

Operational systems evaluation of a large scale multi-agency decontamination exercise

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Scope

- **Operational systems evaluation of a large scale multi-agency decontamination exercise**
 - Introduction
 - What is CBRNE Decontamination
 - The exercise
 - Aim and Methods
 - Findings
 - Analysis
 - Discussion
 - Conclusion

Introduction

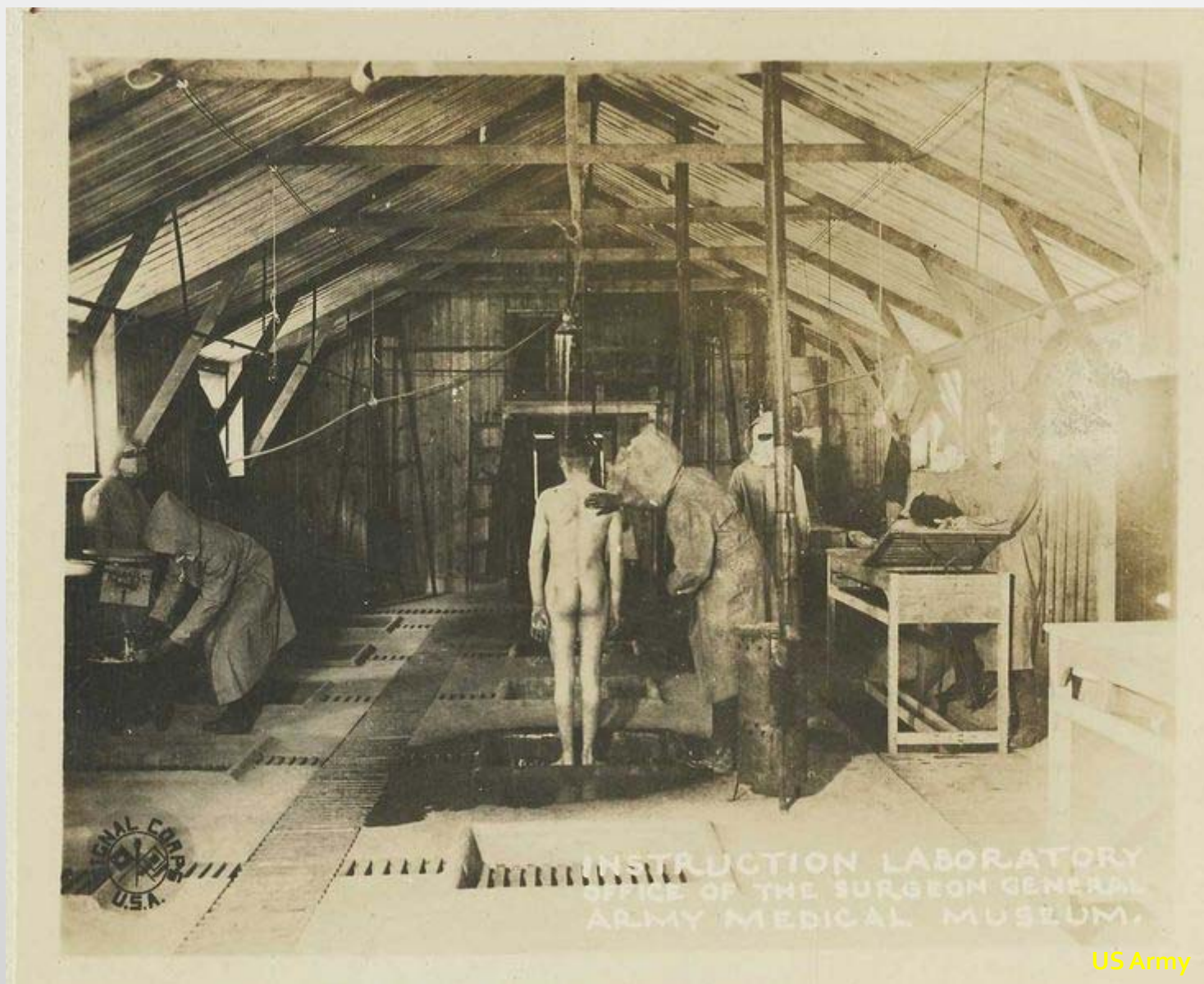
- CBRN = Chemical, Biological, Radiological, Nuclear
- CBRN incident risks are recognised as increasing
- CBRN preparedness is assuming a greater importance now after progressive decline since the end of the cold war
- Decontamination is an essential component of CBRN preparedness
- Decontamination and management of exposed individuals is a multiagency effort, predominantly managed by Fire and Health

Recent CBRN events

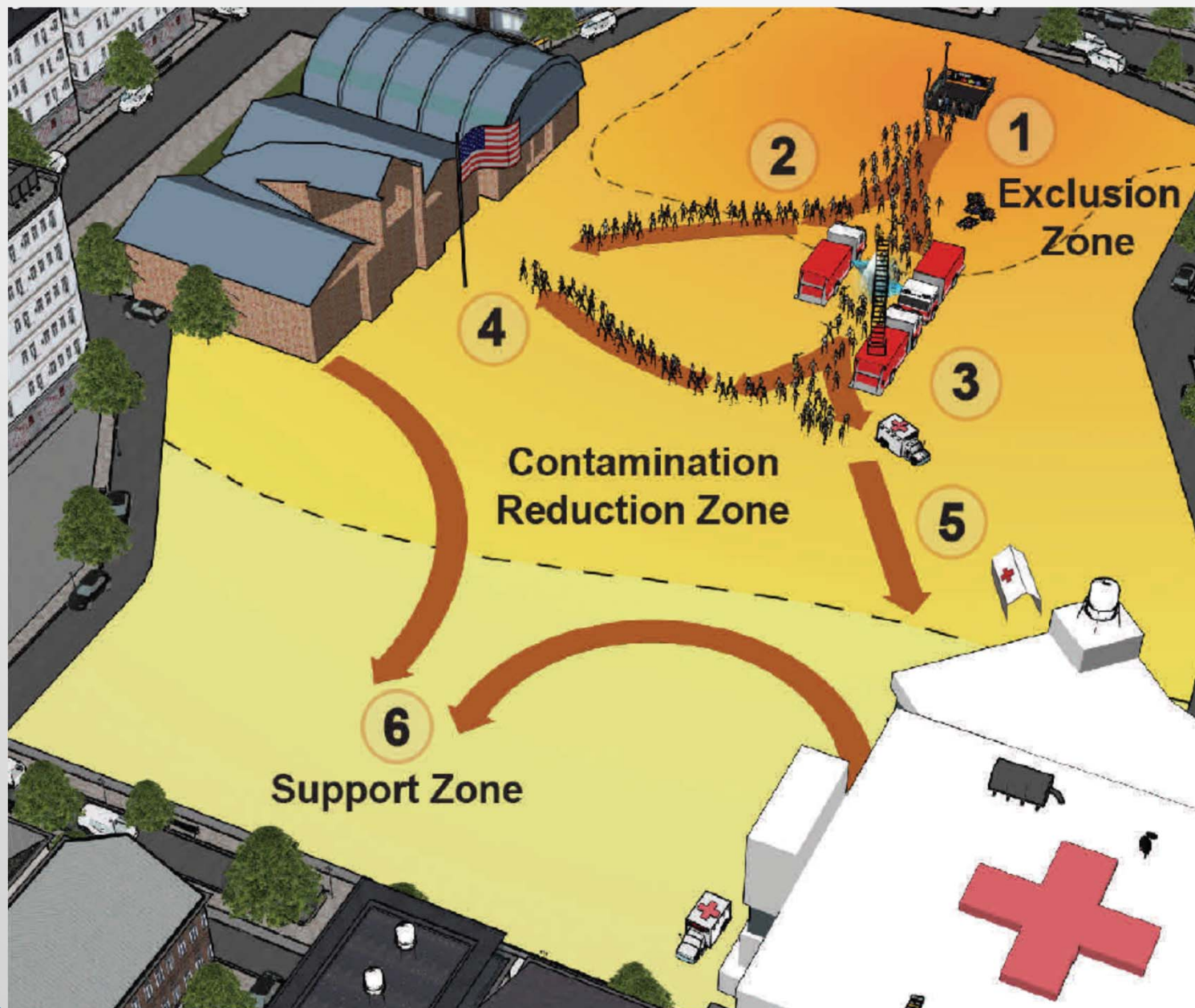
| Year | Location | Incident | Agent Class |
|-------|------------------|--------------------------------|------------------------------|
| 2018 | UK | Deliberate attack | Nerve (4 th gen) |
| 2017 | Idlib pr, Syria | Deliberate attack | Nerve |
| 2013 | Damascus, Syria | Deliberate attack | Nerve |
| 2007- | Northern Iraq | Deliberate attack | Blister, Irritant |
| 2014- | Iraq, Syria | Deliberate attack | Pulmonary, Blister, Irritant |
| 2011 | Fukushima, Japan | Natural disaster, radiological | Radiological |
| 2002 | Moscow, Russia | Intentional release | Opiate/Anaesthetic |

Decontamination

- Decontamination is the deliberate process of reducing a hazard on an object.
- Objects can include: individuals, clothing, technical items, forensic items, medical equipment, animals and plants, buildings, vehicles and public infrastructure.
- Decontamination is a standardised process, applied uniformly to a population. The process and its effectiveness have been *previously validated through study*.
- “Free from contamination” and “Post-decontamination state” are not equivalent in terms of hazard management
- Testing of decontamination effectiveness sometimes employed



US Army



Updated Guidelines for Mass Casualty Decontamination During a HAZMAT/Weapon of Mass Destruction Incident, Volumes I and II. Edgewood Chemical and Biological Research Centre, Maryland, USA



SYDEX16 Fire and Rescue NSW



The Exercise

- Culmination of three major decontamination exercises for health facilities within NSW Health
- Coordinated and supported by Australian and NZ Counterterrorism Committee (ANZCTC)
- Test the responsiveness of decontamination processes and procedures at major NSW Health facilities to:
 - Manage contaminated casualties
 - Conduct decontamination of casualties
 - Manage mass casualty situations

Aim of the research

- Evaluate a large scale decontamination exercise
- Identify areas of latent systemic risk in multiagency response contexts:
 - Deviations from policy
 - Unexpected influence of culture and participant expectations
 - Deviations from acceptable practices
 - Unsafe practices
 - Detailed feedback from participants
- Look beyond usual measures of effectiveness and KPIs to the experience of participants and responders

Ethics approval from University of Sydney Ethics Committee

Organisational approval from ANZCTC, Hospital executive, and LHD Executive

Exercise Scenario

- Release of unknown chemical agent on a train
- Rapid presentation to tertiary health care facility
- Respiratory tract irritant, not lethal
- Symptoms: cough, shortness of breath, eye irritation, lachrymation, rhinorrhoea, burning sensation, unpleasant odour, chemical conjunctivitis, chemical burn

| Presenting complaint | Australian Triage Scale | | | | Total |
|-----------------------------------|-------------------------|---|----|----|-------|
| | 1 | 2 | 3 | 4 | |
| Respiratory – cough | | | 11 | 12 | 23 |
| Respiratory – shortness of breath | 3 | 3 | 6 | 3 | 15 |
| Burn chemical | | 1 | 2 | 1 | 4 |
| Eye watery | | | | 2 | 2 |
| Poisoning | | | 1 | | 1 |
| Pain limb/upper shoulder | | | | 1 | 1 |

Methods

1. Recruitment of participants
2. Participant paper based survey completed on the day
3. Telephone interview 1-2 weeks following (a representative sample of the cohort)
4. Mixed methods analysis
 1. Descriptive statistical analysis (Excel, SPSS)
 2. Qualitative thematic analysis (NVivo)

Contributions: DJH contributed solely to conceptual development of this study. DJH and JC contributed equally to all components of the design, methodology, analysis and reporting of this work

Survey Tool

- Adapted and extended from validated tool piloted and trialled by Public Health UK (Carter et al, 2012 and 2014)
- Tool collected data across a wide variety of response domains
 - Decontamination process
 - Clinical care
 - Psychosocial impacts
 - Communications
 - Command and Control
- Specific subsections for special groups within the response:
 - Casualties
 - Exercise Controllers
 - Non clinical responders (Fire, Police, Security, administrative staff)
 - Clinical Personnel

Findings – Quantitative

| | Direct Survey Question (Responses are numbers of YES responses) | Non-clinical n=14 | Exercise Control n=10 | Casualty n=46 | Clinical n=14 |
|----|--|----------------------|--------------------------|------------------|------------------|
| 1 | Was it clear to you what you had to do? | 14 | 9 | 34 | 12 |
| 2 | At any time did you feel concerned, anxious, frightened or stressed? | 1 | 1 | 20 | 7 |
| 3 | Was the care well organised and well-coordinated? | 12 | 8 | 18 | 7 |
| 8 | Did you notice any departures from current policy or procedures? | 0 | 6 | 10 | 8 |
| 9 | Did you observe any dangerous practices during the decontamination | 2 | 5 | 27 | 7 |
| 10 | Did you feel you had to make assumptions in the absence of knowing exactly what the correct procedures and processes were? | 0 | 2 | 24 | 7 |
| 11 | Did you feel that casualty care was compromised in any way during the exercise? | 3 | 6 | 24 | 4 |
| 12 | Was there adequate and appropriate equipment to manage the decontamination process? | 10 | 5 | 31 | 7 |
| 13 | Was there adequate and appropriate manpower to manage the decontamination process? | 12 | 6 | 11 | 3 |
| 14 | Was there a constant flow of adequate and appropriate communication during the management of the decontamination process? | 11 | 3 | 13 | 5 |

Findings – Quantitative

| | Direct Survey Question (Responses are numbers of YES responses) | Non-clinical n=14 | Exercise Control n=10 | Casualty n=46 | Clinical n=14 |
|----|--|----------------------|--------------------------|------------------|------------------|
| 18 | Were you decontaminated? | | | 37 | |
| 19 | Did you feel that the staff knew how to care for you? | | | 24 | |
| 20 | Was consideration given to your dignity and privacy? | | | 18 | |
| 21 | Were there any delays in your treatment? | | | 34 | |
| 22 | Was there anything more the staff caring for you could have done to assist you? | | | 36 | |
| 23 | Did you consider leaving the treatment area and why and where would you have gone? | | | 27 | |
| 24 | Did you have any difficulty communicating with the staff caring for you? | | | 29 | |

Findings - Qualitative

Thematic development and code analysis

| General Theme: | Clinical Response and Decontamination | Command and Control | Communication | Compliance | Staff Training and Preparedness | Total |
|---------------------------|--|---------------------|---------------|------------|------------------------------------|-------|
| Casualties | 192 | 33 | 160 | 78 | 127 | 590 |
| Clinical Personnel | 29 | 8 | 11 | 4 | 56 | 108 |
| Exercise Control | 19 | 12 | 5 | 2 | 24 | 62 |
| Non Clinical Personnel | 6 | 0 | 1 | 0 | 7 | 14 |
| Total | 246 | 53 | 177 | 84 | 214 | 774 |

| Code | Theme | Respondent Group | | | | Total |
|---------------------------------------|-------|------------------|--------------------|------------------|------------------------|-------|
| | | Casualties | Clinical Personnel | Exercise Control | Non Clinical Personnel | |
| Poor communication | c | 120 | 0 | 3 | 1 | 124 |
| Lack of staff | e | 45 | 14 | 5 | 0 | 64 |
| Potentially dangerous occurrence | a | 39 | 5 | 4 | 1 | 49 |
| Inadequately delivered clinical care | a | 27 | 0 | 6 | 0 | 33 |
| Lack of clinical care provided | a | 31 | 0 | 0 | 0 | 31 |
| Lack of control of situation | b | 11 | 7 | 11 | 0 | 29 |
| Negative privacy event during process | d | 27 | 1 | 0 | 0 | 28 |
| Process concerns or inadequacies | a | 7 | 16 | 3 | 1 | 27 |
| Wanted to leave treatment area | d | 24 | 0 | 0 | 0 | 24 |
| PPE | e | 6 | 7 | 9 | 2 | 24 |
| Inadequate resources | e | 19 | 0 | 1 | 0 | 20 |
| Lack of resources | e | 5 | 10 | 2 | 1 | 18 |

^aClinical Response and Decontamination
^bCommand and Control
^cCommunication
^dCompliance
^eStaff Training and Preparedness

Analysis - Overall

- Highly variable perceptions between participant groups
- Professionals were concerned with factors that were relatively unimportant to casualties
- Casualties were concerned with perceptions of the performance and behaviour of professionals
- Communication, command and control and resources were common concerns

Analysis by participant group

| Casualties | Clinicians (Ambulance, MOs, NOs, others) |
|--|--|
| <ul style="list-style-type: none">• Communications breakdown• Potentially unsafe events• Clinical care not meeting expectations• Care gaps• Poor command and control | <ul style="list-style-type: none">• Resource deficiencies• Command and Control• Lack of training• Communication difficulties• Unsafe occurrences |
| Non Clinicians (Police, Fire, Admin, Security) | Exercise Controllers (NSW Health and Ambulance) |
| <ul style="list-style-type: none">• Poor command and control• Poor communication• Clinical care not meeting expectations• Processes not meeting expectations• Resource limitations | <ul style="list-style-type: none">• Lack of training• Poor communication• Poor command and control• Processes not meeting expectations |

Discussion

- Results similar to that reported in UK
- Vulnerable or important subpopulations not accounted for in plan
- “Average” idealised population difficult to cater for at baseline
- Processes are not designed for use in real situations
- Design of response systems does not align with population reality today

Discussion

- Multiagency CBRN Response Planning:
 - Needs to be systematic
 - Consider key populations that are difficult to manage
 - Easier to plan and achieve goals if casualty focussed from outset
 - Introduce process flexibility where possible



Conclusions

- Policy does not match expected reality
- Workers are left exposed to risk as a consequence
- Factors to improve multisector response are not being properly addressed: interoperability and integration
- Psychosocial aspects of populations appear to be lower on priority list introducing risky assumptions:
 - Importance of communication during event
 - Key vulnerable populations (children, babies, pregnancy, dependent)
 - Catering for unexpected turns of events
 - Clear command and control
 - Resources

Questions



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