

Preparedness for mass-casualty attacks on public transportation

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Akademisk avhandling

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Abstract

Background: Public transportation constitutes a vulnerable sector in modern day society, with high probability of generating mass-casualties if attacked. By preparing for mass-casualty attacks (MCAs) response can become more effective and public transportation can become a less rewarding target.

Aim: The aim of this dissertation was to investigate preparedness for mass-casualty attacks on public transportation. This allowed for identification of major challenges for preparedness and response, with a particular focus on the Swedish context.

Methods: Study I included 477 MCAs identified through searches of the Global Terrorism Database, journals, newspapers and websites, which were examined with descriptive statistics. Study II thematically analyzed 105 articles attained by systematic searches of the databases PubMed and Scopus. Study III and IV statistically analyzed data from 864 responses to a purposive-designed questionnaire, from operational personnel of the Swedish emergency organizations. Study V entailed validation of a finite element (FE) simulation model of a bombing in a train carriage compared to the bombings in Madrid 2004.

Results: International trends of MCAs (≥ 10 fatally injured and/or ≥ 100 non-fatally injured) on public transportation, during the years 1970-2009 (**I**) showed that the average number of injured increased considerably. High numbers of injured people were connected to attacks on terminal buildings, multiple targets and complex tactical approaches. Few MCAs occurred in Europe, but the average number of fatalities per incident and injured per incident were the second highest among regions. The literature study (**II**) of previous on-scene management showed that commonly encountered challenges during unintentional incidents were added to during MCAs, implying specific issues for safety, assessment, triage, and treatment, which require collaborative planning and specific training. The study regarding the Swedish emergency organizations' perceptions of terrorist attacks (**III**) showed significant differences on perceptions of event likelihood, willingness to respond, estimated management capability and level of confidence in knowledge of tasks to be performed on scene. The police respondents stood out; e.g. fewer police personnel had high estimates of their organizations' management capability and knowledge of tasks on-scene, compared to the other organizations. The study of factors which influence responders' perceptions of preparedness for terrorism (**IV**) showed that these were influenced by the responders' sex, work experience, organizational affiliation, various training arrangements and access to personal protective equipment. A FE model of an explosion in a train carriage (**V**) was developed and showed that FE modelling techniques effectively could model damage and injuries for explosions, with applicability for preparedness and injury mitigation efforts, but also that there was room for improvement of the model in terms of injuries.

Conclusion: Achieving preparedness for MCAs on public transportation is a multiple choice balancing act between ostensible dilemmas regarding investments, disaster plans, training, response strategies, collaboration and inventions.

Keywords: antagonism, disaster medicine, emergency response, emergency organizations, mass transit, preparedness, rescue work, security, terrorism.

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