Decision Making in a Strategic Medical Command and Control Team During the Covid-19 Pandemic: A Case Study

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Original Research

Abstract

Objective: To achieve resilience in the response of a major incident, it is essential to coordinate major processes and resources with the aim to manage expected and unexpected changes. The coordination is partly done through timely, adequate, and resilience-oriented decisions. Accordingly, the aim of the present paper is to describe factors that affected decision-making in a medical command and control team during the early COVID-19 pandemic.
Methods: This study used a qualitative method in which 13 individuals from a regional public healthcare system involved in COVID-19 related command and control were interviewed. Data was collected through semi-structured interviews and analyzed using qualitative content analysis.
Results: The factors affecting decision-making in medical command and control during early COVID-19 pandemic were grouped into 5 themes: organization, adaptation, making decisions, and analysis, as well as common operational picture.
Conclusions: The present study indicated that decision-making in medical command and control faces many challenges in the response to pandemics. The results may provide knowledge about disaster resilience and can be utilized in educational and training settings for medical command and control.

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Introduction

During the COVID-19 pandemic, health care systems were strained to an extreme degree for a long time. Dynamic conditions with elevated levels of uncertainties in numbers of patients, unknown disease mechanisms, as well as treatment regimens challenged medical command, and control decision-makers. To manage this situation, the healthcare organizations had to be resilient, defined by Zhong and colleagues as the capability to resist, and absorb, as well as respond to the disaster while still retaining their most essential functionality and recover to either the original state or a new adaptive state.[1,2] One of the most critical factors of a resilient healthcare system is the medical command and control team's ability to adapt to challenges through timely and adequate decisions.[2]

However, there is scarce evidence on how to generate or strengthen resilience and little agreement exists on how to design and build disaster resilience.[3] Previous studies on pandemic crisis management, before COVID-19, primarily focused on historical management approaches for various pandemics, and epidemics, rather than offering insights and implications for improving future pandemic management.[4] Recent studies are generally oriented on lessons learned about managing the COVID-19 pandemic, aiming to describe the quick and effective alignment of medical command structure to cope with the challenges in handling the COVID-19 pandemic.[5–9]

Some studies have focused on strengthening resilience during disaster management through decision-making approaches.[10–13] In 2020, Al-Dabbagh conducted a study aiming to provide insights on decision-making during the COVID-19 pandemic.[10] The study identified several concepts, skills, and strategies related to decision-making in crises such as the COVID-19 pandemic. The study also identified these factors as negatively influencing decision-making: lack of professional competence, lack of decision-making skills, lack of confidence, and lack of information, as well as fear of the consequences of decision-making. Al-Dabbagh also further argued for the need to explore factors affecting crisis decision-making as well as the importance of training decision-makers in proactive thinking to save time and reduce the consequences of a crisis.[10] Reale et al. conducted a literature review on decision making strategies during critical events, and also suggests that better understanding of the factors affecting decision-making in critical events is essential to develop evidence-based practitioner training.[14] One approach to

address this research gap is to use the Critical Decision Method (CDM), a systematic interview method, as was done by Bitan, Lilach-Gueta, and Parush (2022) to study decision-making processes of individual clinicians during the COVID-19 pandemic.[15]

The aim of this paper is to explore and describe factors that affected decision-making in medical command and control teams during the early COVID-19 pandemic. The prolonged nature of the COVID-19 pandemic provided an opportunity to study resilience and decision-making in medical command and control teams in a systematic way. Similarly to Bitan and colleagues,[15] this study used CDM to explore the decision-making processes, but at a strategic level for medical command and control functions rather than at the level of individual clinicians.

Method

Setting

This study took place during the early phase of the COVID-19 pandemic in 1 of Sweden's 21 regional public healthcare systems. The particular region that is analyzed in this study was selected because the authors had access to the decision-making staff from the very first day of the pandemic. As the COVID-19 pandemic developed rapidly world-wide, the immediate access to the highest level of medical incident command offered in the region provided a unique opportunity for this research.

In Sweden, the first case of COVID-19 was detected on January 31, 2020, followed by a second case on February 26. In mid-March, the disease started to spread rapidly, causing more people to be hospitalized. To emphasize the increasing number of patients in need of hospitalization during this period, on March 9, 1 patient was hospitalized in the studied region due to COVID-19, but by April 6, this number had increased to 140. The regional public healthcare system of interest in this study was 1 of the most affected in Sweden and had the fourth highest death toll nationally by the end of April.

On the March 11, *Major Incident* was declared due to the first cases being detected in the regional public healthcare system's catchment area. By declaring "Major Incident," the regional medical command and control team was activated and continued to be so until the end of August. The regional command and control team during this period consisted of approximately 17 individuals, who rotated in decision-making roles, as well as 20 individuals in supporting roles preparing, and implementing decisions. The team consisted of individuals with a range of competences, such as pharmaceuticals, logistics, and economics. All 17 decision-makers had a medical background.

Participants and Data Collection

All 17 decision-makers in the regional command and control team were invited via email or personal contact to participate in the study. Of these, 13 accepted to participate and semi-structured interviews were conducted with them. The interviews aimed to capture the informants' experiences and descriptions of decision-making in this medical command and control team. The research was conducted in accordance with the ethical principles of the Declaration of Helsinki, and all participants provided written informed consent prior to the interviews. Formal ethical approval was not necessary based on Swedish law and research practice.

The interviews followed the structure of Critical Decision Method,[16] and started by asking the informants to describe a highly challenging episode during the COVID-19 pandemic. The decisions made during this episode and the factors affecting those decisions were then explored. Each interview lasted approximately 30 to 60 minutes. The interviews were recorded and transcribed and were also complemented by hand-written notes. The informants were selected using purposive sampling and each interview was conducted in Swedish by 2 of the authors during the spring and summer of 2020.

Data Analysis

The transcribed material was analyzed using a thematic content analysis approach.[17] The analysis was conducted using the MAXQDA analysis software (VERBI Software, Berlin, German; 2019) by the 2 authors who conducted the interviews (JP, MF) and a third author (AB). The analysis was conducted in an iterative process in collaboration between the 3 authors.

Findings

The informants described 13 episodes, of which 12 were unique and 1 episode was described by 2 informants. Throughout the interviews the participants frequently mentioned challenges and strategies in decision-making during the COVID-19 pandemic. These challenges and strategies were grouped into 5 themes based on the content analysis. See Table 1.

Organization

The participants frequently mentioned how organizational and structural aspects of the regional public healthcare system and the regional medical command and control team affected the decision-making processes. One aspect that was particularly emphasized was the fact that decisions in the command-and-control team were initially made using a consensus process, in conflict with established doctrine. This contributed to delayed decisions.

"Here, the work was based on consensus if that is what you call it. So we wanted to, or I wanted to create a more outspoken disaster organization able

Table 1. Themes from the content analysis

Theme	Description
Organization	This theme captures organizational challenges that affected the decision–making process in the medical command and control teams.
Adaptation	This theme describes various strategies used by decision–makers' to overcome some of the obstructive organizational factors.
Making decisions	This theme offers descriptions of strategies and approaches used by the participants to make decisions in the complex environment caused by the COVID–19 pandemic.
Analysis	This theme captures the participants' descriptions of analyses, and the lack of them, in relation to the decision–making processes.
Common operational picture	This theme describes how challenges due to a lack of available information affected the decision–making throughout the pandemic, and the strategies used to create situational awareness for decisions.

to command in a more authoritative manner, and you know as I said, a clear structure from the top to the bottom." (Participant 10)

According to the established doctrine in the studied organization, the main reason to declare *Major Incident* and establish regional medical command-and-control teams, is to provide an authoritative organization with centralized mandates to avoid delays in decisions. An explanation put forth by the participants for the use of a consensus-based decision-making process was that parts of the regional public healthcare system lacked sufficient knowledge of the decision-making mandates during Major Incidents.

"And even though we might think that we have educated a substantial part of the region, you know in our preparation work with Major Incidents and so on, it turned out that it was not enough because there are many who still do not have knowledge of how decisions are made and the mandates." (Participant 12)

The lack of knowledge about the command structure and mandates during Major Incidents affected the organization's trust in the decision-making process. One consequence was the need of extensive motivation for every decision, a strategy that forced a way of working based on consensus.

"It became a challenge on how to communicate since we had a crisis of confidence within the organization. The organization didn't trust the regional command and control team on having control of the situation and, in this specific case, the quality of the personal protection equipment." (Participant 1)

Related to the lack of knowledge of the command structure and mandates across the regional public healthcare system, the participants also emphasized that entire divisions of the organization had been insufficiently included during the preparation for Major Incidents. For example, the primary care division of the regional public healthcare system did not have a contingency plan and they weren't included in the regional disaster educational interventions. This caused challenges when making and implementing decisions.

"One of the reasons why we ended up there was because the primary care did not have their own contingency plan, and certainly not a pandemic preparedness plan. Their own contingency plan was never created and that resulted in difficulties related to mobilizing what they were supposed to do when decisions were made, for example the decision that some care should be postponed and so on, terms that were used in the beginning but also today. Hence, they had difficulties in understanding what was meant. It therefore required a lot of effort from the incident commander and the medical incident commander to get the primary care aligned." (Participant 4)

Adaptation

The theme *Adaptation* captures the participants' descriptions of adaptations that were made throughout the COVID-19 pandemic to overcome challenges affecting the decision-making process. One of these changes can be related to the previous theme of *Organization*, where a decision was made to transform the organization to a more outspoken command structure in accordance with the contingency plan. The aim of this adaptation was to avoid delays by making decisions without relying on a consensus process.

"It is possible to say that the organization became stricter, more like a military organization, and that is what we wanted. That is, a mandate to command in a more authoritative manner and order people to keep working with a task until they have found a solution." (Participant 10)

As time progressed, adaptations were made to involve more divisions of the organization in the regional medical command-and-control team. The purpose was to ease the decision-making process, and particularly make it easier for the rest of the regional public

healthcare system to effectuate decisions made by the regional medical command-and-control team. For example, a decision was made to specifically include representatives from the primary care, thereby avoiding some of the difficulties of making and implementing decisions affecting the primary care.

"Then the positive thing that happened was that the primary care started to be associated with the medical command-and-control team in a more distinct manner. At the beginning they were in the periphery, and we supported them, but then they became a part of the medical command and control team in a more distinct manner." (Participant 4)

In addition to involving new divisions of the organization into the regional medical command-and-control team, adaptations were also made to the organizational scheme within the team by placing units at different organizational levels or assigning them new tasks. For example, 1 unit was given the specific task to analyze information and identify suggestions for decisions, and directly report these suggestions to the medical incident commander.

"A special workgroup was created with the purpose of producing decision support for the medical incident commander in the command-and-control team. The decisions made regarding the limited access to, for example, Isopropanol required a deep analysis, and the decisions regarding this had to be updated several times during several weeks." (Participant 1)

Making Decisions

The participants frequently expressed that decisions sometimes simply had to be made, which is captured in the theme *Making decisions*. One prominent example was that most of the decisions during the beginning of the pandemic had to be made based on sparse information, a fact which most participants praised as necessary to keep the work moving forward.

"During these kinds of situations, decisions must be made based on the information. On the facts that are available now and the best assessment that can be made based on the situation. (Participant 10)

Similarly, the participants also emphasized that to continue progressing, it was important to make any decision rather than no decision. However, they also mentioned that this approach was not preferred amongst all individuals within the regional medical command-and-control team, depending on their background and professional roles.

"Well, it is about individual differences and in some ways, also about the professional role; but where I work it is better to make a decision, and it can even be the wrong decision as long as a decision is made." (Participant 10)

Furthermore, although the participants emphasized that decisions were made based on sparse information, the decisions sometimes also had to be revoked based on updated information. According to the participants, updated information on the economic consequences motivated decisions being revoked. However, it was also mentioned that the economic perspective should not have been given such weight when evaluating the decisions.

"In particular, economic reasons motivated the fact that some decisions had to be revoked, and perhaps, due to the situation we found ourselves in, we should not have been thinking that way." (Participant 6)

Analysis

Although the previous theme emphasized the importance of making quick decisions based on available information, the participants also frequently mentioned the importance of thoroughly analyzing available information before decisions were made. However, during

the beginning of the pandemic, analyses were not prioritized. This caused a lack of understanding regarding the potential effects of decisions.

"Perhaps we should have had a period of analysis, calmly going through (well perhaps not calmly) and prioritizing the analysis, how it could affect us." *(Participant 6)*

The participants also emphasized that although more time should have been spent on the analysis, the capacity to make decisions and organize without thorough analysis could also be interpreted as a strength.

"During the beginning, around March 9 and 10, there was no time for discussion and analysis, contemplating how we should have built that or how we should have done it; and that, at the same time, I think is a success factor that we had individuals with the needed experiences because that made it possible to start working without a thorough initial analysis." *(Participant 12)*

While most participants mentioned a lack of analyses, several also described analyses that were made and how they were made. During the beginning of the pandemic, these analyses were often based on information from Italy, where the chain of events in Italy had to be analyzed based on Swedish conditions.

"It was based on information from Italy that was available the days before Major Incident was declared here and before we got our first case in Östergötland. So we saw a need of being able to separate the different patient flows between ordinary operations and those with suspected COVID-19, and to do that there was a need of adapting the infrastructure because the hospital did not have any." *(Participant 2)*

Common Operational Picture

A factor which, according to the participants, severely affected the decision-making process was the challenge to create common operational pictures, i.e., the information shared and available within the regional public healthcare system and the regional medical command-and-control team. An early example of how the common operational pictures affected decision-making can be found during the beginning of the pandemic, where the initial decision to declare *Major Incident* was made in part to simplify the creation of common operational pictures across the regional public healthcare system.

"It was a problem to have an overview of the tasks, because there were so many tasks. For example, at the Tele-nursing Center, at the primary care regarding testing, and communication via the media, the Unit for Communicable Disease and Infection Control did have a lot of tasks to handle in this event and altogether, we may not have the same desired objective or a common understanding of the situation. That led to the declaration of Major Incident. Due to the lack of a common operational picture and an understanding of the situation, the decision to declare a Major Incident was made." *(Participant 12)*

Although it is possible that declaring *Major Incident* improved the common operational pictures, multiple participants mentioned that the problems caused due to lack of information continued throughout the pandemic. In particular, this problem was mentioned in relation to the situation with personal protective equipment and other materials, where it was largely unknown what was in stock. This challenged the decision-making processes related to purchasing.

"What can I say? For statistics, look at the amount of stuff we have in stock; Questions include "what stuff do we have in stock? And if we do not have the stuff, what other material can be bought to compensate for it in order to maintain the ability to care for these many patients and to ensure patient safety, and we have not been able to manage this, and we still do not have the solution." *(Participant 6)*

Due to the lack of a common operational picture throughout the entire regional public healthcare system, it was difficult to make proactive decisions. One concrete example of this was when medical tubes ran out of stock. The staff who were in charge of making purchasing decisions for the medical materials, were made aware of this on the same day that the tubes ran out of stock, rather than receiving the information earlier, and being able to make a proactive decision.

"When we came here in the morning, the phone rang, and someone shouted, "we are out of tubes," "We cannot treat our patients." What tubes? What kind of tube is it? What happened now? Why did we not know this yesterday or the day before that or 3 days ago?" *(Participant 7)*

Discussion

The current study identified 5 themes of challenges and strategies in decision-making during the COVID-19 pandemic: *organization, adaptation, making decision, and analysis*, as well as *common operational picture*. The challenges associated with *organization* describe the lack of knowledge within the organization about medical command, control doctrine, and contingency plans. The effects of these challenges were the resultant difficulties in making proactive decisions, and a delay in implementation of critical decisions. To overcome the challenges associated with organization, *adaptations* were made. Many adaptations that were made with regards to the organizational structure, were in fact to revert to the structure described in the contingency plan, e.g., using an authoritative command structure to increase decision-making capabilities. Other adaptions were novel, such as embracing a holistic view of the organization by identifying and including new divisions within the healthcare organization into the command structure. Adaptation, as a general concept, is typically part of the very definition of resilience. Zhong and colleagues highlight that adapting to challenges through timely and adequate decisions is a critical factor in resilient healthcare organizations.[2] The theme, *Adaptation*, in the current work has a different nuance in that it refers to adaptations specifically related to the decision-making process itself. The numerous examples of adaptations thus demonstrate how resilient capacity is created by increasing the medical command and control team's ability to make timely, and adequate future decisions, thus allowing them to stay agile and responsive in a dynamic environment.

The theme, *"making decisions"* emphasizes the importance of decision making despite a lack of decision-support, and the need to continuously evaluate the effects and adjust the decisions if necessary. In contrast, *Analysis* highlights the importance of performing analyses to create decision support. Briefly, this might appear as 2 conflicting approaches but are complementary and necessary to manage both short- and long-term processes with different temporal requirements. The theme, *Common operational picture*, captures an essential part of the pandemic management. The informants described the need to structure the available information in a common operational picture, and how this contributed to the ability to make appropriate decisions or seek additional analysis.

The findings in the current study support the findings of Al-Dabbagh (2020) that relate to challenges and strategies in collecting information, performing analysis, and evaluating decisions.[10] Specifically, the current study shows that decision makers in medical command and control teams find that organizational challenges are inevitable and require strategies as a continuous adaptation of work methods.[10] This additional finding is also

supported by Bitan et al. (2022), who used the CDM method to examine individual clinicians involved in clinical and organizational decisions during the early days of COVID-19. Their study highlights the importance of organizational preparedness as well as the significance of constantly introducing new methods. It thus appears that challenges and strategies present similarly for individual clinicians and decision makers in the medical command and control positions, managing the COVID-19 pandemic.[15] Furthermore, the findings concerning organization is reflected in recent studies that emphasize the importance of trust and confidence in the command and command structure on a systemic, organizational, and individual level.[18–20]

There are also similarities between the current findings and those from studies on other types of disaster events. Son et al. (2020) described 6 resilient behaviors that incident command teams exhibited to overcome challenges in handling Hurricane Harvey.[21] There are similarities between these behaviors and strategies identified in the current study, specifically the importance of establishing *common operational picture* and its relation to proactive, reprioritizing decisions. The informants in Son et al. (2020) claimed that the common operational picture was essential as an integrated snapshot of evolving situations serving as basis for proactive decision making. In addition, similarity can be found in the findings related to adopting and adapting plans, where Son et al. points out the challenge and strategy between complying with and departing from preplanned plans.[21]

A limitation of the current study is that it only covers 1 organization during the early phase of the COVID-19 pandemic. Those who were interviewed were all decision makers at a strategic level in a health care command and control structure. This is reflected in the episodes they described and the resulting themes which focus on aspects of strategic level decision making such as organizational characteristics. The findings in the current study should therefore be interpreted carefully as they may not generalize to other command systems or crises. However, the results are in line with other empirical findings, such as Son et al. (2020), and Bitan et al. (2022), as well as theoretical works on resilient systems.[15,21–22] Future works should aim to synthesize these findings with other works to create generalizations and abstractions.

Conclusion

The aim of the current study was to describe factors that affected decision-making in medical command and control teams during the early COVID-19 pandemic, using the Critical Decision Method. The findings are presented in 5 identified themes: organization, adaptation, making decisions, and analysis, as well as common operational picture. These themes align well with related work on COVID-19 management as well as other studies on crisis management based on theoretical perspectives of resilience engineering and naturalistic decision-making. The current study thus adds to the knowledge base of how to create successful crisis management in the face of challenges. The findings can also be used to further develop support and educational interventions for medical command and control teams.

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