

Downstream Hazards Associated with Mass Casualty Decontamination can be Contained or Minimised by Adoption of the PRISM Triple Protocol

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The Primary Response Incident Scene Management (“PRISM”) guidance incorporates evidence-based protocols that focus on the initial operational response to a chemical incident in order to prioritise casualty survival [1]. The PRISM guidance incorporates a “Triple Protocol” approach for ambulatory casualties, involving (i) immediate disrobe and dry decontamination, (ii) gross decontamination (Ladder Pipe System; LPS) and (iii) technical decontamination. The clinical effectiveness of the process has been confirmed in laboratory and field trials [1-3]. It can be reasonably anticipated that first responders will be exposed to vapour and/or contaminated materials discarded by casualties during the decontamination process. However, characterisation of the nature and extent of these secondary hazards has not previously been addressed. Therefore, a human volunteer study (n=115) was performed to assess the impact of the individual and combined decontamination procedures on the secondary hazard posed by contaminated materials using a chemical warfare agent simulant (methylsalicylate; MS).

Recoveries of MS demonstrated a substantial reduction in downstream contamination when the Triple Protocol was employed compared to individual decontamination procedures. Dry decontamination materials were found to be grossly contaminated. Prompt disrobing and use of suitable dry decontamination materials significantly reduced the subsequent contamination of towels and washcloths resulting from the wet decontamination processes. Perhaps most importantly, a significant reduction in atmospheric contamination within the technical decontamination units was observed when preceded by dry and LPS procedures. To put this in context, when technical decontamination was used as a stand-alone method, the concentration of MS vapour within the enclosed structure was equivalent to a dose of sulphur mustard exceeding the IDLH (immediately dangerous to life or health) threshold. In contrast, the Triple Protocol reduced vapour concentration below the IDLH threshold.

In summary, this study has demonstrated that the Triple Protocol reduces contaminant exposure in downstream operational processes associated with a chemical incident response.

[1] R.P. Chilcott, J. Larner and H. Matar, 2018. www.medicalcountermeasures.gov/barda/cbrn/prism/

[2] R.P. Chilcott et al., 2018, *Ann Emerg Med*, DOI: 0.1016/j.annemergmed.2018.06.042

[3] Larner J, Durrant A, Hughes P, et al., 2019. *Prehosp Emerg Care*. 19:1-14. doi: 10.1080/10903127.2019.1636912.