Transferable military medical lessons from the Russo-Ukraine war

Timothy J Hodgetts,1 DN Naumann,2 DM Bowley2

ABSTRACT
The first year of the war in Ukraine has presented critical lessons for the UK’s Defence Medical Services (DMS) regarding its preparedness to support the nation for warfighting at scale. There are tactical, clinical, and strategic challenges that must be addressed. The war has exposed the limitations of international humanitarian law and the laws of armed conflict in protecting forward field hospitals from deliberate targeting. The DMS may need to employ measures such as disguise, deception, and dispersal to provide care in a contested environment. The historical trend of disinvestment in military medical capability between major conflicts, known as the “Walker Dip,” represents a clinical risk that must be mitigated. Even if this is achieved, clinical outcomes during large-scale warfighting are likely to be worse than those the nation has come to expect during more low-intensity conflicts. Effective civilian-military collaboration will be paramount to manage casualties at scale. Both novel and reversionary modes of transportation may be required, such as the mass movement of casualties by train. The DMS requires innovation and adaptability to harness the ability to adopt external ideas, translate successful innovations and address complex challenges. By addressing tactical vulnerabilities, enhancing clinical preparedness, fostering civilian-military collaboration, and embracing innovation, the DMS will be better equipped to support the UK and allied armed forces in future warfighting at scale.

TACTICAL
Abuses of international humanitarian law and the laws of armed conflict
It had previously been assumed that a principle (the Geneva Conventions), and an emblem (the Red Cross) would provide ‘protection’ in state-on-state conflict within forward field hospitals. However, Russian actions have shown this not to be the case. Long before the invasion of Ukraine, in 2016 Amnesty International reported that Russian and Syrian government forces were deliberately and systematically targeting hospitals and other medical facilities to pave the way for ground forces to advance on northern Aleppo.8 In that protracted conflict, health workers were forced underground or into unmarked buildings of opportunity to deliver care to wounded patients.9 Equally in Ukraine, it is now clear the international consensus is inadequate protection against a belligerent party who does not respect either the laws of armed conflict or humanitarian principles. In January 2023, Ambassador Neil Bush, the Head of the UK’s Delegation to the Organization for Security and Co-operation in Europe highlighted mounting evidence of war crimes committed by Russian forces in Ukraine while areas were under their control.9 In addition,
ongoing strikes on Ukraine’s cities, civilians and critical infrastructure is creating an enduring humanitarian impact on the Ukrainian population. Within weeks of the start of the invasion, multiple healthcare treatment facilities had been targeted by the regime, often with devastating consequences. In such circumstances the DMS may need to make better use of disguise, deception and dispersal, such as the use of underground car parks and basement contingency hospital wards to provide care to patients. Enhanced air defence protection for medical treatment facilities such as those at a military headquarters may be required.10

Protected ground Medical Evacuation

Protected ground Medical Evacuation allows combat casualties to reach timely surgery (including ‘damage control surgery’) that can preserve life and maintain future function. This was one of the earliest priority-asks of Ukraine and has been met with wide international assistance. Furthermore, there has been a re-evaluation of reversionary methods of moving mass casualties over large distances while offering meaningful treatment. These have included hospital trains. With a degree of irony, it is acknowledged that the hospital train was a method first used after the battle of Balaklava in Crimea in 1854, and later refined to include a surgical capability as a Russian innovation during their war with Japan in 1904 by the surgeon Vera Gedroits.11 Up to 60% of Ukrainian military casualties have been moved east to west by train. As well as the parallel effort to explore how surgical teams can be mounted on an aircraft, it is necessary to also re-explore how such a capability might be used on a train when moving casualties for hundreds of miles.

Transnational casualty movement

The war in Ukraine has highlighted the need to address the requirement for transnational casualty regulation across and between continents. To manage civilian casualty distribution across Europe from Ukraine, the EU’s Emergency Response Coordination Centre has been used, supported by military STRATEVAC air assets, particularly from Germany and Norway. To manage military casualty redistribution, the new Multinational Military Coordination Centre in Koblenz has been used. Lessons from this experience are enhancing understanding for redistribution of the North Atlantic Treaty Organization (NATO) allied casualties in the event of the UK being involved in warfighting at scale.

Medical supplies (project KOROVAI) and stockpiles

Project KOROVAI is the initiative designed for the international community to come to Ukraine’s aid and to commit to gifting lethal and non-lethal aid. The project has subsequently been expanded to include coordination of medical materiel gifting. This aims to avoid key gaps in provision and avoid duplication of effort. In essence, it is the same function as a ‘wedding list’ and Korovai (коровай) is a symbolic bread baked for Ukrainian weddings, where it is cut and distributed to guests who offer gifts in exchange.

The COVID-19 pandemic demonstrated that ‘just in time’ logistics do not work, particularly when consumables (eg, personal protective equipment) are procured and supplied from a common source. If there is excessive demand by multiple nations on the supply chain, or if the supply chain is contested or disrupted by war, there is a risk of key shortages. In order to address this challenge, there are several key priorities; first to consider what critical equipment or consumables must be manufactured from within the UK (‘sovereign capability’); second to hold more stock and third, how to rotate this greater stock out and use it for healthcare provision, so it is not wasted.

CLINICAL

Expectations for clinical outcomes when fighting at scale

It is acknowledged there is an historical and cyclical disinvestment in military medical capability between major campaigns, known as the ‘Walker Dip’.12 Such a dip has been entered at the end of the contemporary Afghanistan campaign. It is not just a UK phenomenon, but has been mirrored across the NATO alliance. It explains why clinical outcomes improve through the course of a war, in part through restoration of capabilities and in part through innovation to match new signature injury or illness patterns. To offer reassurance, the current European war has been a catalyst for international military medical reinvestment: mitigating actions will drive medical capability collectively back up the curve.

Irrespective, clinical outcomes will still be poorer during warfighting at scale than in low-intensity conflict. The crude outcomes of military casualties in Ukraine have been expressed as the ratio of Killed in Action to Wounded in Action, and these are less favourable than survival in the 21st century conflicts in Iraq and Afghanistan. Yet this is no surprise, given the volume of casualties, the contested evacuation and the proportion of wounding from heavy weaponry. It is a reminder for commanders, politicians and the public—including the families of Service personnel—to understand and accept that outcomes may be poorer in future conflicts of this kind. History confirms that more risk is accepted in wars of national survival than wars of choice. But today, the unattainable public expectation may be the sustainment of exquisite care previously afforded by the DMS for individual casualties in low-intensity conflict.

Antimicrobial resistance

Before the invasion, drug-resistant organisms were prevalent in Ukrainian hospitals. In a study of >9000 surgical patients, rates of surgical site infection were high (21%) with methicillin resistant reported in 35.7% of Staphylococcus aureus isolates.13 With antibiotics previously available over the counter, in August 2022 the Ukrainian Ministry of Health implemented a new process where all patients are required to obtain a prescription from a doctor before buying antibiotics. However, a combination of a sustained influx of patients with complex wounds, delays to treatment, long turnaround time of laboratory tests and transport of patients over large geographical distances has created a ‘perfect storm’ for a major problem with antimicrobial resistance in Ukraine.14 The DMS will need to prepare for, and mitigate this risk if undertaking operations in similar scenarios.

Chemical, Biological, Radiological & Nuclear (CBRN) considerations

The Russian government supported Syria with military aid and direct military involvement since the beginning of the Syrian conflict in 2011. There have been multiple allegations of the use of chemical weapons in Syria (eg, the Khan Shayt Sarin gas attack on 4 April 2017 that allegedly killed 90 civilians; and a chlorine gas attack on Douma on 7 April 2018, which allegedly killed between 40 and 50 people). The spectre of nuclear weapons has also been overtly threatened by Russia. In September 2022, Vladimir Putin stated: “If the territorial integrity of our country is threatened, we will without doubt use all available means to protect Russia and our people. This is not a bluff.”.15 NATO is committed to developing and maintaining necessary Chemical,
To innovate in crisis, it is necessary to harness the ability to be agile, driven by a strong desire to innovate and rapidly bring the idea and rapidly bring it in to one’s own organisation. The conditions required to be a good ADOPTER are Agility, Decisiveness, being Outcome-focused, politically aware, Tolerant of Risk, Empowered and Rewarded. \(^{19}\) ‘Innovation translation’ is where innovation is spread to a different part of an organisation, to another organisation or internationally to an ally. An example of this might be the UK expertise in building military rehabilitation capacity in Ukraine. However, it is not always straightforward to effect change, especially if complex. For innovations to be successful, transformational leadership is required in the receiving organisations as well as responsive networks to effect and distribute change. This would also require innovations to be relevant and adapted to the specific needs so that innovations are accepted, with life-enhancing impacts for patients. The DMS may wish to consider the eight-step model of complex change described by John Kotter when planning for large-scale change. \(^{20}\)

**CONCLUSION**

Vladimir Putin has consistently stated that: ‘Russians and Ukrainians are one people—a single whole’ and descendants of an ‘Ancient Rus’. \(^{21}\) This denial of Ukrainian statehood led to the illegal annexation of Crimea and the subsequent illegal and uncompromised invasion of Ukraine. The devastating impact of modern munitions on a civilian population and national critical infrastructure has revealed the true implications of ‘fighting at scale’. There are tactical, clinical and strategic lessons to learn for the UK’s DMS. The challenge of retrieval of casualties from the point of wounding and their treatment in facilities that are no longer protected while within range of drone munitions and missiles is the catalyst to review and revise modern combat medical support. The Korovai principle of giving what can be afforded to Ukrainian peers must be matched by the effort to ensure the DMS medical capabilities are ready to step up to provide the effective support to the UK and allied Armed Forces.

Twitter DN Naumann @davidnaumann

Collaborators N.A.

Contributors TJH designed and wrote the first version of the manuscript. DNN and DMB provided revisions and critical appraisal. All authors agreed on the final version.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: http://creativecommons.org/licenses/by-nc/4.0/.

ORCID iD DN Naumann http://orcid.org/0000-0003-2243-2325

**REFERENCES**


8. Foreign, Commonwealth & Development Office and Neil Bush. There is mounting evidence of war crimes committed by Russian forces: UK statement to the OSCE.

Hodgetts TJ, et al. BMJ Mil Health 2023;0:1–4. doi:10.1136/military-2023-002435
Taylor L. Russian forces are increasingly targeting Ukrainian Healthcare facilities, says WHO. *BMJ* 2022;376:801.


