

# Health workers and the weaponisation of health care in Syria: a preliminary inquiry for *The Lancet*–American University of Beirut Commission on Syria



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The conflict in Syria presents new and unprecedented challenges that undermine the principles and practice of medical neutrality in armed conflict. With direct and repeated targeting of health workers, health facilities, and ambulances, Syria has become the most dangerous place on earth for health-care providers. The weaponisation of health care—a strategy of using people’s need for health care as a weapon against them by violently depriving them of it—has translated into hundreds of health workers killed, hundreds more incarcerated or tortured, and hundreds of health facilities deliberately and systematically attacked. Evidence shows use of this strategy on an unprecedented scale by the Syrian Government and allied forces, in what human rights organisations described as a war-crime strategy, although all parties seem to have committed violations. Attacks on health care have sparked a large-scale exodus of experienced health workers. Formidable challenges face health workers who have stayed behind, and with no health care a major factor in the flight of refugees, the effect extends well beyond Syria. The international community has left these violations of international humanitarian and human rights law largely unanswered, despite their enormous consequences. There have been repudiated denunciations, but little action on bringing the perpetrators to justice. This inadequate response challenges the foundation of medical neutrality needed to sustain the operations of global health and humanitarian agencies in situations of armed conflict. In this Health Policy, we analyse the situation of health workers facing such systematic and serious violations of international humanitarian law. We describe the tremendous pressures that health workers have been under and continue to endure, and the remarkable resilience and resourcefulness they have displayed in response to this crisis. We propose policy imperatives to protect and support health workers working in armed conflict zones.

## Introduction

This Health Policy presents preliminary results from an inquiry of *The Lancet*–American University of Beirut Commission on Syria: Health in Conflict.<sup>1,2</sup> Health workers affected by the Syria conflict face serious short-term and long-term threats. In this paper, we examine the experiences of health workers inside Syria, and the hazardous situation and precarious conditions these workers face. The origins or evolution of the Syria conflict are not described in this paper, nor the associated impact on populations and health outcomes discussed. Rather, the paper focuses on four analytical themes: attacks on health-care facilities and targeting of health workers as part of a broader pattern of systematic violations of international humanitarian law, the attrition of health workers, the challenges facing health workers in different areas, and the evolving roles of health workers. Examples include the expansion in health-care provision of single-specialty to multiple specialities, whether in medicine, surgery, public health, or all three, as well as role expansion beyond direct health care into administration of hospitals or health directorates, development of non-governmental organisations for aid delivery, coordination of vaccine campaigns, cooperation with UN and other international aid organisations, and finally, advocacy. We build on this analysis to develop policy options to ensure that health workers affected by the Syria conflict, and others elsewhere, receive the essential attention needed to protect them, and to prevent threats to their neutrality and impartiality (panel).

## Health workers under attack

In this paper, we propose the idea of weaponisation of health care to capture the phenomenon of large-scale use of violence to restrict or deny access to care as a weapon of war. Weaponisation is multi-dimensional and includes practices such as attacking health-care facilities, targeting health workers, obliterating medical neutrality, and besieging medicine. Through large-scale violations of international humanitarian laws, weaponisation of health care amounts to what has been called a “war-crime strategy”.<sup>3</sup> Weaponisation of health care in the Syria conflict is manifested most notably in the targeting of health workers and facilities. The historical context is important to understand.

## Global context: protection of health workers under international humanitarian law

The imperative for unobstructed humanitarian aid during armed conflicts is well established.<sup>4</sup> The importance of allowing health workers to treat sick and wounded combatants led to the creation of the International Committee of the Red Cross (ICRC) in 1863 and drove the development of the humanitarian principles of impartiality, independence, and neutrality underlying the first international humanitarian law in 1864.<sup>5</sup> The four Geneva Conventions, codified in 1949, define the obligations of nation states engaged in armed conflict.<sup>6</sup> The Fourth Geneva Convention, which requires warring parties to refrain from hostile actions against

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**Panel: Literature review and data collection**

We define health workers as doctors, midwives, nurses, dentists, pharmacists, physiotherapists, paramedics, ambulance drivers, other emergency response personnel, allied health technicians, medical and allied health students, public health professionals, and civil defence personnel providing volunteer health aid such as first aid and frontline rescue. We focused on these groups because of their prominent roles in conflict settings and in accordance with the definition of medical personnel, as an equivalent term under international humanitarian law.

We collected information about health workers from multiple sources.

- Literature review: we did a thorough scoping review to present a broad overview of the evidence, irrespective of study quality, to examine areas that are emerging, to clarify key concepts, and to identify knowledge gaps. We included all study types and news items. We searched five English language databases (MEDLINE, PubMed, Embase, Human Resources for Health Global Resource Center, and WHO Global Health Library with two search terms "Syria" and "health workers" for articles published between Jan 1, 2011, and Jan 12, 2017. We also searched grey literature through browsing of websites of organisations reporting violations, government and UN agencies tracking the situation of health workers and facilities, and international organisations involved in provision of care in Syria, such as the websites of the organisations Physicians for Human Rights, WHO, Syrian American Medical Society, Human Rights Watch, World Bank Group, Médecins Sans Frontières, United Nations Office for the Coordination of Humanitarian Affairs, International Committee of the Red Cross, Union of Medical Care and Relief Organizations, Amnesty International, and Union of Relief and Development Associations. To enhance the comprehensiveness of our strategy, a Google search was also done with a combination of keywords such as "Syria", "health attacks", "health workers", and "health professionals".
- Data on health workers and care were provided by organisations and researchers.
- Information from experts were provided during consultations, such as a consultation held in November, 2016, with Syrian practitioners including those working in government, rebel, or refugee areas, and meetings convened by *The Lancet*-American University of Beirut Commission on Syria: Health in Conflict.
- Testimonials of health workers, including one from the authors of this Health Policy.
- Collation of data sources with cross-checking of data from all sources to strengthen accuracy and synthesis.

civilian populations, established distinct protections for health and humanitarian workers who provide aid to wounded combatants of any side and to civilian populations.<sup>7</sup> These protections under international humanitarian law confer treaty obligations on all signatory nations. Every country in the world has signed and ratified the 1949 Geneva Conventions; however, not all nation states have signed or ratified the Additional Protocols to the Geneva Conventions that expand and clarify the protections for medical and humanitarian personnel and civilian populations.<sup>8</sup> These protections are recognised as a matter of customary international humanitarian law, which means even governments that have not ratified the relevant treaties are required to respect them.<sup>4</sup> Finally, recognition by UN rights bodies that international human rights law and international humanitarian law provide for access to health care in wartime is increasing.<sup>9-11</sup>

The ability of people in need to access health care depends on state and non-state armed groups respecting

international humanitarian law provisions that protect health workers. Yet several of today's armed conflicts and resultant humanitarian crises are taking place in settings in which both state and non-state armed groups have shown disregard for the safety and lives of health workers, flagrantly violating applicable international humanitarian law with impunity.

Findings from studies<sup>12-14</sup> have emphasised the need to better understand the plight of local and international health workers in conflict. The bulk of attacks occur in ongoing conflicts in Afghanistan, Somalia, South Sudan, Syria, and Yemen.<sup>15</sup> National staff are the most exposed and the most common victims of attacks.<sup>16</sup> When international organisations are forced out of an area, not only are local humanitarians the only groups that remain active, but the UN and other international non-governmental organisations also rely on them as implementation partners. Despite research efforts to document their plight, knowledge and evidence remains scarce.

**Particular violations of international humanitarian law in Syria**

The Syria conflict has seen large-scale aerial bombing of civilian areas, committed by the government and its allies. The pattern of government attacks on civilian areas suggests that the government deems all civilians, including those providing medical care, living in opposition-controlled areas to be affiliated with terrorism, and hence as legitimate military targets. But, as international humanitarian law makes clear, even that designation is no justification for the Syrian Government's war crime of deliberately bombing civilian homes; attacking infrastructure vital to civilian life such as schools, bakeries, and markets; and forcing the displacement of over half the country's population. Nor does international humanitarian law permit the Government's attacks on health workers who provide care for civilians or injured fighters in these areas. Human Rights Watch and Amnesty International describe all of these practices by pro-government forces as war crimes.<sup>17,18</sup>

**Evolving practices in the weaponisation of health care**

Targeting of health workers by pro-government forces was identified as a problem early in the Syria conflict, well before any substantial militarisation.<sup>19-21</sup> Doctors practicing in areas which witnessed protests were forced to treat patients injured in such protests in secret for fear of being arrested.<sup>22,23</sup> The first documented execution of a doctor by pro-government forces occurred in March, 2011.<sup>24</sup> In April 2011, Syrian forces began arresting doctors, patients, and paramedics in Douma and other areas of eastern Ghouta where protests took place.<sup>24</sup> In September, 2011, the first intentional attack on a clearly-marked ambulance occurred in Homs.<sup>21</sup> In July, 2012, the Syrian Government passed a counter-terrorism law

effectively criminalising the provision of medical care to anyone injured by pro-government forces in protest marches against the government.<sup>25</sup> The passing of this law was an effort to justify the arrests, detention, torture, and execution of health workers despite explicit and customary international humanitarian law protecting health workers from punishment for acts in accordance with medical ethics in international and non-international conflicts. Notably, Serbia enacted a similar law during the 1998–99 war in Kosovo.<sup>26</sup>

Targeting of health workers largely by pro-government forces has continued and takes many forms (appendix): attacks on health facilities, executions, imprisonment or threat of imprisonment, unlawful disappearance (ie, kidnapping), abduction, and torture sometimes leading to death. The perpetrators are primarily government forces. Abuses by non-government forces have also been reported.<sup>27</sup> As a consequence of the targeting of health workers, hundreds of health workers have been killed. Whereas data from single sources are commonly reported, we have collated data from several sources including Physicians for Human Rights (PHR), Syrian American Medical Society (SAMS), Syrian Network for Human Rights (SNHR), and Violations Documentation Center in Syria (VDC) to minimise possible reporting bias (table 1). Although all these sources confirm targeting and associated deaths of health works as a major problem, variations in reporting exist, reflecting different methods of classification and verification. This illustrates the difficulty of accurate documentation of attacks from within a conflict area.

PHR report that 782 health workers were killed, in violation of medical neutrality, from March, 2011, through to September, 2016 (figure 1).<sup>28</sup> Shelling and bombing accounted for 426 (55%) deaths, followed by shooting (180 deaths; 23%), torture (101 deaths; 13%), and execution (61 deaths; 8%). The Syrian Government and allied forces are responsible for 723 (92%) of these deaths. Doctors were the most targeted group of health workers, accounting for 247 (32%) of those killed. 176 (23%) nurses and 146 (19%) medics have been killed. Medical, dentistry, veterinary medicine, and pharmacy students were also targeted, accounting for 9% of those killed. Between Oct 1, 2016, and Feb 28, 2017, our review of data from SNHR, SAMS, and VDC indicate that at least an additional 32 health workers were killed, which brings the total number of health workers killed in acts of war crimes over the 6 years of the conflict to 814.

Over time, targeting of health facilities emerged as a key feature in the weaponisation of health care and became more frequent (figure 2), more conspicuous, and more widespread.<sup>33</sup> This practice was so flagrant that it led the UN Security Council to condemn attacks on health workers and facilities in conflict in resolution 2286 on May, 2016.<sup>34</sup> With the military surge that began in late September, 2015, when Russia joined Syrian Government forces, 2016 marked the worst year of the

	2011	2012	2013	2014	2015	2016	2017
Physicians for Human Rights <sup>28*</sup>	48	190	180	177	107	77†	..
Syrian Network for Human Rights <sup>29‡</sup>	34	87	110	118§	112	104¶	12
Violations Documentation Center <sup>30</sup>	36	232	242	148	70	82	5

\*Excludes three deaths for which the year was impossible to ascertain. †January to September, 2016. ‡Included medical and civil defence personnel. §May to December, 2014. ¶Excludes 63 health workers who were not deliberately killed.<sup>31</sup>

Table 1: Health workers killed in the Syria conflict, 2011–17

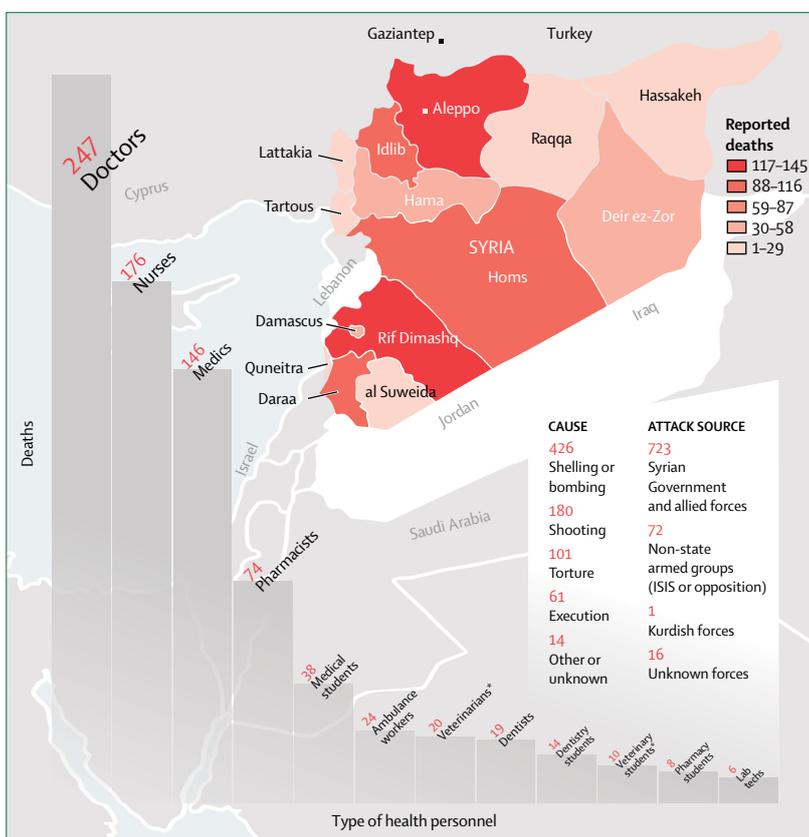
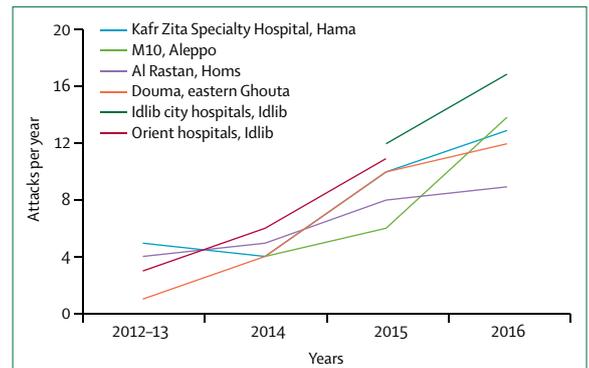


Figure 1: Profile of a war-crime: health workers killed in the Syria conflict, 2011–16. Adapted from Harvard Public Health magazine based on data from Physicians for Human Rights (updated March, 2017). From March, 2011, to September, 2016, at least 782 health workers have died in attacks on health-care facilities and in targeted attacks on individuals. \*Veterinarians and veterinary students killed while treating people.

conflict to date in terms of attacks on medical facilities. SAMS documented 194 verified attacks, an 89% increase since 2015. SNHR reported 289 attacks on medical facilities, ambulances, and Syrian Arab Red Crescent bases, 96% of which were by Syrian or Russian forces.<sup>31</sup> Notably, although PHR data for 2016 is only published up until July, and reporting only 54 attacks for 2016 (of a total of 400 attacks since March, 2011) PHR only reports on attacks against medical facilities that are protected in accordance with international humanitarian law, using a three-point corroboration methodology. PHR stresses that their numbers are highly conservative, that numbers are an underestimate as only those attacks and deaths



**Figure 2: Attacks on health facilities over the course of the crisis, 2012–16**  
Data for years 2012–15 were from PHR, findings as of July, 2016.<sup>28</sup> Number of attacks in 2016 was calculated by summation of the 27 attacks reported by PHR<sup>28</sup> from January to May, 2016, and 172 attacks reported by Syrian American Medical Society<sup>29</sup> from June to December, 2016. PHR=Physicians for Human Rights.



**Figure 3: Recurrent targeting of health facilities in the Syria conflict, 2012–16**  
Data are from Syrian American Medical Society,<sup>32</sup> Assistance Coordination Unit,<sup>36</sup> Physicians for Human Rights,<sup>28</sup> Syrian Network for Human Rights,<sup>31</sup> Violations Document Center,<sup>37</sup> and United Medical Office in Deir Ezzor and eastern Ghouta (independent research and field trips since 2012 by one of the authors AS).

with sufficient evidence to be considered are counted. SAMS declared UN Security Council resolution 2286, passed in May, 2016, a failure after reporting a minimum of 172 attacks from June to December, 2016, with the Syrian Government and its allies responsible for almost 98% of the attacks.<sup>32</sup>

The pattern of attacks on health facilities suggests intention to target, which is a war crime. To the best of our knowledge, the frequency and extent of targeting of health care is not known to have occurred in any previous war.

Examination of attacks since 2012 on health facilities has revealed a distinct pattern of weaponisation.<sup>35</sup> Analysis of attacks over several years in important opposition-held areas of Aleppo, Hama, Idlib, eastern Ghouta, and Homs reveals a pattern of repeated targeting with intention to shut access to health care, whether to impede opposition forces or to force civilian displacement (figure 3). M10, an underground fortified hospital in eastern Aleppo, was attacked 19 times in 3 years, including 13 times between July and October, 2016, shutting it down with the last attack in October.<sup>38</sup> A cave used as a specialty hospital in Kafr Zita, Hama, has been bombed 33 times since 2014, including six times to date in 2017.<sup>39</sup> Orient hospitals throughout Idlib were targeted at least 20 times since 2013, forcing the closure of almost all hospitals by 2016. Hospitals in Idlib city itself, under Government control until March 28, 2015, have been targeted dozens of times since, at least 15 times in 2016.<sup>36</sup> In Homs, Al Rastan hospitals and clinics have been attacked at least 25 times since 2012. Attacks on hospitals and ambulances in Douma, eastern Ghouta, under siege since November, 2012, have been steadily increasing. This targeting of health facilities is so effective that some areas, such as eastern Aleppo, lost all functioning hospitals and almost all health workers as of November, 2016. There are no longer any health facilities in eastern Aleppo, and health workers number in single figures.

### Attrition of health workers and its effects

Facing danger, insecurity, and economic meltdown, many health workers either fled or voluntarily emigrated. With the number of health workers already depleted by so many detentions and deaths, these departures leave an enormous human resource gap. Estimates of loss vary widely and reliable data is scarce. In 2009, there were 29 927 doctors.<sup>40</sup> In 2015, PHR reported that 15 000 doctors had left,<sup>41</sup> and in 2016, a high-ranking UN official stated that 27 000 of 42 000 doctors had left.<sup>42</sup> The Ministry of Health and WHO data on trends in the distribution of health workers in public hospitals and data from the Syrian Medical Syndicate, both of which can be used as proxies of attrition, have not been made public. Although attrition affects the whole of Syria, the situation is very different between government-controlled areas and non-government-controlled areas. In the non-government-controlled area of eastern Aleppo, the ratio of doctors to residents in 2015 was roughly one physician for every 7000 residents, compared with one physician for every 800 residents in 2010.<sup>43</sup>

The effect on the population is profound as reported by the Syrian Center for Policy Research, based on the only population-based survey done during the conflict, in which informants were asked to rate health care as sufficient (ie, adequate number of appropriate health workers).<sup>44</sup> Based on data from 2100 key informant interviews in 698 subdistricts in both government-controlled and non-government-controlled areas, only 42% of the population live in areas that are likely to have sufficient health workers, whereas 31% live in areas where health workers are insufficient and 27% live in areas where health workers are completely absent. All areas without health workers were either affected by or experienced active conflict, and most were under military siege and restriction of mobility (Alsaba K, Mehchy Z, Nasser R, Syrian Center for Policy Research, personal communication).

## Health workers working under different systems inside Syria

Health workers face different challenges in areas under different authorities. A key challenge to our ability to devise policy and practice interventions is the scarce and disparate information available about the realities of work in different areas.

In non-government-controlled areas, the challenges facing health workers and innovations devised in response are yet to be fully described, but observations from various sources collected in this inquiry provide key insights.

### Unmanageable demands under extreme conditions

Across many non-government-controlled areas experiencing regular attacks, health workers report having to deal with influx of trauma victims, severe shortages of medical supplies and human resources, epidemics of infectious diseases, chemical attacks, living under siege, and breaches of medical neutrality, sometimes simultaneously. Other reported practice challenges include working in basement hospitals that have been hit by bombs and using mobile (cell) phone lights to illuminate operations during electricity outages.<sup>44,45</sup> Government targeting of health facilities forces decentralisation of hospital services, so that specialties and expertise are not concentrated in a single facility at risk of attack—for example, emergency rooms are separated from operating rooms, which in turn are separated from intensive care wards.<sup>46</sup>

### Siege medicine

An estimated 1 million people are currently living under siege, largely by the government, which also affects life and practice of health workers in these areas.<sup>47</sup> The Syrian Government rarely allows surgical supplies, dialysis kits, or essential medicines in convoys to besieged areas. The few areas besieged by non-state armed groups receive medical supplies through airdrops.<sup>48,49</sup> The Government has blocked implementation of public health measures such as water chlorination and vaccinations.<sup>50</sup> Whether cancer or complicated antenatal cases, children with meningitis, or victims of airstrikes, patients are rarely allowed to be evacuated to access required health services unavailable within besieged areas. Health workers are forced to make difficult choices between the severe and more severe cases, which jeopardise patients' lives while undermining health worker morale. Patients and health providers have resorted to unusual measures. For example, as intravenous fluids are routinely removed from aid convoys, health workers devised a method to make normal saline. There is now an underground factory in eastern Ghouta near Damascus producing normal saline. Denied blood bags for the collection and storage of blood, urine bags with anticoagulants added are used. Homemade external fixators are used for orthopaedic surgery. Fearing the deliberate attacks on

health facilities, many women have to schedule caesarean sections to avoid exposure to targeted attacks on hospitals during long hours of labour. An ultrasound in early pregnancy is used to reliably plan the date of the C-section, given the dearth of neonatal incubators, ventilators, oxygen, and other fundamental resources needed for the survival of premature infants. This practice results in unusually high rates of caesarean deliveries, which are as high as 70% in eastern Ghouta.<sup>51</sup>

### The need to do it all

The combination of criminalisation of care to civilians in opposition to the government and the attacks on large health facilities has led to the need to create field hospitals in homes, schools, basements, mosques, and even caves to treat casualties on-site and to stabilise patients so they can be safely transported to permanent medical facilities.<sup>52</sup> Many challenges complicated this strategy.<sup>53</sup> The dwindling number of providers in non-government-controlled areas and exodus of older and more experienced doctors has left critical gaps. Smaller numbers of providers who are younger and less experienced than those who have left, many of whom are medical students or early residents, are forced to fill these gaps. Some of these health workers report the need to learn how to do everything, from the full range of medical conditions to war trauma. Treatment of patients with war injuries poses a serious problem because Syria's medical training system did not include specialisation in trauma management, intensive care, or emergency medicine before the crisis. Thus providers must learn on the job.<sup>48</sup>

### Interrupted training

Extensive anecdotal information from informed observers<sup>54</sup> and doctors who have provided medical care in Syria is available. All indications are that care provided by young health workers remaining in non-government-controlled areas has been indispensable, but comes at a high cost. To compensate for shortage of qualified providers, many medical students and early-grade doctors were forced to cease their training to provide health care, despite the fact that they did not have full qualifications. This portends an important gap in supply of skilled medical doctors in coming years. More immediately, as many such providers worked beyond their training and skills, taking on more responsibility without the usual training and mentorship, patients are obviously at risk, particularly when health workers are forced to manage war trauma and chemical attacks. Poor outcomes, including surgical complications and infections, have become more common.

### Managing public health challenges

The restrictions by the Syrian Government on the flow of aid, supplies, and expertise to non-government-controlled areas not only endangers medical care, but

also basic public health functions. Polio re-emerged in October, 2013, in areas with restricted vaccination coverage, and subsequent spread to Iraq triggered fears of regional and global spread. However, Syrian health workers had anticipated the threat: in 2013, doctors at the Assistance Coordination Unit, the humanitarian arm of the political opposition,<sup>55</sup> set up a surveillance system for northern Syria with training provided by the US Centers for Disease Control and Prevention. With the support of the Turkish government, the Assistance Coordination Unit led a successful vaccination campaign in 2014, which brought the polio outbreak under control.<sup>56</sup>

#### Health care and training under Islamic State (IS)

Information about the situation in areas under IS, such as Ar-Raqqa and Deir Ezzor, is limited. Efforts to recruit foreign doctors through social media have reportedly helped IS to develop a functioning health system with modern facilities and equipment, qualified health workers, and a medical school in Raqqa where students train for free.<sup>57</sup> But this health system is exclusive to IS, and foreign doctors are only permitted to provide care for IS members. For the rest of Raqqa's civilians, over 1 million people, there are only 33 specialist doctors including just three obstetricians and one ophthalmologist, and just two public hospitals.<sup>58</sup> Anecdotal reports indicate that health workers are forced to deliver care at gunpoint while others are arrested, abducted, or even executed for refusing to deliver care. To stop the exodus of health workers, IS uses the threat of seizure of homes and clinics in case of absence from work. Gender separation in these areas means that female health providers are subject to additional stress and restrictions, being forced to abide by IS dress code and to treat only female patients.

#### Government-controlled areas

The bulk of Syria's remaining health workers are in government-controlled areas, where there is variability in the capacity of health facilities and personnel. Workers from these areas have also reported challenges, but of a different nature to those working in non-government-controlled areas. Indiscriminate mortar attacks from rebel areas have adversely affected daily life and the public's sense of security. Many health workers report facing multiple security checkpoints for their daily trip to a hospital or clinic. The collapsing economy has eroded living standards and restricted school and career options for offspring of health workers. Medical students fear the military draft and the risk of being sent to the battlefield. To avoid that fate, many seek whatever residency training positions are available upon graduation, irrespective of specialty. However, with the emigration of many experienced senior academics, fewer high-quality specialists are available to supervise the training of younger doctors. Travel restrictions due to sanctions and the need for leave permits from the government leave few choices for these doctors. Some doctors in these

areas have indicated that the international media pay little attention to their plight.<sup>59</sup> Others report being forced to breach ethical principles under unbearable pressure (appendix).

#### From health provision to agency and advocacy Aid provision

An important observation in the Syria crisis has been the evolution and expansion of the role of Syrian health workers and their organisations. The first is aid provision. Syrian health workers mobilised early on in the crisis, but their initial focus on modest-scale relief necessarily gave way to sophisticated international aid operations, with the creation of a network to provide health care that employs thousands of health workers, from professionals to volunteers. SAMS reported treating 2.5 million Syrian people in 2015.<sup>60</sup> The Union of Medical Care and Relief Organizations (UOSSM) reports operating 16 field hospitals and treating 50 000 patients per month.<sup>61</sup> With support from international organisations, these efforts filled a gap in health provision. The Syria Civil Defence (White Helmets), a volunteer group of 2900 rescue workers, has reported saving 80 000 lives, and has gained international pre-eminence because of its role in emergency response, however, they paid a price. In 2016, they were subjected to 149 so-called double-tap attacks, in which a second attack closely follows the first, which are designed to target relief workers (Raed Al Saleh, Syria Civil Defence, personal communication). 154 White Helmet workers have been killed between the inception of the group in 2013 and 2016.<sup>62</sup>

#### Capacity building

In response to interrupted training, and in light of the need to develop skills to address the demands of practice under conflict, Syrian and international health professional organisations mobilised to provide training to health providers practicing in non-government-controlled areas. SAMS, UOSSM, and Syrian Expatriate Medical Association (SEMA) report training thousands of providers. In addition to dozens of training courses, SAMS developed a 24/7 response system that uses social media to support providers in addressing difficult issues. International missions to provide care jointly with such providers inside non-government-controlled areas have also filled a care gap and contributed to skills development.<sup>64</sup> Additionally, Syrian health workers, with international help, have mobilised to develop formal medical education in non-government-controlled areas, for example contributing to building a faculty of medicine in the non-government-controlled area governorate of Idlib.

#### Political advocacy

This mobilisation of health workers has provided health workers' organisations (exemplified by SAMS, UOSSM, and SEMA) with weight, credibility, and legitimacy and has paved the way for these organisations to increase

their political profile on the global stage, which they have used to advocate for both civilians in general and health workers in particular. Examples include testimonies to the US House of Representatives' Foreign Affairs Committee,<sup>63</sup> briefings to meetings of the UN Security Council,<sup>60</sup> a presentation to the 2016 London conference on Supporting Syria and the Region, and advocacy with national governments, particularly the USA. This advocacy has translated into more aid and attention to the plight of health workers, contributed to UN resolutions concerning the flow of aid and access to besieged populations, and the protection of health facilities and providers. It has also led to the invitation of some of these organisations to political talks on Syria's future.

### Global action on health workers in conflict: policy imperatives

This Health Policy has outlined many challenges facing Syria's health workers. Grim as the situation appears today, several policy imperatives emerge from this review that require translation into concrete actions to which global health professionals, we argue, must contribute. At stake are health workers not only in Syria, but also in ongoing and future armed conflicts elsewhere (table 2). In the following section, we draw conclusions, discuss policy imperatives in priority areas, and propose specific measures.

#### Strengthening accountability towards protection of health workers

The key priority in this context is protection of health workers.<sup>64</sup> A dangerous precedent is set by rampant violations of international humanitarian law, and particularly the systematic attacks on health facilities and workers with intention to shut down care and to control the population, by any group involved in the conflict.<sup>35</sup> The absence of consequences for these war crimes exposes an unacceptable global indifference to the plight of health workers who play a role in trying to mitigate the humanitarian toll of armed conflict. This indifference must change through a framework of accountability and consequences.

Several countries, the UN Secretary General, and the UN High Commissioner for Human Rights have supported the referral of Syria to the International Criminal Court, but these efforts have been stymied by repeated vetoes by Russia and China in the UN Security Council.<sup>65</sup> The UN Security Council issued several resolutions demanding humanitarian access, of which resolution 2165 is considered binding, overriding the sovereignty prioritised in UNGA 46/182, the resolution underpinning the UN Office of Coordination of Humanitarian Affairs. Other resolutions demanded ending the use of chemical weapons.<sup>66</sup> Diplomatic and political obstruction has left these resolutions unimplemented.<sup>67</sup> Civil society and the international medical community must exert more pressure on all relevant institutions, governments, and

	Action needed to achieve core measure	Primary responsible organisations
Strengthen protection of health workers	Implement protection mechanisms outlined in UN Security Council resolutions 2139 and 2286; implement UN General Assembly resolution 71/248 to investigate war crimes, create prosecutable cases, and establish tribunals for prosecution; apply pressure on warring parties against targeting health workers as soon as such targeting is documented	UN Security Council, UN General Assembly, and all UN Member States
Monitor the situation	Collect data on numbers, distribution, roles of health workers during and after conflict as a core measure; and collect and disseminate data on attacks including on perpetrators	WHO, local and international health and human rights organisations working in conflict
Build capacity of health workers	Develop competency to address key public health functions, where such functions have collapsed because of conflict, and to respond to health challenges, whether related or unrelated to violence, early in the conflict; involve health worker organisations in development and implementation of strategies to protect health care and workers in conflict	WHO, international and regional medical, public health and allied health academic institutions and organisations
Address professional interruption	Introduce measures to address interrupted training and low skill sets in young health workers; address challenges facing health workers displaced by conflict	WHO, international and regional medical, public health and allied health academic institutions and organisations
Advance solidarity	Strengthen global solidarity platforms on protection of health workers in conflict	Mobilised organisations of health workers and civil society
Ensure learning	Carry out essential research to build the evidence base for action on issues affecting health workers in conflict	Academic and non-academic researchers
Make resources available	Mobilise and allocate resources to health workers in response plans, including for human resource planning	Donors

**Table 2: Global policy imperatives regarding health workers in conflict**

warring parties, to demand an end to these atrocities and to demand accountability for war crimes against medical workers and civilians.

The role of civil society groups—both international and Syrian, within and outside Syria—cannot be understated. Civil society groups, for example in Belgium, France, the Netherlands, Spain, and Sweden, have played a crucial role in lobbying for action on the Syria crisis,<sup>68,69</sup> and in bringing the crisis of health workers to the agenda in peace negotiations.

In view of the stalemate in the UN Security Council, in December, 2016, the UN General Assembly adopted a resolution establishing a mechanism to investigate and prosecute war crimes and crimes against humanity committed in the Syria conflict. Unlike the Commission of Inquiry long established by the UN Human Rights Council to report on war crimes in Syria, the prosecutorial mechanism is designed to collect evidence of war crimes in Syria and to prepare cases so that prosecutions will be more feasible when one or more tribunals become available.<sup>70</sup> To the extent that their mandate allows, global health players, such as UN agencies and international relief organisations operating in conflict areas, can assist these efforts by monitoring attacks on health care, aggregating data from all available

sources, verifying alleged violations, and offering evidence for accountability efforts.

The 2012 World Health Assembly resolution 65.20<sup>71</sup> and the 2015 UN General Assembly resolution 69/132 both called on WHO to take the lead in the systematic collection and dissemination of data on attacks on health workers. In response, WHO developed MEASURES, a tool for Monitoring of Events Against Safe Use and Running of Health Services in complex emergencies, and the Monitoring Violence against Health Care tool, and is now establishing a repository for reports from governments, media, and civil society organisations. These tools should have become available for use by 2016, but have been delayed.<sup>72</sup> Such monitoring to harmonise data collection across humanitarian and global health players should be a core task for groups concerned with global health.<sup>73</sup>

Although WHO has increased its “condemnations of attacks on health workers, delays in medical evacuations and removal of medicines and other medical supplies from convoys”, and although the Health Cluster in Turkey established a mechanism for reporting regularly on attacks against health-care workers and facilities in Syria in July, 2016, these tools as implemented by WHO, report only on the attacks, not the perpetrators responsible. That narrow interpretation of WHO’s reporting responsibilities fosters a sense of impunity on the part of the Syrian and Russian Governments, undermining the accountability needed to end these war crimes.

Ideally, to strengthen investigation of possible war crimes and to document attacks on health workers, these two efforts should be linked to ensure full implementation of relevant aspects of international humanitarian law.<sup>74,75</sup> Different methods of data collection, rules regarding evidence corroboration and use, and the independence of various players create complexities that must be addressed to ensure such linkage.

#### **Supporting health workers working in conflict**

Global changes in the nature of conflict and war strategies, exemplified by the Syria war, introduce complexity to health policies and interventions in conflict. The prolonged and intrastate nature of conflicts and the coexistence of crises of various natures and intensities in the same region call for changes in how we support health workers in conflict and the care they provide.<sup>76</sup> Empowerment and strengthening of the capacity of local, national, and regional health providers and their organisations are needed to deliver a wide range of services spanning care for injuries, neonatal, maternal, reproductive, mental health, vaccine-preventable communicable, non-communicable, and chronic diseases that meet the needs of people affected by conflict.<sup>47,77</sup>

#### **A crucial role for global health**

The crisis in Syria revealed shortcomings in the emergency response of WHO and other global health players to such conflicts.<sup>78,79</sup> We need to draw lessons to encourage WHO

and other groups to review and strengthen their policies and practices, in terms of consistency in reporting breaches of medical neutrality, maintaining independence, resisting pressure by governments to follow the official line, providing undeterred advocacy for health workers under duress including in non-government-controlled areas, and strengthening operational capacity to deliver health aid and support to health workers across conflict lines.<sup>71</sup>

International institutions should also enhance efforts to raise awareness by reminding countries of the importance of international frameworks for protecting humanitarian workers in conflict (eg, through prevention efforts identified by the ICRC<sup>80</sup>) and by encouraging them to devise strategies to reduce violence (such as training the military to minimise disruptions to health-care services).<sup>81,82</sup> Strengthening donor attention to health workers in response plans is needed, a major oversight exposed by the London conference in 2016.<sup>83</sup> Additionally, the new Special Economic Zones, set up by international donors in collaboration with host countries, such as Jordan, to provide employment opportunities for refugees, have limited their focus to agriculture, construction, and textiles sectors. Given right-to-work and visa issues in host countries there has been no attempt to address the situation of health workers. The Organisation for Economic Co-operation and Development and the World Bank in collaboration with the Center for Mediterranean Integration are starting a welcome dialogue in March, 2017, to address this gap.<sup>84</sup> Health workers will form a crucial group on which postconflict reconstruction policies can be designed, particularly in terms of rebuilding Syria’s health system. Such attention is crucial for a stronger longer-term humanitarian-development link to improve the response to any emergency, and is particularly needed in armed conflict.

Donors and the international community need to understand that the health situation in these brutal war settings is a threat to global health and even to their national and regional interests; a stronger response to the Syrian humanitarian and health crisis will strengthen global health.<sup>85,86</sup>

#### **Building on the agency of health workers towards global solidarity**

The Syria conflict case shows the importance of mobilising health workers internationally and their crucial role in supporting fellow health workers on the ground and in advocating for their protection on global platforms. The moral authority of health workers and their advocacy have helped move the issue of Syrian health workers up on the political agenda. We now need to build on this development to advance global collaboration platforms, such as Safeguarding Health in Conflict Coalition and ICRC’s Health Care in Danger initiative, which promote global solidarity with health workers in any conflict. Strengthening these platforms could contribute to the prevention of attacks on health

workers and, when prevention is not successful, early action in favour of the protection and support of such workers.

### Need for research and evidence on health workers in conflict

A wide range of operational research is needed to describe the nature and impact of violent events on health workers and health systems, understand the needs of health workers and how best to support them to cope, and analyse which interventions are successful and what contextual factors determine their effect.<sup>87,88</sup> Investment in the development of an evidence base for action in defence of health workers could help to support and protect them and guide the maintenance of the essential functions that they provide in the midst of armed conflict.<sup>87,89</sup> There is also a need to monitor and map Syrian health workers and training or medical education interventions across the region. Examination of available skill sets, qualifications, and experience will help donors and the international community prepare robust postconflict response plans. This data is scarce and poses severe challenges for addressing future health-care demands in Syria and neighbouring frontline countries.

### Conclusion

The plight of Syria's health workers exemplifies the difficulties facing health-care provision during armed conflict. These difficulties reach unprecedented levels in the Syria conflict under the strategy of weaponisation of health care in which health-care facilities are attacked, workers are targeted, medical neutrality is obliterated, and international humanitarian laws are violated, to restrict or prevent access to care as a weapon of war. The application of this strategy in the Syria conflict, largely by pro-government forces and allies, with limited consequences for perpetrators has profound implications for health protection. The situation calls for more attention by global health practitioners to develop new approaches and research. This Health Policy represents a preliminary inquiry and *The Lancet*-American University of Beirut Commission on Syria: Health in Conflict is eager to collaborate with various colleagues and players in research and practice, including through collection of more evidence from state and non-state parties and international and local organisations, to move this agenda forward.

#### Contributors

AA, APC, AS, AT, FE-J, FMF, MA, and SJ contributed to the conceptualisation and structure of the paper. AA, APC, AS, FA, FMF, FE-J, IA, LBK, NEA, MJ, SR, and SJ contributed to evidence synthesis and data analysis. AA, AS, FE-J, FMF, MA, NEA, and SJ contributed to writing the first draft of the paper. All authors provided comments and approved the final version. AS, FMF, and SJ assume responsibility for the work as a whole.

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#### References

- Jabbour S, Leaning J, Nuwayhid I, Horton R, Das P. *The Lancet*-American University of Beirut Commission on Syria: a new role for global health in conflict and a call for papers. *Lancet* 2016; **388**: 2967–68.
- Horton R. Syria—ending the state of denial. *Lancet* 2016; **388**: 2854.
- Roth K. To stem the flow of Syrian refugees, stop the barrel bombs. <https://www.hrw.org/news/2015/09/23/stem-flow-syrian-refugees-stop-barrel-bombs> (accessed March 7, 2017).
- Henckaerts J-M, Doswald-Beck L. Chapter 2. Distinction between civilian objects and military objectives. In: Henckaerts J-M, Doswald-Beck L, eds. *International Committee of the Red Cross. Customary international humanitarian law*. Cambridge, UK: Cambridge University Press, 2005: 25–32.
- International Committee of the Red Cross. Convention (I) for the amelioration of the condition of the wounded and sick in armed forces in the field. Geneva, 12 August 1949. March 22, 2016. <https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/INTRO/365?OpenDocument> (accessed Feb 20, 2017).
- International Committee of the Red Cross. The Geneva Conventions of 12 August 1949. <https://www.icrc.org/eng/assets/files/publications/icrc-002-0173.pdf> (accessed Feb 20, 2017).
- International Committee of the Red Cross. Convention (IV) relative to the protection of civilian persons in time of war. Geneva, 12 August 1949. 1977. <https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/385ec082b509e76c41256739003e636d/6756482d86146898c125641e004aa3c5> (accessed Feb 20, 2017).
- International Committee of the Red Cross. Protocols additional to the Geneva Conventions of 12 August 1949. 1977. [https://www.icrc.org/eng/assets/files/other/icrc\\_002\\_0321.pdf](https://www.icrc.org/eng/assets/files/other/icrc_002_0321.pdf) (accessed Feb 20, 2017).
- Office of the UN High Commissioner for Human Rights. International legal protection of human rights in armed conflict. 2011. [http://www.ohchr.org/Documents/Publications/HR\\_in\\_armed\\_conflict.pdf](http://www.ohchr.org/Documents/Publications/HR_in_armed_conflict.pdf) (accessed March 7, 2017).
- WHO. Committee on Economic Social and Cultural Rights. The right to the highest attainable standard of health. 2000. [http://apps.who.int/disasters/rep/13849\\_files/o/UN\\_human\\_rights.htm](http://apps.who.int/disasters/rep/13849_files/o/UN_human_rights.htm) (accessed Feb 20, 2017).
- Report of the Special Rapporteur on the right of everyone to the enjoyment of the highest attainable standard of physical and mental health. Aug 9, 2013. [http://www.wma.net/en/20activities/20humanrights/20distress/A\\_-Grover-Report-UN-GA-October-2013.pdf](http://www.wma.net/en/20activities/20humanrights/20distress/A_-Grover-Report-UN-GA-October-2013.pdf) (accessed Feb 20, 2017).
- Barnett M, Weiss TG. Humanitarianism: a brief history of the present. In Barnett M, Weiss TG, eds. *Humanitarianism in question: politics, power, ethics*. Ithaca, NY: Cornell University Press, 2008: 1–48.
- Rubenstein LS, Bittle MD. Responsibility for protection of medical workers and facilities in armed conflict. *Lancet* 2010; **375**: 329–40.
- Terry F. Violence against health care: insights from Afghanistan, Somalia, and the Democratic Republic of the Congo. *Rev Int Croix Rouge* 2013; **95**: 23–39.
- Humanitarian Outcomes: Aid Worker Security Report 2016. [https://aidworkersecurity.org/sites/default/files/HO\\_AidWorkerSecPreview\\_1015\\_G.PDF\\_.pdf](https://aidworkersecurity.org/sites/default/files/HO_AidWorkerSecPreview_1015_G.PDF_.pdf) (accessed March 7, 2017).

- 16 Hammond L. The power of holding humanitarianism hostage and the myth of protective principles. In Barnett M, Weiss TG, eds. *Humanitarianism in question: politics, power, ethics*. Ithaca, NY: Cornell University Press, 2008: 172–95.
- 17 Human Rights Watch. Razed to the ground. Syria's unlawful neighborhood demolitions in 2012–2013. <https://www.hrw.org/report/2014/01/30/razed-ground/syrias-unlawful-neighborhood-demolitions-2012-2013> (accessed March 8, 2017).
- 18 Amnesty International. Syria 2016–2017. 2016. <https://www.amnesty.org/en/countries/middle-east-and-north-africa/syria/report-syria/> (accessed March 7, 2017).
- 19 Human Rights Watch. Death from the skies. April 10, 2013. <https://www.hrw.org/report/2013/04/10/death-skies/deliberate-and-indiscriminate-air-strikes-civilians> (accessed March 8, 2017).
- 20 Amnesty International. Syrian government targets the wounded and healthcare workers. 2011. [http://www.amnestyusa.org/sites/default/files/mde240592011en\\_22.pdf](http://www.amnestyusa.org/sites/default/files/mde240592011en_22.pdf) (accessed March 8, 2017).
- 21 Sparrow A. Syria's assaults on doctors. Nov 3, 2013. <http://www.nybooks.com/daily/2013/11/03/syria-assault-doctors/> (accessed March 5, 2017).
- 22 Gulland A. Doctors in Syria are being forced to treat patients in secret, charity says. *BMJ* 2012; **344**: e1000.
- 23 Zarocostas J. Hospitals in Syria have become instruments of suppression, says Amnesty. *BMJ* 2011; **343**: d6947.
- 24 al-Khalidi S. Syrian forces shoot protesters, kill 6 in mosque. May 23, 2011. <http://www.reuters.com/article/us-syria-gunfire-idUSTRE72M04T20110323> (accessed March 7, 2017).
- 25 United Nations Human Rights Council. Assault on medical care in Syria 2013. <http://www.ohchr.org/EN/HRBodies/HRC/RegularSessions/Session24/Documents/A-HRC-24-CRP-2.doc> (accessed March 7, 2017).
- 26 Physicians for Human Rights. Perilous medicine: the legacy of oppression and conflict on health in Kosovo. 2009. June, 2009. [https://s3.amazonaws.com/PHR\\_Reports/perilous-medicineKosovo-legacy.pdf](https://s3.amazonaws.com/PHR_Reports/perilous-medicineKosovo-legacy.pdf) (accessed March 7, 2017).
- 27 Physicians for Human Rights. Doctors in the crosshairs: four years of attacks on health care in Syria. March, 2015. [https://s3.amazonaws.com/PHR\\_Reports/doctors-in-the-crosshairs.pdf](https://s3.amazonaws.com/PHR_Reports/doctors-in-the-crosshairs.pdf) (accessed Jan 15, 2017).
- 28 Physicians for Human Rights. Anatomy of a crisis: a map of attacks on health care in Syria. Findings as of July 2016. 2016. [https://s3.amazonaws.com/PHR\\_syria\\_map/findings.pdf](https://s3.amazonaws.com/PHR_syria_map/findings.pdf) (accessed March 7, 2017).
- 29 Syrian Network for Human Rights. Statistics from March 2011. <http://sn4hr.org/> (accessed March 7, 2017).
- 30 Violations Documentation Center in Syria. <http://www.vdc-sy.info/index.php/en/martyrs> (accessed March 7, 2017).
- 31 Syrian network for Human Rights. Reports on vital facilities attacked August 2014 through December 2016. <http://sn4hr.org/blog/category/report/monthly-reports/vital-facilities-monthly-reports/> (accessed March 7, 2017).
- 32 Syrian American Medical Society. The failure of UN Security Council Resolution 2286 in preventing attacks on healthcare in Syria. January, 2017. <https://foundation.sams-usa.net/wp-content/uploads/2017/01/UN-fail-report-06.pdf> (accessed Jan 27, 2017).
- 33 WHO. Attacks depriving people of urgently needed health care. *Bull World Health Organ* 2017; **95**: 6–7.
- 34 United Nations. Security Council adopts resolution 2286 (2016), strongly condemning attacks against medical facilities, personnel in conflict situations. May 3, 2016. <https://www.un.org/press/en/2016/sc12347.doc.htm> (accessed Feb 20, 2017).
- 35 Amnesty International. Syrian and Russian forces targeting hospitals as a strategy of war. March 3, 2016. <https://www.amnesty.org/en/press-releases/2016/03/syrian-and-russian-forces-targeting-hospitals-as-a-strategy-of-war/> (accessed Dec 22, 2016).
- 36 Assistance Coordination Unit. Assault on Medical Care AMC 2014. <http://www.acu-sy.org/en/assault-on-medical-care-amc-2014/> (accessed March 7, 2017).
- 37 Violation Documentation Center in Syria. The medical situation in eastern Gouta Damascus Suburbs. November, 2013. <http://www.vdc-sy.info/pdf/reports/1383565710-English.pdf> (accessed March 7, 2017).
- 38 Atlantic Council. Breaking Aleppo. 2017. <http://www.publications.atlanticcouncil.org/breakingaleppo/> (accessed March 8, 2017).
- 39 Francis E. The war on Syria's doctors. August, 2011. <http://foreignpolicy.com/2016/08/11/the-war-on-syrias-doctors-assad-medicine-underground/> (accessed March 7, 2017).
- 40 Ministry of Health, Syria. Annual Report 2009. <http://www.moh.gov.sy/Default.aspx?tabid=251&language=en-US> (accessed Feb 13, 2017).
- 41 Physicians for Human Rights. Syria's neighbors must let doctors practice. Feb 2, 2016. <http://physiciansforhumanrights.org/press-press-releases/syrias-neighbors-must-let-doctors-practice.html> (accessed March 6, 2017).
- 42 Abdullah Dardari. Middle East Institute conference. Nov 29, 2016. <http://www.youtube.com/watch?v=68GBLTM4KNQ> (accessed Feb 25, 2017).
- 43 Physicians for Human Rights. Aleppo abandoned: a case study on health care in Syria. November, 2015. [https://s3.amazonaws.com/PHR\\_Reports/aleppo-abandoned.pdf](https://s3.amazonaws.com/PHR_Reports/aleppo-abandoned.pdf) (accessed Jan 13, 2017).
- 44 Syrian Center for Policy Research. Forced dispersion: a demographic report on human status in Syria. Dec 10, 2016. <http://www.economistes-arabes.org/fr/scpr-forced-dispersion-syrian-human-status-the-demographic-report-2016/> (accessed Jan 25, 2017).
- 45 Attar S. The hell of Syria's field hospitals. *N Engl J Med* 2016; **374**: 2205–07.
- 46 Devi S. Syria's health crisis: 5 years on. *Lancet* 2016; **387**: 1042–43.
- 47 Sahloul MZ, Monla-Hassan J, Sankari A, et al. War is the enemy of health. Pulmonary, critical care, and sleep medicine in war-torn Syria. *Ann Am Thorac Soc* 2016; **13**: 147–55.
- 48 Physicians for Human Rights. PHR urges Russian medical community to protect health in Syria. December, 2016. <http://physiciansforhumanrights.org/library/phr-urges-russian-medical-community-to-protect-health-in-syria.html> (accessed March 7, 2017).
- 49 United Nations Human Rights Office of the High Commissioner. UN Commission of Inquiry on Syria condemns unlawful attacks in the Syrian Arab Republic. May 11, 2016. <http://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=19949&LangID=E> (accessed Jan 27, 2017).
- 50 Sparrow A, Almilaji K, Tajaldin B, Teodoro N, Langton P. Cholera in the time of war: implications of weak surveillance in Syria for the WHO's preparedness—a comparison of two monitoring systems. *BMJ Glob Health* 2016; **1**: e000029.
- 51 Sparrow A. Born to fight. Syria's conjoined twins and Assad's war machine. Sept 12, 2016. <https://www.foreignaffairs.com/articles/syria/2016-09-12/born-fight> (accessed Feb 20, 2017).
- 52 Alahdab F, Omar MH, Alsakka S, Al-Moujahed A, Atassi B. Syrians' alternative to a health care system: "field hospitals". *Avicenna J Med* 2014; **4**: 51.
- 53 Dewachi O, Skelton M, Nguyen VK, et al. Changing therapeutic geographies of the Iraqi and Syrian wars. *Lancet* 2014; **383**: 449–57.
- 54 Taub B. The shadow doctors: the underground race to spread medical knowledge as the Syrian regime erases it. *The New Yorker* (New York, NY), June 27, 2016. <http://www.newyorker.com/magazine/2016/06/27/syrias-war-on-doctors> (accessed Feb 1, 2017).
- 55 Assistance Coordination Unit. Annual Report 2015. 2015. <http://www.acu-sy.org/en/wp-content/uploads/2017/01/Annual-Report-2015-1.pdf> (accessed Feb 7, 2017).
- 56 Tajaldin B, Almilaji K, Langton P, Sparrow A. Defining polio: closing the gap in global surveillance. *Ann Glob Health* 2015; **81**: 386–95.
- 57 Vogel L. Why are doctors joining ISIS? *CMAJ* 2016; **188**: 177–78.
- 58 Ar-Raqqa in numbers. Al Amein for humanitarian support data and need assessment unit 2017. <http://www.alameen.org/reports/> (accessed Feb 11, 2017).
- 59 Beeley V. Dr Nabil Antaki reporting from West Aleppo under daily hail of terrorist mortars, hell cannon missiles. Oct 17, 2016. <http://21stcenturywire.com/2016/10/17/dr-nabil-antaki-reporting-from-west-aleppo-under-daily-hail-of-terrorist-mortars-and-hell-cannon-missiles/> (accessed Jan 20, 2017).
- 60 Syrian American Medical Society. Annual report 2015. 2015. <https://www.sams-usa.net/wp-content/uploads/2016/09/SAMS-2015-Annual-Report.pdf> (accessed Jan 23, 2017).
- 61 Union of Medical Care and Relief Organizations. 2017. <http://www.uossm.org> (accessed March 7, 2017).

- 62 White Helmets. Support the White Helmets. <https://www.whitehelmets.org/en/> (accessed March 9, 2017).
- 63 House Foreign Affairs Committee. Testimony of Dr Annie Sparrow: Assad's abhorrent chemical weapons attacks. June 17, 2015. <http://docs.house.gov/meetings/FA/FA00/20150617/103638/HHRG-114-FA00-Wstate-SparrowA-20150617.pdf> (accessed Feb 15, 2017).
- 64 Syrian American Medical Society. Syrian medical voices from the ground: the ordeal of Syria's healthcare professionals. February, 2015. [https://www.sams-usa.net/wp-content/uploads/2016/09/Syrian-Medical-Voices-from-the-Ground\\_F.pdf](https://www.sams-usa.net/wp-content/uploads/2016/09/Syrian-Medical-Voices-from-the-Ground_F.pdf) (accessed Jan 27, 2017).
- 65 United Nations Security Council. Referral of Syria to International Criminal Court fails as negative votes prevent Security Council from adopting draft resolution. May 22, 2014. <https://www.un.org/press/en/2014/sc11407.doc.htm> (accessed Jan 10, 2017).
- 66 United Nations Security Council. Security Council requires scheduled destruction of Syria's chemical weapons, unanimously adopting resolution 2118. Sept 27, 2013. <https://www.un.org/press/en/2013/sc11135.doc.htm> (accessed Jan 10, 2017).
- 67 Human Rights Watch. Syria: new deadly chemical attacks. Strong security council action needed. Sept 28, 2016. <https://www.hrw.org/news/2016/09/28/syria-new-deadly-chemical-attacks> (accessed Jan 20, 2017).
- 68 Human Rights Watch. Uniting for peace in Syria: global civil society appeal to UN member states. Dec 1, 2016. <https://www.hrw.org/news/2016/12/01/uniting-peace-syria-global-civil-society-appeal-un-member-states> (accessed Feb 21, 2017).
- 69 Polithor European Policy Network. Civil society responses to refugee crisis 2016. January, 2016. <http://polithor.net/wp-content/uploads/2016/01/Polithor-Special-Report-on-Civil-Society-Responses-to-Refugee-Crisis.pdf> (accessed Feb 21, 2017).
- 70 United Nations. International, impartial and independent mechanism to assist in the investigation and prosecution of persons responsible for the most serious crimes under International Law committed in the Syrian Arab Republic since March 2011. Resolution A/Res/71/248. [http://www.un.org/en/ga/search/view\\_doc.asp?symbol=A/RES/71/248](http://www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/71/248) (accessed March 8, 2017).
- 71 WHO. WHO's response, and role as the health cluster lead, in meeting the growing demands of health in humanitarian emergencies. May 26, 2012. [http://www.wma.net/en/20activities/20humanrights/20distress/A65\\_R20-en.pdf](http://www.wma.net/en/20activities/20humanrights/20distress/A65_R20-en.pdf) (accessed Feb 23, 2017).
- 72 WHO. Tracking attacks on health workers—don't let them go unnoticed. December, 2015. <http://www.who.int/features/2015/healthworkers-in-emergencies/en/> (accessed Feb 23, 2017).
- 73 United Nations. Resolution adopted by the General Assembly on 11 December 2014. Jan 9, 2015. [http://www.un.org/en/ga/search/view\\_doc.asp?symbol=A/RES/69/132](http://www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/69/132) (accessed Feb 23, 2017).
- 74 Guha-Sapir D, Rodriguez-Llanes JM, Hicks MH, et al. Civilian deaths from weapons used in the Syrian conflict. *BMJ* 2015; **351**: h4736.
- 75 Coutts A. To prosecute the perpetrators in Syria, the killings must be documented. March 11, 2015. <https://www.theguardian.com/commentisfree/2015/mar/11/syria-prosecute-perpetrators-killings-documented> (accessed March 7, 2017).
- 76 Spiegel PB, Checchi F, Colombo S, Paik E. Health-care needs of people affected by conflict: future trends and changing frameworks. *Lancet* 2010; **375**: 341–45.
- 77 Ismail SA, Abbara A, Collin SM, et al. Communicable disease surveillance and control in the context of conflict and mass displacement in Syria. *Int J Infect Dis* 2016; **47**: 15–22.
- 78 Al Qutob MF. WHO and the refugee crisis in Jordan and beyond. *Lancet Glob Health* 2016; **4**: e304.
- 79 Cousins S. Syrian crisis: health experts say more can be done. *Lancet* 2015; **385**: 931–34.
- 80 International Committee of the Red Cross. ICRC prevention policy. April, 2010. <http://www.icrc.org/eng/assets/files/publications/icrc-002-4019.pdf> (accessed Feb 25, 2017).
- 81 Shetty P. Protecting health-care workers in the firing line. *Lancet* 2013; **382**: e41–42.
- 82 International Committee of the Red Cross. Even wars have limits: health-care workers and facilities must be protected. May 3, 2016. <https://www.icrc.org/en/document/hcid-statement> (accessed Jan 18, 2017).
- 83 Fouad FM, Alameddine M, Coutts A. Human resources in protracted crises: Syrian medical workers. *Lancet* 2016; **387**: 1613.
- 84 Center for Mediterranean Integration. Strengthening human resources for health: integration of refugees into host community health systems. 2017. <http://cmimarseille.org/highlights/strengthening-human-resources-health-integration-refugees-host-community-health-systems> (accessed March 8, 2017).
- 85 Coutts A, Fouad FM. Response to Syria's health crisis—poor and uncoordinated. *Lancet* 2013; **381**: 2242–43.
- 86 Boseley S, Joanne Liu, MSF International President: a need for greater humanity. *Lancet* 2016; **388**: 861.
- 87 Nickerson JW. Ensuring the security of health care in conflict settings: an urgent global health concern. *CMAJ* 2015; **187**: e347–48.
- 88 Coutts A, Fouad FM, Abbara A, Sibai AM, Sahloul Z, Blanchet K. Responding to the Syrian health crisis: the need for data and research. *Lancet Respir Med* 2015; **3**: e8–9.
- 89 The Lancet. Human resources for health—investing in action. *Lancet* 2016; **387**: 1591.