The Impact of Chemical, Biological, Radiological, Nuclear and Explosive Events on Emergency Departments: An Integrative Review

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Introduction: Disasters occur globally and can impact emergency department (ED) services. Chemical, biological, radiological, and nuclear (CBRN) events have different characteristics in terms of onset and duration when compared to other disasters, such as wildfires, floods, and hurricanes. It is important to have an understanding of the impact of CBRN events on EDs to inform disaster preparedness. The purpose of this paper is to identify peer-reviewed published literature that describes the impact on EDs from CBRN events.

Method: An integrative literature methodology was used, guided by the Preferred Reporting Items of Systematic reviews and Meta-Analysis (PRISMA) Guidelines. MEDLINE, PsycINFO, CINAHL, Pubmed, and Scopus were searched using terms relating to CBRN events and EDs. Papers were included if they focused on the impact of real-world CBRN event(s). Information from each included paper was extracted into a table, including author(s), CBRN event characteristics, ED response characteristics, patient presentation characteristics, and outcome characteristics.

Results: Of the 15,982 studies that were identified from the database searches, 4,012 were duplicates and 11,696 were irrelevant at the title and abstract screening stage. Therefore, 274 were screened at the full-text stage resulting in 44 studies for inclusion. Included papers were mostly from the United States of America (n=22/44, 50%), followed by Turkey (n=4/44, 9.1%). Most of the events were chemical (n=36/44, 81.9%), with Chlorine (n=9/36, 25%) being the most frequently reported chemical agent. Between 1 and 5,500 people [M=54, IQR: 22-253] presented to EDs because of CBRN events.

Conclusion: Emergency departments assess and manage patients who present following CBRN events. Of these patients, the majority do not require hospital admission, suggesting that the ED is integral in the health response to CBRN events. As such, EDs should be adequately prepared, from a resource and process perspective to assess, manage and discharge large numbers of CBRN-related patients.

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Health and Social Implications of Potential Indo-Pacific Chemical, Biological, Radiological, and Nuclear (CBRN) Proliferation Driven by Adaptation to Population, Climate Change and Geopolitical Upheaval

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Introduction: Future strategic pressures in the Indo-Pacific region will present major policy and strategic challenges driven by rapidly increasing populations, resource depletion and contests, and forced adaptation to a changing climate. While regional countries remain likely to continue on a high growth trajectory, there is growing concern that nations will face difficulty to sustain economic gains in the face of strategic resource depletion and availability, population growth, and increasingly frequent extreme weather events. This mismatch could result in strategic miscalculation and reformulation, driving CBRN proliferation choices that fall outside of historical norms or standards. Such societal stressors are already occurring in the region and themselves may suddenly impact on health and social systems in unpredictable and complex ways.

Method: Three tabletop exercises called the Boxwood Scenarios were conducted utilizing the Avalanche TTX system, including participants from key intelligence, military, and academic experts. Participants were invited to a Delphi study examining positive and negative drivers, shaping factors, motivators, and consequences of CBRNE proliferation in the Indo-Pacific region. Two rounds of result review were conducted by the group. These results underwent a systematic mixed methods analysis (quantitative and qualitative methods) and interpretation.

Results: Climate change, demographic and geopolitical pressures were highlighted as key to future potential CBRN proliferation risks, with this nexus resulting in major proliferation concerns as early as 2040. Proliferation decisions driven by, and occurring in parallel to, climate and demographic pressures were identified as of major concern. Such decisions would have profound multi-layered social, health and broader implications for Indo-Pacific countries with declining determinants of national power.

Conclusion: Climate change and demographic and geopolitical pressures could drive future Indo-Pacific CBRN proliferation. The consequences to human populations, the viability of ongoing international disaster risk reduction and capacity-building efforts, and the increased future risk of major CBRN events cannot be overstated.

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