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## **Task force Uruzgan, Afghanistan 2006-2010 : medical aspects and challenges**

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## Introduction



## **Chapter 1.** General introduction and outline of the thesis

## General introduction

A good friend of our family recently gave me an article about the experiences of a nurse (close relation) during the battle of Caen (1944)<sup>1</sup>. Her experiences and challenges are by now almost seven decades old, but still very current. In addition to the required military tactical skills and medical competences, this fascinating in depth description of the hardships in a hospital during an armed conflict shows that (1) the mental and physical resilience of casualties and their colleagues is vital for survival, (2) military medicine has no fixed golden standards. Current practices are subject to a continuous process of adaptations, dictated by recent experiences and developments, and (3) injuries sustained in armed conflicts differ from those seen in civilian trauma. The last two items are described extensively in recent literature<sup>2-11</sup>.

As a troop commander in the Royal Netherlands Marine Corps in Uruzgan, Afghanistan, I experienced the overwhelming power of Esprit de Corps, team spirit and learned the importance of being modest. Outside the fence, I witnessed sometimes terrible brutalities in human interaction and learned to respect the horrendous effects of an armed conflict and the human suffering it causes.

Armed conflicts are part of our history and are likely to be part of our future.

Civilian medicine is not similar to military medicine.

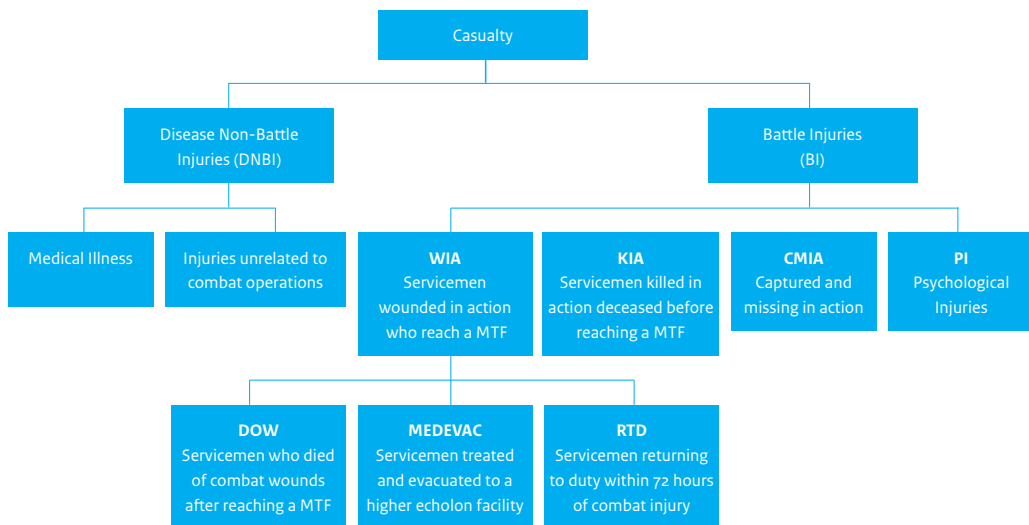
With the above statements in mind, we need to draw lessons from previous conflicts to keep the morbidity and mortality of battle casualties (BCs) as low as possible. As such, we need to develop lessons learned from the Dutch presence in Afghanistan.

## Recent conflicts

In the aftermath of the terrorist attacks of September 11, 2001, the United States of America (US) initiated the so-called Global War on Terror (GWOT) and deployed military units to multiple theaters in the Middle East and Southwest Asia<sup>12-14</sup>.

Starting as a more traditional type of warfare, with overwhelming firepower within the clear boundaries of one country, the GWOT slowly progressed into a counter-insurgency operation; an operation characterized by a blurring of the lines between war and politics, combatants and civilians. This modern type conflict is often referred to as fourth-generation warfare and is characterized by traditional armed forces being challenged by non-state related insurgents that use unconventional combinations of lethal and non-lethal tactics that are extremely complex to neutralize. One of the distinguishing features of this type of conflict is the heavy use of improvised explosive devices (IEDs), causing a typical casualty pattern<sup>6,11</sup>. This casualty pattern, especially the anatomical distribution of this type of battle injuries (BIs), differs drastically from previous conflicts. One of the most striking examples of the maiming effect of IEDs is the so-called dismounted complex blast injury<sup>6</sup>. Since 2001, over 10,000 coalition service members have been killed and over 50,000 were injured during the operations in Iraq and Afghanistan<sup>5</sup>. Additionally, thousands of contractors, host-nationals, foreign national security personnel and insurgents have been injured or killed.

The importance of describing the incidence and character of battle injuries, as well as their precipitating mechanisms, has been recognized since the 19th century. Since that time, many reports have been published<sup>3</sup>. A comprehensive and thorough evaluation of the epidemiology and characteristics of modern times battlefield injuries is vital to improve future combat casualty care, in developing protective measures, in identifying risk factors and populations at risk, and in evaluating efficiency of delivered care<sup>15</sup>. However, the development of reliable conclusions and recommendations requires the universal use of clear and unambiguous casualty definitions (Figure 1).



*Figure 1: Schematic of military casualty definitions and classifications<sup>2</sup>*

Currently, there is very limited literature about recent Dutch participation in armed conflicts. Optimization of our military medical system is only possible with clear data and outcomes. This includes quality of care (QOC), cost-effectiveness and long term follow up of service members. Therefore a thorough evaluation of the Dutch military medical system is required.

### Dutch involvement

Recently, the Dutch Armed Forces (DAF) have participated in two North Atlantic Treaty Organization (NATO) military missions: Operation Enduring Freedom and the International Security Assistance Force (ISAF) mission in Afghanistan. ISAF was authorized by United Nations Security Council resolution 1386 in December 2001<sup>16</sup>. The Netherlands participated in ISAF with Task Force Uruzgan (TFU), as the Netherlands were lead nation in Uruzgan province between 2006 – 2010. During that period, Dutch service members were frequently exposed to the devastating effects of IEDs<sup>11</sup>. The main component of TFU was located at Multi National Base Tarin Kowt (MBTK), a second base was located at Deh Rawod (Figure 2).

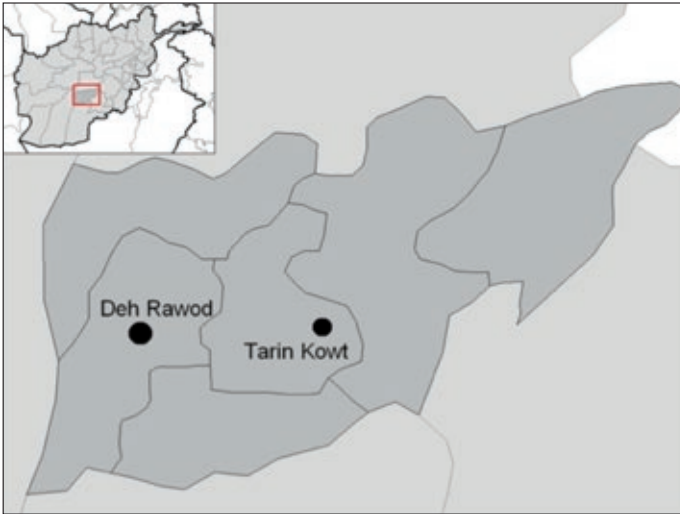


Figure 2: Map Uruzgan, Afghanistan

The Medical Support Organization (MSO) in Southern Afghanistan during the ISAF operations, was a multinational joint service with a wide range of capabilities, delivering care in a hostile and austere environment (e.g. enemy threat, patient's overall medical condition, evacuation timelines, availability of assets, qualifications / capabilities of medical personnel and prevailing tactical / weather conditions). The NATO Allied Joint Medical Support Doctrine (AJP-4.10)<sup>17</sup> is the capstone document on which the MSO is based, but it is not an unchangeable holy doctrine (Figure 3). During the deployment of the DAF to Southern Afghanistan the MSO was adapted to the local situation in Uruzgan province (Figure 4).

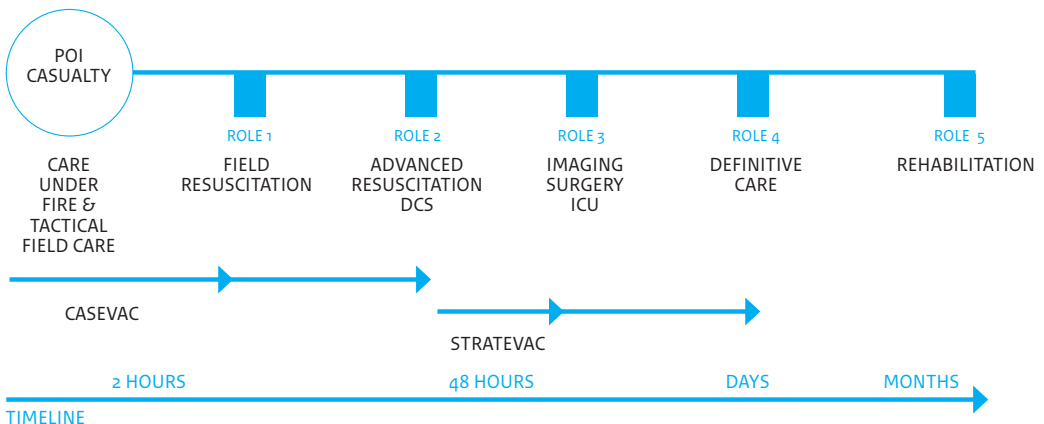


Figure 3: Schematic overview of the treatment phases in the medical support organization in relation to time and availability of medical care<sup>5</sup>

POI indicates point of injury; DCS: damage control surgery; ICU: intensive care unit.

**Figure 4: Description of the medical support organization <sup>5</sup>**

The NATO coalition forces operate with a standardized model of evacuation and (surgical) treatment phases, that can be adapted to several situations depending on different geographical and battle type related factors. This model is based on a system with progressively sophisticated levels of medical support in the chain of events when taking care of a battle casualty (BC).

#### Role 0 (battlefield and evacuation):

This includes Self Care and Buddy Care (SCBC). This is basic assistance that can be provided by all combatants to treat basic circulation- airway, breathing, and circulation (c-ABC) problems.

#### *Evacuation from the point of injury*

This is a critical phase where military tactics, time, information flow and communication are essential. This phase is performed by military tactical commanders, and military nurses trained according to Tactical Combat Casualty Care (TCCC) doctrine and Battlefield Advanced Trauma Life Support (BATLS) principles. The NATO g-liner/ MIST is used as a formal document for Medical Evacuation (MEDEVAC) or Casualty Evacuation (CASEVAC). This g-line medical evacuation message is a series of phonetic letters, numbers, and basic descriptive terminology used to transmit essential evacuation information such as location, (war) time zone, security of pick-up site, number of patients by precedence, special equipment required, patient nationality and status.

#### Medical Treatment Facilities (MTF)

##### Role 1 MTF:

This level is the first level of care in which medical professionals are situated. Care at these facilities is aimed at initial life and limb saving (mostly non-surgical) procedures. On our forward operating base in Dew Rawod there was a role 1 MTF. Care in this phase is generally performed by military nurses (AMV), general duty medical officers (AMA / GDMO) and general practitioners (GP). All of them are trained according to Battlefield Advanced Trauma Life Support (BATLS) principles. If more extensive surgical interventions are required, the patients are transported to a higher echelon.

##### Role 2 MTF:

At this level of care subsequent emergency resuscitation and damage control surgery is performed by military medical specialists, mainly anesthesiologists and surgeons. In addition to a Role 2 Enhanced (E), a Role 2 MTF Light Manoeuvre (LM), medical care is limited to life-and-limb saving and damage control surgery, with a short holding capacity. A Role 2 MTF should be easily accessible and in a safe area. On Multi National Base Tarin Kowt there was a Role 2E MTF with additional (e.g. intensive care unit [ICU], radiological imaging) facilities.

#### *Secondary Evacuation*

Moving the patient to a Role 3 MTF or civilian hospital (by helicopter or tactical ambulance) is called MEDEVAC or Strategic Evacuation (STRATEVAC). At these higher echelons, more specialist care is available and a longer length of hospital stay is possible. The MTFs are designed to provide theatre secondary health care within the restrictions of the Theatre Holding Policy.

Figure 4: Continued

**Role 3 MTF:**

At this level in the Medical Support Organization, there are facilities for deployed hospitalization and the elements to support it. It basically includes surgical interventions at primary surgery level, ICU, nursing beds and diagnostic support. Depending on mission characteristics it includes a mission-tailored variety of clinical specialties, focused on the provision of emergency medical care. During the Dutch operations in Uruzgan province, this task was in most cases fulfilled by the Multinational Role 3 MTF, located at Kandahar Airfield (KAF).

**Role 4 MTF:**

Located at the end of the evacuation and treatment chain, the Role 4 MTF provides the full spectrum of definitive medical care that could (or should) not be delivered in theatre. It includes definitive high care specialist surgical and medical procedures, reconstructive surgery and (long term) rehabilitation facilities. Role 4 care can be provided by military hospitals, but also in cooperation with the national, civilian, health care system. This combined service was provided in the Central Military Hospital and the University Medical Centre Utrecht.

**Rehabilitation**

This is the phase that follows after the sometimes intensive in-hospital treatment.

**Evolution in Military Medicine**

To overcome the gap between civilian and military medicine<sup>3,8,18-20</sup>, many efforts have been undertaken. Frank Butler et al. introduced the Tactical Combat Casualty Care (TCCC) doctrine<sup>21,22</sup>, which comprises a set of trauma management guidelines for use on the battlefield. The TCCC (also TC3) doctrine was first introduced in the US Special Operations community, but the conflicts in Iraq and Afghanistan have seen TCCC, or modifications (e.g. Battlefield Advanced Trauma Life Support principles), become the standard of military pre-hospital care in most NATO coalition forces. Numerous lifesaving materials, tools, protocols and courses (e.g. haemostatic dressings, tourniquet revival, massive transfusing protocol, damage control surgery courses) were developed. Apart from the direct medical effects of modern training doctrines, limiting transportation times is essential in improving survival rates of battle casualties. Improvements and modifications in dedicated rotary or fixed wing evacuation, combined with the mentioned current practices, have reduced mortality rates to far below 5%<sup>23</sup>. The military surgeon plays a vital role in the initial care of a wounded service member and should be ready for this demanding task in the damage control surgery phase. It is conceivable that a “young” military surgeon will deploy soon after completing civilian residency training, encountering complex combat injuries he is not familiar with, simply because they are rare in civilian trauma or are taken care of by a different type of (surgical) specialist. Regardless of (residency) subspecialisation, all Dutch military (trauma) surgeons complete their surgical training on civilian patients. To date there is no standardized (Dutch) military training program implemented, but it is gradually developing based on our recent experiences. Military medicine is a continually evolving specialization; all efforts should be given for optimization<sup>24</sup>. The ongoing struggle to find a “full fit” curriculum for military medical service members might resemble the search for “the holy grail”, and the cost of such an extensive surgical training program may outweigh the

benefits. There is, however, a strong analogy with disaster medicine and surgery. Collaboration of disaster and military medicine could, therefore, potentially be useful. This may imply changes in the training that military and civilian organizations offer to military medical personnel.

### Rationale and aims of this thesis

This dissertation gives a perspective on the combat casualties from a very recent theatre of war, namely Afghanistan, where the DAF were actively involved. This perspective focuses on the short and long term effects of injuries sustained by a service member, but also on the impact of these injuries and their consequences on his comrades and his social network. Despite the evolving technical capabilities of modern mechanized or automated elements (e.g. drones and robots), human “boots on the ground” will likely remain crucial in future armed conflicts. Today’s civilian medicine, characterized by increasing costs, raising patient awareness and growing legal concerns, urges health care facilities and medical professionals to obtain and provide detailed insight in quality of provided care. The introduction of numerous expensive diagnostic modalities and therapeutic strategies urges individual physicians and health care facilities to evaluate efficacy and accuracy of the care delivered. This insight in quality of provided care can be used to detect shortcomings and to initiate new scientific studies. Furthermore, monitoring provided care increases transparency for physicians, hospitals and patients, and can be used to evaluate financial aspects. These analyses are difficult to conduct in military medicine and often lacking. Partially driven by the increase in welfare, value and quality of life, an increased attention for this topic is coming from military, medical, economic and political points of view. Therefore, in order to collect data and draw meaningful conclusions, also regarding QOL and cost-effectiveness, a detailed registration system of interventions on BCs should be used. This thesis recognizes, and aims to enhance, the quality of the short and long term care of service members that perform their (national) duties in the DAF.

### Part 1: Incidence and epidemiology of battle casualties

The first part of the thesis consists of (1) a systematic review of the incidences and characteristics of BCs from NATO coalition forces in Iraq and Afghanistan, and (2) a cross-sectional analysis of incidence and epidemiology of casualties treated at the Dutch role 2 enhanced medical treatment facility at Multi National Base Tarin Kowt (role 2 MTF NL), Afghanistan in the period 2006-2010. **Chapter 2** is a systematic review of the prevalence and characteristics of BCs from NATO coalition forces in Iraq and Afghanistan. This chapter provides insight in demographics and opportunities to optimize quality of care of BCs. The aim of **Chapter 3** is to review the incidence and epidemiology of casualties treated at the role 2 MTF NL at Multi National Base Tarin Kowt. This assessment shows the broad spectrum of battle injuries sustained. **Chapter 4** aims to evaluate the impact of explosive devices on Dutch BCs in Southern Afghanistan, by evaluation of demographics and tactical circumstances.

As such, the objective of this part is (1) to evaluate the incidence and types of BCs in NATO coalition forces and (2) to compare these international data with the DAF and historical figures.

## Part 2: Quality of care

The second part of this thesis evaluates (1) QOC in the pre-hospital phase during the military operations in Uruzgan, and (2) the in-theatre hospitalized phase. **Chapter 5** focuses on determining the impact of combat events in the direct circle (first responders) surrounding a BC. For assessment of post deployment impact, both the Post Deployment Reintegration Scale and Impact of Event Scale were used. This assessment shows the impact of combat events on first responders. The objective in **Chapter 6** is (1) to assess the medical preparedness, deployment experience, and post-deployment impact on Dutch surgeons and anesthesiologists serving in Afghanistan, and (2) to identify potential improvements on various aspects of the medical care. **Chapter 7** describes the challenges in training military surgeons in relation to current surgical resident training programs. The aim of this chapter was to compare the surgical workload at the role 2 MTF NL in Southern Afghanistan with the exposure to surgical pathology in civilian surgical training and the pre-deployment medical specialist work up program, in order to construct a possible curriculum for the future military surgeon. A second goal of this chapter was to perform a detailed assessment of the pre-hospital and damage control phase after a casualty sustained a battle or non-battle injury.

## Part 3: Quality of life

The third part of this thesis focuses on the QOL of a BC, divided in (1) role of social support, (2) outcome, and (3) post deployment reintegration. **Chapter 8** focuses on the long term follow up and care consumption of the BCs of the DAF. The goal of this chapter was to assess the impact of battle injuries on BCs. **Chapter 9** describes an assessment of all care consumption of repatriated servicemen from Afghanistan. The aim of this chapter was to assess the volume and type of injuries of all repatriated Dutch service members. Furthermore, lessons learned were identified for future operations.

**Chapter 10** summarizes our main conclusions and formulates recommendations for future research in military medicine.

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