. Data originated from a training project in Norway. ICNs from a hospital intensive care unit collaborated with educators from a nearby university to improve ICN-students team performance, to make those students better prepared for practice.
Methods: The study used an explorative design. Thirty registered nurses, who were allocated into five teams representing intensive care specialty, participated in a high-fidelity, simulation-based pneumonia with acute respiratory failure setting. Each team consists of five ICN's and one ICN-student. The Mayo High Performance Teamwork Scale was used to measure team performance. We used the Mann–Whitney U test to compare and analyze the teams' self-assessment.
Results: Statistical significant differences were found between ICN-students and ICN's self-assessments on two variables: 1) The team prompts each other to attend to all significant clinical indicators throughout the procedure/intervention; and 2) When team members are actively involved with the patient, they verbalize their activities aloud. ICN's perceived and gave their support to these two assertions to a greater extent than ICN-students.
Conclusion: Our findings indicate that ICNs and ICN students perceive aspects of team performance in a joint team training setting differently. ICN's tend to have a higher awareness than ICN students, in terms of being attentive about clinical indicators throughout the intervention, and by noticing other team members' involvement with the patient.
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Large-Scale Disaster Simulations: Advancing Pediatric Disaster Preparedness and Safety through Whole-Hospital, Inter-Professional Learning

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Study/Objective: To underline the importance of the health care network in the response to a disaster. To share one method of training HCW, and improving communication under strenuous conditions through simulation. To use pediatrics as an example of one of our most vulnerable populations, and their particular needs in a disaster.
Background: Disasters, whether natural or human-made, have a significant impact on the population. Hospitals play an important role in the response to disasters and Health Care Workers (HCWs) must be prepared to respond. Training HCWs for such rare events and especially maintaining their competency is challenging. It has been shown that an all-hazards (CBRNe-Chemical, Bacteriologic, Radiologic, Nuclear, explosive) approach to hospital disaster preparedness is most effective and efficient. Recent Canadian hospital surveys show considerable gaps in hospital disaster preparedness, particularly with respect to decontamination capabilities.
Methods: We report details of our experience in conducting two large-scale, real-time, in-situation disaster simulations in a tertiary care, Level 1 pediatric trauma center. Quantitative and qualitative data from a city-wide trauma disaster simulation (2012), as well as one including exposure to a hazardous substance (2015), will be presented.
Results: Our findings endorse large-scale, in-situational simulations as opportunities for whole-team learning, practicing effective communication, and overall improvement of hospital disaster preparedness.
Conclusion: Training for the rare but high-impact event that is a disaster, and maintaining competency of HCWs, is difficult and costly. Participants in these simulations felt they improved their ability to respond to a Chemical, biological, radiological, nuclear, and explosive (CBRNe) disaster, and that these were valuable to their learning and practice. Our findings endorse large-scale, in-situational simulations as opportunities for whole-team learning, practicing effective communication, and overall improvement of hospital disaster preparedness.
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