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CBRNE

Strengthening Global Systems to Prevent and Respond to High-Consequence Biological Threats

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Introduction: The world is facing the devastating impact a biological event can have on human health, economies, and political stability. COVID-19 has revealed that national governments and the international community are woefully unprepared to respond to pandemics—underscoring our shared vulnerability to future catastrophic biological threats that could meet or exceed the severe consequences of the current pandemic. This study examines potential threats related to deliberate Russian military use and misuse of the tools of modern biology or an accident caused by a CBRN event evolving rapidly in the highly volatile political environment in and around Ukraine and other conflicts.

Method: A participatory foresight, co-creative, future and transformation-oriented methodology was used to structure a transformative model for a disciplined exploration of scenarios to confront complex challenges and facilitate improved outcomes. Foresight helps to evaluate current policy priorities and potential new policy directions; see how the impact of possible policy decisions may combine with other developments; inform, support and link policy-making in and across a range of sectors; identify future directions, emerging technologies, new societal demands and challenges; and anticipate future developments, disruptive events, risks and opportunities.

Results: The study found that the “mitigation scenarios” are based on the “Confront, Regulate, Overcome” metamodel combined with the “Security, Rescue, Care” response modalities.

These require the cooperation/coordination of law enforcement forces along with military forces, fire departments and civil security resources, hospital and first-line responder teams, in order to appropriately address populations, assets and territories issues elicited by the identified threat, which drives key decision makers’ tasks at the strategic level.

Conclusion: The participatory foresight exercise demonstrated gaps in national and international biosecurity and pandemic preparedness architectures highlighted by the challenges of the Ukraine war—exploring opportunities for better cooperation to improve prevention and response capabilities for high-consequence biological events, and generate actionable recommendations for the international community.

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A Systematic Review of PPE Recommendations for First Responders, and Medical Professionals to Nuclear Radiological Events at Nuclear Power Plants

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Introduction: Due to climate change, many countries are exploring nuclear power as a clean, sustainable, and alternative energy source. However, radiophobia stemming from a history of major accidents at nuclear power plants (most recently Fukushima Daiichi) inhibits the expansion of this industry. In an unlikely event of a large-scale accident, the risks posed to humans are minimal when mitigation measures are followed. This includes appropriate Personal Protective Equipment (PPE) for first responders, and medical professionals responding to these emergencies. An examination of the PPE recommendations for these scenarios will highlight best practices for minimizing exposures, and the effects of radiation.

Method: A systematic literature review will provide a historical baseline of the PPE worn during previous nuclear power plant events. Additionally, current recommendations for PPE levels in response to these emergencies will be explored. Five databases will be utilized for this study, including PubMed, Web of Science, and SCOPUS.

Results: Many studies examine different types of nuclear radiological exposures, but few focus on nuclear power plant



scenarios. More than 5,000 articles emerged from a preliminary survey of the five databases. However, less than 1% of them satisfied the extraction criteria, and reviewed PPE for nuclear power plant accidents. Medical responders caring for “exposed” individuals who present at Emergency Departments have minimal exposure once they’re decontaminated, and everyday PPE is maintained. However, data on PPE recommendations for on-site response remains unexplored. Airtight suits and full-face respirators emerged as industry gold standard for protection, but a closer examination of these types of suits, and responders’ self-efficacy utilizing the gear would clarify their actual protective qualities.

Conclusion: While nuclear power plant accidents do not occur often, many remain fearful of their impact. Maintaining proper PPE (including respiratory habiliment) for event responders is one way to minimize the adverse health effects of these nuclear radiological exposures.

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Closer Than We Think: the Management of a European Nuclear Exchange

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Introduction: An exhausted, isolated, increasingly desperate Russia, still in possession of over 4,400 nuclear warheads, puts the world at risk. Since the outbreak of war in Ukraine, Russian rhetoric and military doctrine have evinced an increasing non-chalance toward the employment of tactical nuclear weapons as stockpiles of conventional weapons are depleted. Poor targeting control (or outright perfidy), demonstrated by recent events in Poland possibly violating NATO’s collective defense clause, have only incensed an imminently combustible situation. Given this threat, it behooves medical professionals to gain thorough acquaintance with Acute Radiation Sickness (ARS), including an assessment of sources of exposure, presentation, prognostic indicators, immediate treatments, long-term concerns, and sources of consultant support.

Method: Through thorough review of military and civilian sources, training courses, historical cases, injury mechanisms, first-responder concerns, hospitalization parameters, and laboratory indicators, the ARS spectrum will be explored. Surgical, anesthetic, and intensive care implications will be discussed, as will infection and nutritional concerns. Emerging practices, specialized therapy, and long-term medical sequelae will be covered.

Results: A thorough discussion of potential sources (civil and military), clinical recognition, and presentation of ARS will focus on best clinical guidance, providing the most up-to-date treatment strategies, and will give clear guidance regarding how best to prepare, treat, and obtain specialist consultation.

Conclusion: It is the earnest hope of the presenter (a senior naval physician with nuclear power experience, anesthesiology consultant/board examiner, and intensivist, who studied

radiation safety and injury for much of his career and wrote a Diploma in the Medical Care of Catastrophes dissertation on radiologic injury management) that the audience will never face the horror of a single radiologic casualty. However, the likelihood of such wishful thinking seems as remote as ever. Attendees will not only learn guidance for treatment and prognostication, but will know how to obtain support and expert consultation.

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Will they Panic? The Effect of Risk Messaging on Public Behavior During Non-conventional Terrorism

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Introduction: Non-conventional terrorism (NCT) is laced with uncertainty that can foster fear and lead to unwanted public behavior. One such example is the masses of worried-well overcrowding hospitals. The purpose of this study was to explore public behavioral intentions during NCT and the effect of risk messaging in attenuating unwanted behavior.

Method: An online intervention-based study was conducted among 1,802 adult Israeli participants. Threat perception and behavioral intent before and after exposure to hypothetical NCT scenarios were assessed stratified to the media type, exposure to rumors and fake news, and risk messaging.

Results: Participants perceived the CBRN terrorism threat as low-medium in likelihood, and threat intrusiveness and perceived incident severity were estimated at a medium level. Nearly half (45%) of participants indicated it is highly likely that they would seek medical attention following an NCT incident. Exposure to fake news significantly increased the intention to seek medical attention ($p=0.001$). However, the odds of participants exposed to risk messaging reporting this intention were 0.470 (95% CI: 0.359, 0.615) times that of participants not exposed to risk messaging ($\chi^2=30.366$, $p<0.001$).

Conclusion: This study shows that overcrowding hospitals by worried-well following a non-conventional terror incident can be attenuated by risk messaging. In particular, this study suggests that simple, timely, and clear risk messaging is capable of overcoming fake news that otherwise can increase unwanted behavior. Rumors and fake news have limited power to alter threat perception, but they can significantly change behavioral intent and cause unwanted behavior that could jeopardize crisis management. Rational behavior by the public during NCT can be considered an outcome of rational decision-making by crisis managers, especially risk communicators.

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