

## COMMISSION ON MEDICAL OXYGEN SECURITY

### COUNTRY CASE STUDY

#### Sweden

##### ***Coordinating access to medical oxygen in an aging population***

Ann Liljas, Carina King, Stefan Swartling Peterson, Department of Global Public Health, Karolinska Institutet, Sweden

##### ***Case study focus***

The focus of the Swedish case study is the provision, access, demand and supply of medical oxygen to the ageing population of Sweden, with a particular focus on how oxygen is managed in home-based and care home settings. Sweden has a long history of home and care home-based oxygen treatment, used primarily amongst older patients with COPD.

During the COVID-19 pandemic, this group of institutionalised elderly patients was particularly affected by the coronavirus, alongside widespread narratives that oxygen was unavailable, withheld, or not clinically useful within these settings.<sup>(12)</sup> This raised questions about the governance and adaptability of clinical policies for eldercare, where residents have complex vulnerabilities and multiple organisational structures to coordinate.

##### ***Key messages***

- *Older adults in need of medical oxygen should, if possible, receive medical oxygen where they reside. Thus, portable medical oxygen solutions that are tailored to different use cases (e.g. mobile advance care teams, or LTOT at home) are key to ensuring oxygen access for an ageing population.*
- *Strengthening staff capacity and competence in care homes, where staff often consist of a multi-disciplinary mix of clinical and non-clinical cadres, to provide medical oxygen is important to be able to deliver medical oxygen where the patient resides.*
- *Given home and care home-based settings are complex, and include complex patients, ensuring all frontline workers are incorporated into pandemic preparedness planning is needed – and was criticized as a gap in the COVID-19 response.*
- *As all citizens have equal rights to care irrespective of where they live, providing care in relation to the patient's wishes and where they reside also means needing to have the capacity to offer the same alternatives to those who live in rural areas.*
- *Smoking prevention initiatives are important to reduce long-term oxygen needs as populations age.*

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This case study aims to provide insights into both how long-term oxygen therapy can be equitably sustained in one of the oldest populations in the world, but also how care home settings should be considered in pandemic preparedness and response planning.

### Country context

#### Demography, economy and epidemiology

In Sweden, the leading cause of death is circulatory diseases which accounted for one third (33%) of all deaths in 2018. Of these, 12% were due to ischemic heart disease and 6% caused by stroke. In the same year, cancers accounted for one quarter (25%) of all deaths, of which lung cancer (4%) was the most common. Two in five (38%) Swedish adults have at least one chronic condition and this increases with age: among adults aged over 65 years, 55% have one or more chronic conditions.<sup>(1)</sup>

Indicator	Value	Data source (year)
Total population	10.6 million	UNPF (2023)
Total under-five population	576,367	SCB (2023)
Under-five mortality	2 deaths per 1,000 live births	UNICEF (2022)
Life expectancy (m:f)	82 years: 85 years	UNPF (2023)
GDP	65,84 thousand US Dollars per capita as at first quarter of 2023	IMF (2023)
Healthcare expenditure	6,914.91 USD per capita (in 2021)	The World Bank (2021)
Income status	High income country	The World Bank (2023)
COPD mortality	22.9 deaths per 100 000 inhabitants (in 2021)	Statista (2021)

Table 1. Summary of Sweden's demography, economy and epidemiology

However, Sweden is below the EU average for avoidable hospital admissions due to chronic illnesses (including COPD), reflecting functional outpatient and community care structures, and overall lower burden of these illnesses than other high-income settings.<sup>(1)</sup>

In 2019, one third (34%) of all deaths were attributed to behavioral risk factors of which tobacco accounted for 15%. Air pollution, defined as fine particulate matter and ozone exposure, accounted for only 1%.<sup>(1)</sup> Sweden has one of the oldest populations in the world, with an average life expectancy of 83 years. One in five (20%) adults are aged 65 years and over. Subsequently there is a high and increasing demand for health and social care, as well as medical treatments for chronic conditions, to meet the health and care needs of an ageing population.

### Health system

Sweden is a welfare state in which health and social care are largely tax funded and publicly organized and provided. The guiding principle is to make services available to anyone in need of care, regardless of economic status. Sweden's universal care system is decentralized with 21 regions which locally collect taxes on income to cover costs for primary healthcare, specialized healthcare and rehabilitation. This is then further decentralized to 290 municipalities which oversee prevention and health promotion, and social care primarily for older people (Table 2).

The State's role is typically to decide on policy aims and directives through legislation and financial incentives, which regions and municipalities then enact, and the State provides smaller contributions to the funding of health and social care. Small out-of-pocket fees for outpatient care apply to adults under 85 years (approximately 15–50 USD per visit).

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Through policy and funding, the State also influences health promotion and prevention that is delivered largely by municipalities, with care for elderly being an example of this. Municipalities are (by law) not employing physicians, and municipalities therefore need to allocate physicians to the care they organize – including elderly care homes. In the last few decades, older people in need of both healthcare and social care have been moved to care homes. More recently however, care homes are being replaced by home-based social and health care.(2)

	Sweden		
	State	Region	Municipality
<b>Specialized healthcare</b>			
Policy	X		
Funding	X	X	
Organizing		X	
<b>Primary healthcare</b>			
Policy	X	X	
Funding	X	X	
Organizing		X	
<b>Prevention and health promotion</b>			
Policy	X		X
Funding	X		X
Organizing		(X)	X
<b>Rehabilitation (medical)</b>			
Policy	X		
Funding		X	
Organizing		X	
<b>Social care for older people</b>			
Policy	X		
Funding	X		X
Organizing			X

Table 2. Areas and levels of responsibilities for health and social care for older people in Sweden?

Whilst the care system is universal, it is supplied by both public and private providers, and each patient has the right to choose their primary care clinic and social care provider. Private care providers run 15 of the country's 100 hospitals and 45% of the 1,200 primary care clinics, primarily in urban areas, and 23% of the social care services. The private companies are allocated tax money to provide the care, with no differences in out-of-pocket payments incurred by patients between public and private care providers.(3,4)

There is a wide variation in the proportion of elderly care hours provided by private care providers between regions, ranging from 62% in Stockholm region to 2% in Norbotten region in 2016.(4)

In Sweden, medical oxygen is classified as a medical treatment that requires advanced medical healthcare. All medical treatments used in Sweden are approved by the independent government agency the Swedish Medical Products Agency. The process of approving medical treatments are regulated in law (reference: 2015:315). Medical oxygen is approved for use as a treatment for multiple diseases and conditions, with policies regarding what diseases to be treated based on research and best practice and developed and regularly revised by the National Board of Health and Welfare and the Swedish Medical Products Agency.

Similar to the Swedish Medical Products Agency, the National Board of Health and Welfare is an independent government agency that licenses healthcare workers, develops policy and guidelines, and disseminates information to other agencies, professionals and the general public. The National Board of Health and Welfare also maintains some of the national health data registries and official statistics.(5) The Ministry of Health and Social Affairs is responsible for delivering social welfare, public health, healthcare and care for the elderly. Within this Ministry, the unit for healthcare and medical products has the function of compiling information, including medical oxygen, to provide guidance to the government.(6)

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According to the Swedish Healthcare Act (reference: 2017:30), healthcare providers are obliged to have capacity for providing medical equipment needed according to the Swedish Medicine Agencies regulations, including medical treatment such as oxygen. The policy guideline HSLF-FS 2023:32 developed and distributed by the National Board of Health and Welfare covers administration and prescription of medical oxygen, and policy LVFS 2003:11 refers to medical products approved by the Swedish Medical Products Agency.(7)

### COVID-19

Sweden, and particularly the capital, Stockholm, was hard hit by the COVID-19 pandemic from March 2020 onwards. By 23 June 2023, there had been 622,903 confirmed cases of COVID-19 in Region Stockholm – a population of approximately 2.4 million people. As of the 11th September 2023, there had been 19,475 deaths nationwide of which 2,133 deaths occurred in Stockholm municipality.(8) By February 2023, 88% of the adult population (18 years and over) had received at least one dose of COVID-19 vaccine. Vaccine coverage is the highest among the oldest: 97% of adults aged 80 years and over have taken at least one dose of COVID-19 vaccine.(9)

In Sweden, the response to the COVID-19 pandemic differed from that of many other countries by having recommendations rather than regulations and lockdowns. The recommendations aimed at limiting the spread of the virus in society by keeping a physical distance to other people, focusing on hand hygiene, and specific recommendations aimed at shielding vulnerable populations.

Due to the high mortality risk, those aged 70 years and over were strongly urged to maintain social distancing, and visits to care homes for older adults were banned during certain time periods.(10) There were widespread reports of care home staff lacking basic PPE equipment and challenges around staff illness, shortages and gaps in training.(11,12) These were given as reasons for the high COVID-19 incidence and mortality within care homes, particularly in Stockholm, and when compared to neighboring Nordic countries.(13)

Sweden rapidly increased their intensive care unit (ICU) bed capacity, and while there were examples of capacity being stretched, they were never overwhelmed.(14) This may in part be explained by different approaches to clinical management, especially in the elderly population. Firstly, Sweden had an oxygen saturation threshold of  $\leq 90\%$  for commencing oxygen treatment in COVID-19 patients within their clinical guidelines – lower than many other high-case burden countries, where cut-offs up to  $\leq 95\%$  were used.(15)

Secondly, there were multiple reports in popular media and from personal testimonials that treatment of COVID-19 amongst care home residents should focus on symptom relief and palliative care, rather than admission to hospital for oxygen therapy or intensive care. (12,16,17) While arguments around the need for oxygen and the appropriateness of oxygen treatment amongst these frail patients were raised,(16,18) guidelines for pulse oximetry use for hypoxaemia detection in this setting were not found.

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### ***Oxygen supply and clinical use landscape in Sweden***

#### *Medical oxygen supply*

In the early 2000s, there were national negotiations followed by agreements on medical oxygen supply with mainly two operators: Linde and Air Liquide. These large international providers mainly supply oxygen to the industrial market and the medical oxygen market forms only a small proportion of the oxygen they deliver in Sweden. The companies each provide about 50% of the medical oxygen consumed in the country. The operators are responsible for delivering, re-filling and replacing, and collecting empty oxygen tanks and supplying and repairing concentrators.

Despite efforts to obtain information on these contracts and the volumes of oxygen delivered through freedom of interest requests, we were unable to interpret or discern the meaning of the information provided. In recent years, the operators reported that the request for portable medical oxygen has increased – triangulating with national register data on longer-term oxygen need (see Figure 1). Nonetheless, the procedure for the delivery and collection of oxygen tanks and concentrators of different sizes was described by the industrial key informant as the same i.e. concentrators are collected and returned to hospitals or pharmacies. The oxygen providers offer training to pharmacy staff in how to handle medical oxygen.

In addition, Sweden exports medical oxygen. In 2022 Sweden was estimated to have exported 8.5 million cubic meters of bulk liquid oxygen – mostly to Denmark and Norway and was the 18th largest exporter of concentrators and ventilators by market value globally.<sup>(19)</sup>

#### *Clinical prescribing*

In Sweden, all use of medical oxygen by individuals is regulated and requires a medical prescription. Medical oxygen is purchased and paid for by the regions and ordered online by clinical staff using the region's website. Oxygen equipment is collected at a local pharmacy or delivered to the individual by healthcare workers. Users are required to return the concentrators to the pharmacy after use. Within clinical units that prescribe long-term oxygen therapy for home use,<sup>(20)</sup> a specific cadre of nurse or technician specialized oxygen nurse, or oxygen technician, is responsible for the set-up and follow-up of patients as described by Ekstrom et al. below.

“When a patient fulfills LTOT [long term oxygen therapy] criteria and is identified as eligible by the responsible specialist, contact is established with the specialized oxygen nurse(s) at the responsible clinical unit who manages the practical aspects of treatment and follow-up. The oxygen nurses in most cases hand over the oxygen equipment and information to the patient in the home, check the home condition regarding risk factors for fire including smoking, gas stove, and open fireplaces, and arranges for home adaptation by an occupational therapist as needed.”  
(Ekstrom et al., 2017).<sup>(21)</sup>

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### *Monitoring outpatient oxygen use – Swedevox*

In 1987, a national register of patients receiving long term oxygen therapy (LTOT) was established – Swedevox, and was expanded to include those on long term mechanical ventilation in 1996, and CPAP for the period of 2010 – 2021.<sup>(22)</sup> The register includes approximately 85% of patients receiving LTOT in Sweden and as of end 2022, 30745 patients have been included in the Swedevox register, from 48 clinical units that are able to prescribe LTOT.

The absolute number of patients receiving LTOT has been slowly increasing, and more recently with a dramatic rise in 2021–2022 (Figure 1). The age of starting LTOT has increased from 66 years in 1987 to 76 years in 2022.<sup>23</sup> Reasons given for the more dramatic increase in 2021–2022 is prescriptions for oxygen during exertion/exercise following COVID-19 – although evidence to support this treatment is questioned by the Swedevox report, and the COVID-19 pandemic was also linked to poorer reporting practices for the 2021–2022 period.<sup>(23)</sup> The background trend of increasing LTOT prior to COVID-19 likely reflects the concurrently ageing and growing population of Sweden.

At the time of establishment, 85% of LTOT was being delivered by oxygen concentrators, with the National Lung Organisation responsible for supervising delivery of equipment by commercial companies.<sup>(24)</sup> The predominance of concentrators has remained and has been shown as considerably cheaper than the alternative of liquid oxygen for these patients,<sup>(25)</sup> although associated with more adverse effects on quality of life.<sup>(26)</sup>

The Swedevox register has proven useful in monitoring long-term trends in home-based oxygen use,<sup>(21)</sup> as well as evaluating policy impacts on oxygen need, how evidence is being put into clinical practice, and oxygen safety in non-clinical settings.<sup>(27,28)</sup> It has also highlighted regional variations in prescription practices – especially for mechanical ventilation in palliative care.<sup>(23)</sup>

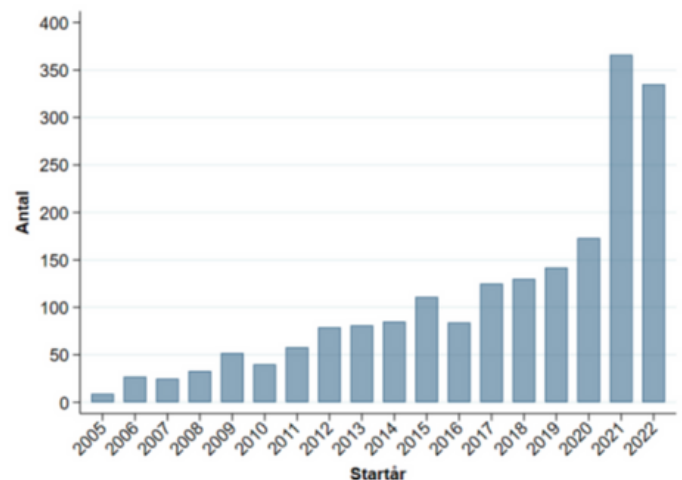


Figure 1: Trend in long term oxygen therapy prescriptions in Sweden from the 2005 Swedevox Annual Report (antal = number; startår = starting year)<sup>23</sup>

### **Access to medical oxygen for an ageing population**

#### *Oxygen stakeholders in Sweden*

As healthcare is publicly provided there is no private market for medical oxygen in Sweden. Key stakeholders include the responsible ministry and public agencies such as the Ministry of Health and Social Affairs, the National Board of Health and Welfare, and the Swedish Medical Products Agency.

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According to those interviewed, in Sweden, medical oxygen is not on the political agenda and there is no lobbyism, yet the market has been dominated by two large suppliers for an extended period. The Ministry of Health and Social Affairs has confirmed that there are no discussions or ongoing work around medical oxygen. Sweden has an active research community in the clinical use of medical oxygen and generating evidence for clinical guidelines both locally and internationally.(23)

*“Currently there is very little discussion about medical oxygen partly because the option [to provide medical oxygen] exists and that COVID-19, which caused the debate, and vaccination...one has gained more knowledge about treatment of COVID-19 and so such discussion is little nowadays.”* Medical doctor working with multiple care homes for older adults.

*Effective public health can reduce the need for long-term oxygen therapy*

Overall, the need for medical oxygen among older adults in care homes is low. According to a medical doctor with management responsibilities for about 40% of the 400 care homes across Stockholm, it is very unusual that older adults residing in care homes need medical oxygen. A couple of medical doctors further said that medical oxygen was rarely used during the pandemic for this patient group, referring to research that showed breathlessness was found in 73% of patients dying in hospitals but only in 35% of older adults dying in care homes.

The authors posited that breathlessness was less common in those who died in care homes since they mostly died within the first 7-8 days of the disease that is characterized by fever, cough, and pronounced fatigue, but not by pneumonia. The paper concluded that many older adults who died in care homes passed away before COVID-19 had entered their lungs and acute respiratory distress syndrome had developed.(18) The implication of this being that oxygen was not needed.

*“There is research concluding that they [older adults in care homes with COVID-19] were too frail. There was a difference between healthy older adults who died from having their lungs infected by the coronavirus and those frail who died because they were close to death anyway as they were so frail, very little was needed, they never got particularly ill before they died.”* Medical doctor specialized in geriatrics.

However, relying on breathlessness as an indicator of hypoxaemia, and therefore oxygen need, was questioned – and doesn't align with the commonly reported phenomenon of 'happy hypoxaemia' occurring in patients without other signs of respiratory distress. As one frontline care worker expressed.

*“Could we give oxygen? I started to think ... I myself did not have problem with breathing, only once I felt that it was difficult to breathe. Then we discovered that many did not have good oxygen saturation even though they did not have difficulty with breathing. They die in silence. That's when we started to use the pulse oximeter much more at the care home and began to think why we weren't allowed to administer oxygen.”* (Kabir et al., 2020)(12)

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According to Air Liquide, one of the two main suppliers of oxygen to the Swedish care sector and a main supplier to other Nordic countries, Denmark has three times as many individuals in need of medical oxygen as Sweden. Yet the total population of Sweden is twice as large as the population of Denmark. This is probably explained by different trends in smoking,<sup>(23)</sup> only 6% of Swedish adults smoke cigarettes daily yet snus, a smokeless, moist powder tobacco product, is commonly used.<sup>(29)</sup>

Regular smoking for a long time increases the risk of lung diseases such as COPD that can require medical oxygen in older age.<sup>30</sup> Both the Swedevox registry and Air Liquide report links the proportion of smokers in the 1950s and 60s with today's medical oxygen demand,<sup>(23)</sup> with Danes starting smoking cigarettes a decade later than Swedes, and younger generations being less likely to smoke.

Similar to the Swedevox registry, Denmark also established a medical oxygen register in 1994, allowing long-term tracking of home-oxygen use and outcomes.<sup>(31)</sup> Interestingly, the oxygen usage data is provided by the oxygen suppliers and linked to patient medical records – providing a nice example of industry collaboration for monitoring oxygen demand. A key difference between initiating LTOT in Denmark and Sweden is the role of smoking – in Sweden it is a counter-indication, also possibly contributing to the lower prevalence of LTOT prescriptions.<sup>28</sup> This has highlighted a safety concern, with higher numbers of burn injuries in this group in Denmark compared to Sweden.<sup>(28)</sup>

This re-emphasizes that the adage “prevention is better than cure”, or rather in this case “...better than treatment” should also be integrated into oxygen policy and planning. Nonetheless, even if the demand for medical oxygen to patients in home-based care or care homes has decreased compared to neighboring countries and remained low until very recently,<sup>(23)</sup> the demand of medical oxygen in hospitals was reported to have remained the same.

*Decentralization can create and exacerbate inequities*

In non-pandemic circumstances, those in need of medical oxygen have it prescribed in hospital by specialist units, and in some cases will need to go to the hospital to receive their medical oxygen treatment. However, in some regions, medical staff from the hospital are part of a team trained in delivering advanced medical care in the home setting and can therefore provide medical oxygen in the patient's home – this mechanism was particularly common during the COVID-19 pandemic. In rural areas of Sweden, distances to the nearest hospital are long, sometimes making it challenging and tiresome for the patient when advance care teams are not present.

*“We have to trust the home help providers [who visit older adults more often than the home care nurse] to report on anything that's not normal [regarding the patient's oxygen supply], which has worked so far.” Medically responsible nurse operating in a rural area.*

Similarly, older adults who live in a care home and have been prescribed medical oxygen may have it delivered by a member of staff from the advanced medical home care team.



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Whilst care home nurses may have a background in advanced healthcare and are trained in caring for patients with medical oxygen, this is not universal across staff. Limited competence and capacity to provide medical oxygen in the older patient's home raises questions on inequity and possible weaknesses to the care system that may negatively influence the individual's life satisfaction.

These differences between regions could be explained by the decentralized system. Some regions also provide additional services such as mobile healthcare teams that conduct outreach for urgent calls and carry smaller medical oxygen cylinders that can be provided to patients residing in their own homes or care homes while they wait for the ambulance to arrive. In Stockholm for example, since COVID-19 medical staff from the advanced home healthcare teams have continued in their role of providing medical oxygen in care homes and in patients' homes; however, it is unclear whether this will continue in the long term.

This has generated discussions on how to ensure that medical oxygen can be provided rapidly to older adults in care homes, and how to ensure this is done equitably given the coordination needed between regions and municipalities. In particular, in other parts of Sweden, the difference between having to undertake long journeys to hospital for medical oxygen treatment versus providing such treatment in the home is of importance to the individual.

### *Delivering medical oxygen without medicalizing the setting*

As mentioned previously, Sweden has one of the oldest populations in the world. In the last few decades, the concept of 'ageing in place' has guided policies around where care for older adults should happen. 'Ageing in place' refers to the idea that older people should remain living at home for as long as possible. Subsequently, the number of beds in hospitals and, particularly, long-term care institutions have been dramatically reduced and the proportion of older adults who remain living at home has increased.<sup>(32)</sup>

Today, a place in a care home is usually not offered until the older person's social care needs exceed what can be reasonably be offered by carer visits, and therefore care home residents in Sweden tend to be very frail with multimorbidity and often have dementia. They need help to undertake everyday activities, with nurse assistants and social care workers running 24-hour services. Nurses are onsite during the daytime, and a medical doctor undertakes routine visits weekly or more often depending on the older adults' medical needs. The poor health of care home residents was reported by several interviewees, including the difficulty in providing medical oxygen treatment to someone with dementia.

Before a major national care reform in the 1990s, medical oxygen was supplied to older adults in long-term care through piped oxygen, with outlets by each bedside.

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Today this is very unusual and has mainly been replaced by oxygen concentrators prescribed to the individual and provided on-site or in hospital. This also applies to independent individuals. Hence, today there is no difference in how oxygen is supplied to individuals residing in care homes or to individuals living in their own homes. Generally, spare or back-up medical oxygen is not stored in care homes as only individuals who have been prescribed medical oxygen receive it.

Several of those interviewed felt this system was good given the risks associated with storing oxygen, such as explosions. It was also mentioned that the home-like environment of today's care homes is highly valued by the older residents and medical oxygen supply in each care home apartment would make the environment more hospital-like. Some medical doctors interviewed elaborated that it would be hard to motivate the costs of having oxygen stored in care homes, given they did not anticipate it would be used often.

*"Sometimes patients don't want to leave the care home to go to the hospital for care, and in such situations we try to provide the care here, including for example providing medical oxygen. Trying to meet the patient's wishes is incredibly important. But having it [medical oxygen] stored in the care home just because someone may need it every other year, one could discuss how resource efficient that would be."* Medical doctor working with multiple care homes for older adults.

During COVID-19 a key challenge raised was the multiple different private providers that are contracted by the municipalities to provide home-based and care-home services – with shortfalls in coordination, communication and infection control.<sup>(33,34)</sup> The intention to maintain a homely environment, despite residents having complex medical needs, may explain why these settings were largely overlooked in Sweden's pandemic preparedness planning:

*"In the Swedish pandemic plan eldercare in general was noted but not further elaborated upon. The level of elaboration in the plan does not correspond to the organizational and systemic intricacies of eldercare, in terms of municipal and regional variations and roles of national authorities, as well as the need for cooperation due to a complex structure"* (Rapeli et al., 2023)<sup>35</sup>

### *Challenges in providing high flow oxygen in the hospital setting*

According to the informant from Air Liquide, the challenge has never been to produce enough oxygen – not even during the COVID-19 pandemic, but to have it delivered all the way to the patient. They stated that the oxygen pipelines in hospitals, and historically those in care homes, are very narrow and restrict the flow. This was identified by them as a problem during the pandemic as several patients simultaneously required a very high flow of oxygen. Air Liquide reported portable cylinders and concentrators to be inadequate to meet the demand during the pandemic and at some hospitals they provided an additional bulk storage tank next to the regular tank outside the building.

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Notably, a study from a regional hospital in Sweden reported a mean flow rate of 3L/min – considerably lower than the WHO estimated rate of 10L/min, and within the capacity of most concentrators to deliver.<sup>36</sup> However, this provides a useful lesson for pandemic preparedness, suggesting that planned treatment centres, surge facilities and settings with high numbers of ICU numbers should have a physical environment that supports surge capacity solutions (e.g. safe location for additional bulk liquid oxygen storage tanks, or the ability to upgrade pipelines for higher flow rates).

The informant at Air Liquide further reported that when there is a crisis, the medical oxygen suppliers prioritize delivery of medical oxygen over industrial oxygen. This was not considered a challenge as only a small amount of the oxygen produced is medical oxygen. The informant at the oxygen supplier further reported that in such situations hospitals are prioritized. Therefore, the hospital setting needs to be considered in addition to the care home and home care settings.

*“In a crisis, hospitals are prioritized. The industry... a paper mill, consumes in one month [the same amount of oxygen as] what a hospital consumes during the entire year. So that's not a problem. The dimensions... a paper mill can stop its production. Hospitals are prioritized, yes they are.”* Industry employee

Dividing the oxygen supplied between different settings could help. The informant at Air Liquide explained that in Norway, during the pandemic, oxygen tanks were placed at hospitals whereas portable oxygen was primarily given to those who live in geographically hard to reach areas,

or who are unable to be transported to hospital. However, this would require both capacity in terms of enough healthcare staff (during COVID-19 many healthcare staff were ill too) and the right competence of such staff. Some informants thought that increased staff competence is always a positive thing yet referred to other areas where staff competence is lacking such as palliative care and dementia – areas of greater interest and importance to themselves. This may illustrate the competition medical oxygen seems to be facing if put on the agenda.

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### Grey literature

Sources of grey literature included searching for information on the following organization webpages between May and September 2023

Organization	Description	Website
1177	Official website on information about illnesses, care and health	<a href="http://www.1177.se">www.1177.se</a>
Andningsviktreglistret Swedevox	The national register for patients on long-term oxygen therapy	<a href="https://www.ucr.uu.se/swedevox/">https://www.ucr.uu.se/swedevox/</a>
Astma- och allergiförbundet	The Asthma and Allergy Association	<a href="https://astmaoallergiforbundet.se/">https://astmaoallergiforbundet.se/</a>
Linde	A major oxygen supplier	<a href="http://www.linde-gas.se">www.linde-gas.se</a>
Tandvårds- och läkemedelsförmånsverket (TLV)	Government agency on dental and pharmaceutical benefits	<a href="http://www.tlv.se">www.tlv.se</a>
Sveriges Kommuner och Regioner (SKR) Läkemedelskommittéer	Committees for medical drugs at the Swedish Association of Local Authorities and Regions	<a href="https://skr.se/skr/halsasjukvard/vardochbehandling/lakemedelkommunerregioner/kontaktuppgifterlakemedelsfragor/lakemedelskommittéer.1934.html">https://skr.se/skr/halsasjukvard/vardochbehandling/lakemedelkommunerregioner/kontaktuppgifterlakemedelsfragor/lakemedelskommittéer.1934.html</a>
Vårdhandboken	Guidelines on healthcare and medicines	<a href="http://www.vardhandboken.se">www.vardhandboken.se</a>

Table 3: List of webpages included in the grey literature search

### Key informant interviews

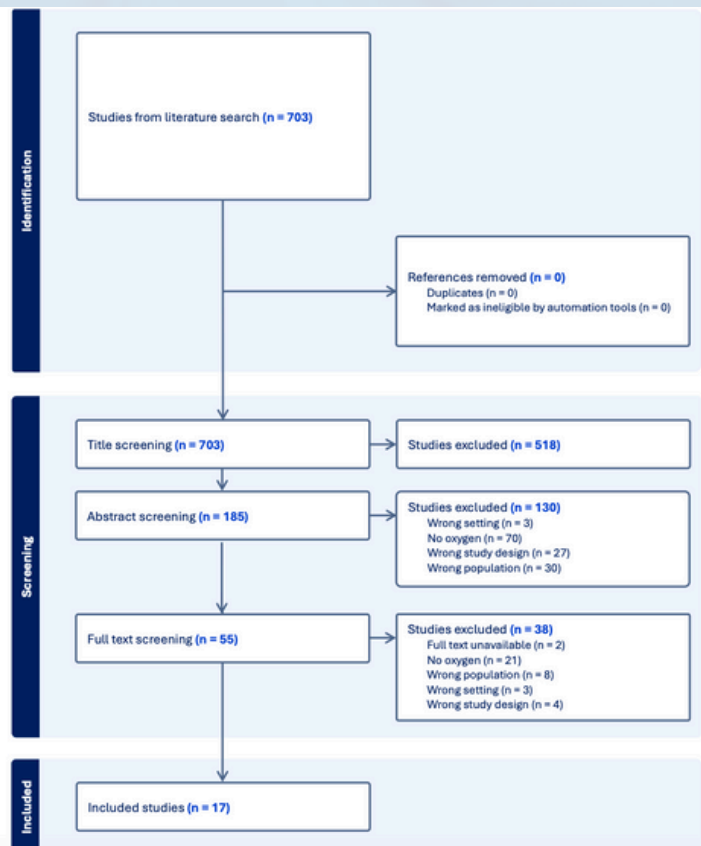
Individuals approached for this project were purposively sampled based on their expertise. Only very limited information can be provided about them to avoid the identification of these individuals. An additional two medical doctors who work on the organization of care reported briefly on the distribution of medical oxygen via email. Contact with a civil servant at the Government Agency on Dental and Pharmaceutical Benefits did not generate sufficient information to estimate provision/consumption of medical oxygen. Five people/organizations/companies contacted did not respond to our requests for interviews despite multiple attempts to contact them via email and by phone.

Civil servant at the Ministry of Health and Social Affairs
Coordinator of health and social care at an employer organization
Medical doctor specialized in geriatrics
Medical doctor specialized in geriatrics and advanced healthcare in the home setting
Medical doctor specialized in palliative care
Medical doctor working with multiple care homes
Member of the Corona commission
Member of staff at oxygen supplier Air Liquide
Medically responsible nurse

Table 4: List of interviewed key informants

### Additional methods information

Desk-based review.



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## COMMISSION ON MEDICAL OXYGEN SECURITY

### ABOUT THE COMMISSION

**Announced** in September 2022, *The Lancet Global Health* Commission on Medical Oxygen Security provides a thorough exploration of medical oxygen coverage gaps, with recommendations to ensure that no patient dies for lack of access to this essential medicine, including during public health emergencies like COVID-19.

The Commission was led by 18 Commissioners - multi-disciplinary academics with clinical, economic, engineering, epidemiological, and public policy expertise - representing all regions of the world. Forty Advisors representing United Nations and global health agencies, donors, academic institutions, and non-governmental organizations provided guidance. A large global network of Oxygen Access Collaborators provided constant input to the Commission and included representatives from industry and Ministries of Health. Special consultations were conducted with patients, caregivers, and clinicians to ensure that their voices and experiences shaped the Commission's recommendations.

An Executive Committee coordinated the work of the Commission and included representatives from **Makerere University**, Uganda; **International Centre for Diarrheal Disease Research (icddr,b)**, Bangladesh; **Murdoch Children's Research Institute (MCRI)**, Australia; **Karolinska Institutet**, Sweden; and **Every Breath Counts Coalition**, USA.

You can find the Commission report [here](#) and the advocacy package [here](#), including:

- **Report with Comments**
- **Policy Brief (English, French, Spanish, Arabic, Chinese, and Russian)**
- **Spotlight Brief: Access to Medical Oxygen Scorecard (ATMO<sub>2</sub>S)**
- **Spotlight Brief: Patient and Caregiver Testimonials**
- **Spotlight Brief: 10 Oxygen Coverage Indicators**
- **Spotlight Brief: 20 Priority Areas for Oxygen Innovation**
- **Country Case Studies**



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