Climate change REsilience framework for health SYStems and hospiTALs

DA1.2 - [Capacity Assessment Matrix]	
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Executive summary

This deliverable was produced as part of action A1.2 of the LIFE RESYSTAL project, which aims to assess the capacities and training needs of each pilot hospital. An adaptative capacity assessment matrix (or checklist) was designed. It covers the different dimensions of hospital's climate resilience: governance & leadership, crisis management, buildings and infrastructure. Interviews were then conducted with targeted members of the communities of practice of each hospital, and climate resilience capacity profiles were produced.

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Abbreviations	**Meaning**
ARS	Agence Régionale de Santé
CCA	Climate Change Adaptation
CH MILLAU	Hospital Center of Millau
CoP	Community of Practice
HCWHE	Health Care Without Harm Europe
NCSRD	National Center for Scientific Research Demokritos
NHOSP	General State Hospital of Nikaia “Agios Panteleimon”
NGO	Non-Governmental Organization
PCAET	Local Climate, Air and Energy Action Plan
POLIBARI	University hospital complex of the polyclinic of Bari and the Giovanni XXIII hospital
RINA-C	RINA Consulting
SERGAS	Galician Health Service
UCAM	University of Cambridge

Hospitals of the Galician Health Service (SERGAS), Health area of Ourense, Verín and O Barco de Valdeorras

Rapid Climate Resilience Capacity Profile

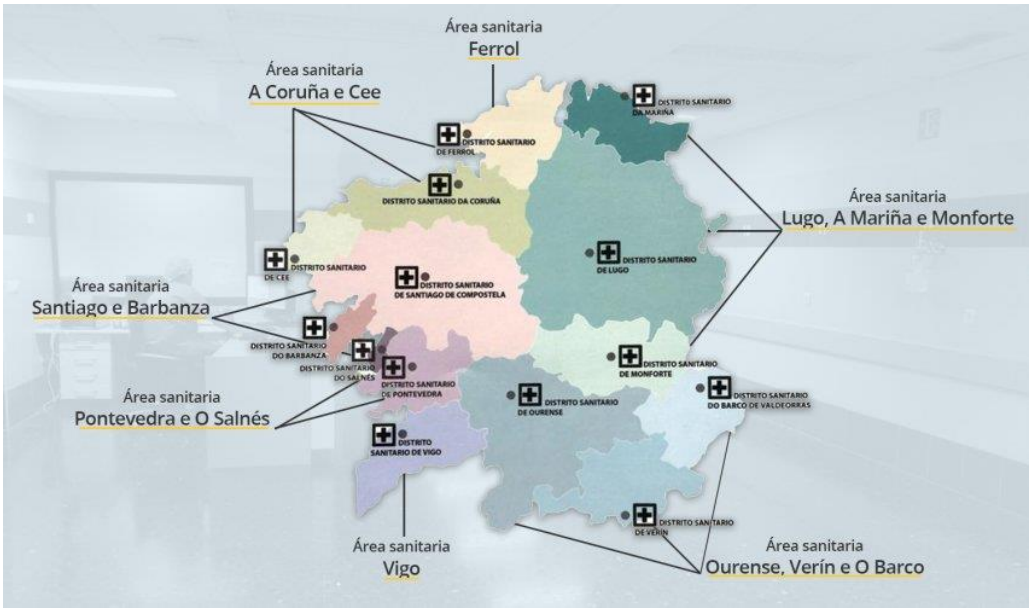
Background information

The Galician Health Service (in Galician, *Servizo Galego de Saúde* - SERGAS) is an autonomous body, established in 1989, attached to the Department of Health of the *Xunta de Galicia*. It is the public system that integrates, coordinates, and organizes the health centres of the autonomous community, within the Spanish National Health System. Below are some key figures:

- It is the largest company in Galicia
- It employs 38,000 workers
- 14 hospitals, 466 primary care centres
- It serves a community of 2,657,529 people.

The three hospitals of SERGAS participating to the LIFE RESYSTAL project are part of health area of Ourense, Verín and O Barco de Valdeorras (*Área Sanitaria de Ourense, Verín y O Barco de Valdeorras*):

- ***Hospital Universitario de Ourense (CHUO)*:** located in the city of Ourense, it is a large hospital with 925 beds, seven buildings, and a built area of 158,900 m2.
- ***Hospital Público de Verín*:** located in Verín, it is a small hospital with 80 beds, one main building, and a built area of 19,700 m2.
- ***Hospital Público do Barco de Valdeorras*** is located in Valdeorras. It is a small hospital with 100 beds, one main building, and a built area of 14,500 m2.



Map of the health areas of SERGAS (Source: Praza.gal)

View of Hospital Universitario de Ourense (left), Hospital Público do Barco de Valdeorras (center) and Hospital Público de Verín (right)

Climate hazards:

The main pressing climate hazards and direct physical impacts for the 3 hospitals are:

- Mainly **heatwaves**, which are more common in certain areas towards Ourense. The hospitals have experienced heatwaves in the past, which have led SERGAS to rethink about their infrastructure
- **Heavy storms**
- The hospitals might be also having a risk of **flood**, not linked to a meteorological phenomenon but because of **overflow of the water & wastewater networks** during storms. Ground floor areas are especially at risk.

On another hand, **wildfires** (as the hospitals are surrounded by forest areas), are a risk for emergency planning.

External risk factors

Socio-economic factors

SERGAS hospitals treat population coming from rural and dispersed areas, which pose a high risk in terms of accessibility to the health system. Moreover, a big percentage of the population is aged population (fourth age) with particular health issues such as, but not only, chronic diseases or traumatic conditions.

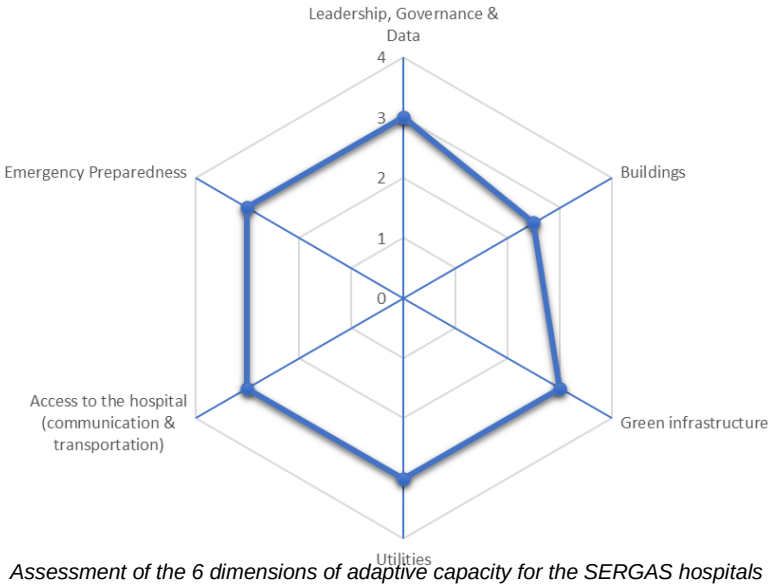
Territorial factors

The Hospital Público del Barco de Valdeorras is located close to an area of industrial activity. This risk is not due to extreme weather effects, but is relevant in terms of emergency planning.

Lessons learned: existing capacities and prospects

Hospital Universitario de Ourense, Hospital Público de Verín and Hospital Público de Verín have today adapted their organization to climate change challenges at a functional level.

They count on **a working group** (Sustainable Management Group) that meets on an ad hoc basis and work on broader sustainability aspects that are not only related to climate change, and the hospitals have a crisis management strategy and a crisis management governing body in place, called Emergency committee, which integrates climate-related risks.



Assessment of the 6 dimensions of adaptive capacity for the SERGAS hospitals

In addition, all three hospitals are quite well prepared in case of emergency, meaning that clinical care would remain functioning in extreme weather events and that the hospitals can

cope and are prepared for supply chain disruptions. Nevertheless, i) the hospitals could face challenges to ensure certain stock and supplies, especially in terms of food, bed linen and staff resources; ii) heavy rains can cause interruption or damage of service at some areas due to the eldness of the installations.
Although there is not specific budget allocated to climate resilience, the hospitals have obtained funding for projects related to energy efficiency, and the main funding instruments are ERDF Programme (EU funds) and own funds.

The way forward:
Within this context, one main challenge for SERGAS will be to accompany the initiative already in place (with the creation of the Sustainable Management Group) and make it disseminate in all dimensions of climate resilience.

The hospital's resilience capacity is analyzed for each dimension identified i.e. (i) Governance, leadership and data, (ii) Buildings, (iii) Green infrastructure, (iv) Utilities, (v) Transport and telecommunication, and (iv) Emergency preparedness and management.

1- Governance, Leadership and Data

Score: 3 (Functional)
This score indicates that the hospitals have functionally adapted their organization to climate change challenges and that they are partially supported financially and technically to do so.

1-1 Organizational capacity

The hospitals' organizational capacity to deal with climate change and sustainable development is rather functional. There is not a dedicated and formal position for sustainable development in the hospitals, and this role relies on the Financial Director (Economic Resources Department). At SERGAS level, there is also a working group (Sustainable Management Group) that meets on an ad hoc basis and work on broader sustainability aspects that are not only related to climate change[1]. Overall, sustainability and climate change are rather at first stages, with an increase of actions taking place at all the hospitals, even if not all staff, especially medical staff and patients, is aware of these activities.
Beyond these actions, there are no specific mitigation or resilience strategies for any of the three hospitals, nor the climate change issue is addressed in any specific way beyond the programmes on heatwaves or cold.

"We are consistently and continuously taking climate change into account, and also proactively. Proactively we are looking to improve in this area ¨
Juan Lojo (Deputy Director Human Resources Department)

1-2 Enabling environment

The SERGAS supervisory bodies, such as *Xunta de Galicia, General Directorate of Climate Change and Environment* do not provide guidelines, plans or directives to adapt the hospitals to climate change. There is, however, some limited collaboration with these bodies on some projects. In general, hospitals are not aware of any support from local authorities beyond the design phase for infrastructures. The support from local and regional authorities is mainly for emergency planning but there are no prevention actions.
The hospitals are currently collaborating with a project on efficient waste management with the University of Vigo, but they are not working on projects focused on climate risks assessments or resilience, besides the LIFE RESYSTAL project.
In terms of funding, the hospitals have obtained funding for projects related to energy efficiency. The main funding instruments are FEDER Programme (EU funds) and own funds.

A supporting document for the hospitals' climate resilience framework : the Xunta de Galicia Heat Plan
The Xunta de Galicia developed a Heat Plan (*Plan de Calor*) in 2015, with the main objective of reducing the

1 This working group is currently developing a strategy on Circular Economy. Moreover, SERGAS is part of Race to Zero initiative, through which SERGAS has committed to reaching net zero emissions by 2040 and to reporting annually on progress towards this goal. The Race To Zero is a global campaign to rally leadership and support from businesses, cities, regions, investors for a healthy, resilient, zero carbon recovery that prevents future threats, creates decent jobs, and unlocks inclusive, sustainable growth: https://healthcareclimateaction.org/racetozero

impact on the health of the Galician population due to the maintenance of heat wave conditions for more than one day. This document establishes a system for forecasting, warning and risk communication; it defines a system of intervention for each level of alert established; and it reinforces institutional coordination between the competent units in this area, including SERGAS hospitals.[2]

1-3 Mechanisms to Collect and Monitor Data

The hospitals do not have indicators on climate adaptation. They do count on some indicators for climate action such as waste, carbon footprint, consumption, production and mobility (internal and patients).

The consumption and waste reports are updated annually, and reports on infrastructure are occasionally developed due to the need of renovations. The hospitals don't count on a specific strategy or plan for monitoring and evaluating climate action.

2- Buildings

Score: 2,5 (Between Marginal and Functional)

This score indicates that the status of building construction is rather sound, despite some vulnerabilities; climate mitigation measures have or are being implemented, contrary to climate-adaptation measures.

2-1 Buildings

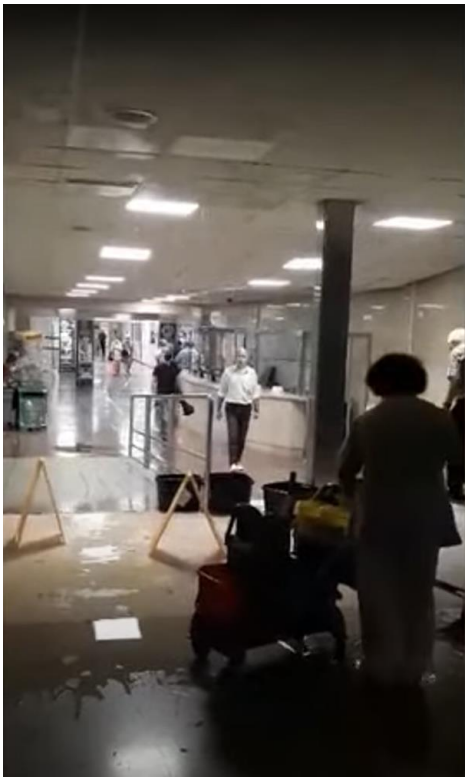
The three hospitals are quite diverse in terms of the number and state of the buildings they host:

- The Hospital Universitario de Ourense is formed of several buildings from different periods.
- The Hospital Público de Verín has one building from the 1990s
- The Hospital Público do Barco de Valdeorras has one building from the 1980s with annexes from the 1990s and 2000s.

In general the state of conservation (which depends to a large extent on the period of construction, with older buildings requiring more maintenance) of the buildings is good.

Buildings are not fully resilient to extreme weather events (e.g. high winds, extreme rainfall, flooding):

- In case of extreme rainfall there are certain areas (especially basements) that become waterlogged due to the low level of the building, sometimes in addition to obstructions in the sewage and drainage systems.
- Windows and glass are not sealed and protected against breakage in the event of a disaster.
- In general, lifts are distributed to allow partial use if any infrastructure is damaged or disabled, except for the building Xeral, located in Hospital Universitario Ourense.



Leaks from the ceiling, Hospital of Ourense (Source : La Región, 2021)

The construction of the buildings was carried out on the basis of Technological Standards and Technical Building Codes with a forecast of the climatic risks/conditions, assigned according to the location and hospital use (temperatures, rainfall, earthquakes, etc.).

Building maintenance:

2 News article about Heat Plan (Plan de Calor), 2015. https://www.xunta.gal/hemeroteca/-/nova/043967/xunta-galicia-ten-marcha-plan-calor-2015-para-reducir-impacto-sobre-saude-provocado?langId=es_ES

In terms of inspections for signs of deterioration, preventive maintenance plans (for all the buildings' installations i.e. sanitation system, water supply, electrical installation, heating, domestic hot water, gas, refrigeration, ventilation and air renewal, fire protection systems, lightning protection, ICT communications installations, etc.) and corrective notices are used to monitor and improve deterioration. These inspections are carried out depending on the periodicity of the preventive maintenance plans of the maintenance company (variable depending on the type of installations). Such maintenance plans are reviewed every 10 years according to Royal Decree-Law 8/2011 and Municipal Ordinances of Ourense.
The facilities and building maintenance procedures do not include instructions on how weather conditions may affect the safety and operation of the hospitals, and those responsible for maintenance are not trained to deal with an emergency or disaster related to extreme weather conditions.

Adaptation measures:
As for measures that have been taken to reduce the vulnerability of the buildings, interventions on buildings are rather related to energy efficiency, although these interventions are also related to vulnerability.
When looking at the compliance with current energy codes for building and window insulation, only the Hospital building of CHUO (Ourense) complies with the current DB-HE energy regulations of the CTE, as it was built after 2006.
Extensions and refurbishments are underway or about to start in all three hospitals in compliance with energy requirements. Walkable roofs are finished with gravel or filter slabs in light colors, and a prototype of a "green pergola without irrigation" has been created, with various types of succulent plants that will allow to study its durability and adaptation. This will serve as a model for pedestrian walkways, covering of living areas and creation of green roofs.
All facilities have insurance coverage against inclement weather and other climate hazards for its buildings.

3- Green infrastructures

Score: 3 (Functional)
This score indicates that the hospitals benefit from a rather good coverage of green spaces, to cope with both heatwaves and heavy rainfalls. However, green infrastructure has not been yet considered as a lever to enhance their climate resilience.

The hospitals are not located within the boundaries of any sensitive sites (habitat for endangered species, Wetlands, primary agricultural land, primary forest) and the green areas of the facilities are located around the perimeter of the buildings.
In terms of how the green space is distributed, it really depends on the hospital. For Verín and Ourense, green areas are on the back of the hospital and in very specific areas, while for Barco the green area is on the main façade.

Green spaces at the back of the hospital of Ourense (Source : Google Earth, 2022)

Regarding stormwater management practices, for permeable paving there are green areas around the perimeter of the buildings that serve as drainage pavements to cope with extreme rainfall. In terms of gutter, the number of drains on the flat roofs is designed to cope with extreme precipitation. As for open space for groundwater recharge / retention ponds, there are cisterns and drainage wells with the necessary collection and drainage dimensions for heavy rainfall.

4- Utilities

Score: 3 (Functional)
This score indicates that the operating parameters without essential utilities are quite effective during extreme weather events.

4-1 Energy

Power and thermal systems:

The heating system of the three hospitals works with natural gas.

The current expected duration of operation without grid power or is **24h**. The three hospitals count on external diesel power generators in case a power cut occurs. The percentage of the hospitals' baseline electricity demand that would be covered by emergency generators is 50%. Critical facilities are not equally equipped to operate without grid power during prolonged outages (yet, the food refrigeration equipment run on emergency power, and hospitals count on some external connections for portable emergency generators in the hospitalisation building). The emergency generators have a diesel B[3] dedicated fuel source.

In terms of thermal systems, the "island" heating or cooling system would last 24h during extreme weather events.

- In the Hospital Público de Verín there are two biomass boilers pellet feed with two tanks with a capacity of 40,000 l. The hospital counts also on three gas boilers to support the biomass system with two tanks with a capacity of 40,000 l as well.
- As for the Hospital Público do Barco de Valdeorras, this hospital has three diesel boilers as the principal system for heating and hot water. The hospital has also two diesel tanks with a capacity of 50000 l and 10000l as well. Both hospitals have a system of coolers that rely on electricity to operate.
- In the case of Ourense there are currently four mixed boilers (natural gas and diesel) in operation, for the main group of buildings. The hospital counts on diesel tanks with a capacity of 50,000 l. As for refrigeration the hospital has a screw cooler and two centrifuges coolers in operation that run on electricity. In addition to this, the commissioning of a biomass (3000 kW), which is already installed, is pending, as well as a system of solar thermal collectors for support. In one of the buildings (Nai) there is an independent system, namely two gas boilers and a mixed boiler (gas and oil) for the hot water and heating systems. The Piñor building has another biomass boiler and solar thermal energy. Moreover the hospital has an oil tank with a capacity of 25,000 l. As for the cooling system, the building has two coolers that run on electricity.

Adaptation and energy efficiency measures:

The Hospital Universitario de Ourense is in process of implementing on-site cogeneration with a gas engine to generate electricity and an ORC (Organic Rankine Cycle), which is a system that recovers heat from exhaust gases to generate heat and electricity. Also, most of the buildings have already a Photovoltaic system. The forecast for the percentage of electricity generated on-site is 40%.

The other hospitals have also explored the possibility of diversifying energy sources and including renewable energy sources such as solar (photovoltaic or thermal), and biomass. It is not the case for wind, as this is not feasible to implement in urban environment and is very complex.

Hospitals have an energy saving programme that sets targets to reduce energy consumption or greenhouse gas emission and they control or monitor their energy consumption, and monitor cost savings. Measures of the plan include: energy-saving lighting, automatic lighting dimming systems to minimise energy consumption, and procurement of energy-efficient medical/non-medical equipment.

Staff, patients and visitors are not informed about energy reduction strategies (energy awareness campaigns).

3 In Spanish: Gasóleo B

4-2 Water and sewage

The hospitals have two independent water sources, being municipal mains supplies and rainwater harvesting.
The are no wells in the hospitals, neither a water source potable without treatment or any surface water source, i.e. pond, lake, etc., that can meet treatment water needs in case of emergency.
In terms of emergency water is available, there are 2,500,000 l available:

- 2,200,000 l Cristal Building
- 100,000 l Nai Building
- 300,000 l H. Piñor Building

The storage can last 24 hours, and if necessary bottled drinking water can be used in case of emergency.
The buildings are not equipped with check valves or equivalent backflow prevention devices installed in the sewerage network to prevent sewage from backing up into the building in the event of major flooding, but due to the location of the hospital at a higher elevation than the sewerage it is not necessary.
The floor drains below flood level are not equipped with drain plugs. Hospitals don't have provisions to store wastewater in case municipal systems become unusable or are lost.

4-3 Waste management

The hospitals measure the amount of waste produced. General waste is shredded and compressed by a centralised system (Ourense kitchen).
The hospitals have adopted the following sustainable waste management strategies: audit all waste streams, conserve and reduce all waste streams, measure and report progress, separate waste to minimise regulated medical waste. The hospitals have also recycling programs in place.

5- Communication, information and access to the hospital

Score: 3 (Functional)
This score indicates that the hospital is relatively well equipped in terms of communication, that it remains well served and accessible.

The hospitals have several communication systems in place for extreme weather emergencies: fixed telephone systems, mobile phone systems (TETRA Network)
In terms of medical information systems (MIS) electronic medical records are available as well as external data centre(s). In case of extreme weather emergencies medical information systems have backup power and off-site data center and on-site backup of medical information systems are available.
Transport systems
When looking at the access routes, multiple alternative evacuation routes exist in almost all sectors and buildings, although not specifically in the event of weather events. At Ourense hospital, basement routes would be affected by flooding. There are alternative routes in case the first one is blocked and pavements are designed to withstand extreme temperatures, freezing and thawing, or solar radiation.
The buildings or campus are served by public transport, mainly bus (no tram nor metro). The hospitals apply the following measures, which contribute to a sustainable and resilience transport: support local suppliers to reduce transport kilometers for supplies, encourage public transport and shared car, support active models (walking and cycling) and encourage non-fossil fuel based transport among staff and patients.

6- Emergency Preparedness & Management

Score: 3 (Functional)
This score indicates that the hospital is quite well prepared in case of emergency, meaning that clinical care remains functioning in extreme weather events and that the hospital can cope and is prepared for supply chain disruptions.

6-1 Response system

The hospital can operate independently as follows:

- Sanitary/health supplies: the average stock is estimated to last about 17 days. In addition to this, it would be possible to count on the stock that might be available in the logistic platform, should there be transport available.
- Electricity failure: the generators can supply for essential units (critical units have uninterrupted supply) but not the whole hospital.
- Uniforms and linen: the estimation is much lower, about 4-5 days, as this is an externalized service.

The average daily bed occupancy in 2019 and 2020 was:

Porcentaxe de ocupación

Xerencia	Referencia	Xaneiro 2020 - Decembro 2020	Xaneiro 2019 - Decembro 2019	
C.H. UNIVERSITARIO DE OURENSE		76,61 %	87,25 %	-
H. PÚBLICO DE VALDEORRAS		50,55 %	60,00 %	-
H. PÚBLICO DE VERÍN		50,87 %	63,21 %	-
Total		71,82 %	82,49 %	-

Average daily bed occupancy 2019 and 2020 SERGAS

Assistance from other actors

The hospitals don´t have a specific protocol for receiving assistance from external partners (e.g. other health facilities, a regional agency, a national agency) in case of a weather-related emergency. Their main related plan is the so-called **Self-Protection Plan** (*Plan de Autoprotección*[4]) that is. There is currently an ongoing work to develop such plans but due to the COVID pandemic they have not been finalised. On the positive side of the pandemic, this has brought new ad hoc connections and cooperation with external partners.

The self-protection plans establish the main response to crisis, and the hospitals count on institutional governance for crisis management. The crisis management governing body is in place and is called emergency committee, which integrates climate-related risks. The hospitals count as well on an early warning system to be informed of climate-related emergencies, lead and coordinated by the Galician Emergency Agency (AXEGA). However, the hospitals don´t count on specific crisis management tools or software.

The self-protection plans are updated every 3 years following the normative (the latest one being from 2021, the plan is being updated in 2024), and when there are crisis events, feedback sessions are organized : this was the case for COVID pandemic management, which was constantly evaluated. Related to this, a specific clinical committee was created to follow up on the pandemic, including staff from IUC, emergency, infectious, admission). The committee used to meet almost daily.

6-2 Exposed locations and location for anticipated patient surge

The following is a summary of the inventory of the critical care departments, support services and diagnostic equipment and establishes if the services are accessible and able to function in the event of an extreme weather event:

LOCATION	RISKS
Emergency services	In 2 of the 3 centers the emergency services are located on the ground floor. In principle, there is no risk of flooding, but there is a risk in case of heatwave if the cooling system suffers a shutdown. There is also a risk of power failure due to storm, or strong wind, which would pose

4 The Self-Protection Plans contains the identification of the human and material resources available in its different Areas and Buildings, according to the different risk levels detected, as well as the basic lines of organization and action of the personnel in the event of an emergency situation.

It also contains the hierarchical and functional structure that allows the coordination of own and external resources and means to guarantee a rapid, organized and effective response in the event of an emergency situation.

	a big threat due to the characteristics of the emergency service (type of life support, characteristics of the box...). In case of heavy rain there a risk of water supply disruption.
Main hall/building entrances	There is risk of flooding from run-off if rainwater, as collection systems are not working properly. Risk of water ingress at the entrance and risk of heat in case of rising temperatures and if air conditioning is not functioning. The electrical risk is minor.
Heliport	The risk is difficult to evaluate, as is the pilot's decision to land or not depending on the situation.
Imaging	Except for Verín, all other buildings are located on the ground floor and basements (risk of flooding). There is a high risk of power failure, and any overvoltage caused by meteorological phenomena can damage the equipment. If they exceed this step to the generator, there is a diesel generator (there is no electrical backup line). The generators cannot support 100% but they can support basic services (diagnostic imaging is considered a basic service). They are very sensitive to heat, and a in some cases ice packs have been used when overheating occurs.
Intensive care units and/or ICU beds	These are very sensitive to power outages (continuous monitoring and life support). The aim is for all equipment to be equipped with 30-minute back up, but this is not always possible. If they are connected to generator Uninterruptible Power Supply (UPS), 100% critical services should be covered. They are sensitive to temperature changes, and not located in places particularly sensitive to flooding but on upper floors. They are not so sensitive to strong winds, rain etc.
Pharmacy	Usually located at street level, there is therefore a risk of flooding. This department is very sensitive to temperature changes (storage conditions). There is less risk of power cuts. Robotic systems are available but can be operated manually if necessary.
Medical records/IT	Very sensitive to power cuts (for example strong wind). When information systems go down and care applications go down, it is very difficult to replace. Cannot go back to paper record. The Data Processing Centre (DPC) is on the ground floor, it has protection systems, but there is always some risk due to changes in temperature. The DPCs are the most protected areas of the hospital.
Emergency Command Centre	In some cases, this is virtual, but there is always a second transfer location. Security command centre (ground floor, to the outside). The problem is if there are no communications. There is a risk of telecommunications going down, and a risk of power failure. In the Self-Protection plans it is established where the emergency command has to move in case of emergency.
Kitchen/Food and water storage	In general, all hospitals have their own kitchen, except Verín (catering). Kitchens are sensitive to power, gas and water cuts. Particularly in Ourense there is a risk of flooding, because the kitchen is located underground, and water often enters the kitchen. Another risk is that there is very little storage of non-perishable food. Therefore, any problem with the electricity means a loss of the stored raw material. There is a temperature monitoring system, and there is an alarm system to check if this is due to a power cut.
Accessible clinical supplies	Those of the entire SERGAS are in a central warehouse. There is no internal storage. The storage points are the consumption units themselves. There is a risk if there are high temperatures and due to power cuts. Therefore, a more manual method would have to be prioritised.
Clinical laboratories	Located in the ground floor or even below, therefore a risk of flooding exists, and laboratories are sensitive to temperature changes, telecommunications outages and power outages. Centrifuges, for example would not work, and there are many samples that require refrigeration. To that end, laboratories do have generators to support.
Hazardous waste storage	These are defined as clean points, meaning that these are specific areas in hospitals and that the pick-up need to wait until a specialised transporter comes. Not very dependent on electricity, but high risk of air conditioning and ventilation. The frequencies of waste collection should be played with. These frequencies should be increased (which cannot always be guaranteed). During COVID there was a lot of complication with this.

Morgue	These are cold rooms; there is an alarm system that goes on if temperature rises. If there is an outage, it switches to diesel generator. Risks: air conditioning, water supply, electrical supply. Similar to operating theatre.
Ambulance fleet refuelling/ Garage Ambulances	There are advanced life support ambulances, which are very close to the emergency services, on the ground floor. An external company manages non-emergency ambulances. When they are not in service, they are in garages. There are underground car parks - sensitive to flooding (only Ourense). In the other hospitals these car parks are not covered.
Corridors/connections inside the building	Especially in Ourense, there is risk of flooding and leaks. Verín and O barco are above ground. For heat, there is no circulation at risk because there is no glass walkway. There are no emergency lighting systems.

The emergency service works with patient triage. This is computerized and once, we had an emergency situation and the system was down for 4 hours. The situation was very serious. Electrocardiograms, for example, could not be seen. The paperless hospital policy makes it very complicated if there are risky situations. A process had to be accelerated to find electrocardiogram paper, to write medical records on blank paper… It was a very critical situation. It is obvious that having everything highly computerized can be a risk.

Heliport of the Hospital of Ourense

The most critical part is the ICT blackout, and cyber-attacks. Digitalisation, when the systems do not work, can be very risky. There is no contingency plan when the digital systems don´t work. There are alternatives to a cold room or a leak, but with ICT issues it becomes very critical¨

Francisco Aramburu, Head of the Emergency Department, Hospital Universitario de Ourense

Location for expected patient flow

In the Self-protection plans, there are specific protocols to transfer patients, as well as which possibilities exist to establish field hospitals, and in which areas, for example the car parks for non-urgent patients. During the COVID pandemic spaces had to be recovered or new spaces had to be adapted.

During the pandemic, SERGAS worked in a modus operandi called Network Hospitals (*Hospitales en red*) to coordinate this. However, these protocols need to be improved.

6-3 Personnel

Building on COVID´s experience the hospitals have an approximate idea about the number of employees that might be absent from work due to inability to travel, illness or security problems. There is a statistic that is sent out on a quarterly basis and it establishes what the % of absences is. Human resources cover this statistic:

	2019			2020			2021		
	DIAS IT	DIAS CONTRATO	%	DIAS IT	DIAS CONTRATO	%	DIAS IT	DIAS CONTRATO	%
C.H. UNIVERSITARIO DE OURENSE	95.560	1.378.284	6,93 %	131.412	1.424.417	9,23 %	119.653	1.453.787	8,23 %
H. PÚBLICO DE VALDEORRAS	12.787	186.214	6,87 %	18.927	191.452	9,89 %	14.323	188.989	7,58 %
H. PÚBLICO DE VERÍN	11.732	126.154	9,30 %	13.056	129.416	10,09 %	9.090	127.957	7,10 %

Absence rate provided by Human Resources for 2019, 2020 and 2021. SERGAS.

There is also a staffing strategy in case of overload (who can work from home, who can work from another place, who is needed in the hospital).

Teleconsultation

In the emergency department, there is no possibility to telework. Even if there is the possibility to call out of service physicians in case of a catastrophe, there is no specific plan in place. The plan that was being developed before the COVID pandemic (it was a draft), overlapped with the pandemic response and was left halfway through.

Nonetheless, teleconsultation was considered in a contingency plan was made by *Salut Mental* (Mental Health) during the pandemic. What was seen is that in order to be able to telework, there was an IT limit. It is possible to reach 50% of teleworking if computer equipment is secured. It is possible to provide 50% consultation for 1-3 months 50% with a computer foresight could be carried out.

Tools to manage shifts

During normal operations the hospitals have a tool to manage the shifts of healthcare staff. When temporary staff is needed due to influx of patients in times of crisis, the hospitals use phone calls to communicate with additional staff resources. They also have a system of a pool of temporary staff. For nurses, physiotherapist, X-ray technicians and all non-medical staff there is a computer system in place. For medical staff there is not a plan in case of catastrophe. The hospital's own doctors, for example would have to be called in as it is not possible to call in for external doctors. On the other hand, the Self-Protection Plans identify resources of temporary personnel for external help.

Psychological support

The emotional and physiological support is included in the disaster/response plans plan. There is a plan for the whole region of Galicia as well as a psychosocial care plan for SERGAS staff, which includes an email contact and several telephone hotlines.

6-4 Healthcare supplies

The Supply Platform with which the hospitals operate has a contingency plan to allow for the storage of more supplies during the extended period when the facility is self-sufficient.

The access to sufficient stocks of essential supplies and resources to continue to provide assistance during one or more weather related emergencies are defined as follows:

- Medicines treatments, pharmaceuticals: the stock is held in the pharmacy and all consumables depend on the Supply Platform. The storage capacity is very limited.
- Medical equipment: there is sufficient stock. Especially for life support
- Food: there is not enough stock. The non-perishable is quite limited.
- Water: there is enough stock for human consumption as there are fountains with filters in all hospitals except for Verín, where they use bottled water.
- Non-medical material, such as bed linen, cleaning products: there is not much stock. The safety stock for bed linen can last 4-5 days as it taken care by an external laundry. The cleaning products are outsourced.

Overall the hospitals consider that their readiness of their supply chain is functional.

Sources and limitation

Data was collected from (i) contributions from the participants to the kick-off meeting of the community of practice held on 18 January, 2022, (ii) written responses to the questionnaire filled by Cristina Enjamio, Director of Economic Resources, and Yago Garrido Rodriguez, Hospital Maintenance Architect in Ourense. (iii) Three online interviews: first interview focusing on governance, second on infrastructure and third on crisis management; (iv) some information was also taken from the Self-Protection Plans of the three hospitals.

One limitation of this assessment may be that the interview was focusing on the three hospitals at the same time, and therefore there might be data missing from specific hospitals in some areas.