

Orchestrating leadership communication during hospital incident command activation: A grounded theory study

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ARTICLE INFO

Keywords:

Incident command system
Critical infrastructure
Leadership communication
Risk management
Hospital preparedness
Grounded theory

ABSTRACT

Hospitals can experience disruption to their operations, due to a variety of crisis events. To maintain operational functionality, they are required to implement a hospital incident command (HIC). This study explores the process from routine operations to a staff-based HIC, analyzing how leadership communication and dynamics emerge, evolve, and are negotiated during crisis transitions. The focus lies on interactions between roles, practices, training, and structures under high operational pressure. A qualitative single-site study was conducted applying a Grounded Theory methodology based on two consecutive HIC tabletop exercises following targeted training. Data comprised semi-structured post-exercise interviews with 19 HIC members from diverse professional backgrounds and triangulation with a series of collected observational materials (notes and protocols). The analysis indicates that the enactment of staff-oriented HIC structures varies along a spectrum of coordination: Explicit orchestration of leadership communication was associated with a shift toward more structured coordination, reflected in clearer role articulation, defined process boundaries, and separation of briefing and operational tasks. Where orchestration was less pronounced, coordination tended to rely on routine practices, accompanied by blurred responsibilities and more fragmented coordination patterns. The findings suggest that the mere presence of command structures, roles, procedures, and communication tools was often insufficient to establish coordinated staff work. Instead, their practical effectiveness appeared to depend on an interactional process, conceptualized here as *orchestrating leadership communication*. Moderation emerged as one important manifestation of this process, suggesting that HIC training should place greater emphasis not only on structures and procedures, but also on interactional practices.

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1. Introduction

In Europe the healthcare sector is one of 11 (+7) critical infrastructure sectors that are subject to specific legal requirements of the Network and Information Systems/Security Directive 2 (NIS-2, (EU) 2022/2555) and the Critical Entities Resilience Directive (CER, (EU) 2022/2557) regarding preparedness for crises and disasters [1], [2]. As key providers of healthcare to the public, hospitals are required to develop emergency response plans in accordance with the mentioned directives and national law, based on an all-hazards approach [1], [2], [3]. When hospital operations are disrupted by a crisis situation, rapid coordination is essential. As has been shown in past crises, such as during the COVID-19 pandemic, it is particularly important that leadership structures are established and become operational quickly [4], [5]. Following the principles of an all-hazards approach in particular, the hospital incident command (HIC) -the designated leadership body -should be empowered to ensure the continuity of hospital operations during crises [6], [7].

In different countries, aligning the HIC organizational structure with a staff-based system is recommended, providing a consistent nomenclature and interoperability between different emergency management agencies [6], [8], [9]. This structure resembles a continental staff-system based command structure, as commonly found in military organizations, in which a temporarily established advisory body supports leadership functions in complex operational environments [10], [11]. Staff work, as a distinct mode of operations in high-risk contexts, is characterized by uncertain duration, diverse task demands, limited information, high time pressure, and restricted opportunities for training [10], similar to so-called “Volatility, Uncertainty, Complexity, Ambiguity (VUCA) situations” [12]. Consequently, HIC actors require expertise in emergency protocols, problem-solving, decision-making, and leadership [13].

For this purpose, hospitals are required to provide staff with the necessary training and regular exercises [8], [14], [15], [16]. Disaster exercises not only enhance procedural knowledge but also improve role clarity, teamwork, communication, confidence in response capabilities, and stress resilience during actual emergencies [13], [16], [17]. However, scientific literature highlights a lack of sufficient evidence to conclusively determine whether training in healthcare settings effectively improves disaster preparedness [18]. Several studies call for a stronger emphasis on the scientific evaluation of the efficacy of such training programs [19], particularly through high-quality multidisciplinary research using validated assessment tools [20].

Daily hospital leadership differs significantly from that of other organizations, such as the police, the fire department, or the military, and therefore lacks experience in staff-based management. Nevertheless, these are high-performing employees with a high level of expertise and leadership experience and therefore could be trained quickly [21]. Some authors have noted that exercises incorporating the HIC and previous experiences with disaster management have proven helpful in managing the situation [22], [23]. Further, it was demonstrated that HIC performance improved with predefined roles and trained executives [24]. While previous research has provided important insights into preparedness and command structures, less is known about the transition from routine operations to incident command activation. Relational leadership theory conceptualizes leadership as a social influence process through which coordination and social order are constructed and produced within specific organizational contexts [25]. From this perspective, leadership is not confined to formal authority structures but may emerge through relational processes occurring during collective action. To address this gap, the present study adopts an exploratory perspective on the implementation of a staff-based hospital incident command system. Accordingly, the study addresses the following research questions.

RQ1: How do hospital professionals experience and organize the transition into a staff-based hospital incident command system during an exercise-based activation?

RQ2: What organizational and interactional processes emerge during an exercise-based activation of a staff-based hospital incident command system?

By addressing these questions, the study seeks to develop a context-sensitive understanding of how hospital incident command systems are enacted in practice and how organizational actors collectively establish and maintain coordination during crisis response.

2. Methods

2.1. Study design

This study was conducted as a qualitative, single-site investigation at Heidelberg University Hospital using a Grounded Theory approach [26].

The study was situated within an exercise-based hospital incident command environment. It therefore examines how staff-based command may be enacted in a structured training and tabletop exercise context, rather than during a real hospital incident or disaster. Multiple data sources were included to support an in-depth understanding of the exercise setting: semi-structured interviews, participant observations, and documentary materials generated during the exercise, including observation sheets, field notes, written protocols, and photographic documentation of flipcharts. This multi-source approach enabled methodological triangulation and allowed emerging insights to be examined across complementary data sources, thereby supporting category development across the broader empirical dataset.

2.2. Grounded theory methodological approach

Grounded Theory is particularly suited to generating explanatory frameworks for complex social phenomena [26]. Accordingly, it

provided an appropriate methodological approach for investigating leadership communication during the transition from routine operations to a major incident. The methodological focus was on capturing participants' processes of meaning attribution in action-interaction using a systematic yet flexible interpretive approach [27]. Data analysis followed open, axial, and selective coding, combined with constant comparison and memo writing to develop and relate categories [27]. The methodological approach was informed by the grounded theory methodology of Corbin and Strauss [27], drawing on its pragmatist and interactionist foundations. Consistent with this methodological tradition, researchers' prior professional knowledge and broad analytic interests were understood as resources for theoretical sensitivity rather than as predefined analytical categories, while concepts and relationships were developed through sustained engagement with the empirical material.

To enhance theoretical sensitivity and promote heterogeneity of perspectives, the research team deliberately maximized contrast across three dimensions: theoretical expertise, professional background, and degree of involvement in the planning and execution of the exercise (see Table 1). The resulting diversity of perspectives was used throughout the analytic process to challenge assumptions, test alternative interpretations, and support the development of categories grounded in the empirical material.

2.2.1. Analytical focus and sensitizing interests

Consistent with a grounded theory approach, the study refrained from formulating formal objectives and instead worked with analytically evolving foci that remained open to revision throughout the research process. Particular attention was given to leadership communication and interaction dynamics as they unfolded during the transition from routine clinical operations to emergency mode within a staff-based hospital incident command (HIC) system. Additional analytic attention emerged around how participants experienced and made sense of training and exercise contexts, how confidence and uncertainty were negotiated, and how communication practices evolved within and across command functions.

These areas of interest served as sensitizing points of orientation for data analysis rather than as predefined analytical categories. Throughout the research process, categories, relationships, and explanatory concepts remained open to development, modification, and refinement as analysis progressed. Concepts that later became central to the emerging framework were therefore grounded in iterative engagement with the empirical material rather than specified in advance.

2.2.2. Sampling and field context

The training courses and exercises were planned independently of the present research project by the external service provider *Institut für Gefahrenabwehr* (Institute for Hazard Prevention, Institut für Gefahrenabwehr GmbH, Ruppichterth, Germany), in close coordination with the Crisis and Disaster Management Unit of Heidelberg University Hospital.

Two training sessions (April 29 and May 20, 2025) and two exercise sessions (May 26 and May 27, 2025) were conducted. Prior to the exercise, participants were introduced to the composition, functions, and working methods of the hospital incident command team. The tabletop exercise was designed to allow participants to apply these principles in practice.

The scenario involved a large-scale failure of the hospital information system, resulting in widespread disruption of administrative and clinical processes and requiring coordination under conditions of uncertainty and time pressure.

The study used a complete-case sampling strategy within a theoretically bounded exercise cohort. All employees of Heidelberg University Hospital who were eligible for deployment within the hospital incident command system and participated in at least one

Table 1
Overview of researcher roles and observational focus.

Observer Role	Professional Background & Positioning	Degree of Involvement	Primary Observational Focus	Reflexive Considerations
Observer A	Social education professional with expertise in communication and employee guidance; no prior disaster exercise experience.	Non-intervening participant observer	Role allocation and leadership behavior; communication of role expectations, responsibilities, and authority.	External perspective enhanced sensitivity to implicit role norms and unspoken assumptions.
Observer B	Psychologist with qualitative-methodological expertise; limited disaster exercise experience.	Non-intervening participant observer	Team communication and collaboration; linguistic, paralinguistic, and non-verbal interactional features.	Balanced micro-interactional sensitivity with situational and organizational context.
Observer C	Physician-scientist with international disaster medicine certification and civil-military background.	Non-intervening participant observer	Decision-making and problem-solving under uncertainty; development of alternative courses of action.	Maintained distinction between normative disaster medicine standards and empirically observed practices.
Observer D	Head of operative hospital emergency and response planning; extensive experience in disaster exercises and voluntary disaster management.	Expert observer; involved in exercise planning and coordination	Exercise structure and procedural clarity; disruptions and distractions; communication with external actors.	Explicit separation of design evaluation from interactional analysis to mitigate expectancy effects.
Observer E	Physician with extensive hospital emergency management and clinical operations experience.	Participant observer; involved in exercise conceptualization and conduct	No additional independent observational focus assigned.	Excluded from direct coding of the empirical material. Contributed only to higher-level analytical discussions, without involvement in primary data analysis, to mitigate bias related to the embedded role.

exercise session were invited to take part in the study. Further inclusion criteria were adult age and the provision of written informed consent. The sole exclusion criterion was refusal to participate.

This sampling strategy enabled the inclusion of the full available exercise cohort and supported variation within the bounded case regarding professional background, organizational role, prior experience, and familiarity with staff-based command work. Given the bounded nature of the exercise cohort, saturation was assessed within the available dataset rather than through iterative recruitment. Saturation was considered reached when repeated comparison across interviews, observations, documents, coding memos, and team discussions no longer generated substantially new category properties, dimensions, or relationships relevant to the emerging conceptual framework.

2.3. Data collection

Data collection followed a multi-method qualitative approach and comprised participant observation during the exercise sessions as well as semi-structured interviews conducted after completion of the exercises. Both data strands were analytically integrated in line with Grounded Theory principles.

2.3.1. Participant observation

Observational data were collected during the exercise sessions held on May 26 and 27, 2025. Participant observation was embedded in the training and exercise process and accompanied all central phases, including pre-briefings, debriefings, feedback sessions, and coaching elements. The primary objective was to capture interactions, practices, and communication processes as they unfolded *in situ*.

In line with Jorgensen [28], participant observation was conducted as part of a flexible and evolving qualitative research process aimed at understanding social interactions from the participants' perspectives. Observations were documented in detailed field notes. To preserve an exploratory orientation, no standardized observation checklist was applied [29]. Instead, sensitizing concepts were used to guide attention toward analytically relevant phenomena without constraining openness to emergent processes [30]. In addition to field notes, materials generated during the exercises - including observation sheets, written protocols, and photographic documentation of flipcharts - were collected and included as supplementary data sources. All documents related to the content and execution of the staff framework exercise were incorporated into the analysis.

2.3.1.1. Structured observational perspectives and researcher roles. While maintaining an exploratory stance, participant observation was conducted by a multidisciplinary research team using complementary observational perspectives. Drawing on prior empirical research on communication structures in staff work and the effectiveness of situation briefings [10], observations were guided by a set of broad observational perspectives intended to support systematic attention to different interactional and organizational aspects of the exercise (see Table 1). These perspectives served as points of orientation rather than predefined analytical categories and were complemented by ongoing attention to unexpected or emergent phenomena.

Observers differed in professional background and prior experience with disaster preparedness exercises, ranging from social education and psychology to disaster medicine and hospital emergency management. While some observers acted as exclusively non-intervening participant observers, others were involved in exercise design and attended in an expert observer role. This deliberate differentiation enabled the exercise to be observed from multiple vantage points while maintaining awareness that observer positioning could shape what was noticed, emphasized, or taken for granted. Differences in observer roles and levels of involvement were therefore treated as an explicit resource for reflection and comparison throughout the analytic process. An overview of researcher roles, degrees of involvement, and observational foci is provided in Table 1.

2.3.2. Interviews and sample characteristics

Semi-structured interviews constituted the second main data source. Following completion of the exercise sessions, all eligible participants were contacted individually and invited to participate in an interview. Interviews were scheduled after the exercises to allow participants to reflect on their experiences retrospectively and were arranged at individually convenient times.

A total of 19 interviews were conducted. The sample comprised 12 male and 7 female participants. The mean age of the interviewees was 50 years, indicating a predominantly senior cohort. On average, participants held their current position for 5.5 years, reflecting substantial career seniority and organizational familiarity. The professional backgrounds represented a broad range of disciplines, including clinical (e.g., physicians, nursing leadership), administrative, technical (e.g., IT specialists, engineers), and executive roles (e.g., board-level management). Most participants ($n = 13$) reported prior relevant experience in clinical or emergency-related contexts (before the underlying training program), whereas six participants indicated no such prior experience. Overall, the sample can be characterized as experienced, multidisciplinary, and predominantly composed of individuals in senior or strategic positions.

All eligible participants were interviewed, as the group represented a theoretically bound case universe in which each individual constituted a potentially relevant source of conceptual variation. Interviewing the entire cohort supported constant comparison across cases and facilitated the achievement of theoretical saturation.

All participants provided written informed consent prior to participation. Interviews were conducted via video conferencing software (Microsoft Teams), using existing institutional licenses. The interview guide was developed by the research team following the S2PS2 procedure (collect, sort, check, delete, subsume) [31]. It comprised an open introductory question designed to elicit a narrative, followed by probing questions to ensure structural coherence across interviews. The interview guide is provided in the appendix.

In line with Grounded Theory methodology, the guide was refined iteratively over the course of data collection. At the beginning of each interview, participants received detailed information about the study aims, procedures, duration, and data handling. Interviews were audio-recorded and transcribed verbatim in pseudonymized form using MAXQDA software (VERBI Software, 1989–2024). Interviews were conducted in German. For publication purposes, selected excerpts were translated into English by the research team and checked by a second researcher to ensure linguistic accuracy and conceptual equivalence.

2.4. Data analysis

All available data, including interview transcripts, observational field notes, documents produced during the exercises, visual materials (e.g., flipcharts and situational displays), and evaluation materials provided by the external service provider, were analyzed collaboratively by the research team following Grounded Theory procedures. Analysis was iterative and involved continuous movement between data familiarization, coding, comparison, and theoretical integration. Observation protocols, including the oral debrief feedback provided by the Institute for Hazard Prevention as the concluding element of each exercise, were expanded and documented immediately after each exercise to ensure analytic usability. These observational materials informed subsequent interviews and analysis without predetermining codes or categories.

2.4.1. Analytic procedure

All interviews were pseudonymized before analysis and independently reviewed by all members of the analysis group to establish an initial holistic understanding of the dataset. This familiarization phase was followed by joint analytic sessions in which preliminary interpretations were systematically elicited, contrasted, and discussed.

Cases and incidents were systematically compared using the constant comparative method, allowing categories to be developed and related in terms of their properties and dimensions [27]. Through axial and selective coding, a core category was identified and analytically situated within a coding paradigm linking causal conditions, contextual conditions, action/interaction strategies, and consequences [32].

Subsequently, focused coding was conducted independently by two researchers (JK, MR) to further refine category properties and dimensions. The results of this focused coding phase were discussed and integrated within the full analysis group to ensure conceptual coherence, analytic rigor, and consistency with the emerging theoretical framework. Illustrative quotes were selected based on (a) representativeness of the coded category, (b) clarity of articulation, and (c) density of information, in line with Pratt's [33] guidance on power quotes vs. proof quotes.

2.5. Ethics and dissemination

The names of the employees and all other confidential information collected as part of the study are subject to confidentiality, the provisions of the German Federal Data Protection Act (BDSG) and the State Data Protection Act (LDSG) of Baden-Württemberg, Germany, as well as those of the General Data Protection Regulation (GDPR). The study was conducted in accordance with the

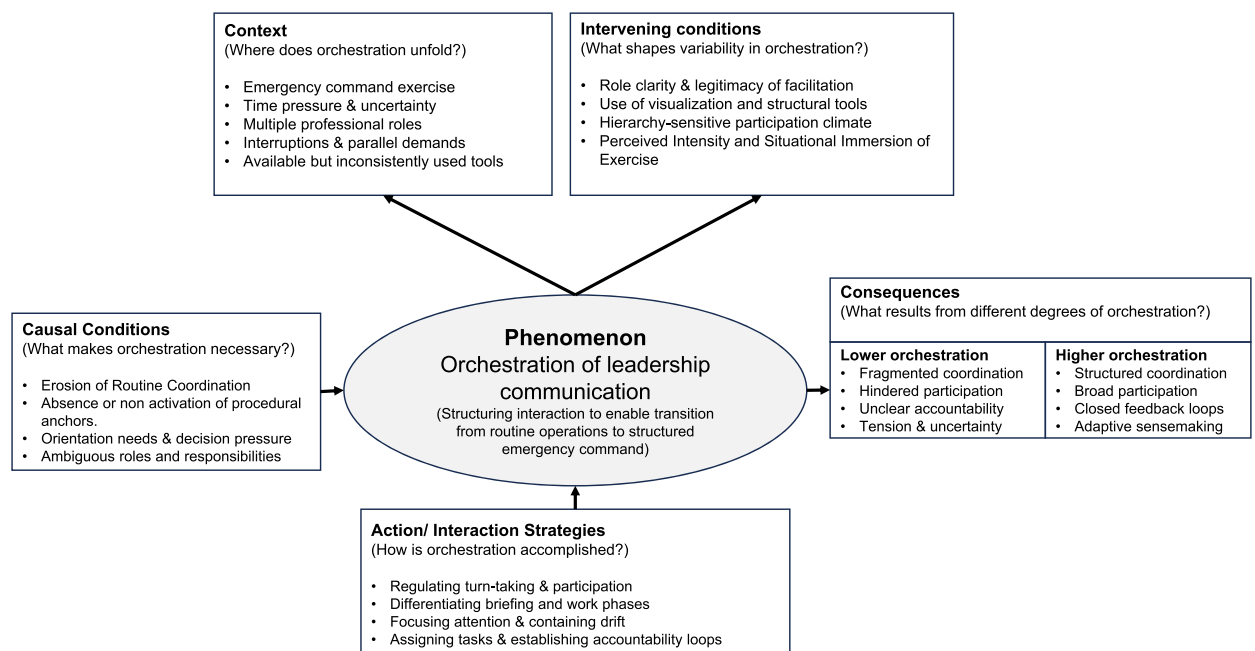


Fig. 1. Axial coding paradigm of the phenomenon of orchestrating leadership communication.

Declaration of Helsinki and the current version of the Professional Code of Conduct for Physicians of the Baden-Württemberg Medical Association. The study was approved by the Ethics Committee of the Medical Faculty of Heidelberg University (S-065/2025) and was registered on [ClinicalTrials.gov](https://www.clinicaltrials.gov) (DV 100 as a Framework for the Hospital Incident Command System (OrAKEL), Registration NCT06913010) before enrolment.

3. Results

This results section presents an empirically grounded analysis of leadership communication during the transition from routine operations to structured emergency command, observed within an exercise-based hospital incident command environment. Across the material, a recurring pattern emerged concerning how participants attempted to organize collective action under conditions of uncertainty, role ambiguity, and disrupted routine coordination. This pattern is captured by the core category of *orchestrating leadership communication*. The concept refers to the interactional work through which available structures, roles, procedures, and communication practices were brought into use and translated into staff work within the exercise-based command environment.

The following axial coding paradigm developed in this study constitutes a central theoretical result (see Fig. 1). By systematically relating context, causal conditions, intervening conditions, action-interaction strategies, and consequences around the core phenomenon, the paradigm provides an explanatory framework for understanding how *orchestrating leadership communication* emerged across the material. Importantly, orchestration was not observed as an all-or-none phenomenon. Rather, it varied in degree and could be understood along a continuum ranging from more fragmented and implicit forms to more explicit and structured forms of organizing collective action.

3.1. Context: where does orchestration unfold?

The situational and organizational context in which leadership communication and coordination unfold within a HIC exercise can be described as a temporary command environment in which participants are required to coordinate under conditions of *time pressure and uncertainty* while simultaneously processing scenario inputs and interacting with internal and external actors. The interview material reflects this situational pressure, with participants emphasizing time constraints as an inherent feature of the exercise: “*Time pressure was definitely a factor, I think - that is simply inherent to the situation, in that you naturally do not have an optimal balance between resources and problem solving.*” (Interview ID3, #176-180).

Participants operate within a setting characterized by *multiple professional roles* (see chapter 3.2.3) that are brought into the command environment from everyday clinical and administrative practice. Coordination takes place alongside ongoing scenario developments and external interactions, including communication with external actors via phone, email, or in-room exchanges, as injected by the Institute for Hazard Prevention.

The material indicates the presence of *interruptions and parallel demands* within the exercise context, including non-scenario emails, participants temporarily leaving the room, alarms on personal devices, technical issues, and parallel phone calls during briefings. These everyday work practices are also reflected in the interview material: “*At times, phones were ringing, someone else picked up their mobile phone to answer an email, because it was everyday work. I also left the room to attend a meeting. That is something that would never happen in a real crisis situation.*” (Interview ID16, #141-143).

In addition, during the exercises, documentation and visualization resources - and in particular, prepared templates and checklists for incident management - were made available. The material suggests, however, that the availability of such resources does not necessarily translate into their consistent use. Rather, the *use of tools appears situational and variable*, forming part of the contextual conditions within which orchestration is enacted.

3.2. Causal conditions: what makes orchestration necessary?

Across the material, orchestration becomes salient under a set of recurrent causal conditions that can be located along a continuum from stable routine coordination to situations of increasing disorientation.

Erosion of Routine Coordination. At one end of the continuum, routine coordination loses its organizing capacity. Interaction is no longer structured by implicit rules of turn-taking, sequencing, or task progression. This becomes observable in unregulated speaker changes, overlapping conversations, and contributions that are not taken up or integrated. Participants themselves articulate this experience of disorder in the observational data (e.g., “*We really need to move on now*”), accompanied by frustration markers (“*This is a mess here*”) and reduced engagement, where contributions are voiced quietly or require explicit prompting to be heard (e.g., “*Please speak louder so this can be documented*”). Interview accounts reinforce this impression by pointing to unclear responsibilities and coordination deficits: “*It was not clearly agreed who would communicate externally and who was responsible for which tasks and when. It was all a bit chaotic.*” (Interview ID16, #88-89).

Absence or Non-activation of Procedural Anchors. The observational material shows that although tools, templates, and procedural conventions are formally available, they are not consistently used as shared points of orientation. As a result, basic procedural questions remain open - such as how decisions are documented or how interaction with external actors should be organized - leading to ad hoc process negotiation and explicit expressions of uncertainty (e.g., “*I have never done this before - what am I supposed to do?*”). Along the continuum, the lack of procedural anchoring increases the need for situational structuring through orchestration. The material suggests that procedural anchors may remain available in principle without becoming enacted in practice. As one participant recalled: “*We should have taken 3 min to regroup. We did not do that. It somehow just continued ... now she is taking notes, thank God, so I*

don't have to." (Interview ID16, #243–247).

Orientation Demands in Pressured Decision-Making. Further, high orientation needs coincide with perceived decision pressure. This dynamic is reflected in the interview material, where decision-making is described as following incoming information in a sequential but unsystematic manner rather than being based on a consolidated situational overview: *"So we did not first systematically define which information we actually needed, and which information we would get from whom in order to have a solid situation report from which to derive a decision. Instead, we essentially received information, processed it, and then moved on to the next step."* (Interview ID11, #96–99).

In the observational data, this condition is further reflected linguistically through frequent modal constructions such as *"we must"*, *"we should"*. At the same time, multiple orientation-seeking questions accumulate (e.g., *"Can we rely on this?"*, *"Who is talking to the police?"*, *"Which systems are protected?"*) without being systematically resolved. From a descriptive standpoint, orchestration can be read as emerging in these situations as an attempt to stabilize sense-making and enable action under conditions of uncertainty.

Ambiguous Roles and Responsibilities. Participants describe uncertainty and a tendency to withdraw into their professional domains when expectations remain unclear: *"At times, I felt uncertain. I then tended to withdraw into my professional expertise ... I would have wished for that to be a bit clearer."* (Interview ID10, #147–149) Interview accounts further illustrate how underspecified roles lead to improvised role enactment rather than coordinated task fulfillment. In one instance, a formally assigned role remained unclear, resulting in self-directed interpretation instead of structured implementation: *"We then assigned a secretary [...] to prepare a situation report ... She then interpreted her role herself and kept a logbook."* (Interview ID16, #75–78).

Where role clarity is low, responsibilities overlap or remain implicit. Participants explicitly question decision authority (e.g., *"Who decides what and when?"*), while moderation and leadership are not clearly separated. The observational material shows task delegation without clearly articulated accountability or follow-up, indicating reduced capacity to sustain coordinated action. In such situations, orchestration remains weak or contested, as it lacks a clear role-based mandate to organize collective responsibility.

3.3. Intervening conditions: what shapes variability in orchestration?

The material suggests several conditions that appear to shape how orchestration unfolds in practice. These conditions can be read as intervening in the relationship between coordination challenges and orchestrating activities. Rather than determining orchestration, they seem to influence whether orchestration becomes more explicit and recognizable or remains implicit and fragile.

Role Clarity and Legitimacy of Facilitation. The interview material indicates that orchestration becomes more explicit when facilitation roles are clearly differentiated and enacted in interaction. Participants describe the presence of a moderator who structures communication by sequentially addressing functions and questions according to urgency: *"There was a moderator, and the different functions were then addressed in relation to specific questions, which were worked through sequentially depending on the urgency or criticality of the issue. That is how I perceived it – very structured."* (Interview, ID6, #111–114).

This structuring role is further described as involving responsibility for the overall communicative process: *"There was a moderator who took responsibility for ensuring that communication within the exercise was structured."* (Interview, ID6, #131) Drawing on the observational data, this includes explicit process guidance, such as opening briefings, interrupting side conversations, and summarizing interim results (e.g., *"We begin with the next briefing: please stop all side conversations"*, *"May I summarize again ..."*). This structuring role was perceived as particularly valuable when facilitation and leadership responsibilities were deliberately separated. One participant emphasized that *"we progressed quite well through this division of roles"* because the crisis team lead *"could focus on decision-making issues and was not in this moderator role"* (Interview ID9, #77–82). Similarly, another participant described the collaboration between moderator and team lead as *"outstanding"* and a source of security within the team (Interview ID2, #300–303).

However, the material also contains situations in which responsibility for communication and process guidance remained less clearly established. One participant reflected: *"There were communication problems. It was clear who was supposed to keep the record, but there were still uncertainties about what should actually be documented... And at the beginning of the incident, who actually took responsibility for communication?"* (Interview ID7, #131–136). In such situations, communicative responsibilities and facilitative functions remained only partially clarified. Consistent with this observation, the importance of clearly differentiated roles was reflected: *"I think the clear distribution of roles, especially if it really comes to a crisis, as has been suggested, the distinction between moderation and so on. I think I would definitely do that and also have a clear definition."* (Interview ID4, #244–245).

Use of Visualization and Structural Tools as Coordination Infrastructure. Along the continuum, orchestration becomes more explicit when visualization is framed as a shared reference for making decisions, measures, and responsibilities visible. In these situations, tools such as flipcharts or slides are used to externalize the situation and support collective orientation. This is reflected in the interview material, where participants describe how written visualization and process-guiding presentations structured the coordination process: *"There was, of course, also a lot of written work, which was visualized through my activity on the flipcharts. There was a presentation that guided the process, which was very helpful in working through the issues in a structured way using the PowerPoint presentation."* (Interview ID3, #157–159).

In less explicit forms, documentation may be extensive but is described as *"not pragmatic."* Open tasks and assignments are then not readily visible, and visualization remains detached from decision-making. Participants note that information is repeated verbally without being documented, and that additional visualization options are not considered. Under these conditions, orchestration remains limited in its capacity to structure collective action.

Hierarchy-Sensitive Participation Climate. Participation is contingent on how legitimate and safe speaking up is perceived. When contributions require strong self-assertion, participation becomes selective rather than collective: *"If you want to communicate something, you have to assert yourself quite strongly. If you don't, you can quickly fade into the background."* (Interview ID1, #300–305) This

dynamic is reflected in moments of hesitation or withdrawal, where participants describe missed opportunities to speak up due to situational unfamiliarity and hierarchical positioning: *“There was a half-second window where I could have raised that question, which I didn’t do ... because I’m simply not used to regularly sitting in such rounds yet.”* (Interview ID14, #135–137) Under these conditions, orchestration appears constrained by uneven participation.

At the same time, the material shows moments in which participation is oriented toward shared task completion and collective orientation: *“Here it’s about the matter itself and making sure everyone is brought along and knowing where things stand.”* (Interview ID1, #316–317) From an analytic perspective, hierarchy-sensitive participation climate shapes who speaks, when, and with what perceived legitimacy, thereby modulating the visibility and sustainability of orchestration.

Perceived Intensity and Situational Immersion of Exercise. Participants are confronted with cognitive demands, when information must be processed, documented, and translated into timely decisions under conditions of uncertainty. This is described as requiring sustained concentration and coordination effort: *“There is definitely a high need for concentration in order to adequately process all the information and then document it in a timely manner ... And then clearly and quickly summarizing decisions—that is, of course, quite a challenge.”* (Interview ID3, #132–134).

At the same time, the data show heterogeneity in how demanding the exercise is perceived. Some participants describe the situation as comparatively abstract and emotionally distant, noting a lack of urgency or arousal: *“I found it somewhat abstract and ... you could clearly tell that there was no adrenaline in the room.”* (Interview ID16, #46) Others articulate a desire for more emotionally intense and dilemma-laden scenarios, suggesting that stronger emotional activation could influence decision dynamics and learning processes: *“For training purposes, I would wish for a situation that stresses people much more, that leads them more into dilemmas and brings more emotions into play.”* (Interview ID13, #188–190).

These statements do not point to opposing conditions but to different perceptions of situational immersion within the same exercise context. This heterogeneity appears to shape the degree of engagement and urgency with which participants approach coordination and decision-making. It is further reflected in the expectation that orchestration would unfold differently in a real incident: *“If it were a serious situation, if it were a real incident, I would clearly expect something different.”* (Interview ID16, #156).

3.4. Action/interaction strategies: how is orchestration accomplished?

Orchestration is accomplished through a repertoire of recurring communicative practices. These practices range from less explicit, situationally fragile coordination to more explicit and stabilized forms of collective organization.

Regulating Turn-Taking and Participation. A central orchestration strategy concerns the regulation of turn-taking and participation. The material shows moments in which interaction is dominated by a small number of actors who repeatedly initiate topics, give instructions, and summarize, while others contribute mainly through brief interjections that may remain unanswered. In these situations, participation is uneven and contingent on individual assertiveness, requiring participants to actively “make themselves heard.”

In other moments, participation is more explicitly structured. Contributions are elicited in a round-based manner, and facilitative interventions include explicit invitations to speak or instructions that support shared understanding and documentation. From an analytic perspective, these practices can be read as stabilizing participation by redistributing speaking opportunities and rendering interaction more manageable within the group.

Differentiating Briefing and Work Phases. Another orchestration strategy concerns the differentiation between briefing and work phases. The material shows instances in which discussion and task execution are not clearly separated, resulting in extended discussion phases and limited protected time for focused work.

In other instances, phases are explicitly differentiated. Briefings are clearly opened and closed, work phases are designated as such, and the timing of subsequent briefings is communicated. Analytically, this differentiation structures collective activity over time by creating temporary spaces for focused task execution within the broader coordination process.

In addition, the observational material contained episodes in which the coordination process itself became an explicit topic of discussion. In one instance, uncertainty about whether all participants should remain involved in the same event or divide responsibilities prompted a moderator-led discussion about the allocation of time, attention, and tasks. By temporarily shifting attention from the substantive issue to the organization of collective work, participants established a shared approach for subsequent action. Such moments suggest that orchestration may involve facilitating reflection not only on operational decisions, but also on how collaborative work is structured and coordinated.

Focusing Attention and Containing Drift. The data describe segments in which multiple topics and interjections proliferate across domains, leading to fragmented discussion that participants themselves describe as disorder. In these moments, concerns are raised in parallel without being integrated into a coherent, actionable sequence, and interaction risks stalling: *“At times, I felt that we went through a phase where we were simply going around in circles. It felt as though the exercise could very easily have stalled completely. From the outside, as an observer or as someone in a leadership role, that would have been the point to make a cut - basically to say, let’s pause here, look at where we are, and then look ahead to what would make sense now.”* (Interview ID11, #181–183).

Efforts to contain drift include refocusing, interrupting side conversations, and setting clear boundaries about issue levels - practices that restore shared focus and prevent fragmented attention. Where these strategies are enacted, participants describe the coordination process as more structured, calm, and efficient: *“In our case, I perceived the overall situation as very structured. The process was calm and well organized, and the issues were worked through relatively quickly.”* (Interview, ID8, #179–181).

Assigning Tasks and Establishing Accountability Loops. In some situations, tasks are delegated without systematic follow-up, and participants describe the absence of a closed *assignment-completion-control* cycle. This pattern is often linked to an immediate coupling of incoming information and decision-making, without a clear separation between information gathering and decision derivation:

"Instead, we basically received a piece of information and then made a decision immediately. So we did not really have a clear system or a clear separation between collecting information and deriving decisions." (Interview ID11, #174–178) Under these conditions, delegated tasks were not consistently revisited, implementation status remained unclear, and responsibilities became difficult to track over time. Task assignment alone therefore did not appear sufficient to ensure collective follow-up and accountability. In other situations, task allocation is more structured. Responsibilities are explicitly discussed, assignments are documented, and tasks are revisited in subsequent interactions. Implementation is actively checked, and task uptake is confirmed through acknowledgements such as *"Understood."* Interview accounts indicate that checklists and overviews support this process and contribute to clearer organization and follow-up: *"That means you were also able to derive your tasks very well based on this checklist, on this overview. The tasks were, of course, also discussed and assigned again in part. And within our group, there was, in my view, quite good organization with the Head of the Command Staff and the Moderator."* (Interview ID1, #100–104).

3.5. Consequences: what results from different degrees of orchestration?

The material included situations in which available structures and coordination tools appeared insufficient to support coordinated collective action, particularly when moderation remained unclear, accountability loops remained open, or participants reverted to routine professional roles. Rather than being tied to specific situations or sessions, these tendencies recurred across observational and interview data. Fig. 2 provides an analytic summary of these contrasting situations in which orchestration appeared more fragmented or implicit with situations in which orchestration became more explicit and structured. Rather than representing a binary distinction, the figure visualizes a continuum and illustrates how different degrees of orchestration were associated with different ways of organizing collective action within the exercise-based command environment.

4. Discussion

This study examined how leadership communication unfolds during the transition from routine operations to emergency command and identified recurring patterns in how coordination is established, maintained, or undermined. The preceding results demonstrated that, the applicability of a staff work-oriented incident command approach varies along the orchestration continuum identified in this study. The findings indicate that staff-work-oriented command structures are enacted differently depending on whether leadership communication is explicitly orchestrated or remains implicit. Where orchestration becomes interactionally established, coordination stabilizes toward the structured end of the continuum, characterized by the creation of process boundaries, clearer role and responsibility articulation, differentiation between briefing and work phases. In contrast, where orchestration remains weak or contested, participants tend to fall back on routine roles and everyday work practices, resulting in blurred responsibilities, fragmented coordination, and inconsistent use of available procedural tools.

To synthesize these analytically derived patterns and to relate them to the broader literature on incident command, the following analytical propositions condense recurring mechanisms shaping the applicability of staff-based incident command in hospital settings (see Table 2).

The core proposition (Applicability through Orchestrated Leadership Communication) aligns with Incident Command System (ICS) and Hospital Incident Command System (HICS) guides that identify leadership and communication as necessary conditions for effective command and coordination [9], [11], [14]. The present findings do not suggest that moderation, accountability, visualization, role clarification, or boundary management are novel mechanisms in themselves. Rather, they show how the practical effectiveness of these established elements varied depending on how they were interactionally connected and maintained during

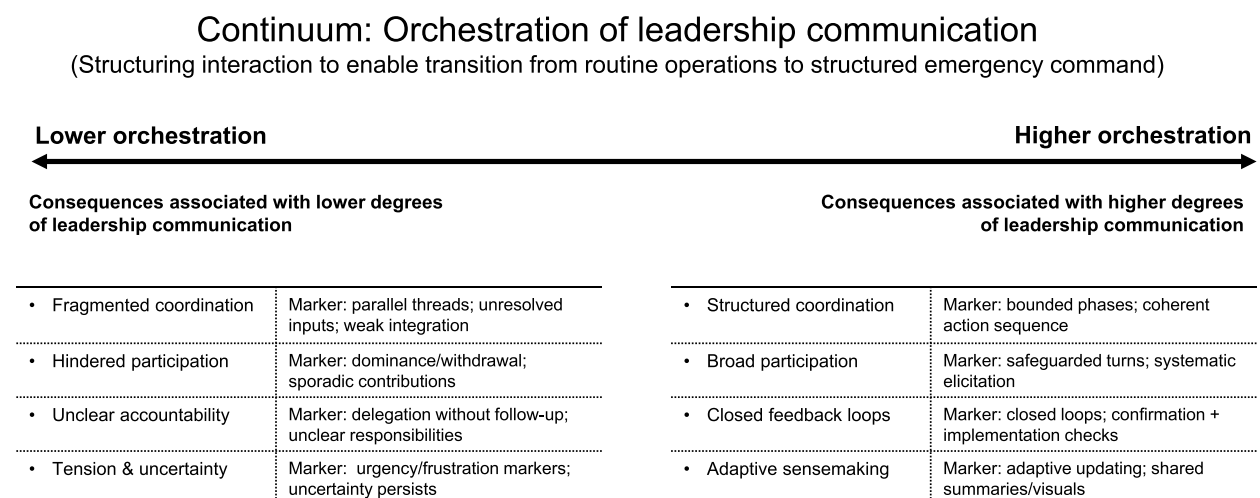


Fig. 2. Consequences associated with different degrees of orchestration.

incident command activation. In this sense, *orchestrating leadership communication* is best understood as an empirically grounded integrative framework.

This distinction can become particularly salient in hospital settings. In emergency services, military organizations, and professional incident management teams, command practices are embedded in continuous training regimes, formal qualification systems, and repeated real-world activation, allowing coordination routines to stabilize over time [34], [35]. In contrast, hospital incident command systems are activated infrequently and are typically staffed by ad hoc constellations of professionals whose primary roles lie outside formal command work [36]. Evaluations of HICS effectiveness repeatedly identify limited routine exposure and insufficient training as key challenges to sustained command performance in hospitals [37], [38]. Under these conditions, leadership orchestration in the context of hospitals should not be treated as a taken-for-granted competence. Rather, the findings suggest that the organization of roles, interactional participation, and accountability often required active communicative structuring. Building on this core proposition, the following analytically derived propositions specify mechanisms and conditions that could stabilize or undermine the applicability of staff-based command in hospital contexts.

P 1: Moderation as an Interactional Enabler

The analysis identifies moderation as a key interactional resource through which orchestrated leadership communication can be sustained even under conditions of limited routine experience and heightened uncertainty: When leadership communication remains implicit or contested, coordination does not simply weaken but tends to destabilize, creating uncertainty about roles, participation, and authority. In the absence of explicit orchestration, actors frequently reverted to routine hierarchies and professional domain logics, probably as a pragmatic fallback strategy. Rather than indicating resistance to staff based command, such reversions may be understood as attempts to re-establish coordination when roles and interactional structures remain unclear. In this sense, the present observations resonate with findings, which emphasize the need for qualified leadership and functional management approaches to enable reliable communication, collaboration, and coordination within incident command systems [39].

Where facilitation roles were clearly articulated and interactionally enacted, a moderator can support explicit orchestration by structuring turn-taking, containing interactional drift, and enabling the articulation of uncertainty without reinforcing professional power gradients.

In line with Autrey and Moss (2006), such practices can be interpreted as complementing formal incident command structures by contributing to situation awareness and communicative coordination in dynamic emergency settings [40].

P2: Accountability Closure as an Indicator of Operative Command

Closed accountability loops emerged as a clear indicator of whether staff-based command was operative. Where task assignment, confirmation, monitoring, and feedback were explicitly connected, coordination tended to stabilize. Where accountability remained open, command work stayed largely nominal and drifted toward ad hoc improvisation despite the presence of formal command roles. While accountability is a core principle in ICS and HICS doctrine [9], [35], empirical analyses of how accountability loops are interactionally enacted and sustained - particularly in hospital staff systems - remain scarce. The present study specifies accountability closure as an observable interactional marker of more explicit orchestration.

P3: Scaffolding as an Interactional Support under Uncertainty

Material and procedural scaffolding, such as visualization boards, checklists, templates, and briefing scripts, appeared to support the enactment of staff-based incident command, as recommended in the WHO, the US and the German guidelines [8], [9], [14]. Importantly, the present findings suggest that scaffolding did not operate automatically. Where such materials were introduced at

Table 2

Core proposition and analytically derived propositions on the applicability of staff-based incident command.

Core proposition: Applicability through Orchestrated Leadership Communication		Staff work-oriented incident command appeared more readily enactable when leadership communication was explicitly orchestrated through facilitation, phase separation, visualization, and closed accountability loops.
P 1: Moderation as an Interactional Enabler		Moderation can operate as an interactional enabler of staff-based coordination by supporting explicit orchestration of leadership communication. Where moderation is absent or weak, coordination more readily reverts to routine hierarchies despite formal command structures.
Functional Dimensions of Orchestration	P2: Accountability Closure as an Indicator of Operative Command	Operational applicability hinges on establishing a closed accountability cycle (assignment, confirmation, monitoring, feedback); without it, command work remains nominal and can drift into ad hoc improvisation.
	P3: Scaffolding as an Interactional Support under Uncertainty	In largely inexperienced workforces, staff work applicability depends on material and procedural scaffolding (e.g., shared visualization boards, checklists/templates, briefing scripts) that externalizes staff logic and reduces cognitive load under uncertainty.
	P4: Boundary management	Staff work oriented incident command structures are less likely to “take hold” when routine interruptions (emails, leaving the room, parallel calls) permeate the command space; explicit boundary-setting is therefore a prerequisite for sustained staff-based coordination.

analytically relevant moments and embedded into ongoing coordination and decision-making processes, they appeared to function as shared orientation and reference points. In line with the broader proposition of moderation as an interactional enabler, it appears plausible that, under conditions of time pressure, heightened uncertainty, and limited collective training, a moderating function could support collective orientation toward relevant scaffolding resources and their integration into ongoing coordination.

P4: Boundary management

Boundary management emerged as a further condition shaping the sustainability of staff-based command. Staff-based coordination was particularly vulnerable when routine interruptions, parallel communication channels, and everyday operational practices permeated the command space. Although activation procedures and transition concepts are addressed in emergency planning guidelines, the findings suggest that boundary setting is not a one-time effect of formal activation but an ongoing interactional practice required to sustain orchestration over time [14], [41].

Taken together, these propositions suggest that the applicability of staff-based incident command in hospitals varies along an empirically identified orchestration continuum rather than hinging on formal structural compliance or general leadership competence alone. Staff-based command emerges as a fragile accomplishment that may be supported by explicit leadership orchestration, interactional enabling practices, accountability closure, material scaffolding, and sustained boundary work. This perspective shifts analytical attention from the formal adoption of command structures to their practical enactment within exercise-based command environments under conditions of uncertainty.

4.1. Limitations

This study is based on a qualitative Grounded Theory analysis of a single hospital setting and examines staff-based emergency command during an exercise rather than real-world incidents. As such, the findings should be understood as contextually grounded insights into how staff-based command may be enacted in an exercise-based command environment. Transferability to other hospital settings, emergency contexts, and real incidents therefore requires careful consideration.

Although theoretical sampling guided analysis, it was limited by the predefined cohort and single-site design. Emerging categories could not be explored across settings or participant groups, and saturation should be interpreted within the study's empirical scope. Consistent with the methodological orientation of Corbin and Strauss, the analysis was informed by sensitizing interests in leadership communication and coordination, and the study involved researchers with different degrees of involvement in the planning and execution of the exercise [27]. These conditions may have influenced data interpretation despite the use of reflexive procedures throughout the research process. To address these limitations, we deliberately combined multiple data sources, including participant observation during the exercise and semi-structured post-exercise interviews, and composed an analysis group that maximized contrast in professional backgrounds, theoretical expertise, and degrees of involvement. This approach was intended to enhance theoretical sensitivity and reduce single-perspective readings of the data. The contribution of this study lies primarily in its close contextual grounding, process sensitivity, and detailed reconstruction of interactional dynamics in a setting where command structures are activated infrequently.

4.2. Outlook and implications for future research

The proposed framework may help explain how leadership communication was organized within the present exercise-based hospital incident command setting and points to several directions for future research. Further research could explore how different configurations of moderation, scaffolding, and accountability interact over time and whether less experienced hospital teams benefit disproportionately from interactional enabling practices. The propositions suggest implications for training design, shifting attention from procedural knowledge alone toward the development of interactional competencies that support orchestration under uncertainty. Future studies may also examine how material artifacts, spatial arrangements, and digital tools contribute to better orchestration of leadership.

In addition, a systematic analysis of existing staff doctrines and guidelines could examine how roles related to moderation or staff leadership are formally defined, and to what extent these definitions address interactional coordination requirements observed in hospital settings. Such work may help inform training designs that complement procedural instruction with interactional competencies supporting leadership orchestration under uncertainty.

Future research could also examine the transferability of the orchestration continuum to other hospital settings and healthcare systems, as well as its relevance in real incidents such as mass casualty events, cyberattacks, or pandemics.

CRedit authorship contribution statement

Maik von der Forst: Writing – review & editing, Writing – original draft, Project administration, Investigation, Conceptualization. **Erik Popp:** Writing – review & editing, Resources, Investigation. **Hanne Schäfer:** Writing – review & editing, Investigation, Data curation. **Kirsten Bikowski:** Writing – review & editing, Investigation. **Klaas Franzen:** Writing – review & editing. **Markus Ries:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation. **Janna Küllenberg:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Funding

Open Access funding was enabled and organized by Projekt DEAL. The funders had no role in study design, data collection, analysis and interpretation of data, or the writing of this manuscript.

Declaration of competing interests

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Maik von der Forst is chair of the Scientific Advisory Board of the German Association for Hospital Emergency Planning (Deutsche Arbeitsgemeinschaft Krankenhaus-Einsatzplanung e.V., DAKEP). All other authors have no conflict of interest to declare.

Acknowledgements

The authors would like to extend their gratitude to all participants who shared their knowledge and perspectives during the interviews.

Appendix

Interview Guide for the OrAKEL Study	
Introduction	– Purpose of the interview – Assurance of confidentiality and data protection – Option to decline answering questions
Demographic Information	– Age, gender – Professional experience and duration in current position – Prior experience in disaster preparedness exercises or real-life emergencies
Understanding Professional Context & Exercise Roles	– What role did you assume during the exercise? – Did this role feel realistic? Why (or why not)?
Phase: Unfreeze	(E) How did you perceive the situation when notified of the hospital's IT emergency?
Checkpoints:	(P) How did you experience bearing responsibility for crisis management in the Hospital Emergency Management Team?
✓ Initial crisis awareness (irritation, diffusion) ✓ Role transition (conscious vs. unconscious) ✓ Self-reflection on adaptability ✓ Relevance of role changes (rituals)	(P) As a leader/team member, how did you perceive the shift from routine operations to emergency mode?
Phase: Change	(E) How was communication structured during the emergency?
Checkpoints:	(P) How did you perceive team communication and collaboration?
✓ Communication under temporary leadership ✓ Reflection on leadership approach ✓ Unexpected challenges in implementation	(P) Who primarily organized or influenced communication?
	(P) Did communication evolve during the scenario?
	(E) How did your tasks and role change during the emergency? Describe in detail.
	(P) How did you experience this shift?
	(P) Which challenges or changes were most impactful?
	(P) Did you consciously deviate from protocol? What motivated this?
	(E) How were leadership responsibilities reassigned?
	(P) Did you adjust your leadership style? If so, how?
	(P) Which roles or individuals were most critical? Why?
	(E) How was crisis communication managed?
	(P) Were there misunderstandings or uncertainties? How were they resolved?
	(P) What could have improved communication?
	(E) How did you experience the transition back to normal operations?
	(P) What was particularly noticeable or challenging?
	(P) How would you describe the post-crisis adjustment in communication and leadership?
	(P) Did crisis management alter your perspective on daily functions?
	(E) How do you personally assess the success of crisis resolution?
	(P) What were the three main problems encountered?
	(P) Which measures/decisions were most effective?
Conclusion	– Should any insights be shared internally or with other hospitals/organizations? – In one sentence: What is your takeaway from this exercise? – If you could make one improvement to crisis response—what would it be?

(E = Exploratory question with the goal of prompting a narrative; P = Probe questions to provide alignment in structure).

Data availability

The data that has been used is confidential.

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