



## Management of hospital care during the COVID-19 pandemic: Lessons learnt from five European countries

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### ABSTRACT

**Background:** The COVID-19 pandemic required significant adjustments in hospital management across Europe. This article explores the challenges faced and lessons learnt in managing hospital care, aiming to improve future pandemic preparedness and resilience.

**Methods:** Hospital management during the pandemic in Denmark, France, Germany, Hungary and Italy was investigated using a qualitative case study approach based on document analysis and 57 semi-structured interviews with senior hospital staff conducted in the spring and summer of 2022. The country case studies were subjected to an overarching analysis focusing on successes and failures in hospital pandemic management.

**Results:** Hospitals faced an overwhelming surge of patients, leading to the conversion of regular wards into COVID-19 units and the postponement of elective surgery, affecting the care of chronically ill and non-urgent patients. Telemedicine was crucial but faced challenges in terms of acceptance by elderly patients and physicians. Staff shortages and high workloads affected patient care and staff wellbeing. In addition, shortages of medical supplies led to a re-evaluation of logistics and warehousing. Many hospitals found existing policies and pandemic plans inadequate, leading to the formation of internal task forces.

**Conclusion:** The pandemic highlighted gaps in hospital preparedness and the need for improved resilience. Strategies to improve pandemic resilience, such as better working conditions and collaboration with primary care, would also improve health system performance in "normal times". Pandemic-specific measures, such as postponing elective surgery, are necessary but need to be carefully managed to minimise the negative impact on overall patient care.

### 1. Introduction

The COVID-19 pandemic has profoundly affected health systems worldwide and posed unprecedented challenges to hospitals and health workers. On the frontline in combating the pandemic, hospitals have

faced immense pressure to adapt, reorganise and coordinate resources while ensuring the safety of both patients and hospital staff.

Previous research has highlighted the significant impacts of the COVID-19 pandemic on hospitals, providing valuable insights to enhance pandemic preparedness and resilience. For instance, hospitals

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often postponed elective surgeries to accommodate a surge in COVID-19 patients (Hunger et al., 2022; Oosterhoff et al., 2023; Shivkumar et al., 2023). Simultaneously, patients were hesitant to seek medical care due to concerns about potential exposure to the virus (Splinter et al., 2021; Arnetz et al., 2022; Habbous et al., 2023). This resulted in a noticeable reduction in the number of diagnoses of diseases such as cancer (Angelini et al., 2023; Dinmohamed et al., 2020; Muka et al., 2023). Furthermore, studies have shown evidence of increased mortality from non-COVID-19 conditions during the pandemic compared to before (Dang et al., 2022; Jiang et al., 2024).

Moreover, there has been a considerable amount of research investigating other areas affected by the pandemic, such as human resources as well as governance. In particular, mental health and wellbeing of health workers were widely examined (Lima et al., 2023; Aymerich et al., 2022; Hovland et al., 2023; Lee et al., 2023; Van Wert et al., 2022; Young et al., 2022). Further aspects of human resource management that were investigated include ethical conflicts and decision-making of ICU staff (Falcó-Pegueroles et al., 2023a, 2023b), governance strategies as well as barriers and enablers of effective leadership and governance (Gautier et al., 2023; Phillips et al., 2022).

However, to the best of our knowledge there has been little qualitative research providing a comprehensive account of the crisis experience from the viewpoint of hospital staff in a cross-country setting. Instead, most of the literature is based on experiences pertaining to single countries (Peiffer-Smadja et al., 2020; Chabrol et al., 2023; Mohammadinia et al., 2023; McGuinness et al., 2022; Baldwin and George, 2021) or isolated issues (Falcó-Pegueroles et al., 2023b; Gautier et al., 2023; Phillips et al., 2022; Jackson et al., 2023). Exceptions are Tartaglia et al. (2021) and Ravaghi et al. (2023) who identified challenges and interventions in the context of, among others, human resources, communications and information, leadership and organisation of service delivery in international surveys/interviews. However, their data were collected no later than October 2020 and are thus limited to the early phase of the pandemic. We aim to expand that literature by exploring five countries in Europe and encompassing experiences up to summer 2022. Therefore, our goal is to provide a holistic account of the measures taken by hospitals to respond to the pandemic and answer the following research question: "What were the major challenges in hospital management during COVID-19 and what can be done to improve hospitals' pandemic preparedness and resilience?".

This research is part of the PERISCOPE project (Pan-European Response to the ImpactS of COVID-19 and future Pandemics and Epidemics), a research project funded by the Horizon2020 programme of the European commission. Among others, the project aimed to analyse preparedness and adaptive capacity of health systems with regards to COVID-19, assess the impact of the outbreak and policy measures on health systems and draw lessons from these experiences to improve health system resilience.

## 2. Method

A qualitative approach, comprising a multi-case study followed by an overarching analysis, was selected to investigate pandemic preparedness of the hospital sector in five European countries. This approach allows for an in-depth exploration of the varied responses to the pandemic in different health systems. The analysis focused on the main challenges faced by hospital management and the strategies they employed to address these issues.

### 2.1. Country case studies

The methodological approach of a case study (Gerring, 2007; Yin, 2017; Mills et al., 2010; Byrne and Ragin, 2009; George and Bennett, 2005; Ridder, 2017; Flick, 2018; Mason, 2017) was chosen to investigate the management of hospitals during the COVID-19 pandemic in selected European countries. The hospital sector of a country represents a case

and the data were collected by means of document analysis and semi-structured interviews.

The country case studies aimed to identify successful strategies and lessons learnt as well as gaps and failures regarding pandemic management of hospitals. In the country case studies, special focus was put on aspects of organisation of care (e.g., balancing care between non-COVID-19 and COVID-19 patients), resource management (e.g., ICU equipment) as well as information and communication (e.g., communication with patients and/or public authorities) and governance (e.g., pandemic plans). These aspects were prioritised based on gaps identified in the literature in a narrative literature review (Czypionka et al., 2022).

Five countries were individually investigated by means of a country case study by researchers from the respective countries (except Germany) following a common template. The selection of countries for the case studies was driven by five main principles: (1) different degrees to which countries were affected by different COVID-19 waves, (2) broad geographic coverage of the European Union, i.e., one country from Western, Central, Northern, Eastern and Southern Europe, respectively, reflecting different cultural aspects and social norms, (3) balanced mix of countries in terms of population characteristics, (4) balanced mix of countries with differently structured hospital sectors (ownership type, bed density), (5) balanced mix of countries with different health systems, more precisely, Beveridge vs. Bismarck model of health financing. The application of these criteria resulted in the selection of the following five countries: Denmark, France, Germany, Hungary and Italy. Table 1 provides an overview of population and health system characteristics of the selected countries.

Researchers from the Institute for Advanced Studies (IHS) assumed the conceptualising and coordinating role in the research process. They prepared a guideline for the analysis and held several meetings with all participating researchers to ensure a uniform approach and a homogeneous analysis in all country case studies. Furthermore, the researchers from IHS were in constant exchange with the researchers from the respective countries during the entire process of data collection and analysis.

The country case studies were conducted by researchers of the following research institutes/universities: Denmark – University of Copenhagen, France – National Institute of Health and Medical Research (INSERM), Germany – Institute for Advanced Studies (IHS), Hungary – Med-Econ Human Services LTD and Italy – LUISS Guido Carli. Each researcher held a degree from social sciences and/or medicine at least at the level of a Master's degree. Overall, 44 % of the research team were female.

#### 2.1.1. Document analysis

As preparation for the semi-structured interviews, a document analysis (Czypionka et al., 2022) was carried out. It aimed to collate background information on aspects of organisation of care, resource management as well as information and communication and governance during the pandemic. To achieve this, available literature and documents (e.g., scientific articles, grey literature, official regulations) were screened for relevant information. The results of this analysis then fed into the design of the interview guides and were used to give interviewers contextual knowledge.

#### 2.1.2. Semi-structured interviews

Semi-structured expert interviews were conducted with different types of senior hospital staff, mostly medical specialists and/or hospital staff in management roles. The interviews aimed at gaining insights into the biggest challenges for hospitals in organising care during the pandemic as well as (suggested) measures to address them.

**2.1.2.1. Interview guide.** Prior to the development of the interview guide, the IHS research team conducted a narrative review in the summer of 2022. The objective of this review was to identify the major

**Table 1**  
Country characteristics.

Country	Population characteristics				Health system characteristics						
	Population size (2023) <sup>1</sup>	Population density (2023) <sup>2</sup>	Population aged 65 or older (2023) <sup>1</sup>	Life expectancy at birth (2023) <sup>1</sup>	General type of health care system	Expenditure for health, total, % of GDP (2022) <sup>2</sup>	Expenditure for hospitals, % of GDP (2022) <sup>2</sup>	Hospital beds per 1000 population (2022) <sup>2</sup>	Curative acute care hospital beds per 1000 population (2022) <sup>2</sup>	Hospital discharges per 100,000 population, all causes (2022) <sup>2</sup>	Decline of hospital discharges per 100,000 population, all causes, 2019–2022, % of 2019 (2022) <sup>2</sup>
Denmark	5,932,654	141.3	19.0 %	81.9	Beveridge model	9.5	4.3	2.5	n.a.	n.a.	n.a.
France	68,172,977	107.6	19.9 %	83.1	Mixed model	11.9	4.6	5.5	n.a.	15,402	15.8
Germany	84,358,845	238.8	20.5 %	81.2	Bismarck model	12.6	3.4	7.7	5.7	21,264	16.0
Hungary	9,599,744	105.2	19.9 %	76.9	Bismarck model	6.7	2.8	6.7	4.2	14,313	13.7
Italy	58,997,201	198.1	23.2 %	83.8	Beveridge model	9.0	3.9	3.1	2.6	9,749	24.9

Note: n.a.=not available

Sources: <sup>1</sup> Eurostat (2023), <sup>2</sup> OECD (2024)**Table 2**  
Summary characteristics of interviewees in the five country case studies.

	Number of interviewees	Gender	Medical profession	Area	Mean duration of interviews (in min)
Denmark	5	4 male 1 female	4 physicians 1 chief medical secretary	3 urban 2 mixed	37
France	17	9 male 8 female	7 physicians 6 nurses 4 others	13 urban 4 rural	55
Germany	10	6 male 4 female	9 physicians 1 other	7 urban 1 rural 2 mixed	54
Hungary	15	5 male 10 female	9 physicians 5 nurses	7 urban 3 rural 5 mixed	59
Italy	10	7 male 3 female	9 physicians 1 other	7 urban 3 mixed	63

Note: mixed area = area with rural and urban parts

impacts of the COVID-19 pandemic on hospitals as discussed in the literature up to August 2022. The search process utilised multiple academic databases and search engines, including Elsevier's Scopus, PubMed, Google Scholar and ResearchGate. More information on the methodology and findings of the narrative review can be found in [Czypionka et al. \(2022\)](#). When subsequently developing the interview guide, the aim was to deepen the knowledge on issues that had already been investigated and, more importantly, to gather new evidence on issues that appeared to be under-investigated. The interview guide was piloted in Denmark and Hungary by local research team members. The interview guide was translated into the languages of the respective countries and used in all countries to synthesise common and/or diverging experiences for the case studies (see [supplementary material](#)). Researchers were free to adapt the interview guide according to specifics of their countries (e.g., cultural particularities) in consultation with the IHS research team.

**2.1.2.2. Selection of interview partners.** A purposive sample of interviewees was defined for each country by the researchers in said country and subsequently discussed with the IHS researchers. The aim was to interview at least ten persons in each country, and ensure sufficient variation via the following criteria: (1) at least one hospital from a rural area (if applicable), (2) at least one hospital from an urban area, (3) hospitals must be from different regions within the country, (4) hospitals should have different roles in the pandemic response and (5)

interviewees should be involved in hospital management or patient care.

Researchers were free to invite additional interviewees in case they regarded it necessary to obtain more information. In total 57 interviews were conducted, five in Denmark,<sup>3</sup> 17 in France, ten in Germany, 15 in Hungary and ten in Italy. Summary characteristics of interviewees are presented in [Table 2](#), with a detailed description being presented in the [supplementary material](#).

**2.1.2.3. Conducting interviews.** The interviews were conducted face-to-face or via videoconference in spring and summer 2022. All interviewees were informed about the PERISCOPE project as well as about the background of the respective interviewer (e.g., educational/occupational background, research interests). Prior to the interview, each interviewee handed in a signed GDPR compliant informed consent sheet. The interviews lasted approximately 60 minutes and were digitally audio or video recorded. Some researchers took notes during the interviews in addition to the recordings. There was no one present during the interviews besides researchers and interviewees. Participants were informed that they could withdraw from the interview at any time. No participant payment was made to the interviewees.

<sup>3</sup> In case of Denmark, the research team had already rich knowledge on hospital management during COVID-19 and concluded that saturation (in the sense of Mayring's thematic analysis ([Mayring, 2021](#))) was reached after 5 interviews.

**2.1.2.4. Analysis.** All interviews were transcribed verbatim from the audio/video file either by the interviewer or an independent research transcriber. The resulting transcripts were analysed using qualitative content analysis (Mayring, 2021). The results of the analysis were organised according to the six building blocks of the WHO health systems framework (World Health Organization, 2007) and an analytical framework on health system resilience (Reiss et al., 2024). Relevant sub-categories within these broad building blocks were identified inductively for each country. The units of analysis, i.e., verbal sequences from the interviews, were coded according to the categories and sub-categories identified by the researchers using ATLAS.ti or NVivo software. The interview quotations selected to be included in the country case studies were edited into readable forms and translated into English.

## 2.2. Overarching analysis

The five country case studies were subjected to an overarching analysis (Timulak, 2009; Paterson, 2001) focusing on successful strategies as well as gaps and failures regarding pandemic management of hospitals. The analysis was led by the research question “What were the major challenges in hospital management during COVID-19 and what can be done to improve hospitals’ pandemic preparedness and resilience?”. Two researchers from IHS conducted independent analyses of the themes addressed in the country case studies in order to inductively identify categories associated with pandemic preparedness and resilience of hospitals. Coding and interpretation of results were discussed to explore differences in interpretation of narratives, improve consistency of coding and reduce subjective influences. The categories, findings and conclusions were checked back against the country case studies by the researchers from the respective countries to ensure consistency and validity.

## 2.3. Ethics approval

The Ethics Committee of the Institute for Advanced Studies has reviewed the facts and approves the implementation of the project. Reference: Case\_003\_2022\_HEHP; Project: PERISCOPE; Project lead: Thomas Cypionka (HEALTH ECONOMICS AND HEALTH POLICY); Application content: H2020 PERISCOPE Work Package 3; Funder: European-Commission H2020; Date: Vienna May 31st, 2022.

All data were collected and all methods were carried out in accordance with relevant guidelines and regulations. In all countries, interviewees provided written informed consent to the interviews, to the recording of the interviews and to the subsequent use of the collected data. They were informed that interviews were confidential and voluntary, and that they could revoke their consent at any time.

## 3. Results

The main themes which emerged from the overarching analysis were grouped into four categories, broadly based on the six building blocks of the WHO health systems framework (World Health Organization, 2007) and an analytical framework on health system resilience (Reiss et al., 2024): organisation of care, resource management, information and communication and governance. However, we used the categories human resource management and physical resource management as sub-categories and combined them into a single category called resource management. Moreover, the interviews did not reveal any key themes concerning healthcare financing, preventing us from providing information on this specific building block. It is important to note that the presentation of results reflects the descriptions and perceptions of interviewees, which were subjective, and not necessarily exhaustive. Thus, if a theme is described for a selection of countries, this does not necessarily imply that the respective circumstance was not present in the remaining countries, but only that it did not emerge as a key theme

there.

### 3.1. Organisation of care

Across all interviews, four sub-themes were identified to address the challenges faced in sustaining service delivery during the pandemic: (1) balancing care between non-COVID-19 and COVID-19 patients, (2) infection control measures, (3) digital solutions and (4) visitor management.

#### 3.1.1. Balancing care between non-COVID-19 and COVID-19 patients

In all investigated countries the interviewees reported considerable challenges to balance care between non-COVID-19 and COVID-19 patients. To ensure sufficient capacities for the care of COVID-19 patients, hospitals implemented several measures, often to the detriment of non-COVID-19 patients. Notably, they opted to close regular wards and/or ICUs to establish COVID-19 wards in their place, as reported by a physician in a German hospital:

*“This happened relatively quickly, many clinics, including ours, had to close wards relatively quickly, we could care for fewer patients, and we were no longer allowed to admit all patients.” – GER\_IP08*

Another widely employed measure was the postponement of non-emergency services, such as screenings, check-ups for chronically ill persons and elective surgeries, to facilitate the scaling-up of COVID-19 capacities. This issue was for example described by a German medical director:

*“During this time, we increasingly restricted elective services in order to create capacity, especially in the ICUs. We were simply no longer able to perform surgery on certain groups of patients. These were not only chronic patients, but above all patients who wanted, let’s say, an elective replacement of just one joint or something like that.” – GER\_IP01*

These measures, however, had a negative impact on the timely diagnosis of (malignant) diseases as well as on the continuity of care, as pointed out by two Hungarian physicians:

*“The treatment of tumor patients who were not diagnosed correctly in the last two years will be a massive problem in the coming period.” – HUN\_IP14*

*“Truth is, the quality of care for non-COVID chronic patients has dropped significantly.” – HUN\_IP01*

To avoid such negative consequences, a French physician, for instance, decided to contact all her patients because her service was shut down:

*“I only talked to patients on the phone, by video [...]. It was so stressful that in fact I called them in order to give them information and tell them what to do. That’s it. But also, [I called] to reassure them because obviously everyone was extremely stressed [...]. At my end I was living [the epidemic] on a daily basis, so I had inside information. I knew how things were going. But in fact, the others, who were at home watching TV, they had zero information. In fact, they were just thinking we’re all going to die, everyone is dying, the caregivers are overwhelmed.” – FRA\_IP07*

However, some measures initially implemented to accommodate for a surge in COVID-19 patients proved useful also outside the pandemic context and entered routine care. A German physician emphasised the positive impact of reducing routine post-operative ICU admissions:

*“In the past, many patients were placed in ICUs after surgeries for one night for safety reasons. [...] And then we actually looked at which people really need the ICU, developed risk scores [...]. As a result, we now operate on patients much more frequently without them having to go to an ICU afterwards.” – GER\_IP08*

### 3.1.2. Infection control measures

The pandemic also necessitated the implementation of infection control measures to limit the spread of the virus in hospitals. For example, hospitals encouraged patients to use their cars as waiting rooms and set up temporary spaces, such as large tents for receiving COVID-19 patients, as reported from Danish hospitals:

*“We have actually called them and said, “if you are interested in coming in for dementia investigation, we still offer it. You can stay in your car so you don’t have to go into the waiting room and then you can call us when you are here, then we will come down and get you and will take you straight to the examination room”.* – DNK\_IP02

Other measures included setting up dedicated COVID-19 hospitals, using separate wards, zones or pathways for COVID-19 and non-COVID-19 patients. However, it became evident that not all hospitals were constructed in a manner to easily facilitate a hermetic separation of COVID and non-COVID patients as described by a French nurse:

*“We quickly realised that our hospital buildings were not at all designed to do two patient pathways. We realised that it was very complicated to separate COVID patients from non-COVID patients in our context.”* – FRA\_IP11

A Danish physician also considered the limitations of some of these measures when COVID-19 was a secondary diagnosis:

*“And then it turned out that this concept [...] of separating COVID patients from all the others, it did not work at all. Because what if there was a cardiology patient with pain in the chest who also had COVID, where should we place them? Because in actual fact, one would say that a heart condition would be the main condition and then COVID was a secondary diagnosis.”* – DNK\_IP05

### 3.1.3. Digital solutions

The use of various digital applications for service delivery was another measure that was increasingly applied during the pandemic. Several interviewees in the investigated countries mentioned that telemedicine in its various forms has considerable potential to help upholding service delivery for chronically ill patients. Successful examples of telemedicine included teleconsultations, electronic prescriptions and telemonitoring. A Hungarian physician emphasised the importance of electronic prescriptions:

*“In my opinion, the NeHS [electronic prescriptions system] helped immensely in maintaining the continuity of patient care, and reducing unnecessary doctor-patient visits, because the chronic patient did not come in for the prescription but only telephoned in.”* – HUN\_IP14

There was essentially a consensus among all interviewees in the investigated countries that telemedicine will play a more important role in the future, also in “normal” times. A French physician brought up its potential to reduce the health system’s reliance on hospitals:

*“Telemedicine was a powerful tool [...] patients are well treated because they have a whole care pathway and a series of [professionals] who take care of them throughout their care pathway and during their lifetime. I think that our current model is too hospital-centric, we need to open up more to other professionals, I think that’s the future.”* – FRA\_IP16

The interviewees, however, noted that remote forms of service delivery come with certain problems and limitations. Most importantly, they emphasised the significance of enhancing digital literacy and of improving both access to and acceptance of digital technologies, especially among elderly patients and physicians. These necessities were mentioned, for instance, by an Italian chief information officer and a Hungarian physician:

*“A statistic of the more or less five thousand visits we did in 2020: less than half had a reference mobile phone, less than a third had e-mail.”* – ITA\_IP04

*“The older generation of doctors, middle-aged and older, did not like telemedicine. As soon as the opportunity for in-person visits opened up, they herded 30–40 patients into a waiting room and made them wait in 20 square meters just to conduct in-person visits.”* – HUN\_IP03

### 3.1.4. Visitor management

Visitor management was identified as another challenging aspect during the pandemic. The interviewees in all investigated countries described different forms of visitor bans put in place, at least during peak phases. These bans were a cause of additional distress to both patients, who felt socially isolated during their hospital stays, and their relatives, who were not able to see or support sick loved ones. Measures to alleviate these problems included exceptions for specific cases (e.g., paediatric patients, patients with disabilities, palliative patients) or the use of tablets for videocalls.

The interviewees in the investigated countries reported that visitor restrictions also led to arguments between staff members and non-compliant visitors, as explained by a German chief physician:

*“That means we offered rapid tests ourselves and then they had to wait those twenty minutes until the rapid test was readable and were allowed on the ward. [...] It was also difficult for the staff, who then said: ‘On Sundays, now we also have to test all the visitors and then they are unwilling and unreasonable and insult us!’”* – GER\_IP06

### 3.2. Resource management

During the pandemic, it was pivotal for hospitals to carefully manage the available resources. Two sub-themes were identified in this context: (1) human resource management and (2) physical resource management.

#### 3.2.1. Human resource management

In all investigated countries interviewees agreed that staff management was one of the major challenges for hospitals during the pandemic. Sharply increasing numbers of infected patients during peak phases were accompanied by severe staff shortages as staff members got infected themselves or had to quarantine. This became particularly acute during later waves when infection rates were higher and staff began to physically and mentally burn out, as stressed, e.g., by a French nurse:

*“Now [in 2022] we’re down to two nurses per 17 beds. [...] And we should be happy to be two, except that it’s very hard. It’s very hard, especially after having experienced opulence and an influx of staff [during the first wave] [...]. We had a glimpse of what excellent working conditions were really like.”* – FRA\_IP05

However, staff shortages were already prevalent before the pandemic. Notably, interviewees from France, Hungary and Italy mentioned how past austerity measures had already impacted the number of available employees before the onset of the pandemic. For instance, a human resources manager of a French hospital expressed disagreement with decisions to cut spending, but was still forced to implement them:

*“And my mission was to find savings. Afterwards, contrary to what you can read in the press, we are not evil cost killers, we are just civil servants who do their job. And I’m not accountable for the choices of the national representation as such. [...] But there has been a political prism in recent years that has led us to make quite drastic savings [...] that meant that we had to cut, so I can’t give precise figures, but roughly speaking, several dozen jobs per year.”* – FRA\_IP09

Measures to deal with staff shortages during the pandemic were mentioned by almost all interviewees. The most prominent measures included redeployment of staff from different wards, specialisations or former health workers returning from work in administration, redistribution of tasks, reactivation of retired or inactive staff, recruitment of additional staff (e.g., medical students), outsourcing or relaxing working-time regulations. It was generally acknowledged that these measures were inevitable, but some of them were still perceived as problematic. For instance, redeployed staff was assigned to tasks that they had not been trained for or lacked confidence in and were overburdened, as reported by a Hungarian physician:

*"Many residents were transferred to COVID departments, where they practically didn't know what was going on. Ophthalmologists, young surgeons, everyone who had just entered the system, those who had just graduated in September carried out the work in October-November with minimal help." – HUN\_IP04*

Furthermore, interviewees reported apparent imbalances, as in some non-COVID-19 wards, staff were underemployed due to postponed services, or it was felt that redeployment for vaccinations withdrew more staff from their core tasks than necessary.

In Italy and France, however, interviewees identified beneficial aspects of redeployments. Italian interviewees described positive experiences of including physiotherapists into teams. In some French hospitals the palliative care team was redeployed to support health workers caring for dying COVID-19 patients. Despite their pre-pandemic experience, the latter felt a severe burden from high mortality among patients, as described by a French physician:

*"In fact, the palliative medicine team was very present [...] it really helped, doctors and teams felt supported, but in my opinion, it was very violent for them too. Actually, even if they deal with death on a daily basis, [my colleague from the palliative care team] had a breakdown. He told me 'I've never seen that before [...] I don't see three [deaths] a day everyday.'" – FRA\_IP02*

The pandemic imposed a considerable burden, both mental and physical, on health workers. Interviewees in all investigated countries described that, while in the early phases of the pandemic, there was a high level of motivation and unity among staff, frustration grew with every wave. Major sources of distress named by several interviewees include physical strain of working long hours in protective gear, seeing many patients die in isolation without support networks (predominantly during the first wave), sacrificing their personal lives, having to take on additional administrative tasks (e.g., managing COVID-related data), lack of external appreciation, or disappointment due to lacking or badly managed financial compensation. Multiple measures were implemented to mitigate distress. For example, psychological support was organised in the form of helplines, counselling or support groups. Health workers also received special support like provision of food or childcare. These measures were, however, not perceived as sufficient as mentioned, for example, by a German physician:

*"So that's the biggest madness of it all, isn't it, that an airline has been saved with several billion. That the gas suppliers have now been saved [...], but everyone is clapping for the nurses, right? So now everyone is surprised that there are no more hospital beds or no more hospital beds that can be used. Although there seems to be money somewhere. [...] That's very flat and tabloid-like, but there's still a certain bias in the perception." – GER\_IP05*

The importance of well-being among health workers was highlighted by a nursing director of a Hungarian hospital, who noted that staff members prioritised having sufficient time to rest over working additional hours for extra remuneration.

*"To reduce the waiting list for ultrasound examinations, the government offered extra money, which you had to apply for. So, you had to*

*determine how many hours and how many examinations you would do more. We discussed this with our colleagues, and everyone said they didn't want extra working hours. Money cannot buy time for regeneration." – HUN\_IP02*

### 3.2.2. Physical resource management

There was a broad consensus among interviewees in all investigated countries that lack of capacities was another major challenge for hospitals during the pandemic. Limited capacities of hospital and ICU beds as well as the shortage of medical equipment in ICUs were named as most pressing. For example, a nursing director of a Hungarian hospital described that hospital capacities were determined according to "normal" demand and there were no excess capacities available to be used in case of emergencies:

*"Our entire system is built to meet the minimum requirements. All infrastructure, equipment and human resources are designed for the minimum. All capacity should be utilised, but if the demand for healthcare increases even a little, it can be seen that there will be a sudden rush and madness. Because there is no extra room in a hospital [...] and there are no additional human resources." – HUN\_IP02*

In all investigated countries, interviewees reported a shortage of personal protective equipment (PPE) at the beginning of the pandemic. An Italian physician, for example, related the lack of adequate PPE to the surge in case numbers during the first COVID-19 wave in Italy:

*"I can tell you that, having managed the supply of personal protective equipment at our hospital, it was a real drama for us, in the initial stages of the pandemic, to have adequate quantities of PPE [...]. Probably, the fact that we had difficulty in the beginning to contain the spread of the disease may be due to the scarcity of protective equipment." – ITA\_IP05*

In Germany, interviewees stated that hospitals reconsidered their storage policies following the shortage of medical supplies at the beginning of the pandemic. They established dedicated pandemic warehouses and bolstered their awareness for supply chains. However, logistics proved costly and determining optimal stock levels for various materials remains a challenge, as discussed by a German economist:

*"I don't know whether it always makes sense to have a certain amount of stock for every product, but the availability of materials and awareness of the supply chain has now become established and internalised everywhere, so that you really can always ensure a certain level of preparedness." – GER\_IP07*

### 3.3. Information and communication

Several challenges were reported by interviewees about the communication efforts of hospitals. They were grouped into the following three sub-themes: (1) communication with public authorities, (2) internal communication and (3) communication with patients.

#### 3.3.1. Communication with public authorities

Interviewees in several investigated countries encountered difficulties dealing with public authorities. Hospitals were faced with overwhelming data requests (e.g., daily statistics on infections or bed occupancy rates), which hampered their efforts to respond to the pandemic. A French physician recalled that hospitals received conflicting information from authorities, and were left having to improvise and adapt to the local context:

*"And the small problem is that in the French state [...] each one is jealous of the other with petty rivalries between the public institutions. So [...] there were at least three different voices, all saying: 'no, but I'm the chief, you have to listen to my recommendations'. [...] we gathered all the information saying: 'well, in practice, what should we do?'" – FRA\_IP01*

### 3.3.2. Internal communication

Internal communication was another challenge for hospitals during the pandemic, as pointed out by several interviewees. Hospitals implemented various measures to ensure staff members had access to up-to-date information including the establishment of internal dashboards, which displayed data such as the number of infected staff members and the number of occupied beds. Additionally, hospitals set up dedicated internal phone lines and e-mail inboxes to address staff members' requests. For some hospitals, managing these communication channels required a significant effort, blocking considerable human resources, as described by a deputy chief physician of a German hospital:

*"We also had a central hotline from the pandemic team, that every employee could call [...]. So sometimes there were five to ten people working there at the same time." – GER\_IP10*

### 3.3.3. Communication with patients

Interviewed physicians in the investigated countries observed a reluctance among patients to seek medical care in hospitals due to concerns about potential infections. In response, hospitals launched information campaigns and educational initiatives to reassure patients about the effectiveness of their safety protocols and the importance of seeking timely medical care.

Additionally, physicians encountered communication challenges while wearing protective equipment. Moreover, in Italy, there were health information systems which had already been installed pre-pandemic, but they turned out to be not sufficiently user friendly to be used in the hassle of a crisis. Instead messenger services such as WhatsApp were found to be an effective tool to communicate with patients, even though there were some security concerns as highlighted by a chief information officer of an Italian hospital:

*"WhatsApp was rampant to meet the needs of the patient when the doctor would say: 'Let me see the report of the last blood test you did externally, in another region', [...]. The easiest thing is to send the photo of the report via WhatsApp directly to the doctor. [...] It is known that it is a channel that is not secure and perfected, but functionally it is actually what was needed". – ITA\_IP04*

## 3.4. Governance

Three significant subthemes were identified from the interviews: (1) guidelines and pandemic plans, (2) internal task forces and (3) interface management with primary care.

### 3.4.1. Guidelines and pandemic plans

Interviewees from all investigated countries generally offered some form of criticism regarding government-issued guidelines. Common criticism included a slow initial governmental response, lack or insufficient clarity of guidelines, challenges in keeping up with rapidly changing guidelines, lack of transparency and involvement of professional and patient organisations in the creation of guidelines, as well as notable regional differences in guidelines. For instance, a Danish interviewee was frustrated with short-notice publications of guidelines, as it left them insufficient time to implement and familiarise themselves with the guidelines:

*"They [the guidelines] just changed overnight. And sometimes the media and the patients knew about it before we did. Because someone heard about it in the news and then the citizens knew about it and the guidelines had not even been published yet [...] so it has been difficult to keep up." – DNK\_IP02*

In several investigated countries interviewees, mostly hospital managers, expressed a desire for more comprehensive guidance in certain areas while criticising an overflow of guidelines and regulations in other areas. For example, a chief physician of a German hospital

explained that the complexity of regulations posed a significant challenge for all those lacking legal expertise:

*"And then, you have to consider that health workers usually do not also have a law degree. And when they come along with a regulation that is formulated in a legally precise manner so as to close all potential loopholes, but is also as unspecific and vague as possible, that is not exactly helpful in my daily work." – GER\_IP05*

Moreover, the practical applicability of pandemic plans was criticised by interviewees of most investigated countries where such plans were available. Some pandemic plans were perceived as too unspecific, i.e., a clear allocation of roles, tasks and responsibilities across stakeholders inside and outside the hospital was missing. Other pandemic plans were tailored for different scenarios such as an influenza epidemic. According to a German chief physician, an especially significant issue was the reluctance of policymakers to provide adequate pandemic plans in a timely manner. She particularly criticised the political procrastination on this matter, and likened the provision of pandemic plans, and achieving a sufficient level of pandemic preparedness to the functions of the fire brigade:

*"We are not abolishing the fire brigade because there is no fire at the moment, but we are maintaining it [...] and it was never politically accepted, that we also need to put more thought into infectiological research, emergency and disaster plans. It has always been 'Oh, we'll take care of that when we have time and everything.' And suddenly it was there and then everyone realised, 'Ah, unfortunately we don't really have anything now.'" – GER\_IP03*

### 3.4.2. Internal task forces

Interviewees in all countries described the establishment of internal task forces or crisis boards as essential for coordinating the crisis response. Typically, these consisted of representatives from major units, established a clear chain of command and specified roles and responsibilities. However, as adequate guidelines and pandemic plans were widely lacking on the government level, hospitals were often forced to develop their own as described by a Hungarian hospital director:

*"The pandemic plan was completed at the entire hospital level at the beginning of the first epidemic wave. The plan had several stages of when and what to do, assessing how many beds, equipment and human resources we could provide and how many patients we could receive. Even before any government measures were taken here, we started implementing our own measures." – HUN\_IP13*

Moreover, hospital managers sought cooperation with other hospitals within or beyond their region and built networks to exchange best-practice solutions and distribute patients according to each hospital's capacities. While distribution of patients was not always successful, most interviewees praised the coordination with other hospitals. For example, a medical director of an Italian hospital was very positive about regional meetings to coordinate paediatric patients:

*"Talking about pathways, we have had an extraordinary collaboration with the region, for which we have participated within the network as a reference paediatric hospital for the whole region [...]. This was fundamental because we also participated in the daily meetings that the region held on emergency management. So, we have had relationships and collaborations with all the hospitals that had difficulties in the paediatric field." – ITA\_IP10*

A German medical director, however, recalled his frustration in dealing with smaller hospitals:

*"We comprehensively managed our hospitals. So, we looked to see where an ICU bed was available. We also tried to coordinate with other hospitals. That didn't work [...]. The city appointed a coordinator to look after*

*this. And we were then allocated smaller specialist clinics that were supposed to support us with staff and clinical capacities. That didn't work because these smaller hospitals simply closed down, took annual leave, et cetera, and didn't get involved.* – GER\_IP01

### 3.4.3. Interface management with primary care

Generally, interviewees in all countries agreed that there was a need to strengthen primary care to relieve pressure on hospitals. This sentiment was underscored by German and Hungarian experiences where pre-pandemic collaborations with primary care providers proved beneficial during the crisis. In contrast, in regions where such pre-pandemic cooperation had been absent, interviewees felt that general practice did not perform adequately, noting the high number of referrals:

*“Because general practice [...] in my view, they opted out of the game and said ‘we do not have anything to do with this’ [...]. So general practice did not respond [...]. We [...] received many referrals regarding things that we might have not needed to handle.”* – DNK\_IP04

However, some interviewees also acknowledged a shortage of GPs and the resulting difficulties in managing the high demand, as illustrated by a French physician:

*“In [our] sector, we have a shortage of general practitioners. And so, they are in great demand and they can't keep up. They can't keep up with the demand and patients can't even find a GP [...]. And GPs are also in difficulty.”* – FRA\_IP10

## 4. Discussion

Our analysis provides first-hand insights into the key challenges faced by hospital management in five European countries during the pandemic as well as strategies and measures to overcome them. In general, effective pandemic management requires a coordinated effort involving all sectors of the health system, not just hospitals. For instance, successful pandemic management requires close cooperation between hospitals and primary care services and strengthening the role of the latter (Kraus et al., 2023). In addition, improving hospital preparedness should be an ongoing effort during “normal times” rather than a reactive measure taken during a crisis, as any collaboration in healthcare requires trustful relationships built over time (Ravaghi et al., 2023). More specific lessons learnt are discussed below.

In terms of organisation of care, the main challenge was to provide sufficient capacities to care for COVID-19 patients. To provide this care, it was decided to postpone screenings, check-ups for chronically ill persons and elective surgeries. These measures provided surge capacity for COVID-19 patients but had a negative impact on the timely diagnosis and early detection of (malignant) diseases, as well as on the continuity of care for patients with chronic diseases (Angelini et al., 2023; Dinmohamed et al., 2020). In future pandemics, efforts should be made to maintain routine care to avoid such negative consequences. This can be aided by telehealth, including efficient means to contact patients. While the COVID-19 pandemic has promoted the use of telehealth, some barriers, such as user-friendliness as well as patient and physician acceptance, need to be addressed.

With respect to human resource management, the main problem faced by hospitals was a shortage of health workers (Gautier et al., 2023; Mohammadinia et al., 2023). Health systems have long been subjected to financial spending cuts, unattractive working conditions and misallocation of staff, resulting in understaffing already without additional strain. The pandemic exacerbated the problem, resulting in a persistent shortage of health workers. Interviewees stressed that emergency measures such as redeployments led to mixed results, with some health workers appreciating the contribution of other specialties, and others highlighting inadequate training or a lack of confidence. As redeployments will remain an essential tool in such situations, hospitals

should prepare not only legally but also by fostering exchange of health workers and know-how between departments. However, to substantially address the shortage of health workers, several measures should be taken to increase the attractiveness of health and care professions. These could include, but are not limited to, increasing salaries, providing additional time off and the hiring of administrative staff to allow health workers to focus on their core competencies.

Regarding physical resource management, supply shortages have been traced back to a reliance on global supply chains (Ravaghi et al., 2023; Bown, 2022). In response, hospitals built up dedicated pandemic stockpiles. Although generally perceived as effective, our interviewees had difficulties determining optimal levels of stockpiling. Furthermore, it may be more economical to stockpile jointly with other hospitals in the area. To further improve pandemic preparedness in this regard, (emergency) production within Europe should be feasible to reduce dependency on global supply chains. It also became clear that hospital buildings often hinder a broad-scale separation of infectious and non-infectious patients. Thus, our interviewees suggested to consider the integration of separate patient pathways when renovating old or building new hospitals.

Considering information and communication, hospitals received conflicting information from public authorities during the pandemic (McGuinness et al., 2022; Filip et al., 2022). This forced hospitals to improvise. However, a consistent and clear response from public authorities would be preferable to reduce confusion in managing the pandemic. Such coordination would enable hospitals to implement effective strategies in a consistent and more efficient way. To improve pandemic preparedness in this area, a single overarching body may be needed to provide clear, consistent and cross-agency information.

In terms of governance, the lack or partial inapplicability of pandemic plans was criticised (Tartaglia et al., 2021). Some pandemic plans appeared too vague or even infeasible, while others were tailored to scenarios deviating too much from the case of COVID-19. Pandemic preparedness would benefit from regular reviews of pandemic plans, which should consider different care settings, roles and responsibilities of (medical) staff and modes of disease transmission. In addition, their general practicability should be assessed, on the macro- as well as on the micro-level, similar to fire drills. After each review, the pandemic plans should be adapted to the lessons learnt.

The research presented in this article has several limitations. Methodologically, one potential limitation is that the individual country case studies were not presented to the respective interviewees for validation, which may affect the reliability and robustness of the findings and conclusions. In addition, a limited number of interviews could reflect only a part of the problems encountered and measures taken in each country, although interviews were conducted to saturation in the sense of Mayring (2021). Furthermore, a selection of five countries is most likely not sufficient to derive pan-European learnings. The selection of countries was aimed at covering countries with different health systems and mixed experiences but can still only cover the cases of these specific countries.

## 5. Conclusion

The current article is a comprehensive cross-country qualitative analysis of lessons learnt from the management of hospital care during the pandemic. It offers a valuable resource for improving preparedness and can assist health systems in achieving their optimal performance in future pandemics.

An implicit hypothesis underlying the article was that structural variation across health systems can be expected to result in a similar variation in perceived problems. To evaluate this assumption, countries with distinct health system structures and varying levels of resource availability were selected for analysis, as outlined in Table 1. However, one of the unexpected findings of the analysis was the remarkable similarity in the perceived challenges associated with the pandemic



across countries. For example, one may assume that problematic experiences in hospitals during the pandemic would be negatively correlated with pre-pandemic levels of physical capacities. Our findings indicate that such a clear correlation does not exist. This is exemplified by Denmark, which, despite having the lowest hospital bed capacity among the selected countries, did not encounter more severe pandemic problems than the other four sample countries. Another observed commonality was that the challenges emphasised by interviewees predominantly pertained to the provision and regulation of healthcare services. Financial or monetary concerns were infrequently mentioned. This suggests that both wealthier and less affluent countries focused primarily on the core function of health systems—delivering care—rather than raising issues related to financial resources or funding mechanisms.

The COVID-19 pandemic demonstrated the importance of preparedness for health system shocks and resilience of health systems in real terms. Both concepts had been the subject of health policy research long before the outbreak of the COVID-19 pandemic, partly prompted by previous shocks. Nevertheless, many health systems were not well prepared for the COVID-19 pandemic.

A key learning from the overarching analysis is that many strategies to improve pandemic resilience would also improve health system performance in “normal times”. For instance, fostering closer collaboration between hospitals and primary care services strengthens resilience during health system shocks, and also improves the quality of care under normal conditions. Similarly, improving working conditions not only strengthens resilience of the workforce, but in general helps to attract and retain health workers.

Finally, pandemic-specific measures should be implemented with minimal negative impact on other care services. These measures include postponing screenings, check-ups for patients with chronic diseases and elective surgeries to create surge capacity for infected patients. Such postponements need to be carefully managed to minimise potential adverse effects on patient care. In addition, the implementation of infection control measures, such as separation of patient pathways, and the establishment of crisis boards should be an essential part of the pandemic response toolkit.

### Ethics approval and consent to participate

The Ethics Committee of the Institute for Advanced Studies has reviewed the facts and approves the implementation of the project. Reference: Case\_003\_2022\_HEHP; Project: PERISCOPE; Project lead: Thomas Czipionka (HEALTH ECONOMICS AND HEALTH POLICY); Application content: H2020 PERISCOPE Work Package 3; Funder: European-Commission H2020; Date: Vienna May 31st, 2022

All data were collected and all methods were carried out in accordance with relevant guidelines and regulations.

In all countries, interviewees provided written informed consent to the interviews, to the recording of the interviews and to the subsequent use of the collected data. They were informed that interviews were confidential and voluntary, and that they could revoke their consent at any time.

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### CRedit authorship contribution statement

**Markus Kraus:** Writing – original draft, Validation, Project administration, Methodology, Formal analysis, Conceptualization. **Christoph Stegner:** Writing – original draft, Formal analysis. **Miriam Reiss:** Writing – review & editing, Validation, Methodology, Investigation, Conceptualization. **Monika Riedel:** Writing – review & editing, Validation, Methodology, Investigation, Conceptualization. **Anne Sofie Børsch:** Writing – review & editing, Investigation. **Karsten Vrangbæk:** Writing – review & editing, Investigation. **Morgane Michel:** Writing – review & editing, Investigation. **Kathleen Turmaine:** Writing – review & editing, Investigation. **Krisztián Horváth:** Writing – review & editing, Investigation. **Gergő Túri:** Writing – review & editing, Investigation. **Roberto Dandi:** Writing – review & editing, Investigation. **Angelo Rossi Mori:** Writing – review & editing, Investigation. **Thomas Czipionka:** Writing – review & editing, Validation, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

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### Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.ssmhs.2025.100050](https://doi.org/10.1016/j.ssmhs.2025.100050).

### Data availability

The datasets used and/or analysed during the current article are available from the corresponding author on reasonable request.

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