

## Strategy, responsiveness and preparedness of the Syrian health care system in the short, mid and long term



Prepared by:

Bodo Ebens, M. Eng.

Erik Fosse, MD, PHD, MHA

Michael Niechzial, MD, PHD, MPH

Oliver Rentzsch, MD, PHD, M. Eng.

Under the guidance of the WHO Representative in Syria, the Hospital Committee of the Ministry of Health and the Ministry of Higher Education of the Syrian Arab Republic

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## List of acronyms and abbreviations

ALOS	Average Length of Stay
ICU	Intensive Care Unit
IDP	Internally Displaced Person
IT	Information Technology
KPI	Key Performance Indicator
Med.Tech	Medical Technology
MoH	Ministry of Health
MoHE	Ministry of Higher Education
OECD	Organisation for Economic Co-operation and Development
OR	Operation Room
WHO	World Health Organization

## 1 Executive summary

The findings and related strategic suggestions presented in this report are based on a hospital assessment, including data analysis and inspection, of various hospitals in the Syrian Arab Republic conducted during the period October to December 2015. They were further developed by a group of health care and hospital management experts through a discussion of concepts for potential solutions, taking international best practice into consideration. They were finally consolidated during a two-day strategic workshop involving stakeholders of the Syrian health care system (including representatives of the Syrian ministries of health and higher education, as well as health professionals from various public hospitals) and World Health Organization (WHO) experts.

Besides many positive aspects, the main and strategically relevant findings with regard to strengthening the Syrian health care system, including and preparedness and responsiveness, are the following:

- Technology and infrastructure
  - relevant health care is not accessible by the affected population;
  - essential (existing) medical technology and infrastructure often do not function due to lack of maintenance, while essential medical technology is often missing completely; information technology (IT) support for medical record keeping and documentation could be improved;
  - availability of equipment, and hence services, does not always correlate well with needs (there is scarcity of equipment in some hospitals and oversupply in others).
- Human resources
  - There are shortages (varying from region to region) in specialist doctors and nurses and decreasing availability/capacity of the health workforce.
- Cooperation, coordination and capacity
  - The possibilities to build capacity by strengthen inter-sectoral cooperation (e.g. public-private) are underdeveloped, there is still potential capacity to provide health services. The management of the secondary health services could be strengthened to promote an integrated, balanced use of existing capacity.
  - The incentives for the managing structures of the system to develop flexible and situation adapted solutions are improvable. The regulative framework is setting inexpedient hurdles of relevant actions and procedures.

As a result of the above-mentioned workshop, the following action clusters were agreed:

- assessment, development and management of health infrastructure, health technology and the relevant services and maintenance capacities, consumables and medication;

- management of human resources in health care, considering the adverse impact of the crisis;
- leveraging the responsiveness of the Syrian health care system – in particular the primary and secondary health care levels.

The agreed actions and initiatives were prioritized and introduced into a planning framework.

The authors of this document would like to emphasize that certain actions can be started very soon, utilizing existing resources and not requiring substantial funding: for example, an assessment of medical technology, infrastructure and logistics of goods and services can be performed by personnel already available in the system.

Based on the discussions and completed by an expert approach, a very raw estimate is that high- to mid-priority actions would require a budget of US\$ 1.5 billion. This budget would cover a sufficient rehabilitation of the secondary health care sector and some limited improvement measures.

## **2 Aims, objectives and limitations of the study**

After more than 5 years of an ongoing crisis in Syria, it is relevant to think and plan the necessary steps and actions to (re-)strengthen the responsiveness and readiness of the Syrian health system. Integrated into the strategical action plan of WHO and other agencies of the UN, the aim of this study is to provide a systematic first overview related to the actual situation in the secondary health system, a strategical qualitative analysis and to develop the basic framework for strategical actions and planning processes. At the end, a first version and a structure of an agreed action plan, clustered into short-, mid- and long term actions including a first budget overview and relevant implementation measurement indicators should be developed.

The objectives are developed in a three step approach. The first step is the review of existing data and relevant information (analytical framework), followed by several site visits in dedicated areas of the country and is finalized in a workshop with relevant stake holders of the system including external qualitative input by international health care professionals.

The limitations of this projects are firstly in the focus on secondary care (primary care is objective of an own existing study), secondly in the focus on qualitative/strategical aspects of the system (detailed needs for rehabilitation is the scope of a planned following project) and finally certain difficulties to inspect health care facilities in hard to reach areas in the country.



### 3 Introduction

The adverse impact of the Syrian crisis on the most vulnerable people continues to be compounded by the disrupted health system. As at December 2015, of 113 assessed public hospitals, 43% (49) were fully functioning, 31% (35) were partially functioning, while 26% (29) were reported to be non-functioning. The health care system is challenged both by the destruction of buildings, the lack of medical device maintenance and spare parts, and the loss of human resources. The purpose of the mission of October to December 2015 was to review available data and assess secondary care in selected governorates, in order to assist the Syrian Ministry of Health (MoH) in identifying gaps and priorities. Based on this review, an action plan was developed for exploring the possibilities for re-establishing a viable health care system during the crisis and, in the longer term, restoring the health care system.

Although standard health indicators in Syria had improved steadily for decades, the Syrian secondary health care system faced challenges even before the crisis. The number of health care staff was already limited; the ongoing crisis has exacerbated the situation, leading to a loss of health care professionals and reduced mobility between institutions.

Another challenge predating the crisis was the availability of quality data from all hospitals for monitoring performance and maintaining cost control at a time when health institutions are becoming steadily more technology dependent. Advanced devices like ultrasound, computer tomography, magnetic resonance imaging, fluoroscopy and videoscopes are today tools that are used daily in diagnosis and treatment. Digitalized information allows digital storage of image data, patient records, and laboratory data and allows establishment of quality registries both in hospitals and at national level.

Dependence on technology makes hospitals vulnerable, however, and creates challenges for hospital organization and human resources. For hospital management and procurement processes, maintenance and servicing of the technology represent a challenge. For the workforce, the technology requires new collaboration and a team approach to diagnosis and treatment. Maintenance of medical technology and spare part procurement are major challenges in Syrian hospitals today.

In actions to maintain and restore a qualitatively acceptable hospital structure, this development has to be taken into account. Thus, the establishment of managerial tools like quality databases and systems for human resource management are integral parts of the suggested plan.

WHO has conducted frequent Health Resources Availability Mapping System (HeRAMS) assessments over the years. In addition, the assessment carried out in 2015 through site visits to hospitals in different areas in Syria (for details see Section 6) yielded relevant insights for further discussion, agreement and implementation of activities and initiatives aiming at the rehabilitation of the Syrian health care system.

The workshop was organized in order to link previous findings with information from international references and best practices along with insights from the participants

(representatives of ministries, governorates, hospitals and other institutions). Relevant information was discussed and processed in order to obtain commitment to achieving the necessary actions and initiatives. Finally, the experts also brought their suggestions for the strategic development of a modern and comprehensive health care system in Syria.

The principle approach and structure of the study and the systematic approach is summarized in Fig. 1.

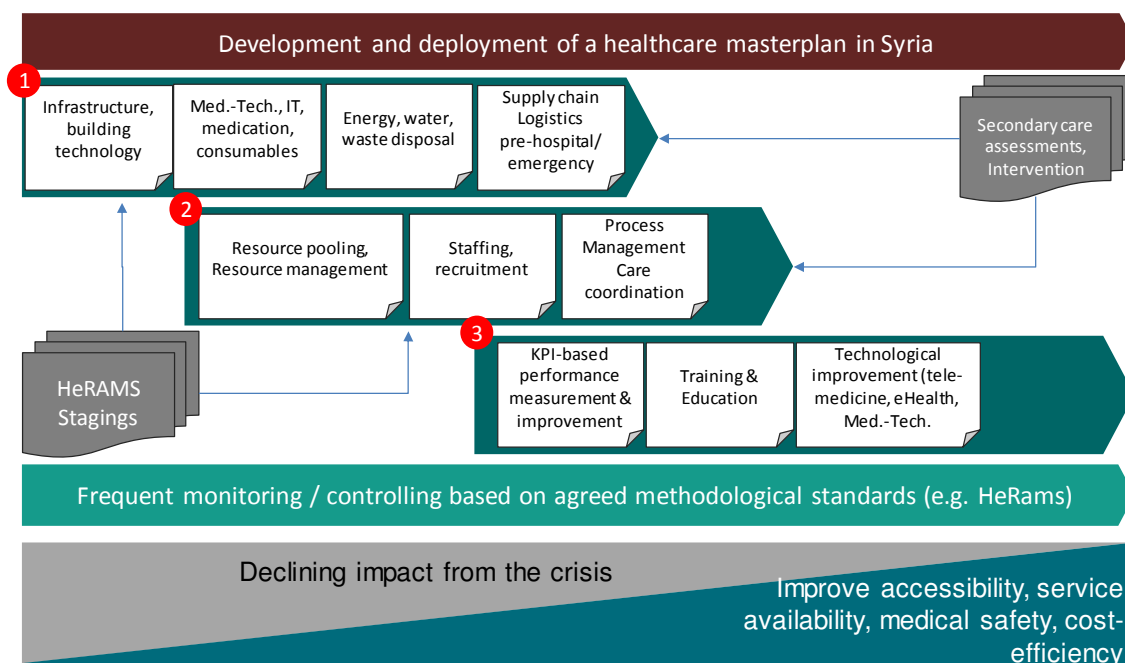


Fig. 1. Systematic approach of the masterplan development, discussed in the workshop held in Damascus, 23–24 February 2016

The topic of the workshop is planned as an integrated framework in order to touch the strategical relevant aspects. The identified strategical action cluster for the first approach to strengthen the responsiveness and readiness of the health system (focus secondary care) in a logical time chain are:

- Hospital infrastructure, support and logistics
- Human resources and process management
- Management and Monitoring, technological development lines (long-term)

A challenge of the stake-holder workshop is to find the right balance between short-term (crisis related) and long term (system development related) actions. The solution was to integrate the action into a time frame in assumption of a “normalization” of the situation in the country in the future perspective.

## 4 Basic data and information

Before the present crisis in Syria, traditional health indicators had steadily improved over three decades. The maternal mortality rate dropped from 123 per 100 000 in 1990 to 49 per 100 000 in 2010. Life expectancy at birth was 75 years in 2013, two years above the global average.<sup>1</sup> Infant mortality and child mortality also showed a steady improvement. Death from communicable diseases was declining. However, these were indicators of better living conditions, but not real indicators of the status of the health care system.

Total government expenditure on health as a percentage of gross domestic product was 3.3 in 2013, which is low, including in comparison with neighbouring countries like Jordan (8.0), Iraq (4.8) and Lebanon (7.5).<sup>1</sup> Despite the low public investment, however, access to health services had shown a steady increase.

There has been growing concern regarding the validity of health data, overall inequity, transparency, utilization of capacity and coordination between providers of health services in Syria. Since 2000, there was a large growth in the private hospital sector with an unclear sharing of responsibility between the private and public sectors. There have also been concerns regarding standardization and quality assurance.<sup>2</sup>

The lack of quality registries makes it difficult to assess the impact of the present crisis on the quality of the health care. The WHO publication “Framework for health information systems and core indicators for monitoring health situation and health system performance 2015”<sup>3</sup> gives actual data. Respecting the fast changes of the crisis impacts on the environment and the resulting difficulties of data acquisition it can be assumed, that the indicators are showing a trend, the absolute value might be not exact.

An increase in the maternal mortality rate from 49 deaths per 100 000 live births in 2010 to 68 deaths per 100 000 live births in 2015 may be an indicator of how the crisis is affecting public health, but is not an indicator of the quality of health care provision as such.

Developments in the human resources for health may give reason for concern. The relative number of medical doctors in Syria was 1.3 physicians per 1000 population in 2014<sup>4</sup> as compared with other countries of the Eastern Mediterranean Region (per 1000 population: Jordan 2.9; Lebanon 3.0; Palestine 2.1 and OECD 3.3<sup>5</sup> ).

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<sup>1</sup> <http://data.worldbank.org/>

<sup>2</sup> Kherallah M, Alahfez, Sahloul Z, Eddin KD, Jamil G. Health care in Syria before and during the crisis. *Avicenna J Med*. 2012 Jul;2(3):51–3.

<sup>3</sup> Framework for health information systems and core indicators for monitoring health situation and health system performance 2015  
[http://applications.emro.who.int/dsaf/EMROPUB\\_2015\\_EN\\_1904.pdf?ua=1&ua=1](http://applications.emro.who.int/dsaf/EMROPUB_2015_EN_1904.pdf?ua=1&ua=1).

<sup>4</sup> Global Health Observatory data repository (<http://apps.who.int/gho/data/node.main.A1444>).

<sup>5</sup> Health at a glance 2015: OECD indicators. Paris: OECD Publishing; 2015. doi:[10.1787/health\\_glance-2015-en](https://doi.org/10.1787/health_glance-2015-en).

Nurses greatly outnumber physicians in most countries of the Region (and OECD). Nurses play a critical role in providing health care not only in traditional settings, such as hospitals and long-term care institutions, but increasingly in primary care. As the complexity of health care provision increases, specialized nurses become increasingly important to clinical care.

The relative number of nurses and midwives (together) in Syria was 1.98 per 1000 population in 2014<sup>4</sup> which was (far) less than other countries (per 1000 population: Jordan 3.7; Lebanon 3.3; Palestine 2.5; OECD 9.1 nurses (alone)).<sup>5</sup>

The Syrian MoH has a benchmark of 2 nurses per physician, which is comparable with some countries in the WHO European Region, such as the Russian Federation, but which is lower than the OECD median of 2.8.<sup>5</sup> Looking at more culturally comparable countries the ratio in Jordan is 1.0; Lebanon 1.1 and Palestine 1.2. However, the actual figures indicate that the ratio of nurses and midwives to physicians in Syria as a whole in 2014 was 1.5. This indicates, that the governmental benchmark is strategic comprehensible and integrates cultural aspects with international health standards.

The annual HeRAMS report for 2015 gives cause for alarm concerning developments in the availability of medical personnel in Syria. The report showed that the number of medical doctors in public hospitals decreased by 11% from 10 586 in January to 9455 in December 2015. In the same period, the number of nurses decreased by 9% from 16 450 to 14 892. The number of midwives in public hospitals decreased by 13% in 2015 from 1516 to 1319.<sup>6</sup>

Health care support staff were not registered in the HeRAMS report. The ratio of support staff to medical staff was benchmarked at 0.25 in Syria before the crisis, but is assumed to be much lower now. This is a challenge to a health care system that relies to an increasing degree on advanced technology in diagnostics and treatment.

The report also demonstrated geographical differences between Syrian regions in the density of university trained health personnel.

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<sup>6</sup> HeRAMS annual report January–December 2015: Public hospitals in the Syrian Arab Republic. WHO; 2015.

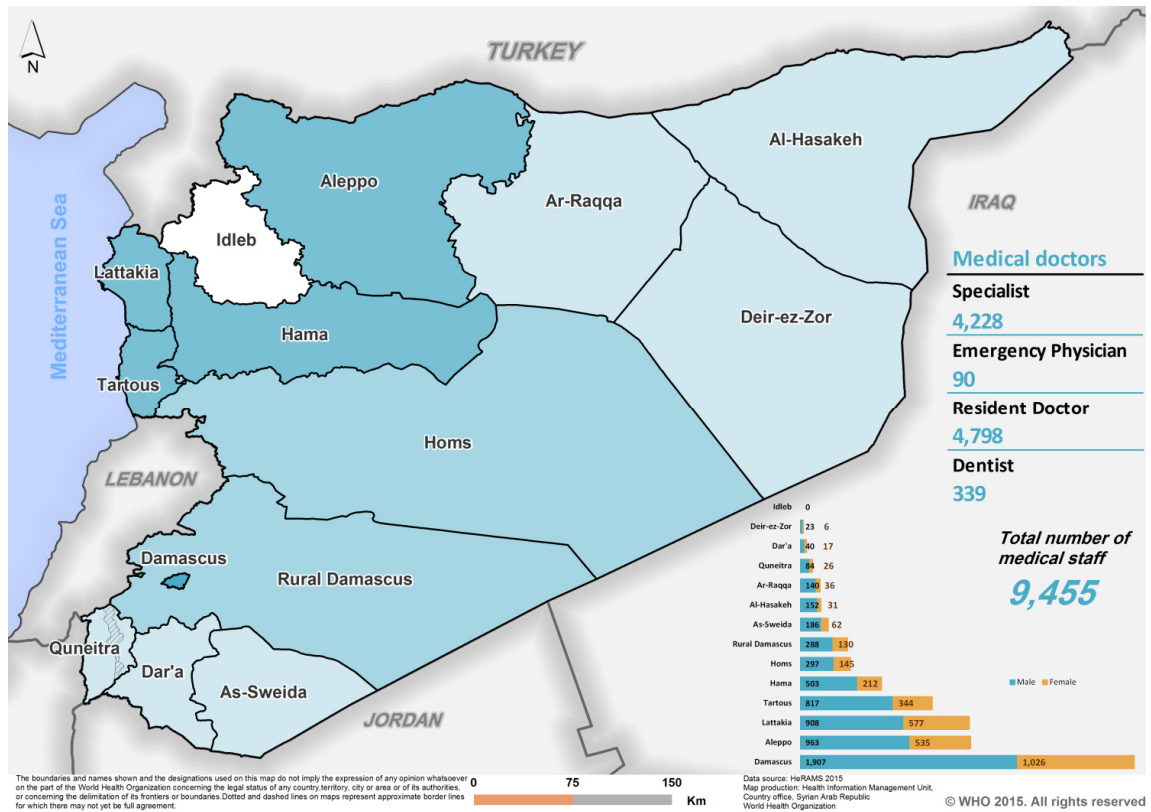


Fig. 2. Availability of medical doctors in functional public hospitals as at the of December 2015, per governorate (Source: HeRAMS annual report January–December 2015: Public hospitals in the Syrian Arab Republic. WHO; 2015).

Public hospitals are owned either by the Ministry of Higher Education (MoHE) (university/teaching hospitals) or the MoH. In 2105, 31% (2952) of medical doctors (specialists and resident doctors) worked in MoHE hospitals, while 69% (6503) worked in MoH hospitals.

The MoHE hospitals are located in four governorates (Damascus, Rural Damascus, Aleppo and Lattakia), serving the whole country.

By the end of December 2015, of the 113 assessed public hospitals (MoH and MoHE), 43% (49) were fully functioning, 31% (35) were reported to be partially functioning, while 26% (29) were reported to be non-functioning.<sup>7</sup>

<sup>7</sup> HeRAMS annual report January–December 2015: Public hospitals in the Syrian Arab Republic. WHO; 2015.

## 5 Scope of the workshop

The scope of the 2-day workshop, as the final step of the hospital and health system assessment, was to create a common understanding of relevant stake holder about the findings of the assessment and identification of starting points, of necessary actions and the development of a strategic plan to strengthen the readiness and responsiveness of the Syrian health system, with a focus on secondary care.

According with the planned structure of the workshop (ref. chapter 1), a presentation and focused discussion of the findings of the hospital assessment and health system analysis gave an overview of the current situation and identifies first gaps in the health system, and respective practical challenges.

In the second phase, an expert input on various strategies and systematic data analysis focusing on system relevant components of a health system as technology/infrastructure, human resources, monitoring/management and future system developments complements the analysis and existing challenges.

These priorities were supplemented by additional analyses by the WHO expert team and were finally condensed into a principle strategic action plan. The plan gives an overview of the necessary actions in a logical framework, taking into consideration the required resources and project management principles.

The workshop should provide a basis for the preparation of further actions to strengthen the responsiveness and readiness of the Syrian health care system and should facilitate related resource and project planning. It is not a detailed master plan, which still has to be developed based on further assessments and analysis (e.g. hospital rehabilitation assessment (planned) and structural primary health system analysis (existing)).

## 6 Strategic Workshop

### 6.1 Hospital assessment

#### 6.1.1 Findings of the assessment

The assessment covered data provided by HeRAMS, the auditing of hospitals managed under the auspices of the MoH (general hospitals) or the MoHE (university/teaching hospitals) as well as private/nongovernmental hospitals in Syria, and focused discussions with stakeholders of the Syrian health system.

The WHO “Hospital safety index”<sup>8</sup> will provide a deeper analysis and is the right toll for a necessary and planned second, more in rehabilitation focussed, assessment. The scope of this study and the on-site visits was to create useful base-line information for the strategic approach the strengthen the Syrian health system.

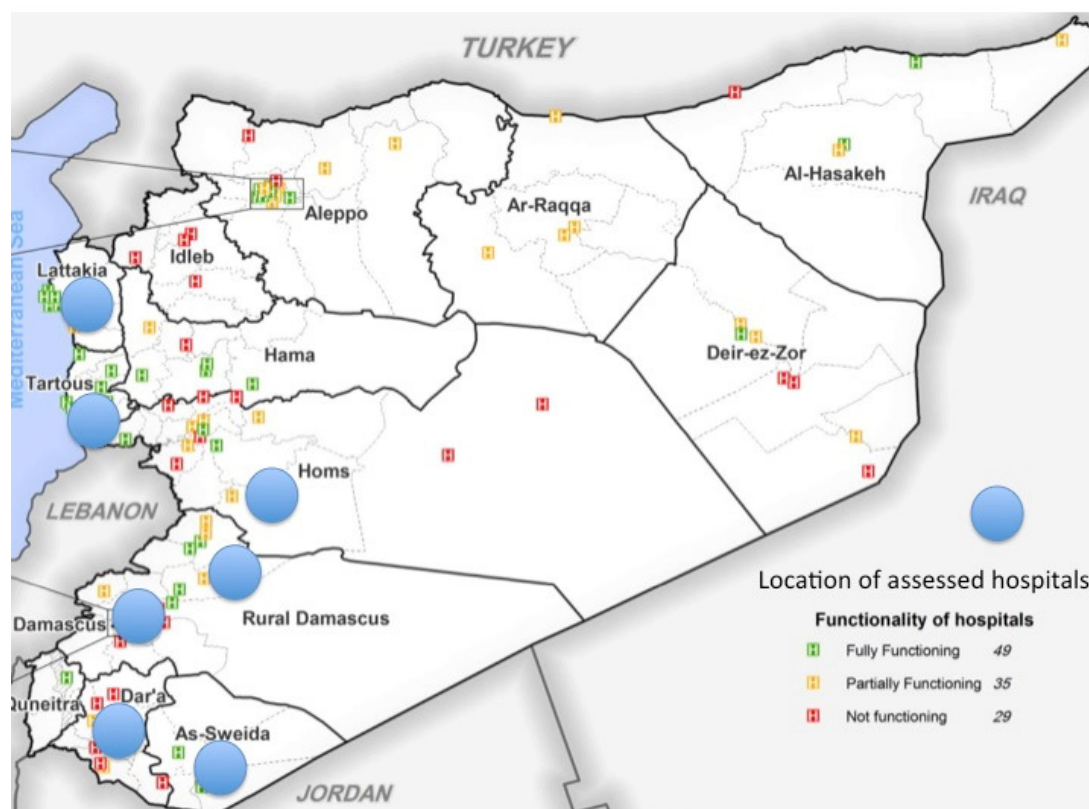


Fig. 3. Distribution of the assessed hospitals (Map source: HeRAMS Syria 2015)

There are some areas of strength in the system that can be built on. Major findings in this context are as follows:

- one general observation was that there is a high level of competence of health workers, at both the specialist and non-specialist levels and nursing/midwifery;
- the services offered (under the crisis circumstances) are compliant, when structurally possible, with good standards for quality of care;
- there is an existing competence baseline in the system for developing responsiveness and readiness in the current situation and in the future;

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<sup>8</sup> Hospital Safety Index  
[http://www.paho.org/disasters/index.php?option=com\\_content&view=category&layout=blog&id=907&Itemid=884](http://www.paho.org/disasters/index.php?option=com_content&view=category&layout=blog&id=907&Itemid=884)

- the indicators for health system effectiveness (life expectancy of 76 years, maternal mortality of 68 (2015) but 49 (2010) per 100 000 live births<sup>9</sup> underline the potential performance of the system and the possibly high standard.
- the cooperation that has been achieved in Daraa is noteworthy. Due to the damage sustained by the public hospital and the dangerous surrounding area, WHO, through cooperation with a nongovernmental organization, enables “free of charge” maternity care in a functional private hospital in the region, thereby closing a very important gap.

Besides these positive aspects, which are an essential baseline for development, the focus of the assessment was to identify challenges and strategic actions for improving healthcare with a short-, mid- and long-term perspective

The map below (Fig. 4) gives an overview of the functionality status of health infrastructure and the distribution of IDPs.

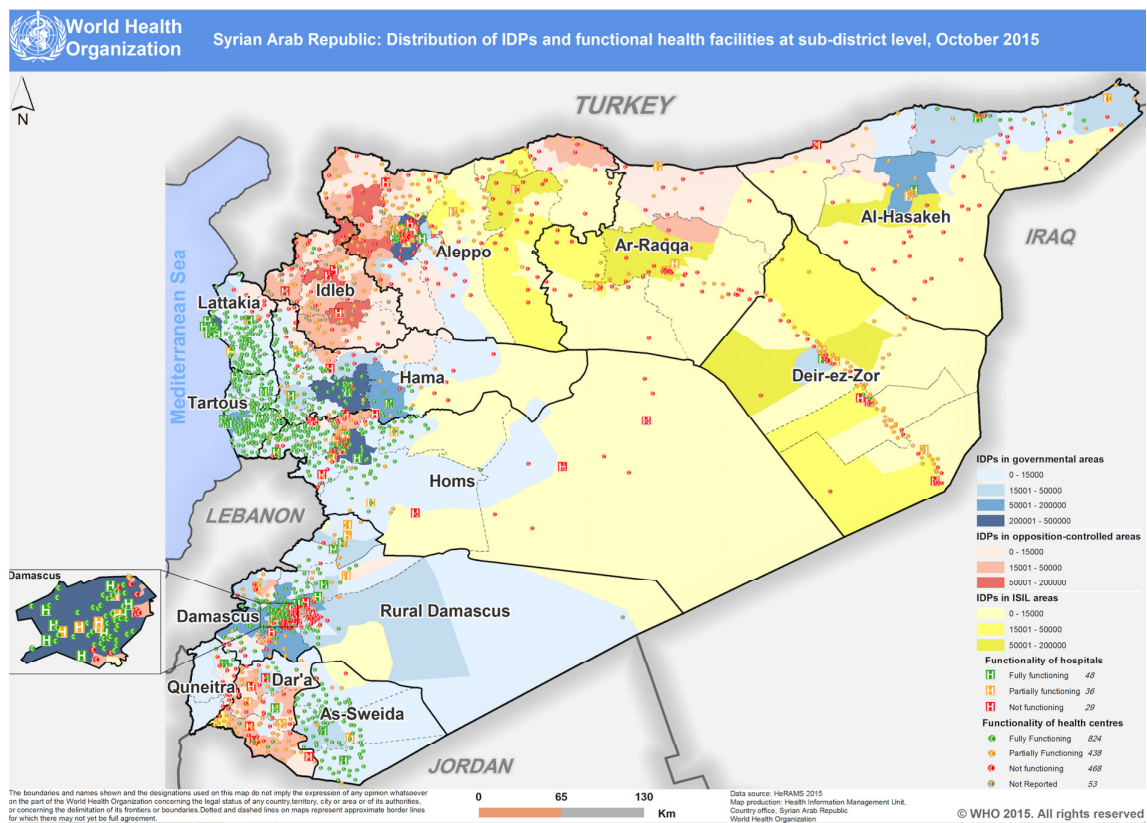


Fig. 4. Functionality status of health infrastructure and IDP distribution (Source: HeRAMS Syria 2015)

- Due to the higher level of economic and managerial responsibility in autonomous hospitals, the authors observed that acquiring data and information on service

<sup>9</sup> Maternal mortality in 1990-2015, WHO 2015  
[http://www.who.int/gho/maternal\\_health/countries/syr.pdf](http://www.who.int/gho/maternal_health/countries/syr.pdf)



performance, capacities and quality is less difficult than in the public non-autonomous hospitals. In addition, some obvious advantages for semi-autonomous structures could be observed. They are offering “free of charge” emergency care for the people, charging fees for “normal care”. The fees (e.g. around 100\$ -150\$) for delivery care, are in an acceptable range, which could be covered by comparable insurance organizations. In the current crisis, the free of charge emergency care is an important part of basic health service. The semiautonomous status opens also additional channels for donations etc.

- The workload for medical doctors is usually case-based and not primarily allocated according to the number of “operated beds”. The current high numbers of cases (emergencies, outpatient services, and surgical procedures) can principally be managed by the health workers still available in the system (at the moment of observation). The capacity of health professionals seems to be almost sufficient, but only under the current circumstances. Once the secondary and tertiary health care system is re-established and reactivated at national level, a shortage in certain specialties can be expected (as has already been observed in Lattakia).

Nevertheless, the impression is that the relation between available working capacity/infrastructure and case-load is not well established and that consequently human resources capacity is not distributed according to service needs.

- Detailed and specific assessments of the infrastructure situation and rehabilitation needs are required and will be part of a planned study. However, the operational capacity of hospitals is currently severely compromised by the non-availability of essential biomedical technology – this is critical.
- Quantitative data and indicators for the measurement and evaluation of service quality are not available at the moment. It appears that the main risks for the quality of medical services are in the areas of infrastructure and the availability of functional medical technology and essential pharmaceuticals (already being addressed by WHO).
- Substantial quality problems are appearing in reaction to the crisis:
  - insufficient infrastructure causes hygiene problems, especially in the operating room (OR);
  - the short average length of stay (ALOS) (1–2 days, post-surgery) as a reaction to the high case-load does not allow for satisfactory monitoring of patients during the recovery period;
  - technical equipment for diagnostic procedures (e.g. X-ray, ultrasound, endoscopy) is generally insufficient (availability, functionality) due to lack of maintenance and non-availability of spare parts.
- In general, the problem of non-availability of technical infrastructure caused by missing spare parts and lack of maintenance by manufacturers is evident and

critical for health services. WHO's response work in Syria, delivering essential equipment and pharmaceuticals, is in operation and effective. The hospitals require continuing support to keep their services running.

- There was a broad range of utilization rates of the hospitals visited; generally, all “free of charge” hospitals are overburdened, the semi-autonomous hospitals (charging fees for many of their services) are operating at normal capacity, and the “pay per case” (private) hospitals are often underutilized. There are exemplary models of cooperation, such as in Daraa, where a regulation is in force stipulating that private hospitals must deliver 24-hour “free of charge” care for emergencies and a private hospital offers maternal care, funded by a WHO-supported NGO; this is an example which shows excellent results in capacity building and service management.
- The impression is that damaged functional areas (OR, diagnostics, intensive care units (ICUs)) require reconstruction. Simple rehabilitation will not be sufficient in most cases to meet functional and hygiene requirements. The HeRAMS data provide a proxy of the real situation.
- In regions with highly damages hospital infrastructure, there is mostly no sufficient “back up” for health service. A reconstruction is needed.
- There is a quantitative and qualitative gap in providing mental care. The demand, due to crisis related psychological trauma is highly evident.

#### 6.1.2 Assessment linked - (direct-) recommendations

First recommendations were discussed during the meetings with the local hospital management and regional Directors of Health (DoH) in the site visits. The following list gives an overview about these points:

- For reaction on local shortages in Health work force a case-load based allocation of human resources, including a flexible oversight and management system should be established.
- Due to the highly significant shortage in the availability in medical technology, it is recommended that priority must be given to the establishment of technical intervention teams that offer mobile maintenance and repair services to all (public and private) hospitals.
- For quality evaluation and improvement a focus on qualitative exploration methods such as observation and peer review is recommended.
- For complex technical equipment, the integration of availability and needs into a regional hospital services management concept, including several regional health care providers (public/private, autonomous) is recommended, in order to max-

imize the utilization of existing facilities and the number of beneficiaries (efficiency).

- Coordinated cooperation among hospitals would contribute to better accessibility to quality care for the population and will build capacity in a short term perspective. Nevertheless in certain regions with damaged hospital infrastructure a (modular) reconstruction will be mandatory.
- The ((partly-) damaged) hospital infrastructure needs to be evaluated on a case-by-case basis in an infrastructure assessment that would establish the basis of a master plan for the development of hospital services in Syria a useful tool could be the Hospital Safety Index by WHO.
- For the detailed rehabilitation plan, in addition to the good HeRAMS data set, a qualitative inspection is required, otherwise important information on which to base interpretation and conclusions will be missing.

## 6.2 Input from the experts: international references and best practices

### 6.2.1 Biomedical equipment management in hospitals and primary care centres

Besides personnel and infrastructure, biomedical equipment is the most important resource in primary health care (PHC). Due to the rapid evolution of medical procedures as well as the increasing challenge of funding medical technology, the supply of medical equipment should closely adhere to medical demand in terms of functionality, availability and capacity. In order to achieve this, the following parameters/indicators should be taken into account.

#### **Case numbers**

- Diagnoses, major procedures
- Respirator treatments (estimated hours per ICU patient)

#### **Medical devices**

- Main type (e.g. imaging, electro-surgical, infusion/fluid management)
- Sub-type (e.g. radiography system, Doppler ultrasound, syringe pump, cautery device)
- Number of devices
- Location/assigned dept. in the facility (e.g. ward, OR, X-ray-department, ICU)
- Classification of the device according to international standards (e.g. Universal Medical Device Nomenclature System)

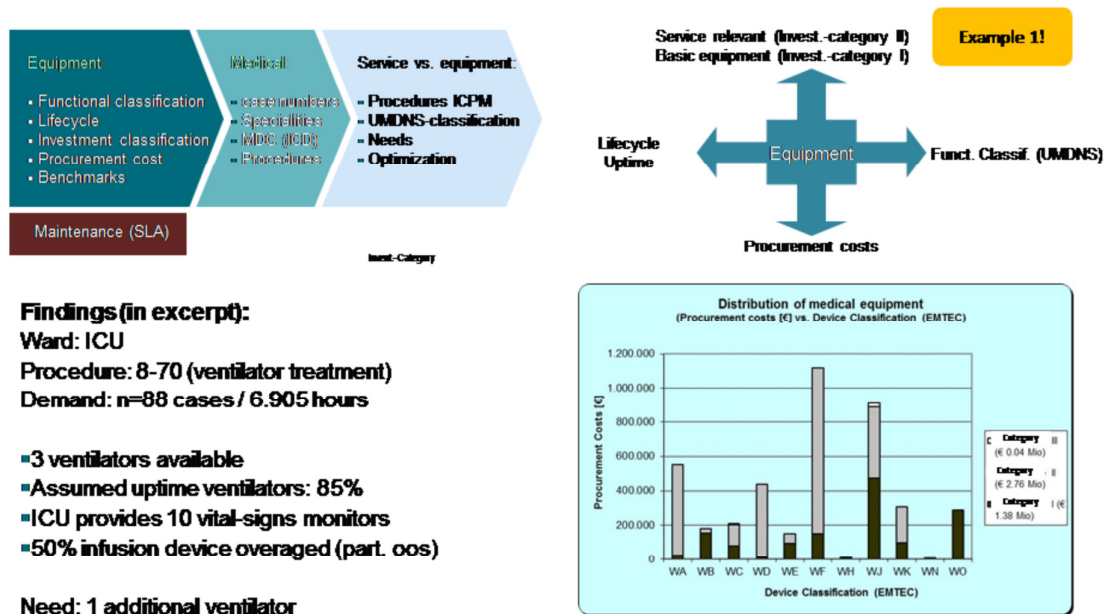


Fig. 5. Example of the application of principles and criteria for planning needs regarding biomedical equipment

The above-mentioned indicators represent merely the basic information required for planning purposes. However, in the current crisis these data need to be collected for gap analyses and the respective gap closure activities (renewal/repair of damaged devices, adding devices on the basis of changing medical needs).

### 6.2.2 Introduction of integrated medical pathways

Medical pathways have been widely introduced into health system management in order to improve medical outcome quality, to focus medical staff on taking timely action along the treatment process, and to secure proper resource utilization and cost efficiency (see Fig. 6 for a schematic overview of an indication-related clinical pathway). Despite the ongoing crisis in Syria and highly dynamic medical demands due to factors such as mass casualties, there is a need to have pathways in place. Last but not least, the implementation of clinical pathways will help to improve cooperation between PHC and secondary health care.

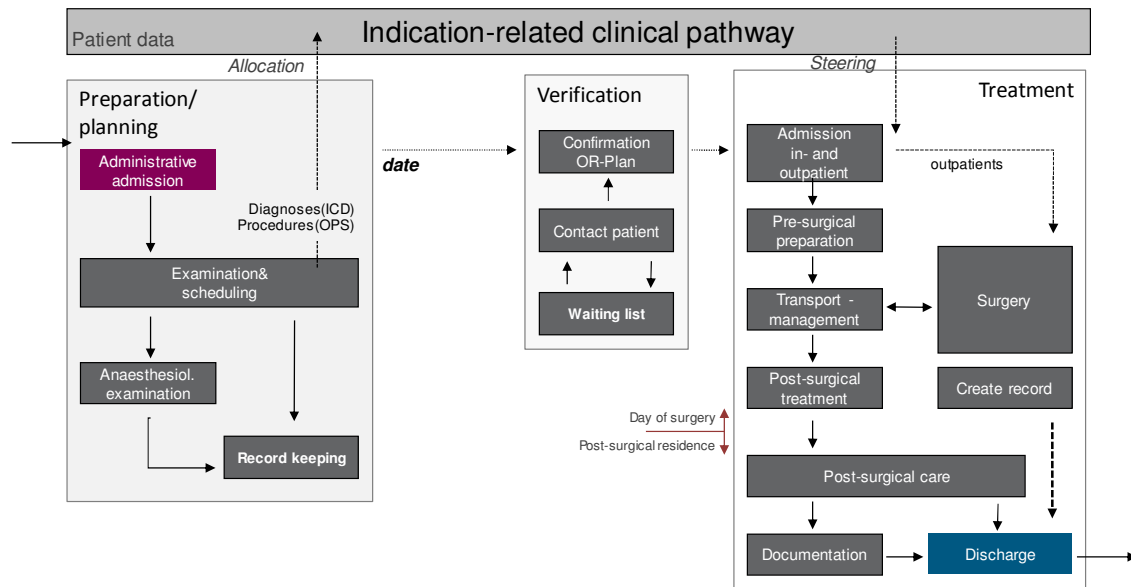


Fig. 6. Schematic overview of an indication-related clinical pathway

Clinical pathways should refer to medical guidelines, which are generally published by medical societies. After building the framework, the adaptation to individual needs in each given hospital is required. In this respect, the pathway is considered to aggregate clinical processes on a superficial level. Clinical processes must therefore be ascertained, brought into a holistic multi-layer process model and then related to the demands from the pathway. In particular, the performance-duration of processes or single activities should be analysed. Time frames will be assigned in order to trigger certain processes or single measures to secure a proper and timely execution of the pathway. Furthermore, it is essential to have resources assigned to the pathway and its corresponding processes. Consequently, modern medical management requires multi-resource management including infrastructure, personnel, medical equipment and instruments as well as medication and consumables.

Last but not least, the authors emphasize the need for sufficient hospital IT where all of the pathways will be implemented.

### 6.2.3 Cross-sectoral, mid-term care coordination and management

Due to the impact of the crisis (morbidity load, IDP flows, partially or fully damaged infrastructure and equipment and drain of personnel/capacity) it is extremely important to leverage care coordination. Coordination in the current situation will also help to make best use of existing/remaining infrastructure.

In the future, care coordination will play an important role, while comprehensive population health management is implemented across the country. As an example, the management of stable angina pectoris was presented during the workshop. The approach facilitates the taking of timely action, as well as the assignment of medical staff, infrastructure and other resources to the treatment in a mid-term perspective.

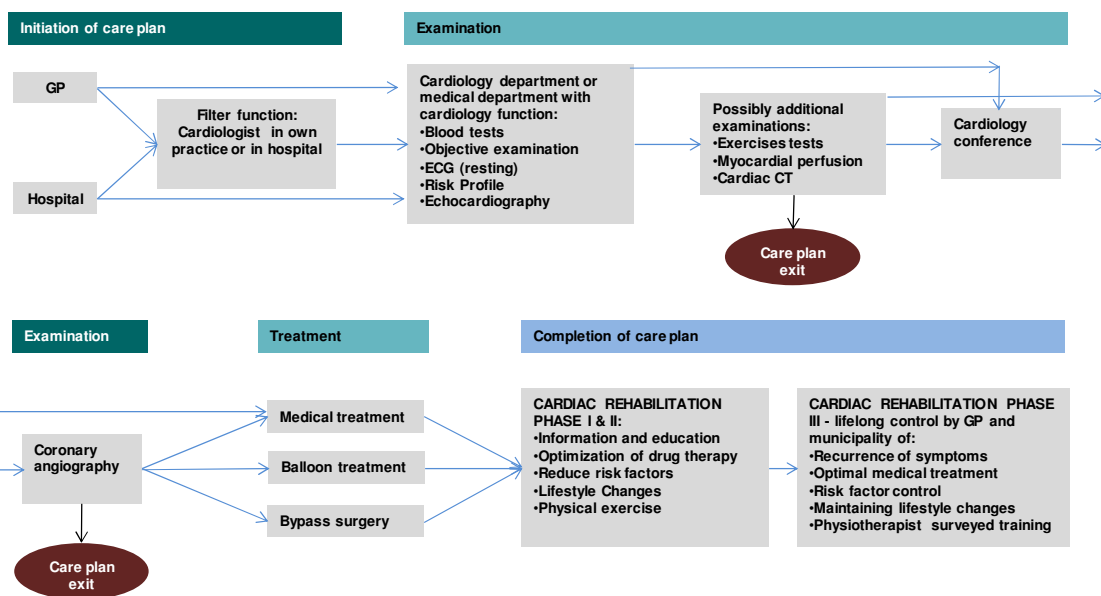


Fig. 7. Schematic overview of angina pectoris management in a collaborative approach (in excerpt)

### 6.3 Human resources management

Human resources consist of two parts: The skills of the individual employee, and the way the employees are organized.

Normally it takes a long time to build human resources capabilities in modern secondary care health institutions in a formal way.

It is, however, possible to build individual skills in a crisis and thereby also increase the capability of the organization.

Typically, the individual health care worker can be trained through short courses to perform tasks and procedures they normally do not undertake. This is unproblematic when it is within the profession's responsibilities: for example, to train a surgeon to perform procedures that are outside his/her normal speciality. It is also possible to train personnel who are not doctors to perform procedures that are normally performed only by doctors – for example, to train nurses and paramedics in insertion of chest tubes, intubation and minor surgical procedures. However, when training personnel in procedures that normally require authorization as a doctor, legal and accountability issues have to be considered, and the training programme should be condoned by the national health authority. Some successful examples are described below.

Vascular injuries with massive bleeding are life-threatening and may be daunting for surgeons who have never been trained in vascular surgery. Consequently, during armed conflict, when transport between hospitals can be impossible, these patients may bleed to death. By establishing a structured short course in vascular injury management for experienced general and orthopaedic surgeons, this challenge can be met. The course could contain theoretical lessons in basic vascular surgery, on topics such as techniques,

suture material, anticoagulation and antibiotics, followed by training on animal vessels purchased from the slaughterhouse and on live animals.

There are also examples of training nurses in midwifery techniques over shorter intervals. In remote areas, experience has shown that lay people with no formal health education can be trained to perform acute wound management, wound debridement, chest tube insertion, free airway procedures, etc.

There are numerous examples of health authorities starting a programme to expand the work of certain health professions, for example training midwives to perform pre-delivery maternity controls where there are no doctors available.

Increasing surgeons' skills can also be done on a one-to-one basis through exchanges of staff between hospitals with the purpose of learning, for example, burn management or advanced wound management.

Enhancing the organization's skills can be performed on many levels. The most relevant in Syria is formal team training in trauma management, including organization of trauma teams and training in trauma team leadership.

Training in advanced resuscitation for ambulance drivers and paramedics can be performed with simple techniques.

It is also possible to train hospital managers during a crisis. Emergency planning implies allocating the personnel with the right skills to the right jobs and allocating space and resources for the care of patients and families. Management also includes establishing systems to record and monitor all the cases admitted to the hospital.

On a long-term basis, a systematic approach for human resources development would imply formal health management training of managers at all levels in the hospital, possibly in collaboration with universities. Courses in management for health care workers such as doctors and nurses can be planned and are necessary for implementation of a uniform human resources system throughout an organization.

By establishing quality databases within hospitals as well as at the national level, the health authorities can monitor the quality of hospital performance and identify human resources gaps. The specialists indicated clearly (during the mission, subsequent discussions and workshop) that there are many skilled doctors, nurses and hospital managers within the Syrian health care system, and that it would be possible to establish systems for exchanges of experience and sharing of knowledge.

Suggested literature on training health workers in unusual skills during war or other crises:

- Husom H, Ang SC, Fosse E. War surgery (available for download free at: <http://traumacare.no/publications/war-surgery/>).
- Warner D, Thiuman C, Maxwell J. Where there is no doctor (available for download free at: [http://hesperian.org/wp-content/uploads/pdf/en\\_wtnd\\_2013/en\\_wtnd\\_2013\\_fm.pdf](http://hesperian.org/wp-content/uploads/pdf/en_wtnd_2013/en_wtnd_2013_fm.pdf)).

## 6.4 Proceedings of the discussion within the workshop

### 6.4.1 Medical equipment including service and maintenance, and consumables

The discussion on the requirements for improving the availability of medical technology focused on three areas:

- **Allocation** (having the right device in the right place at the right time in order to perform medical procedures)
- **Availability** (the device is maintained appropriately and fully functional)
- A **service and maintenance concept** is in place and operational; this includes supply of spare parts and consumables

Considering the existing data from previous HeRAMS assessments and the additional assessments described in Section 5 of this document, the requirements are generally challenging. In some of the assessed/visited hospitals, environmental conditions and the direct impact of the crisis have created an improvisational mode of operation. For example, the number of certain medical devices does not correlate with the number/type of procedures/cases. Moreover, the ratios between certain types of medical devices (e.g. vital signs monitors/respirators/anaesthesia machines/OR tables) appear to be not valid. As an explanation, the authors assume that in some cases, “over-capacities” in medical devices are part of the service and maintenance concept, as a redundant device will serve as a back-up or as a source of spare parts.

The workshop participants stated that in many of their facilities a lack of medical device capacities hinders medical treatment.

Summarizing the findings from previous assessments and the workshop discussion, the authors suggest that a biomedical needs analysis should be conducted that considers actual medical requirements and with a view to filling the gaps caused by the crisis. As a result, reallocation of existing devices, replacement of damaged equipment and refurbishment of non-functional devices could be undertaken. The above mentioned assessment would not cover any aspects arising from the substitution of presumed capacity-gaps that existed before the crisis.

### 6.4.2 Human resources

The main challenge facing the Syrian health care system is that of human resources, both at the individual and the systematic level. There is a mismatch between the distribution of skills at the organizational and individual levels, and the areas of need. This adds to the difficulties caused by the fact that the number of health care providers is already low. It is a particular problem when it comes to the number and skills of nurses and midwives.

Representatives of hospitals suggested that a study or survey could be conducted among health care providers to identify what type of training is most needed for health care workers.



In areas where there is a high number of casualties, the mismatch of needs and skills affects the treatment of patients. For example, the number of Caesarean sections has increased. From Homs national hospital it was reported that most women now had caesarean section so that they could be discharged the same day. This calls for better interaction between the hospitals to share the burden of the crisis.

Health care workers are in many places confronted with clinical situations they normally would not see, as a result of the crisis. It was suggested that workshops and short training courses should be organized to meet this challenge.

There is a need to train health care professionals in hospitals as well as paramedics and staff handling patients before admittance and during transport to hospital. The lack of technical staff to maintain the technical infrastructure of hospitals is also serious.

The low number of doctors and nurses could be remedied by increasing the number of students, to take a long-term perspective. This is probably feasible for nurses, but as was pointed out, a good quality medical education requires resources – medical studies include laboratory and clinical work. To increase the number of student is thus a costly and slow process and will not affect the current situation.

To meet the critical need for nurses, the participants suggested establishing courses for nurses who are not working to ensure that they are adequately trained to work in the current situation.

Several hospitals reported that they believed lives could be saved by better and more systematic training of pre-hospital staff.

Some participants suggested training nurses or anaesthetists to perform tasks done by doctors, but as was pointed out there are legal issues and it is important that all steps to increase the capabilities of the remaining health care workers are carried out within the Syrian legal framework and under the control of the MoH.

To increase the capabilities of human resources it was pointed out that the hospital management need to look at flexible solutions for staffing models within the hospitals.

## **7 Recommendations and suggestions**

### **7.1 Detailed investigation of the situation regarding infrastructure**

It is recommended to provide a detailed investigation and assessment of the situation regarding biomedical equipment, infrastructure and the respective services, and supply chain management

#### **7.1.1 Assessment of medical equipment, servicing and maintenance**

The assessment of medical technology should ideally include every hospital under the auspices of the MoH and the MoHE. To achieve this, a decentralized approach is appropriate, in which the departments for medical technology from the ministries can take

over supervision. The authors also suggest that these departments **set certain premises** for the future planning of medical equipment in hospitals, some of which are:

- Reduce the diversity of device types wherever appropriate and possible (“harmonizing” medical equipment in order to optimize the ratio between uptime, service management, training and education needs and costs)
- Consider medical workload (case numbers and corresponding type of diagnoses and procedures) wherever possible
- Consider the existing workforce in servicing and maintenance (biomedical department, engineers, technicians with respective skills)

To secure timely actions it will be necessary to staff so-called **intervention teams per X governorates** from among existing hospital-based engineers and technicians. Further external capacities may be required occasionally. Additional staff (e.g. medical technicians or ICU nurses) can also be included for team-building purposes. Each team should have no more than three or four members and each site-inspection/assessment should be limited to a maximum of three days. In total this would result in a workload of up to 360 man-days. Assuming a workforce of five teams/20 full-time equivalents the assessments could be completed in approximately six weeks.

Additional hints: As at December 2015, 43% of public hospitals were reported to be fully functioning. Regarding the suggested technology assessments, these hospital facilities could be set to priority 2, assuming that sufficient medical equipment is in place and functioning to at least a reasonable level. As a consequence, the assessment of the partially or fully damaged hospitals could be executed in less time and with a smaller workforce. However, this should be considered only as a “plan B” in case the assessment of any available hospital is hindered by limited capacities. Further details can be retrieved from the latest HeRAMS assessments. As an example, Fig. 8 demonstrates the variations in the availability of functional medical devices across 13 governorates.

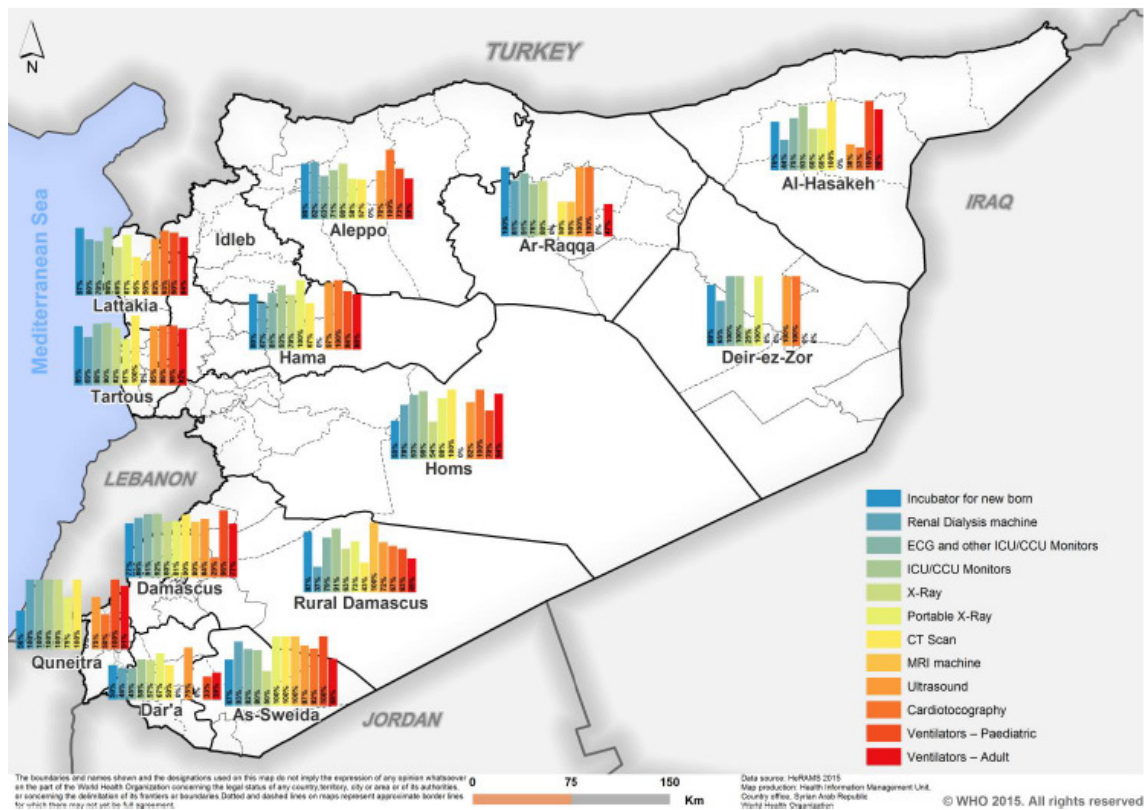


Fig. 8. Geographical distribution of functional specialized equipment as a percentage of available equipment in functional hospitals.

Every team member should be equipped with a mobile device (tablet computer or notebook with WiFi/WAN/LAN connectivity). This device should hold a **simple to use tool-set** (MS-Excel™ based) which is capable of **collecting the required data**. These data will be sent to a centralized entity and then be consolidated into one database for further processing/analysis. This facilitates the establishment of reliable information for further action planning.

The above-mentioned intervention teams will need to be sufficiently trained. **Training sessions** can be conducted by means of **web sessions**. A helpdesk to support the teams during their site visits should be put in place.

### 7.1.2 Assessment of infrastructure, building technology, servicing and maintenance

The detailed assessment of hospital infrastructure, building technologies and the respective service and maintenance concepts will be conducted in a similar way to the assessment of medical equipment (see Section 7.1.1). The energy and water supply as well as waste management/disposal will be considered.

### 7.1.3 Further activities in this cluster

The discussion during the workshop supported the findings of a recent HeRAMS assessment of supplies of medication and medical consumables. This applies to almost any category of drugs and consumables with a considerable variation in distribution across the 13 examined governorates. Hospital managers and doctors claim that dispensing

costly and specialist drugs to patients with severe – sometimes chronic – diseases is difficult and in some cases impossible. Consequently, the procurement of drugs and medical consumables as well as the implementation of micro- and macroscopic logistics and warehousing is extremely important. The initiative to improve these important factors, a requirements list should include prioritization and there should be a joint approach established by the MoH and WHO.

The actions in this cluster will have a short- and mid-term effects. The authors recommend starting the assessments very soon as they can be sourced from existing resources, coordinated by the ministries and responsible directors in the governorates and supported by external consultants. The latter need to provide the conceptual framework, tools and training. After completion of the assessments of medical equipment, the authorities can probably start the reallocation of existing functional devices to close gaps in certain areas and facilities.

## 7.2 Development and management of human resources

### 7.2.1 Assessment of the current human resources situation nationally and at hospital level

WHO monitors the available human resources. But there is a need to obtain a better understanding of the quality of health care in order to identify the gaps in human resources and the consequences. To monitor the quality of treatment, quality registries should be established both at the hospital and the national level.

### 7.2.2 Develop a human resources management plan

In the short term, the plan could include the following

- Incentives like increases in wages or career opportunities for medical staff such as doctors and nurses.
- Incentives like increases in wages or career opportunities and including for paramedics and biomechanical hospital staff.
- Incentives for transferring personnel from hospitals with lower workloads to hospitals with greater workloads, regardless of the ownership of hospitals.
- Facilitating the transfer of patients from hospitals with high workload to hospitals with lower workload. The authors suggest including private hospitals in such plans to meet the needs caused by the present crisis.
- Facilitating collaboration between public hospitals owned by the MoH and hospitals owned by the MoHE.
- The plan should also include establishing quality registries at all hospitals and nationally to monitor the quality of services and record the types of disease, treatment and results in each of the facilities, thereby identifying gaps in treatment quality.

### 7.2.3 Implementation of the human resources management plan

The human resources management plan must be implemented by the MoH.

#### 7.2.4 Development of a human resource training programme

A training programme for doctors, nurses and medical technicians will strengthen clinical and management capacities at peripheral level.

To meet emergency medical needs, the authors suggest the following actions:

1. Workshops for doctors and nurses concerning specific topics of interest, and training courses in: pre-hospital casualty management, handling of vascular injuries, burn injuries, wound management, missile induced open fracture treatment, abdominal injuries, thoracic injuries, head and neck injuries, obstetrics in a crisis situation, management of mass casualty situations, and trauma team organization.
2. Systematic inter-hospital exchanges of specialists for upgraded training, for example a vascular surgeon from a university hospital visiting a peripheral hospital that is currently receiving casualties.
3. Increased collaboration with the International Committee of the Red Cross (ICRC) and civil defence organizations in pre-hospital training and management.
4. Identification of gaps in skills in hospitals due to the drain of professionals.
5. Utilization of the limited number of nurses only for tasks where a nursing education is required, and hiring of unskilled staff to perform simpler procedures. A plan should be developed by the MoH/MoHE in cooperation with WHO.
6. Training of hospital management in resource planning, process management, quality management, cooperation and alliance management

#### 7.2.5 Implementation of the training programme

The highly skilled Syrian health care professionals could carry out parts of the training programme. Collaboration with international organizations, such as the ICRC and WHO and others, may speed up the process of establishing formal courses.

### 7.3 Leveraging the responsiveness of health care provider organizations

For an overview of agreed actions and initiatives for health care provider organizations to urgent/emergency needs in the context of the crisis refer also to Table 2 in the Appendix.

#### 7.3.1 Strengthening cooperation between primary and secondary health care

Strengthening cooperation between primary and secondary care was one of the core requirements that emerged from the discussions in the workshop. In the light of the crisis, where approximately 40% of the public hospital infrastructure is reported to be fully or partially damaged and approximately 50% of public health centres have been affected, the need to improve cooperation between the two sectors is evident. Moreover, it is evident from many health care systems around the world that a more patient-centred approach and improved utilization of resources requires closer cooperation among service providers. Finally, the transition from inpatient to outpatient treatment has a significant impact in this area.

As closer cooperation requires the integration of workflows/processes, these have to be agreed among the different institutions. Workflow integration includes, in particular, sharing and routing of relevant medical and administrative data and information. Therefore, an appropriate IT infrastructure is required. As this is actually either not in place or the degree of IT system implementation is unclear, an assessment and conceptual study should be conducted. The outcome of this study will be a blueprint for an architecture that can be used as the basis for a subsequent procurement/tender process. Both the study and the implementation of selected technology and processes can be supported by external consultants. The first pilot projects then need to be evaluated, continuously improved and rolled out to other locations/regions. In any case, this initiative should be embedded into a master plan for the Syrian health care system.

### 7.3.2 Cooperation and collaboration

The workshop participants discussed two further important activities to be implemented soon. Both address one impact of the crisis, namely the altering workload resulting from flows of IDPs and the significantly increased demands from emergencies (including mass casualties).

**Cooperation and collaboration** should be established **between public and private health care providers** (primary and secondary care) aiming at the development of local/regional resources required to serve IDPs. As these individuals frequently move, cooperation between public and private health care sectors needs to be based on appropriate agreements that allow, for example, medical staff from public organizations to perform procedures utilizing private infrastructure and equipment, and vice versa. The MoH should start direct negotiations with representatives of the private sector involving legal experts.

As long as the crisis continues to have the above-mentioned impact on the geographical allocation of health care resources, this initiative will allow the **pooling of resources**, which was suggested by the authors as a major mitigation action.

### 7.3.3 Emergency medical services

**Emergency medical services need to be managed** in an organizational and infrastructural environment that has been considerably affected by the crisis (partially/fully damaged infrastructure, lack of personnel and materials, etc.). In an improved setting, a directly accessible hospital or health care centre could take over dispatch of the patients and refer them to hospitals with spare capacity in emergency/trauma care. However, this will be limited due to local/regional security issues and existing transport infrastructure.

In a modern scenario, ambulances will be equipped with radio-technology (e.g. multi-band routers) that enable on-site emergency assistants to share medical data with emergency doctors based in hospitals – in other words, medical technology and knowledge comes to the patient and not vice versa. In some northern European coun-

tries, the introduction of this kind of pre-hospital/emergency care has saved lives and improved quality of treatment.

## 8 Strategic outlook

The authors suggest that a staged approach should be taken to the health care development programme, with a short-, mid- and long-term perspective. The short- and mid-term perspective basically covers the intervention in areas seriously affected by the crisis (e.g. reallocation of equipment, building infrastructure, pooling of resources, etc.). On the other hand, long-term development requires the preparation of a health care master plan that matches the national health care strategy.

### 8.1 Population health management

During the input session of the workshop, the authors presented **population health management** as an innovative and relevant strategy for a holistic and coordinated Syrian health care system. Fig. 9 represents the major aspects that drive a health care system from a siloed management of individual entities and sectors to a coordinated/integrated approach in which prevention, care, coordination, and management and rehabilitation are linked.

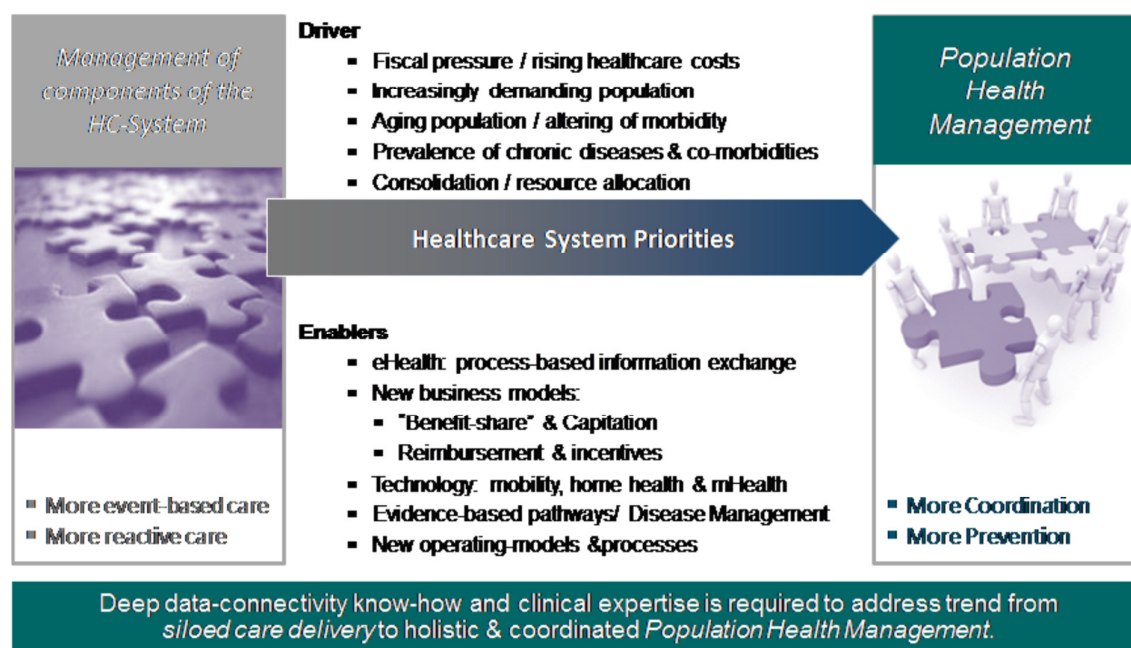


Fig. 9. The transformation from siloed to coordinated/integrated health care management

### 8.2 Master plan

A prerequisite for achieving the above within a reasonable period is a master plan. This strategic initiative in the Syrian case could be separated into two major sections:

- I. construction/reconstruction/rehabilitation of health care infrastructure;
- II. development of a health care management system including a regulatory/legal framework and a financing system.

The details of a sufficient master plan will not be discussed in this document and were beyond the scope of the workshop. However, this initiative remains one of the recommendations of the authors. The basic principles of an effective master plan are as follows:

- increasing the flexibility and security of the health system by appropriately decentralizing and distributing facilities;
- concentrating the location of sub-specialities (e.g. women's and children's health, mental health);
- maximizing the use of existing, well-located and developable assets;
- replacing and withdrawing clinical services from ageing assets;
- encouraging non-acute facility-based long-term care in appropriate locations;
- providing appropriate health care facilities and services to the whole population.

### 8.3 Further recommendations

The scope of the workshop was to determine the actions that will help to solve the actual problems facing health care services as a result of the crisis in Syria. In addition, the authors would like to emphasize certain weaknesses in the Syrian health care system that existed before the crisis:

- I. **medical procedures** in certain areas do not take place according to the latest international standards (e.g. laparoscopic tumour ablation in the liver, non-invasive cardiac valve replacement);
- II. corresponding to I., some **medical technology** is not up to current international standards (e.g. robotic surgery, hybrid OR suites, interventional radiology, metabolic imaging);
- III. modern **hospital management and planning** is lacking; so as **performance based budgeting and funding**
- IV. **digital transformation in health care** has not yet started.

Topics III. and IV. require sufficient IT infrastructure, hospital information systems, clinical information systems, electronic patient records and business intelligence systems. The digital transformation also requires solutions for process integration, registration of patients and other individuals, risk stratification and predictive modelling. Even communication and collaboration with patients – patient engagement – needs dedicated mobility solutions.



Modern hospital management should integrate key performance indicator based planning, management and monitoring addressee-oriented reporting (both to administrative and medical staff) and, last but not least, continuous service, multi-resource accounting, financial and innovation management. In many mature health care systems, management principles such as LEAN have been adapted from other sectors for use in the health care sector. It is very clear that a sufficient hospital management system provides appropriate data for various other purposes such as State-/national-level capacity planning, quality management and benchmarking.

#### 8.4 Recommendation for a future integrated planning approach

Approximately 380 out of 500 hospitals in Syria are privately owned. They represent 9500 beds, which is less than one third of the total bed capacity before the crisis started. The private sector in many mature health care systems is growing, for various reasons, including the fact that demand for best-practice therapies is increasing in many countries, and public authorities often suffer from insufficient funding. Private health care providers have introduced a more competitive business approach and are aiming at increased market shares that will help to adjust risks and secure expensive investments in human workforce, infrastructure and technology.

In Syria, the public and the private sectors are completely separated. The private hospital and primary care market is actually not considered in a systematic capacity planning process. Even the revenue streams in private hospitals are different as out-of-pocket payment for treatment is mandatory. The risk for the Syrian Government is an increasingly diverging provider system: private hospitals offer state-of-the-art treatment to patients at a reasonable price (presumably after certain risk-adjusted pre-selection). In contrast to this, public hospitals with different/challenging cost structures have to treat every patient adequately. Tertiary hospitals are also responsible for training and education, which is expensive and leads to reduced productivity and cost efficiency.

As an example, in certain international health care systems most of the private or privatized hospitals are an integral part of community, municipality and national hospital planning. Private hospital services are basically funded from the same sources as public hospitals. Both private and public hospitals are allowed to charge extra costs for certain services. However, both sectors are obliged to provide accountable care in their catchment areas and are supervised by governmental authorities. This model could be discussed as a blueprint for the Syrian health care system.

## 9 Appendix

### 9.1 Action plan (short-, mid-, long-term perspective)

Table 1 gives a structured overview of the activities and initiatives summarizing action clusters as described in section 7.

The short term perspective is according to 2016, the mid-term approach 2017 and the long term perspective 2017 ff. All the time suggestions are, of course, depending on the development of the crisis situation in Syria. It is recommended to start the short term actions (Table 2 as an extract of table 1) independently from the actual crisis impact in the country. The short-term phase is driven by the conception and adaption of solutions, the mid-term phase primary implementation oriented and in the long-term perspective the focus will be the health system development and full recovery.

The action plan below summarizes the activities required to achieve the overall objective of the health and hospital sector development programme (i.e. to strengthen Syrian health care and specifically the hospital system, in order to improve preparedness for and responsiveness to current and future challenges) in three cluster (result) areas:

1. re-establishment (where they have been damaged or destroyed) and modernization (where they have become outdated) of hospital services in order to comply with international norms and standards for infrastructure and equipment;
2. development of human resources (capacity building) and the human resources management system in order to ensure the most efficient use of this valuable resource;
3. adaptation of the regulatory framework as well as guidelines/standard operating procedures to allow for the most efficient use of human, financial and material resources available in both the public and the private sectors – specifically in times of crisis and disaster management.

Though the plan focuses on strengthening the health system to better manage crises, it also aims to promote sustainable, long-term developments. Budgets mentioned under each activity are indicative and solely serve the purpose of helping the Syrian Government (MoH/MoHE) and international organizations involved (WHO) to mobilize funds currently made available by the international community to help development of sustainable social and health care systems and infrastructure.

Objective / Result / Activity	Indicator of achievement	2016				2017	2018	2019	2020	Responsible	Budget	Comments / assumptions
		I	II	III	IV	I-IV	I-IV	I-IV	I-IV			
<b>O Strengthen the Syrian health care system and specifically the hospital system to improve preparedness for and responsiveness to current and future challenges</b>	<b>Morbidity and mortality</b> • Crude mortality • Maternal mortality • Infant mortality										US\$ 1 365 640 K	
<b>R1 Hospital services comply with minimum international norms and standards</b>											US\$ 1 150 160 K	
A1.1 Complete detailed assessment of existing hospital infrastructure & equipment to determine needs for rehabilitation / construction / procurement	Assessment report	X	X								US\$ 150 000	Consultant support
A1.2 Develop a plan for the rehabilitation / construction & equipment of health facilities	Master plan for rehabilitation, construction & equipment										US\$ 10 000	Funds are available Consider quick solutions e.g. procurement of prefabricated “modular” hospitals
A1.3 Implement the plan for the rehabilitation / construction & equipment of health facilities	Detailed design plans / facility; contracts for construction works and equipment supply / operational hospital beds										US\$ 875 million	Target: re-establish status quo ante 1.5 hospital beds / 1000 population; build 5000 beds @ US\$ 175 000 Include PHC centres as appropriate
A1.4 Support procurement and distribution of selected drugs and medical consumables	List of key drugs and consumables to be procured									MoH / WHO	US\$ 200 million	Focus on anaesthesia / emergency & anti-cancer drugs to be imported / 5 years

Objective / Result / Activity	Indicator of achievement	2016				2017	2018	2019	2020	Responsible	Budget	Comments / assumptions
		I	II	III	IV	I-IV	I-IV	I-IV	I-IV			
A1.5 Assure maintenance of hospital infrastructure & medical equipment	<ul style="list-style-type: none"> <li>Central (maintenance) intervention team</li> <li>Central procurement of key equipment and spare parts</li> </ul>									MoH / WHO	US\$ 75 million	Focus on complementary support to assure availability and functioning of imaging lab, ICU, OR sterilization and other key equipment
<b>R2 Human resources capacities and management are developed to support preparedness and responsiveness of the health care system</b>											<b>US\$ 5170 K</b>	
A2.1 Assess current human resources situation / health care facility / district / governorate	Assessment report									MoH / MoHE	US\$ 150 000	Consultant support
A2.2 Develop an HR management (retention / redeployment / recruitment) plan	HR management plan									MoH / MoHE	US\$ 10 000	
A2.2 Implement the HR management (retention / redeployment / recruitment) plan	MDs (generalists & specialists) & nurses / midwives / 1000 population / governorate and / district									MoH / MoHE	t.b.d.	
A2.3 Develop a training programme for doctors, nurses and medical technicians to strengthen clinical and management capacities at peripheral level	Training programme									MoH / MoHE / WHO	US\$ 10 000	Training of trainers; clinical “on the job” training Part of continuing medical education management training
A2.4 Implement the training programme	<ul style="list-style-type: none"> <li>No. of staff trained</li> <li>Person days of training</li> <li>Training reports including results of pre-/post-tests</li> </ul>								US\$ 5 million			

Objective / Result / Activity	Indicator of achievement	2016				2017	2018	2019	2020	Responsible	Budget	Comments / assumptions
		I	II	III	IV	I-IV	I-IV	I-IV	I-IV			
<b>R3 The regulatory framework &amp; SOPs are adapted to allow for appropriate responses of the health care system to urgent needs and emergency situations</b>										US\$ 210 310 K		
A3.1 Define clinical guidelines / pathways for the management of emergency situations / mass casualties especially in areas still affected by the crisis	Specific guidelines / clinical pathways / SOPs									MoH / MoHE / WHO	US\$ 50 000	Consultant support as required
A3.2 Develop a programme for public–private partnerships in order to ensure service provision in areas affected by the crisis and to manage additional workload due to the influx of IDPs										MoH / MoHE / WHO	US\$ 10 000	Service contracts with private providers to ensure service provision to poor people / IDPs
A3.3 Implement the public–private partnership programme	<ul style="list-style-type: none"> <li>No. of service agreements signed</li> <li>No. and type of cases treated under the service agreement(s)</li> </ul>									MoH	US\$ 200 million	Monitor implementation of the programme and adapt as necessary
A3.4. Conduct a study on how to strengthen cooperation with the PHC level in order to improve service delivery at the interface between primary and secondary level care	PHC strengthening programme and plan									MoH / WHO	US\$ 150 000	Consulting support as required
A3.5 Implement the PHC strengthening programme and plan	<ul style="list-style-type: none"> <li>Patient visits at PHC level</li> <li>NCD morbidity &amp; mortality</li> <li>ALOS at hospitals</li> </ul>									MoH / WHO	US\$ 5 million	Support to operation of PHC centres – exact measures to be defined

Objective / Result / Activity	Indicator of achievement	2016				2017	2018	2019	2020	Responsible	Budget	Comments / assumptions
		I	II	III	IV	I-IV	I-IV	I-IV	I-IV			
A3.6 Develop a system to coordinate emergency medical services (EMS) (dispatching of patients to specific hospitals having the required capacity) and to improve pre-hospital care	EMS strategy and plan									MoH / MoHE / WHO / ICRC	US\$ 50 000	Consulting support as required
A3.7 Implement the EMS coordination system	<ul style="list-style-type: none"> <li>• EMS coordination centres established</li> <li>• Hospital beds registered at EMS coordination centres</li> <li>• No. and type of cases referred through coordination centres</li> </ul>									MoH / MoHE / WHO / ICRC	US\$ 5 million	Radio equipment, ambulances; office equipment for EMS centres; operational budget for vehicles and staff

Table 1. Activities and initiatives summarizing action clusters as described in Sections 7

## 9.2 Short term activities and objectives

Objective / Result / Activity	Indicator of achievement	2016				2017	2018	2019	2020	Responsible	Budget	Comments / assumptions
		I	II	III	IV	I-IV	I-IV	I-IV	I-IV			
<b>Short term perspective</b>										US\$ 275 Mio		
<b>R1 Hospital services comply with minimum international norms and standards</b>												
A1.1 Complete detailed assessment of existing hospital infrastructure & equipment to determine needs for rehabilitation / construction / procurement	Assessment report	X	X							US\$ 150 000	Consultant support	
A1.2 Develop a plan for the rehabilitation / construction & equipment of health facilities	Master plan for rehabilitation, construction & equipment									US\$ 10 000	Consider quick solutions e.g. procurement of prefabricated “modular” hospitals	
A1.4 Support procurement and distribution of selected drugs and medical consumables	List of key drugs and consumables to be procured								MoH / WHO	US\$ 200 million	Focus on anaesthesia / emergency & anti-cancer drugs to be imported / 5 y.	
A1.5 Assure maintenance of hospital infrastructure & medical equipment	<ul style="list-style-type: none"> <li>Central (maintenance) intervention team</li> <li>Central procurement of key equipment and spare parts</li> </ul>								MoH / WHO	US\$ 75 million	Focus on complementary support to assure availability and functioning of imaging lab, ICU, OR sterilization and other key equipment	
<b>R2 Human resources capacities and management are developed to support preparedness and responsiveness of the health care system</b>												
A2.1 Assess current human resources situation / health care facility / district / governorate	Assessment report								MoH / MoHE	US\$ 150 000	Consultant support	
A2.2 Develop an HR management (retention / redeployment / recruitment) plan	HR management plan								MoH / MoHE	US\$ 10 000		
A2.3 Develop a training programme for doctors, nurses and medical technicians to strengthen clinical and management capacities at peripheral level	Training programme								MoH / MoHE / WHO	US\$ 10 000	Training of trainers; clinical “on the job” training	

Objective / Result / Activity	Indicator of achievement	2016				2017	2018	2019	2020	Responsible	Budget	Comments / assumptions
		I	II	III	IV	I-IV	I-IV	I-IV	I-IV			
<b>R3 The regulatory framework &amp; SOPs are adapted to allow for appropriate responses of the health care system to urgent needs and emergency situations</b>												
A3.1 Define clinical guidelines / pathways for the management of emergency situations / mass casualties especially in areas still affected by the crisis	Specific guidelines / clinical pathways / SOPs									MoH / MoHE / WHO	US\$ 50 000	Consultant support as required
A3.2 Develop a programme for public–private partnerships in order to ensure service provision in areas affected by the crisis and to manage additional workload due to the influx of IDPs										MoH / MoHE / WHO	US\$ 10 000	Service contracts with private providers to ensure service provision to poor people / IDPs
A3.4. Conduct a study on how to strengthen cooperation with the PHC level in order to improve service delivery at the interface between primary and secondary level care	PHC strengthening programme and plan									MoH / WHO	US\$ 150 000	Consulting support as required
A3.6 Develop a system to coordinate emergency medical services (EMS) (dispatching of patients to specific hospitals having the required capacity) and to improve pre-hospital care	EMS strategy and plan									MoH / MoHE / WHO / ICRC	US\$ 50 000	Consulting support as required

Table 2. Activities and initiatives in the short term perspective as described in Sections 7 (excerpt of Table 1)



### 9.3 Mid and long-term activities and objectives

Objective / Result / Activity	Indicator of achievement	2016				2017	2018	2019	2020	Responsible	Budget	Comments / assumptions
		I	II	III	IV	I-IV	I-IV	I-IV	I-IV			
<b>mid-term perspective</b>												
A1.3 Implement the plan for the rehabilitation / construction & equipment of health facilities	Detailed design plans / facility; contracts for construction works and equipment supply										US\$ 875 million	
A1.4 Support procurement and distribution of selected drugs and medical consumables	List of key drugs and consumables to be procured									MoH / WHO	US\$ 200 million	Focus on anaesthesia / emergency & anti-cancer drugs to be imported / 5 years
A1.5 Assure maintenance of hospital infrastructure & medical equipment	<ul style="list-style-type: none"> <li>Central (maintenance) intervention team</li> <li>Central procurement</li> </ul>									MoH / WHO	US\$ 75 million	Focus on complementary support
<b>mid-term perspective</b>												
A2.2 Implement the HR management (retention / redeployment / recruitment) plan	MDs (generalists & specialists) & nurses / midwives / 1000 population / governorate and / district									MoH / MoHE	t.b.d.	
A2.4 Implement the training programme	<ul style="list-style-type: none"> <li>No. of staff trained</li> <li>Person days of training</li> <li>Training reports</li> </ul>										US\$ 5 million	
<b>Long-term perspective</b>												
A3.3 Implement the public-private partnership programme	<ul style="list-style-type: none"> <li>No. of service agreements signed</li> <li>No. and type of cases treated under the service agreement(s)</li> </ul>									MoH	US\$ 200 million	Monitor implementation of the programme and adapt as necessary
A3.7 Implement the EMS coordination system	<ul style="list-style-type: none"> <li>EMS coordination centres established</li> <li></li> </ul>									MoH / MoHE / WHO / ICRC	US\$ 5 million	Radio equipment, ambulances; office equipment for EMS centres;

Table 3. Activities and initiatives in the mid- and long term perspective as described in Sections 7 (excerpt of table 1)

## 9.4 Root-Cause Analysis of essential findings during the assessment and workshop

Issue			Cause		Possible Solutions	
Description	Source	Critically	Description	Likelihood	Description	Urgency
The allocation of resources is not performance based, this causes mal distribution	Site visits	low	-the system management is primary administrative/financial oriented	high	-development of a concept for performance based budgeting and benchmarking	Long term
The emergency service (rescue) is partly inefficient	Site visits	med	-the responsibility for emergency rescue is fragmented organised (regional/ different organisational framework)	high	-setting up a concept for more integrated Emergency Services, inter-ministry cooperation, perhaps integration of NGOs (SARC)..	Mid term
No digital documentation available, incl. digital Patient records, incl. Telematic / tele-medicine	Site visits	low	-actual no hardware and respective software available	high	-Developing a e-health concept and strategy.	Long term
Hospitals are overburdened by ambulant patients	Site visits	high	-the cooperation between primary and secondary health service suppliers is underdeveloped	high	-Developing inter sectoral health policies and funding systems, including clinical pathways	Mid term
The capacities and capabilities to provide mental health therapy is underdeveloped	Site visits/ expert analysis	high	-mental health care was not prioritised before the crisis, the mental trauma care has become essential even now	med	-develop a national concept for inter-sectoral mental health, ideally using WHO standards	Mid term

Issue			Cause		Possible Solutions	
Description	Source	Critically	Description	Likelihood	Description	Urgency
Less availability of essential pharmaceuticals	Workshop /Site visits	high	-Increasing prices -less import capabilities -bad access to hard to reach areas	high	-continuing support by UN Agencies (WHO) -sufficient reliable funding -enhancing the cooperation with governmental institutions to organize access	High /short term
Insufficient availability of functional medical technology	Workshop /Site visits	high	-non- availability of international technology products -no company based, essential, maintenance -non- availability of spare parts	high	-establishing industry partnerships under WHO umbrella -establishing „interventions teams“ including central (MoH) coordination -professional training of local technicians	High / short term
Progressive gap in the availability of health professionals	Workshop /site visits /expert analysis	Medium high	-progressive movements out of the country -maldistribution of available health-workforce -hard to reach facilities for health professionals	high	-re allocation of health workforce according to the demand -training and allowance for semi-professionals (sub qualified tasks -increasing incentives for health workers -establishing a re-patirat program	Medium/mid term
Not efficient use of still available hospital capacity	Site visits	Medium high	-relative strong administrative and financial borders between the health sectors (private, public, autonomous)	high	-implementing a regulatory framework to allow deeper cooperation and the use of capacities 24/7 -enabling of e.g. NGOs to organize intersectional health service	Medium/mid term
Missing (damaged / not accessible) hospital infrastructure in regions with high crisis activities	Site visits/ expert analysis	Medium/long term	-Hospitals not reachable due to conflict activities -destroyed health infrastructure	high	-providing a detailed rehabilitation assessment -developing a master plan for rehabilitation (funding base) -organising access in calm areas (commitments)	Mediun/mid/long term (depending on the development of the situation in the country)

Table 4. Root-Cause Analysis of essential finding during the assessment