



# Management of the emergency response to the SARS-CoV-2 (COVID-19) outbreak in Stockholm, Sweden, and winter preparations

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## ABSTRACT

**INTRODUCTION:** Sweden is unique in adopting a ‘no-lockdown’ public health approach to the SARS-CoV-2 (COVID-19) outbreak. There were fears that health services would not be able to care for high numbers of COVID-19 patients.

**AIM:** To describe and review the emergency response of a public primary and community health-care organisation in Stockholm, Sweden, to the demand for care for COVID-19 and non-COVID-19 patients during March–July 2020, and summarise preparations for the months to follow.

**METHODS:** This was a rapid implementation action research case study, which also draws on one author’s experience as Chief Executive Officer and other members’ experience in an emergency management group.

**RESULTS:** Sweden experienced similar mortality per million population to the UK, despite the different public health strategy used to address the COVID-19 outbreak. The Stockholm-integrated public primary and community health-care service, serving a population of 2.3 million, made many changes quickly. One change included coordinating non-acute private health-care services, following the local government emergency directive to do so.

**DISCUSSION:** It is possible that the fast and effective response by management and services in primary and community health care reduced infection and hospital demand, which contributed to a lower mortality than otherwise expected. The actions and preparations described for Stockholm’s response may provide ideas for other health-care systems. The partnership research approach between the Karolinska Medical University and the Region Stockholm health-care system used in this project shows that rapid research methods have advantages for both partners in an emergency situation.

**KEYWORDS:** COVID-19; SARS COV-2; Emergency response; Primary Healthcare; Integrated health system; Implementation

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## WHAT GAP THIS FILLS

**What is already known:** Uncontrolled infectious diseases outbreaks can result in illness demands that acute care hospitals may not be able to meet. Primary and community health care have a critical role to play in reducing infection and acute illness in such outbreaks.

**What this study adds:** We describe the emergency and evolving response of a large regional integrated public primary and community health system to a novel high-consequence infectious disease. We articulate actions to consider for the coming months to minimise suffering and costs in a continually changing environment, including the contribution of rapid research partnerships.

## Introduction

### Why was the Swedish COVID-19 mortality not higher?

To reduce the spread of the infection in early March 2020, the Swedish government passed laws to prohibit gatherings over 50 people, promoted border controls and limited visitors to care homes, among a number of other requirements. The Swedish constitution legally protects freedom of movement of its citizens and does not allow a 'lockdown' during peace time.<sup>1</sup> The Swedish public are expected to follow a series of 'non-voluntary' recommendations from the government agency responsible for public health, but sanctions are limited.<sup>2</sup>

The contrast of this approach in Sweden to approaches taken by other countries is reflected in the Oxford 'COVID-19 government response stringency index'.<sup>3</sup> This scores Sweden as 46/100 from 4 April 2020, compared to the scores for New Zealand of 100/100 and the UK of 76/100 on 26 March 2020, as shown in Figure 1. Despite the differences between Sweden and the UK, daily confirmed COVID-19 mortality per million and trends are almost identical for UK and Sweden, as shown in Figure 2.<sup>4</sup> There are many possible explanations, but one is that fast and effective coordinated primary and community health-care responses in Sweden may have played some part.

### The Stockholm health system

Approximately 2.3 million people live in Stockholm, which has a tax-funded mixed public and private

health and social care system. Approximately 60% of primary care facilities are private, as well as one acute hospital and some geriatric hospitals. Many non-medical but health-related services are provided or purchased by the 26 municipalities in the region, including non-medical services for older people, such as private home visiting services and care homes for ~15,000 people.

Stockholm is unique in that all public non-acute health-care services are owned by the region and managed within the 'Stockholm health-care' organisation.<sup>5</sup> This primary and community health-care organisation includes a diverse range of service delivery units and medical home care services, including specialist 'hospital at home' and palliative care; 70 primary care centres; services for psychiatry, addiction, rehabilitation; and some community-based geriatric hospitals.

## Methods

This article describes the emergency response of the public primary and community health-care division within the Region Stockholm health system and lessons from this response for the next months and for future outbreaks. The basis for the description is the experience of two members of the emergency management team (MO and UL) and a related rapid implementation research project (principle investigator JØ). The latter was started in mid-March 2020 by a combined team of Karolinska Institutet medical university researchers and researchers and administrators employed by Region Stockholm who worked in the SLSO primary and community health-care organisation.<sup>6</sup> To document and evaluate the emergency response, we used data from a weekly survey of all management heads of SLSO primary and community health-care services ( $n = 110$ ); minutes of management meetings; interviews with the emergency management team; and documentation from the emergency management system and emergency planning documents.<sup>7</sup>

## Results

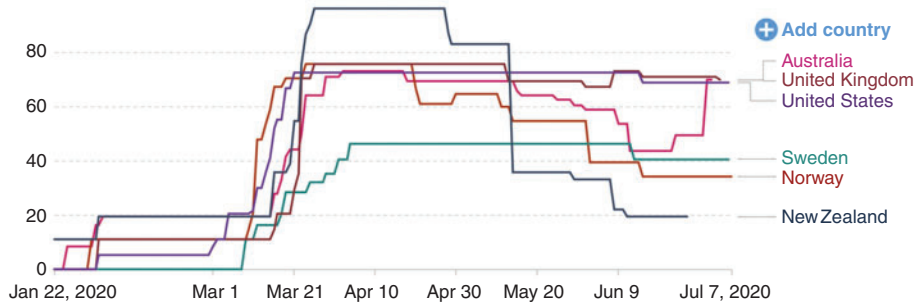
### The SLSO emergency response

Staff practising at three levels of the SLSO organisation had different responses to the emergency over the period from March to July 2020. The three

Figure 1. COVID-19 government response stringency index for January–July 2020 (Hale et al.<sup>3</sup> and Our world in data<sup>4</sup>).

### COVID-19: Government Response Stringency Index

The Government Response Stringency Index is a composite measure based on nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100 (100 = strictest response).

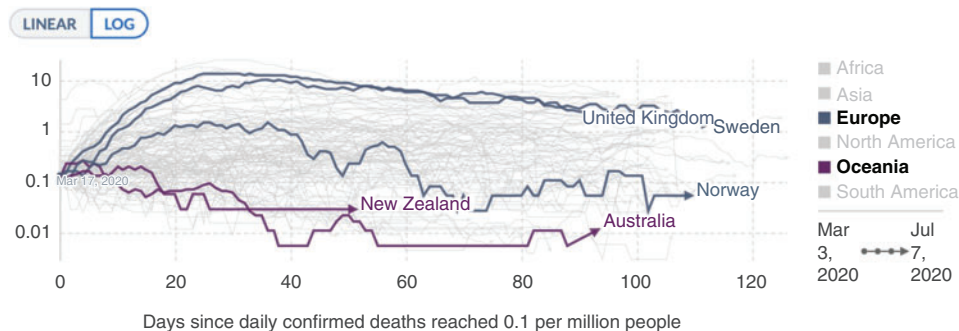


Source: Hale, Webster, Petherick, Phillips, and Kira (2020). Oxford COVID-19 Government Response Tracker - Last Updated 7th July.

Figure 2. COVID-19 deaths per million population for March–July 2020 (Our world in data<sup>4</sup>).

### Daily confirmed COVID-19 deaths per million: which countries are bending the curve?

Shown is the 7-day rolling average of daily confirmed COVID-19 deaths per million people. Limited testing and challenges in the attribution of the cause of death means that the number of confirmed deaths may not be an accurate count of the true number of deaths from COVID-19.



levels were: SLSO senior management and head-quarters support staff; heads of service delivery units; and clinical and other staff serving patients in these units. The response is summarised in Table 1.

#### The response from March to July 2020

The emergency management team for SLSO was formed and met twice daily from the 1 March 2020 to perform the 10 functions of the NATO emergency management model.<sup>7,8</sup> The main objectives of the emergency system were to establish and operate an emergency management organisation

structure and systems; communicate information required by staff and patients (internal and external); and mitigate and stop the spread of infection.

#### March 2020

In the first 2 weeks of March, we documented rapid and important changes to SLSO operations at each of the three levels of services. Each change would previously have taken months or years to make. Some of these changes were common elsewhere, such as rapid scale-up of telephone and video

Table 1. Timeline of main events and responses by SLSO public primary and community health-care organisation

31 January 2020	SARS-CoV-2 first positive case registered in Sweden.
7 February 2020	Region Stockholm Government activates a level 1 (out of 3) response and forms an emergency management team (RSSL) with functions and powers following the NATO model.
29 February	Region RSSL requests SLSO CEO to help with testing and tracing people who may have been in contact with COVID-19-positive patients overseas.
March	
1	SLSO CEO establishes the local emergency management team and systems and meetings start and run two times a day, following the SLSO emergency plan and NATO model.
11	Sweden's first COVID-19 death reported and the World Health Organization declares a global pandemic.
20	Stockholm Government directs SLSO to coordinate all municipality and private primary and community services in the Region.
22	Cluster organisations established with coordination meetings of senior managers in municipalities and SLSO.
30	Stockholm Government directs SLSO to manage the new emergency field hospital that was standing by to take patients if needed (Älvsjö).
April	Evolving response and further development of clinic changes and other changes (e.g. training, clinical updates, continued increase in telephone and video consultations and e-health information to the public, and primary care 'node units' dedicated to physically receiving patients with suspected COVID-19 infection and examine and advise patients).
May	Further COVID-19 outbreaks in private older people's residential homes contracted by the municipalities. Support provided by SLSO.
June/July	With reduced COVID-19 demand, possible to follow-up patients and give more time to routine care. PCR and antibody tests offered free to Stockholm residents on 12 June 2020. 'Normal operations' declared on 10 July but SLSO emergency management team still meeting, but not daily.
August/September	Planning and preparations for winter.

SLSO, Stockholm integrated public primary and community healthcare division; NATO, North Atlantic Treaty Organisation; PCR, polymerase chain reaction

consultations, and the provision of e-health information to the public and staff. Two strategies were used to protect staff health and reduce the risks of infection spread. Staff thought to be at high risk of serious illness if infected were deployed to non-patient contact and lower-risk work such as digital service responses. Other staff were encouraged to report sick if symptomatic and did not need certification for payment. The human resources department was able to work constructively with staff unions and established arrangements that made it possible to redeploy staff to services where they were most needed. Certain primary care units were designated as 'node units', dedicated to receive patients with suspected COVID-19 infection and not in need of immediate hospitalisation. At this time, these units provided clinical examinations and advice to patients, but not tests. In addition, an information system was established to provide the emergency management team with timely information, as described later in this article.

#### April 2020

In March, shortages of personal protective equipment (PPE) in all patient contact services was reported in the weekly surveys of unit managers. Local links and flexibility made it possible for SLSO and Karolinska hospital to set up a 'command centre' for purchasing and logistics that included Scania construction company staff, using their expertise and systems to source and purchase materials internationally and distribute them to units.<sup>9</sup> Part of this response was to establish a system to assess the material needed in all 700 units and establish a central store at the SLSO offices of protection material and distribute this quickly when needed.

PPE shortage was experienced in private long-term care homes contracted by the municipalities. This contributed to outbreaks in infection and mortality in some homes. Although it was not the responsibility of SLSO to do so, the above logistics centre

distributed PPE to homes in need and formed five mobile teams to reinforce testing capacity in long-term care homes and our geriatric units.

#### *May 2020*

In May, the weekly unit managers' surveys indicated that staff became more practiced and less anxious and the systems were revised to become more efficient. To coordinate all private services and municipality governments, three area organisations were established. These three high-level groups were headed by SLSO and municipality directors covering social care and combined the head municipality and private health service leaders.

#### *June and July 2020*

The disease activity curves began to level-off in May, and in June, the twice-daily meetings of the emergency group were reduced to once a day and then three a week. After 10 July the emergency management system was dis-established, and 'normal operations' declared on 10 July. Surveys and reports from staff in the first COVID-19 months show that, although anxiety was high, there was also a strong esprit de corps and mutual support, as well as the enjoyment of being free to focus on medical practice with less 'form filling'. However, by May and June, there was evidence of the effects on some staff of the high and continual workload in an uncertain situation, that was compounded by staff sickness.

### **Overview of changes in service utilisation**

From data about service utilisation and financial payments to services, we observed high levels of staff sickness leave, yet for many services, similar levels of utilisation and service production were observed compared to the same period last year in this multi-service organisation. Possible explanations are that remaining staff worked harder or more efficiently and provided services in response to similar levels of demand to 2019. Others have reported significantly lower levels of health-care utilisation, but we did not observe this in all services from the available data.<sup>10</sup> The exceptions were in primary care services where data, from March to June 2020 compared to 2019, showed that there was

an overall reduction of 24% in physician visits, 22% in nurse visits and 25% in rehabilitation, including telehealth visits.<sup>11</sup>

### **Winter preparations**

During July and August, the services catered for localised outbreaks and a growing demand from patients whose health may have deteriorated, but who may not have contacted services. As yet, there is no firm evidence of the latter demand. There are different views about a possible increase in mental health issues, as well as problems arising from health conditions that may have deteriorated due to patients avoiding care, or experiencing challenges in performing self-care and maintaining a healthy lifestyle. Two groups that are of concern are older patients living alone and family carers supporting people with health conditions such as dementia and psychiatric illness. SLSO continued to provide specialised support to patients at home with compromised immune systems and to some patients who experienced periods of serious illness. COVID-19 care is being revised for what staff are learning to be a multi-organ disease that can have variable and serious long-term effects.

Preparations are now being made for potential localised outbreaks, as well as more widespread resurgence in disease activity at any time; these may be more likely as the winter proceeds. Three possible scenarios are: (1) no change to usual demand and use of health care; (2) significant changes in demand or use from different patient groups; and (3) proactive and preventive targeted outreach to individuals or specific groups who have not presented but whose health is likely to deteriorate and are likely to need care (known patients, groups or areas at risk). These are informed by the three scenarios for the winter made by the Public Health Agency of Sweden.<sup>12</sup>

### **Future emergencies**

An inquiry is underway into the tragedy of infection and COVID-19 deaths among residents of specific care homes, and we are also aware of possible infection of staff employed by services who visit older people in their homes. Our initial survey shows no difference in mortality rates between private and public long-term care homes. There are



indications, reported elsewhere, of an association between higher rates of infected cases and the size of unit in terms of number of residents.<sup>13</sup>

During the 2020 summer break, we are considering how to prevent outbreaks in care homes. One issue to be addressed is clarification and implementation of responsibility for preventing infection. Municipalities contract private care homes and home-visiting social care services. The health-care system contracts private general medical practice staff to serve residents. In addition, funding and support responsibilities will be reviewed, given the high human and economic costs of infection prevention failure. Related to this are methods to identify homes that might be most at risk of infection spread, both when making and reviewing contracts, and then routinely. This will be done using formal risk assessment methods<sup>14</sup> and by seeking and using local reports and knowledge of relatives, professionals visiting the homes and care staff. It may be possible to develop systematic and effective ways to seek and act on this knowledge. The media have demonstrated that this can be done.

### System understanding of interdependencies

Outbreaks in nursing homes affected hospitals, often because PPE was not available, or infection control was poor. The emergency highlighted how actions or inactions by one sector or service affected others, often later in time and in unpredictable ways. Rapid transition to telemedicine by primary and community health services reduced emergency department attendances and possible infection of uninfected people.

A related systems observation are comments made by some management staff in interviews; they had noted theirs and others' limited knowledge of the role played by different functions and services and the consequences of not organising systems as a whole. Initially, it was not clear to some managers in the emergency management team why some functions in the NATO model were needed. They reported that they learned how necessary all the functions were at the decision table, as well as the need to bring expertise, such as from pharmacists, into meetings. Implications for the future include the need to develop a systems perspective among

staff. It is also necessary to ensure that there are people from different parts of the system with different perspectives at decision-making meetings, as well as effective decision processes to integrate perspectives, and a method for later reviews for fast decisions that have to be made where there is uncertainty about the effect of these decisions on different parts of the system.

### Matching demand to supply in an evolving crisis

A large number of staff employed by one organisation in many different services can quickly be redeployed and retrained as necessary, to balance staff availability to the rapidly changing needs of services and populations. We documented effective redeployment of high-risk staff out of harm's way; for example, to telemedicine, but in some cases, redeployment of staff in low-workload services to areas with high workload was not achieved. This only became clear from the retrospective analysis of production and reporting data in July 2020.<sup>11</sup> One lesson is that more timely data to show comparative high and low workloads in different services are necessary to take better advantage of the benefit of a large single multi-service employer in an emergency.

### Health deterioration, follow up and outreach

During the summer transition, service staff had more time to carry out scheduled follow ups for patients with chronic and other conditions and identify patients at risk of health deterioration who had not been in contact. It is uncertain whether there will be a rise in demand for health care from patients whose physical or mental health conditions have deteriorated or what the possible health consequences of unemployment and stress in vulnerable populations will be.<sup>10</sup> We learned to regard primary and community health care as the 'front line', with acute hospitals as 'back-up', but to be avoided if possible. Winter preparations include planning to target specific groups and services for proactive action to prevent health deterioration. This includes regular updates from research elsewhere about such demand so as to guide targeting and action. If planning is effective, the load on acute hospitals can be minimised to retain their capacity

to respond to a winter COVID-19 resurgence, if this occurs.

### Data and rapid research

The value of timely information to management about service use, infection rates and valid predictive models was demonstrated early, as were the limitations of national level data. Experts and analytical members of the SLSO emergency management team found a way to link local databases and present analyses regularly to the team, to enable informed decision-making. This continues with revisions to help winter decisions and developing a more robust, more accurate and efficient data analytics system for this and other health-care emergencies. Related to this was the rapid implementation research project involving a team of university researchers and SLSO staff. The researchers were able to bring relevant knowledge from different sciences to design the weekly surveys and provide knowledge support about management, organisation and implementation to SLSO. One lesson for the winter and for others is of the value of engaged rapid partnership research to provide real-time information to management.

### Conclusion

This article drew on research by a joint university and health-care system team and thus may be biased towards positive findings about the health-care system investigated. However, there were advantages of a joint team using rapid research methods and building on existing partnerships from other ongoing research. One was rapid access to data and our ability to quickly document and make assessments. The primary conclusion was that the pandemic highlighted the strengths of the health-care system and of its staff, but also its vulnerabilities. Managers reported they were aware of many of the system weaknesses highlighted by the emergency. The likely winter demands on the system and the need for a more effective response mean careful preparations are now being made, informed by the lessons of the last months. The pandemic showed clearly the service interdependencies, but also the absence of timely reliable information and previous effective coordination arrangements between public and private services and the municipalities providing social care.

The COVID-19 crisis brought people together, put aside squabbles about budgets and responsibilities and resulted in fast and effective action. The sense of professional vocation and of common purpose will be needed in the coming months. People who came together and were tested carry this experience and the benefits they saw into the coming months, but not all will be in post or present for the next outbreak. We saw that effort and rising to the occasion is not enough and people become exhausted over time. We have learned we need to use this experience to build systems and to revise and establish the organisation and management needed to support clinicians and patients, both for emergencies and for improvements to routine care.

### Competing interests and funding

Research team members were employed by Stockholm Region Government and by the Karolinska Institutet medical university, and conducted the research in addition to their other funded projects and works assignments. No separate funding was provided to researchers and health service staff for this project. One research member was retired and not employed by either organisation. Possible bias could result as many project members were employed by Stockholm Region Government and were investigating how their employers implemented emergency management.

### Ethics approval

Etikprövningsmyndigheten BESLUT 2020-04-08 Document ID: B42F283821A94986986F74E4-F866C7FD Title: 'Omställning av närsjukvården som svar på covid-19-utbrottet: en studie av krisorganisationen i Stockholms läns sjukvårdsområde' ('Implementation of management and organisation response to the COVID-19 outbreak: a study of the crisis organization in Stockholm County's health-care area'). Sökande forskningshuvudman Region Stockholm, Forskare som genomför projektet John Øvretveit.

### Acknowledgements and contributions

John Øvretveit wrote the first draft manuscript and edited later revisions, and is named principle investigator in the ethics application with co-applicant Mikael Ohrling, director SLSO, who

significantly revised the manuscript, together with Mats Brommels, associate at the Karolinska Institutet, MMC, and Ulf Lockowant, Head of Division for Special Operation, SLSO. Ulf Lockowant and Clara Hellner, professor at the Karolinska Institutet and director of research and development, SLSO, carried out the data analysis of service use and information for the management team. Vibeke Sparring, researcher and senior administrator of research and development in SLSO, undertook the translation of the ethics application and the weekly surveys to managers. Karin Solberg Carlsson, researcher at the Karolinska Institutet, MMC, and Hakan Uvhagen, development officer SLSO, undertook interviews with emergency management team members during May and June 2020.

## References

1. Riksdag S. The Constitution of Sweden: the fundamental laws and the riksdag act. Stockholm: The Swedish Parliament; 2016. [cited 2020 July 25]. Available from: <https://www.riksdagen.se/globalassets/07.-dokument-lagar/the-constitution-of-sweden-160628.pdf>
2. Folkhalsomyndigheten, Bromsa smittan – det här kan du som privatperson göra, (HSLF-FS 2020: 12). Public Health Agency of Sweden. 'Slow down the infection - this is what you as a private person can do: a summary of amendment to the regulations and general guidelines on everyone's responsibility to prevent covid-19 infection'. Stockholm, Sweden. [cited 2020 July 25]. Available from: <https://www.folkhalsomyndigheten.se/smittskydd-beredskap/utbrott/aktuella-utbrott/covid-19/skydda-dig-och-andra/bromsa-smittan-det-har-kan-du-som-privatperson-gora/>
3. Hale T, Webster S, Petherick A, et al. Oxford COVID-19 Government Response Tracker. Blavatnik School of Government; 2020. [cited 2020 July 25]. Available from: <https://www.bsg.ox.ac.uk/research/research-projects/oxford-covid-19-government-response-tracker>
4. Our world in data 2020. Daily confirmed COVID-19 deaths per million, rolling 7-day average; 2020. [cited 2020 July 25]. Available from: <https://ourworldindata.org/grapher/daily-covid-deaths-per-million-7-day-average>
5. SLSO. Stockholms läns sjukvårdsområde (Stockholm County Healthcare Area). Stockholm, Sweden. [cited 2020 July 25]. Available from: <https://www.slsosll.se/>
6. Øvretveit J. Implementation evaluation of emergency response to covid-19 in Region Stockholm primary and community healthcare (SLSO). Approved ethics application and Master document of study, 2020, Stockholm, Sweden. Available from [john.ovretveit@ki.se](mailto:john.ovretveit@ki.se), LIME MMC Karolinska Institutet.
7. Engström U, Ohrling M. Kris och katastrofmedicinsk beredskap - plan för SLSO, (Crisis and emergency medical preparedness - plan for SLSO) PLA-01691-v.21.0, Stockholms läns sjukvårdsområde, Dec 2019. Stockholm County, Sweden.
8. Granåsen M, Olsén M. Att leda Att leda brandbekämpning eller indirekt eld? Analys av militära ledningssystem tillämpbarhet för kommunal räddningstjänst (Analysis of military C2 systems applicability for the rescue services FOI-R-4883-SE December 2019). Stockholm County, Sweden.
9. Scandia 2020. Scandia & Karolinska Covid 19 Command Center; 2020. [cited 2020 July 25]. Available from: [https://www.youtube.com/watch?v=6HB2Gk2w0nk&feature=emb\\_logo](https://www.youtube.com/watch?v=6HB2Gk2w0nk&feature=emb_logo)
10. Academy of Medical Sciences. Preparing for a challenging winter 2020–21. London: The Academy of Medical Sciences; 2020. [cited 2020 July 25]. Available from: <https://acmedsci.ac.uk/file-download/51353957>
11. Lockowandt U, Ocklin G. Covidpåverkan på SLSOs produktion och intäkter – med särskilt beaktande av behandlingsskuld. ('Covid impact on SLSO's production and revenues - with special regard to treatment debt'.) Internal document SLSO. Stockholm, Sweden; 2020.
12. Folkhalsomyndigheten, Scenarier: Tre smittspridningsscenarier inom regeringsuppdraget ('Plan inför eventuella nya utbrott av COVID-19, Stockholm, Sweden. (Scenarios: Three contagion scenarios within the government assignment 'Plan for possible new outbreaks of covid-19'). [cited 2020 July 25]. Available from: [FolkhalsomyndighetenScenarier-tre-smittspridningsscenarier-plan-eventuella-nya-utbrott-covid-19.pdf](https://www.folkhalsomyndigheten.se/scenarier-tre-smittspridningsscenarier-plan-eventuella-nya-utbrott-covid-19.pdf)
13. Comas-Herrera A, Zalakaín J, Litwin C, et al. (2020) Mortality associated with COVID-19 outbreaks in care homes: early international evidence. Article in LTCcovid.org, International Long-Term Care Policy Network, CPEC-LSE, 26 June 2020.
14. Centers for Disease Control and Prevention. Preparing for COVID-19 in Nursing Homes. [cited 2020 July 25]. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/long-term-care.html>