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ARTICLE

The Basis and Practice of Crisis Communication for Critical Health Infrastructure in Selected Institutions of the Hungarian Health Sector

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Critical system elements in the healthcare system operate continuously under all circumstances, which has implications for emergency planning in ensuring operational safety for system elements, minimising the occurrence of any incidents, and ensuring continued operation regardless of extraordinary events. This research involved a questionnaire survey of designated critical infrastructure in the Hungarian

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health sector, a review of crisis planning documents, and an exploration of practical experience and methodologies. The research identified infocommunication tools, systems, channels and methods that can be used with a currently appropriate level of technology and security in alerting, notifying and equipping participants in health care operations during crises, as well as for communication and messaging activities between intervention forces in the care environment and society generally.

Keywords: critical infrastructure, healthcare sector, crisis communication, emergency situation, alerting and mobilisation technologies

Introduction

The European Union (EU), national governments and individual hospitals faced serious challenges during the coronavirus pandemic in managing the crisis and in applying the communication techniques and tactics that accompany the crisis management process.

The response to this global pandemic was typically improvisational because existing risk assessments had not predicted a pandemic of such enormous scale and impact, and there were no pre-prepared plans in place.

Hospitals generally use scenario-based planning, preparing disaster plans not only for global pandemics but also for hospital fires, lockdowns, mass casualty care and other situations.

Through crisis communication – an aspect of crisis management present in all phases and scenarios – our research examined the general level of regulation and preparedness of inpatient care institutions.

We propose a framework for crisis communication that can be applied uniformly in the healthcare sector, and could be raised to the level of European Union legislation with further scientific discussion and refinement. It is based on the legislative hierarchy, best practice as presented in international research, the crisis management practice at Semmelweis University (Hungary's largest medical institution), and the structural and content elements in disaster plans from inpatient care institutions in Hungary.

Literature review

Crises and their communication

There are a variety of concepts of disaster or crisis, for example, "a severe disruption in the functioning of a community or society, involving extensive human, material, economic, or environmental losses and impacts, surpassing the coping capacity of the affected community or society from its own resources" (UN, 2009); or disaster as "the breakdown of established symbolic frameworks that legitimize the existing socio-political order" ('t Hart, 1993). They pose a threat to the fundamental values or functioning of a system, or of life-support systems, and require urgent attention in conditions of profound uncertainty (Rosenthal et al., 2001). Hungarian regulations, whether defining states of emergency or crisis periods,

or establishing the framework for a crisis situation in the healthcare sector, typically set out from the premise that the series of events in question cannot be effectively managed within the framework of 'peacetime' cooperation. A crisis then is a period during which the capabilities and resources available for crisis resolution within the local, temporal and peacetime operational frameworks are insufficient to cope with the extent, impacts and rapid progression of the crisis situation, leading to disproportionality among these factors.

There are multiple approaches to crisis management, one such, the three-phase approach, consists of pre-crisis, crisis and post-crisis periods. The pre-crisis stage requires proactivity inclined to take all possible measures to prevent a crisis occurring and is subdivided into detection, prevention and crisis preparedness phases. However, crises cannot always be prevented, and the members of organisations need to be prepared for them. That involves handling any early warning signal emitted of crisis, since preemptive measures can help to avoid crises (Lando, 2014). Two studies identified four stages to crisis management: mitigation and prevention, preparedness, response and recovery (Burnham, 2008; Haddow & Haddow, 2008); and another distinguishes five phases: signals/detection, preparedness/prevention, containment/mitigation, recovery and learning, with communication playing a crucial role in all five (Hutchins et al., 2008). Both in theory and in practice, the tendency is to view crisis management as a holistic process encompassing prevention, planning, acute response, recovery and learning (Comfort, 1988; Coombs, 1999; Curtin et al., 2005; Nudell & Antokol, 1988; Regester & Larkin, 2002).

The purpose of crisis communication is to inform the public of an event or issue in an emergency, its impacts, and how particular actions can influence the outcome and protect community members (Reynolds & Seeger, 2012). Another aspect of crisis communication is internal hospital communication, that is, messages within and between hospitals that are transmitted and received internally. This can also be termed internal communication (Liu et al., 2017). Another critical area is organisational communication, involving heightened and effective coordination of messages sent and received between hospitals and external stakeholders during a crisis. Thus crisis communication is a complex task present in every phase of crisis management, and involving all levels of leadership and intervention.

Legal framework for crisis management in the healthcare sector

Health systems are the responsibility of national authorities in each country, and various systems operate in different EU countries. The EU is responsible for coordinating and cooperating on health issues in certain areas, but the detailed rules and regulations governing hospital disaster plans are more a matter for the national authorities of the Member States.

The Civil Protection Mechanism is a key EU document designed to deal with crises, including healthcare crises. It allows EU countries to help each other in disaster situations, for example by providing medical assistance or mobilising other resources.

The European Centre for Disease Prevention and Control (ECDC) also plays a key role in managing healthcare crises, focusing on the prevention and control of epidemics and facilitating the exchange of information between EU Member States whose responsibility is to plan health systems, develop preparedness plans and implement crisis management

measures, particularly when dealing with crisis situations, with cooperation supported at EU level. While hospital emergency plans are not defined at Community level, as mentioned above, there is a preference for crisis management tasks related to the safety activities of critical infrastructure operators to be regulated at Community level.

The geopolitical and globalisation changes that took place up to the 1990s led to extremely rapid technological development and increased societal dependence on infrastructure systems. The proper functioning of these systems is essential to the public, as well as to the economic, commercial, financial, governmental and administrative sectors.

In the 2000s, terrorist attacks in the EU and the USA prompted lawmakers to take action to protect critical infrastructure. The Green Paper presented in 2007 defined the following eleven critical infrastructure areas: energy, information and communication technologies; water supply; food safety; healthcare; the financial system; public safety and the justice system; the administrative system; transportation (road, rail, air, inland waterway, maritime and aviation); chemical and nuclear industries; space; and research. Following a proposal, in 2008 the European Council formulated the concept of critical infrastructure and its classification criteria in Directive 2008/114/EC on 8 December 2008 (hereinafter: The Directive). In this context, the Hungarian Government defined the ministries and authorities responsible for the various sectors and the national division of those sectors in Government Decision 2080/2008 (VI. 30.) on the National Program for Critical Infrastructure Protection. Government Decision 1249/2010 (XI. 19.) on government tasks to be carried out to comply with The Directive on the identification and designation of European critical infrastructures and the assessment of the need to improve their protection (hereinafter: Government Decision) opened a new chapter in the regulation of critical infrastructure protection in Hungary.

Current legal framework for crisis management in the Hungarian healthcare sector

To ensure domestic compliance, Act CLXVI of 2012 on the Identification, Designation, and Protection of Critical Systems and Facilities was passed and also a government decree for implementation (Government Decree 65/2013). Act CLIV of 1997 on Healthcare then laid down the basic rules for emergency health care in Hungary in a separate chapter, defining the concept of a healthcare crisis situation, when and who can declare it, listing in detail the organisational and planning tasks to be performed in a crisis situation.

The content requirements for healthcare crisis management plans in healthcare institutions, as well as amendments to certain ministerial decrees related to healthcare, are defined in Government Decree 43/2014 (VIII. 19.) of the Ministry of Human Capacities (hereinafter: Decree). The Decree establishes the rules for central approval of these plans, detailing the planning process and requiring the preparation of sub-plans for various scenarios and background activities in addition to the basic plan.

This Healthcare Crisis Management Plan (HCP) essentially comprises a basic plan and fourteen sub-plans. To facilitate structure, understanding and obviously application, the plans can be grouped into four categories:

- Basic Information and Readiness Access
- Response to an extraordinary event affecting the organisation
- Response to an extraordinary event occurring elsewhere, extending services
- Operation of supporting processes

The implementation and application of the plans can occur separately or simultaneously in various permutations, depending on the nature of the ongoing event (Kátai-Urbán et al., 2019).

The Regulation requires inpatient care facilities to prepare and annually review the following sub-plans:

- Basic plan
- Alert and deployment plan
- Evacuation plan
- Discharge plan
- Isolation plan
- Emergency medical shelter deployment plan
- Emergency hospital deployment plan
- Plan for the provision of additional tasks in peacetime and in the special period of law and order
- Plan for the maintenance of care in the event of damage to the institution or in circumstances that prevent its operation
- Medical and other material insurance plan
- Transportation plan
- Food plan
- Communication plan
- Plan for the provision of tasks related to the national emergency plan
- Plan for the implementation of the International Health Regulations

From the crisis communication perspective, the Alert and Deployment Plan, and the Communication Plan are the most important, which the present research analysis details.

Our hypotheses are as follows:

H1. In a healthcare crisis situation, alerting and mobilising healthcare workers in an extensive emergency may not be feasible and/or may not occur in a timely manner with the planned resources.

H2. The Communication Plan prepared based on the legal regulations – as currently applied – is unsuited to maintaining effective communication within institutions, with intervention forces, or towards the public during crisis healthcare activities.

Research methodology

Our research examined the healthcare emergency plans from two medical universities (institutions with the highest level of progressivity in multiple fields, each with a national service area and a combined total of approximately 60 independent hospital facilities), a national healthcare institute (an institution with the highest level of progressivity in one field and seven such institutes nationwide), two controlling county-level institutions (representing 19 counties and the capital city as administrative units, each overseeing multiple locations and hospitals to ensure inpatient care for a given county), and a central hospital in the capital city (meeting inpatient care needs for the Capital and Pest County, primarily based on four centrally located hospitals with multiple branches operating within the administrative jurisdiction of the controlling county).

The practice varies among institutions as to whether they prepare independent HCPs for each site based on the peacetime organisational structure, or rather a central plan for each site and organisation with attachments and chapters. Consequently, we conducted a comparison of 19 sets of plans for the institutions mentioned above, requesting plans in a completely anonymised form for reasons related to national security and data protection. Thus, compliance regarding personnel and contact information was not examined.

Analysis of the Decree

Excerpt from the Decree:

1. Alerting and Deployment Plan
    1.1. The purpose of the Alerting and Deployment Plan is to prepare for the deployment of the necessary personnel in case of unexpected tasks.
    1.2. The Alerting and Deployment Plan is prepared in two versions:
        1.2.1. For the main operating hours of the day, to deploy personnel who are not on duty;
        1.2.2. For periods beyond that (including holidays and public holidays), for the partial or complete deployment of the staff.
    1.3. Both versions include:
        1.3.1. Necessary address data for alerting the narrower personnel – leadership or those representing special areas of expertise,
        1.3.2. The name and address list of the entire staff, grouped by organizational unit and profession (in the case of a large healthcare provider or one with multiple locations, it is advisable to plan for alerting by organizational unit or site separately, at the same time),
        1.3.3. Multiple alternative options for alerting, taking into account the potential failure of individual communication systems in case of a disaster,
        1.3.4. Alternative notification possibilities (besides telephone, mobile phone, notification by car, local electronic media),
        1.3.5. Designation of persons responsible for executing the alerting, deployment (notification), defining their tasks,

1.3.6. The sequence of notification, including actions to be taken in case of a break or danger of a break in the alerting chain,
1.3.7. Name and address list of the leadership to be informed – in case of their unavailability, the names and addresses of those replacing them,
1.3.8. List of names and addresses of employees designated by the designated healthcare provider for deployment to the installed healthcare institution, medical assistance sites, or other designated tasks,
1.3.9. The standard time for the execution of the alert, as well as the arrival of the deployed personnel, and
1.3.10. The person responsible for receiving arrivals and assigning their tasks.

1.4. Related plans: for evacuation by car, the Isolation Plan, and for delivery, the Transportation Plan.

12. Communication Plan

12.1. The Communication Plan includes:

12.1.1. Tasks related to informing patients during evacuation, relocation, isolation, and damage to the institution,
12.1.2. Informing patients about the temporary restriction of patient rights,
12.1.3. The method of continuous information for employees, temporarily assigned personnel, and volunteer helpers about the current situation and expected tasks,
12.1.4. The person responsible for maintaining contact with the county government office, ambulance service, territorial and local branches of the disaster management, institutions in the area or region, and the media,
12.1.5. Development of simplified documentation and patient records,
12.1.6. Method and person responsible for informing relatives about patient admission, transfer, and death (Government Decree 43/2014).

In Germany, similarly to Hungary the precise process of designating critical infrastructure in the healthcare sector is based on laws and guidelines. The Federal Office for Information Security, the *Bundesamt für Sicherheit in der Informationstechnik* (BSI) is responsible for implementing the *Kritische Infrastrukturen-Verordnung* Regulation (KRITIS) in the healthcare sector. The office defines the process, criteria and considerations for designating critical healthcare infrastructure. Furthermore, it mandates the development and implementation of security measures.

a) This law regulates the security of information technology systems and includes regular reviews and updates of measures and requirements related to the protection of healthcare infrastructure.
b) The BSI KRITIS Regulation governs the process of designating healthcare critical infrastructure, outlining the sectors considered critical infrastructure, and establishing the requirements for security measures to protect them.
c) Professional Guidelines and Recommendations: Organisations within the healthcare sector and guidelines issued by authorities provide additional specific requirements regarding the designation of critical infrastructure (necessary security measures, monitoring, and assessment of processes and managing vulnerabilities).

In contrast to Hungary, crisis planning and management in Germany are not regulated centrally but delegated instead to the *Land* (state) level. As a result, individual states autonomously establish the mandatory rules and provisions for critical infrastructure.

Alert and deployment

In the context of critical healthcare infrastructure, alert and deployment mean ensuring that sufficient human resources – doctors, nurses, maintenance and support staff, etc. – are available as rapidly as possible to manage any extraordinary event. In order to achieve that, it is necessary to alert the organisation's employees and, if necessary, to deploy an appropriate number of off-duty workers. There are various communication channels to alert and deploy the workforce needed.

Alerting and deployment of on-duty and off-duty staff

Possible communication channels include face-to-face conversations, phone calls, group meetings, mass media (television, personalised mass media such as reverse emergency call services, and interactive social media platforms such as Twitter, etc.) (Bradley et al., 2014). The abovementioned communication channels are reinforced by the Crisis and Emergency Risk Communication issued in 2012 (Reynolds & Seeger, 2012). Traditional top-down crisis management, including communication, may only prove successful and effective to limited extent during a crisis (Boin & McConnell, 2007).

FACT24 is a crisis management and notification application and service that can be downloaded onto mobile phones to alert and deploy employees. In a crisis, the system provides for rapid response and overview capability, facilitating activation, modification and real-time tracking of alert processes. The system operates continuously worldwide, supporting crisis managers in alerting and mobilising emergency services, crisis management teams and affected individuals. The application offers services such as on-call services (targeted on-call team alerts), IT alerts (direct connection to servers and technical infrastructure), protection of isolated employees, mass alerting functions, building monitoring (reporting technical issues and malfunctions) and various alert features (FACT24, 2023).

The advantage of the above application and service is that it allows for employee record-keeping and real-time alerting within a single application. Furthermore, the feedback from alerted employees helps in planning the scale of human resources needed for crisis management.

If internet-based electronic communication tools become unusable due to network damage or shutdown, then crisis communication needs to be conducted through alternative communication channels. Such channels could include a TV public information broadcast, radio announcements and traditional methods of local communication (town crier, bulletin board and advertising column). Additionally, law enforcement agencies and individuals can

use loudspeaker devices capable of live speech broadcast, as well as handheld loudspeaker devices. These measures ensure redundancy in communication channels (Mógor, 2011).

Performing and monitoring tasks related to alerting and deployment

Crisis communication involves adhering to the alert system and levels, as well as assigning tasks to incoming colleagues after deployment, and monitoring their progress. The examined studies indicate the application of emergency codes in the healthcare sector, with the aim of preventing confusion and enhancing rapid response for emergency patients requiring cardiac and pulmonary resuscitation, or for handling extraordinary events. Emergency codes alert relevant healthcare staff of a critical situation within the hospital without causing fear among patients and visitors. Emergency codes are assigned specific colours, making their reports easily identifiable.

Table 1:
Comparison of emergency colour codes

Emergency colour code	The meaning of the code		
	Riyadh City Hospital[1]	**British Columbia**[2]	**California**[3]
Red	Fire/internal disaster	Fire	Fire
Blue	Cardiac arrest/respiratory failure	Heart attack	Adult medical emergency
	Adult medical emergency		
	Pediatric emergency		
Green	Delete the code	Evacuation	Missing high-risk patient
	Evacuation		Triage/Emergency alert; Limited activation of selected key personnel for potential incident
	Overcrowding		Activation of Emergency Operations Plan for Internal Incident
	Pediatric emergency		Triage/Activation of External Emergency Operations Plan for External Event
	Adult medical emergency		
	Hazardous/Chemical spill		
	Cardiac arrest/ Pediatric emergency		
Pink	Infant/Child abduction	Pediatric and/or Obstetric case	Child abduction

1 Ashworth et al., 2015.
2 British Columbia Ministry of Health Services, s. a.
3 Dauksewicz, 2019.

Emergency colour code	The meaning of the code		
	Riyadh City Hospital[1]	British Columbia[2]	California[3]
Yellow	Sandstorm/Severe weather	Missing patient	Bomb threat
	External disaster		
	Oxygen depletion		
	Utilities failure		
	Hazardous/Chemical spill		
	Internal disaster		
	Bomb threat		
	Polytrauma		
	Traffic accident in the emergency department		
Black	Bomb threat	Bomb threat	–
	External disaster		
	Internal disaster		
	Aggressive individual/security needed		
	Polytrauma		
	Mass casualties		
	Death		
Orange	Hazardous/Chemical spill	–	Hazardous/Chemical spill
	Delete the code		
	External disaster		
	Bomb threat		
	Oxygen depletion		
	Internal disaster		
	Adult medical emergency		
Amber	External disaster	Missing or abducted infant or child	–
Brown	Hazardous/Chemical spill	Hazardous spill	
	Aggressive individual/security needed		
	Explosion		
	Sandstorm/Severe weather		
Grey	Utilities failure	System failure	Aggressive individual
	Aggressive individual/security needed		
	Hazardous/Chemical spill		
	Bomb threat		
	Internal disaster		
Silver	Aggressive individual/security needed	–	Armed individual and/or active shooter and/or hostage situation

Emergency colour code	The meaning of the code		
	Riyadh City Hospital[1]	British Columbia[2]	California[3]
White	Bomb threat	Aggression	Pediatric emergency care
	Aggressive individual/security needed		
	Evacuation		
	Delete the code		
Lilac	Aggressive individual/security needed	–	Child abduction
	Missing child/adult		
Purple	Aggressive individual/security needed	–	–
	Oxygen depletion		

Source: Compiled by the authors.

Table 1 summarises the emergency colour codes used by various healthcare organisations, and it can be observed that there are codes with similar or common meanings, such as the red code indicating a fire and the blue code indicating a cardiac arrest. However, most of the codes have various meanings. A study conducted by Hyo-Jin Lee and Ogcheol Lee suggests that standardised emergency codes, including colours and simple wording, minimise confusion by aiding hospital staff in recognition and prompt response (Lee & Lee, 2018).

Another possible solution for crisis communication is the creation and distribution of *action cards* for employees, prepared for a specific emergency and tailored to each employee's level, indicating who needs to be notified, the tasks to be performed, and serving to track all these activities (Mackway-Jones & Carley, 2019). Action cards represent a list of measures that a responsible party in a critical process must take during an emergency or disaster to ensure the continuity of operations (Camacho et al., 2019).

During a professional study trip within the German healthcare system, we could gain insight into the operations of the Institute of Emergency Medical Science and Medical Management. This institute, the first of its kind in Germany, was founded in 2002 to ensure an appropriate response to healthcare emergencies. The main tasks of the institute include the development of emergency, evacuation, alerting and deployment plans, as well as the establishment of emergency crisis teams, communication, training and practice exercises. For the latter, they perform full-scale, personnel and external drills, and conduct practice alerts twice a year. The institute also has a simulation centre, where participants' activities can be analysed with special equipment. The institute has developed scenario-based plans for various crisis situations, outlining primary and secondary measures in the primary alert process, situation assessment and a secondary alert process. The tasks are illustrated to workers in the respective organisational unit using various action cards.

Action cards can be used by the employee as a team leader during the event when the necessary measures are itemised. The employee marks completion of each action by ticking a box. The card first specifies the use of distinguishing vests, followed by filling out the reporting form. Following the event assessment, the alert level is determined based on

the opinions of the operational leader and on-call medical personnel. The alert levels are influenced by the number of casualties, available staff and the time of the event, which the employee also marks. The card defines eight levels of alert, and depending on the severity of the level, the healthcare personnel serving at the institution at that time are mobilised at the lower level alerts, while at more severe alert levels off-duty personnel and functional units are mobilised. The alert and deployment process takes place through their own internal alert system. The card includes a table listing the callable and deployable staff with phone numbers and designated command points. After completing tasks, the employee can review the steps taken at the command point, and then the action card determines the immediate care of the patient after classifying injuries, specifying accurate information, determining and documenting personal data.

Crisis communication

A crucial concept in crisis communication is the actual designation of the crisis and the initiation of plan implementation. It is important to distinguish between the two terms:

- Classification of the situation
  - Act CLIV of 1997 on Healthcare clearly defines the concept of a healthcare crisis situation, indicating that in the event of its declaration, HCP are to be applied.
- Ordering the implementation of the plan

Justification for the application of multiple sub-plans exists not only during a declared healthcare crisis situation, but also in other situations, for example, for a facility a fire evacuation, or a local chemical accident when isolation may be necessary. There are numerous scenarios that do not require government-mandated, coordinated defence activities but the implementation of certain sub-plans is practical from the perspective of institutional crisis management.

Fundamentals of internal communication within an institution

The foundation of crisis communication is internal communication within the institution, with the aim of informing and updating employees and patients about the extraordinary event. This also plays a crucial role in coordinating the necessary measures for crisis management, as found in several studies. An organisation should communicate with both its internal and external stakeholders not only during a crisis but also before, during and after negative events. The goal is to implement strategies aimed at minimising damage to the organisation's image (Lando, 2014). Uncertainty and ambiguity are inherent aspects of crises. Consequently, those involved in crisis communication may make statements indicating that not all facts are available yet or that the understanding of the situation is unclear (Dauksewicz, 2018). According to a study conducted by Petra Dickmann and colleagues, half of the hospitals examined differentiated between risk communication and daily PR activities. They had crisis communication plans to regulate this distinction (Dickmann et al., 2014). A study

analysing the crisis communication plans of Ontario hospitals revealed the increasing use of social media for crisis communication. It also highlighted the necessity for integration between crisis communication and operational crisis management (Dobosz, 2020).

Communication with partner organisations

Communication and collaboration with partner organisations, such as government offices, disaster management, law enforcement and emergency services are integral parts of crisis communication. Its significance lies in alerting authorities and determining the extent of intervention, effectively contributing to crisis management.

During the first wave of the global coronavirus pandemic, the practical experiences of communication with partner organisations and coordinating authorities in Hungary are revealed in the following excerpt from a study:

> The management of defence and thus the operation of inpatient care facilities (beyond daily operations) was carried out based on written instructions from the Operational Staff, the Ministry of Human Resources (as the professional directing authority), the Ministry of Innovation and Technology (as the maintainer in the case of university clinics), the National Hospital Command, and the National Public Health Centre. Accordingly, the reporting obligation was defined in these directions, where it occurred that a healthcare institution had to submit a daily report, consisting of the same content but meeting different formal requirements, in a table with several hundred rows, regarding the available and utilised resources (personnel, equipment, bed capacity). This not only imposed a significant administrative burden but could also lead to data distortion due to overload and the possibility of institutional advocacy (Kátai-Urbán et al., 2021).

In Hungary, there are various examples of supervisory communication, including information gathering, reporting and task assignment. Currently, these systems do not extend to the access of certain institutions. The Ministry of the Interior operates the Civil Emergency Information System (PVIR) to ensure Hungary's security in preparation for extraordinary events, disasters and emergencies, as well as supporting the mitigation and elimination of their impact and restoring the original situation. Through this information system, not only static informative data but also dynamic information can be published on a unified interface for organisations involved in disaster and emergency management (Polgári Veszélyhelyzeti Információs Rendszer, s. a.). In addition to PVIR, the Marathon Terra info-communication application operates for defence and security administration purposes. It is an independent, closed, reliable information system capable of data traffic without file type restrictions. The system is designed with essentially the same preparatory goals as the PVIR system mentioned above. The system currently includes automatic alerts from the National Meteorological Service and event maps from the National Association of Radio Emergency and Infocommunication (RSOE). Moreover, the application collaborates with Google Maps (Marathon TERRA, s. a.).

Contacting authorities and information exchanges are significantly facilitated by the Unified Digital Radio Telecommunication System (hereinafter: EDR), which has established data transmission capabilities nationally in Hungary, and provides an info-communication channel among standby services, intervention forces and organisations. The foundations of this system are laid down in Government Decree 109/2007 (V. 15.) on the Unified Digital Radio Telecommunication System. Government Decree 346/2010 (XII. 28.) on governmental networks defines the scope of organisations entitled and obliged to use the system.

Various emergency services are equipped with the current EDR to efficiently carry out their operational activities. EDR is a communication system based on the Trans-European Trunked Radio (TETRA) network with nationwide coverage that meets Schengen criteria. The system provides continuous accessibility for the communication of emergency services through advanced data transfer services and information security solutions. In addition to emergency services, civilian groups can also join the service with permission from the Ministry of the Interior. Users of the system can conduct secure communication through virtual private networks, ensuring separate and secure communication without interference (Hanák, 2008; Kardos, 2021; Kuris, 2010).

Informing the population and media

During the Covid–19 global pandemic, people turned to social media more frequently than usual to keep informed on the outbreak and health-related information, relying on online sources for news and updates (de Calheiros Velozo & Stauder, 2018; Li et al., 2018). Crisis management in Cameroon during the Covid–19 pandemic involved community information dissemination and health education related to the coronavirus disease through various platforms and channels including television, radio, print media, flyers, posters, government websites, healthcare facilities, volunteers, community health workers and social media (Bang, 2020). The United Arab Emirates provided information related to the Covid–19 situation, including daily statistics, case numbers, death toll, the number of tests conducted, total recoveries and up-to-date health regulations on the Ministry of Health and Prevention website. Local health authorities such as the Ministry of Health in Abu Dhabi, the Abu Dhabi Health Services Company (SEHA), the Dubai Health Authority and the Dubai Health Authority's website also disseminated information. Additionally, these authorities utilised social media platforms, including Twitter and Instagram, as well as official news channels and traditional media to extend messaging and broaden the dissemination of information (Zaher et al., 2021).

Patient identification and information to relatives

Accurate and clear identification of patients and injured individuals entering healthcare is essential, contributing to the factual and real-time information provided to relatives.

During extraordinary events and the associated crisis communication in the healthcare sector, quick and effective patient identification is crucial. There are various options, such as identifying patients with wristbands, which is an internationally accepted practice; however, organisational, financial and human factors can lead to errors or undesirable events (Tase et al., 2013). In case of mass casualty care, however, wristbands are practical and effective. Numbered medical record cards and patient wristbands can be stored at the entrance, allowing for immediate distribution to the injured. This system enables easy tracking of the arrival order of patients and the total number of injuries treated. The official patient identification and hospital registration are done later to avoid hindering the orderly processing of patient care due to administrative reasons (Avidan et al., 2007).

There are additional options for patient identification, such as RFID technology and 1D codes such as barcodes, as well as 2D codes such as QR codes. The use of QR codes in particular is currently the optimal choice, as QR code-based label technology, combined with a mobile phone as a code reader and decoder, appears to be the most practical and cost-effective alternative for automatic patient identification and quick access to remote health records (García-Betances & Huerta, 2012; Riplinger et al., 2020).

Patients' relatives can be informed in person and over the phone; however, in an extraordinary situation, these channels may be inefficient. As an alternative solution, semi-automatic telephone exchanges can assist in conveying information. A prime example of this is the information system introduced at Hungary's largest healthcare facility during the pandemic, which allowed the relatives of Covid–19 inpatients to receive information on practical aspects of Covid care at the clinics. This included details about the treatment of Covid patients in the facility, options for sending packages and authorised visitation opportunities. Information was provided in an organised manner via a menu, offering guidance 24/7. Answers to frequently asked questions were also published in written form on the organisation's website; and dispatchers were also available for direct contact over the phone within weekday business hours. Family members could request brief updates on the condition of a specific patient, and information over the phone regarding the medical documentation could be provided to an individual designated by the patient. The establishment of the information line was necessary to ensure that family members could reliably access information about the most important practical issues, allowing doctors and nurses to focus all their attention on patient care (Semmelweis Hírek, 2020).

Comparison of the analysed crisis communication plans

Comparison of the Alert and Deployment Plans reveals that, with two exceptions, their structure consistently follows the requirements listed in the Regulation, treating the regulatory listing as chapters. In one case, the plan solely provides an organisational chart-like description of the alarm chain, while in another case, details regarding the reception of incoming individuals are missing from the plan. Thus, the comparison reveals that, with one exception, each plan logically outlines first how the healthcare crisis – and thus the application of the plans – will be communicated, through which alert channel, and who is

authorised to order it. Only in one plan did we observe that beyond this qualified period, the leader of the institution is authorised to order the application of the plans.

The Decree stipulates how the institutional authority should carry out the planning system's annual maintenance review. After the pandemic, Hungary's system of defence administration and government-level control underwent a transformation through Act XCIII of 2021, which coordinates defence and security activities, modifying several defence-related regulations, including those related to healthcare crisis situations. We did not find a single example of these changes having been incorporated into the plans we received and processed in the fall of 2023, although clear and verifiable classification of the healthcare crisis situation and the order for enactment of the plans as the first elements of the alert chain are crucial.

The scope and communication channels for those authorised to order enactment under the previous regulations were specified, indicating the channels through which orders could no longer be received. However, in one plan there was no mention of the obligation on the recipient to verify the authenticity of the order. Currently, the classification of a healthcare emergency situation can only be determined by the government by decree, with the official communication channel being its publication in the Hungarian Gazette. However, none of the plans mention this.

In the next step, the alert chain hierarchy within the institution is described for each plan, which, with one exception, was prepared in accordance with the Regulation, both for working hours and in overtime, with the separation of the two periods within the chapters.

The Regulation states the plan must include the method of alerting with the elaboration of several alternatives, taking into account the potential failure of communication systems in a disaster.

In one plan, only phone alerts are specified with no alternative provided in case of failure. In sixteen cases, the following channels are listed:

- Orally
  - in person, through a delegate, or a messenger
  - using a telephone or mobile phone
  - through a public address system
  - in collaboration with news service providers (TV, radio)

In fifteen of these cases, the following channels are supplemented:

- In writing
  - telegram
  - circular letter
  - short message service (SMS)
  - e-mail
  - call
  - use of a mandate letter

In two cases, only the actors in the alert chain and not the communication channels are specified. None of the plans distinguish the internal alert channels or the alert channels for the staff to be mobilised, apart from, for example, alert via the public address system and

circulars, the inference being that these are to be applied within the institution. Overall, institutions generally plan for three communication channels:

- connected to the telephone network
- connected to internet access
- interpersonal

The redundancies of various alternative solutions are generally determined within the same communication system. For example: phone–SMS, e-mail–circular, letter–call. In case of telecommunication service providers, the access and methodology had not been elaborated in any of the plans.

With regard to the alarm and arrival standard times outlined in the plans, it is noteworthy that beyond listing the communication systems to be used as mentioned above, none of the plans specifies a concrete sequence, the number of attempts, or any criteria for the person initiating the alarm to follow in case of malfunctions of certain systems, unavailability of the alerted personnel, or lack of confirmation. This can significantly affect the desired standard time for achieving readiness.

For internal alarms, none of the plans includes a code system, predetermined text, or guidance for those initiating the alarm. While for mobilisation, sixteen plans contain pre-written text and prescribe verification of authenticity for mobilisation through recall or presentation of a mandate letter.

In seventeen cases, evacuation by a designated vehicle was included as an alternative, as highlighted in the Regulation. In fifteen cases, the involvement of authorities (Police) is mentioned, as well as the utilisation of broadcasting based on the residence of the mobilised personnel. However, there is no description of individual data or methodology regarding the latter.

During the evacuation by designated vehicles, the institution's vehicles and drivers are always considered primary. However, there were no references to the Regulation, which, in this case, requires the simultaneous activation of the transportation plan and the detailed plan. As a second step, the use of the resident staff and vehicles is mentioned without further details. In this case, the lack of further elaboration raises questions about the sustainability of that institution's operational capability. As a third step, ordering taxis is mentioned. Institutions generally have framework agreements with taxi companies. This method is practical because it allows for delivery, especially during non-working hours, as taxi companies have larger logistic capacity. In the event of potential or actual disruption in the alert chain, solutions are outlined in fifteen plans, with replacements designated for each position.

All the plans assume that employees, especially those with responsibilities outlined in the alert and activation plans, are familiar with the plan and have access to it and its attachments, including activation lists. However, none of the plans explicitly mentions their specific location or how to access this information.

Fifteen plans include responsibilities and general tasks related to receiving arrivals, such as studying documents, forming workgroups, clarifying headcounts, providing briefings, establishing contacts, etc.; two plans omit this chapter altogether; one plan only generally prescribes reporting to the workplace leader; and one plan lists in detail the tasks of key figures and positions (from the leader to the porter).

Communication plan

With three exceptions, the structure of the plans in each case follows the regulations listed in the Decree, treating the regulatory listing as a chapter. In one, the plan includes only the contact information of the contacts, in another case, the plan lacks the designation of responsibility for contacts with the county government office, ambulance service, territorial and local disaster management organisations, the institutions of the area and region, and with the media. In yet another case, the development of simplified documentation and patient records is missing.

In sixteen cases, we saw that in the introduction, external communication (towards the media, patients, relatives, authorities) and internal communication (towards patients and staff) had been differentiated when defining the purpose of the plan. With one exception, all include tasks related to informing patients in case of evacuation, relocation, lockdown and damage to the institution. In one case, the plan refers the tasks to be executed at the discretion of the current CEO without further details. In one case, the only task mentioned is reporting to the maintainer. Fifteen plans define general tasks such as:

- presenting the danger
- introducing basic safety rules
- temporary restriction of patient rights
- describing the actions
- providing reassurance

Additionally, while there are brief descriptions of specific scenarios, with a common emphasis on preventing panic, these descriptions lack methodological guidance, any mention of available tools and techniques, or additional external and internal communication tasks (such as communication with collaborating authorities, or societal communication on the institution's website). Each of these plans includes that activation should be in line with the plan for the specific scenario. In one plan short headline-based task descriptions were prepared separately for each of the four scenarios, taking into account key intervention and control roles. Here, in addition to the general tasks listed above, the main guiding principle is to determine with whom the person in a given position communicates (holding superiors/meetings), both downward and upward, thus establishing the order of task assignment and reporting.

Fifteen plans specify that informing patients of temporary restrictions on patient rights can be done primarily through oral communication, posters, forms, or circulars (distributed to each department). The plans also include the basic legal constraints regarding these restrictions. In one, the head of the Communication and PR department is specifically designated to prepare informational material, and the deputy medical director of the respective site takes action to ensure that the departments acquaint the patients concerned with the pre-formulated informational material through reading or handing out printed copies. This is also supported by international examples; communication professionals typically add value to their organisations by building reputation and engaging with stakeholders. Integration ensures that communication professionals provide value by assisting management in achieving broader goals, especially in crisis situations (Dobosz, 2020).

In one plan, the heads of the departments are tasked with informing the patients in this regard, and the CEO is responsible for checking this; however, the creation of the information material is not mentioned. In addition to CEO directives and verbal departmental communication, in only one other case it is mentioned that assistance in developing the temporary restriction of patient rights can be sought from the institution's legal expert. The establishment of an information service for ensuring external communication was exclusively mentioned in this case.

The continuous appraisal of employees, seconded personnel and volunteer helpers about developing situation and expected tasks is generally prescribed in all plans (verbal and/or written communication is involved in some cases, occasionally linked to tasks related to briefing incoming personnel in the Alert and Deployment Plan, but without further details.

The appointment of the contact person responsible for communication with the county government office, ambulance service, territorial and local branches of disaster management, regional institutions and the media is present in all cases but one; however, in one case, not all the bodies listed in the regulation are named. In most cases, legal compliance is ensured by appointing a contact person from the institution. In a single case, only the contact person and their contact details on the cooperating side are designated, along with the communication channel (telephone).

The patient identification process is essential in healthcare institutions, even during extraordinary events, to ensure the safety and quality of patient care. Three plans lack instructions for developing simplified documentation and patient records. Fifteen plans mandate the routine work of the patient admission office during working hours without specifying the details of simplified documentation. Outside working hours, record-keeping is delegated to hospital departments through a simplified list, without specifying the content. In only one case, the precise content of simplified documentation is provided, including:

- patient's name, place, and date of birth
- social security number (TAJ)
- mother's name
- address
- name and address of the nearest relative
- arrival time: year, month, day, hour
- destination or transfer location
- departure time: year, month, day, hour

In this case, the responsibility for preparation is assigned to the nursing leader; however, there is no indication of the format, collection location, or assignment to the patient for the documentation. In three cases, only the person responsible for informing the relatives has been designated without further task details. In fifteen cases, it has been further specified that the person responsible for the information should be published on the institution's website along with their contact information for the respective hospital department. In summary, of the nineteen sets of plans received:

- One institution does not meet the legal requirements at all; it only includes the directions and responsible parties for crisis communication without specific task assignments.

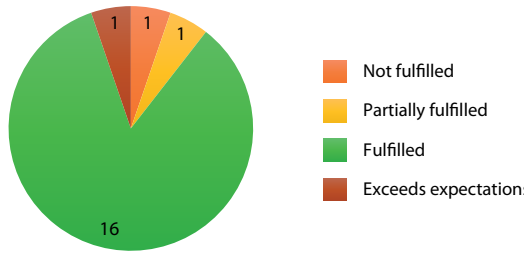

Figure 1:
Compliance with regulations in the examined plans
Source: Compiled by the authors.

- One institution deviates from the legal structure but broadly includes its fundamental criteria.
- For sixteen institutions, it is evident that, due to the managerial structure and professional network, they were generally prepared similarly, precisely meeting the legal criteria without excessive expansion, and, in fact, only minimally tailored to the specific institution.
- In one plan, there is a reflection of institutional conditions, a comprehensive adherence to legal frameworks, endeavouring towards precise task delineation.

In general, it can be stated that precise and detailed planning for methodology, technical tools, channels and reasonable redundancy in crisis communication is not characteristic of any of the cases examined. Furthermore, each plan package should be interpreted as a central plan, constituting several hundred pages for the entire planning system. Accordingly, disclosure, training and availability in the respective positions of these plans are significantly limited, questioning the rationality of their application. The legislation does not provide specific guidance on this latter issue.

Conclusions

Based on our research, we propose handling crisis communication in Hungary according to the legal framework with the divisions and focuses listed below. As a first step, determining the activation stages is essential (defining crisis situations, and identifying those responsible and authorised to order activation).

Staffing communication

Alert, signalling

This includes informing hospital staff of the emergency event with the appropriate content, providing them with the necessary information to immediately begin their tasks while

avoiding panic among patients and visitors. In this regard, it is necessary to establish the following regulations and conditions:

- tactical aspects, such as
  - pre-defined alarm chain (responsibilities, sequence)
  - the content of the alert, for which a recommended code system should be applied (comparing the practices of multiple institutions, the code system can be standardised)
- Technical aspects, such as
  - automatic sound equipment
  - displays
  - mobile phone applications
  - telecommunications equipment
  - SMS, push messages
  - the sequence of redundant elements
  - preferably, the use of different channels in case of failures

Deployment

This refers to the mobilisation and placement of the personnel on leave or vacation to their duty station, following the guidelines outlined below:

- Planning the shift work schedule, the rest periods of the personnel in advance for multiple scenarios, determining the timing of deployment.
- The communication channels and content of the deployment as per the provisions in the alert.
- Possible additional personal communication channels for deployment include
  - courier services
  - taxi companies
  - involvement of local authorities
  - predetermined route plans based on the residential address for the planned deployment of resources is recommended in all these cases
- Confirmation of receiving the deployment to ensure predictability in personnel.
- Ensuring the entry of the deployed personnel, taking into account the incidental damages arising from the nature of the extraordinary event, as well as the complicating circumstances resulting from its extent:
  - independently
  - through a taxi company
  - with the assistance of authorities or cooperating agencies
- Authentication procedures
  - which can be part of the confirmation of the alert
  - use of dedicated channels (e.g. VPN)
  - application of a predetermined signalling system, possibly varying in higher alert levels

Task assignment

Predetermination of the individuals responsible for receiving the deployed personnel, who will issue primary information and task assignments according to the specific situation is essential. Based on the Hospital Major Incident Medical Management and Support (HMIMMS) methodology, scenario-based action cards significantly assist in this task and even facilitate the pre-training and preparation of the personnel. It is important to ensure access to these cards through multiple platforms (e.g. on paper, projectors, a central storage system, in an application). The general content of such action cards includes:

- who assigns tasks
- whom to report to and through which channels
- immediate measures
- main guidelines for the task

Verification

Knowledge of the personnel available to handle the extraordinary event including numbers, capabilities and availability at all times is essential for the leader. Accordingly, it is necessary to monitor this, which can be done through an operational log led by the personnel responsible for alerting and mobilising, based on reports from leadership levels, using registration forms filled out by incoming personnel through a mobile application developed for this purpose, and based on data from the access control system. Additionally monitoring and detecting any potential break in the alert and mobilisation chain, planning interventions and addressing them in an inbuilt manner within the given process is crucial.

Crisis management communication

Identification and differentiation of stakeholders

It is necessary to differentiate between intervention personnel, patients and relatives.

- Intervention personnel
  - Distinguishing from patients and visitors, typically achieved through a uniform; however, this must be ensured for the deployed personnel from the outset.
  - Distinguishing leadership levels and functions, particularly if deviates from peacetime structure (e.g. using different coloured armbands or vests).
- Patients
  - Rapid identification and condition assessment through solutions, such as
    - triage cards
    - wristbands
    - RFID, QR codes
  - Based on the above, simplified record keeping, recording and data transfer.
- Relatives

- physical separation when possible
- possible removal when feasible
- assessment of those assisting in the intervention, as needed

Internal communication within the institution

Intervention staff communication

In this section, it is necessary to document the communication procedures for the intervention staff (who can give instructions to whom and in what sequence, which can be determined on action cards, for example), the methods and channels available, their redundancies and sequence (public address systems, displays, mobile communication devices, applications, etc.).

Communication with patients

In communication with patients, it is necessary to differentiate between patients in the institution and those scheduled for care or, due to the impacts of the extraordinary event, those who may require future care from the institution. The latter will be discussed partly in relation to society.

Communication with institutional patients is primarily focused on reassuring them and providing information about the continuation of their treatment in the given situation. Depending on the characteristics of the emergency event, tasks may include assessing patients (triage), preparing them for transfer, discharging them to their homes, relocating them, or isolating them. Practicing communication schemes related to this is essential for the staff, as their task is to maintain professional patient care and reassure individuals in an intensified atmosphere. Accordingly, this section of the plan requires the development of tasks related to specific scenarios.

Communication with authorities and partner organisations

In this regard, it is necessary to separate and define:

- the applied communication channels, such as
  - mobile phones
  - radio
  - TETRA radio (or any radio system used by authorities)
    - This is advantageous because, with properly separated channels, communication can be conducted smoothly in line with the practice of the authorities, thus supporting the work and communication of the intervening authorities.

    - communication platforms used by public administration in emergencies
        - The advantage of this extends to more extensive extraordinary events, supporting sectoral or national measures with appropriately collected information, as well as clear, uniform, linear implementation of reporting and instruction systems.
- the credible sources of communication
    - institutional contacts, their deputies and their contact information on all applied communication channels
    - authority/interagency contacts, their deputies and their contact information on all applied communication channels

Communication with society

In communication with society, it is important to highlight information directed towards patients who will require care from the institution due to the effects of extraordinary events, as well as providing information to the relatives of patients within the institution. Accordingly, it is necessary to document:

- the applied media, social media platforms, their access methods and authorised users
- institutional contacts, their deputies and their contact details on all applied communication channels
- contacts for mass media, their deputies and their contact details on all applied communication channels
- establishing an information centre
    - informing society according to the above
    - technical requirements for access
    - human resource needs
- pre-prepared templates for scenarios
- how to involve legal expertise, including responsibilities (restricting patient rights, data protection)

In addition to these, it is essential for the staff to regularly train and practice. Their role is crucial in preventing misinformation and malicious initiatives.

Summary

A key tenet of our research is that crisis communication accompanies every step and level of crisis management, from the first indication of an extraordinary event – the alert – through communication with the forces involved in resolving the event and the stakeholders (patients and visitors), to communication with society in general.

The Covid–19 pandemic highlighted the importance of healthcare crisis management and the lack of unified regulations. This gap was most evident in unified communication,

as not only national governments but also individual hospitals often applied different techniques and tactics, sometimes in an ad hoc manner.

We explored the requirements of domestic and international regulations, analysed documents and plans from healthcare organisations designated as critical infrastructure in Hungary, with a particular focus on the content elements of communication plans. Beyond legal compliance, we examined the practical applicability and feasibility of these plans.

Our research and practical experience have highlighted the lack of unified guidelines for handling crisis situations in healthcare at the community level. Recommendations from EU and national organisations often provide examples based on individual experiences or scenarios, and they may lift existing peace-time operational foundations for healthcare in a given country. Among these, crisis communication is functionally present but lacks a cohesive approach.

We recommend developing unified guidelines for managing crisis situations in healthcare, encompassing practical solutions such as a standardised colour-coded alert system for use during alerts, the use of action cards summarising the tasks of deployed healthcare staff and facilitating traceability of their implementation. Additionally, techniques for patient identification should be presented, and possibilities for the internal and external channels of crisis communication, their technical requirements and redundancies should be outlined.

The authors of this study have gathered relevant crisis communication techniques and tactics and examined the practical feasibility of legal regulations in Hungary. Based on these findings, we propose the establishment of a framework that, after further professional discussions and research, could serve as a foundation for unified healthcare crisis communication regulations.

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