

# The Mosul Trauma Response

A Case Study

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Photo: Kent Garber/Johns Hopkins University

**Paul B. Spiegel MD, MPH**

Professor, Johns Hopkins Bloomberg School of Public Health  
Director, Johns Hopkins Center for Humanitarian Health

**Kent Garber MD, MPH**

Research Associate, Johns Hopkins Bloomberg School of Public Health

**Adam Kushner MD, MPH**

Associate, Johns Hopkins Bloomberg School of Public Health  
Core faculty, Johns Hopkins Center for Humanitarian Health  
Adjunct Professor of Surgery, Uniform Services University of the Health Sciences

**Paul Wise MD, MPH**

Richard E. Behrman Professor of Child Health and Society and Professor of Pediatrics  
Senior Fellow, Freeman Spogli Institute for International Studies  
Stanford University

**Correspondence:** Paul B. Spiegel, [pbspiegel@jhu.edu](mailto:pbspiegel@jhu.edu)



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# 1. Executive Summary

Beginning in the fall of 2016, as Iraqi, Kurdish, and the U.S.-led coalition forces pushed to expel the Islamic State of Iraq and the Levant from Mosul, trauma care for civilians became a top priority for many stakeholders in the conflict. Over the following nine months, thousands of civilians were seriously injured or killed, and nearly a million were displaced.

Responding to serious gaps in trauma care in Mosul, and under growing pressure from government and military authorities, the World Health Organization (WHO) coordinated a first-of-its-kind trauma response for injured civilians. Drawing upon military principles, WHO funded multiple non-governmental organizations (NGOs) and one private medical organization to bring trauma care closer to the frontlines to save civilian lives. These efforts, which included placing medical teams within approximately 10 minutes from the frontline to provide stabilization care and field hospitals within around one hour to treat the most seriously wounded, were funded in part by the United States (U.S.) and European Union governments.

The Center for Humanitarian Health hosted at the Johns Hopkins Bloomberg School of Public Health approached the Office of U.S. Foreign Disaster Assistance (OFDA) to request funding to conduct an independent case study of the trauma referral pathway, which was granted. The study focuses on four key areas: 1) the decision-making process; 2) humanitarian principles; 3) the effectiveness of the response; and 4) lessons learned and recommendations. From July through October 2017, more than 50 interviews were conducted with key stakeholders, participants, and experts; data were collected from several organizations; and field missions to Northern Iraq and Geneva were undertaken.

A mixed-methods approach was developed using qualitative virtual and field-based semi-structured interviews and a quantitative analysis of data collected by WHO, its implementing partners, and other actors. These efforts were supplemented by an extensive review of relevant meeting notes, presentations, internal reports, needs assessments, press briefings, media articles, and other relevant documents.

This report finds that the WHO-coordinated efforts helped address critical needs in the provision of trauma care for wounded civilians and saved lives. Approximately 1,500-1,800 lives may have been saved by the collective action of responders, based upon available data of varying quality; of those lives saved, an estimated 600-1,330 were likely civilians.

In the pursuit of such results, several important current and future issues, some of them fundamental to humanitarian action, emerged that have sparked considerable debate within the humanitarian community. These include: 1) By attempting to provide western military standards of trauma care and “moving forward” to the frontline, WHO and its partners challenged existing humanitarian principles and some humanitarian organization’s modus operandi; 2) although the UN took decisive action to save lives in a situation where the Iraqi government was unable to fulfil its responsibilities under the Geneva Conventions and Additional Protocols, in the future greater effort should be made to ensure that warring parties can care for wounded civilians and that humanitarians are not potentially instrumentalized; and (3) aspects of battlefield care that save lives and improve outcomes, including transportation, coordination, post-operative and rehabilitative care, and data collection, could be improved for future settings.

Many of these concerns are of such importance that the study team believes they warrant significant more discussion and reflection at the highest levels of the UN, other international organizations, donors and NGOs working in conflict settings. As WHO itself noted, demands for accountability and improved standards of care are growing. Yet the entire humanitarian community is understandably struggling with how to respond in an era where the nature of warfare is changing, health facilities and workers are targets, and funding is stretched. It is the study team’s hope that this report will be an impetus for all actors to examine their actions—the ends and the means—so that future humanitarian responses will be principled, effective, and accountable to those who need them the most: the victims of war and forced displacement.

Below are the report’s top ten recommendations.

## TOP TEN RECOMMENDATIONS

1. Governments need to ensure that their militaries are capable to fulfil their obligations under the Geneva Conventions and Additional Protocols to protect and provide care to wounded civilians on the battlefield in interstate and intrastate conflicts.
2. Discussion is needed regarding the responsibilities of governments that provide operational support to allied militaries or armed militias to care for war-wounded civilians, especially when the latter do not or are unable to fulfil their obligations.
3. Given the changing nature of war and pressure upon organizations to “move forward” in attempting to provide the most appropriate standards of trauma care to civilians in conflict, there is a need to reexamine, reform, or reaffirm humanitarian principles designed to guide the humanitarian response to conflict at a high-level meeting, either at the Inter Agency Standing Committee or the intergovernmental level. In this area, our recommendations include:
  - Accept a “pluralism” in the balancing of humanitarian principles among different humanitarian actors;
  - Medical teams operating directly with a combatant force should not be identified as humanitarian;
  - Frontline medical services could be provided by specialized groups explicitly trained to work directly with combatant forces, possibly contracted as military support services focusing on providing frontline medical services for both injured soldiers and civilians.
4. Using private medical organizations to provide humanitarian services in conflict settings needs further study.
5. Humanitarian organizations must be extremely careful to avoid being instrumentalized as part of a conflict strategy by governments, militaries and armed combatants in the future.
6. Future trauma referral pathways could be significantly strengthened by improving transportation, field coordination, post-operative and rehabilitative care, and data collection.
7. Only organizations and professionals with conflict experience, international humanitarian law training, and a strong understanding of the high-risk environments in which they will be working should be deployed near frontlines.
8. Actors and donors should plan for emergency trauma and non-trauma care to address all urgent civilian needs to the greatest extent possible, as trauma care must be viewed within the broader epidemiology of health needs in conflict settings.
9. Data collection systems should be strengthened and include clinically appropriate indicators of standard practices to accurately document the quantity and quality of care provided; monitoring should inform decision-making and include financial components and individual tracking of patients throughout the referral pathway and beyond.
10. In future conflict settings, planners and stakeholders should critically assess the key elements identified in this report to decide if and how a trauma referral pathway should be implemented. In the Mosul context this included: the preclusion of neutrality; inability of the Iraqi government/military to fulfil their role under the Geneva Conventions; coordinated military/civilian planning; medical teams co-located/embedded with specific Iraqi military units; U.S.-led coalition support to humanitarians; sufficient infrastructure and medical personnel to allow for such a trauma referral pathway; strong and active UN leadership with high tolerance for risk; and strong donor interest.

## 2. Introduction

### 2.1 Overview

The Battle of Mosul was one of the largest urban sieges since World War II. From October 2016 to July 2017, at least 30,000 Iraqi and Kurdish forces, backed by a U.S.-led international anti-Islamic State of Iraq and the Levant (ISIL) coalition, fought to retake Iraq's second-largest city, which fell to ISIL in 2014.<sup>1</sup> Over nine months, more than 940,000 civilians fled the city, often facing ISIL sniper fire, mortar shelling, or coalition airstrikes. Thousands were injured as they sought safety.<sup>2</sup>

As the battle unfolded, the need for life-saving frontline trauma care for injured civilians became increasingly evident. The Iraqi military, decimated after the 2003 U.S. invasion, had few combat medical units ready to deploy. Coalition forces, for their part, made clear they were in a supportive role and were unwilling or unable to supply large numbers of combat medical teams. International non-governmental organizations (NGOs), stung by recent attacks on health facilities and workers, struggled to find their footing amid the heightened security risks and other programs they were implementing; moreover, many argued that their role had never been to provide frontline care, which they said should be and must remain the responsibility of the warring factions, as spelled out in numerous articles of the Geneva Conventions and Additional Protocols.<sup>3,4</sup>

The World Health Organization (WHO), as the “provider of last resort” for coordinating the provision of health services in the cluster approach,<sup>5</sup> ultimately stepped in to fill this void. In practice, it ended up coordinating what Lise Grande, the Humanitarian Coordinator for Iraq, would describe as one of the “most complex operation[s] the UN has done anywhere in the world”<sup>6</sup>: a trauma pathway, modeled after military trauma systems, involving several levels of care. This included “trauma stabilization points” (TSPs) located ideally within 10 minutes from the frontline, and field hospitals positioned within an hour drive (the so-called “golden hour”). Unable to get military or civilian government medical teams in and outside of Iraq to participate, WHO ultimately contracted humanitarian NGOs, as well as a private, for-profit medical company, to manage the TSPs and field hospitals, drawing upon its experience dispatching emergency medical teams (EMTs)<sup>7</sup> in natural disasters and the recent Ebola response. Funding came primarily from three donors: the U.S. government, through the Office of U.S. Foreign Disaster Assistance (OFDA), United States Agency for International Development (USAID); the European Union, through European Civilian Protection and Humanitarian Aid Operations (ECHO); and the United Nations (UN) Central Emergency Response Fund (CERF).

The Mosul trauma response was novel for several reasons. It marked the first time that WHO played the lead role in coordinating trauma care in conflict; the first time a trauma system for civilians was attempted in such a setting; and the first time that the UN sent humanitarians within minutes of the frontline to deliver trauma care in close

<sup>1</sup> Chulov, M, et al. Battle for Mosul: Iraqi forces converge in decisive battle against ISIL. The Guardian, October 17, 2016. <https://www.theguardian.com/world/2016/oct/17/kurds-lead-advance-on-mosul-in-decisive-battle-for-iraqs-second-city>

<sup>2</sup> UN. After Mosul victory, senior UN officials detail Iraq's political and humanitarian needs, July 17, 2017. <http://www.un.org/apps/news/story.asp?NewsID=57192#.WfY807pFw2w>

<sup>3</sup> ICRC. Treaties, States Parties, and Commentaries. <https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/WebART/380-600006?OpenDocument>

<sup>4</sup> ICRC. Customary IHL. [https://ihl-databases.icrc.org/customary-ihl/eng/docs/v2\\_rul\\_rule110](https://ihl-databases.icrc.org/customary-ihl/eng/docs/v2_rul_rule110)

<sup>5</sup> <https://www.humanitarianresponse.info/en/about-clusters/what-is-the-cluster-approach>

<sup>6</sup> UN Briefing, July 17, 2017. <http://webtv.un.org/watch/lise-grande-unami-on-the-situation-in-iraq-press-conference-17-july-2017/5510054178001/?term>

<sup>7</sup> WHO, Emergency Medical Teams. [http://www.who.int/hac/techguidance/preparedness/emergency\\_medical\\_teams/en/](http://www.who.int/hac/techguidance/preparedness/emergency_medical_teams/en/)

coordination with the military. Furthermore, it was the first time a private, for-profit medical organization was contracted by WHO (or any other agency, to our knowledge) to provide trauma care in a conflict setting. Moreover, this response took place not only within the highly charged geopolitical landscape of Iraq, but also within the context of a rapidly shifting global environment for humanitarian actors. In the past three years, nearly 1,000 health workers have been killed in conflict settings, at times deliberately, an alarming figure that has raised serious questions about whether traditional notions of humanitarian action remain tenable.<sup>8</sup>

Given the unprecedented nature of this response, as well as the questions it has raised about humanitarian principles and its applicability to other contexts, there is strong interest to better understand what was done, why it was done, and whether this approach represents a model that can or should be used in future conflict settings.

The Center for Humanitarian Health hosted at the Johns Hopkins Bloomberg School of Public Health approached the Office of U.S. Foreign Disaster Assistance (OFDA) to request funding to conduct an independent case study of the trauma referral pathway, which was granted.

The Hopkins team, together with a colleague from Stanford University, focused on four main aspects of the response: 1) the decision-making process; 2) humanitarian principles 3) the effectiveness of the response; and 4) lessons learned and recommendations.

## 2.2 Scope and Methodology

This study focuses primarily on activities related to the WHO-coordinated (and OFDA-supported) trauma response during the Battle of Mosul, from October 2016-July 2017. However, given that many humanitarian actors were involved in the response but not formally contracted by WHO, this study takes a broader view of the trauma landscape, attempting to understand the decisions and actions made by major players within the specific geopolitical, security, and humanitarian contexts of the Mosul theatre.

A mixed-methods approach was developed using qualitative semi-structured interviews, conducted virtually and in the field, and a quantitative analysis of data collected by WHO, its implementing partners, and other actors. These efforts were supplemented by an extensive review of relevant meeting notes, presentations, internal reports, needs assessments, press briefings, media articles, and other relevant documents.

For the qualitative component, the team identified key actors and organizations through publicly available and privately shared documents, discussions with WHO and OFDA, and chain-referral sampling. From July through October 2017, the team conducted semi-structured interviews, either virtually or in person, with more than 50 individuals at the international, regional, and field levels. These included staff or representatives from WHO, OFDA, ECHO, Samaritan's Purse, Aspen Medical, NYC Medics, Global Response Management (GRM), CADUS, Médecins Sans Frontières (MSF), International Committee of the Red Cross (ICRC), Handicap International, International Organization for Migration (IOM), United Nations High Commissioner for Refugees (UNHCR), United Nations Population Fund (UNFPA), UN Office for the Coordination of Humanitarian Affairs (OCHA), the U.S. military, Ninewah Department of Health (DoH), and Emergency Hospital in Erbil. A full listing of the organizations interviewed is provided in the Annex. Given the sensitive and political nature of many of the discussions, interviews were generally conducted on the agreement that information collected would be attributable to the organization, but not the individual, with certain exceptions. Follow-up interviews were conducted as needed. Detailed notes or transcripts were taken for all interviews and saved for reference. For the analysis, interview transcripts and notes were carefully reviewed in conjunction with supporting materials to identify key themes, concerns, and observations. With respect to the technical aspects of the response, themes were interpreted in the context of trauma system frameworks that have

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<sup>8</sup> Safeguarding Health in Conflict Coalition. Impunity Must End: Attacks on Health in 23 Countries in 2016. <https://www.safeguardinghealth.org/sites/shcc/files/SHCC2017final.pdf>

been used in militarized settings and were explicitly invoked by WHO planners during the Mosul conflict. For the discussion around humanitarian principles, these themes were interpreted with respect to common and long-standing definitions and interpretations of humanitarian principles.

In September 2017, the Hopkins team, with a researcher from Stanford University, undertook research missions to Erbil and Geneva. In Iraq, team members visited field hospitals at Hammam Al-Alil (Aspen Medical) and Bartella (Samaritan's Purse), as well as Emergency Hospital in Erbil. The team interviewed dozens of participants and stakeholders on the ground including Ninewah DOH, WHO, OFDA, ECHO, Samaritan's Purse, Aspen Medical, NYC Medics, CADUS, MSF, ICRC, Handicap International, IOM, UNHCR, UNFPA, OCHA CivMil, the U.S. military, and Emergency Hospital. In Geneva, the team interviewed key officials from WHO, MSF, ICRC, International Federation of Red Cross and Red Crescent Societies (IFRC), and IOM headquarters' offices.

For the quantitative component, trauma response data were solicited from WHO and implementing partners, including information on patient demographics, injury severity or acuity, treatments provided, and clinical outcomes, including mortality and complications. Data on fixed and operational costs, as well as donor financial support, were also requested.

## 2.3 Limitations

As with all studies, particularly in conflict settings, there were several limitations.

First, this review is retrospective. At the time of the team's mission, the Battle of Mosul had ended, and facilities were transitioning to general medical care to meet post-conflict health needs. As a result, the team was not able to directly observe the trauma response itself. Efforts were made to interview as many participants as possible, but some viewpoints may be under-represented or missed. Recall bias is always an important issue in such retrospective methods.

Second, this review does not include the perspectives of those who received care. Interviews with Iraqi civilian beneficiaries would have added a highly meaningful perspective, but were outside the scope of the OFDA request and would have required additional institutional approval. Future studies should consider interviewing Iraqi civilian trauma victims to better characterize their experiences and identify areas for improvement.

Third, there are significant data limitations. Several interviewees raised concerns about data quality and reliability, particularly with regards to overcounting; others have argued that data may be incomplete and underestimate the true number of patients treated. Some relevant indicators were captured only partially, or not at all. The trauma referral pathway did not have the capacity to track individual patients through different levels of care, limiting conclusions about the effectiveness and impact of the care. Furthermore, although WHO did share substantial data with the team, the Hopkins team was not given full access to all data.



## 3. Background

Given the military, geopolitical, and humanitarian complexities surrounding the Battle of Mosul, context is critical for analyzing the response. This section provides an overview of key topics to better inform the analysis that follows.

### 3.1 Military and Geopolitical Context

#### Timeline

In the summer of 2014, ISIL forces swept into northern Iraq, capturing almost a third of the country's territory. Mosul, Iraq's second largest city with a mostly Sunni population of 1.4 million, fell that June.<sup>9</sup> By August 2014, ISIL came within 30 kilometers (km) of Erbil, the capital of Iraqi Kurdistan. Mosul's fall, and the rapid advance by ISIL forces, prompted a massive change in U.S. foreign policy in Iraq. U.S. and coalition partners escalated airstrikes, began shipping weapons to the Kurds, and launched a \$1.6 billion fund to train and equip Iraqi and Kurdish forces.<sup>10</sup> In late 2015 and 2016, momentum turned, as the Iraqis reclaimed swaths of Anbar province, in western Iraq, and, by summer 2016, recaptured Fallujah, 65 km west of Baghdad.

After months of planning, the Mosul offensive began on October 17, 2016. Iraqi forces retook East Mosul on January 23, 2017. After a relative lull in the fighting, the campaign in West Mosul, separated from the eastern side of the city by the Tigris River, opened in late February and lasted until July 10, 2017, when Prime Minister Al-Abadi announced the retaking of Mosul, three years after its initial capture by ISIL. Most fighting ended within the next two weeks.

#### The Role of Iraqi and Kurdish Forces

At least 18,000 Iraqi forces and 10,000 Kurdish Peshmerga troops fought in Mosul, comprising the majority of ground forces.<sup>11</sup> The battle in the east was led by the Iraqi Counter-Terrorism Service (CTS), a special operations force, and supported by other Iraqi units, including army personnel divisions, the Federal Police, and the elite Emergency Response Division (ERD).<sup>12</sup> In addition to the Peshmerga, Iraqi troops were joined by the Popular Mobilization Unit (PMU), a loosely organized groups of Shia militias. The battle of Mosul marked one of the first times Iraqi and Kurdish forces had closely coordinated efforts during the three-year campaign to expel ISIL from Iraq. Many units suffered significant casualties: more than 774 Iraqi soldiers were killed and 4,600 wounded, according to preliminary figures released by the Pentagon in March 2017.<sup>13</sup>

<sup>9</sup> UN Habitat. City Profile of Mosul, Iraq: Multi-sector Assessment of a City Under Siege. October 2016. [https://reliefweb.int/sites/reliefweb.int/files/resources/UN-Habitat\\_MosulCityProfile\\_V5.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/UN-Habitat_MosulCityProfile_V5.pdf)

<sup>10</sup> Gibbons-Neff, T. U.S. failed to keep proper track of more than \$1 billion in weapons and equipment in Iraq. Washington Post, May 24, 2017. [https://www.washingtonpost.com/news/checkpoint/wp/2017/05/24/u-s-failed-to-keep-proper-track-of-more-than-1-billion-in-weapons-and-equipment-in-iraq/?utm\\_term=.a71449e977c5](https://www.washingtonpost.com/news/checkpoint/wp/2017/05/24/u-s-failed-to-keep-proper-track-of-more-than-1-billion-in-weapons-and-equipment-in-iraq/?utm_term=.a71449e977c5)

<sup>11</sup> Some estimates put the actual number of ground troops much higher. Babb, C. Americans Advancing on Mosul with Iraqis and Kurds. Voice of America. October 18, 2016. <https://www.voanews.com/a/iraqi-kurdish-fighters-make-gains-in-battle-to-retake-mosul/3556203.html>

<sup>12</sup> The ERD has been formally blacklisted under the U.S. Leahy Act, which restricts such groups from receiving U.S. military aid, since March 2015: <http://abcnews.go.com/International/us-ignores-evidence-atrocities-blacklisted-iraqi-military-unit/story?id=47745913>

<sup>13</sup> Michaels, J. Iraqi forces in Mosul see deadliest urban combat since World War II. USA Today, March 29, 2017. <https://www.usatoday.com/story/news/world/2017/03/29/united-states-mosul-isil-deadly-combat-world-war-ii/99787764/>

## The Role of U.S. and Coalition Forces

Officially, U.S. and coalition forces announced they would play an “advise and assist role” in Mosul, providing air cover with minimal ground forces. In an early October 2016 briefing, the Pentagon outlined a three-pronged approach for retaking Mosul, in which Iraqi special forces and Peshmerga troops would lead from the east, and coalition forces would play a largely supportive role behind the frontlines. Approximately 100 U.S. “advisers,” mostly special operations, were authorized to join Iraqi and Kurdish forces at the frontlines.<sup>14</sup>

In practice, the U.S.-led coalition played a much more forward role. Following the election of President Donald Trump, Secretary of Defense James Mattis relaxed restrictions on U.S. troop movements, allowing them to join Iraqi troops at the battalion level, at times working within several hundred meters of ISIL forces.<sup>15</sup> In January 2017, the 82<sup>nd</sup> Airborne’s 2<sup>nd</sup> Brigade Combat Team deployed upwards of 1,700 paratroopers to the Mosul theater.<sup>16</sup> Numerous coalition special operations units also worked closely at or near the frontlines, at times directly assisting Iraqi counterparts.

## ISIL Resistance and Tactics of Urban Warfare

In the lead-up to Mosul, Iraqi and Kurdish troops encountered an array of lethal tactics as they cleared surrounding villages that would typify the Battle of Mosul. As the Pentagon noted in September 2016, “Daesh have been in that area for more than two years, so they've had a chance to build intricate defenses.”<sup>17</sup> In East Mosul, Iraqi and Kurdish forces continued to contend with a variety of ISIL threats: roads and buildings full of IEDs, car bombs, drones carrying explosives, and well-positioned snipers. Even after areas had been retaken, ISIL fighters sometimes snuck back through tunnels and terrorized previously “secured” neighborhoods. West Mosul proved an even more complex military theatre. With all bridges to East Mosul bombed out, an estimated 800,000 civilians were thought trapped in West Mosul. Streets were too narrow to accommodate armored vehicles. Such concerns, coupled with the complexities of urban warfare, forced Iraqi and coalition forces to move slowly at times and restricted them from deploying the full force of coalition airpower, although coalition forces still carried out thousands of airstrikes during the Mosul campaign, at times killing dozens of civilians. Recent reporting by the *New York Times*, *Associated Press*, and other media outlets suggests that civilian deaths from coalition airstrikes were likely much higher than previously estimated, despite claims that the air campaign was the most precise in military history.<sup>18,19</sup>

## 3.2 Humanitarian Context

### The Legacy of Fallujah

In the lead-up to Mosul, many humanitarian actors were clearly shaken by shortcomings in the Fallujah response of May-June 2016, when few had been positioned to receive the more than 50,000 residents who fled into the Anbar

<sup>14</sup> Sisk, R. More Than 100 US Troops Move Forward With Mosul Attack Force. Military.com, October 18, 2016. <http://www.military.com/daily-news/2016/10/18/100-us-troops-move-forward-mosul-attack-force.html>.

<sup>15</sup> George, S. In final stages of Mosul battle, U.S. troops take on Expanded Role. Associated Press, July 1, 2017. <http://www.chicagotribune.com/news/nationworld/ct-islamic-state-mosul-20170701-story.html>

<sup>16</sup> <https://www.iraqinews.com/iraq-war/us-army-send-1700-soldiers-iraq-early-2017>

<sup>17</sup> US Defense Department Briefing. September 8, 2016. <https://www.defense.gov/News/Transcripts/Transcript-View/Article/938183/departement-of-defense-press-briefing-by-col-dorrian-via-teleconference-from-bag/>

<sup>18</sup> Arango, T. and Cooper, H. U.S. Investigating Mosul Strikes Said to Have Killed Up to 200 Civilians. New York Times, March 24, 2017. [https://www.nytimes.com/2017/03/24/world/middleeast/us-iraq-mosul-investigation-airstrike-civilian-deaths.html?\\_r=1](https://www.nytimes.com/2017/03/24/world/middleeast/us-iraq-mosul-investigation-airstrike-civilian-deaths.html?_r=1)

<sup>19</sup> George, S. Mosul is a graveyard: Final IS battle kills 9,000 civilians. Dec. 21, 2017. <https://www.apnews.com/bbea7094fb954838a2fdc11278d65460>

desert.<sup>20</sup> Many of the displaced had ended up in hastily arranged camps, often with limited food and water. Iraqi authorities acknowledged being caught off guard; the UN lamented that its response was constrained by funding limitations. As Brett McGurk, the US representative to anti-ISIL coalition, told reporters. "We had some real problems in Fallujah and we want to make sure some of those problems are not repeated in Mosul." He added: "Mosul will be the biggest challenge."<sup>21</sup> A spokesperson for the Norwegian Refugee Council put it more bluntly: "The entire humanitarian community has failed Iraq – from donors, to governments, to the implementing agencies on the ground," adding, "Fallujah has exposed all of our shortcomings with massive consequences for the tens of thousands of civilians displaced."<sup>22</sup>

## The Focus of Initial Planning

The UN, as early as summer 2016, was loudly warning that the civilian impact in Mosul could be "devastating."<sup>23</sup> In its humanitarian contingency plans, released late summer 2016, the UN laid out three displacement scenarios for Mosul: a so-called best case, a most likely case, and a worst-case scenario. According to the most likely case, some 200,000-400,000 residents might be displaced; in the worst-case, more than 750,000. ICRC estimated the number could reach up to one million.<sup>24</sup>

Heeding these estimates, and reflecting the failures in Fallujah, the Iraqi military drafted a "concept of operations" note, or ConOps, which called for establishing "safe corridors" for fleeing civilians if they did leave their homes. These corridors would, in theory, provide protection, as well as basic supplies and services, to those fleeing. The UN also issued a \$284 million "flash appeal" for Mosul, including \$35 million for health,<sup>25</sup> noting that the primary needs would be food, water, emergency shelter, and medical assistance. Its general strategy focused on prepositioning vital supplies and aid near screening points for individuals once they reached safety and providing transportation to and shelter in IDP camps. WHO planned to run mobile clinics, which would provide basic medical care, as well as some trauma triage, for the displaced.

## Operational Challenges

Despite the anticipation of massive needs, preparations were hampered on several fronts. One was resource fatigue. After years of war, many of the region's humanitarian actors—not to mention civil services—were stretched thin; Kurdistan was already housing 1.5 million IDPs even before the Mosul displacement began. An internal Iraqi government report, leaked in August 2016, warned that the Mosul offensive would likely push Kurdish resources "to the breaking point."<sup>26</sup> Assistance from the international community, the report warned, was desperately needed.

Another problem was access. In Fallujah, ISIL tactics—using residents as shields, positioning snipers on rooftops, shooting at civilians attempting to flee—made many neighborhoods inaccessible; many expected Mosul to be worse. Most humanitarians in Northern Iraq were, by necessity, concentrated in Kurdish-held regions. Even newly "liberated" areas were proving difficult to reach. Dibaga IDP camp, outside of Mosul, had taken in so many people it required

<sup>20</sup> Slemrod, A. The failure in Fallujah. IRIN, June 28, 2016. <https://www.irinnews.org/analysis/2016/06/28/failure-Fallujah>

<sup>21</sup> George, S. and Szlanko, B. Iraqi forces prepare for assault. The Associated Press, August 13, 2016. <http://www.businessinsider.com/ap-un-100000-displaced-as-iraqi-forces-prepare-for-mosul-battle-2016-8>

<sup>22</sup> Slemrod, A. The failure in Fallujah. IRIN, June 28, 2016. <https://www.irinnews.org/analysis/2016/06/28/failure-Fallujah>

<sup>23</sup> UN. Mosul Flash Appeal. July 2016. [http://reliefweb.int/sites/reliefweb.int/files/resources/Mosul\\_flash\\_appeal\\_final\\_web.pdf](http://reliefweb.int/sites/reliefweb.int/files/resources/Mosul_flash_appeal_final_web.pdf)

<sup>24</sup> Hendawi, H. and Abdul-Zahra, Q. Retaking militant-held Iraqi city likely to cost. Associated Press, August 1, 2016. <http://www.gazettenet.com/Retaking-city-tricky-3775342>

<sup>25</sup> UN. Mosul Flash Appeal. July 2016. [https://reliefweb.int/sites/reliefweb.int/files/resources/mosul\\_flash\\_appeal\\_final\\_web.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/mosul_flash_appeal_final_web.pdf)

<sup>26</sup> Graham-Harrison, E. Could the liberation of Mosul lead to a million fleeing to Iraqi Kurdistan? The Guardian, August 27, 2016. <https://www.theguardian.com/world/2016/aug/27/iraq-kurdistan-mosul-battle-refugee-crisis>

multiple extensions, yet aid groups were having trouble accessing such sites for a variety of security and logistical issues.

Finally, UN funding remained inadequate. Despite the UN's flash appeal for Mosul, by the end of September, it had received only about half of its request.<sup>27</sup> By the time the offensive began, the UN admitted that it was rushing to be ready. Although it had managed to set up numerous emergency sites around Mosul, those would accommodate only 60,000 people. "We're still short and everyone who's working on this operation knows that," said Lise Grande, the UN Humanitarian Coordinator in Iraq. "We're continuing to discuss with authorities what might have to happen."<sup>28</sup>

## Importance of Trauma Care

As discussed later, trauma care was not a primary focus of the initial UN or WHO humanitarian response plans. The UN Mosul flash appeal, for example, does explicitly mention the need for trauma care close to where civilians would be expected to flee. That said, the bulk of the initial humanitarian planning focused on other areas, including the provision of shelter, water, food, and basic medical supplies to displaced individuals. Section 4 explores how and why trauma care became an increasingly important concern as the offensive progressed.

## 3.3 International Humanitarian Law (IHL) and Humanitarian Principles

The trauma response in Mosul raised important questions regarding the rights and obligations of parties to conflict under IHL, as well as the core humanitarian principles guiding humanitarians during times of conflict. Relevant legal points are reviewed here.

### Care for the Sick and Wounded Under IHL

The Geneva Conventions and Additional Protocols affirm that in settings of armed conflict all wounded and sick individuals must receive timely medical care to whatever extent possible. The Conventions are also clear about who bears primary responsibility for providing this care. As the ICRC summarizes, "The wounded and sick must be collected and cared for by the party to the conflict which has them in its power."<sup>29</sup> This principle is clearly spelled out in Common Article 3 of the Geneva Conventions relating to an armed conflict not of an international character as well as in Article 8 of the 1977 Additional Protocol II, a portion of which is reproduced in the Annex 2. Note that Article 3 also allows—but does not compel—impartial humanitarian bodies such as the ICRC to offer medical services to parties of the conflict. The Geneva Conventions and Additional Protocols also state that the wounded and sick should be treated based upon medical need alone; no distinction should be made based upon the identity of the injured.<sup>30</sup>

### The Role of Humanitarian Principles

Humanitarian principles derive from IHL and provide guidance for humanitarians on how to act in conflict settings, with the intention of protecting humanitarians and the populations they serve. In many conflicts, military and political pressures can expose humanitarians to substantial risk if they are viewed as supporting one party over another. Historically, acting in accordance with the principles has been seen as essential for humanitarian actors to gain access, ensure safety, and preserve their ability to continue working in a setting once conflict has ended. The four main

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<sup>27</sup> OCHA. Humanitarian Funding Update. September 2016. <https://reliefweb.int/report/world/humanitarian-funding-update-september-2016-united-nations-coordinated-appeals>

<sup>28</sup> Astor, M. Mosul operation to test UN humanitarian efforts. Associated Press, October 17, 2017. <https://apnews.com/192a7029ad9c498c87eecdd083e0161a>.

<sup>29</sup> ICRC. War and International Humanitarian Law. <https://www.icrc.org/eng/war-and-law/overview-war-and-law.htm>

<sup>30</sup> Footer, K and Rubenstein, L. A Human Rights Approach to Health Care in Conflict. *International Review of the Red Cross*, 2013, 95(899): 1-21.

humanitarian principles, outlined in the table below, are **humanity, impartiality, neutrality, and independence**. The first three were adopted in 1991; the latter was added in 2004.

**Table 1: Core Humanitarian Principles**

PRINCIPLE	DESCRIPTION
<b>Humanity</b>	Human suffering must be addressed wherever it is found. The purpose of humanitarian action is to protect life and health and ensure respect for human beings.
<b>Neutrality</b>	Humanitarian actors must not take sides in hostilities or engage in controversies of a political, racial, religious or ideological nature.
<b>Impartiality</b>	Humanitarian action must be carried out on the basis of need alone, giving priority to the most urgent cases of distress and making no distinctions on the basis of nationality, race, gender, religious belief, class or political opinions.
<b>Independence</b>	Humanitarian action must be autonomous from the political, economic, military or other objectives that any actor may hold with regard to areas where humanitarian action is being implemented.

Source: UN Office for the Coordination of Humanitarian Affairs (OCHA)<sup>31</sup>

## Challenges to Humanitarian Principles

In recent years, humanitarians and health workers in conflict settings have faced repeated attacks, leading many to question whether the principles afford the same level of protection they presumably once did. In 2016 alone, WHO recorded 207 attacks on health facilities, resulting in 418 deaths and more than 500 injuries.<sup>32</sup> In Syria alone, more than 200 attacks were recorded in 2016. In Afghanistan, 24 health facilities were attacked last year, and more than 100 have closed due to conflict and insecurity.<sup>33</sup> In October of 2017, ICRC announced that it was drastically scaling back operations in Afghanistan, after seven of its health workers were killed. “Exposure to risk has become our greatest challenge and concern,” Monica Zanarelli, head of the ICRC in Afghanistan, told reporters. “We have no choice but to drastically reduce our presence in Afghanistan.” Even when humanitarian actors do choose to remain, many have become more hesitant to go into conflict settings, reflecting these risks.<sup>34</sup>

## 3.4 Trauma Care in War

### Evolution of Battlefield Trauma Care by Military Forces

Battlefield care for soldiers of professional armies (NATO, U.S. military, etc.) has changed dramatically in recent decades, driven largely by lessons gleaned from civilian trauma systems and real-time experiences in Iraq and Afghanistan. In the early years of those conflicts, data emerged showing that lives of injured soldiers were being lost unnecessarily, and that few of the medical lessons of Vietnam were being applied.<sup>35</sup> In response, the U.S. Central

<sup>31</sup> OCHA. What are Humanitarian Principles? [https://docs.unocha.org/sites/dms/.../OOM-humanitarianprinciples\\_eng\\_June12.pdf](https://docs.unocha.org/sites/dms/.../OOM-humanitarianprinciples_eng_June12.pdf)

<sup>32</sup> WHO. Health Attacks Dashboard: 2016 [http://www.who.int/emergencies/attacks-on-health-care/attacks\\_dashboard\\_2016\\_updated-June2017.pdf?ua=1](http://www.who.int/emergencies/attacks-on-health-care/attacks_dashboard_2016_updated-June2017.pdf?ua=1)

<sup>33</sup> WHO. Attacks on healthcare on the rise in Afghanistan. <http://www.emro.who.int/afg/afghanistan-news/attacks-on-healthcare-on-the-rise-in-afghanistan.html>

<sup>34</sup> Smith, J. International Red Cross to drastically cut Afghan operations after attacks. Reuters, October 9, 2017. <https://www.reuters.com/article/us-afghanistan-icrc/international-red-cross-to-drastically-cut-afghan-operations-after-attacks-idUSKBN1CE0AG?il=0>

<sup>35</sup> Holcomb JB, McMullen NR, Pearse L, et al: Causes of death in U.S. Special Operations forces in the global war on terror. *Ann Surg* 2007; 245: 986–91.

Command formed the Joint Trauma System (JTS), creating a military-wide, evidence-based, integrated approach to combat care, with a goal of “**right patient, right place, right time, right care.**”<sup>36</sup> In recent years, this approach has been widely credited with dramatically improving troop survival: Rasmussen (2015) found a case fatality rate of 9.3% in Iraq and Afghanistan versus 23% in Vietnam.<sup>37</sup> Two key pillars of this approach—systems-based thinking and evidence-based clinical care—are described below.

**Systems of Care.** One key innovation has been the application of a systems lens to combat care, adapted from peacetime civilian experience.<sup>38</sup> Well-functioning trauma systems deliver not only high-quality pre-hospital, hospital, and rehabilitative care, but also integrate that care through effective transportation, coordination, and data collection. During the U.S. wars in Afghanistan and Iraq, for example, the U.S. military established the Joint Trauma Theatre Registry (JTTR) to track injured soldiers.<sup>39</sup> Casualty data were analyzed to provide iterative feedback, allowing the system to improve and adapt. Though far from perfect, military experts believe this capacity was critical to assessing the quality and effectiveness of care. Likewise, military experts have stressed the importance of uninterrupted en-route medical care when transporting severely injured soldiers from frontline aid posts to more advanced facilities and have committed extensive resources to this task.<sup>40</sup>

**Pre-Hospital Combat Care Standards.** Pre-hospital standards of care have also improved. At the beginning of the U.S. wars in Afghanistan and Iraq, most medics were not trained on using tourniquets to stop hemorrhagic bleeding (reflecting an outdated concern that tourniquet use might hasten limb ischemia), and few had access to hemostatic dressings, among other life-saving supplies.<sup>41</sup> Over the past decade, the U.S. military, through the JTS, has implemented standards of care to address those shortcomings, including aggressive use of tourniquets and hemostatic dressings, permissive hypotensive resuscitation, and technologies to minimize heat loss. Reports have shown significant reductions in preventable deaths attributable to these interventions, particularly from tourniquet use.<sup>42</sup>

**The Element of Time.** A long-standing principle of trauma practice holds that reducing the elapsed time between injury and definitive care improves outcomes. In Vietnam, despite the use of air evacuation, only 31% of patients were admitted to hospitals within an hour of injury, and 86% within four hours.<sup>43</sup> The past few decades have seen steady pressure to reduce those times. NATO, the U.S. military, and other armed forces have designed sophisticated evacuation pathways to meet this goal, using a series of roles, of levels, of care<sup>44</sup>:

<sup>36</sup> Berwick D, Downey A, Cornett E, eds. *A National Trauma Care System: Integrating Military and Civilian Trauma Systems to Achieve Zero Preventable Deaths After Injury*. Washington (DC): *National Academies Press (US)*; 2016. <https://www.ncbi.nlm.nih.gov/books/NBK390321/>

<sup>37</sup> Rasmussen TE, Baer DG, Cap AP, Ahead of the curve: Sustained innovation for future combat casualty care. *J Trauma Acute Care Surg*. 2015 Oct;79(4 Suppl 2): S61-4.

<sup>38</sup> Remick, K. and Elster, E. (2017). Trauma Care in Support of Global Military Operations. *Joint Force Quarterly*, July 2017.

<sup>39</sup> Eastridge, B. J., D. Jenkins, S. Flaherty, H. Schiller, and J. B. Holcomb. 2006. Trauma system development in a theater of war: Experiences from Operation Iraqi Freedom and Operation Enduring Freedom. *Journal of Trauma* 61(6):1366-1372.

<sup>40</sup> Morrison JJ, Oh J, DuBose JJ, O'Reilly DJ, Russell RJ, Blackburne LH, Midwinter MJ, Rasmussen TE. En-route care capability from point of injury impacts mortality after severe wartime injury. *Ann Surg*. 2013 Feb;257(2):330-4.

<sup>41</sup> Butler FK. Two Decades of Saving Lives on the Battlefield: Tactical Combat Casualty Care Turns 20. *Mil Med*. 2017 Mar;182(3): e1563-e1568.

<sup>42</sup> Kotwal, R. S., H. R. Montgomery, B. M. Kotwal, H. R. Champion, F. K. Butler Jr., R. L. Mabry, J. S. Cain, L. H. Blackburne, K. K. Mechler, and J. B. Holcomb. 2011. Eliminating preventable death on the battlefield. *Archives of Surgery* 146(12):1350-1358.

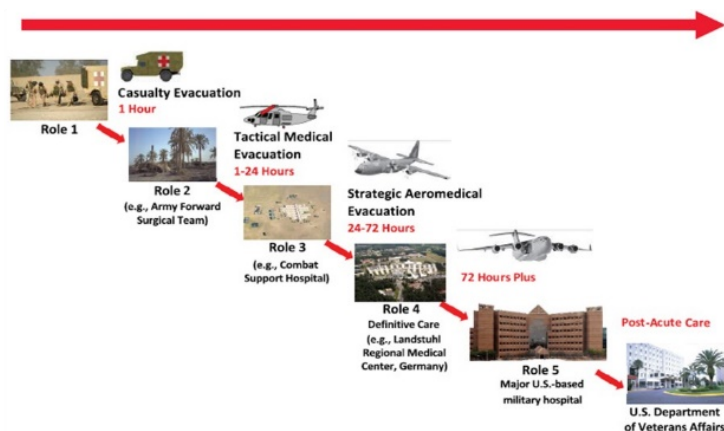
<sup>43</sup> Blyth, D et al. Lessons of War: Combat-related Injury Infections during the Vietnam War and Operation Iraqi and Enduring Freedom. *J Trauma Acute Care Surg*. *J Trauma Acute Care Surg*. 2015 Oct; 79: S227–S235.

<sup>44</sup> Bailey, J., M. A. Spott, G. P. Costanzo, J. R. Dunne, W. Dorlac, and B. J. Eastridge. 2012a. *Joint Trauma System: Development, conceptual framework, and optimal elements*. San Antonio, TX: Fort Sam Houston, U.S. Department of Defense, U.S. Army Institute for Surgical Research.

**Role 1** is point-of injury care with trauma stabilization;

- **Role 2** is a forward facility near the frontlines providing damage control resuscitation and limited surgery;
- **Role 3** is larger, typically fixed hospital that can perform more complex surgery and rehabilitative care; and
- **Roles 4-5** are facilities typically outside of the combat theatre that provide additional high-level care.

**Figure 1: Roles of Care in the Joint Trauma System**<sup>45</sup>



Significant questions, however, remain as to how quickly care should be delivered—and thus how far forward certain capacities must be—to optimize outcomes. In 2009, then U.S. Defense Secretary Robert Gates ordered that all critically injured U.S. military be transported to a definitive facility (defined as one offering life- or limb-saving surgery) within an hour of injury, invoking the so-called “golden hour of trauma care,” a decades-old teaching positing that survival is improved if severely injured patients reach definitive care within 60 minutes. A recent study of Gates’ 60-minute rule found that survival rates did increase after its implementation, but simultaneous improvements, such as earlier provision of blood and increased use of helicopter evacuation with en-route medics, were also plausible explanations for the outcomes.<sup>46</sup> Even NATO has cautioned against interpreting the “golden hour” too literally, noting in its 2009 guidelines that care must be tailored to specific patient needs, rather than prescriptive time frames.<sup>47</sup>

## Role of Military Actors in Treating Injured Civilians

Some military medical battlefield advances have also aided wartime care for injured civilians. In Afghanistan, from 2002 to 2013, U.S. military surgeons performed more than 9,400 operations on civilians, more than half of which were war-related.<sup>48</sup> During roughly the same period in Iraq, U.S. military facilities treated more than 3,000 children, slightly more than half of whom had combat-related injuries.<sup>49</sup> More recently, the French military deployed forward surgical

<sup>45</sup> Bailey, J., M. A. Spott, G. P. Costanzo, J. R. Dunne, W. Dorlac, and B. J. Eastridge. 2012a. *Joint Trauma System: Development, conceptual framework, and optimal elements*. San Antonio, TX: Fort Sam Houston, U.S. Department of Defense, U.S. Army Institute for Surgical Research.

<sup>46</sup> Kotwal, R. S., J. T. Howard, J. A. Orman, B. W. Tarpey, J. A. Bailey, H. R. Champion, R. L. Mabry, J. B. Holcomb, and K. R. Gross. 2016. The effect of a golden hour policy on the morbidity and mortality of combat casualties. *JAMA Surgery* 151(1):15-24.

<sup>47</sup> Tien, H, et al. Advances in damage control resuscitation and surgery: implications on the organization of future military field forces. *Can J Surg*. 2015 Jun; 58(3 Suppl 3): S91–S97.

<sup>48</sup> Sharon R. Weeks, John S. Oh, Eric A. Elster, Peter A. Learn. Humanitarian Surgical Care in the US Military Treatment Facilities in Afghanistan from 2002 to 2013. *JAMA Surg*. Published online September 13, 2017. doi:10.1001/jamasurg.2017.3142

<sup>49</sup> Edwards MJ, Lustik M, Burnett MW, Eichelberger M. Pediatric inpatient humanitarian care in combat: Iraq and Afghanistan 2002 to 2012. *J Am Coll Surg*. 2014 May;218(5):1018-23.

teams (Role 2) to Central African Republic and Mali, during which they have explicitly embraced providing medical assistance to the population as part of their mission. It is unclear, however, what percentage of the overall burden of civilian injuries were treated by military versus civilian facilities in these settings, or whether many civilians were unable to access appropriate care.

Within professional militaries, there continues to be a debate about whether—or to what degree—providing humanitarian care fits with military objectives. Some writings on this topic have framed the topic foremost in strategic terms (promoting goodwill among the population, serving nation-building interests, etc.) rather than as an obligation under IHL. Others have noted that military surgeons deployed to war zones frequently see their primary responsibility as supporting troops; French military doctrine, for example, explicitly states that “care is exercised in a priority towards soldiers.”<sup>50</sup> In previous wars in Iraq and Afghanistan, the U.S. military adopted specific medical rules of eligibility that placed limits on when civilians could receive care at military facilities.<sup>51</sup> The role of the Iraqi and coalition military in providing frontline trauma care in Mosul, and policies governing that care, is discussed in more detail in Section 4.

## Role of Humanitarian Actors in Treating Injured Civilians

The military evacuation system is historically not the model used by humanitarian actors, who, working with far fewer resources, often provide a substantial volume of civilian surgical care in conflict settings.<sup>52</sup> MSF and ICRC, arguably the two most experienced humanitarian actors with war surgery,<sup>53</sup> commonly work in austere locations, often amid civil conflicts with semi-professional or poorly trained fighters, where capacity for advanced evacuation pathways is limited. To reach facilities, injured civilians often take whatever means available—sometimes arriving on foot. In some of the earliest documented ICRC field hospital experiences, during the Afghanistan conflicts of the 1980s, ICRC set up field hospitals along the Pakistan border, where it took patients, on average, several days to reach the facility, meaning that most critically injured patients died before arriving.<sup>54</sup> MSF field hospitals—often inflatable tents—can be set up within 48 hours and are generally intended to be self-sufficient, typically with few options for onward referrals.<sup>55</sup> ICRC, among others, has also worked over the years to upgrade ambulance fleets and provide first-aid training, as it did during the Ethiopian-Eritrean conflict of the late 1990s and early 2000s.<sup>56</sup>

In recent years, however, some aspects of humanitarian surgery have evolved, reflecting, in part, a growing sophistication and acceptance of risk. Some facilities have moved closer to fighting. MSF’s trauma field hospital in northwestern Syria, for example, which opened in 2012, was located within several kilometers of the frontline, in a converted chicken farm, close enough to be fired upon.<sup>57</sup> Some facilities have also coordinated out-of-theatre referrals; the MSF Syria hospital referred some complex surgery cases across the border to Turkey. As discussed later, both MSF and ICRC deployed innovative mobile surgical units in Mosul, attempting to access patients closer to the point of injury, but debate remains about how best to deploy these assets.

<sup>50</sup> Barbier, O et al. Dynamic Insights on Surgical Activity in a New Modern Warfare. *Military Medicine* 2017, 182:1756-1761.

<sup>51</sup> Michael L. Gross (2017) Saving Life, Limb, and Eyesight: Assessing the Medical Rules of Eligibility During Armed Conflict, *The American Journal of Bioethics*, 17:10, 40-52.

<sup>52</sup> Chu K, Trelles M, Ford N. Rethinking Surgical Care in Conflict. *The Lancet*, January 23, 2010.

<sup>53</sup> Korver, A. Outcome of war injured patients treated at first aid posts of the ICRC. *Injury* (1994) 25, (1), 25-30.

<sup>54</sup> Coupland, R. and Howell, P. An experience of war surgery and wounds presenting after 3 days on the border of Afghanistan. *Injury* (1988) 19,259-262.

[https://www.ncbi.nlm.nih.gov/pubmed/?term=Chu%20K%5BAuthor%5D&cauthor=true&cauthor\\_uid=19672649](https://www.ncbi.nlm.nih.gov/pubmed/?term=Chu%20K%5BAuthor%5D&cauthor=true&cauthor_uid=19672649)

<sup>55</sup> Surgeons without borders: a brief history of surgery at Médecins Sans Frontières. *World journal of surgery*. 2010 Mar;34(3):411-4. <https://www.ncbi.nlm.nih.gov/pubmed/19672649> "

<sup>56</sup> ICRC. Activities in Ethiopia. <https://www.icrc.org/eng/resources/documents/update/57jqc4.htm>

<sup>57</sup> Trelles M, Dominguez L, Tayler-Smith K, Kisswani K, Zerboni A, Vandenborre T, Dallatomasina S, Rahmoun A, Ferir MC. <https://www.ncbi.nlm.nih.gov/pubmed/26674297> *Confl Health*. 2015 Dec 15; 9:36.



## 4. Decision-Making

Why did the Mosul trauma response unfold as it did? Why was WHO called upon to coordinate a first-of-its-kind civilian trauma referral pathway in a conflict setting? What was the role played by other actors, including government, military, and NGOs, in necessitating and shaping this response? These questions matter, for at least two critical reasons: One, they speak directly to some of the most difficult issues facing humanitarian actors today; and two, to answer whether such a response should be done again, one must first know why it was needed in the first place.

### 4.1 Trauma care in Initial UN Planning

Although humanitarian planning was extensive in the months preceding the Battle of Mosul, the need for frontline trauma care was not a major initial focus for the UN. For one, there were other, massive humanitarian needs that required attention, as discussed in Section 3. Two, according to discussions with the UN Humanitarian Coordinator, it was assumed that the Iraqi and coalition military would provide frontline trauma care, and that hospitals in Erbil—less than 90km away—and surrounding districts would have capacity to care for the seriously injured. Others within the UN system stated that they assumed MSF and ICRC, given their experience in conflict settings, would fill this role.<sup>58</sup>

As discussions with WHO, OCHA, and others indicated, the initial humanitarian concept of operations stressed civilian protection; as civilians fled Mosul, they would encounter a series of checkpoints, including mustering points (where the military would bring civilians) and screening sites, where food, water, protection, and basic medical care would be provided. To support these corridors, the WHO stated that they focused on pre-positioning medical supplies, operating fixed and mobile primary health clinics, as well as supporting health services in IDP camps. Although the Mosul flash appeal in July 2016 notes that partners were also working to establish sites for “trauma triage and mass casualty management,” the UN Humanitarian Coordinator acknowledges that trauma care, by and large, “wasn’t in our initial contingency plans—it wasn’t there.” Rather, realities on the ground, once operations began, forced the issue.

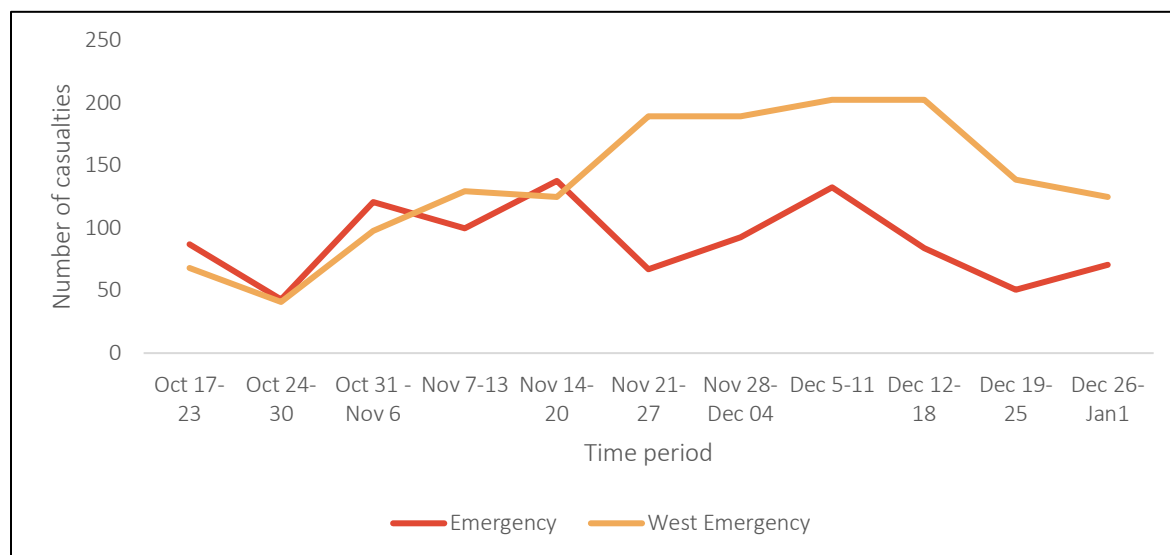
### 4.2 Growing referral challenges in Erbil

The first weeks of fighting, and evolving conditions in the East Mosul, led to an increasingly public discussion of the need for civilian trauma care closer to the frontline. According to discussions with WHO, these concerns evolved rapidly, within the first two weeks of fighting, reflecting developments in the Mosul theatre. Many actors had expected displaced Iraqis to flee north, where MSF-Swiss and ICRC had positioned hospitals or surgical personnel. Those routes, however, never truly materialized, because there was limited access through Kurdish checkpoints. Of the more than 70,000 Iraqis displaced in the first weeks of fighting, most flowed toward Erbil. Erbil’s main trauma hospitals reported a sharp spike in casualties, as shown below; nearly 60% of the reported casualties were combatants, and the remainder civilians, according to discussions with Emergency Hospital and WHO data.<sup>59</sup>

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<sup>58</sup> MSF and ICRC, in interviews, indicated that such an assumption misrepresents their mandate or historical roles.

<sup>59</sup> WHO. Mosul Operation: Casualty Cases to Emergency and West Emergency Hospitals, Erbil Iraq (17 October to 17 December 2016). Infographic, Version 12. Over this period, 59% of the reported 2,052 casualties at these facilities were combatant.

**Figure 2: Casualty Load at Erbil Hospitals, Oct-Dec 2016**

Source: WHO

By late October 2016, the UN projected that up to 40,000 civilians could be seriously injured in the fighting.<sup>60</sup> In Erbil, there were widespread reports that hospitals were stretched beyond capacity, with patients lined up on the floor and operating rooms running around the clock. According to interviews, there were also grumblings from the Kurdish side that Kurdish resources, already strapped, were being spent on Iraqis. Soon, Kurdish checkpoints into Erbil tightened, significantly slowing access to care for critically wounded patients. Ambulances coming from Mosul were frequently stopped; sometimes, patients had to be transferred from Iraqi to Kurdish ambulances, then wait for a series of phone calls before they could get approval to pass. According to several individuals, the transport times from Mosul to Erbil could take four hours or more. It is possible some patients died trying to get to Erbil, as some have suggested.

### 4.3 Limited forward options

The problem was not just one of getting patients to Erbil. There were also emerging concerns that options for trauma care closer to the frontlines were inadequate; as one respondent put it, the area was a “no man’s land.” As Iraqi forces moved westward and retook towns from ISIL, the extent of hospital damages became apparent. Several organizations sent teams to scope out options for rehabilitating hospitals, yet because ISIL had ransacked many of them, repairs promised to be time-consuming and expensive. Security also remained volatile, restricting movement and making it harder for NGOs to set up facilities.

It also became apparent that life-saving stabilization care near the frontline, presumably the domain of the military, was ad-hoc at best, and often completely absent. Several sources noted that the Iraqi and Kurdish forces lacked medical personnel to adequately care for soldiers or injured civilians. The Iraqi medical corps, which was largely dissolved after the 2003 U.S. invasion, had never been substantially rebuilt. According to coalition sources, the Iraqi army had lost more than 90% of its physicians. According to the Ninewah DoH, at the beginning of the East Mosul battle, the Iraqi forces had only three combat medical teams and limited supplies. For all these reasons, the Iraqi military was ill-equipped to provide medical care for thousands of troops, let alone civilians. Likewise, many

<sup>60</sup> WHO. WHO and partners gear up to safeguard lives of displaced persons fleeing Mosul. October 26, 2016.

respondents noted that the Ninewah and Dohuk DoHs were overstretched and understaffed, having lost many of their health workers after ISIL arrived in 2014.<sup>61</sup> U.S.-led coalition forces, officially, were in an “advise-and-assist” role and had restrictions on deployed medical units treating civilians, as discussed in section 4.5 below.

Into this void, a handful of “non-traditional” frontline actors, including the Free Burma Rangers (FBR) and Academy of Emergency Medicine (AEM),<sup>62</sup> a Slovakian-based NGO, arrived by November 2016, further illustrating the gaps in organized frontline care. AEM had been assisting the Peshmerga since August, but in early November, drove to the frontlines and began working with Iraqi special forces, providing first aid care to injured soldiers and civilians. The FBR team, led by David Eubanks, a former U.S. Army special forces member, provided not only stabilization care but, in some cases, point of injury care, working directly with Iraqi counterparts to retrieve battlefield casualties. Many respondents interviewed have described these activities, at times, as bordering on “paramilitary.” According to discussions with WHO, the presence of these actors—and the absence of professional military frontline trauma care—created growing pressure for a more formalized trauma response.

## 4.4 Pressure to Act

Based upon our discussions, this confluence of events—likelihood of growing civilian casualties, hospital overcrowding in Erbil, tightening of Kurdish checkpoints, extensive infrastructure damage, gaps in frontline military care, and ever-present security threats limiting access—led many decision-makers to recognize a need for a more robust trauma response. These decision-makers included the UN Humanitarian Coordinator for Iraq, WHO, the Ninewah Directorate of Health, and donor partners, among others. Internally, both MSF and ICRC, according to interviews, were also debating how to best respond to these challenges, with some factions pushing for a more aggressive response.

According to numerous interviews, pressure was coming from multiple directions. The UN said it received appeals from the Government of Iraq and Iraqi military, as well as requests from members of the Coalition. The Ninewah DoH, which managed to set up at least one TSP in East Mosul, said it reached out to WHO, asking for more support for the types of frontline resources that AEM medics were providing. Some donors also appeared to push for a stronger trauma response. Discussions with MSF indicated that ECHO, specifically, had written to all MSF operating centers in the fall of 2016, asking them to deploy additional resources. OCHA said that members of the coalition had also tried to influence NGOs to set up field hospitals.

## 4.5 The Coalition Position

Amid these pressures, and given gaps in the Iraqi medical corps, the UN Humanitarian Coordinator for Iraq approached the U.S.-led coalition for additional support. Although officially in an “advise-and-assist” role, the coalition did, in fact, have some medical assets on the ground. According to interviews with the U.S. coalition and other actors in the field, the military deployed multiple units around Mosul to support special operations forces assisting Iraqi units. At least one Forward Surgical Team (FST), the equivalent of a level 2 Emergency Medical Team (EMT), was active in the West Mosul theater. Casualties seen by this unit were sent by Medevac helicopter to Erbil, where they were treated at a Canadian-run military hospital, or sent south to Qayarra or Baghdad, where the coalition had additional facilities. An additional coalition facility was reportedly present in Bartella during the East Mosul offensive. Although precise figures

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<sup>61</sup> As the offensive progressed, the Iraqis, according to discussions with multiple respondents, did establish some additional referral options for their own troops. These included a PMU hospital in West Mosul and efforts to evacuate some casualties by plane to facilities in the south.

<sup>62</sup> In early 2017, a team from AEM formed a new NGO, Global Response Management (GRM), which was a key player in the West Mosul TSP response. In East Mosul, AEM was the primary NGO providing frontline stabilization support.

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on the number of coalition medical personnel deployed to Mosul are unknown, the coalition considered its medical footprint relatively small, according to interviews.

Additionally, U.S.-led coalition medical units faced restricted rules of engagement (alternatively referred to medical rules of eligibility) dictated by the Pentagon. According to interviews, the U.S. Department of Defense (DoD) approved a limited amount of so-called “Class 8” material—essentially, medical supplies—for deployed forces. At the Role 2 and 3 level, coalition units treated primarily coalition soldiers, sources say, and not civilians except under very limited circumstances. Moreover, the medical units deployed around Mosul reflected larger strains on the U.S. military medical corps. Some forward units, according to one source, were staffed not by trauma surgeons, but by podiatrists, obstetric-gynecologists, or other non-trauma specialists, due to personnel constraints. Collectively, discussions with coalition suggest that coalition medical units had a very specific role in the conflict—supporting injured soldiers—as dictated by leadership. As a result, the UN Humanitarian Coordinator’s request was not fulfilled.

## 4.6 WHO Trauma Planning

By October 2016, WHO, under pressure, had developed plans analyzing challenges and options for delivering trauma services within 20 kilometers of Mosul. These plans drew upon contingency planning carried out earlier that year, assessing trauma needs if the Mosul dam were to collapse, but also clearly reflected discussions with military and civilian planners regarding the evolving situation on the ground.

In the initial WHO trauma plan, dated October 25, 2016, there is a clear focus on trying to adapt military standards to civilian care, including providing access to first aid within 10 minutes and emergency surgical care within an hour (See section 3.4 for more discussion of military battlefield standards).<sup>63</sup> As the report notes, standards used by NATO and other professional armies “should also be used as the planning standard for civilians caught up in a conflict,” and meeting these standards would require placing field hospitals closer to the frontlines, as well as a “viable road or helicopter ambulance system” and “careful coordination close to the frontlines.”

In principle, injured civilians were being evacuated by Iraqi military to nearby clearing posts for first aid and stabilization before being referred to civilian facilities. However, as the WHO’s revised November 2016 report notes, the current referral pathways were “not optimally functional,” with too few field hospitals accessible within an hour, and a need for more “trauma stabilization points” to provide first aid care within 10 minutes of injury.<sup>64</sup> Notably, recommendations for the capacities needed at these facilities drew heavily upon WHO EMT standards, which had been developed for sudden onset natural disasters, not for conflict settings; in planning documents, these field hospitals are described as “EMT 2 hospitals” and would be expected “to provide trauma services according to EMT standards.” Note, however, that none of the groups that responded to the Mosul crisis were accredited EMTs. According to WHO, these plans were discussed in a series of meetings in Erbil and refined with OCHA, which provided military intelligence to help planners identify how best to position humanitarian responders—assuming those responders could be identified.

<sup>63</sup> WHO. Trauma care plan near frontlines during Mosul Offensive: Concept of operations planning (draft) as of 25/10/16.

<sup>64</sup> WHO. Trauma care plan near frontlines during Mosul Offensive: Updated Concept of operations planning as of 23/11/16.

## 4.7 The MSF and ICRC Positions

In the absence of a military or local government partner to address trauma care gaps, WHO reached out to MSF and ICRC, asking them to “cover a section,” i.e. provide trauma care for a geographic area of the battlefield, based upon the above planning. Both organizations ultimately declined. Respondents cited several reasons, including the importance of independently identifying where civilian needs were and targeting assistance accordingly; the need to maintain independence from the Iraqi and coalition forces to avoid compromising humanitarian principles and ensure access to populations in need; and the challenge of maintaining their own security given their inability to negotiate with ISIL, which they worried would be further threatened if they were viewed as having “embedded” with the military. Some also mentioned their own limited capacity to respond given their current staffing and other commitments. ICRC had been rehabilitating Sheikhan Hospital to the north and deployed surgical teams there and in Erbil, but was largely focusing on primary healthcare needs for IDPs. In October 2016, MSF-Swiss had opened a hospital in Hatara, also to the north, anticipating IDP flows that never substantially materialized (as discussed in 4.2). MSF-France was focusing in Qayyarah, south of Mosul, where it opened a hospital in December 2016.<sup>65</sup> MSF-Belgium eventually opened the first post-operative hospital on the east side, in Al-Hamdaniyah, as well as the first surgical facility for civilians in West Mosul, in Hammam Al-Alil, in February 2017, but struggled for several months in East Mosul with customs and logistics. Both organizations were also, they admit, being cautious, given recent attacks on their teams in other countries.

## 4.8 Contracting NYC Medics, Samaritan’s Purse, and Aspen Medical

**NYC Medics:** In late November 2016, still seeking partners,<sup>66</sup> WHO put out a call for assistance at its annual EMT meeting. NYC Medics, a U.S.-based NGO that had previously worked in natural disasters but never in a conflict zone, was the only group that stepped forward. In December 2016, the executive director for NYC Medics met with key leaders in Erbil, including the Ninewah DoH and AEM, and saw the scale of the needs; the Iraqi CCP she visited had no tourniquets and was short on medicine. Following contract discussions, NYC Medics became operational February 2017.

According to conversations with NYC Medics, several priorities compelled them to respond: mainly, that there were massive needs, and no other organizations were responding. But they were also hesitant for security reasons. Relying upon advisors with military backgrounds, NYC Medics ultimately agreed to “co-locate” specifically with the ERD, a specific unit of the Iraqi Special Forces, in part because they felt strongly that ERD protection would keep them safe (see section 5 for detailed discussion of “co-locating” or “embedding”). It also used a team of remote advisors, mainly retired Special Forces, to provide additional security.

**Samaritan’s Purse:** A faith-based NGO, Samaritan’s Purse entered discussions with WHO in early December 2016. Having worked in Kurdish Iraq since 2007, Samaritan’s Purse was running two mobile medical clinics for IDPs coming from Mosul. As the East Mosul offensive progressed, however, its medical staff felt more needed to be done. Its country director scheduled a meeting between the UN Humanitarian Coordinator and its leadership in early December. The UN had given WHO \$9 million to operate three field hospitals, the organization learned, but still had no partners. Samaritan’s Purse had previously deployed an inflatable field hospital for the Ecuador earthquake in 2016, and its leadership felt it had the capacity to respond. According to interviews, the NGO put together a proposal offering to operate a field hospital for six months in Bartella to respond to needs in East Mosul, estimating the effort

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<sup>65</sup> Many actors have questioned the placement of this facility, saying it was too far away from Mosul.

<sup>66</sup> WHO also put out calls to military medical teams registered with the EMT initiative, asking them to respond through the Coalition, but none stepped forward.

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would require \$6 million in support. They signed an agreement with WHO on December 13, 2016. Its field hospital arrived in Iraq on December 24, 2016 and received its first patient on January 8, 2017. Part of their decision-making to deploy was based around security and logistics; as one official put it, “we feel like we should go to where the needs are.” The NGO maintains its own security department and performed an in-depth analysis in the Bartella area, which included discussions with the Iraqi army, the mayor of Bartella, and private contractors. Ultimately, to ensure the security of its staff, Samaritan’s Purse implemented three layers of security around its facility, including armed Iraqi forces on the outermost ring, private contractors internally, and a concrete 12-foot high blast wall and protective berm. To operationalize the facility, Samaritan’s Purse, supported by appeals from WHO and the UN, received special government exemptions to land their medical supply airplane and import narcotic medications.

**Aspen Medical:** As East Mosul concluded, WHO was still looking for partners in West Mosul. In early February 2017, it began construction on two hospital sites but had no provider. Through personal contacts, WHO reached out to Aspen Medical, an Australia-based private company specializing in medical care in remote and challenging settings that had run emergency treatment units in Liberia and Sierra Leone during the Ebola crisis. Using a private sector provider was a “last choice” according to WHO, as they had no other options. According to Aspen Medical, the company provided a proposal to WHO in February 2017 to run three hospitals, each for six months, in and around Mosul. In early March, Aspen sent a reconnaissance team to Erbil and performed a security and risk assessment. As one Aspen official put it, “security was paramount,” and the company relied heavily upon staff with military backgrounds and contacts in Iraq to assess security needs. WHO’s budget was “similar to international NGOs,” according to Aspen officials, but they (as well as WHO) declined to provide budget information, as discussed in more detail in section 6. The first Aspen-run hospital opened in Adhba on Mar. 23, 2017; the second facility opened in Hammam Al-Alil the third week of April.

## 4.9 Additional Actors

Although the focus of this report is on OFDA-supported activities, many actors played a critical role in the Mosul response, such that by the end of the Mosul operations, at least 18 facilities were participating in the referral pathways. In addition to those mentioned above (Samaritan’s Purse, Aspen Medical, MSF, ICRC, NYC Medics, AEM/GRM), several other organizations, including International Organization for Migration,<sup>67</sup> the Qatari Red Crescent, CADUS, and the Ninewah, Dohuk, and Erbil departments of health, provided vital links and services. Although a full detailing of the decision-making of each of these organizations is outside the scope of this report, effort is made to discuss their contributions in later sections.

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<sup>67</sup> IOM’s hospital in West Mosul received funding primarily from the UK Department for International Development (DfID).

## 5. Application of Humanitarian Principles

The fighting in Mosul challenged traditional approaches to the provision of humanitarian services. NGOs accustomed to working with parties on all sides of the conflict were unable to do so; UN leaders talked openly of defeating ISIL; health workers not affiliated with militaries assumed positions typically filled by militaries. These challenges and decisions have raised substantial debate within the humanitarian community about what was done, why it was done, and the future consequences of such actions. This section explores several key aspects of this debate, including:

- (1) Which components of the referral pathways represented the greatest challenge to traditional thinking around the four humanitarian principles?
- (2) What were the potential short and long-term impacts of these decisions? How carefully have these implications been considered?
- (3) In the future, who should bear responsibility for providing care in these settings?

### 5.1 Challenges to Humanitarian Principles

By attempting to provide western military standards of trauma care and “moving forward,” WHO and its partners challenged existing humanitarian principles and some humanitarian organization’s modus operandi, particularly that of ICRC. The most controversial element of the trauma response was moving the TSPs as close to the frontline as possible by “co-locating” or “embedding”<sup>68</sup> them with specific Iraqi military divisions and having them move with these divisions as the frontline shifted. This primarily occurred for security reasons (to ensure the NGOs would be sufficiently protected from ISIL) and logistical reasons (it took too long to deliver wounded Iraqi soldiers to the Iraqi military’s equivalent of TSPs and deliver wounded civilians to a separate NGO-run first aid station).<sup>69</sup> Furthermore, all TSP respondents we interviewed stated that the trauma skills of the NGO medical professionals were considered better than the Iraqi medical trauma personnel. As a result, they stated, the NGOs often treated injured Iraqi soldiers as well as civilians. Although originally envisaged that the TSPs would be geographically separated from Iraqi military TSP-equivalents, health care personnel at the TSPs, particularly in densely packed West Mosul, often worked alongside the Iraqi medics in the same makeshift buildings, and in some cases, were much closer to the frontline than originally planned. According to the TSP respondents, depending upon the location of the TSP, in some circumstances the majority of casualties treated by the NGOs and Iraqi medics were wounded Iraqi soldiers; other times it was primarily

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<sup>68</sup> WHO and its implementing partners preferred the word “co-located,” rather than “embedded,” to describe the working relationship between TSPs and the Iraqi military, arguing that “embedded” has a military connotation. In the study team’s research, we noted that the term embedded has a variety of uses. During the Bush and Obama Administrations, “embedded Provincial Reconstruction Teams (ePRTs)” were civilian teams placed within U.S. combat brigades to support counter-insurgency efforts. These embedded units were “physically located within a [brigade combat team, or BCT], worked in the BCT’s assigned area of operations, relied on the BCT for most logistical support, and were essentially part of the BCT commander’s staff,” according to a report by J. Naland of the U.S. Institute of Peace (<https://www.usip.org/sites/default/files/SR290.pdf>). The term embedded, however, is also used in other contexts, e.g. embedded journalism, whereby journalists are placed within a specific military unit, receiving protection to provide front-line reporting. Based upon our conversations with many TSP providers, we believe that many of the concepts described above—assigning of civilians to specific medical units for protection and support to carry out a specific job—could apply to the TSP-military relationships that developed in Mosul. However, acknowledging that many stakeholders prefer to use the term “co-locate,” we have adopted the practice of using both terms together throughout the report.

<sup>69</sup> According to some respondents, TSP-equivalents that did not “co-locate” or “embed” with the military, such as those operated by MSF at various points, struggled to receive patients, as casualties were brought out from the frontlines almost exclusively on military vehicles, and non-co-located TSPs were too far back to warrant a separate trip by military transport.

civilian, particularly when there was a lull in the fighting. NYC Medics stated that based upon preliminary analysis of their data, 60% of their overall patient load was military, the remaining 40% civilian.

How did these actions challenge the four humanitarian principles? The humanitarian principles have conventionally been regarded as indivisible, to be followed in their entirety at all times. In practice, some are emphasized more than others depending upon the circumstances. While all humanitarian organizations should strive to uphold these principles, compromises are often made according to varying contexts (e.g. military convoys), usually to allow for increased access to affected populations and improved security for humanitarians. The extent and implications of those compromises remain a source of contention. In the case of Mosul, the trauma referral pathway architects and many implementing partners viewed humanity—the imperative to save lives—as the overriding humanitarian principle. By “co-locating” or “embedding” humanitarian organizations with the Iraqi military in the TSPs, the principle of humanity was consciously given precedence over the principles of neutrality and independence; we would also argue over impartiality as well.

**Neutrality:** For many in the humanitarian community, this conflict was considered rather “black and white,” with the Iraqi and Kurdish military supported by the U.S.-led coalition clearly being the “good” side. According to ICRC colleagues, this was the first time that the ICRC did not have any contact with all sides of the conflict to negotiate humanitarian space to fulfil its mandate. Since it was not possible to negotiate humanitarian space and security with ISIL, the humanitarian organizations, regardless of their declarations of neutrality, worked with only one side of the conflict. While the rules of IHL clearly lay out the principles of neutrality and impartiality (see above Geneva Conventions and Additional Protocols), the provision stating “*to the extent practicable*” also needs to be considered. The ICRC commentary to art. 70 of Protocol I, which contains the neutrality principle, notes that relief actions must observe “*the principle of non-discrimination, including the principle of proportionality (i.e., the sharing according to needs) as a general aim and an ideal which cannot always be achieved, especially in a limited action.*” This language reflects a recognition that respect for humanity may require some flexibility to respond to the exigencies of a complex battlefield and yet maintain a strong public posture of neutrality.

**Independence:** The primary challenge to the principle of independence was based in the establishment of the TSPs near the frontlines. From interviews with all NGOs and Aspen Medical (private company) that established or supported hospitals, the humanitarian principles of humanity, independence<sup>70</sup> and impartiality were known to all and they did their best to respect them. The positioning of the TSP’s near the frontlines, to move trauma care “forward,” required the provision of security, which, given the reality of the fighting in Mosul, could only be provided by the Iraqi military. The level and sustained nature of this security requirement surpassed that provided by armed convoys accompanying humanitarian workers to and from a hospital or health center. Regardless of the language used to describe the arrangement, the NGO and Iraqi medics at the TSPs worked side-by-side and learned from one another. Given the security requirement and the need to provide timely care to all non-combatants, it was not possible and could have been detrimental to the provision of such care to have separated the TSPs into those for wounded civilians and those for wounded soldiers. Each NGO was situated with a specific military division/group with whom they worked throughout the battle. Our interviews clearly showed that a strong bond of trust developed between the civilian and military medical staffs, as often does when people work under intense and stressful conditions. This experience suggests that in some conflict settings, the need to move civilian-provided medical care forward may require the protection from a supporting, combatant force. This security requirement may in turn, diminish the practical independence of the civilian medical personnel, a condition that clearly developed with the TSP’s in Mosul. Accordingly, alternative strategies that rely less on civilians for the provision of frontline medical care may prove more attentive to the principle of independence when responding to a severe humanitarian crisis.

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<sup>70</sup> Note that Samaritan’s Purse had armed Iraqi military as its outer defense of the hospital



**Impartiality:** The NGO personnel working in the TSPs clearly stated that impartiality was maintained, as they treated any and all wounded persons who arrived at their locations – civilians, wounded Iraqis and wounded enemy combatants. In fact, many claimed that their presence alongside the Iraqi military may have actually enhanced impartiality by possibly preventing the mistreatment and extrajudicial killings of enemy combatants. Although we cannot confirm this to be the case, the research team believes the presence of foreign medical workers could have had a positive effect in certain circumstances, given the examples that we heard during interviews. However, we could not ascertain the perception of Mosul community, particularly those Sunni residents who may have harbored fears that Shia elements in the Iraqi security forces may have discriminated against them if they sought care at the TSPs. In many circumstances, the wounded were transported directly from the frontline to the TSPs in Iraqi military Humvees and ambulances. Although it was not possible to verify, it was possible that enemy combatants, their families and ISIL supporters avoided the TSPs due to these concerns of impartiality. Thus, while impartiality in treatment at the TSPs may have occurred, “co-location” or “embedding” of medical NGOs with the Iraqi military in the TSPs may have led some persons/groups to avoid them. Finally, there were reports, unverified by us, that in mass casualty events involving large numbers of injured arriving near simultaneously at the TSPs, the Iraqi military applied pressure, whether overt or subtle, to provide trauma care first to wounded Iraqi soldiers, then to wounded civilians, and finally wounded enemy combatants. Some NGO interviewees suggested that this kind of pressure from the Iraqi military occurred only early in the TSP experience and receded after NGO refusal to triage patients in any manner other than medical necessity.

**Humanity (revisited):** The question remains, however, as to whether humanity in the form of the human imperative to save lives should be elevated in ways that diminish compliance with other humanitarian principles. The principle of humanity is defined as: “*Human suffering must be addressed wherever it is found. The purpose of humanitarian action is to protect life and health and ensure respect for human beings.*”<sup>71</sup> This mandate generated the most vexing, and ultimately most controversial challenge to all those concerned for the health of civilians injured during the Battle of Mosul. The technical requirements of high quality trauma care demand rapid stabilization and transfer for definitive medical care. However, in some settings, the security requirements inherent in providing such frontline care may heavily burden other humanitarian principles. This tension is core to the humanitarian response and may hold important implications for future responses and organizations’ mandates and operational strategies. Given the diversity of humanitarian expertise and international responsibilities, it could be argued that there may need to be a pluralism in how different organizations balance and implement humanitarian principles depending upon the organization’s mandate and specific operational context. The ICRC, which is custodian of the Geneva Conventions and must perform many international roles beyond trauma care, is fundamentally dependent on a global perception of neutrality and independence. Similarly, IFRC and other humanitarian organizations with global reach would also appear to have much more at stake if perceptions of neutrality and independence were compromised. Organizations tightly focused on trauma care or local service provision may emphasize “saving lives” in a focused arena and believe they have less at stake in broad notions of neutrality and independence. Clearly, the complexity of this issue took pragmatic root in the humanitarian response to the fighting in Mosul and a thoughtful, collective discussion of this issue at senior levels, which is beyond the scope of this report, seems imperative. The changing nature of warfare, attempts to provide military standards of care, and the proliferation of organizations involved in humanitarian response, would seem to underscore the need to reexamine, reform, or reaffirm accepted principles designed to guide the humanitarian response to violent conflict around the world.

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<sup>71</sup> [https://docs.unocha.org/sites/dms/.../OOM-humanitarianprinciples\\_eng\\_June12.pdf](https://docs.unocha.org/sites/dms/.../OOM-humanitarianprinciples_eng_June12.pdf)

## 5.2 Potential Humanitarian Implications

The WHO-coordinated trauma system clearly moved care closer to those in need, but it also carried risks, both in the short and long-term. Many participants interviewed for this study raised questions regarding whether those risks had been fully considered. These include:

**Health worker casualties could have led to a stoppage of the entire humanitarian response:** The danger to humanitarian workers, particularly in the TSPs, was substantial and unusual in terms of what most humanitarian organizations would accept. Although it is difficult to know what the counterfactual would have been if a NGO medic in a TSP was killed, it is possible that the whole humanitarian response—not just trauma, but other programs (shelter, WASH, protection, etc.)—would have been affected, potentially scaled back, or even halted for a certain period of time. Because most deaths in conflict settings are due to long-term, indirect, rather than direct trauma causes, it is possible that more people would have died from such an interruption in humanitarian aid than were saved by the TSPs. Discussions with coalition personnel confirmed they were concerned that humanitarian fatalities could lead to some coalition partners withdrawing support for such activities.

**Humanitarians may become instrumentalized to do the work of others obligated to care for civilians:** Concern that humanitarian organizations could unburden warring parties from their responsibilities for caring for injured civilians was expressed as far back as the founding of the humanitarian movement in the mid-nineteenth century.<sup>72</sup> In 2001, Colin Powell raised questions regarding the strategic role of humanitarian groups when he stated that “...*I am serious about making sure we have the best relationship with the NGOs who are such a force multiplier for us, such an important part of our combat team.*”<sup>73</sup> In many ways, the modern humanitarian enterprise has clearly developed to play an extensive role in caring for the essential needs of populations affected by conflict. However, trauma care may be different from other elements of care as it increasingly requires the positioning of resources in particularly insecure and high-risk locations. Although the UN requested the Iraqi government and the coalition forces to play a larger role in caring for civilians at the frontline, they did not respond affirmatively. The Iraqi military claimed lack of capacity, and coalition forces cited a “light footprint.” These positions were based on numerous factors including claims of scarce medical resources. However, ultimately it is the obligation of the Iraqi government, and many would say the coalition, to provide protection and emergency health care to wound civilians and combatants (Iraqis and ISIL). Given the scale of resources expended on training and combat operations in Mosul, a greater commitment to train and support a stronger Iraqi medical capability would seem not only possible, but appropriate. The willingness of the UN to “fill the gap” in this context may create a precedent for future conflicts, such that parties to the conflict expect they can outsource their obligations to humanitarians; this must be avoided.

**Health workers may find it harder to gain local acceptance and may become more vulnerable to attack:** Perceptions of populations are extremely important, and conflict-affected populations may struggle to distinguish among humanitarian organizations working in different arenas of care and protection. The practice of “co-locating” or “embedding” civilian medical groups with the Iraqi military could have caused considerable confusion regarding the commitment to care for all those in need. This confusion may have been compounded by the inability of the humanitarian organizations to function within ISIL-controlled areas and the tendency to frame the battle as having a “good” and “bad” side. This confusion could put humanitarians at greater risk of attack. This concern has already been raised within the UN Global Health Cluster; minutes from an April 2017 meeting note that although the WHO-supported medical teams were filling “*a gap in trauma care, concerns were raised around adhering to principles of*

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<sup>73</sup> [http://avalon.law.yale.edu/sept11/powell\\_brief31.asp](http://avalon.law.yale.edu/sept11/powell_brief31.asp)

*neutrality and impartiality principles, based on concerns that blurring of humanitarian principles can attract attacks on health care.”<sup>74</sup>*

**Enabling conditions that kept humanitarian actors safe in Mosul may not be generalizable to other contexts.** Although Mosul was a highly insecure environment, humanitarian actors benefited from organizational support structures that may be not found in other austere conflict environments. TSP providers relied heavily upon the Iraqi special forces for protection, who in turn were heavily supported by coalition air forces and, in some cases, special operations ground troops. Discussions with members of the coalition military confirmed that the coalition considered avoiding humanitarian casualties to be an explicit part of its mission and dedicated logistical resources to fulfilling that mission. Additionally, OCHA CivMil personnel played a critical role in coordinating information sharing between humanitarian and military partners. Whether such coordination and oversight are possible in other contexts—particularly contexts without coalition military or extensive intelligence and security resources—is a question that deserves careful reflection.

### 5.3 Who Should Provide Trauma Care Near the Frontline?

Underlying the debate about humanitarian principles is a fundamental question about responsibility: In times of conflict, who bears responsibility for caring for wounded civilians? And what should happen when that party is unable—or unwilling—to provide such care?

**Parties to the Conflict.** As stated in the Geneva Conventions and Additional Protocols, the wounded and sick should be collected and cared for by the party to the conflict which has them in its power. This is also supported by a variety of agreements, including Rule 110 of customary international humanitarian law. However, the U.S. and its coalition partners have never accepted direct responsibility for the medical care of all civilians during wars in Afghanistan or Iraq. Rather, the medical rules of engagement (or eligibility) for U.S. and coalition militaries in general provided care to local nationals if: 1) if there was an imminent threat to “*life, limb or eyesight*”; 2) bed space was available at a combat support hospital that is not needed to treat coalition forces; and 3) their injuries were the direct result of coalition action; although these protocols were generally applied, local commanders have on many occasions exercised their discretion to provide care to wounded civilians. These eligibility criteria are not triage rules; they are pre-triage rules based not on medical need, but on patient identity. These eligibility rules have been justified on the grounds that in wartime, scarce military medical resources must respond to the demands of military necessity more than medical necessity.<sup>75</sup> Again, this posture is based on a claim of scarce resources, resources that would be overwhelmed by the numbers of civilians needing care, resources that first and foremost must attend to wounded soldiers. Therefore, the position of coalition forces has never conformed to the position that they must assume direct responsibility for the medical care of all injured local nationals, either allied soldiers or civilians. In general, civilian health authorities and humanitarian organizations have largely had to fill this gap in medical care.

However, new pressures to provide immediate trauma care near the frontline has had the effect of refocusing attention on the roles both local and coalition militaries should be playing in training and supplying military frontline medical personnel dedicated to the care of the injured. Given the billions of dollars of support provided to the Iraqi military by the U.S.-led coalition, it was surprising that the Iraqi military’s medical capabilities proved so inadequate in the Mosul theater. It should be noted that this concern is not directed at the coalition’s *in bello* use of force or targeting protocols, which are beyond the scope of this report. Rather, it is focused on the apparent abandonment of this arena of medical care despite the special complexities that civilians operating near the frontlines can generate for both humanitarians and militaries. If appropriate training and capacity building had occurred prior to the Mosul

<sup>74</sup> <http://www.who.int/health-cluster/about/structure/GHC-Partner-Meeting-Apr2017-NFR.pdf?ua=1>

<sup>75</sup> Gross, Michael L. Saving life, limb and eyesight: assessing the medical rules of eligibility during armed conflict. *Amer J Bioethics*. 2017; 17:40-52.

operation, WHO may not have needed to act as the “agency of last resort” and place civilians in close proximity to combatant forces. Therefore, the refrain we heard quite frequently that it was the Iraqi government’s responsibility, while correct, implies a long-term commitment to strengthen the Iraqi military medical capability once the fighting in Mosul had been initiated, would have been too little, too late.<sup>76</sup> As mentioned above, such training and capacity building should have occurred earlier.

**The health agency of last resort (the World Health Organization):** The UN understandably wanted to avoid civilian trauma deaths in the battle for Mosul. The Humanitarian Coordinator worked with the Iraqi government, the U.S.-led coalition, and OCHA CivMil on various versions of a Concept of Operations (ConOps) plan that ensured the Iraqi government, supported by the U.S.-led coalition, would allow for security corridors for civilians to flee during the battle. Without such a ConOps, the Humanitarian Coordinator for Iraq told us that she would not have agreed to implement the trauma response. She reiterated that these security corridors were essential for the trauma response plan to work. When the Iraqi government and the U.S.-led coalition could not or would not provide frontline trauma care for civilians, WHO, as the health agency of last resort for non-refugee settings, decided to act. WHO requested ICRC and MSF to establish trauma care further towards the frontline. But for a variety of reasons, including security, capacity and concerns regarding humanitarian principles, they declined (however, both agencies participated in the overall trauma response and provided much needed medical support). WHO then turned to governments and organizations that had been certified as EMTs. These groups declined to participate as well. In summary, WHO, as the health agency of last resort in this context, decided that it had no other choice but to coordinate the establishment of a trauma system to save lives. It adapted military standards of care, which required its implementing partners to “move forward” towards the frontline.

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<sup>76</sup> As mentioned earlier, medics with AEM had spent months training Kurdish Peshmerga medics in the lead-up to Mosul and found their capacities very limited.

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## 6. Results and Effectiveness of Trauma Care

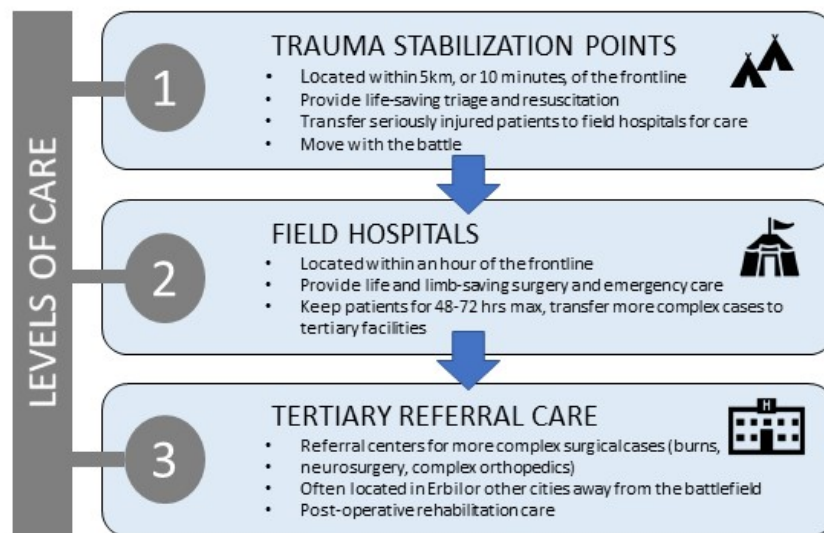
To evaluate the effectiveness of the Mosul trauma referral pathway, the team sought to systematically examine the structure, outputs, and outcomes of the response.<sup>77</sup> Specifically, this section assesses:

- (1) Structural components: Did the referral pathways include appropriate operational and infrastructure components?
- (2) Processes/Outputs: e.g. How many casualties were treated? Did they receive appropriate care?
- (3) Outcomes: e.g. How many lives were saved? What is the burden of complications and disability?
- (4) Cost and Sustainability: How much did elements of this response cost? What efforts were made to ensuring sustainability?

### 6.1 Structural Components

As discussed in section 3, the military models upon which the Mosul referral pathway was based are complex systems, in which pre-hospital, hospital, and rehabilitative care are linked through transportation, coordination, and other infrastructure components. These linkages are vital, yet resource- and planning-intensive. This section examines these components in the Mosul response, acknowledging that planners faced numerous time and resource limitations adapting these principles for the first time.

Figure 3: Levels of Care in Mosul Civilian Trauma Referral Pathway



<sup>77</sup> Donabedian (2005)

## Pre-Hospital and Hospital Care

From an operational perspective, the TSPs clearly filled important gaps in frontline care that was largely absent or ad-hoc at the start of the battle. Field hospitals operated by Aspen Medical, Samaritan's Purse, and others also addressed critical needs. When Samaritan's Purse opened in January 2017, there was no field hospital between Mosul and Erbil, and transport to Erbil took several hours. On the west side, the opening of the Aspen Medical field hospitals likewise addressed a paucity of referral sites. MSF-Belgium's Hammam Al-Alil facility, which opened in February 2017, was the only surgical facility on the west side until Aspen's Adhba Hospital opened in late March.

**Timing.** Many respondents have questioned whether the timeliness of implementing these components could have been better. Samaritan's Purse set up with remarkable speed—it arrived Dec. 24, 2016 and was operational by the first week of January 2017—but admittedly could have had a greater impact in East Mosul had it been contracted sooner. The same could be said for the Aspen Medical hospitals in West Mosul. Although construction began on these hospitals in early February, the first did not open until late March. Documents reviewed by the team and discussions with Aspen Medical and its advisers suggest that WHO's internal contracting system, as well as difficulties finding partners, reduced the timeliness of these components. As discussed in section 4, MSF teams and ICRC were also slow to find their footing in Mosul, reflecting their inability to negotiate with ISIL and not wanting to be associated with a military response.

**Siting.** At the TSP level, the ability of TSP providers to move with the battle—and remain in close contact with the military—proved essential. According to multiple participants, TSP providers that attempted to work less directly with the military, such as the TSP-equivalent operated by MSF in East Mosul, had difficulty receiving patients, as battlefield casualties were being brought out mainly by military vehicles.

Some respondents questioned the choice of location of several hospitals. Because the East Mosul offensive ended within weeks of Samaritan's Purse opening, the Bartella hospital received fewer trauma patients than was anticipated. Although moving the facility was discussed, the organization chose to stay where it was, partly due to its extensive security apparatus, and instead increased its provision of medical and (non-trauma) surgical emergency care—also in high demand. In West Mosul, the Adhba facility was criticized by several respondents for being difficult to access, having been set up at the end of a road littered with dozens of speed bumps. These criticisms, of course, must be interpreted in the context of the limited set of options available to planners at the time.

Some have suggested that mobile facilities could have been more adaptive to the kinetic battlefield. However, several respondents noted limitations with these facilities, including that they may offer fewer services, accommodate fewer patients, and be more difficult to secure. In fact, several actors, including MSF and ICRC, deployed mobile surgical units in the Mosul theatre, with mixed results. MSF-OCB ended up using its mobile facility as a fixed site, and ICRC was able to operationalize its forward surgical unit near Scorpion Junction, a screening site, for only a few weeks before closing operations.

**Resources.** Many respondents credited WHO with supplying vital medications and supplies, and in general, supply or medication shortages do not appear to have been a major issue. Numerous actors, however, reported challenges obtaining restricted medications such as narcotics due to customs and permissions issues in Erbil. At least one organization (Samaritan's Purse) was able to bypass some of these issues thanks to special permissions obtained from government authorities through support from WHO and the UN.

**Services.** As discussed in more detail in section 6.2, TSPs and field hospitals contracted by WHO were asked to provide an array of services reflecting WHO Trauma Guidelines and EMT standards. Although WHO declined to share contracts or terms of reference with the research team, WHO documents outline several expected clinical tasks for TSPs, including tourniquet placement, needle compression, and splint placement; data collection templates and discussions with TSP providers suggest these procedures were routinely performed. NYC Medics, in fact, pushed to raise the level of care provided at TSPs to include endotracheal intubation and chest tube placement, reflecting the skillset of

physicians staffing their teams. The highly skilled actions by NYC Medics likely saved additional lives, but such activities may not be appropriate in other settings where provider numbers are very limited or receiving facilities cannot care for such patients. Intubation and chest tubes, for example, places higher demands on transport personnel, who may not be qualified to manage those needs, or may require clinical staff to leave their posts and accompany patients to ensure continuity of care. These decisions should not be taken lightly in settings where resources—particularly personnel—are limited.

At the field hospital level, facilities were expected to provide services in accordance with WHO EMT 2 standards. Discussion with dozens of respondents have raised important questions about the services provided at some facilities, including their willingness to treat non-trauma patients and the appropriateness of some services in a war setting. Several interviewees criticized Aspen Medical for adhering too strictly to the letter of its contract with WHO and turning away patients who lacked traumatic injuries, a practice that it corrected, but one that may suggest inherent challenges to contracting private providers rather than humanitarian NGOs. The research team's discussion at Emergency Hospital in Erbil, likewise, raised concerns that some field hospital surgeons may not have been practicing damage control surgery, but rather performing operations more suited to well-resourced, civilian settings. Other respondents questioned whether some surgeons, inexperienced in war surgery, may have been too quick to operate. In the absence of better data, however, these concerns cannot be further evaluated.

As discussed in more detail in section 6.5 (Sustainability), many actors deserve credit for working to address the larger burden of medical need and not confining their services to trauma. As MSF's work has shown, civilian medical needs in conflict typically extend well beyond trauma, including emergency surgical, medical, and obstetric care. By all accounts, UNFPA provided critical support to the Aspen Medical field hospitals, establishing obstetric wards and supporting skilled obstetric care; it recorded 504 vaginal deliveries and 207 Cesarean sections at these hospitals (such obstetrical surgical care was not initially available at Samaritan's Purse' hospital) alone. Several MSF teams eventually set up facilities to address non-trauma and obstetric needs in addition to trauma, including MSF-Swiss's hospital in Muharibeen, in East Mosul, which opened in February 2017. Data from MSF-Belgium (Hammam Al-Alil facility) and Samaritan's Purse show that emergency rooms at both facilities treated thousands of patients over the course of their operations for a variety of non-traumatic medical and surgical ailments. However, as several respondents noted, WHO contracting could have been more flexible in allowing UN-supported "trauma" facilities to meet population needs.

## Post-Op and Rehabilitative Care

Support for TSPs and field hospitals undoubtedly helped many patients access care in a shorter time. In dozens of interviews, however, many suggested that greater attention should have been given to the so-called "back end" of trauma care, namely, post-operative and rehabilitative care, as many injured patients require lengthy rehabilitation and, in some cases, life-long assistance.

Due to space constraints and concerns about bed availability for mass casualties, field hospitals were instructed to discharge surgical patients typically within 72 hours of admission. Many patients likely returned to IDP camps to recover, although no formal system existed to track them. In February/March, MSF-Belgium, recognizing a growing need for post-operative care, opened a rehabilitative hospital in Al-Hamdaniyah, east of Mosul. In West Mosul, a trauma hospital operated by the International Organization for Migration and the Qatari Red Crescent also provided additional rehabilitative care.

Many respondents credited Handicap International for attempting to raise the profile of post-operative and rehabilitative needs. After evaluating the Mosul theatre in late 2016, Handicap International began working in multiple hospitals and in IDP camps to identify and treat post-operative and rehabilitative needs. It also began advocating within the Trauma Working Group (TWG) for earlier hospital rehabilitation and, by March, had assumed a lead role for post-operative coordination, often working closely with MSF. Its efforts were funded primarily by ECHO and the Canadian government (and, starting August 2017, OFDA, according to the organization), but budget limitations, lack of local physiotherapists, and security concerns limited further expansion. As reported in section 6.3, Handicap

International identified hundreds of patients with complex injuries who will need additional care, many for months to come. As Handicap International noted, this number likely represents a severe underestimate, given that it has been able to reach only a subset of those in need.

Discussions with Handicap International raised several “lessons learned.” Representatives noted that post-operative and rehabilitative care could have been anticipated sooner and better incorporated into planning. As they noted, even as trauma capacity increased in early 2017, post-operative and rehabilitative care remained largely static. They argued that more attention should have been paid to training physiotherapists (or even educating family members); decreasing pressure on hospitals to discharge patients within 72 hours; bringing additional rehabilitative actors onboard; and addressing specific gaps in care, such as spinal cord injuries and psychosocial needs. WHO policy would agree: Its 2016 EMT guidelines, “Minimum Technical Standards and Recommendations for Rehabilitation,” call for EMTs to incorporate rehabilitation into their responses.<sup>78</sup> Type 2 EMTs, for example, should deploy with rehabilitation professionals and devote space for rehabilitative care. In practice, however, although some EMT standards were applied to the Mosul response, rehabilitative care figured less prominently.

## Transportation

Discussions with participants and review of TWG notes suggest that patient transport was a challenge throughout much of the response. WHO identified the centrality of transport in its trauma planning, noting that functioning referral pathways require viable ambulance networks with “care providers at the paramedic level or above during transport” to provide en route care. Although WHO procured dozens of ambulances, they faced numerous contextual challenges, including shipment delays, and ambulances were sometimes commandeered by the Iraqi military. Respondents noted that enough ambulances were generally available such that critically ill patients did not die waiting for transportation at TSPs, but these vehicles were often little more than taxis; most did not have trained medical personnel or supplies and were unable to provide the en-route care that is critical for patient outcomes. Drivers frequently got lost, according to several sources, and maps were printed in English but not in Arabic. Notably, IOM contracted four ambulances to serve its West Mosul Hospital specifically and felt that this arrangement resolved some of the transport issues that other partners faced.

## Coordination and Communication

Multiple levels of coordination were evident in the Mosul response, including strategic and operational coordination in the trauma working group (TWG), the Health Cluster and eventually the rehabilitation working group, field coordination led by NYC Medics, and intelligence coordination led by UN-OCHA CivMil and supported by coalition assets. At the strategic level, all respondents commended WHO for convening a regular TWG, which provided trauma-specific partners an opportunity to share experiences and identify unmet needs. Many also specifically commended the Ninewah DoH director, who provided leadership at many of these meetings and much needed contextual knowledge for actors working in the Mosul theatre. At the intelligence level, OCHA was generally commended for providing a strong link between humanitarian actors and Iraqi and coalition military personnel. According to discussions with OCHA CivMil, the agency routinely monitored humanitarian actors’ locations and kept military planners apprised of humanitarian activities. Notably, conversations with coalition military personnel indicate that the U.S.-led coalition also had personnel in theatre specifically tasked with monitoring movements of non-military actors and avoiding collateral damage.

At the field level, much of the coordination fell to one or two individuals working for NYC Medics. Many respondents applauded the tireless efforts provided by this small team (often just one individual), which received calls from TSPs almost every time a patient was injured and told TSPs where to refer patients. This group also coordinated transfers among field hospitals. However, many respondents felt that WHO should have provided greater resources to support coordination and real-time communication, such as a call command center with greater staffing and more routine

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<sup>78</sup> <https://extranet.who.int/emt/sites/default/files/MINIMUM%20TECHNICAL%20STANDARDS.pdf?ua=1>



efforts to assess and update the capacity of referral facilities. Furthermore, although there was strong communication between the TWG and the Health Cluster, it was not clear how they reported to one another. There were questions by some organizations and individuals as to the most appropriate agency to coordinate trauma care in conflict settings. The authors believe that WHO, in its role as the lead of the Health Cluster, is the appropriate agency to be the provider of last resort of trauma care in conflict situations. Numerous working groups developed over time that would benefit from further coordination with the Health Cluster, which has the broadest mandate and thus would be best placed to coordinate the overall health response. Activities could include stronger data sharing about needs observed in IDP camps to ensure that trauma providers are more aware of concerns that exist outside of their facilities.

## Education, Training and Experience

Respondents commented that skills of health personnel working in WHO-contracted organizations were generally good, but may, in some cases, have been poorly suited for the Mosul theatre. Although WHO drew upon EMT standards to require certain provider skillsets,<sup>79</sup> prior conflict experience was not a requirement, and many volunteers appear to have been unaware of the extreme risks they were taking, particularly those working in TSPs. Additionally, participants were not required to undergo IHL training prior to deployment, and many were likely ill-equipped to respond to difficult questions regarding independence and neutrality, based upon experiences described in some interviews.<sup>80</sup> Some respondents felt that greater familiarity with IHL and humanitarian principles would have been beneficial to all involved. As discussed above, some participants have raised questions about whether some expatriate surgeons, more familiar with civilian standards of care, were doing operations ill-suited for war zones. Appropriate data, unfortunately, were not available to investigate these concerns.

## Data Collection

Although NYC Medics developed standardized data templates for TSP providers, and WHO disseminated these templates among the field hospitals (Annex 3), there were significant gaps in data collection and reporting that limit our assessments of outputs and outcomes. According to discussions, TSPs were asked to report data daily, and field hospital weekly, but reporting was not always timely, and paper data sheets were sometimes lost. Based upon the team's review, some organizations, such as Samaritan's Purse, kept digital operative logs and routinely reviewed and reported their data. But even after a new data platform by Dharma, a private technology company, was adopted in spring 2017, irregular reporting still occurred, according to working group notes.

After reviewing the available data, there are significant concerns regarding patient double or triple-counting, as patients could not be tracked when they moved among facilities. It must also be mentioned that WHO's reported numbers (for total patient encounters) include data from donor-supported facilities, such as Aspen Medical and Samaritan's Purse, as well as MSF facilities, which coordinated with referral pathways but did not receive material support from WHO. Both sets of parties deserve credit for their work, and care should be taken when making attributions based upon the available data.

A matrix showing strengths and weaknesses of the structural components of the response is listed below. As noted above, these weaknesses must be interpreted in the context of resource, logistical, and time constraints planners faced as they designed and implemented a response.

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<sup>79</sup> [http://www.who.int/hac/techguidance/preparedness/emergency\\_medical\\_teams/en/](http://www.who.int/hac/techguidance/preparedness/emergency_medical_teams/en/)

<sup>80</sup> ECHO reportedly supported IHL training for some humanitarian participants who had already deployed to the field.

**Table 2: Strengths and Weaknesses of Structural Components of the Trauma Referral Pathway**

<i>System Component</i>	<i>Strengths</i>	<i>Weaknesses</i>
<i>Education and Training</i>	<ul style="list-style-type: none"> <li>• WHO supported training courses for Iraqi surgeons and paramedics</li> <li>• EMT standards require certain level of skilled providers</li> </ul>	<ul style="list-style-type: none"> <li>• No IHL training requirement for humanitarian or private sector actors</li> <li>• No previous conflict experience required</li> </ul>
<i>Communication and Coordination</i>	<ul style="list-style-type: none"> <li>• Strong coordination by UN-OCHA CivMil to share intelligence among humanitarian and military partners</li> <li>• Development of Trauma Working Group and Post-Operative Care Working Group to share concerns and insights among partners</li> <li>• Strong local leadership and coordination by Ninewah DoH</li> </ul>	<ul style="list-style-type: none"> <li>• Limited support for field coordination</li> </ul>
<i>Transportation</i>	<ul style="list-style-type: none"> <li>• Efforts made by WHO leadership to procure and position additional ambulances</li> </ul>	<ul style="list-style-type: none"> <li>• Delays in ambulance availability</li> <li>• Lack of en-route care disrupting continuity of treatment between TSPs and field hospitals</li> </ul>
<i>Data Collection</i>	<ul style="list-style-type: none"> <li>• Standardized data collection forms</li> <li>• Efforts made to improve digital data collection</li> </ul>	<ul style="list-style-type: none"> <li>• Fragmented and inconsistent data collection</li> <li>• Inability to track patients through continuum of care</li> <li>• Lack of reliable information on patient outcomes</li> </ul>

## 6.2 Outputs

### TSP Level Outputs

**Patient Demographics.** An estimated 12,910 patient encounters were reported at TSPs during the Battle of Mosul.<sup>81</sup> Of those, approximately 7,005 patient encounters were reported during the East Mosul campaign, and roughly 4,730 during the West Mosul campaign.<sup>82</sup> In the East, the main TSP providers were AEM and Ninewah DoH, and, to a lesser extent, MSF-France. In the West, TSP care was provided primarily by NYC Medics, Global Response Management, and CADUS.<sup>83</sup> According to NYC Medics, 60% of their patients were military; data from all providers were not made available by WHO due to political sensitivities.

**Injury Acuity/Severity:** Based on available data, 57% of patients were triaged as green (minor injuries); 27% yellow (moderate to serious injuries for which care could be delayed); 14% red (severe injuries requiring immediate care); and 2% **black** (dead or unlikely to survive given available resources). Triage data were missing for nearly 40% of patient encounters.

**Interventions Performed:** Data on the number and type of interventions performed were not made available to the research team. According to TSP data templates, documentation of interventions such as tourniquets, needle decompression, and airway management were requested, and interviews with TSP operators suggest these interventions were routinely done. However, these data were not shared with team.

**Disposition:** According to WHO data, 47% of TSP patients were referred to a higher level of care; 48% were discharged; and 5% died at the TSP site. The outcome of referrals from the TSPs to higher levels of care were not tracked, limiting conclusions on patient outcomes.

**Quality:** Anecdotally, clinicians at the field hospitals commented that they were generally satisfied with the appropriateness and quality of interventions performed by the TSPs. TSP providers unanimously felt they elevated the level of frontline care, noting that Iraqi medics generally had limited skillsets (e.g. placing IV lines). In a separate analysis shared with WHO, NYC Medics calculated that 71% percent of TSP patients were referred within 15 minutes of arrival, and 90% within 30 minutes. NYC Medics also reported that from February to April 2017, the percent of patients with

Table 3: Summary of TSP Data, Nov 2016-Jul 17

Variable	Number or %
Total Patient Encounters	12,910
Sex	
Male	81% <sup>†</sup>
Female	19% <sup>†</sup>
Age	
<18	17% <sup>††</sup>
>18	83% <sup>††</sup>
Status	
Civilian	40% *
Military	60% *
Injury Location	
Head	14%
Torso	19%
Extremity	53%
Multiple	15%
Triage Status /Severity	
Green	57% <sup>†</sup>
Yellow	27% <sup>†</sup>
Red	14% <sup>†</sup>
Black	2% <sup>†</sup>

<sup>†</sup>TSP data from 11/21/16-7/21/17. Source: WHO.

<sup>††</sup>Infographic TSP data from 2/18/17-7/20/17.

Source: WHO

\*Per conversation with NYC Medics

<sup>81</sup> These figures reflect data compiled by WHO and shared with the study team. Reporting categories were developed by WHO and are reproduced as faithfully as possible here. WHO advised that the numbers be interpreted cautiously. "Patient encounters" do not mean unique patients: Some patients may have been overcounted if they were transferred between TSPs, as occasionally occurred during mass casualty events. Other encounters may be undercounted due to gaps in reporting.

<sup>82</sup> Note that estimates do not sum to 12,910, as some TSP encounters were recorded between the East and West Mosul offensives. Although the TSP system was more formalized in West Mosul, some have speculated that TSP casualty numbers were lower there because more civilians were dying (not fleeing), in part due to the intensity of coalition airstrikes.

<sup>83</sup> CADUS became operational in early June 2017 and worked primarily with the Iraqi 9<sup>th</sup> Division. MSF-Swiss and ICRC briefly operated TSPs or forward surgical units in West Mosul, but their patient totals are not included here. Interviews suggest some of these teams had difficulty accessing patients due to limited access to the military.

fully documented vitals improved from 45% to nearly 60% at their TSPs, and from less than 5% to more than 50% at other TSPs.<sup>84</sup>

## Hospital Level Outputs

**Patient Encounters:** Hospitals participating in the trauma referral pathways reported 19,784 patient encounters.<sup>85</sup> Data were reported by 10 facilities, including Emergency and West Emergency Hospital in Erbil; MSF-supported facilities in Hammam Al-Alil (MSF-Belgium) and Qayarra (MSF-France); Samaritan's Purse in Bartella; Aspen field hospitals in Adhba and Hammam Al-Alil; IOM/QRC field hospital in Hammam Al-Alil; and the Dohuk DoH-run Sheikhan Hospital, north of Mosul. Note patients transferred from a field hospital to a second facility were likely counted twice. Of the visits recorded from January-July 2017, an estimated 59% were outpatient.

**Injury Acuity/Severity:** Information on triage category or injury severity was not systematically collected by WHO at the hospital level. Some facilities, such as Samaritan's Purse, recorded this information, but others did not.

**Interventions Performed.** Data collection on surgeries performed was fragmented, and surgical reporting categories changed in May 2017. As a best approximation, it appears that 3,544 major surgeries were reported January-July 2017 by the six hospitals for whom WHO provided data; of these, 1,907 major operations were reported by Samaritan's Purse (1,091), Aspen-Adhba (345), and Aspen-Hammam Al-Alil (471), and 1,637 were reported by Erbil hospitals. Data were not reported on whether procedures were urgent or delayed, or whether patients underwent multiple procedures. Note that reporting appears incomplete.

**Quality Metrics.** Verbal reports on quality of care provided were generally good but inconsistent, and specific quality indicators are lacking. Several observers raised questions about whether surgeries being performed at some facilities were appropriate for war zones. Some field hospitals reportedly were slow to develop standard operating procedures. Data were unavailable regarding intra-operative mortality. Field and referral hospitals did report data on hospital deaths along three categories (dead on arrival, dead within 24 hours, dead after 24 hours), but these numbers are not linked with information on severity or cause of admission, leading to difficulties with interpretation.

Table 4: Hospital-Level Outputs, Oct 2016-Jul 2017\*

<b>Total Patient Encounters</b>	19,784
<i>Inpatient</i>	41% <sup>^</sup>
<i>Outpatient</i>	59% <sup>^</sup>
<b>Sex</b>	
<i>Male</i>	45%
<i>Female</i>	55%
<b>Age</b>	
<i>&lt;15</i>	32%
<i>&gt;15</i>	68%
<b>Status</b>	
<i>Civilian</i>	73%
<i>Military</i>	27%
<b>Injury Site</b>	
<i>Head</i>	12%
<i>Torso</i>	13%
<i>Extremity</i>	32%
<i>Multiple Sites</i>	24%
<i>Minor</i>	17%
<i>Burns</i>	2%
<b>Triage Status/Severity</b>	
<i>Green</i>	NR
<i>Yellow</i>	NR
<i>Red</i>	NR
<i>Black</i>	NR

\* Some data categories may reflect a subset or variation of the reporting period. Source: WHO data, infographics, or situation reports. NR: not reported. <sup>^</sup>Reporting for this category began in January 2017.

<sup>84</sup> NYC Medics, May 2017 Presentation, Courtesy WHO.

<sup>85</sup> This number is difficult to interpret. On one hand, it double counts patients seen at multiple facilities. On the other, it does not fully capture contributions from some partners. MSF-OCB, for example, documented 3,899 ER visits at its Hammam-Al Alil site through July, but only 1,404 are recorded by WHO.

**Disposition:** Length of stay data were provided for Erbil hospitals, but not for the field hospitals. Data regarding patient discharge location (home, IDP camp, facility) were not reported.

Additional data are included in Annex 4.

## 6.3 Outcomes

### General Findings

Many claims have been made regarding the impact of the trauma referral pathways, including the number of lives saved. In this section, we derive a best estimate of the number of lives saved, acknowledging that such an effort is limited by the nature and quality of data collected. Additionally, this section explores other commonly reported outcome measures, including mortality and complication rates.

Overall, the team finds that the trauma referral pathways—thanks to the efforts of all actors involved—likely saved about **1,500-1,800 lives** (of which **600-1,330 were civilian**) based upon a number of generous assumptions, which are detailed below. Other outcome measures have proven even more difficult to calculate. Although deaths at individual hospitals were recorded, WHO cautioned the study team against calculating mortality rates given gaps in data collection.

### Lives Saved

To more precisely calculate the number of lives saved, a more sophisticated data system tracking individual patients would have been required.<sup>86</sup> We have attempted a gross estimate based on several assumptions. Assuming TSP patients were appropriately triaged, approximately 14% of encounters (1,807 patients)<sup>87</sup> were red cases, 27% yellow, and 53% green. Red cases, by definition, require immediate attention, and we have generously assumed that all red cases, if appropriately triaged, would have died without stabilization and subsequent referral.

How many survived because of treatment? Even in non-combat settings with timely access to quality medical care, at least some traumatically injured patients still die. A recent study of the U.S. National Trauma Database, reviewing more than 300,000 civilian patients, found that those triaged as red still have a 16.8% mortality rate.<sup>88</sup>

**Table 5: Reported Hospital Encounters by Facility, Oct 2016-Jul 2017**

Facility	Encounters
<i>Samaritan's Purse (Bartella)</i>	2,987
<i>Aspen (Adhba)</i>	2,220
<i>Aspen (Hammam Al-Alil)</i>	1,811
<i>IOM/QRC (Hammam Al-Alil)</i>	3,712
<i>Emergency (Erbil)</i>	3,112
<i>West Emergency (Erbil)</i>	2,537
<i>MSF-OCB (Hammam Al-Alil)</i>	3,899**

\*\*Courtesy MSF-OCB; Other data: WHO

<sup>86</sup> Calculating lives saved also requires asking the counterfactual: How many lives would have been saved if the WHO-led trauma pathways had not been in place? This question is hard to answer, although clearly some actors would have been present had the UN system not intervened. However, we believe it is fair to say that, had the TSPs and field hospitals not been deployed, many patients with life-threatening injuries would likely not have received care in time, either because (a) frontline trauma care was absent or limited and/or (b) functional facilities were too far away.

<sup>87</sup> As noted earlier, triage data were available only for a subset of TSP encounters. This figure here assumes that the same ratio of triage category would apply to all TSP encounters.

<sup>88</sup> Cross KP, Petry MJ, Cicero MX. A better START for low-acuity victims: data-driven refinement of mass casualty triage. *Prehosp Emerg Care*. 2015 Apr-Jun;19(2):272-8.

Applying this rate to the red cases treated at TSPs, we can say:

$$(total\ red\ cases\ treated) - (total\ red\ cases\ died\ despite\ treatment) = total\ red\ cases\ saved$$

Therefore,  $1,807 - 1,807(.168) = 1,503$  estimated lives saved.

How many of the yellow and green cases would have died without treatment? Green cases, which comprised more than half of all TSP encounters, are minor and almost never life threatening. Yellow injuries are moderate to serious, but care can usually be safely delayed for at least several hours. Most yellow patients, in other words, would likely not have died from a lack of care within the so-called “golden hour” and would have been able to reach a facility farther away from the combat theatre, assuming transportation was available.<sup>89</sup> That said, some yellow cases may have been under-triaged (i.e. “red” patients classified as “yellow”); prior studies in conflict and simulated disaster settings have found an under-triage rate of up to 11%.<sup>90</sup> Applying this rate to the estimated number of yellow cases seen at TSPs (3,486), the team estimates that as many as 383 yellow patients may have been reds and would have required timely life-saving care. Again, some portion of these patients would have died even if they had received appropriate care; applying the 16.8% mortality rate to the upper estimate yields 319 under-triaged yellow patients. Adding this number to the initial estimate of lives saved (1,503), the team concludes that the TSP referral pathways may have saved between 1,503-1,822 lives.

Of the lives saved, how many were *civilian*? Again, it is impossible to be certain. However, multiple data points can support an estimate. In East Mosul, 41% of casualties received at the Erbil hospitals between October 17-December 16 were reported as civilian; 59% were combatants.<sup>91</sup> NYC Medics, in interviews, estimated that based upon their preliminary data review, roughly 40% of their casualties in West Mosul were civilian. At the field hospital level, in total, 73% of all recorded patient encounters between October 2016 and May 2017 were civilian (see table 4), according to WHO data. Taking 40%-73% as the lower and upper bounds of the civilian portion of lives saved, the team estimates **601-1,330 civilian lives saved**, acknowledging that this number is at best a rough approximation and limited by the available data.

These ranges may be overestimates for at least two reasons. One, mortality in an austere combat environment is likely higher than in a civilian setting, and civilians, particularly women and children living under ISIL control with limited food and water, may have been more vulnerable and debilitated, and thus subject to higher mortality rates. Second, over-triage (e.g. incorrectly classifying “yellow” patients as “reds”) can be a greater source of error than under-triage. In many of the studies reviewed above, over-triage rates, depending upon the setting and triage system used, exceeded 15%.<sup>92</sup> Factoring over-triage estimates into our analysis would have lowered the estimated number of lives saved.

<sup>89</sup> This argument assumes transport and access to facilities within several hours. It is hard to determine what the availability of such resources would have been without the donor-supported WHO-coordinated trauma efforts, although there were civilian and humanitarian services available in the region outside of the so-called “golden hour.”

<sup>90</sup> Note that undertriage rates vary widely, based upon the context and triage system used. In general, overtriage is a much more common problem than undertriage. Kahn CA, Schultz CH, Miller KT, Anderson CL. Does START triage work? An outcomes assessment after a disaster. *Ann Emerg Med.* 2009 Sep;54(3):424-30, 430.e1; Jones N, White ML, Tofil N, Pickens M, Youngblood A, Zinkan L, Baker MD. Randomized trial comparing two mass casualty triage systems (JumpSTART versus SALT) in a pediatric simulated mass casualty event. *Prehosp Emerg Care.* 2014 Jul-Sep;18(3):417-23; Valles P, Van den Bergh R, van den Boogaard W, Tayler-Smith K, Gayraud O, Mammozai BA, Nasim M, Cheréstal S, Majuste A, Charles JP, Trelles M. Emergency department care for trauma patients in settings of active conflict versus urban violence: all of the same calibre? *Int Health.* 2016 Nov;8(6):390-397; Plackett TP, Nielsen JS, Hahn CD, Rames JM. Accuracy and Reliability of Triage at the Point of Injury During Operation Enduring Freedom. *J Spec Oper Med.* 2016 Spring;16(1):51-6.

<sup>91</sup> WHO. Mosul Operation: Casualty Cases to Emergency and West Emergency Hospitals, Erbil Iraq (17 October to 17 December 2016). Infographic, Version 12.

<sup>92</sup> e.g. Kahn et al (2009), Plackett et al (2016), among others.

On the other hand, additional lives may have been saved among critically injured patients who bypassed the TSPs and arrived directly at field hospitals. Unfortunately, data collected at the hospital level do not distinguish this population, nor were triage data (or other acuity indicators) systematically collected at the field hospitals, based upon the team’s discussions with WHO. Some individual providers, such as Samaritan’s Purse, did collect and report this data, but such detailed reporting does not appear to have been standard. Finally, further lives may have been saved among treated casualties who were not documented, but this number is impossible to know.

## Mortality Rates

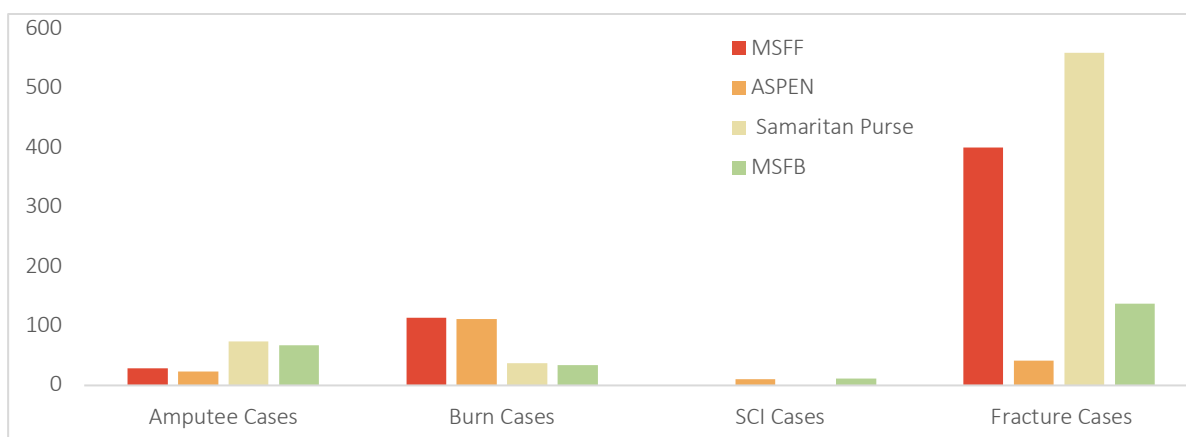
Mortality rates cannot be reliably calculated from the data. Although hospital deaths were recorded, WHO cautioned the team against calculating mortality rates due to gaps in the data.

## Complications

Reliable data on complication rates are also not available. At the field hospital level, most patients were discharged within 72 hours of surgery, often to camps or unknown locations, with little opportunity for follow-up. Complications, however, may very well be an underreported concern that deserve further attention. Handicap International, working in multiple IDP camps and hospitals around Mosul, documented numerous amputation site and hardware infections that required treatment or referral back to a facility. Some infections, of course, are expected, and data are lacking to determine whether infection rates were higher than other conflict settings. At the Erbil referral level, concerns were also voiced about the quality and clinical appropriateness of some surgeries performed at field hospitals that resulted in complications requiring further operations. According to some respondents, it was also not uncommon to see external fixators still on patients long after they should have been removed. Further comments are limited by lack of data.

**Disability.** Data provided by Handicap International shows 2,135 “complex” cases reported by four field hospitals alone (Aspen Medical, Samaritan’s Purse, MSF-France, and MSF-Belgium) between January and June 2017. The leading cause of need was orthopedic fractures (1,443), followed by burn injuries (346) and amputations (279), as shown below. During that same period, Handicap International reported reaching more than 600 patients, nearly half of whom were in camps. Many camps, however, remained uncovered as of fall 2017, suggesting many patients likely lacked access to rehabilitative care and may therefore suffer from preventable morbidity. Handicap International’s reach was understandably constrained, like many actors, by financial resources.

**Figure 4. Rehabilitative Needs Reported to Handicap International by Four Referral Hospitals, Jan-Jul 2017**



Source: Handicap International

## 6.4 Cost Effectiveness

Given the demands on the humanitarian system, financial considerations are increasingly important for donors and implementing agencies making difficult choices about which activities to support.

The research team requested financial information from WHO regarding the costs of the trauma referral pathways, including the costs of operating TSPs and field hospitals; however, WHO declined to make this information available, citing contractual obligations.

However, some cost information related to the referral pathways is publicly available, and additional data were obtained independently during interviews and other research. These findings include the following:

- According to a March 2017 report by the WHO's Independent Oversight and Advisory Committee, WHO Iraq spent \$20.0 million on trauma care, defined specifically as field hospitals and TSPs, in its 2016-2017 budget. This amount represented approximately 25% of WHO's \$80.8 million total budget.<sup>93</sup>
- A presentation by the WHO Iraq Health Cluster, also from March 2017, lists the cost of establishing a field hospital at \$2.5 million, and monthly operating costs at \$1 million.
- The same presentation lists the costs of operating a TSP at \$66,000 per month.<sup>94</sup> CADUS, on its website, estimated the cost of operating its own TSPs at €25,000 per month.<sup>95</sup>
- According to the Independent Oversight and Advisory Committee report, another \$15.4 million was spent on medical devices, equipment, and medicines, including ambulances, some of which were used in the trauma response.

Additionally, Samaritan's Purse reported that it received roughly \$9 million from WHO over the period of the Bartella field hospital operation (January-September 2017), before handover to the Ninewah Department of Health. Additionally, Samaritan's Purse raised and invested \$6 million of its own funding into the hospital.

Aspen Medical did not provide cost or expense information to the research team. However, assuming the costs described in the WHO Iraq Health Cluster presentation were relatively constant and applied across implementing partners, the Aspen Medical facilities would have received roughly \$11 million from WHO for operating costs (given that the Adhba facility operated for roughly six months and the Hammam Al-Alil facility for five months). The research team is unable to confirm these numbers.

In terms of operating costs for the TSPs, WHO contracted directly with NYC Medics, but also provided NYC Medics with extra funding to support other TSP providers, including GRM. Given that the WHO Iraq Health Cluster quoted the cost of TSP operations at \$66,000 a month, the overall costs for the TSP portion of the trauma referral pathways were likely significantly lower than the field hospital costs, although precise estimates are not possible.

Can credible conclusions about cost-effectiveness be drawn from this data? In principle, one could perform a basic calculation and divide the total cost of the operating these facilities by the estimated number of lives saved to provide a crude estimate of cost-effectiveness. However, the research team would not advise to do this. For one, donors have specific priorities, oftentimes political. And funding for different types of programs may come from different funding

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<sup>93</sup> Ammar, W. and Ryan, M. IOAC Iraq Mission Report. Iraq Oversight and Advisory Committee for WHO Health Emergencies Program. March 22-24, 2017.

<sup>94</sup> WHO. Iraq Humanitarian Crisis Presentation. March 2017. <http://www.who.int/health-cluster/about/structure/Iraq2-web.pdf?ua=1>

<sup>95</sup> <https://www.cadus.org/en/article/wir-sind-genau-rechtzeitig-in-mosul-angekommen-199>. These costs included: "medication, bandaging material, and other medical supplies, flights and insurances for volunteer doctors, paramedics and technicians, as well as infrastructure costs like fuel for the generators and catering for the crew"



pots. Trauma is high visibility; it captures media attention in ways that chronic and primary health problems do not, and this attention can create tremendous political pressure for action. Arguing that the funding might have “gone farther” had it been used for another purpose ignores the reality that donors might not have been willing or interested in funding another cause. Second, cost-effectiveness analyses tend to assume a utilitarian point of view, i.e., given limited funding, would more people benefit from one intervention versus another? However, a rights and justice-based view holds that as a matter of fairness civilians should have access to life-saving trauma care, regardless of the cost.

Perhaps a more useful question to ask is: Given that money was made available for this cause, was it used as well as it could have been? Within the trauma pathways, should additional support have been given to areas such as post-operative and rehabilitative care, or monitoring and evaluation, that appeared to receive less support? The analyses provided in this report attempt to provide guidance to some of these questions.

## 6.5 Sustainability

This report finds that multiple efforts were made to incorporate sustainability into the response. These include: (1) decisions to transition from trauma to non-trauma medical care; (2) efforts to strengthen Iraqi and Kurdish health worker capacity; and (3) planning to hand over field hospitals to Iraqi authorities. Some of these efforts, particularly the continued operation of facilities turned over to local authorities, will likely require further support.

### Incorporation of Non-Trauma Medical Care

In WHO’s initial trauma planning, there was an awareness that civilians fleeing Mosul would need support for non-trauma medical emergencies, such as myocardial infarctions (heart attacks), severe respiratory symptoms, and complicated deliveries requiring cesarean sections. In practice, however, these services initially took a back seat to trauma. Conversations with Samaritan’s Purse and Aspen suggest that non-trauma medical care did not figure prominently in their initial contracts, but as the battle evolved, both organization expanded their non-trauma services. For Samaritan’s Purse, the end of fighting in East Mosul meant fewer trauma patients, leading it to ask WHO for permission to expand its portfolio of services to meet a broader array of “post-conflict” needs. Aspen also reported that it started treating more medical cases as its trauma caseloads declined. Additionally, UNFPA partnered with Aspen and WHO to support obstetric care at the two Aspen field hospitals, an addition that has been widely praised by many stakeholders. In a sense, many facilities evolved to meet the broader needs of the local communities (or IDP populations). But conversations with several partners suggest that initial contracts could have been better designed to give them more flexibility to rapidly adapt to the changing health needs of the population. Other actors such as MSF have advocated that more attention needs to be paid to a “global package of care” that meets the full needs of the population.

In principle, WHO EMT standards, which were developed for sudden onset natural disasters (SODs), are fairly explicit in acknowledging the need for a wholistic approach to care.<sup>96</sup> Deployed medical teams are expected to treat communicable diseases, surgical emergencies, and mental health needs. For children, teams should be able to treat the “five worst killers, namely pneumonia, malaria, diarrhea, measles and malnutrition.” For adults, teams must be able to treat “basic and emergency presentations of chronic diseases.” As noted earlier, the medical teams contracted by WHO in Mosul were not registered EMTs. However, WHO leadership did endeavor to apply EMT standards to the Mosul context, and discussions with WHO indicate that Mosul was seen, in a sense, as a test case for expanding the EMT program from SODs to conflict settings. Nonetheless, these more wholistic concerns were de-emphasized in the initial contracts, which WHO acknowledged were “too trauma focused.”

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<sup>96</sup> WHO. Classification and Minimum Standards for Foreign Medical Teams in Sudden Onset Disasters. 2013. [https://extranet.who.int/emt/sites/default/files/fmt\\_guidelines\\_september2013.pdf](https://extranet.who.int/emt/sites/default/files/fmt_guidelines_september2013.pdf)

## Health Worker Training

Although many teams arrived with heavily expatriate-based staff (particularly Samaritan's Purse and TSPs), efforts to train local health workers accelerated over the course of the response. At the TSP level, because providers were often working alongside Iraqi military medics, many reported spending significant time teaching clinical skills to Iraqi counterparts and saw their competencies improve over the course of the battle (the research team is unable to independently verify these claims, although they seem plausible). Training and capacity building efforts were also evident at the field hospital level. Samaritan's Purse, though relying upon a largely expatriate staff, trained 9 Iraqi doctors, 30 nurses, and 42 technicians over the course of their deployment. Aspen's two field hospitals employed a roughly even mix of expatriate and local health workers, who were identified and referred by the local department of health.

## Hospital Hand-Over

In the second half of 2017, Samaritan's Purse and Aspen Medical worked closely with local authorities to transition their facilities to local counterparts. This work included significant planning, training, and coordination, based upon our interviews. Samaritan's Purse formally handed over its Bartella facility to Iraqi authorities at the end of September 2017. Aspen Medical handed over the Adhba facility in August 2017, and its Hammam Al-Alil site the following month. Although assessing the post-conflict health response is outside the scope of this report, the team, at the time this study was done, found that the sustainability of these handovers could be tenuous, particularly without continued financial support. As Samaritan's Purse documented in its September 2017 report, at the time of hospital hand-over, the DoH was unable to find enough local surgeons or anesthesiologists to staff the hospital, resulting in closure of the operating rooms and an uncertain future.

## Future Needs

Conversations with multiple organizations emphasized the severe rebuilding and reconstruction challenges facing Mosul and surrounding areas in northern Iraq. On a systems level, the field hospitals handed over to Iraqi authorities will require electricity, maintenance, staffing, and other basic inputs. At the time this report was conducted, it was unclear whether some of the hospitals would continue to be used because of where they are located. On a population level, post-conflict health needs, primary health care, obstetric care, and so forth, are many. In its last three months of operation, Samaritan's Purse performed 679 operations, and as Handicap International has documented, likely thousands of patients face continuing rehabilitative needs, many of whom were difficult to access.

## 7. Lessons Learned and Recommendations

In the course of interviewing dozens of participants and stakeholders in the Mosul response, the research team heard a range of strongly held opinions, from passionately supportive to deeply critical. To draw “lessons learned” and make future recommendations, the team has attempted to synthesize these opinions and triangulate them when possible through other interviews, data, and relevant documentation. This exercise has been aided, in part, by other “lessons learned” efforts undertaken over the past year, including the Iraq Global Health Cluster (March 2017) and the Trauma Working Group (May 2017). Discussions with MSF and ICRC indicate that many actors have been undertaking their own internal reviews.

### 7.1 The Geneva Conventions and Humanitarian Principles

The Mosul experience clearly illustrated how the complexity of an urgent humanitarian challenge can generate tensions among different humanitarian principles. WHO deliberately chose to emphasize the principle of humanity and the imperative to save lives in the short-term; as one key WHO official told us, the thinking was “humanity first.” Its strategy was to act in the acute setting by drawing upon military standards of care to place humanitarian medical teams near the frontlines, often under the protection of Iraqi security forces. WHO embraced this approach recognizing that it likely violated strict adherence to the humanitarian principles of neutrality and independence. In this manner, the legitimacy of the WHO strategy depends partially on whether it did, in fact, save lives. Our findings suggest that the WHO strategy did save lives. The actual number of lives saved among the war-injured is difficult to determine due to insufficient and poor-quality data. However, based upon the data that are available, we estimate that approximately 1,500 to 1,800 lives were saved, of which roughly 600-1,330 were likely civilian.

Tensions in operationalizing humanitarian principles in real-world settings are not new. In principle, the humanitarian principles of humanity, neutrality, impartiality, and independence are indivisible. However, in practice, some pragmatic balancing of these principles is often required. For example, it is not uncommon for humanitarian groups to use armed convoys in order to reach civilian populations in insecure locations. Asymmetrical warfare is becoming more common, and extreme forms of terrorism and barbarity appear to be increasing; consequently, neutrality may be more difficult with combatants such as ISIL. According to ICRC, this was the first time in the organization’s history that it was not able to have any contact with all warring sides of a conflict; it had no contact with ISIL. Hence, neutrality was not able to be maintained in this particular context as humanitarians were unable to access and work with parties on all sides of the conflict. There is considerable debate as to whether this was an extremely rare—even unique—situation with a clear “good” and “bad” side of a conflict, or whether this type of warfare will become more common in the future; the answer will have a considerable effect on how humanitarian action must and will evolve to address these issues. The nature and scale of humanitarian need in Mosul cast the tensions between humanitarian principles in sharp relief and, consequently, has generated strong incentives to carefully reconsider traditional approaches to providing trauma care for civilians caught in complex, insecure environments.

The medium and long-term implications of deliberately choosing to negate independence of humanitarians in order to save lives is also unclear and needs further consideration. Does the principle of humanity and the possibility to save more civilian lives trump the other three humanitarian principles? Those humanitarian organizations that will stay for the longer term in Iraq have concerns that the Sunni population in Mosul may perceive them as supporting the Shia dominated Iraqi government, putting their work and possibly their lives at risk. Although the study team did not directly interview Iraqi civilians, many humanitarian responders expressed the concern that, based upon their experiences, local populations may find it difficult to distinguish among different international humanitarian agencies or UN organizations; they are often seen simply as foreigners and lumped together. ICRC, as the custodian of the

Geneva conventions, has a unique mandate and is understandably alarmed about the potential consequences, as are other humanitarian organizations.

The authors believe that these issues are sufficiently important for the future of humanitarian action that they need to be discussed broadly and at a variety of levels. This could include a governmental gathering at the UN and/or at the Inter Agency Standing Committee (IASC). The deliberation of these issues should also include organizations with deep experience in providing humanitarian services in contested areas as well as representatives of the communities most directly impacted by violent conflict. The authors suggest below the issues felt to be most critical to this comprehensive deliberation.

- a) **Warring factions, and allied government/militaries supporting them, need to enhance the medical capacities of the former to enable them to fulfill their obligations under the Geneva Conventions and Additional Protocols.** Any organized combatant force should be expected to have sufficient medical capability to provide quality, frontline care for their own soldiers as well as all civilians injured due to combat operations. Our findings suggest that the medical capabilities of the engaged Iraqi security forces were inadequate to meet the needs of those injured, both combatants and civilians, during the Mosul fighting. The need to enlist the WHO and its client humanitarian medical groups is a result of the inadequacy of the Iraqi medical capability. In addition, the role of the U.S. military and its coalition partners in addressing the needs of injured civilians must also be questioned. Given the billions of dollars that they have invested in training and equipping the Iraqi military, the authors believe it was a missed opportunity to have not ensured a stronger Iraqi, frontline medical capacity. Alternatively, U.S.-led coalition forces could have played a more active direct role in caring for and evacuating injured combatants and civilians. The apparent U.S.-led coalition posture of remaining “unseen and in the background” was a political consideration, and should not be seen as inherently unburdening these parties from responsibility for caring for the injured. While the ethical, legal, and practical issues raised by the relatively passive role of the U.S.-led coalition partners in this regard are complex, an urgent and careful consideration of the role of engaged militaries in addressing the frontline needs of injured civilians is imperative.
- b) **Accept a “pluralism” in the balancing of humanitarian principles among different humanitarian actors.** Given the tensions that can emerge among humanitarian principles in different conflict settings, it would seem reasonable to expect, and coherently tolerate, that different humanitarian organizations would emphasize different humanitarian principles. For example, ICRC has multiple international responsibilities, such as ensuring humane treatment of prisoners of war, that require a clear global perception of neutrality and independence. However, groups such as NYC Medics, with their technical focus on the immediate provision of urgent medical interventions, would elevate a shorter-term, life-saving, humanity principle. While one could argue that strict adherence to all humanitarian principles should be expected, it seems a more pragmatic strategy to recognize that tensions between different humanitarian principles and therefore, between different humanitarian actors, can emerge in increasingly complex humanitarian environments. The challenge, therefore, is to craft coordinated, collective, humanitarian strategies that respond to this pluralistic reality and can best address the needs and very real implications for all groups concerned.
- c) **Medical teams operating directly with a combatant force should not be identified as a humanitarian group.** Although a pluralism regarding humanitarian principles is needed in the field, there should be limits. We recommend that if non-military, frontline medical services are to be provided to injured civilians by “co-locating” or “embedding” with the military, great care should be taken to distinguish these services from the broader humanitarian effort. This could be accomplished in two general approaches. First, the language and identifying public representations used to describe these groups should purposefully differentiate these groups from other humanitarian groups operating in more neutral and independent postures. The goal would be to insulate the larger humanitarian enterprise from the work being performed by medical groups operating in close proximity or “co-located” or “embedded” with an active combatant force. These groups should not be labeled “humanitarian” and strong efforts should be made to distinguish the public presence of these groups from other humanitarian actors. Second, frontline medical services could be provided by specialized groups explicitly trained to work

directly with combatant forces. The Mosul experience has potentially outlined a new “market” for contracted military support services focused on providing frontline medical services for both injured soldiers and civilians. Given the special security and technical requirements of medical personnel working in frank combat environments, it would seem reasonable to consider the development of organizations that were specifically established to operate in such settings. Such groups could draw upon medical personnel with training and experience working in combat areas, such as former military medical providers, and function explicitly in coordination with a combatant force. While this approach raises its own set of ethical and pragmatic concerns, it would respond to the dual requirement of ensuring the technical capabilities of frontline medical personnel and distinguishing such personnel from other humanitarian actors.

Table 6: Findings and Recommendations for Humanitarian Principles

HUMANITARIAN PRINCIPLES	
Finding(s)	Recommendations
<b>Obligations under the Geneva Conventions</b>	
The Iraqi government and its military did not have the medical capacity to fulfil its obligations to protect and care for wounded civilians on the battlefield.	<ol style="list-style-type: none"> <li>1. Governments have an obligation to ensure their militaries have sufficient capacity and capability to fulfil their obligations under the Geneva Conventions to protect and support wounded civilians.</li> <li>2. Governments supporting other nations’ militaries or groups of armed combatants need to capacitate them to fulfil their obligations under the Geneva Conventions.</li> <li>3. All governments, donors and humanitarian actors must apply strong pressure to ensure that responsible parties uphold their obligations under the Geneva Conventions before and during conflict.               <ol style="list-style-type: none"> <li>a. Humanitarian actors should be much more vocal in appealing to capable militaries and governments to provide battlefield protection and care, and publicly question why those with capacities refuse to step forward.</li> </ol> </li> </ol>
The U.S.-led coalition was requested but did not provide substantial protection and care for wounded civilians on the battlefield.	<ol style="list-style-type: none"> <li>4. If militaries or other armed combatant groups are unable to fulfil their obligations under the Geneva Conventions, then strong advocacy of Governments supporting such armed combatants is needed so that they protect and support wounded civilians on the battlefield.</li> </ol>
<b>Humanitarian Principles</b>	
WHO, as the agency of last resort, and its partners filled an important gap in trauma care through implementing TSPs, and field hospitals, which saved lives. WHO consciously chose humanity and the humanitarian imperative to save lives over other humanitarian principles such as neutrality, independence, and some would argue impartiality. “Co-locating” or “embedding” humanitarian actors with militaries challenges humanitarian principles and may erode local trust in humanitarian groups and threaten their safety and future work.	<ol style="list-style-type: none"> <li>5. The decision to use humanitarian organizations in TSPs near the frontline and for them to be “co-located” or “embedded” with armed combatants could have implications for future humanitarian action and needs to be discussed at a senior level such as at the Inter Agency Standing Committee or at the intergovernmental level. Recommendations include:               <ol style="list-style-type: none"> <li>a. Accept a “pluralism” in the balancing of humanitarian principles among different humanitarian actors.</li> <li>b. Medical teams operating directly with a combatant force should not be identified as humanitarian.</li> <li>c. Frontline medical services could be provided by specialized groups explicitly trained to work directly with combatant forces; they could be contracted as military support services focused on providing frontline medical services for both injured soldiers and civilians.</li> </ol> </li> <li>6. Humanitarian organizations must be extremely careful to avoid being instrumentalized by governments, militaries and armed combatants in the future.</li> <li>7. All partners in the future, whether humanitarian or not, need training in international humanitarian law and humanitarian principles.</li> </ol>

## 7.2 Effectiveness of Trauma Referral Pathway

As stated previously, this was the first time that such a “forward leaning” civilian trauma pathway, modeled along military principles, has ever been implemented in a conflict setting, and there are many lessons to be learned if a modification of this model or components of such a model will be implemented in the future. Thus, in this section we summarize many of the lessons learned and recommendations for the future; these are not meant to minimize the flexible and determined effort that WHO and its partners used to implement and improvise such a trauma referral system in a fluid, insecure and complex setting. Moreover, these recommendations should not be interpreted as a prescriptive endorsement of this approach for other conflicts; such decisions must be made with respect to the country context. Rather, they are offered as suggestions for how such a model might be improved upon if it is used again.

### **Pre-Hospital and Hospital Care:**

- a) **TSPs:** By all accounts, TSPs saved lives of wounded civilians, Iraqi soldiers, and enemy combatants. Of the roughly 13,000 patient encounters recorded at TSPs, roughly 1,800 were critically injured, based upon extrapolation from available data. Close coordination with the military, though highly controversial, was critical for effectiveness and security. Anecdotally, TSP providers raised the quality of frontline care, and referrals appear to have been mostly timely, but other quality metrics are lacking. Furthermore, organizations like NYC Medics, GRM, and CADUS undertook on the job training of the medics in the Iraqi military.
- b) **Field Hospitals:** Samaritan’s Purse and Aspen’s two field hospitals addressed critical needs, performing at least 1,900 major operations through July 2017. Timeliness and locations of the field hospitals as well as planning for sustainability could be improved in the future if there is more time to plan. The level of security needs to be carefully weighed against patient and community access. Since battle lines can move quickly, the main function of the hospital may need to transform from trauma to more general non-trauma care, rehabilitative support, or specialty care. The required movement of trauma patients from field hospitals after 72 hours should be re-examined for the future. The 72-hour rule was designed to ensure that there were sufficient beds for mass casualty events. However, it resulted in patients being discharged too early from field hospitals with insufficient post-surgical and rehabilitative care. Additionally, all field hospitals should have the capacity to provide surgical obstetrical care. The UNFPA-supported obstetrics ward adjacent to the Aspen field hospitals was an important development; there was limited obstetric surgical care at Samaritan’s Purse field hospital. In the future, plans to deal with non-trauma medical emergencies need to be further considered. Aspects of a more mobile field hospital as opposed to a large static field hospital should be examined. Plans for sustainability of the field hospitals were considered ahead of time with DOH participation; this is a good practice. A plan to train Iraqi medical personnel and leave behind the tents/buildings and the equipment had been agreed upon. However, such planning is complicated as the location of the field hospital may be appropriate for battle but not the post-conflict reconstruction plans of the district. Given the limited data, is not possible to quantitatively assess the quality of the different field hospitals.

**Post-Op and Rehabilitative Care:** There was insufficient planning for post-operative care as well as rehabilitation. This was a major issue that was eventually recognized and attempted to be addressed, particularly by MSF, Handicap International, and others; however, there was insufficient capacity to meet the level of burden. Furthermore, it was compounded by the 72-hour discharge policy. The full extent of rehabilitative needs among war victims in IDP camps is unknown.

**Transportation:** Movement of patients from TSPs to field hospitals as well as other functioning hospitals in the Ninewah district and Erbil was a major challenge. Because functioning trauma systems require well-stocked ambulances with medics who can provide en route care, the possibilities for rendering such care in a civilian system deserve more attention. WHO deserves credit for working to procure ambulances under difficult circumstances. In

practice, however, these ambulances often lacked supplies and trained medical personnel (although NYC Medics did have paramedics accompany patients who had received invasive procedures at the TSP). It is unclear whether additional lives were lost due to the lack of trained ambulance personnel and challenge of coordination and communication from TSPs to hospitals.

**Coordination and Communication:** OCHA CivMil provided valuable tactical intelligence for trauma providers, and the Trauma Working Group was a novel innovation that improved dialogue and coordination among participants. At the field level, however, one to two individuals from NYC Medics improvised a referral system and did heroic work in trying to coordinate the transport of patients from the various TSPs to the numerous hospitals that had different levels of trauma care and constantly changing bed occupancy. However, if this model is used again in the future, a more capacitated system needs to be developed.

**Education, Training and Experience:** Finding partners to provide the services needed for the trauma referral pathway was very difficult due to the high level of insecurity and the large risks to humanitarians by moving them closer to the frontline; this was compounded by the challenge to humanitarian principles discussed above. Therefore, WHO was understandably challenged to find organizations to respond in this context. After an extensive search, WHO chose Samaritan's Purse, NYC Medics, and Aspen International. None of these partners had ever provided such services before in a conflict setting, and the latter was a private medical organization, not a humanitarian agency. Clearly all professionals who worked with these three organizations understood they were taking substantial risks in working in a conflict zone. However, those who worked in the TSPs, such as NYC Medics, CADUS, and GRM, were taking extraordinarily high risks. Following our interviews with NYC Medics and CADUS, we are concerned that some of the volunteer young professionals did not truly understand the context in which they would be working, the extremely high risks that they would be taking, nor were all sufficiently informed about humanitarian principles and the challenges to them by being "co-located" or "embedded" with Iraqi military units. If TSPs are used again in a similar model, significantly more consideration needs to occur regarding the types of organizations and professionals employed, their previous experiences, and their training (both medically and in the humanitarian realm). Furthermore, there appeared to be insufficient psychosocial support to professionals during and after these intense and extremely experiences; such support is crucial for the future.

The hiring of a private medical organization, Aspen Medical, to resource and manage two field hospitals is unusual in humanitarian contexts and has concerned some humanitarians. Unlike humanitarian organizations that generally pay minimal salaries to their employees, Aspen Medical paid market rate salaries. In our view, how much organizations pay their employees is irrelevant and should not be a factor except in terms of cost effectiveness (see below). Although there are varying claims regarding quality of services provided by different organizations, the data that were shared with us are of insufficient completeness and quality to analyze such claims. Another claim is that Aspen Medical employed surgeons and other health care personnel who did not have sufficient conflict experience compared with humanitarian organizations. As with quality of care, we do not have sufficient data to verify this; however, the professionals we interviewed at Aspen Medical did have conflict experience and some had previously worked in the same humanitarian organizations that were on the ground in Northern Iraq. One difference between private and humanitarian organizations that we noted was the type of work provided. The private organization had a specific contract with WHO to perform specific tasks (despite requests, we were unable to see any contractual arrangements/agreements that WHO provided to any of their partners). This contractual relationship appeared to initially confine the type of services provided to only those identified in the contract while other humanitarian organizations appeared more flexible in meeting the needs of affected populations. A tight focus on only services stipulated in a contract may not prove to be the most effective in a challenging and often unpredictable conflict situation. However, modifications of the contract to respond to dynamic environments is possible. In addition, we have not been able to ascertain the extent of formal training of Aspen Medical employees regarding humanitarian contexts and humanitarian principles. In summary, the role of private medical companies in humanitarian settings needs to be examined. In future conflicts,



the private medical sector may play an important role, particularly if humanitarian NGOs are overstretched, unable to or do not wish to respond. The private sector is often looked upon with suspicion in the humanitarian world; however, with cash-based transfers, this is changing. The development of B-Corporations that attempt to use business to address social and environmental challenges is an interesting evolution. Therefore, we recommend an objective analysis of the potential for this business model, as well as the corresponding humanitarian ethos, cost effectiveness, and adaptability, that would need to occur.

**Data Collection:** The lack of well-organized and consistent data systems was a major weakness in the Mosul effort that should be improved in future contexts. Although a standardized data template for TSPs was created by NYC Medics and for field hospitals by WHO, it is clear that data collection was fragmented. A new data platform produced by Dharma, a private technology company, was adopted in spring 2017, but the research team was unable to assess the impact of this platform based upon the data that have been provided. If such a model is used again in the future, a system that generates an individual patient identifier that can be followed throughout the referral pathway and beyond seems essential. Such a system will reduce double counting of patients, provide the ability to distinguish between the number of patient encounters and the number of actual patients utilizing the system, and allow subsequent analysis of patient data to improve the quality and efficiency of the care. We understand that this type of system would have been difficult to implement in such a short time period and in such a rapidly changing context. However, it is not implausible that such a system could be developed and readied for urgent deployment in future emergency settings.

**Cost Effectiveness:** The authors do not believe that direct comparisons of cost-effectiveness between trauma interventions and preventative and primary health care services are appropriate. The latter will be more cost-effective per patient in most situations. Rather, there is wide acceptance that trauma care should be available in conflict settings, and the more relevant question is whether the resources that were available for such care were used efficiently. In addition, sources of funding for distinct arenas may follow different pathways and not lend themselves to simple shifts from one service domain to another. There may also be other ethical and political considerations that enhance the justification for expenditures on civilian casualties. Trauma can be highly visible and capture media attention in ways that chronic health problems cannot. While this may be lamentable, it does provide a pragmatic opportunity to attend to a critical arena of civilian need. Also, given the enormous expenditures on military training and operations, one could question the legitimacy of pitting the needs of a trauma care system against other arenas of medical need. An alternative approach would embrace a more inclusive rights and justice-based model that holds that it is a matter of fairness that civilians have access to life-saving trauma care, regardless of the direct costs.

The more appropriate questions rest on whether the amount of resources provided for the trauma care system was sufficient and whether there were opportunities to utilize the available resources more efficiently. Unfortunately, we were not provided these data from WHO. However, it is likely the existing data would not be sufficiently comprehensive or granular to be able to address this issue adequately. As was noted for the patient care data systems, enhanced financial data systems should be implemented so that useful cost and efficiency analyses could be conducted, and donors should push for more robust monitoring and evaluation.

**Sustainability:** Several efforts were made to address sustainability, including incorporating non-trauma care into the services offered by the field hospitals; training Iraqi health workers; and handing over operations of the facilities to Iraqi authorities after fighting had ended. Some of these efforts could have started earlier; for example, many respondents felt that WHO-supported field hospitals focused narrowly on trauma care for too long, and should have had contracts that allowed more flexibility in responding to medical and obstetric emergencies. Other efforts, such as handing over facilities to the Iraqis, were included in the initial contracts. Yet long-term sustainability of the handovers remains a question, as reports from Samaritan's Purse suggests DOH staffing and financing challenges may complicate efforts to keep facilities running.

Table 7: Findings and Recommendations for Effectiveness of Trauma Referral Pathway

EFFECTIVENESS OF TRAUMA REFERRAL PATHWAY	
Finding (s)	Recommendation
<b>Continuum of Care</b>	
Although initial plans called for field hospitals to treat non-trauma medical emergencies, in practice some facilities did not initially consider this care to be part of their mandate.	8. Standardize emergency non-trauma care, including OBGYN services, in future planning, including explicitly defining these types of services in TORs with contracted providers.
Standard operating procedures (SOPs) may have differed among TSPs, field hospitals and providers, or in some cases were non-existent.  The 72-hour policy to discharge patients may have exacerbated post-operative complications.	9. Ensure standardized SOPs are created and require implementing partners to follow them. a. Stronger efforts should be made to include professional societies and international organizations to develop clinical protocols and standards for civilian care on the battlefield. b. Develop flexible procedures that allow complex patients to stay in field hospitals longer if adequate referral is not available and avoid strict time limits.
Post-operative care and rehabilitative care required greater attention.	10. Incorporate post-operative care and rehabilitation needs much more strongly into future planning and funding and support organizations such as HI that specialize in such care.
WHO added dozens of civilian ambulances to the combat theatre, but ambulances generally lacked en route care.	11. Support ambulances with trained personnel and appropriate resources to the extent possible to allow en route care, as well as stronger and more sophisticated communications systems to ensure patients reach the intended point of care.
Static field hospitals limited their trauma utility as the battlefield moved onwards.	12. Future consideration as to the feasibility and cost of mobile field hospitals needs to occur.
<b>Quality of Care</b>	
Data were insufficient to make conclusions regarding quality of care at field hospitals.	13. Track critical processes and outcomes using clinically appropriate indicators (e.g. injury severity scores, mortality and complication rates) to improve quality of care.
<b>Partners</b>	
WHO searched for and found partners, all of whom had never undertaken such work in conflict settings, after "traditional" partners declined.	14. Whenever, possible, organizations with strong experience in conflict and war trauma should be mobilized. a. Strong pre-deployment training including components on international humanitarian law and humanitarian principles as well as contextually appropriate medical procedures. b. Clear understanding of high risk environment, particularly for those working in TSPs, needs to be undertaken pre-deployment. c. Post-deployment psychosocial support needs to be made available.
Some humanitarian organizations/persons were concerned about the deployment of a private medical organization to run a field hospital.	15. Further examination into the potential advantages and disadvantages of deploying private medical organizations at any point along the trauma referral pathway should be undertaken in an open and objective manner.

<b>Coordination</b>	
There were questions by some organizations and individuals as to the most appropriate agency to coordinate trauma care in conflict settings.	16. WHO, in its role as the lead of the Health Cluster, is the appropriate agency to be the provider of last resort of trauma care in conflict situations, but must be cautious of the risk of being instrumentalized by governments, militaries and armed combatants.
Local leadership (Ninewah DoH) played a critical role in providing leadership and operational guidance, as well as access to Iraqi military counterparts.	17. National and district leadership should be prioritized together with capable local partners with strong networks in any future response.
OCHA CivMil played a vital coordination with the rest of the UN system, the Iraqi military and the U.S.-led coalition.	18. OCHA CivMil should continue to play a strong civilian-military coordination role in the future.
There were numerous working groups developed over time that need to be strongly coordinated and linked together. For example, the Trauma Working Group formed a critical link for discussions and coordination around trauma care and improved the response.	19. Ensure appropriate integration of the Trauma Working Group and the Post-Operative Care Working Group into future planning; and ensure these are all closely coordinated under the aegis of the Health Cluster.
Field coordination at the TSP level was outsourced due to security reasons and fell largely to a single individual working for one of the implementing partners.	20. WHO should support field coordination more strongly with additional personnel and resources as well as more sophisticated tracking mechanism from TSPs to field hospitals and onward after hospital discharge.
<b>Data and Information Management</b>	
Data collection was fragmented, not uniform, and of varying quality, which limited conclusions about the effectiveness of the various components of the pathways.	21. Invest in data management systems and personnel to track patients and relevant outcomes. 22. Develop minimum data sets based upon common clinical practice to ensure common reporting across providers. Consult with trauma experts to ensure that appropriate, clinically useful data points are collected.
<b>Cost-Effectiveness</b>	
Data were not provided to the authors to address the important issue of who costing along the trauma referral pathway was effectively used.	23. Future mechanisms should be established to allow donors, WHO and its partners, as well as external organizations to study the cost effectiveness of implementing trauma care along the trauma referral pathway. 24. Despite contractual issues, a sufficient financial system that corresponds with trauma outcomes needs to be established.
<b>Sustainability</b>	
WHO and its partners together with Ninewah DoH attempted to plan for sustainability in terms of training Iraqi medical personnel as well as hand over and usage of facilities and equipment, but there were numerous challenges.	25. Further consideration needs to occur regarding: creating new hospital structures versus rehabilitating damaged structures; siting of facilities; capacity building efforts; and longevity of funding for human resources and functioning of facilities.

## 7.3 Exception or a Model for the Future?

The geographic, social, political, and security conditions of any given emergency are always complex and often reflect intricate and unique histories. Nevertheless, there may be generic observations that transcend these specific realities and lend themselves to important lessons of relevance to a variety of emergency settings. The challenge in examining the Mosul experience, therefore, is to identify those elements that need to be considered as part of any overall assessment of its relevance for future humanitarian emergencies.

- a) **Preclusion of Neutrality:** Despite repeated attempts, there was no ability of humanitarian organizations to reach civilian populations residing in areas controlled by ISIL. In addition, there was strong evidence that ISIL fighters targeted civilians fleeing the fighting as well as humanitarian facilities and personnel. As a result, the humanitarian effort was confined to those areas controlled by Kurdish and Iraqi security forces or affiliated militias. This reality did not conform to the humanitarian aspiration of neutrality in which in all civilian populations in need can be accessed under the auspices of all combatant forces. This pressure on traditional neutrality may prove most problematic in intra-state, civil conflicts, in which the array of combatant forces may be complex, and their ideological positions or strategic calculations may put humanitarian activities at great risk. These considerations would appear to be relevant to a number of current conflicts and deserve careful attention as they speak directly to the well-being of humanitarian actors as well as to the ethical foundations of the global humanitarian response.
- b) **Inability of Iraqi government/military** to fulfil their role under the Geneva Conventions to protect and care for wounded civilians. The Mosul experience suggests that a critical assessment of military capacities to implement trauma care is urgently needed. We cannot ascertain how representative the Iraqi capability is of other state militaries around the world. However, given the technical requirements to provide trauma care as part of a well-organized system with a strong forward presence, our expectation is that many militaries of concern, particularly those in low and middle-income countries, may not possess the requisite capabilities to deploy such a system in a timely manner. Although the scale and urban nature of the Mosul military operation may not be widely repeated, the lack of adequate military trauma response may, in fact, occur repeatedly, and present the humanitarian community with challenges similar to those confronted by the WHO and other organizations in the Mosul theater.
- c) **Coordinated Military/Civilian Planning:** The Mosul experience underscored the importance of military/civilian planning and coordination in a dynamic conflict setting. Tight communication linkages between military and forward-positioned humanitarian components proved essential in avoiding strikes on humanitarian facilities and personnel. OCHA CivMil was essential in coordinating with the UN agencies, Iraqi government and military and the U.S.-led coalition. In addition, the Iraqi military worked with humanitarian organizations to develop a “ConOps” plan with security corridors for civilians to leave contested areas. Although the integrity of these corridors came under severe pressure from ISIL fighters, the ConOps plan and other strong communication ties with the Iraqi and Kurdish governments provided a level of trust with the UN and other humanitarians that extended to a variety of essential protective and service mechanisms.
- d) **Medical Teams “Co-located” or “Embedded” with Specific Iraqi Military Units:** The humanitarian organizations who worked in the TSPs were “co-located” or “embedded” with the same Iraqi units throughout the Mosul operation. By all accounts, the Iraqi military acted professionally toward the humanitarians. Trust, comradery and mutual respect developed among the humanitarian and their Iraqi military units. Whether this experience would be replicated with other military organizations is unclear; however, the strength of the relationship between medical personnel and their military counterparts was an important determinant of the Mosul TSP effectiveness.

- e) **U.S.-led coalition support to humanitarians:** In addition to UN-OCHA CivMil, the U.S. military and coalition partners had assets tracking humanitarian movements and working to avoid harm to non-combatants. This provided a level of security to forward-positioned medical personnel. Additionally, at least one coalition special ops unit was working in close proximity to an NGO TSP, based upon the team's reporting. The availability of this military capability and security assurance may not exist in many conflict settings, even if US and coalition partners have military assets nearby. Accordingly, care should be exercised in assuming that the positioning of medical personnel within TSP's would prove as effective or safe as that experienced in Mosul.
- f) **Sufficient infrastructure and medical personnel to allow for such a trauma referral pathway:** The availability of roads, bridges, and transport—although in many ways deficient—was adequate to support a referral pathway in the Mosul response. In addition, the presence of health facilities and skilled personnel in the Erbil area was also important. Although significant barriers to easy transfer emerged over time, the presence of capable and relatively secure referral facilities located within 100 kilometers of the fighting proved to be an important contributor to the trauma referral network. Such medical capabilities located in proximity to the fighting may be relatively unusual and not generally available in other conflict settings.
- g) **Strong and active UN leadership with high tolerance for risk:** The Humanitarian coordinator and the WHO Representative provided leadership to establish the Mosul trauma referral network. Inherent to this leadership was a willingness to accept a high level of risk for humanitarian personnel, with all the potential implications that this entailed. Based upon the team's interviews and observations, young and inexperienced expats, many of whom had never worked in conflict settings, and were not trained in humanitarian principles, worked in TSPs near the frontline. Although the hiring decisions were made by the NGOs themselves, and not WHO, there was a distinct possibility that one or more of these expat humanitarians could have been killed near the frontline. In the past, when humanitarians are killed by combatants, some or all organizations withdraw for a period of time. If such a withdrawal had occurred during the height of the fighting, the life-saving work of other humanitarian actors might have been severely curtailed.
- h) **Strong donor interest:** Both the U.S. and EU governments provided significant funding for a response, reflecting their significant political and foreign policy interests in Iraq. It is unlikely that such strong support will be present in other conflict settings where interests are not as strong.

The authors believe that the contextual factors described above could provide important lessons for other humanitarian interventions in areas of violent, civil conflict around the world. To that end, this report sought to document and critically assess the Mosul response in a format that hopefully permits a careful analysis as to whether or not to apply some of the “lessons of Mosul” to other challenging humanitarian environments. It may be that the establishment of a trauma network that “co-locates” or “embeds” medical actors with military units near the frontline will prove relatively rare. However, technical advances in trauma referral systems may continue to put pressure on longstanding humanitarian strategies. This report aimed, in part, to inform these considerations and to elevate the need for both humanitarian groups and modern militaries to rethink and possibly reform the principles and infrastructure shaping the medical response to civilians caught in violent conflict.

**Table 8: Findings and Recommendations for Exception of a model for the future?**

Exception or Model for the Future?	
Finding (s)	Recommendation
Humanitarian worker casualties could have significantly disrupted the entire Mosul humanitarian operation	26. As part of operational planning, planners must explicitly weigh the risks to rest of the humanitarian system by placing health workers and other responders into very high-risk setting, such as TSPs.
Specific factors and context that allowed humanitarians to move forward in the Mosul theatre will likely not be replicable in most other conflict settings.	27. Carefully consider the enabling conditions that allowed humanitarians to work in such elevated risk situations. 28. In future conflict settings, critically assess the key elements identified in this report to decide if and how to implement a trauma referral pathway. 29. A high-level meeting, either at the Inter Agency Standing Committee or at the intergovernmental level, needs to occur to discuss and decide upon how humanitarian action should adjust to these new realities (i.e. changing nature of war, implementing standard of care for trauma).

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## 9. Annexes

### Annex 1: List of Interviews

<b>List of Interviews (By Organization or Affiliation)</b>
1. Aspen Medical*
2. CADUS
3. Emergency Hospital, Erbil
4. Free Burma Rangers
5. Global Response Management*
6. Human Rights Watch
7. International Committee of the Red Cross (ICRC): Geneva and Erbil*
8. International Federation of Red Cross and Red Crescent Societies (IFRC)*
9. IOM: Geneva and Erbil*
10. Karolinska Institute, Sweden
11. Médecins Sans Frontières- Belgium/OCB : Brussels and Erbil*
12. Medecins Sans Frontières -Swiss/OCG: Geneva and Erbil*
13. Ninewah DOH
14. NYC Medics*
15. Samaritan's Purse*
16. U.S. Military/Coalition Partners*
17. UNFPA, Iraq
18. UNHCR, Iraq
19. United Nations Humanitarian Coordinator, Iraq
20. UN-OCHA CivMil
21. USAID/OFDA: DART Team, Iraq*; Washington D.C.*
22. World Health Organization: Emergency Medical Teams Initiative, Geneva*; Emergency Director; Emergency Risk Management and Humanitarian Response Team; Global Health Cluster; Health Cluster Iraq; Iraq WR and numerous other WHO colleagues in Erbil*

*\*Denotes more than 1 person interviewed*

## Annex 2. Relevant International Humanitarian Law (IHL) Conventions for Civilian Care in Conflict Settings

### CHAPTER 1, ARTICLE 3 of the GENEVA CONVENTIONS (1949)

*In the case of armed conflict not of an international character occurring in the territory of one of the High Contracting Parties, each Party to the conflict shall be bound to apply, as a minimum, the following provisions:*

(1) Persons taking no active part in the hostilities, including members of armed forces who have laid down their arms and those placed hors de combat by sickness, wounds, detention, or any other cause, shall in all circumstances be treated humanely, without any adverse distinction founded on race, colour, religion or faith, sex, birth or wealth, or any other similar criteria.

To this end, the following acts are and shall remain prohibited at any time and in any place whatsoever with respect to the above-mentioned persons:

(a) violence to life and person, in particular murder of all kinds, mutilation, cruel treatment and torture;

(b) taking of hostages;

(c) outrages upon personal dignity, in particular humiliating and degrading treatment;

(d) the passing of sentences and the carrying out of executions without previous judgement pronounced by a regularly constituted court, affording all the judicial guarantees which are recognized as indispensable by civilized peoples.

(2) The wounded and sick shall be collected and cared for.

An impartial humanitarian body, such as the International Committee of the Red Cross, may offer its services to the Parties to the conflict.

The Parties to the conflict should further endeavour to bring into force, by means of special agreements, all or part of the other provisions of the present Convention.

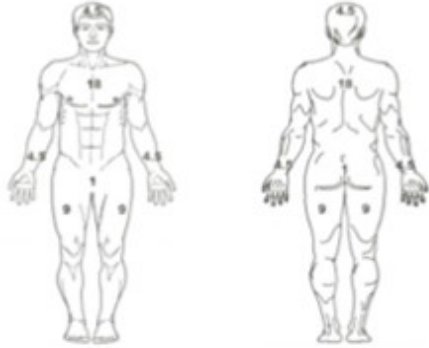
### Additional Geneva Convention Articles Pertaining to Care for the Wounded on the Battlefield

Rule 110, Customary International Humanitarian Law	Rule 110 states that the wounded, sick and shipwrecked must receive, <u>to the fullest extent practicable</u> and with the least possible delay, the medical care and attention required by their condition. No distinction may be made among them founded on any grounds other than medical ones.
Article 10 of the 1977 Additional Protocol I	1. All the wounded, sick and shipwrecked, to whichever Party they belong, shall be respected and protected. 2. In all circumstances, they shall receive, to the fullest extent practicable and with the least possible delay, the medical care and attention required by their condition.
Article 7 of the 1977 Additional Protocol II	1. All the wounded, sick and shipwrecked, whether or not they have taken part in the armed conflict, shall be respected and protected. 2. In all circumstances they shall be treated humanely and shall receive, to the fullest extent practicable and with the least possible delay, the medical care and attention required by their condition.
Article 8 of the 1977 Additional Protocol II	"[W]hen circumstances permit, and particularly after an engagement, all possible measures shall be taken, without delay ... to ensure adequate care" of the wounded and sick.
Article 18(1) of the 1977 Additional Protocol II	"The civilian population may, even on its own initiative, offer to ... care for the wounded, sick and shipwrecked."


### Annex 3: WHO Data Collection Templates

#### TSP Data Collection Template (Courtesy WHO)

Patient number: AAAA

MOSUL TRAUMA STABILIZATION POINT (TSP) CLINICAL CARE FORM					
TIME IN: <small>24-hour format</small> ____ : ____	Date: 2017 / <small>M M</small> ____ / <small>D D</small> ____	Clinician Name: _____			
NGO Name: _____	TSP Location: _____	Clinician Signature: _____			
Last Name: _____		Sex: <input type="checkbox"/> M <input type="checkbox"/> F			
First Name: _____		Age: ____ Unaccompanied minor (<18): <input type="checkbox"/>			
Allergies: _____		Status: <input type="checkbox"/> Combatant <input type="checkbox"/> Civilian			
MECHANISM OF INJURY?: _____				<input type="checkbox"/> Chemical exposure	
		<b>INJURY:</b>			
		<b>VITALS:</b>			
		Time			
		Pulse			
		BP			
		RR			
		SaO2			
AVPU					
Pain (0-10)					
<b>TREATMENTS:</b>					
C: <input type="checkbox"/> Wound packed <input type="checkbox"/> Pressure dressing <input type="checkbox"/> Hemo agent <input type="checkbox"/> Tourniquet: ____ : ____				<small>Time</small>	
A: <input type="checkbox"/> Intact <input type="checkbox"/> NPA/OPA <input type="checkbox"/> Cric <input type="checkbox"/> ET-Tube <input type="checkbox"/> Supraglottic device					
B: <input type="checkbox"/> Needle-D (Side: L   R) <input type="checkbox"/> Chest-Tube (Side: L   R) <input type="checkbox"/> Chest-Seal (Side: L   R)					
Medication/IVF	Indication	Dose/Volume	Route	Time	
<b>NOTES:</b>					
<b>TRIAGE:</b> <input type="checkbox"/> Green <input type="checkbox"/> Yellow <input type="checkbox"/> Red <input type="checkbox"/> Black					
<b>DISPOSITION:</b> <input type="checkbox"/> Discharged <input type="checkbox"/> Deceased <input type="checkbox"/> Referred → Destination: _____					
→ Referral line called? <input type="checkbox"/> Yes				<b>TIME OUT:</b> ____ : ____	

## Field Hospital Data Collection Template (Courtesy WHO)



**World Health Organization**

**Hospital Reporting Form**

**A. Reporting Details**

Date: dd/mm/yyyy Reporting Period: dd/mm/yyyy to dd/mm/yyyy

Reporting site (e.g. name of hospital or EMT): \_\_\_\_\_

Adhba Hospital
Hamam Al-Alii Hospital
Al Khadra Hospital
Hamam Al-Alii Hospital 2
Qayyara Hospital
Al-Hamdaniya Hospital
Bartella Hospital
Shaikhan Hospital
Emergency Hospital
West Emergency Hospital
Muharibeen Hospital

Governorate:

Ninewa	Erbil	Dahuk
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District:

Ninewa	Erbil	Dahuk
Akre	Choman	Amedi
Ba'aj	Erbil	Dahuk
Hamdaiya	Koishjaq	Sumel
Hatra	Makhmur	Zakho
Mosul	Shaqlawaw	
Shikhan	Soran	
Sinjar		
Telafar		
Tilkaif		

Name of Focal Point: \_\_\_\_\_

Organization:

Aspen
ICRC
QRC
Samaritan's Purse
MSF – France
MSF - Belgium
WAHA
Emergency
Handicap International
Chaine de l'espoir

**B. Summary Indicators**

Outpatient: Patients who arrive, are treated and able to leave the facility without being admitted. New  
 Inpatient Admissions: Casualties who arrive and are admitted and stay at the hospital to receive treatment.  
 Status: Civilian vs Combatant  
 Dead on Arrival: Having died prior to arriving or being treated at the receiving facility.  
 Hospital Deaths <24 hours: Death within 24 hours of arriving at the facility.  
 Hospital Deaths >24 hours: Death after 24 hours of arriving at the facility.  
 Average length of stay (days): period of time patients are staying at this facility prior to referral or discharge.

**C. Outpatient Consultation by Age**

Indicate total number of patients within each age bracket.

**D. Inpatient Admissions by Age**

Indicate total number of patients within each age bracket.

**E. Referral and Discharge**

Referrals from another facility: Patients received from another medical facility (ex. TSP, Field Hospital, Rehabilitation facility).  
 Referral to another facility: Patient treated and referred for subsequent treatment at another facility.  
 Discharge: Patient treated and no longer required to stay at a medical facility.  
 Referral to a long term rehabilitation facility: Patient treated and referred to a specific specialist care facility.

**F. Admission and Procedures - Trauma**

Major Head/Neck: Treatment for a major head/neck injury.  
 Major Spinal Cord Injury: Treatment for a major spinal cord injury.  
 Major Chest/Abdomen Injury: Treatment for a major chest/abdomen injury.  
 Major Extremity Injury: Treatment for a major extremity injury.  
 Burn Injury: Burn injury.  
 Minor Injury: Treatment for a minor injury.  
 Multiple: For casualties with more than one site of injury, record each site of injury AND count it as one entry into the "Multiple" field

**G. Admission and Procedures - Non Trauma (Emergency)**

Surgical: example appendicitis, etc  
 Medical: examples complication of diabetes, stroke, etc  
 Obstetric Complication: examples ectopic pregnancy, etc  
 Other: non-surgical, medical or obstetric complication cases

**H. Admission and Procedures - Procedure**

Major: Procedures done under general anesthesia  
 Major – Neurosurgical: surgery to the head and spine  
 Major – Cardiothoracic: example - thoracotomies  
 Major – Abdominal: example - laparotomies  
 Major – Neck Surgeries: surgery to the neck  
 Major – Burns: example – skin graft  
 Major – Amputations: severing of a limb  
 Major – External Fixations: bone immobilization with pins, screws and external frame  
 Major – Other Orthopedics: example - Plastic reconstruction, complex debridement, non-hardware  
 Moderate: Procedures done under regional blocks and sedation (example Reductions, debridement, complex wound repair)  
 Minor: Procedures done under local anesthesia

**I. Risks**

Notifiable Infectious Diseases: example Cholera, Measles, etc.  
 Unaccompanied Child: Casualty received under the age of 17 without an accompanying guardian  
 Critical incident to hospital: Y/N

**J. Needs /Operational Constraints**

Logistics/Supply: can make note of Logistics/supply situation or enter N/A  
 Other needs: can make note of other needs or enter N/A

## Annex 4: Additional Data Findings

Figure 5: Cumulative West Mosul TSP Casualties by Triage Category, Feb 20-Jul 21, 2017

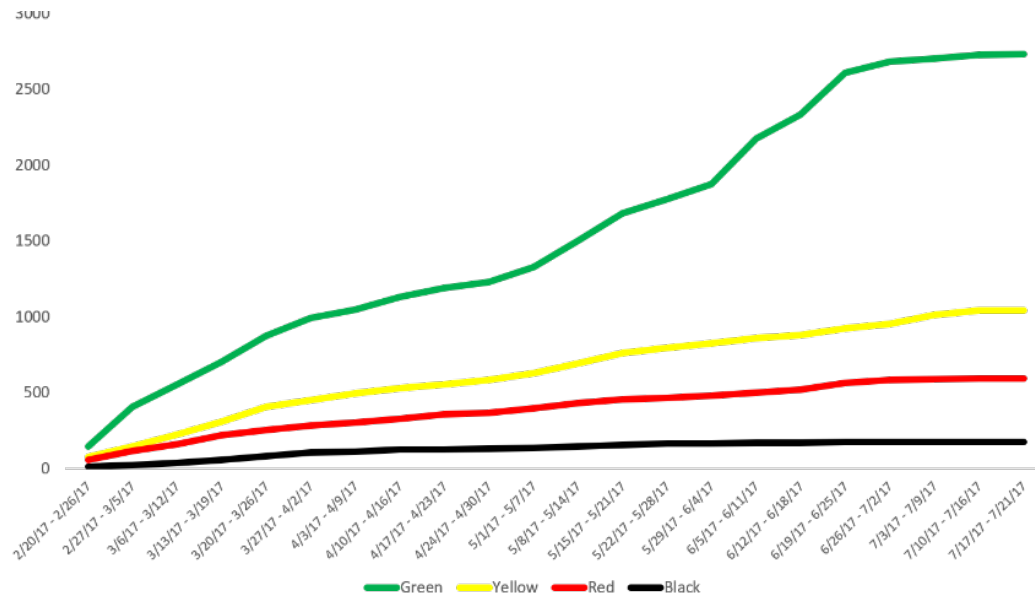
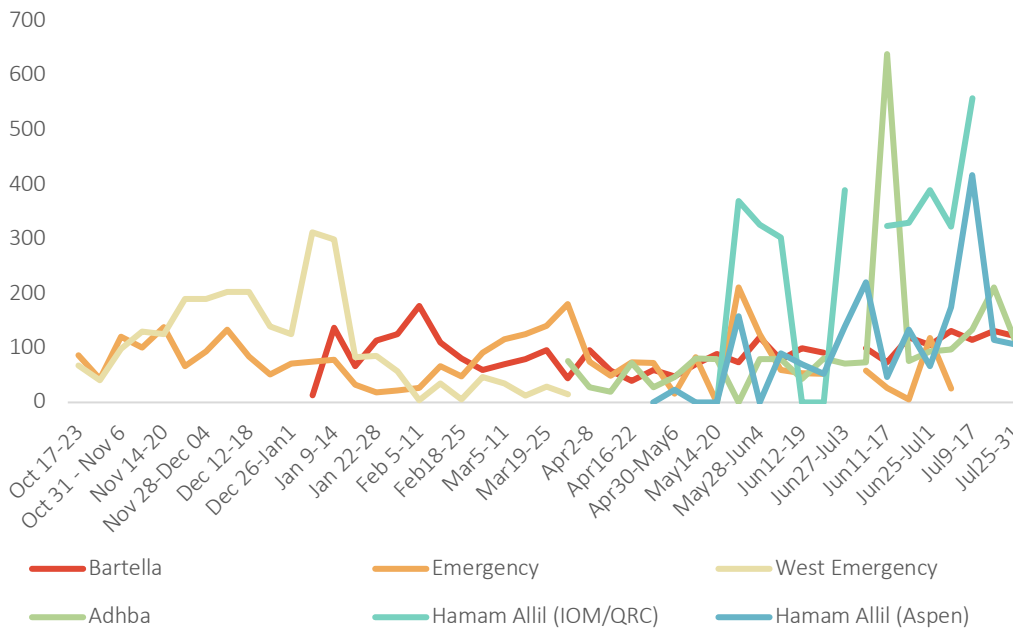


Figure 6: Patient Encounters, Selected Facilities, Oct 2016-Jul 2017



Data Sources: WHO



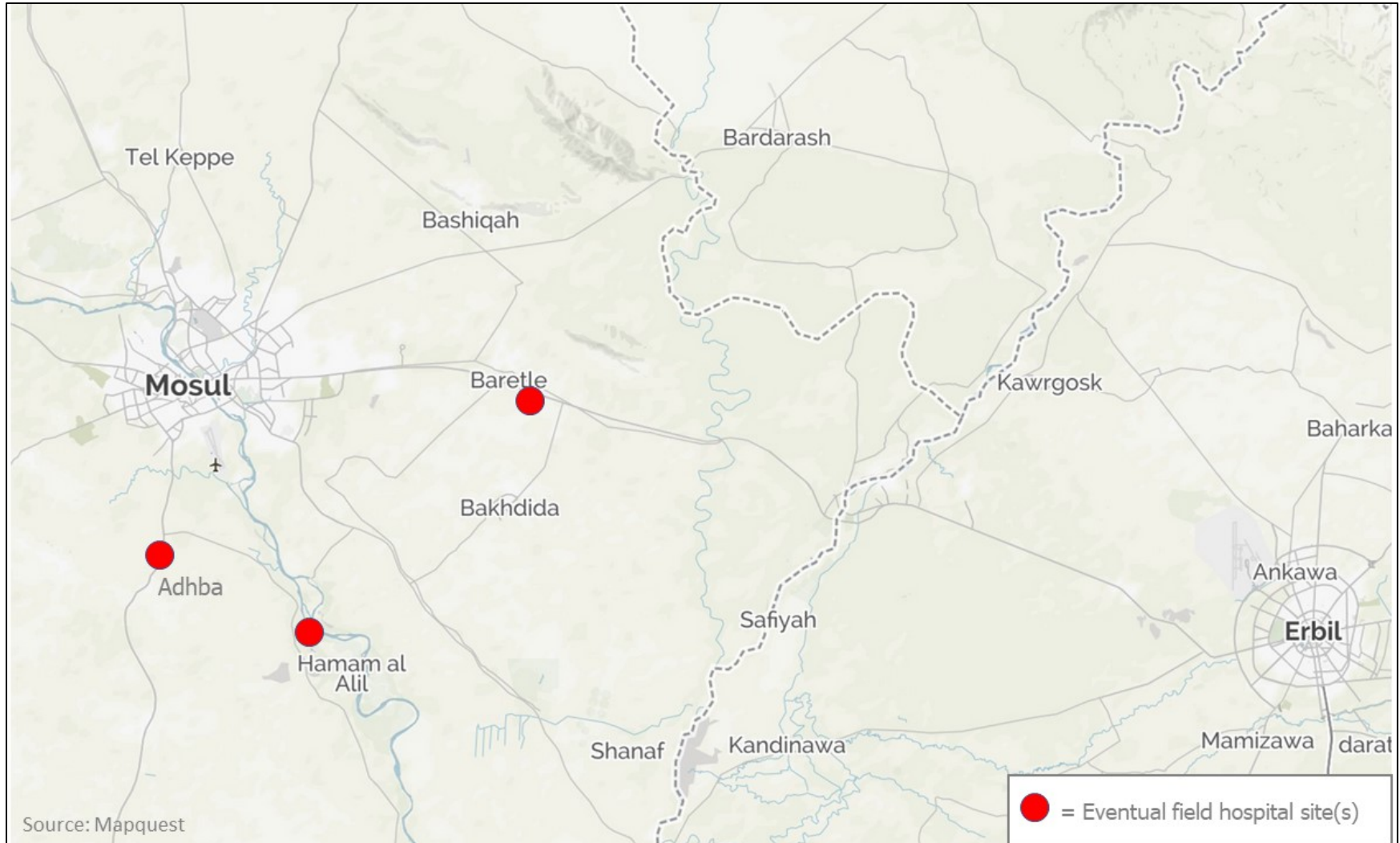
**Table 9: Samaritan’s Purse: Major Operations by Category, Jan-Jul 2017**

Operation Type	Number (%)
Abdominal	198 (17%)
Amputation	70 (6%)
Burns	54 (5%)
Cardiothoracic	26 (2%)
External Fixation	199 (17%)
Major-Other Orthopedic	322 (28%)
Major-Other General Surgery	265 (23%)
Head/Neck	5 (<1%)
Neurosurgical	4 (<1%)
Total Major Operations	1,143

Source: Samaritan’s Purse, preliminary analysis of data.

## Annex 5: Maps

Map 1: Reference Map and Eventual WHO-supported Field Hospital Sites



Map 2: Territory Control at Start of Battle of Mosul, October 16, 2016

