A nice read about the digital healthcare system of Israel (link embedded)

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International best practices organization of Covid-19 care

Report

Expert Team; Ministry of Health Welfare and Sports

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Introduction

Background

In January 2022 the Covid-19 expert team was established. The aim of the Covid-19 expert team is to come up with ideas / solutions to organize healthcare in the Netherlands in such a way that by September 2022 Covid-19 care does not interfere with non-Covid-19-care, especially where it regards clinical and ICU capacity in the hospitals.

KPMG The Netherlands has been asked to support the Covid-19 expert team by providing an overview of international best practices for the organization of Covid-19 care. In this exercise, we focused on examples that have relevance to the Netherlands and can help in increasing the Covid-19 ICU and/or hospital bed capacity.

Approach - three phases

KPMG created the overview in three steps:

1. First a long list of potential best practices was created.
2. Of the longlist, 5 best practices were selected for a detailed analysis. These were selected based on the type of interventions (various types were selected) in increasing hospital capacity, and if their situation could be somewhat translated to the Dutch system.
3. The 5 best practices were evaluated with the expert team to distill the lessons for the Netherlands.

Country specific vs. case specific; best practices

Please note:

— This report describes for 5 cases in 5 countries how they dealt with Covid-19. In most countries there was some form of a centralized, nation-wide response in combination with various interventions taken on a regional or care provider level. This regional or care provider specific response differed per region or care provider. Therefore this report describes both the nation wide response, as well as for some countries a more in depth outline of a case specific response. This is highlighted throughout the report.

— This report describes 5 best practices. Please note that there was no practice that turned out to be a “best practice”. Each country, and each region and each care provider, struggled with the response to Covid-19. But there are lessons to be learned from each case.

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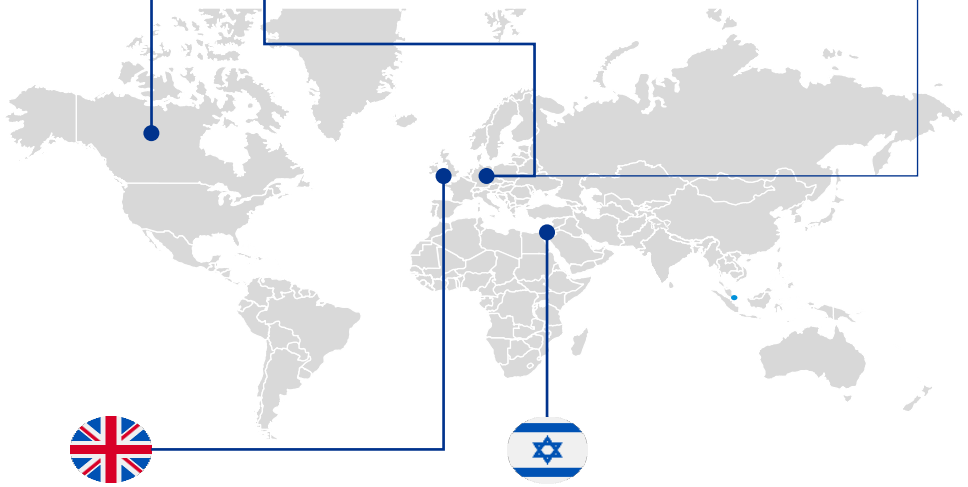
Chapter 1
Deep dive five best practices

5 cases in 5 countries that have implemented interventions to optimize capacity for Covid-19 care have been analyzed

– Central governance to optimize patient distribution between region
– Lowering nurse vs patient ratio by task differentiation

– Expanding at-home services
– Private public partnerships



– Optimized efficiency of staff
– Adapted care delivery model
– Task differentiation principles

– NHS Nightingales
– At-home treatment of Covid-19 patients

– Completely isolating Covid-19 and non-Covid-19 care
– Health system with digital backbone allowing fast decision making

Each country has a unique healthcare system; the main principles described

Netherlands

The Netherlands is characterized by its mandatory **insurance**. All citizens are required to purchase statutory health insurance from private insurers.

The national government has the responsibility for law, monitoring access, quality, and costs. The municipalities are responsible for overseeing some health care services, including preventive screenings and outpatient long term services. Hospitals and primary care providers are independent organizations (not-for-profit) and are contracted by insurers.

The Dutch healthcare system is on a number of aspects decentrally organized, primarily in regions (e.g. ROAZ regions for acute care) and has a regulated market.

Israel

Israel has a healthcare system that is characterized by its **Health Maintenance Organizations** (HMO). Each citizen chooses from four competing nonprofit health plans (provided by the 4 HMOs) that provide a mandated benefit package.

The government is responsible for population health and overall functioning of the system. It operates almost 50% of hospital beds. The largest HMO operates 30% of hospital beds.

HMO's play a key role in care. They actively engage in client's health by providing preventive services and supporting care providers in optimizing care delivery (by for example providing data insights about patient's health).

Germany

Governance divided between three levels. Federal level, responsible for policymaking. State (Lander), responsible for hospital planning and financing of hospital investments. The third level are self governed bodies, such as associations of sickness funds and providers, coming together in the Federal Joint Committee, which issues directives for providers, payers, patients, manufacturers (e.g. benefits covered by SHI funds).

Health **insurance** is compulsory and offers almost universal coverage. People with an income above a fixed threshold or people that are belonging to a particular professional group can opt to enroll in private insurance for full coverage.

France

The French health care system is based on **state regulation, which is applied regionally**. The government is responsible for health law and allocates budgeted expenditures to regional health agencies ("ARS") who are responsible for planning and service delivery. The ARS coordinate prevention, health and supportive care within their region; they oversee both public and private hospitals as well as all care organizations of the care continuum.

Health **insurance** is compulsory and offers almost universal coverage. On top of that citizen can buy private insurance

Canada

Canada has a **decentralized publicly funded health system** called Canadian Medicare. Health care is funded and administered primarily by the country's 13 provinces and territories. Each has its own insurance plan, and each receives cash assistance from the federal government. Benefits and delivery approaches vary.

All citizens have access to basic healthcare services through public **insurance**. Some provinces and territories provide some coverage for targeted groups. In addition, about two-thirds of Canadians have private insurance.

UK

The UK has a government-sponsored universal healthcare system called the **National Health Service** (NHS).

Healthcare is **centrally governed by NHS England**, with local Clinical Commissioning Groups (group of GPs) governing and paying for care delivery at the local level. The government owns the hospitals and providers of NHS care (the NHS trusts). NHS England is responsible for managing the NHS budged and overseeing the 191 Clinical Commissioning Groups (group pf GPs).

Citizens are entitled to healthcare under this system, but have the option to buy private health **insurance** as well. The private sector is relatively large.

Israel's digital healthcare system enabled a rapid effective response. SHEBA rapidly increased capacity by patient segmentation, task differentiation and technology

What has been done

- Israel has been heralded as leading the world in the battle against Covid-19. Due to their disaster preparedness principles, the country was prepared for each wave before the wave reached its peak.
- Sheba Medical Center, a 1900 bed tertiary hospital in Israel, has been leading the way in Israel's Covid-19 response. During the first wave, Sheba could surge capacity through rapidly constructing separated Covid-19 ICUs and wards. The emergency shelter hospital (already existed) was used to built 50 level-1 and 70 level-2 ICU beds. "Clean zones" were completely separated from Covid-19 zones; geographic isolation allowed for continued routine care of non-Covid-19 patients.
- SHEBA's Covid-19 ICUs were categorized by their severity in three levels. For each category the minimum level of personnel and equipment was defined, increasing the efficiency. Patient allocation was managed centrally with detailed criteria for transition between ICU levels. Non-ICU staff was trained to provide the care.
- During the last wave most (circa 90%) Covid-19 patients were not admitted to the hospital primarily for Covid-19. This in combination with the shortage of personnel led to the decision to start "reintegrating" Covid-19 patients into non-Covid-19 wards. Wards did have a separate Covid-19 section, but Covid-19 patients were not completely isolated.
- Currently, SHEBA is debating to further let go of the split between Covid-19 patients and non-Covid-19 patients, because of personnel shortages getting worse, high number of infections and the relatively low number of patients requiring ICU for Covid-19.

Israel's digital backbone

- Israel is known for its innovative utilization of digital tools throughout the health system. The digital organization of Israel's system allows them to identify and reach citizens with vaccination programs. Once patients are in the hospital, full digital patient records are available and instantly accessible to any HMO and healthcare provider. As a result, healthcare providers know everything about people's health. Patients at risk by can be identified and monitored by flagging underlying conditions and risk of exacerbation.
- SHEBA beyond: virtual wards are used with a medical specialist on site that is responsible for both patients inside and outside the hospital ("virtual beds"). Patients are monitored with telehealth at-home, connected to SHEBA. When patients exacerbate, the army is deployed for bringing patients into the wards.
- To upscale ICU coverage, reduce staff infection risk, and lessen errors related to working in protective gear, complete online patient monitoring is used at all COVID-19 units (Electronic Supplementary Material) at SHEBA.
- SHEBA's medical professionals and management have access to real time data about patients, bed occupancy, personnel etc.

Effectivity

- Disaster preparedness principles and innovative utilization of infrastructure, equipment, and personnel facilitated an increase of 30 ICU beds and 150 beds for Covid-19 patients at SHEBA.
- Non-Covid-19 care was not disrupted to large extent at SHEBA. During the first waves there was less inflow of patients as patients postponed treatments themselves. During the last waves patients did not postpone treatments, resulting in pressure on capacity (bed occupancy of 120%).
- Bed capacity is not the problem with the current Omicron wave, it is personnel. Personnel shortages due to quarantine puts pressure on available capacity.

(Financial) resources

- SHEBA isolated patients in clean zones (building A) and red zones (in building B).
- Creating Covid-19 emergency sites within or next to existing hospitals.
- Government and HMOs converted many facilities into Covid-19 beds expanding capacity even further.
- SHEBA developed closed suction machines for Covid-19 patients that need to be incubated. This decreased the risk of infection.
- Costly operation; funding for the complete operation has been an issue for SHEBA during all waves.

Personnel

- SHEBA increased staff capacity rapidly by task differentiation and use of digital tools. To increase capacity for level-3 ICU, 60 teams of non-ICU physicians and nurses underwent rapid simulation-based training at the Israel Center for Medical Simulation.
- SHEBA suffered from shortage of ICU nurses during entire pandemic. Mitigated by training non-ICU nurses training program to ICU nurses. Training included simulations and on the job training.
- During the first waves, the main bottleneck was bed and ICU capacity. With Omicron, the biggest challenge is to retain personnel. +/- 300 infected nurses and doctors of SHEBA were at home.

Governance

- Israel has a centralized national system of government with four HMOs covering the entire population.
- Effective cooperation with fast and effective decision making between government, health plans, hospitals, and emergency care providers – particularly during national emergencies (e.g. disaster preparedness principles).
- Support tools and decision making frameworks to support vaccination campaigns and inform the general public.
- SHEBA took the lead in the response to Covid-19, other hospitals quickly followed the strategy of SHEBA.

References: (A): Israel Medical Association Journal 2020 (B): Israel's Covid-19 vaccination success - KPMG (C) Intensive care med 2020 (D) Yuval Levy, Medical Director SHEBA hospital

Helios Hospital Berlin-Buch was able to optimize capacity by downscaling care, optimizing patient to professional ratios and central coordination of resources

What has been done

- Helios* Germany operates 89 acute care hospitals, about 130 outpatient clinics, six prevention centers and treats approximately 5.2 million patients annually.
- Helios Hospital Berlin-Buch (one of the Helios Germany hospitals) was able to adapt the amount of ICU beds often and fast, due to collaboration with smaller hospitals in the region, other Helios's hospitals, and central coordination of bed capacity coordinated by the government.
- During the first wave, Helios Hospital Berlin-Buch's response was to set up a separate Covid-19 unit. For this Covid-19 unit to be successful, regular care had to be downscaled and surgeons from other wards were integrated into a special Covid-19 care team (i.e. 50 cardiologists worked in the Covid-19 team).
- By the installment of yellow, green and red zones (based on the PCR results prior to patients coming to the hospital), patients at Helios Hospital Berlin-Buch were divided into three groups with the aim of separating Covid-19 patients from non-Covid-19 patients and limiting the risk of infection.

In more detail

- The ICU capacity in "normal" times is relatively high in Germany, especially when compared to the Netherlands. However, ICU capacity still had to be increased to respond to the increased demand.
- The MoH organized regional patient distribution between hospitals by clustering hospitals in clusters. Hospitals in one cluster distributed Covid-19 patients based on available capacity among each hospital.
- In order to address personnel shortages, Helios Hospital Berlin-Buch adapted the ratio nurse to patient. The ratio of patients to ICU nurses was altered to 1:2 by having regular nurses supporting ICU nurses.
- In order to increase COVID-19 capacity, Helios Hospital Berlin-Buch, as welll as all hospitals in Germany, downscaled elective scare to a large extent. Elective surgeries that could lead to ICU influx were postponed in order to free capacity.
- Helios Hospital Berlin-Buch altered standard of care. Protocols were put in place to shorten the required number of days on the ICU for certain patients in a scenario of high shortages of ICU beds

Effectivity

- Helios Hospital Berlin-Buch doubled the number of ICU beds in 5 days from 30 beds to 65 beds. With potential to increase up to 90 beds with the downside of having to close many non-ICU beds to free up staff.
- Helios Hospital Berlin-Buch set up a dedicated Covid-19 team, operational within 5 days. Required equipment and materials were rapidly made available due to cooperation between Helios' hospitals in the region (i.e. transfer of ventilators from small to bigger hospitals).
- Pandemic preparedness of Helios Hospital Berlin-Buch was high in March '20, but the inflow was way lower than expected.
- Helios Hospital Berlin-Buch did not implement at-home monitoring, because it was not necessary. Charite Berlin did set up an outpatient treatment team.

(Financial) resources

- During the first wave, equipment and materials were the biggest bottleneck. To deal with this, smaller Helios' hospitals provided ventilators to Helios' "designated COVID-19"-hospitals overnight.
- Germany's federal government provided hospitals with compensation for lost income when they cancelled elective procedures: €560 a day for every acute bed they keep vacant for a Covid-19 patient; and €50,000 for each additional intensive care bed Since then, the occupancy rate of German ICUs has fallen from around 80% to 50%.
- Helios created an emergency equipment and supplies inventory that provides for a period of 2,5 months.

Personnel

- Helios Hospital Berlin-Buch optimized the nurse to patient ratio to 1:2. Non-ICU nurses were trained on the job, grouped and worked under ICU-nurse supervision.
- Helios Hospital Berlin-Buch set up a special Covid-19 team that involved doctors from various wards for Covid-19 ICU care.
- Creating engagement and rewarding staff has been essential in keeping the morale high at Helios Hospital Berlin-Buch. By structural testing of personnel (each day) a sense of safety was created.
- Germany suffered from a large outflow of nurses at the end of the last wave. Reason is believed to be the ongoing psychological stress of the pandemic in combination with the ongoing budget cuts for nurses over the last decades (before Covid-19).

Governance

- Strong regional collaboration: Germany by government initiated divided the different states in clusters. Each cluster had to collaborate and distribute Covid-19 patient within its cluster (i.e.3 states were 1 cluster).
- Government centralized patient distribution coordinated by the MoH. The government facilitated a dailyy update on # of beds available. Every hospital had to ensure that 10% of total capacity was available for possible influx from other regions in cluster. This allowed for a more centralized approach to patient distribution.
- Central coordination within Helios allowing to redistribute equipment and materials between Helios' hospitals as well as patients.

References (A): Prof. Muehlberg leader COVID care Helios hospital (B): Financial Times (C) KPMG input.

*Helios is a network of hospital in Germany and Europe.

France's regional health agencies supported in efficient use of regional capacity, at-home services reduced patients' influx into hospitals

What has been done

- France suffered from a shortage of hospital capacity during the pandemic. Elective care was and still is highly disrupted.
- France has a strong at-home care organization. This played a major role in reducing the influx of Covid-19 patients to hospitals. At-home services were focused on keeping patients at-home as long as possible, by providing Covid-19 patients at-home oxygen treatment and by treating vulnerable patients (elderly, chronic) at-home as much/long as possible.
- Regional health authorities monitored bed capacity on a regional level and organized redistribution of patients between regions if that was needed.
- The government, on a national level, guaranteed a financial safety net for hospitals (both public and private). This was a key success factor for streamlining patients among hospitals and for setting up public-private collaborations.
- In some regions public and private hospitals collaborated. In some cases private hospitals provided facilities to public hospitals. In other cases private hospitals took elective care patients from public hospitals to free up capacity in public hospitals.
- Shortage of staff was a problem during the whole pandemic. Task differentiation was used to increase capacity. During the first wave professionals of regions with low levels of Covid-19 were put to work in regions with high levels of Covid-19.

Regional organisation

- The French health care system is organized within regions by regional health agencies ("ARS"). Regional health agencies coordinate prevention, health and supportive care within their regions. They oversee both public and private hospitals as well as all care organizations of the care continuum.
- During the pandemic, the regional agencies monitored the number of beds available real time in their region. If capacity within the region was insufficient, the regional agency organized redistribution of patients to other regions.
- Before the pandemic local authorities played little role in healthcare organization, but during the pandemic they played a key role by supporting local initiatives.
- In some regions, public-private collaborations were set up. This differed per region depending on the amount of pressure of the regional agency and the willingness to collaborate. Willingness was higher in regions where collaborations already existed.
- Most collaborations consisted of private hospitals taking over elective care procedures to free up capacity in public hospitals. Other collaborations focuses on private hospitals providing facilities (beds, ORs) to public hospitals.

Effectivity

- France managed to create 4800 ICU beds for Covid-19 (+95% from baseline).
- But overall there was a large shortage of hospital capacity. Capacity was increased by discontinuing elective care.
- To decrease influx of hospitals, at-home care services were further expanded. During Covid-19 at-home services facilitated at-home oxygen treatment of Covid-19 patients. And focused on keeping chronic, elderly patients at home as long as possible by providing at-home treatments.
- In some regions, private hospitals collaborated with public hospitals to free up capacity for Covid-19 patients.

(Financial) resources

- Government guaranteed financing for hospitals, both public and private, in the first wave, creating a safety net for hospitals. This fast-tracked collaboration between hospitals and collaboration between public and private sector.
- Patients were provided with oxygen treatment at their homes (to decrease influx of hospitals). Structures (at-home services) were already in place before the pandemic, so this could be rapidly implemented.
- France did not implement technological tools (like virtual wards). At-home treatment monitoring was already in place before the pandemic.

Personnel

- France has a pool of nurses and physicians that they can call upon in times of crisis. This system was already in place and included unemployed health workers, community workers, and medical/ paramedics students. The pool was not large enough to cover shortages, but did result in a fast mobilization of extra staff.
- In hospitals shortage of staff was dealt with by task differentiation and retraining staff from non-ICU to ICU staff.
- During the first wave, which only hit certain regions in France, nurses and physicians from regions with low levels of Covid-19 were "distributed" to hospitals with high levels. During the next waves this was not possible as all hospitals were short of staff.

Governance

- Organization of healthcare during the pandemic lies primarily with the regional health agencies. Regional agencies oversee the whole care continuum (incl at-home and preventive care).
- During the pandemic the regional agencies monitored bed availability for their region. If required, regional agencies organized patient redistribution between regions.

References (A): Elsevieer 2020 (B): KPMG France

In Canada, HCS optimitized its workforce by implementing new team based models of care

What has been done

- Health sciences centre Winnipeg (HCS) developed a new team based care model for both critical and acute care. The model ensures patient care needs are met with staff from various professional and para-professional disciplines.
- The model focused on training and providing nurse extenders. Nurse extenders were trained to take over several tasks of ICU nurses. These nurse extenders were mostly nurses from other departments.
- This was done in a very structured way by developing (refining) new standards of care, outlining key responsibilities and accountabilities of each of the staff members.
- The model is still in place during the Omicron wave and continues to be refined through continuous feedback and improvements.
- *NB. Although it did result in increased efficiency of staff, it also resulted in a highly distressed workforce with high dissatisfaction rates.*

The eight step approach of care model redesign

To design the new team based model of care, an eight-step approach was undertaken:

1. Skills assessment: completing a skills assessment of key roles with the breakdown of tasks, to define how to optimize skill sets to free up resource capacity.
2. Current state: validating the current baseline staffing levels and determining which staff was available for reassignment and redeployment.
3. Jurisdictional scan: reviewing existing team based model of care within Canada and internationally.
4. Defining new roles and responsibilities: developing new standards of work for the roles under the new team based models of care, outlining role classification and key responsibilities.
5. Developing and redefining models of care: creating detailed model of care taking into consideration future Covid-19 bed expansion plans.
6. Developing and implementing training and education to support staff development and ensure confidence in expanded skill set.
7. Develop communications plans to ensure consistent messaging and communications to staff and ensure leaders have the support and tools to drive the change.
8. Identifying key metrics for ongoing evaluation to ensure patient and staff safety.

Effectivity

- Overall the redesign program helped to decrease the workload in the acute and critical care units. However, it did not result in extra capacity in terms of beds of ICU
- Outcomes depended greatly on nurses' willingness to accept the change and their match with their buddy. Therefore, HCS put major focus on change management, creating awareness and communicating the outcomes.
- The new roles and responsibilities are well defined for all team members to allow for clear understanding of expectations and accountability within the team in order to best meet the needs of the patient.

(Financial) resources

- A skills assessment has been done to identify overlapping skills sets. Nurses were paired with a buddy who provided training. Also, an extra trainer was added to the floor to assist them on the job.
- The consistent availability of the required number of nurse extenders continues to pose a challenge for HCS.

Personnel

- The interventions led to an increase in the ICU-nurse to patient ratio from 1:1 to 1:3.
- Traditionally, staff worked Monday to Friday from 8am-4pm. To successfully adopt the proposed models of care shift changes were required during the second and third wave. 12 hour day shifts were introduced.
- Education and additional training was provided to the nurse extenders.
- Additional education opportunities for staff including shadow and buddy shifts and educator support from other departments.
- Canada did not focus on providing (mental) care for healthcare providers. This was one of the main reasons of the extensive outflow of nurses during the pandemic.

Governance

- Medicine and Critical Care working groups were established to support the development and implementation of the new models of care. The Working Groups included representatives of nursing, allied health, housekeeping, HR and the Covid-19 command team.
- The working groups communicated the drafts of the models early on in the design process with key stakeholders including physicians, resulting in higher success rate.

References (A): KPMG Canada (B): Potloc 2020

The UK combined several elements in order to increase hospital capacity during the Covid-19 pandemic

Nightingale hospitals

- Seven Nightingale hospitals were built in England, starting in April '20 with a 400-bed facility at London's ExCel center (potential of 4000 beds). The Nightingales had different purposes, some set up as critical care facilities and others to deliver step-down care for recovering Covid-19 patients. None were fully functional hospitals.
- The NHS did not have sufficient staff to be able to use all the capacity of the Nightingales, as well as for the traditional hospitals. Consequently, efforts were made to increase the amount of healthcare staff: recruiting previous employed healthcare staff resulting in increase of 10.000 healthcare professionals; recruiting outside of hospitals (e.g. British Airway staff); and closing a deal with the private sector in which NHS could make use of the available staff in the private sector.
- The Nightingale hospitals were never used to its full capacity (only 40 in London), because of various reasons. Staff was resistant to work in Nightingales, because of limited resources and unclarity about processes as well as working with less skilled staff (e.g. British Airways). Moreover, the Nightingales were not equipped to provide non-Covid-19 care, while most patients suffered from other diseases besides Covid-19. Therefore questions remain if these hospitals were worth all the investment (both in terms of money as well as time) or was it worth for having a crisis "insurance" policy (white elephant dilemma)?

At home care

- To increase patient outflow of hospitals, the NHS introduced home care, adopted in several regionas, in which pulse oximeters were used to support people at-home who had been diagnosed with Covid-19 and were most at risk of becoming seriously unwell.
- A pulse oximeter is a small medical device that is put on the tip of the finger, to check someone's oxygen levels. Pulse oximetry allow for early detection of silent hypoxia (low oxygen levels in the absence of significant shortness of breath). This identifies patients at risk that need to be treated in the hospital in a timely manner.
- People were offered regular prompts or check-ins to ensure that they know what to do if oxygen levels fall below normal levels.
- If, after 14 days of the onset of symptoms, patients showed no signs of deterioration with Covid-19, they were appropriately discharged from the service.
- These at-home monitoring services created a big relief for hospitals and are now being extended to different care paths.

Workforce shaping

- During the Covid-19 pandemic a shortage of ICU staff was limiting NHS to expand services. For the Nightingales the nurse to patient ratio was raised to 1:6, with all tasks not requiring the skills of an ICU-nurse reallocated to other competent staff
- The task differentiation was executed in four steps:
  1. Mapping the clinical pathway, breaking down each step into tasks and identifying every role competent to perform that task.
  2. Re-designing roles by grouping tasks. Ensuring staff with the most in-demand skills are relieved of as many other duties as possible.
  3. Calculating staffing ratios and scaling out according to service size.
  4. Arranging any training and accreditation required for upskilling of staff.

Private sector

- To increase capacity the NHS claimed capacity of the private sector in order to continue elective and oncology care during the pandemic and decrease pressure on public hospitals.
- Currently contracts are in place for the NHS to be able to claim facilities and staff from the private sector in the case that additional capacity is needed.
- The private sector capacity has been used extensively throughout the pandemic. Currently overall use is at almost 115 per cent of pre-pandemic levels, including over 470,000 day cases, and almost 2,800,000 surgical procedures in the last year.

Effectivity

- Nightingale increased bed capacity significantly within 9 days; in London 400 extra beds were created of which only 40 were used.
- Recruitment outside regular channels increased available staff capacity.
- Adapting oxygen infrastructure increased efficiency.
- Capacity further increased at-home treatment and task differentiation.

(Financial) resources

- Creating Covid-19 emergency sites within or next to existing hospital infrastructure required additional financial investments; overall 530M pounds.
- Buildings like conference centers were used for the Nightingales. Resulting in significant challenges as these buildings are not hospital equipped (sanitary issues).

Personnel

- Due to task differentiation the ratio of ICU nurses to patients was multiplied several times, releasing stress on staffing capacity.
- The Nightingale initiative included a plan to increase the ICU nurse to patient ratio from 1:1 ratio to 1:6. This has put an enormous burden on staff. Besides, staff was reluctant to work at the Nightingales, because of unclear processes and teams.

Governance

- Top-down central coordination of the NHS during the pandemic enabling fast decision making. The NHS provided decisive and clear direction and even "forced" hospitals to increase capacity beyond what was expected to be possible.
- NHS stimulated the implementation of the at-home care and task differentiation by providing support tools and frameworks. Implementation was done regionally.

References (A): NHS England (B): KPMG UK

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Chapter 2
Lesson learned

There is no one silver bullet to respond to Covid-19; it is the combination of several interventions

Introduction

Covid-19 has been one of the biggest crisis the world and our country has faced in generations. In many countries the pandemic resulted in healthcare systems becoming overwhelmed. As shown in the description of the best practices, everyone struggled with Covid-19.

The cases described used different interventions to deal with the crisis. To learn from these, the best practices have been discussed with the expert team during the “Heisessie” on Feb 14, 2022, the expert meeting on Feb 22, 2022 and the working group meeting on Feb 23, 2022. The discussions have been summarized in this chapter.

A couple of notes:

- This project and the research is not aimed to be a scientific research program but focusses on useful lessons for the Netherlands. Ideally the different interventions of the cases described are compared using objective metrics. That is, however, not possible. Metrics are not comparable as healthcare systems are different, definitions of key metrics differ, effect is measured in various ways and often one-off and decentral, and the various Covid-19 waves have impacted countries in different ways.
- It is safe to say that there is no one silver bullet for dealing with Covid-19. Care providers in all countries have implemented various interventions, that in combination has led to a certain effect, but there is not one specific intervention that has been shown to be the most effective.
- Moreover most interventions have been piloted and/or have been implemented by one of more care providers in the Netherlands as well. One could argue that the Netherlands could learn most from the cases in terms of how to upscale and standardize such interventions rapidly nation-wide.
- This analysis focus on lessons learned for Covid-19. However, some lessons learned are also relevant in “normal times”.

Although this is not a scientific exercise and there is no clear winner strategy, there are still lessons to be learned from other’s approaches. For this exercise we discuss the applied interventions on 6 key aspects: governance, personnel, financials, resources, technology and non-Covid-19 care.

Governance

Most of the countries had some form of central governance implemented to deal with Covid-19.

- Israel has a more centralized healthcare system consisting of the government and four HMOs responsible for providing care to the entire population. This, in combination with existing structures for crisis management, leads to an effective collaboration with fast and effective decision making between government, HMOs, hospitals, and emergency care providers. The result was a massive increase in ICU-capacity and little backlog of elective care.
- Germany put a strong central governance in place during the pandemic by clustering healthcare regions with a strict regime to realize optimal and mandated patient distribution within regions.
- In the UK, the central coordination of the NHS resulted in fast decision making throughout the pandemic, and a significant increase in capacity in a relatively short amount of time.

Key take-aways for the Netherlands

The Dutch healthcare system is organized with a strong decentral focus and autonomy of each individual care provider. Therefore, central governance is relatively difficult to implement and most likely will result in some form of pushback.

However, looking at other countries, these countries did benefit from having some form of central governance during the pandemic. It did result in faster decisions making and execution of necessary interventions.

Therefore it might be worthwhile to consider a more strict central governance for the Netherlands during worser and worst case scenarios. This would allow faster decision making and less time spend on coordinating. And for more rapidly upscaling of regional successful interventions. A certain base framework could be set up, defining the central governance and the conditions (when this would be operationalized).

In less worse scenarios but still in case of a pandemic it might be worth to consider to provide certain supportive tools centrally (like the UK), to prevent regions having to reinvent the wheel themselves. This, however, should be done with care so it is still in line with the market mechanism in regulatory framework.

There is no one silver bullet to respond to Covid-19; it is the combination of several interventions

Workforce

During the pandemic, workforce was one of the main (if not the biggest) bottlenecks in most countries. To optimize the efficiency of their healthcare professionals the cases described focused on different aspects:

- In all countries care providers used task differentiation to increase the efficiency of personnel (mostly nurses). Most care providers effectively increased the nurse to patient ratio by having other personnel taking over non-key tasks from ICU nurses, by having non-ICU nurses work under supervision of ICU-nurses, buddy systems, and/or rapidly training nurses to perform ICU-nurse tasks (also using national virtual training programs). Although this did result in an increase nurse to patient ratio, in most cases this also resulted in an outflow of nurses and/or increase in dissatisfaction of staff.
- SHEBA (Israel) used simulation training to train their staff in a limited time period. Sixty teams of non-ICU trained physicians, nurses, and bio-technicians underwent rapid simulation-based training for critically ill patient care at the Israel Center for Medical Simulation. After this training these healthcare workers were multi deployable.
- Another way to deal with a shortage of staff is by adding resources. France for example had a pool of nurses and physicians in place (already in place before the pandemic), that they could call upon in times of emergencies. This increased the workforce in a relatively short amount of time.

Key take-aways for the Netherlands

It is very clear that workforce in critical functions is the main bottleneck in this crisis in all countries, it is also the key element in increasing capacity.

Like some of the Netherlands also experimented with task differentiation to increase the patient to nurse ratio. The discussion of the extend to which the nurse to patient ratio can be increased is still ongoing. The cases described show that increasing the nurse to patient ratio has been effective, it did result in an increase in capacity. But it has also negatively impacted nurses, resulting in an outflow of nurses.

Therefore what can be learned in this regard is that in times of worse case scenarios it is possible to stretch. However this has to be done with caution and mitigating interventions to prevent a too highly distressed workforce. Therefore this measure is time limited and should not be implemented on a regular basis.

SHEBA (Israel) had an effective method to train their staff in a short amount of time using digital tools. It might be interesting to look at their training methods and the way in which they were rolled out.

France had a system in place to call upon nurses and physicians in times of crisis. Their system is composed of active and inactive health workers. Active personnel are employed health workers who can be called in time of crisis to help other hospitals or territories. Inactive personnel are unemployed health workers, community workers or even early medical/paramedics students. With this system France could rapidly increase capacity in any crisis.

The Netherlands might benefit from such a system as well. This would allow for faster increasing the workforce in times of crisis and for people interested to be a volunteer a system to register. The Netherlands could actively promote this possibility among former healthcare workers and / or medical students. This intervention needs to be paired with a strategy to keep this reservoir of staff updated on their skills and expertise.

There is no one silver bullet to respond to Covid-19; it is the combination of several interventions

Resources and infrastructure

All countries increased their capacity.

- The UK chose to set up the Nightingales; separate Covid-19 emergency hospital sites. Even though the Nightingales were not used to their full potential, it did increase hospital bed capacity within two weeks significantly.
- SHEBA (Israel) increased its hospital bed capacity rapidly by 1) separating Covid-19 beds from non-Covid-18 completely, and 2) increasing Covid-19 bed capacity by building emergency sites next to the hospital. By completely isolating Covid-19 patients, non-Covid-19 care was relatively less impacted thereby preventing backlogs.
- In France and the UK private sector capacity was used to increase Covid-19 capacity in public hospitals and/or to take over elective care patients from public hospitals.
- Most care providers in all countries cases increased their capacity by transforming wards into Covid-19 wards within hospitals.
- To decrease influx and increase outflux for hospitals, SHEBA (Israel) and several care providers in the UK implemented at-home monitoring. France extended its at-home services in regions.
- Helios Hospitals (Germany) was able to redistribute materials and ventilators overnight to designated Covid-19-hospitals, due to the fact that Helios hospitals are part of one organization. Apart from that Helios created an emergency equipment and supplies inventory, providing their hospitals with a 2,5 months supply of necessary equipment in times of crisis.

Key take-aways for the Netherlands

The Netherlands did not choose to set up separate Covid-19 emergency hospital sites. There was an initiative for such a emergency site in Ahoy Rotterdam as well as MECC Maastricht, but this was discontinued. Setting up separate dedicated emergency sites requires a significant investment, is often said to be risky as it is not embedded within an existing hospital structure and does not solve the main issue which is the lacking of required staff. This is shown by the Nightingales example in the UK, which has not been successful for these reasons. The Netherlands could learn from this experience and conclude that setting up a separate Covid-19 emergency hospital (not embedded in a hospital system) does not seem to be an appropriate solution for the Netherlands.

SHEBA (Israel) completely isolated Covid-19 patients from non-Covid-19 patients, allowing elective care to be continued to a larger extent. The Netherlands did separate Covid-19 patients within each hospital, but did not completely isolate Covid-19 patients (in separate buildings).

The Netherlands could learn from these examples, and investigate the potential of centralizing Covid-19 patients in several existing hospitals in times of worse case scenarios. Hospitals would be fully equipped, and the large number of patients might result in efficiency gains and would allow for complete isolation.

Temporarily increasing hospital bed capacity by transforming wards into Covid-19 wards was done by care providers in the Netherlands as well as by care providers in other countries. To allow for more flexibility, France and the UK effectively used private sector. The NHS (UK) had to negotiate significantly, but did manage to successfully use the private sector capacity to a large extent. The Netherlands did investigate a collaboration, but this was only limited successful. The governance of our health care system and market based system prevented a successful collaboration. The question remains to what extend this should be altered in times of crisis. The Netherlands could investigate this further, and put frameworks (agreements) in place to enable use of private sector capacity in certain scenarios.

In some regions in the France at-home oxygen treatment was implemented. As at-home services require relatively less investment, it is considered a solution that puts the structures in place that can enable at-home oxygen treatment in all scenarios (not only worse case scenarios). Moreover, such structures can be beneficial to non-Covid-19 patients as well.

On top of that it would be worthwhile to use the potential created by the implementation of virtual wards. This requires more investment, and might therefore be more suitable in more worse case scenarios. But, like at-home oxygen treatment, virtual wards will also benefit non-Covid-19 patients and can have a longer term beneficial effect to the resilience and sustainability of our health system.

To avoid bottleneck with resources, an emergency inventory is worthwhile to consider. This should include required materials in terms of crisis (not only Covid-19 materials).

There is no one silver bullet to respond to Covid-19; it is the combination of several interventions

Financials

Due to the severeness of Covid-19 most hospitals were in need of additional financial recourses. This was done differently in every country, some examples:

— In France the government guaranteed financing for hospitals, both public and private, in the first wave, creating a safety net for hospitals. This fast-tracked collaboration between hospitals and collaboration between public and private sector.

— The NHS financed the Nightingale initiative completely.

— Germany's federal government provided hospitals with compensation for lost income when they cancelled elective procedures.

Key take-aways for the Netherlands

The Netherlands also set up a separate Covid-19 financing regulation. Every country dealt with this topic in its own tailored approach.

It might be worthwhile to consider how to deal with financing in times of crisis, and how this relates to the existing financing structures and processes. Moreover, this is a topic that needs to be bespoke ("maatwerk"), therefore there is not one straightforward solution that is suitable for all situations. This should always be done with care in line with the existing financial frameworks.

Technology

In several countries technology was a key enabler for a more effective response to Covid-19:

— Israel is known for its digital mature health care system. Because SHEBA (Israel) had this all in place before the pandemic, SHEBA was able to quickly adapt its hospital processes to Covid-19. Its advanced hospital system enabled to optimize nurse to patient ratios, to optimize physician to patient ratios and to increase hospital bed capacity. Moreover SHEBA was able to rapidly implement virtual wards, decreasing patient's inflow and increasing patient's outflow.

— Several care providers in the UK used digital support tools to allow for patients being treated at home.

Key take-aways for the Netherlands

Technology is not related only to Covid-19, but is an ongoing trend despite Covid-19.

Covid-19 did show how technology can benefit health care systems. In countries with a strong digital backbone (like Israel), health care is more efficient in times of crisis and in normal times. In times of crisis this provides a base that allows for efficient use of critical capacity and implementing at-home treatments.

Moreover. in some countries (like the UK) the pandemic fast-tracked the digitalization of healthcare, like the at-home treatments in several regions. The UK is "using" the momentum of Covid-19 to further implement technology in their healthcare pathways.

The Netherlands is lacking behind on this topic, the digitalization of healthcare is slowly starting to be implemented. There are some regions using technology to optimize Covid-19 care. It would be valuable to use the momentum and the lessons learned from these experiments and start expanding to non-Covid 19 care. A key essential element that needs to be taken into account here is the increased need for central coordination to build and implement digital healthcare in the Netherlands.

A key question for the Netherlands is how the country can speed up innovation in times of crisis. Due to the fragmented governance, it tends to take long before innovations are accepted or implemented in "normal" times. It might be worthwhile to develop structures that can safeguard and allow faster implementations (or pilots) of innovative practices in times of crisis, so the care delivery model can be adapted more swiftly and we create more flexibility in our models.

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Non-Covid-19 interventions

Apart from interventions focused on increasing capacity for Covid-19 patients, there are also lessons to be learned from interventions focused on continuing non-Covid-19 care during the pandemic. Several examples:

— The UK developed at-home treatment for Covid-19 care, but also for other diseases (mostly chronic diseases) allowing patients to be treated at home and releasing pressure on care providers.

— France focused on keeping non-Covid-19 patients at home as long as possible (mostly elderly and chronic patients), also releasing pressure on care providers.

— Israel benefitted highly from their digital infrastructure.

Moreover, in general, there are lessons to be learned from other countries to improve our health care system. Such interventions / initiatives go beyond the scope of this Covid-19 research, but are worthwhile to mention:

— Digital care; implement digital care pathways allowing patients to be treated at home releasing pressure on hospitals and other care providers.

— Data; allow for a infrastructure that allows for sharing data to create a centralized up-to-date overview of limited capacity in times of crisis.

— Governance; how can governance be adapted to facilitate swifter innovation and more agility in the system and delivery models.

3. Appendix

I. Long list

Longlist of potential best practices in increasing capacity for Covid-19

Category - Setting up one or more additional hospitals					
	Country	**Description**	**Effect of the best practice**	**Select for deep dive?**	**Selected**
1	**Spain (Madrid)** 	- Rapid increase of capacity by building a field hospital at the IFEMA EXHIBITION CENTRE. - Increase capacity by opening additional ICUs in existing hospitals.	- Succeeded in releasing pressure on healthcare system during the pandemic - An increased ICU capacity - No extra financial support from the government was needed	- Capacity is/was only temporary increased - High levels of (ICU) staff needed, no solution of workforce issues - Will put an extra strain on need for buildings/infrastructure	
2	**US (Colorado)** 	- Set up of five Alternate Care Site locations (= field hospitals)	- Succeeded in releasing pressure on healthcare system during the pandemic - An increase of hospital capacity (~2500 beds) - All five ACS locations were decommissioned as of February 2021 - Strongly increase costs of care	- Capacity is/was only temporary increased - High levels of (ICU) staff needed, no solution of workforce issues - Significant different healthcare system - Will put an extra strain on need for buildings/infrastructure	
3	**UK (Nightingale)** 	- Set up of 7 COVID hospitals (the nightingale hospitals) - Adapt the oxygen infrastructure to ensure more patients could be treated with oxygen at the same time - Task differentiation to increase efficiency of nurse teams - Recruiting extra help outside hospitals (e.g., British Airway staff, and retired health workers)	- Succeeded in releasing pressure on healthcare system during the pandemic - Doubled the amount of beds in 9 days, resulting in an increase of capacity - Due to task differentiation ratio of ICU nurses to patients was multiplied several times, releasing stress on staffing capacity - Recruitment outside regular channels increased available staff capacity - Adapting oxygen infrastructure increased efficiency - Increase of patient capacity and therefore increased inflow of patients was possible	- Capacity was increased by novel solutions with a -partly- sustainable character - Rapid increase of capacity - Different health system but comparable processes in execution of care delivery - Will put an extra strain on need for buildings/infrastructure	✓

Longlist of potential best practices in increasing capacity for Covid-19

Category - Transforming hospital wards into ICUs					
	Country	**Description**	**Effect of the best practice**	**Select for deep dive?**	**Selected**
4	**Finland (Helsinki)** 	- Hospital wards (e.g. operating wards) were transformed into ICU beds. - A new law was introduced, giving the government the mandate to call on health personnel. This means that healthcare staff in both the public and private sectors must make themselves available to care for, in this case, COVID-19 patients.	- Succeeded in releasing some pressure on healthcare system during the pandemic - Capacity of ICU beds was doubled - Elective care disrupted and backlogs created	- Will not solve the problem of creating back logs in elective care, so no long term solution - Introducing this law in the Netherlands might lead to labor and political unrest	
5	**Denmark (Odense)** 	- Instruments to convert postoperative beds to ICU beds in the case of a disaster was already available. Therefore hospitals could increase capacity very fast.	- Rapid increase of capacity - Not all the available capacity was used - Strongly increased costs of care	- High costs to structurally maintain this system; increasing longer term healthcare costs	
6	**France** 	- Ambulatory Care Units (ACU) and Post-Anesthesia Care Unit (PACU) were transformed into ICUs - Private- public partnerships (in some regions) - At-home services allowing for at-home Covid-19 treatment - Mobilization of nursing staff	- An increase of capacity (+95% increase from baseline) - Elective care was disrupted and backlogs created	- Will not solve the problem of creating back logs in elective care, so no long term solution	✓
7	**Israel (SHEBA)** 	- Increased ICU surge capacity through rapidly constructing separated COVID-19 ICUs - Implemented disaster preparedness principles - Innovative utilization of infrastructure, equipment, and staff (e.g. robot nurses)	- Increase of capacity (an increase of 362% ICU beds and 5% general care beds)	- Significantly increasing capacity with relatively smaller increases in staff capacity need - Innovations can have a long term and wider effect - Significantly different healthcare system	✓

Longlist of potential best practices in increasing capacity for Covid-19

Category - Optimizing the efficiency of staff					
	Country	**Description**	**Effect of the best practice**	**Select for deep dive?**	**Selected**
8	**Canada (HSC)** 	Optimized nurse capacity by: - Task differentiation - Adding new roles - On the job training of staff	- Succeeded in releasing some pressure on healthcare system during the pandemic - Overall the programs helped to decrease the workload in the units - There was no extra bed capacity created - No research done on the effects on elective care - Relatively little extra costs of care	- Pressure on workload decreased - No actual increase in capacity or treatment - The level of task differentiation that was done in Canada might not be accepted in the Netherlands - At the end of pandemic: distressed workforce leading to outflow of staff	✓
9	**Germany (Berlin)** 	- Recruiting refugees with a healthcare background to help in hospitals. Several initiatives were implemented to speed up that process so that they could be deployed during the pandemic - Lowered the ratio nurse vs patient so hospitals could treat more patients at the same time - Recruiting previous employed healthcare staff	- Succeeded in releasing some pressure on healthcare system during the pandemic - Increase of staffing and thus hospital capacity - Elective care was impacted (even though more bed capacity) as staff was a main bottleneck	- Germany has a relatively high healthcare capacity (baseline) compared to Netherlands wherefore this level of increase might not be enough for the Netherlands	✓
10	**Sweden (Stockholm)** 	- Use task differentiation to work more effectively. - Use data to predict the amount of care / beds needed.	- Succeeded in releasing pressure on healthcare system - Increase of hospital capacity - Decrease of the workload in hospitals - Relatively low impact on elective care during the crisis, only low levels of backlogs created	- The level of task differentiation that was done in Sweden might not be accepted in the Netherlands - Tools to predict the amount of care have longer term effects	
11	**China (Wuhan)** 	Upscaling bedding capacity in Wuhan by: - Effective organization management - Target-oriented task forces - Rapid and accurate information communication	- Helped in releasing pressure on healthcare system - An increase in efficiency in nurse teams - Cost of care strongly increasing due to the rapid scale up	- Significant different culture - Significant different healthcare system	

Longlist of potential best practices in increasing capacity for Covid-19

Category - Optimizing patient distribution across hospitals					
	Country	**Description**	**Effect of the best practice**	**Select for deep dive?**	**Selected**
12	**South-Africa** 	• Implementation of call center with COVID-19 Doctors on Call to screen patients requiring a phone consultation • Recruiting extra care givers	- Workload was spread across different hospitals - No actual increase of patient inflow or capacity in hospitals or ICU - Reached 450 pro bono caregivers who helped in the call center - Helped to release pressure on healthcare system during the pandemic	- Significant different culture - Significant different healthcare system - Might not reach that many pro bono care givers	
13	**France** 	- Regional governmental bodies organized distribution of patients in and between regions	- Workload was spread across different hospitals - No actual increase of capacity in hospitals or ICU - Helped to release pressure on healthcare system during the pandemic	- No extra resources or staff are needed - Longer term sustainable solution as overall capacity in regions/countries is optimized	✓
14	**Germany (Augsburg)** 	- Implementation of a tool which can predict the health care capacities needed. - With this the management of the hospital and the civil protection service can make reasonable decisions and adapt the disaster response to the realistic needs. - At the same time the forecasts create the possibility to plan the strategic response days and weeks in advance.	- Workload was spread across different hospitals - No actual increase of capacity in hospitals or ICU - Helped to release pressure on healthcare system during the pandemic	- Comparable healthcare system - Making use of existing tools and staff - Longer term sustainable solution as overall capacity in regions/countries is optimized	

Longlist of potential best practices in increasing capacity for Covid-19

Category – Use of technology / at-home services					
	Country	**Description**	**Effect of the best practice**	**Select for deep dive?**	**Selected**
15	**Italy** 	- Supporting the implementation of tele medicine / tele care solution to have GPs (Family Doctors) manage Covid patients at-home	- Helped a little in reducing pressure on healthcare system - This intervention was related to out-of-hospital interventions aimed at expanding care at-home this increased the throughput of patients - Long lasting efficiency win	- Long lasting decrease of (extra) burden	*Not further analyzed as this is already implemented in the NL*
16	**Switzerland** 	- Supporting public healthcare authority to monitor and support Covid-19 positive patients during self-isolation via app for patient engagement and a web application for administration by the public health service	- Helped a little in reducing pressure on healthcare system - An increase of outflow of patients out of clinic - Potential decrease of inflow of patients in first or second line of care - Long lasting efficiency win	- Long lasting decrease of (extra) burden	
17	**UK (NHS)** 	- COVID virtual wards were being used as part of the NHS response to COVID-19. - Virtual wards support safe and earlier discharge of Covid-19 patients from hospitals. - When moving from hospital to a virtual ward people are given a pulse oximeter and supporting information to monitor their oxygen levels at-home	- Helped in reducing pressure on healthcare system - An increase of outflow of patients out of clinic - Potential decrease of inflow of patients in first or second line of care - Long lasting efficiency win	- Long lasting decrease of (extra) burden	✓