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Total defence and blood preparedness

OPINIONS

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Acts of war are associated with a significant risk of injury and traumatic bleeding in military personnel as well as civilians. Rapid access to damage control surgery, resuscitation and balanced blood transfusion is crucial to reducing morbidity and mortality rates.

Access to blood transfusions is essential when treating combat-related injuries involving a major loss of blood, as Major General Jon Gerhard Reichelt, former Surgeon General of the Norwegian Armed Forces Joint Medical Services, recently described in an editorial in the Journal of the Norwegian Medical Association (1). Whole blood is the Norwegian Armed Forces' preferred option for transfusion, primarily for logistical reasons, so as to ensure access to early balanced transfusion with a blood product containing platelets, in accordance with national clinical recommendations (2). The fact that whole blood is, for the same reason, likely to be chosen as the primary product at Norwegian hospitals in the event of war, and that Norwegian hospitals and the Armed Forces must have a system and resources available for the donation, storage and transport of large quantities of whole blood has, however, created controversy (3). The Norwegian Armed Forces Joint Medical Services therefore wants to explain the ramifications of inadequate blood preparedness in the civilian healthcare system in times of crisis and war.

Modern warfare

In modern warfare, some serious injuries will require damage control surgery and blood transfusion. In recent weeks, the Ukrainian army has suffered hundreds of fatalities on a daily basis, and more than three times as many military personnel have been injured as a result of gunfire or explosions. If the soldiers survive their initial injuries, the trauma team awaits them in a pre-hospital setting or at a field hospital. The greatest risk that wounded soldiers face in this phase is death from haemorrhagic shock or complications from this (4).

> ***«Experience shows that it is possible to save critically injured soldiers. Access to blood products is a key success factor»***

Experiences from Iraq, Afghanistan and other recent military conflicts in the Middle East show that it is possible to save critically injured soldiers (5–7). Access to blood products is a key success factor. National and international civilian and military guidelines recommend early balanced transfusion when treating patients with life-threatening bleeding (2, 8). Balanced transfusion is achieved by using blood products containing erythrocytes, platelets and plasma, which can be done by pooling blood components or using whole blood.

During armed conflicts, pre-hospital treatment and trauma surgery take place in or near the war zone, which is often inaccessible to civilian healthcare personnel. Initial surgical stabilisation in the form of damage control surgery may require significant volumes of blood products. The need for blood products in modern warfare is well documented by the British field hospital in Helmand, Afghanistan (9). The logistics for getting blood products to the army medics and doctors at the frontline need to be robust, ensuring that the cold chain is not broken and that the products are not destroyed en route.

War in Norway

If war were to break out in Norway, the expectation would be that blood products – sometimes large volumes – can be moved between regions. However, this poses a logistical challenge, as blood components are stored at different temperatures. In balanced blood transfusions, three cold chains are required for the constituent components, whereas whole blood needs just one. Meeting the need for balanced blood transfusions in non-hospital settings is therefore a challenge. As we have seen in Ukraine, this can also be problematic in hospital settings during a military conflict or other major crises. The need for blood transfusions can snowball suddenly, sometimes on a large scale, and the situation can be compounded by reduced access to vital supplies of electricity,

water and personnel etc. Today's peacetime infrastructure may not be adequate to cope with such circumstances, and contingency plans must take this into account (10).

Whole blood and freeze-dried plasma are the Norwegian Armed Forces' first choice for meeting the need for balanced blood transfusions during wartime. Whole blood was first used in World War I. It was then forgotten and subsequently 'rediscovered' during the war on terror that began in 2001 (11). Whole blood is a complete blood product that is described in European guidelines for the production and quality control of blood components (12), and is included in Norway's national trauma plan (2). Several Norwegian blood banks use whole blood in the routine treatment of patients with life-threatening bleeding, and large volumes of it are used in a number of trauma centres in the United States (13–15). Recent observational data show that the alternative of whole blood transfusion has the same safety profile as balanced transfusion (16, 17).

> ***«In balanced blood transfusions, three cold chains are required for the constituent components, whereas whole blood needs just one»***

Blood products for use in potential military operations in Norway or by Norwegian armed forces abroad need to be produced by civilian blood banks in Norway. Walking blood banks are an emergency solution for when access to blood products is compromised due to logistical reasons, but as Nissen-Meyer et al. point out, these will have a very limited effect in terms of volume donated (3, 18, 19).

Whole blood and freeze-dried plasma should be used

The total defence, i.e. the whole-of-society national defence, and the healthcare system represent the backbone of the blood supply for Norwegian military operations. All the regional health trusts must be equipped to produce whole blood in order to ensure military preparedness in times of peace, crisis and war. The production of desired blood products should be monitored nationally and distributed according to need.

> ***«An effective preparedness plan is not necessarily about doing more of what you normally do»***

In peacetime, civilian hospitals must of course be allowed to choose their own transfusion models and treatment methods; however, in the case of blood preparedness, it is important that the principle of cooperation, as described in the national health preparedness plan, is applied (20). This means that all contingency plans must be drawn up in a collaboration involving all relevant actors. An effective preparedness plan is not necessarily about doing more of what you normally do. European recommendations on devising national, regional and local blood preparedness plans should also be followed in Norway.

They should be adapted to local conditions and provide for the handling of crises in both peacetime and wartime (21). The recently established centre for the coordination of blood preparedness in Norway (*NoKBlod*) can provide assistance with this.

When the nation asks its young people to put their lives and health at risk in order to ultimately save the nation's existence and protect the freedom of its citizens, the potential for ensuring their survival must be fully exploited. Their morale and willingness to fight depend on it.

The Norwegian Armed Forces' decision to use whole blood and freeze-dried plasma for resuscitation together with damage control surgery to stop life-threatening bleeding, was well thought through. Whole blood transfusions save lives in the treatment chain until bleeding can be brought under control, and the total defence must help to make this possible.

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