Medical CBRN Defence in the Australian Defence Force

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Introduction

This article focuses on a specialist area of military medicine, following a series of recently published papers regarding occupational and environmental medicine in the ADF.[1] They assert that high rates of preventable workplace illness and injury indicate the need to improve the management of occupational and environmental hazards associated with ADF workplaces, with better emphasis on prevention rather than treatment.

These papers advocate that, rather than replicating the treatment services used for Australian civilians, the ADF's health services should be premised on an occupational and environmental health paradigm. For this to occur, the health capability gaps in the current ADF health service delivery model demand reassessment of the fundamental inputs to (health) capability, for both Joint Health Command (JHC) and Defence's Work Health and Safety Branch.

Such a reassessment, with implementation of necessary changes, could lead to a holistic and sustainable workforce-based ADF health service delivery model by 2030. This timeframe is based on the current state of the ADF's occupational and environmental health services, and the small number of civilian specialist practitioners within the Australasian Faculty of Occupational and Environmental Medicine (AFOEM). These considerations suggest that a mature health delivery model would take 10–15 years' sustained effort, with respect to occupational and environmental physicians alone.[2]

This article expands on the previous papers, with respect to how such a paradigm is essential to the ADF's defensive medical Chemical, Biological, Radiological and Nuclear (CBRN) capabilities.

Global CBRN Threats

Hunter-gatherer communities have used biological weapons such as poisoned-tipped spears and arrows since prehistoric times. However, the first documented use of a biological agent for warlike purposes was in 1346, when plague-infected corpses were catapulted into the city of Caffa (now Feodosia in Crimea) by besieging Mongols. Even so, it was not until the mid-19th century that investigators, such as Louis Pasteur in France and Robert Koch in Germany, demonstrated that microorganisms could cause disease, while research into the industrialised weaponising of potential biological agents only began during World War I (WWI).[3]

Lethal chemical weapons were first used in 1915 by the Germans near Ypres on the Western Front.[4] The century since has seen many nations develop, and sometimes utilise, a chemical weapons capability.[5] Although nuclear weapons were used twice in 1945,[6] other radiological weapons have so far not been employed on a mass scale.[7,8,9]

Since the end of the Cold War, most CBRN events have usually entailed the use of chemical and biological weapons by non-state terrorist organisations.[10] Examples include the 1995 attack on the Tokyo subway by the Aum Shinrikyo cult using sarin,[11] and the 2001 attack on the US Senate and two media outlets by unknown perpetrators using anthrax.[12]

The development, production, stockpiling and use of chemical weapons is prohibited by the 1997 Chemical Weapons Convention,[13] while the 1975 Biological Weapons Convention likewise prohibits that for biological weapons.[14] Nuclear weapons are presently subject to the 1963 Partial Nuclear Test Ban Treaty15 and the 1970 Nuclear Non-Proliferation Treaty.[16,17]

However, several nations have not signed or ratified some or any of these treaties. In addition, North Korea withdrew from the Nuclear Non-Proliferation Treaty in 2003,[18] and has recently threatened several regional neighbours, including Australia, with nuclear weapons.[19] Moreover, these treaties lack relevance with respect to compliance by non-state non-signatories, such as terrorist organisations. CBRN weapons therefore, remain an important global threat.

Furthermore, the goals and actions of non-state terrorists in recent years have made the use of CBRN weapons more likely, while technological advances

have made their use more feasible.[20] Given the victims of a CBRN attack may vary from individuals to whole populations – which may include military personnel as well as civilians[21] – defending against these weapons has become an important public health issue.[22]

Many nations including Australia have therefore focused their defensive CBRN measures against the public health threat posed to their civilian populations by terrorist organisations, particularly after the 2001 World Trade Center terrorist attacks.[23] This approach predicates managing health responses to *deliberate* CBRN terrorist attacks that are *intended* to cause harm, on comparable terms as for *accidental* hazardous material incidents.[24]

This article therefore, contends that occupational and environmental medicine has an important role with respect to commanders applying a risk management approach to the prevention and treatment of CBRN casualties, while maintaining ADF operational capability.

Civilian CBRN Defence in Australia

Within Australia, the primary responsibility for protecting life, property and the environment lies with the states and territories. Each of these have their own plans and arrangements to respond to, and recover from, natural and human-caused emergencies. To this end, some state and territory health departments have dedicated disaster management units.[25]

To complement their efforts in responding to emergencies, the Australian Government can also provide physical and financial assistance. This is an Attorney-General's Department responsibility through Emergency Management Australia (EMA).[26]

Australia's civilian CBRN defensive measures are generally incorporated into a unified 'All Hazards' approach, for a range of different emergencies. Local authorities initially respond to these emergencies, followed by a series of escalatory stages. In addition, EMA has specific health guidance for dealing with CBRN hazards.[27]

ADF CBRN Defence

For a medium-sized power, Australia's involvement with CBRN issues has been surprisingly intimate. This began in WWI, where 323 Australian Imperial Force (AIF) personnel died and 16,426 were wounded by gas on the Western Front.[28] Although they were not used, Australia stockpiled its own chemical weapons during WWII, as a deterrent against the Japanese.[29] Australia then provided three sites and about 15,000 personnel for 12 British nuclear weapons tests between 1952 and 1957.[30]

More recently, the Australian deployments before and during the 1990-91 Gulf War were conducted in what was assessed as a high-threat chemical and biological warfare environment.[31] Australians then participated in a series of United Nations CBRN weapons inspections in Iraq.[32]

The ability of ADF personnel at sea, on land and in the air to maintain operational capability before, during and after a CBRN attack remains fundamental to defending Australian interests. To this end, all ADF personnel undergo basic CBRN defensive training on entry and periodically thereafter (typically every five years). It usually takes only one day and is generally limited to describing the various types of CBRN hazards and practical demonstrations of respirators and other CBRN equipment. Navy incorporates this training into its non-CBRN shipboard damage control courses.[33]

Additional training is provided for the relevant instructors and for specific deployments that are assessed as posing a greater CBRN threat.

ADF health support in CBRN environments is based on self- and buddy-aid, which are time-critical and complicated by the risk of further contamination. After decontamination, casualties require further specialist CBRN treatment, perhaps concurrently with resuscitation for other life-threatening injuries.

Current ADF operational doctrine for CBRN defence is therefore predicated on five pillars – Detection, Identification and Monitoring (DIM); Warning and Reporting (W&R); Physical Protection; Hazard Management and Medical Countermeasures (MCM); and Medical Support. Although the medical contributions are predominantly centred on the final pillar, they still include all the others, which can be summarised as:

CBRN occupational screening. This ensures that at-risk personnel meet the appropriate physical, medical and psychological standards. This particularly refers to personal protective equipment suitability, fitting and kitting. The standards are difficult to justify, and are often subsumed within broader medical standards, where their justification can be lost.

CBRN medical preparation. This includes physical conditioning activities, vaccinations, providing personal medical countermeasures and CBRN first aid items. Apart from high readiness elements, this is

usually conducted 'just-in-time'. It is also contingent on sufficient quantities of in-date vaccinations and CBRN medications being available when required, typically when other nations are competing for the same items simultaneously.

CBRN medical training. This refers to the medical theory and recognition of CBRN agents, how to use personal medical countermeasures, protocols for self- and buddy-aid, casualty evacuation, decontamination and integrating each of these individual medical activities into overall CBRN defences. This training tends to have a heavy theoretical component, is generally scenario-based and is difficult to access.

In support of integrating wider activities across these pillars and their related medical activities, the ADF has an extensive range of non-health CBRN policy references.[34] Additional guidance is also available from a range of NATO[35] and other references.

The development and maintenance of CBRN-related health policy, doctrine and procedures, and providing health input into strategic CBRN policy and doctrine, is a JHC responsibility.[36] However, at present, JHC lacks the dedicated specialist health staff necessary to perform these tasks. Furthermore, JHC does not have a dedicated ADF CBRN health manual. Instead, extant guidance is dispersed among and within multiple operational health references.[37]

Current recruiting health standards[38] for ADF members do not include factors such as CBRN respirator compatibility with their spectacles, CBRN personal protective equipment compatibility with their height and weight, or medical conditions that may restrict their ability to use CBRN countermeasures.[39] While these factors may not affect their ability to undertake their normal duties, it may limit or preclude ADF members from doing so in a CBRN environment. Such cases should therefore be identified before they are called upon to do so.

Apart from self- and buddy-aid, basic periodic CBRN training does not include on-scene casualty treatment or specialist toxicological and emergency management; since 2012, these capabilities have resided only within Army's Special Operations Engineer Regiment (SOER). SOER originated in 1999 as the Joint Incident Response Unit (JIRU), as part of the ADF's security arrangements for the 2000 Sydney Olympics. JIRU was formed from amalgamating several specialised Royal Australian Engineer units, including its Chemical Biological Radiological Response (CBRR) Squadron.[40]

The intent of CBRN training for military health personnel is to conserve fighting strength, continue providing non-CBRN health services and support to the maximum extent possible, protect health personnel from CBRN injuries, minimise CBRN morbidity and mortality, avoid the spread of contamination into health vehicles and facilities, and provide command advice.

To this end, various Army and Navy units have conducted medical officer CBRN courses over many decades. Apart from a hiatus in 2003, these courses were centralised at the Army Logistic Training Centre from 1994 until 2007. Besides Australian CBRN subject matter experts, these courses employed presenters from the US Army Medical Research Institute of Infectious Diseases (USAMRIID),[41] the US Army Medical Research Institute of Chemical Defense (USAMRICD)[42] and the US Armed Forces Radiobiology Research Institute (AFRRI).[43] These together arguably constitute the Western world's centres of medical CBRN expertise.

CBRN training for ADF health personnel has been a JHC responsibility since 2009. To this end, the ADF Medical Officer CBRN course was updated in 2011 to incorporate advances in technology and medical practice. Its intent was to teach Permanent and Reserve medical officers, nursing officers and senior ADF medics how to apply their existing medical skills to treat CBRN casualties.[44] Although the updated CBRN Health Course was piloted in 2012, it has not been conducted since.[45]

Implications

Like many other military organisations, for many years it has been ADF practice to deliver basic defensive CBRN instruction during entry training, followed by limited periodic refresher CBRN courses. Additional training is provided for the relevant instructors and for specific deployments that are assessed as posing a greater CBRN threat.

The rationale for this approach stems from the substantial personnel and other resources necessary to sustain a high level of CBRN preparedness. While this gives every permanent and many reserve ADF members at least some CBRN familiarity, it does not provide the specialist medical or non-medical expertise required to develop and implement strategic-level CBRN policy and doctrine.

Furthermore, nearly 30 years after it ended, the current 'just-in-time' approach still reflects Cold War doctrine, despite the goals and actions of non-state terrorists making the use of CBRN weapons more feasible and likely. In particular, this approach does not address unforeseen CBRN threats to ADF

personnel that may arise mid-deployment or even within Australia.

The ADF's ability to treat its own and other military CBRN casualties is presently constrained to that which can be provided by SOER, which is limited to its supporting and enabling role for Special Operations in general. Additional training is required for health staff who support and enable the ADF's *non*-Special Operations capabilities, in particular its Role 2 health units[46] such as Army's 1st Close Health Battalion[47] and Navy's Maritime Operational Health Unit.[48]

Yet, the fact that there has been no CBRN health course since 2012 means that JHC's ability to conduct one has probably atrophied, to the point where it would more-or-less entail starting from scratch. Even with overseas assistance, reconstituting the breadth and depth of specialist health CBRN expertise within the ADF to conduct this course will take several years, at a time when the use of CBRN weapons by terrorist organisations in particular, is more feasible and likely.

In any event, future ADF CBRN health courses should still employ the expertise provided by USAMRIID, USAMRICD and AFRRI, either directly to course participants, or indirectly through 'train-the-trainer' courses. Additional clinical CBRN refresher training should be also provided on the same terms as other clinical refresher training, such as the Advanced Trauma Life Support course.

The lack of CBRN expertise within JHC also compromises CBRN health policy currency and precludes providing higher-level CBRN policy and doctrine health input. Furthermore, incorporating extant CBRN health policies into JHC's generic operational health guidance implies that they are not considered a high priority.

The relevance and importance of occupational and environmental medicine to the broader ADF has previously been highlighted.[49] In this instance, among their other attributes, occupational and environmental physicians undergo comprehensive theoretical and practical education with respect to applying a risk management approach to the medical aspects of preventing, assessing, managing, treating and advising on biological, chemical, radiological and other hazards.[50]

Military occupational and environmental physicians therefore, already possess many of the skill sets required to provide specialist CBRN health training, policy development and command advice. Their participation would also be predicated on managing CBRN hazards on comparable terms as other military occupational and environmental hazards. As applied to the ADF population, this approach is consistent with current national guidance for managing CBRN attacks on Australian civilians, while also maintaining ADF operational capability.

This paper therefore contends that, in collaboration with other occupational and environmental health practitioners and CBRN subject matter experts, occupational and environmental physicians have much to offer the ADF, with respect to leading and sustaining a holistic and time-critical responsive CBRN health planning, preparation and operational response capability.

Conclusion

With ADF personnel arguably exposed to the most diverse range of occupational and environmental hazards of any Australian workforce, high rates of preventable workplace illness and injury indicate the need to improve the management of occupational and environmental health hazards with better emphasis on prevention than treatment. This includes the accelerated pace and reduced warning of future CBRN threats to ADF personnel.

These considerations suggest that the ADF's health services be premised on an occupational and environmental health paradigm, with revised fundamental inputs to capability that would lead to a genuinely holistic and sustainable workforce-based ADF health service delivery model by 2030.

Among other attributes, this paradigm would entail military occupational and environmental physicians, who already possess many of the specialist skills to manage CBRN hazards, on comparable terms as other occupational and environmental hazards.

Many nations, including Australia, have focused their CBRN defensive measures against the civilian public health threat posed by terrorist organisations. Military occupational and environmental physicians can apply the same approach to the ADF population, with respect to the prevention and treatment of CBRN casualties, while also maintaining operational capability.

Authors

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Disclaimer

The views expressed in this article are the authors, and do not necessarily reflect those of the Australian Army, the RAN or any of the other organisations mentioned.

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49 N. Westphalen, 'Occupational and environmental medicine in the Australian Defence Force', Australian Defence Force Journal, 2016 , Issue 200, pp. 49-58, available from <http://www.defence.gov.au/ADC/ADFJ/Documents/issue_200/Westphalen_Nov_2016.pdf.

50 'Physician Readiness for Expert Practice (PREP) Training Program Occupational and Environmental Medicine Training Curriculum', Royal Australasian College of Physicians, available from https://www.racp.edu.au/docs/default-source/default-document-library/at_occupationalenvironmentalmedicine_curricula1.pdf?sfvrsn=8.