

# Role of Emergency Response Codes in Handling Hospital Emergencies – An Experience of Protocol Designing, Development, and Implementation in a Large Multispecialty Tertiary Care Teaching Hospital, Mysuru, India

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## Abstract

**Introduction:** “An emergency is defined as any incident, caused by humans or a natural event that requires an effective, responsive action to protect life or property.” Therefore, the response to an emergency must be quickly coordinated and well planned. Emergency codes in the hospitals are used worldwide to alert the hospital employees for handling various emergency situations in hospitals. The use of codes is intended to convey essential information quickly with a minimum of misunderstanding to the hospital staff, while preventing stress or panic among visitors of the hospital.

**Objectives:** The objectives of the study were to prepare standard operating procedures (SOPs) using codes for various emergency situations that arise and to implement the same in the hospital and to make clear all the employees about various codes implemented in the hospital and to provide guidance for the same.

**Methodology:** (a) Various emergency situations that can occur in the hospital were identified. (b) SOPs were developed for each emergency situation using codes. (c) A training program was planned for all the staff members about their roles and responsibilities for effective functioning of hospital emergency response codes before implementation.

**Conclusion:** Emergency response codes are color-coded indicators used in hospitals to alert all staff members for emergency issues that may arise. Hence, clear communication is a key element to ensure a quick response to protect patients, visitors, and staff and hospital property.

**Key words:** Communication, Emergencies, Hospital, Response codes

## INTRODUCTION

Hospitals and health-care organizations work to provide a safe, functional, and supportive facility for patients, families,

staff, and visitors, but an emergency can arise at any time due to any cause. According to the World Health Organization (WHO), an emergency is a sudden and usually unforeseen event that calls for immediate measures to mitigate impact. An emergency is also defined as any incident, caused by humans or a natural event that requires an effective, responsive action to protect life or property.<sup>[1]</sup> Therefore, the response to an emergency must be quickly coordinated or communicated and well planned. Standardized emergency codes are required to identify a risk or emergency situation within any facility. An emergency code is a notification of an event that requires an immediate action. Emergency codes

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in the hospitals are used worldwide to alert the hospital employees for handling various emergency situations in hospitals. Hospitals are the most common institutions that use color codes to designate emergencies because hospitals/health-care organizations are home to patients and are vulnerable to mishaps such as fire, earthquake, floods, violence, and epidemic outbreaks.<sup>[2]</sup> Communication is essential during an emergency situations to convey data and information which supports situational awareness to hospitals and response personnel. The use of codes is intended to convey essential information/communication quickly with a minimum of misunderstanding to the hospital staff, while preventing stress or panic among visitors of the hospital.<sup>[3]</sup> Emergency response codes allow trained hospital personnel to respond quickly and appropriately to various emergency events. Emergency response codes are necessary to improve the response capability of hospital employees. Hence, hospital/hospital employees must be prepared to deal efficiently and effectively with different emergencies that may arise. Hospital employees, including doctors, should undergo extensive training to respond to each of these events, allowing them to save lives. One of the primary benefits of a code system is that trained hospital employees know to respond to any given emergency without alarming those being treated and hospital visitors. Panicked bystanders can hinder the response efforts of emergency responders. Emergency codes are extremely important for the safety of everyone inside a hospital. They allow doctors and administrative employees to respond quickly and effectively to save lives in emergency situations. As the WHO puts it in its guide to mass casualty management systems, “The most commonly cited problem in disaster management is invariably communications breakdown, with emergency activities and decision-making being seriously affected by vital information being lost or delayed.”<sup>[4]</sup> Thankfully, technology today offers several options that can be deployed to ensure that there is no communications breakdown. From traditional methods of communication such as telephones and on-site alarms to more modern options such as short message service, video conferencing, and virtual receptionists, everyone who needs to be kept informed now can be, and all through their medium of choice. Hence, this project has been taken up for designing, developing, and implementing emergency response codes, policies, and standard operating procedures (SOPs) in this Tertiary care Teaching Hospital in Mysuru.

### Objectives

The objectives of the study were as follows:

1. To prepare SOP and policies using codes for various emergency situations that may arise and to implement the same in the hospital.
2. To make clear all the employees about various emergency response codes implemented in the hospital and to train and provide guidance for the same.
3. To make policies available with regard to various emergency response codes which can be followed in a hospital.
4. To explore the experiences of designing and implementation of emergency response codes.

### METHODOLOGY FOR IMPLEMENTATION

1. Study of currently available national and international literature on the subject.
2. Various emergency situations that can occur in the hospital were identified.
3. SOP and policies were developed for each emergency situation using emergency response codes.
4. Planning: Steps that are currently required to complete the process like how is it done? Why is it done that way? How will an SOP improve the process? How the performance can be measured?
5. First draft: Emergency events were coded by a color, a code name, and a number. For each code, SOP is structured under following key components: Purpose, policy, team members, roles and responsibilities, process flow/procedure, documentation, training, and education along with the detailed list of the steps to be performed in the order that they can be done. This list is now a draft of the procedure.
6. Review: Inputs from all staff/employees who will perform the procedure have been taken by giving them the first draft and revision of the procedures has been done as necessary.
7. Testing: Procedures for each code has been tested by doing each step exactly written in the SOPs. Revised as necessary.
8. Posting: After preparing a final draft, approval has been taken from the hospital top management, and the same has been uploaded into the quality module of the hospital information system so that it is available to all the stakeholders.
9. Training: Regular training sessions have been planned and organized for all the staff members about their roles and responsibilities for effective functioning of hospital emergency response codes before implementation. Presentations were scheduled with various groups within the hospital such as physicians, nursing staffs, technicians, and security staffs to update on new emergency response codes. Information about new emergency response codes to be implemented was shared at various levels of staff meetings, safety meetings, and all new hospital personnel orientation meetings.
10. After formulating policies and procedures, training ,and education, the same were implemented.

11. A signage poster containing all the details of the emergency response codes and contact information is displayed at all the counters nearest to the telephone. All the employees are periodically trained for the same [Figure 1].
12. Informal oral surveys to determine staff knowledge using management rounding or other existing feedback mechanisms were also conducted.

in a uniform manner and provides information about the duration of the operation, the authorities of those involved, and other relevant details.<sup>[6]</sup> By definition, An SOP or “Standard Operating Procedure” tells in writing about WHAT should be done, WHEN it should be done, WHERE it should be done, and WHO should do it.

## RESULTS AND DISCUSSION

SOPs are detailed written instructions to achieve uniformity of the performance of a specific function. SOP is a complete reference document or operations manual that describes the purpose of a preferred method of performing a single function or a number of interrelated functions

### Emergency Response Plan

It can be defined as a set of written procedures that guide emergency actions, facilitate recovery efforts, and reduce the impact of an emergency event.

### Emergency Response Codes Policies and Procedures for a Large Multispeciality Tertiary Care Teaching Hospital

#### Purpose

The purpose of the study was to provide an appropriate response to various emergency situations including hazards

CODE	SITUATION	MESSAGE ALERT VIA INTERCOM (PAS) (3 TIMES ALERT) #54	TO BE CONTACTED
 CODE BLUE	Cardiac Arrest / Respiratory Arrest/Medical Emergency	<b>CODE BLUE</b> At < Location > Respond Immediately	Code blue Resident doctor & team members on duty / EMD / Nursing Supervisor / MOD / Security Officer / HK Supervisor.
 CODE RED	FIRE	<b>CODE RED</b> At < Location > Please activate Emergency Response team	Fire Officer / Security Officer / EMD / MOD / Engineering Dept. / CAO / Floor Manager / HK Executive / HR / PRO./ IP Manager/ IT Dept/ Finance Officer
 CODE PINK	Infant / Child Abduction	<b>CODE PINK</b> At < Location > Reach immediately	Security Officer / MOD / RMO / Consultant / IP Manager / Nursing Supervisor / DCNS / Floor Manager / PRO / IT DEPT / CAO
 CODE VIOLET	Violent Patient / Violent Patient Attender	<b>CODE VIOLET</b> At < Location > Reach immediately	Security Officer / MOD / Treating doctor / Reception / IP Manager / Finance Officer/MS / CAO / RMO / PRO / Nursing Supervisor / HR manager
 CODE ORANGE	External Disaster	<b>CODE ORANGE</b> Please Activate Emergency Response team	MOD / EMD / MS / CAO / Nursing Supervisor / DCNS / CMO / Security Officer/ Finance officer / PRO.
 CODE YELLOW	Internal Disaster	<b>CODE YELLOW</b> - At < Location > Please Activate Emergency Response team	MOD / Security Officer / CAO / EMD Department / DCNS / Nursing Supervisor / IP Manager / PRO / HR Engineering Dept. / Floor Manager /
 CODE BLACK	Bomb Threat Suspicious package	<b>CODE BLACK</b> Please activate Response team	Security Officer / MOD / MS / CAO / Finance officer / RMO / Reception / PRO / IT DEPT / HR

Figure 1: Poster depicting emergency response codes

and events that may arise in the hospital and may potentially have a significant impact on the normal operations of the hospital.

#### **Policy**

All employees have a responsibility to respond quickly to a suspected or actual emergency situation.

#### **Scope**

Hospital wide.

#### **Responsibility**

All the hospital employees, staff, students, etc.

#### **Emergency response color codes designated for this hospital under study**

- **Code Blue:** Code blue is the most universally recognized emergency code. Code blue means that there is a medical emergency occurring within the hospital. Common reasons for activating a code blue include cardiac arrest like a heart attack or dangerous arrhythmia and respiratory arrest (when someone stops breathing)
- **Code Red:** A code red denotes the presence or reasonable presumption that fire is occurring in a facility. For instance, a staff member who sees or smells smoke may activate fire codes.
- **Code Pink:** A code pink denotes a missing child/infant in this hospital.
- **Code Violet:** A code violet denotes violent patient/patient attender in this hospital. The purpose of this code is to provide an appropriate response to situations involving an aggressive, hostile, combative, or potentially combative persons toward hospital employees.
- **Code Orange:** A code orange denotes external disaster or a mass causality incident in this hospital. This could mean anything from a major road traffic accident to a natural disaster or act of terrorism or even epidemic disease outbreak. In short, it's any event that results in a high number of casualties that could stretch existing resources to their breaking point. Announcing this code may involve calling in staff on short notice, sourcing additional equipment, repurposing existing equipment, and prioritizing patient treatment so that there is enough physical space available to deal with incoming casualties.
- **Code Yellow:** A code yellow denotes internal disaster in this hospital.
- **Code Black:** A code black denotes a bomb threat to the hospital. This may include the identification of an actual bomb within the facility. The purpose of announcing this code is to provide an appropriate response in the event of a bomb threat or physical threat and the discovery of a suspicious device or item.

#### **When to activate an emergency response code**

An emergency response code will be initiated when any of the above emergency situations will occur.

#### **Who can activate emergency response code**

Any individual, i.e., hospital staff of all categories may call a code.

#### **How to activate emergency response code**

1. Step one in organizing an emergency response is notification. An efficient notification service is required to ensure that the right resources are mobilized based on the type of incident.
2. Communication system in the hospital is adequate along with a good public address system, and in fact, each and every telephone in the hospital is connected to public address system so as to communicate to other hospital employees in case of any emergencies.
3. The individual calling the code must dial the designated number to call a code that is applicable to that particular emergency situations.
4. Give the exact location (i.e., block, floor, area, room no., etc.)

#### **What happens when the emergency response code is announced**

1. When a code is called, a pre-designated team of physicians, nurses, and other appropriate personnel respond swiftly and efficiently, based on their training.
2. When the emergency response code is announced, the message will be received by the team, who are expected to arrive at the scene and expected response time is 0–3 min.
3. When an emergency response code is called, all team members of that code should respond immediately.
4. The members of the emergency code team must ensure that area/scene is safe before proceeding with their response. This requires rapid assessment of the location and circumstances associated with the emergency response code call.
5. Emergency response code team members function collaboratively during the code with one person identified as code team leader.
6. The code incident report is filled by the team leader at the end of event and submits to the director/medical superintendent/chief administrative officer/committee (CPR committee/safety committee, etc.)

#### **Documentation and reporting**

1. Documentation containing information about the activation is reviewed and retained.
2. Reporting of the incident may be completed through an event report/incident report which is designed or any other reporting method.

3. Management will conduct a root cause analysis or similar review of the incident to identify areas for improvement and then implement those improvements

#### **Training and education**

1. Training and education ensure that all staffs are aware of potential emergency situations and/or security hazards, how to respond or react and how to protect themselves and their coworkers through established policies and procedures.
2. Specific training should be provided to all the team members as to their specific roles and responsibilities during a variety of scenarios.
3. Training for staff includes what to do when they become a hostage or victim.

### **CHALLENGES OF IMPLEMENTATION**

One of the primary problems of the hospital emergency response code system, in general, is a lack of national standardization. Although some emergency response codes, such as code blue and code red, are universal around the world, many of the other codes are not consistent. Each color can have various meanings across different states or countries. Some hospitals use numbered code systems rather than colors. Each hospital or hospital association is responsible for developing its own emergency codes. When these codes are developed independently by hospitals, there is a variability and overlap between hospitals and a great deal of variance, which can be a source of confusion at critical moments to health-care personnel. This variability may also mitigate the effectiveness and speed of response in critical events. Besides the lack of uniformity in emergency codes, critical events are often defined differently between hospitals, for example, "Fire" is included in "Internal Disaster" in some hospitals, whereas in others, each has its own code. Health care workers move frequently between hospitals and may work at more than one hospital,<sup>[5]</sup> resulting in an inability to remember and respond to the right code at the right time. Some countries, such as England and Canada, use a nationally standardized set of emergency hospital codes. This means that every hospital uses the same communication terminology to communicate during an emergency situation. However, this standardization has not yet been implemented in India, although it has previously been recommended.

### **CONCLUSION**

Emergency response codes are color-coded indicators used in health-care facilities to alert all relevant hospital staff members for potential issues arising in the hospital. An

emergency can happen anytime. Clear communication is a key element to ensure a quick response to protect patients, visitors, and staff and hospital property. Communications technology clearly has a huge role to play in the event of various hospital emergencies and should be an integral part of any emergency handling plan. If you cannot communicate effectively, then your chances of adequately responding to the situation are greatly reduced. The most commonly cited problem in emergency situation management is invariably communications breakdown, with emergency activities and decision-making being seriously affected by vital information being lost or delayed. Hence, the right technology, if implemented correctly, can make a huge difference in emergency situations. The goal is for hospitals to phase in the implementation of the recommended codes so that the required materials and training can be developed and offered at a time best suited for hospital employees. Emergency response codes help hospital personnel understand how to effectively manage various emergency situations. Hospital emergency management is a continuous process requiring the seamless integration of planning and response efforts with local and national programs. The above layout can be useful to assist hospital administrators and emergency managers in responding effectively to the most likely emergency scenarios as well as while planning to implement emergency response plans in other small or large health-care organizations.

#### **Recommendations**

1. Continuous training programs should be organized for the hospital employees through regular classes or mock drills.
2. Periodic Corrective Action Preventive Action analysis of the documented events.
3. Periodically reviewing and revising the protocols as per need.
4. Continuous monitoring of the various incidents and staff handling skills because monitoring all aspects of the program provides valuable data to improve the program and further reduce the risks in the hospital.
5. Training exercises can help in raising level of preparedness and ensure that everyone knows what their role should be if an emergency situation arises.
6. Testing: The importance of testing can never be understated. The systems and equipment may be top of the line, but they also need to be easy to work with and ready to go at a moment's notice. An emergency may occur at any time, so you need to be able to launch straight into your emergency procedures. This means that 100% uptime is not just a goal, but a requirement, and to ensure that this is the case, you should carry out regular testing. Your notification system, for example, should have built-in test procedures that enable you to check functionality without actually triggering an alert.

7. To evaluate the adherence to the implemented protocols, the actual training and competence of hospital staff in the use of emergency response codes by conducting surprise mock drills.
8. To evaluate the success of implementation efforts and institutional compliance, a much larger follow-up study to be conducted.
9. It is recommended that the higher authorities and regulatory bodies should bring together local and national experts in the field to develop standard emergency response codes for hospitals in India.
10. To assess the effect of emergency response codes on issues such as the satisfaction of hospital staff and the prevention of in-house complications.

### Strengths

1. Our study has several strengths, such as we had developed the policies and procedures in a systematic way, and is validated by the experienced experts in the field.
2. The policies and procedures formulation included individuals who are directly or indirectly related to functioning of those emergency response codes.

### Limitations of these Policies

1. The principles and recommendations outlined in these policies are specially designed for this large multispecialty tertiary care teaching hospital only. Hence, the principles and recommendations included in these policies may be used by other hospitals at any level of emergency preparedness only after suitable modifications as per their organizational needs and resources available.
2. Emergency response codes and its activation dial number will vary from one hospital to another. Always follow your organizational policy and procedures for emergency response code activation.
3. Means of announcing these emergency response codes also differ from hospital to hospital depending on the resources available.
4. Depending on each hospital size and level of care, code designations may vary and team composition for various codes is not fixed and may vary from hospital to hospital.

### AUTHORS' CONTRIBUTIONS

Dr. Sathish Raju N conceived the concept, developed the structure, and wrote the first draft of the manuscript.

Dr. M. D. Ravi made critical revisions and contributed to the writing of the manuscript and approved the final version. Dr. Jayati Bahuguna participated in the design of the study. Dr. (Col) M Dayananda participated in the design of the study and revised the manuscript. All authors read, reviewed, and approved of the final manuscript.

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