

One Health

Graves, Rebecca L; Whitaker, John; Clay, K

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Main Manuscript

One Health – Opportunities for Defence Engagement (Health)

"This paper forms part of a special issue of BMJ Military Health dedicated to Defence Healthcare Engagement"

ABSTRACT

The One Health concept continues to gain traction as a necessary approach to tackle emerging threats to human, animal, and environmental health, but has not yet been adopted within Defence Engagement (Health). The health of humans, animals and ecosystems are closely interlinked. The One Health concept recognises this interdependence and seeks to balance and optimise the health of all three through an integrated and unifying approach. With a focus on zoonoses, vector borne disease, antimicrobial resistance, and food safety it encourages collaboration, communication, coordination, and capacity building. The UK has made commitments to the One Health approach in the Global Health and Security Agenda, and the Integrated Review. This article explores how the One Health approach could and should be adopted within Defence Engagement (Health) activity to offer potential for high impact, low risk activity whilst facilitating long term relationship building.

Key Messages

What is already known on this topic:

- The health of humans, animals, and ecosystems are closely interlinked and changes in these relationships can increase the risk of new human and animal diseases developing and spreading.
- The One Health concept recognises this growing interdependence of humans, animals, and the environment and seeks to balance and optimise the health of all three.

What this study adds:

- The UK's commitment to the One Health approach is explicit in the Global Health and Security Agenda, UK Biosecurity Strategy 2023, and the Integrated Review 2021.
- This article discusses how the One Health approach could be successfully applied to Defence Engagement activity.

How this study might affect military practice or policy:

- One Health offers potential for high impact, low risk DE activity with long term relationship building.

Introduction

The Earth's human population is expected to grow by 2.1 billion and reach 9.8 billion by 2050. This will place increasing stress on our environment, resulting in habitat destruction, reductions in biodiversity and the collapse of some ecosystems. This will create growing competition for resources and force humans, domestic animals, and wildlife to live in closer proximity, placing greater strain on their shared environment. The health of humans, animals, and the environment will therefore become increasingly interlinked, raising the risk of new animal or human diseases emerging and spreading. Zoonotic diseases are infections transmitted from non-human animals to humans and account for approximately 75% of all emerging diseases.(1) Understanding and managing these health threats necessitates a multidisciplinary and multi-agency approach.

The One Health concept recognises this growing interdependence of humans, animals, and the environment and seeks to balance and optimise the health of all three. The UK Government has acknowledged this and made commitments to strengthen the global One Health approach as part of the Global Health and Security Agenda (GHSA) and in the Integrated Review.(2, 3) This article discusses potential benefits to Defence of incorporating the One Health approach within Defence Engagement (Health) (DE(H)) activities to deliver strategic effects.

We explore what One Health is, discuss its application from a multinational to regional level, and finally consider how it could be better integrated into DE(H) activity. This article forms part of a special edition of BMJ Military Health on Defence Engagement.

One Health

There is no agreed definition of One Health. In May 2021 the One Health High-Level Expert Panel (OHHLEP) was formed by four global partners: The Food and Agriculture Organization (FAO), the World Organization for Animal Health (OIE), the United Nations Environment Programme (UNEP), and the World Health Organization (WHO). The OHHLEP made it their priority to develop a 'working definition' of One Health which is becoming one of the most cited definitions in use. It states that '**One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals, and ecosystems. It recognizes the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and inter-dependent.**'(4)

Central to the OHHLEP definition is real-world implementation, which is illustrated schematically in figure 1. Using One Health principles it seeks to strengthen communication, coordination, collaboration, and capacity building: the 4 Cs.

At its most basic, One Health is an approach that recognises that the health of people is closely connected to the health of animals and our shared environment.(5) One Health focuses on the animal-human-ecosystem interface, particularly emerging and endemic zoonoses, vector-borne disease (disease that are spread through the bites of vectors such as mosquitos, ticks and fleas), antimicrobial resistance (AMR), and food safety and food borne disease (such as salmonella and listeria). Some important examples are shown in Table 1. The OHHLEP definition also provides scope to include environmental and ecosystem health such as climate change, water pollution and air pollution, wildlife, land use and biodiversity among other things.(6)

Application of the One Health approach

Recently, and particularly post-COVID-19, literature on One Health has advanced awareness of the approach with examples of its implementation ranging from international action plans to regional projects. At an international level the OHHLEP published their One Health Joint Plan of Action (2022-2026) (OH JPA).(7) The OH JPA is guided by a theory of change and makes use of One Health principles to strengthen the 4 Cs equally across all

sectors responsible for addressing health concerns at the human– animal–plant– environment interface.(7) There are also several predominantly US based organisations that promote One Health on an international level, such as the Centers for Disease Control and Prevention,(5) the One Health Commission, (8) and the One Health Initiative.(9) These organisations predominantly focus on education, but they also run projects to combat antimicrobial resistance (AMR) and trial new approaches to address zoonotic diseases.(5)

Nationally, the UK has committed, as part of the Global Health and Security Agenda (GHSA), to ‘creating an International Zoonoses Community of Experts to strengthen global One Health communications and exchange of intelligence’.(10) The UK Health Security Agency (UK HSA) has a strategic priority to reduce the impact of infectious diseases and AMR, and to play a leading role in international health security initiatives in consultation with the Department of Health and Social Care (DHSC), including the UK’s ambitions in the GHSA. The UK’s Biological Security Strategy was updated in 2023 with a vision that by 2030 the UK will be resilient to a spectrum of biological threats and a world leader in responsible innovation, making a positive impact in global health, economic and security outcomes. This includes the desire to embed a One Health and climate focussed approach to biological security.(11) This aligns with national security and international policy objectives, specifically to build resilience at home and overseas. This fourth objective of the *Integrated Review 2021* (IR21) has a specific goal to ‘build health resilience at home and at the international level, recognising the interconnected nature of our global health system’ by taking a One Health approach.(3) Priority actions include

- Accelerate equitable access to COVID-19 vaccines, therapeutics and diagnostics worldwide.
- Strengthen the UK’s preparedness for future pandemics, taking a One Health approach.
- Reform the global health system and strengthen the One Health approach worldwide, by establishing a Global One Health Intelligence Hub, as well as strengthening domestic and international efforts to combat the threat posed by increasing AMR.

Whilst the OH JPA and UK policy offer a good indication of international emphasis on the One Health approach evidence to support its implementation at this level is limited. The UK has demonstrated success in areas such as reduction in the use of antibiotics and supporting efforts to curb AMR,(12) however some the best examples of the application of the One Health approach can be found at a regional level. This is likely because communities, particularly in rural settings, are among those who are most vulnerable to changes in animal and environmental health. Table 2 illustrates some of these examples.

One Health and Defence Engagement (Health)

Formation of the OHHLEP and inclusion of One Health considerations in international and national policy demonstrate growing global recognition of One Health’s importance. It should be considered within DE(H) activity planning and delivery, given the goals outlined in the IR and potential for the approach to achieve DE effects (prevent conflict, build stability, gain influence). The definition of DE(H) “Defence Engagement by a medical unit” using “military medical capabilities to achieve Defence Engagement effects of preventing conflict, building stability and gaining influence in the health sector” also provides ample scope for employment of the One Health approach.

Currently there are few examples of the One Health approach being applied to DE(H). In preparation of this article PubMed and open-source searches for ‘One Health and Defence Engagement’ yielded no peer reviewed studies to draw on. The US state that their Global Health Engagement efforts address other DoD and US Government Priorities such as

combatting global health threats like emerging infectious diseases and antibiotic-resistant bacteria. It does this through the Global Emerging Infections Surveillance (GEIS) Programme.(13) However this programme focuses on addressing militarily relevant infectious disease threats and informing force health protection decision making, rather than delivering DE effects. The US does, however, see that there is a clear and important supporting role to be played by military medicine as the GHSA offers the DOD and other militaries a framework to engage and better coordinate with interagency (other ministries) and international partners.

The work of the Australian Defence Force's (ADF) Army Malaria Institute (AMI) has been running for nearly fifty years and is recognised for its contribution to One Health. Although primarily aimed at reducing malaria incidence within the ADF, the AMI's mission has expanded to include other operationally relevant infectious disease. The AMI has achieved this through extensive monitoring and surveillance, and stabilisation and support to the civilian population of partner countries.(14, 15) The Armed Forces Research Institute of Medical Sciences (AFRIMS) is like the AMI. It is a 50-year-old joint institute of the US and Royal Thai Army Medical Departments located in Bangkok, Thailand. Investigators from the Institute have carried out research in Thailand and the region, in collaboration with many partners, focusing on many tropical infectious diseases, researching the medical problems of refugees and of the health of Thai peace-keeping forces.(16)

There remain challenges to advancing the One Health agenda both internationally and within DE(H). Internationally the UK government cites power imbalances between lower, middle- and high-income countries, conflicts of interest between sectors, underrepresentation of the environmental sector and limited evaluation mechanisms as key reasons for this. (17)The lack of literature on the application of the approach in DE(H) settings may dissuade planners from this line of activity. More research, and evidence of effective collaboration at an international level is needed. Reporting, monitoring and evaluating the effects of One Health aligned engagement will allow data to emerge, and collaboration with academic partners can shape a future evidence base to draw from. Increased investment in, and optimisation of existing monitoring tools such as the NATO force health surveillance tool, EpiNATO-2 (18) could also improve military collaboration at an international level. Increasing awareness of the approach and the potential scope of its application and benefits could motivate commanders to generate the demand and resources when planning DE activities. This is required not only among UK military health care professionals, but also partner country representatives and partner forces to ensure a broad application and benefit to all stakeholders. Some activities may require an enduring and multidisciplinary approach and a plan to interface cross-Governmentally and with non-military partners may be needed.

Acknowledging these limitations, it is suggested that there are three key areas where consideration of the One health approach could shape the planning and delivery of DE (H) activities in several ways:

- a. **Antimicrobial Resistance.** Through education and the provision of resources, antimicrobial stewardship in partner countries could be promoted through UK military clinicians and veterinarians. A recent example is the Russo-Ukraine conflict. There were high rates of resistance to cephalosporins and carbapenems in non-fermentative gram-negative organisms isolated from conflict related wounds in Ukraine preceding the 2022 invasion.(19) The Defence Medical Services (DMS) have been working alongside the Ukrainian military to address this and the Defence Pathology service have been providing antimicrobial advice when requested for complex post traumatic infections.

- b. **Zoonotic Disease, Vector Borne Disease, Food Safety and Food Borne disease.**
- i. **Infection Prevention and Control (IPC).** Partner forces could be supported to strengthen or implement biosecurity procedures and more broadly partner countries could be supported to reduce the spread of infection and prevent epidemics.
 - ii. **Disease Surveillance and Response.** The NATO Military Medicine Centre of Excellence have developed near real-time surveillance to monitor outbreaks within NATO exercises/operations, (20) in addition to the EpiNATO-2 system. This is an area where the DMS could feed into and seek to improve compliance with, or use of existing structures, as an organisation that is often present in unique where there is little published outbreak surveillance. The UK military recently worked with the PakMil Surgeon General (SG) to strengthen the Pakistan Armed Forces Medical Services (PAKAFMS) understanding of linkages between Integrated Disease Surveillance and Response systems and share best practise on clinical and nursing excellence.(21)
 - iii. **Logistics.** Through assistance in the design and build of isolation facilities and laboratory infrastructure to support IPC and disease surveillance and response.
 - iv. **Diagnostics.** Through education on the use and interpretation of diagnostic tools to rapidly identify and limit the spread of disease.
- c. **Environmental Health.** Environmental health teams could advise on sanitation and allow for great food and water security. The importance of including water related pathways in a One Health approach has been highlighted as a key enabling function.(22)

When planning activity in any of the areas above contribution to whole of government efforts, including key departments like the Foreign, Commonwealth and Development Office (FCDO), should also be considered. The emphasis on communication, coordination and collaboration is central to the success of a One Health approach and this must start at the national level. Of particular note to DE(H) is an initiative aimed at developing a sub-set of One Health, namely 'One Health in Complex Settings' (OHICS). (23)

Conclusion

Given international interest and national and international pledges to enhance global health security, a One Health approach to strengthening healthcare systems and epidemic and pandemic preparedness is highly important. The UK strategic direction provides ample scope and justification for its use. Use of the One Health approach in the planning and conduct of Defence Engagement activities is nascent to date but has the potential to deliver substantial impact and long-lasting effect. For maximal and enduring effect, a cross government and multidisciplinary approach is required within DE focussed military relevant taskings. Raising awareness of a One Health approach to DE(H) is needed to identify opportunities to leverage UK military capabilities to strengthen global health security.

Tables:

Table 1 Examples of recent outbreaks at the animal-human-ecosystem interface.

Core One Health focus	Outbreak	Summary
Zoonoses	Ebola	The 2014-2016 outbreak of Ebola was the largest outbreak of Ebola since it was first discovered. In August 2014 WHO declared the outbreak as a Public Health Emergency of International Concern (PHEIC). When the outbreak was declared over in 2016 11,325 people had died and more than 28,600 had been infected.(24) Ebola virus initially enters the human population through contact with an infected animal such as a fruit bat or nonhuman primate.
Vector Borne Disease	Zika virus	The Zika virus (ZIKV) is the virus that causes the mosquito-borne illness known as zika fever. The WHO declared Zika a global public health emergency in February 2016. More than 45 nations have been affected, including those in the Pacific Islands and Ocean, Central and South America, and the Caribbean. Due to a decrease in mosquito habitat the ZIKV-carrying mosquitoes typically reside in and around homes and spawn in stagnant water that has accumulated in items like animal bowls, flowerpots, and old vehicle tires.(25)
Antimicrobial resistance	Campylobacter	During 2004-2012, in the United States the incidence of Campylobacteriosis outbreaks and clinically significant AMR increased.(26) The drivers of AMR include antimicrobial use and abuse in human, animal, and environmental sectors and the spread of resistant bacteria within and between these sectors and around the globe. A One Health approach is therefore logical when tackling this problem.(27)
Food Safety	African Swine Fever	A highly contagious viral disease of pigs, in its acute form it often results in mortality. The ongoing and expanding outbreak in Europe threatens food supply and livelihoods.(28)

Table 2 Application of the One Health approach at a regional level.

Country/Region	Project Focus	Summary
Rwanda	Education	The University of Global Health Equity, a global health institution in Rwanda, is championing One Health approaches through a pioneering educational model. Through the University's Centre for One Health, students are trained to think holistically, prioritising collaborative, multi-sectoral partnerships. The unique

		positioning of this university in Rwanda's remote Northern province provides a stimulating environment for students to see One Health approaches in action by learning directly from farmers, community members and livestock owners and the protective measures that these practitioners employ against zoonotic disease transmission.(29)
Australia/New South Wales	Collaboration	Named the Regional One Health Partnership, this network was not formed for the purposes of addressing a particular project or specific One Health issue. Instead it arose from shared interests in zoonotic disease prevention and animal health concerns relevant to regional northern NSW, initially with a focus on Q Fever, Leptospirosis, and Cryptosporidium. (30)
Cambodia	Education, collaboration	The Cambodian Applied Veterinary Epidemiology Training (CAVET) program was established in 2012. It aims to strengthen the One Health approach involving human, animal, and environmental health sectors to combat zoonotic diseases such as avian influenza and rabies.(31)

Figure captions:

Figure 1 One Health toward a sustainable healthy future, developed by the OHHLEP.
OHHLEP, One Health High- Level Expert Panel. (4)

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