

**To Assess whether human variables have an impact on CPR
procedures at Jaypee Hospital, Noida, using Simulation**

Dissertation Submitted to



The IIHMR University, Jaipur

For the partial fulfillment for the award of the
degree of Master of Business Administration

(MBA)

in

Hospital and Health Management

by

Dr. Rashmi Rana

Under the Supervision and Guidance of

Mr. Sandesh Kumar Sharma

2022

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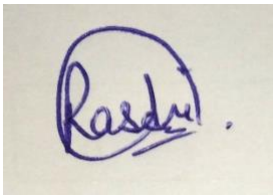
Under the Supervision and Guidance of

Mr. Sandesh Kumar Sharma

2022

DECLARATION BY STUDENT

I hereby declare that this dissertation titled **To Assess whether human variables have an impact on CPR procedures at Jaypee Hospital, Noida, using Simulation** is a true record of the work I did for my initial research. I certify that it has not been applied for a degree or diploma from any other university or institution. Information that was taken from other people's published or unpublished work has been properly acknowledged in the text.

A handwritten signature in blue ink, appearing to read 'Rashmi', enclosed within a circular scribble.

Rashi Rana

Date: 25-06-2022

INTERNSHIP COMPLETION CERTIFICATE



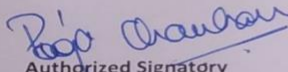
Dated: 25 June 2022

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. Rashi Rana** from **IIHMR University, Jaipur, Rajasthan**, has successfully completed Internship in **Quality & System** with Jaypee Healthcare Limited from **29 March 2022 to 25 June 2022**. She was found sincere & hard working during this tenure.

We wish her all the best for her future endeavours.

For Jaypee Healthcare Limited


Authorized Signatory
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CERTIFICATE

This is to accredit that dissertation titled **To Assess whether human variables have an impact on CPR procedures at Jaypee Hospital, Noida, using Simulation** is a record of the research work undertaken by **Dr. Rashmi Rana** in fragmentary attainment of the exigencies for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur under my guidance and supervision and her advent to the research study has been genuine, experimental, and interpretive.

Mr. Sandesh Kumar Sharma

Faculty Guide
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Date

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School Dean
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Date

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There will be many hurdles along the way to success, and they may impede development, but if you keep practicing and moving forward, nothing can stop you.

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Rashi Rana

HM25

ABSTRACT

Objectives: The prognosis for in-hospital cardiopulmonary arrest is bleak. According to recent data, adults receive poor quality basic and advanced life support, this makes outcomes less than desirable. The objectives of this study were to assess whether human variables have an impact on CPR procedures & to identify gaps (if any) in the Code Blue processes at Jaypee Hospital in Noida, as well as to propose and implement changes that would result in improved CPR outcomes.

Methodology: A Descriptive Retrospective study, which is based on the data gathered from Jan 2022-March 2022, another approach is the observational/participatory study Apr-June 2022 was used to assess if the human variables have an impact on CPR procedures at Jaypee Hospital, Noida, U.P. Patients admitted to the ICUs and in-patient wards, as well as all visitors and Jaypee Hospital staff, served as the study population. There were no exclusion criteria in this study. Analysis of the collected data was done through MS Excel.

Results: Several gaps were discovered after analyzing the retrospective data of CPRs from January to March 2022. The quantitative information was not presented in percentages. Several gaps were identified through direct observations during Code Blue mock drills, and significant corrective actions were taken to close them in order to improve the outcomes of CPRs in the hospital.

Conclusion: Observations, group debriefings, and CPR review forms were used to identify mistakes that could have affected CPR responses. The organization's CPR Review Committee was then informed of the mistakes for further action and repair. After additional analysis of the quantitative and qualitative data, the gaps or errors were filled in. Exercises including mock code simulations offered a special and practical way to orient healthcare staff. This study offered a thorough gap analysis that was used to create and put into practice a tailored system-wide CPR protocol.

Key Words: Code Blue, Cardiopulmonary Resuscitation, Cardiac Arrest, Gap Analysis, Simulation, Mock Code, Advanced Cardiac Life Support.

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Acronyms:

S. No.	Acronyms	Meaning
1.	CPR	Cardiopulmonary Resuscitation
2.	ROSC	Return of Spontaneous Circulation
3.	ERT	Emergency Response Team
4.	OT	Operation Theatre
5.	ICU	Intensive Care Unit
6.	BLS	Basic Life Support
7.	ACLS	Advanced Cardiac Life Support
8.	NALS	Neonatal Advanced Life Support
9.	PALS	Pediatric Advanced Life Support
10.	CTVS	Cardiothoracic and Vascular Surgery
11.	AED	Automatic External Defibrillator
12.	ECG	Electrocardiogram
13.	NICU	Neonatal Intensive Care Unit
14.	PICU	Pediatric Intensive Care Unit
15.	TICU	Transplant Intensive Care Unit
16.	MOD	Manager on Duty
17.	EMO	Emergency Medical Officer
18.	RMO	Resident Medical Officer
19.	CBT	Code Blue Team
20.	AHA	American Heart Association
21.	MICU	Medical Intensive Care Unit
22.	MOM	Minutes of Meeting

Chapter 1: Introduction:

The term **Code Blue** is a code that is used to describe a patient who requires resuscitation or emergency medical assistance, usually because of a respiratory or cardiac arrest. The Code is called so that the ERT members reach the location on time and also to avoid panic in the premises.

As part of its catastrophe planning, every hospital establishes a rule stating which departments offer personnel for code coverage. Theoretically, any EMT can respond to a code, but the team can only be joined by individuals who have ACLS or other comparable resuscitation training.

The team includes a critical care nurse and specialists who specialize in anesthesiology, emergency medicine, and internal medicine. The process of “running the code” is carried out by a physician or rapid response team leader, who is in charge of overseeing the resuscitation effort.

A crucial part of treating cardiac arrest is cardiopulmonary resuscitation. It is advised that it begin as soon as is practical with the least amount of disruption. When performing CPR, chest compressions have the most impact, along with administering necessary drugs in the prescribed quantities. When a patient’s heart rhythm is in asystole after 20 minutes of excellent CPR without a ROSC and CPR has been stopped, it is reasonable to declare the patient dead.

1.1 JAYPEE HOSPITAL’S CPR COMMITTEE:

The Cardio-Pulmonary Resuscitation (Code Blue) Committee at Jaypee Hospital is a multi-disciplinary body that supports high quality patient care standards by monitoring and assessing the effectiveness and appropriateness of all significant cardiopulmonary resuscitation procedures.

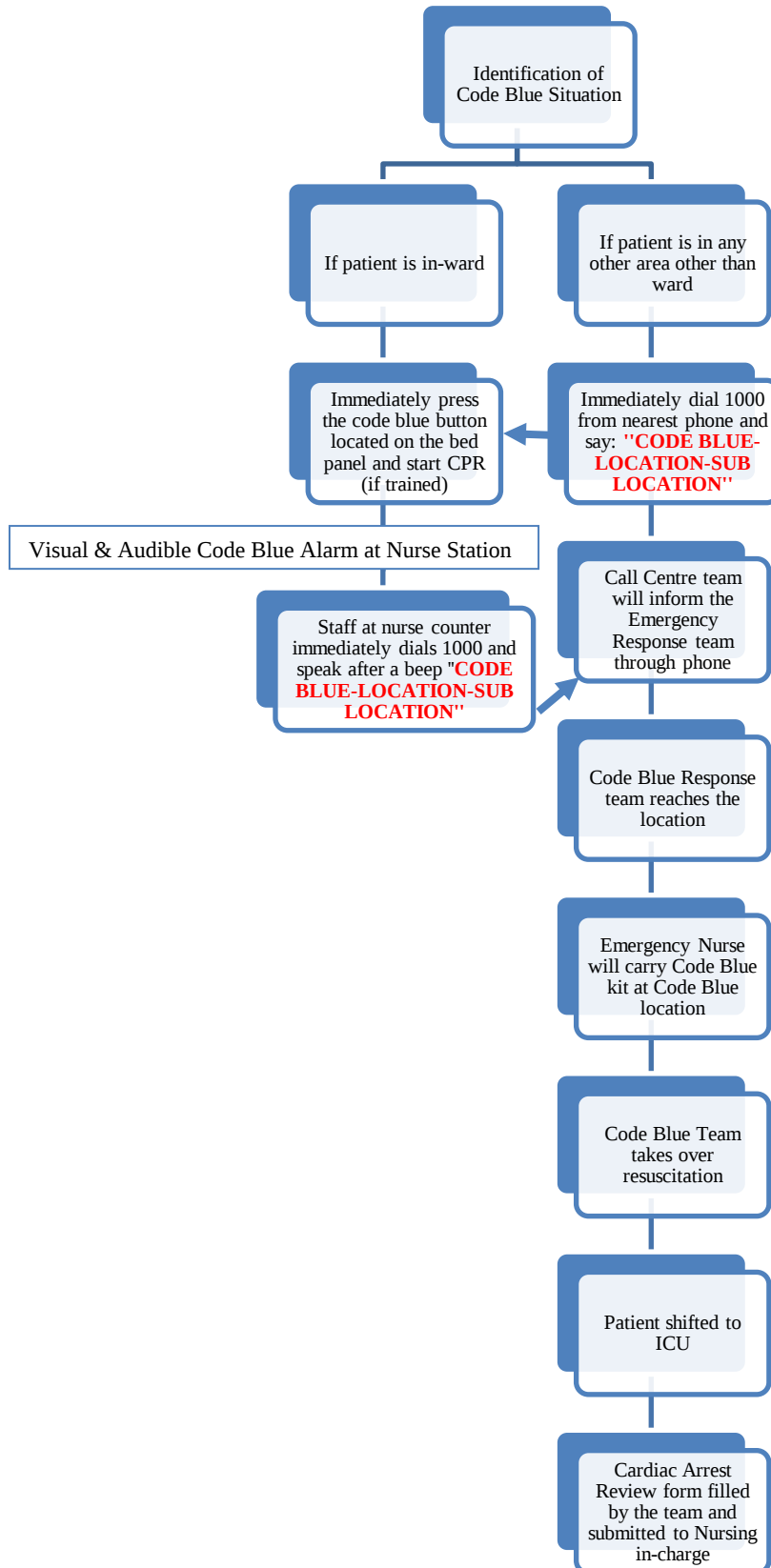
1.2 Objective of the CPR Committee: To develop protocols on how to administer mechanical breathing and heart support in cases of cardiac and/or respiratory arrest and closed-chest cardiac massage.

1.3 Policy for CODE BLUE in Jaypee Hospital:

1. The individual who notices the cardiac arrest should call the call centre using the CODE BLUE.

2. When a patient in the ward experiences a cardiac arrest, the Code Blue button on the bed panel can be pressed to alert the nurses at the nursing station.
3. The Call Centre then alerts the ERT, who has a three-minute response time.
4. If the phone system fails, the Call Centre will notify the ERT team via the Public Announcing System.
5. If the PA system fails, the Call Centre will notify the security in-charge about the code blue and the location, and the security in-charge will notify all security guards via wireless walkie-talkie. Emergency, OT, and ICU security guards will immediately notify the nurse in charge and duty doctor of their respective departments.
6. As soon as the Critical care doctor arrives, he or she will assume command and assign tasks to team members, as well as direct their actions. Determines the most appropriate therapy according to ACLS criteria and issues orders to team members. Once the patient has been stabilized, decides on the best course of action. One of the team members is responsible for briefing the patient's attendant during resuscitation. The Internal Medicine Doctor is in-charge of keeping track of occurrences in the code blue flow sheet and dealing with the medicine.
7. NICU/PICU/Paeds CTVS (on call) Doctor assigns duties to team members and guides their actions according to NALS/PALS rules in the case of neonates and pediatric patients.
8. The anesthetist collaborates with the ICU doctor to determine the patient's rescue plan.
9. Nursing Supervisor and Emergency In-charge Nurse follows the doctor's orders. She is in-charge of turning on the AED/Defibrillator. She must monitor rhythms using AED pads/ECG leads/paddles, as well as analyze rhythms and deliver shocks as directed by the doctor.
10. Security officers guarantee that the code blue site is not over-crowded.
11. The MOD works with the code blue team to coordinate.

1.4 Code Blue Process Flow in Jaypee Hospital:



1.5 Code BLUE team members:

- i. Anesthetist (on call)
 - ii. ICU Doctor (on call)
 - iii. EMO on duty
 - iv. Emergency In-charge Nurse (on call)
 - v. PICU Doctor (on call)
 - vi. NICU Doctor (on call)
 - vii. Paeds CTVS Doctor (on call)
 - viii. Nursing Supervisor (on call)
 - ix. Manager-On-Duty (on call)
 - x. Security Supervisor (on call)
 - xi. Internal Medicine- Doctor (on call)
- } (as per requirement)

1.6 ROLES AND RESPONSIBILITY OF CODE BLUE TEAM MEMBERS:

(a) First Responder The closest healthcare personnel, who discovers the need for resuscitation
Starts CPR as per protocol (within 1 minute)

1. Scene Safety
2. Shakes and shouts-Are you okay? To check responsiveness
3. Scans the chest for breathing.
4. Calls for help/Activates – Code Blue himself if no help available
5. Checks pulse and delivers chest compression
6. Open airway and give two Rescue Breaths
7. Until the Code Blue crew arrives, keep performing CPR
8. Upon arrival, brief the Code Blue crew

(b) Second Responder The one who has heard the call for help or one designated by the first responder

1. Dial your code activation number and state —Code Blue, location, and age of patient
2. Brings the crash cart & Defibrillator to the room.
3. Opens Crash Cart & connects AED pads to patient's bare chest
4. Switches to oral airway, ambu-bag, and oxygen if available
5. Assists in CPR

(c) Call Centre: Top priority to code blue calls and send messages immediately to the designated numbers, through phones, if phones are not working then PA system and if PA system is also not working then through Wireless walkie talkie.

1. Arrival of "Code Blue Team" (Within 3 minutes)
2. Intensivist, Anesthetist, EMO, ER Nurse, Nurse, Manager on duty, Security Staff
3. 2 Floor nurses & nursing team leader will help the code blue team
4. Also informed by call centre: Duty Manager, Security Personnel

(d) Code Blue Team Leader (Intensivist):

1. Assigns team members roles and controls their behavior.

2. Makes a treatment decision in accordance with ACLS recommendations and issues directives to team members.
3. Once the patient has stabilized, decides on the best course of action.
4. Assign one of the team members to inform the patient's companion while performing CPR.
5. Ensures that the Nursing Manager is assigned the responsibility of keeping a running log of events for the code blue.
6. Ensures that the floor doctor helps nursing manager fill out the record sheet.

(e) Airway & Breathing (Anesthetist + ER Nurse):

1. Bag Mask Ventilation
2. Prepares for advanced airway with the help of a nurse if required.

(f) Circulation (RMO + Nurse):

1. Cardiac Compressions
2. IV/IO access & administers drugs as directed by the team leader.

(g) Defibrillation (Nurse):

1. Turn on the AED/Defibrillator
2. Monitor rhythms using AED pads/ECG leads/Paddles
3. Conduct rhythm analysis and shock administration as directed by the Code Blue Team Leader

(h) Security Personnel:

1. Directs team members towards code location
2. Certifies that the code blue site is not overcrowded

1.7: Jaypee Hospital's CPR record sheet and review form Format: The Critical Care team doctors record the Cardiopulmonary Resuscitation (CPR) event in a form called the Cardiopulmonary Resuscitation Record (CPR) form and in a coder sheet to be filled out by the critical care doctor stating the minutes of resuscitation. The code blue committee conducts a post-event analysis to determine the necessary corrective/preventive action. The CPR Record Sheet and CPR Review Form are formatted and attached in Appendix A.

Chapter 2: Review of Literature:

S. No	Title	Authors	Objective	Methodology	Findings
1.	Code Blue Policy for a Tertiary Care Trauma Hospital in India	Sapna Ramani Sardana, DK Sharma, Sonia Chauhan, Sheetal Singh, Sanjeev Bhoi (2015)	To certify the prompt arrival of a qualified medical team for emergency resuscitation and to offer urgent life-saving assistance in the event of a life-threatening emergency.	Between January and June 2015, a descriptive cross-sectional study was conducted. Doctors, nurses, paramedics, and quality managers from both public and commercial institutions were included in the study population. After a thorough analysis of the literature, a checklist was created and concocted.	The overall response rate was 62%. Out of the 50 doctors contacted, 41 responded. Of the 50 nurses contacted, 34 responded. Of the 50 quality managers contacted, 20 interacted. Of the 25 doctors contacted, 16 responded with expertise in handling Code Blue situations. Of the 25 nurses contacted, 14 responded with expertise in infection control procedures. After taking into account feedback from responses provided in light of the checklist, policy was formulated.
2.	Using simulation to orient code blue teams to a	Hania Wehbe-Janek, Stephen Sibbit, Frank J. Villamaria,	To familiarize Code Blue Teams	To orient CBTs to important situations,	12 practice codes were run in various parts of the new

	new hospital facility	Jennifer Hays-Grudo, Jose F. Pliego, Neil Coker, Paul E. Ogden, M. Hasan Rajab, Jeff L. Browning, Keith Musick (2008)	(CBTs) with catastrophic occurrences in a brand-new healthcare facility via high-fidelity simulations. Clarifying variables that might have influenced debriefing teams' responses was a secondary goal.	high-fidelity simulation-based mock Code Blue trainings were executed in actual corporate contexts. Participants were informed after each sample code to identify any obstacles to quick response and sound judgement.	building. 69% of the participants said the training was helpful. First responders arrived on average in forty-two seconds, and the first CBT member arrived in sixty-six seconds. The average delay between the start of chest compressions and the arrival of the crash cart was 80 seconds, 68 seconds, and 341 seconds, respectively.
3.	Epidemiology and outcomes of in-hospital cardiopulmonary resuscitation in the United States, 2000-2009.	Julie A Sosa, Sanziana A Roman, Hadiza S Kazaure (2013)	To investigate at population-level temporal patterns in the epidemiology and results of in-hospital CPR patients.	The Nationwide Inpatient Sample of the US (2000-2009) was used for the retrospective study on the temporal patterns in CPR prevalence, survival to discharge, discharge propensity, length of hospital stays,	In the US, the rate of in-hospital CPR has grown, while CPR beneficiaries have gotten younger and sicker over time. The rate of survival after discharge has increased by 41.3%. Functional results following in-hospital CPR seem to have

				and hospitalization costs for CPR patients (age 18 years or above).	gotten worse, with significant clinical and financial ramifications.
4.	Human factors affect the quality of CPR in simulated cardiac arrests	Katja Marquardt, Franziska Tschan, Stephan C U Marsh, Patrick R Hunziker, Christian Müller, Gerson Conrad (2003)	To actuate if and how human variables influence the quality of CPR.	In a patient simulator, 16 teams of three healthcare professionals were examined. The example of a cardiac arrest that was witnessed and caused by ventricular fibrillation was provided. Ventricular fibrillation might be brought under control with two counter shocks given within the first two minutes or two counter shocks given within the first five minutes, as long as basic life support was initiated without interruption in under 60 seconds. If ventricular fibrillation was changed into sinus	Nearly two thirds of teams made up of certified health-care professionals fizzle to administer BLS and/or defibrillation within the allotted time frame in a scenario involving a simulated observed cardiac arrest. Poor team performance was linked to a lack of leadership behavior and a lack of defined work distribution. The inability to transform theoretical understanding into efficient teamwork appears to be a significant issue.

				rhythm, teams were deemed successful. Leadership, task allocation, information transfer, and conflicts all received behavioral ratings.	
5.	Evaluation of staff's retention of ACLS and BLS skills	Karen Pierce, Kimberly K Smith, Darlene Gilcreast (2008)	To evaluate the retention of theoretical knowledge and advanced or basic psychomotor skills in registered nurses.	Scenarios requiring ACLS or BLS abilities were employed in penned and attainment exams (initial, post-training, and final testing). The last testing period was assigned at random to three, six, nine, or twelve months.	According to study findings, nurses were losing their ability to conduct ACLS and BLS procedures to standard for the duration of their certification. There is a requirement for more frequent refresher training. There is no documented research at this institution that shows that patient outcomes were negatively impacted by skill decline. It is necessary to conduct more research on the topics of ACLS and BLS course design,

					management, and implementation.
6.	Impact of ACLS training program on the outcome of cardiopulmonary resuscitation in a tertiary care hospital	Anupam Shrivastava, Kanwalpreet Sodhi, Mahender Kumar Singla (2009-2010)	To assess the effect of an AHA-certified BLS and ACLS provider training on CPR outcomes at our hospital.	During the course of the retrospective investigation, 18 months passed. The study included all adult patients who experienced in-hospital cardiac arrest during the pre-BLS/ACLS training period (January to September 2009) and the post-BLS/ACLS training period (October 2009 to June 2010). Amid these 2-time frames for study, CPR results were compared.	Six hundred twenty-seven cardiac arrests occurred inside hospitals, 284 of which happened before BLS/ACLS training and 343 of which happened after. 52 patients (18.3%) experienced a recovery of spontaneous circulation during the pre-BLS/ACLS training phase, compared to 97 patients (28.3%) during the post-BLS/ACLS training period.
7.	Hands-on time during cardiopulmonary resuscitation is affected by the process of team building: a prospective randomized simulator-based trial	Sabina Hunziker, Franziska Tschan, Norbert K Semmer, Roger Zobrist, Martin Spychiger, Marc Breuer, Patrick R Hunziker, Stephan C Marsch (2009)	To investigate and evaluate the effects of ad-hoc team building on the adherence to the CPR methods among general practitioners and hospital	The performance of premade teams, or teams that had gone through their process of team formation before the commencement of a cardiac arrest, was compared with	Inadequacies in the process of ad hoc team building, and specifically deficiencies in leadership, have a detrimental impact on hands-on time and time to defibrillation, 2 performance

			physicians, 2 categories of doctors who play a significant role as cardinal responders during CPR.	that of teams that had to form ad hoc during the cardiac arrest in this prospective randomized trial. Fifty teams of 3 general practitioners and fifty teams of three hospital doctors were randomly assigned to one of 2 variations of a mock witnessed cardiac arrest: either the arrest took place with only 1 doctor present while the other 2 were called to assist ("ad-hoc"), or it took place with all three doctors present ("preformed"). Entire scenarios were recorded, and 2 impartial observers evaluated performance after the fact.	indicators of CPR with a proven congruity for medical result. Thus, it must be understood that team formation is an additional job placed on the teams that spontaneously form during CPR. All doctors should be apprehensive that initial team organization is a requirement for performing CPR efficiently and on time.
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8.	The effect of adherence to ACLS protocols on survival of event in the setting of in-hospital cardiac arrest	Haley E Moore, Paul J Nietert, Matthew D McEvoy, Sheila H Scarborough, Larry C Field, Jeremy C Smalley (2013)	To gain a better understanding of the relationship amid overall adherence to ACLS guidelines and successful ROSC.	A retrospective chart audit of medical records and code team worksheets was conducted for seventy-five patients who had ROSC after an IHCA event (SE group) and seventy-four who did not survive an IHCA event (DNS group). Protocol cohesion was examined using a comprehensive archive based on the 2005 ACLS updated protocols. Several additional patient idiosyncracics and assets were also assessed as potential predictors of ROSC.	For seventy-five patients who experienced ROSC following an IHCA incident (SE group) and seventy-four patients who did not survive an IHCA event, a retrospective chart audit of medical records and coding team worksheets was carried out (DNS group). As potential predictors of ROSC, a number of additional patient conditions and characteristics were also looked at.
9.	Association between Hospital Resuscitation Team Leader Credentials and Survival Outcomes for	Sarah L Krien, Brahmajee K Nallamothu, Paul S Chan, Vittal Hejjaji, Theodore J Iwashyna, Ali O Malik, Brad Trumpower,	To find out if different hospitals' in-hospital cardiac arrest (IHCA) survival rates differ	Hospitals taking part in the Get with the Guidelines - Resuscitation register for IHCA were surveyed.	A total of 44,477 IHCAs from one hundred ninety three hospitals, who completed the study survey,

	in-hospital cardiac arrest	Apurba K Chakrabarti, Marci Kennedy, Khaja Chinnakondepalli (2018)	depending on whether resuscitations are frequently led by an attending physician, a medical trainee, or a non-physician.	Based on the responses, hospitals were divided into three groups: attending physicians, physician trainees, and non-physicians, depending on who usually directs resuscitations. Then, using multivariable hierarchical regression, the rates of good neurological survival, survival to discharge, and recovery of spontaneous circulation in these 3 hospital groups from 2015 to 2017 were compared.	participated. In the majority of hospitals, doctors performed resuscitations; 121 (62.7%) had attending physicians in charge, 58 (30.0%) had doctors-in-training in charge, and 14 (7.3%) had non-doctors in charge. Regardless of whether resuscitations were frequently led by an attending physician, a medical trainee, or a non-physician, the risk-standardized rates of survival to discharge were comparable across hospitals. The risk-adjusted rates of recovery of spontaneous circulation and good neurological survival were also the same in all three groups.
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10.	Randomized controlled trial comparing pit crew resuscitation model against standard ACLS training	Martias Rantanen, Ville Peltonen, Jaana Koskela, Miretta Tommila, Laura-Maria Peltonen, Olli Vanttinen, Jari Säämänen, Katariina Perkonoja, Sanna Salanterä (2022)	To determine if, in comparison to traditional ALS teaching, a pit crew model of training enhances performance assessment and ALS skills retention.	This trial used parallel groups and was prospective, blinded, random, and controlled. Students were assigned to 4-person resuscitation teams, and a follow-up was conducted after 6 months. A linear mixed model was used to model the difference amid the groups in the TS and NTS after technical skills (TS) and non-technical skills (NTS) were assessed with a tool measuring TS and NTS. The difference amid the groups in hands-on ratio and hands-free time was investigated using a different linear model.	The median (Q1-Q3) total evaluation score at the 6-month follow-up was 6.5 (6-8) for the control group and 7 (6.25-8) for the intervention group, although there was no statistically significant difference amid the two groups ($U = 133$, $P = 0.373$). The quality of the chest compressions was better in the intervention group.
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Chapter 3: Methodology:

3.1 Study Design: Descriptive Retrospective study was used for this study.

- Another approach is the observational/participatory study, to assess if the human variables have an impact on CPR procedures at Jaypee Hospital, Noida, U.P.

3.2 Setting: This study was conducted at Jaypee Hospital, Noida, U.P.

3.3 Study Population: Patients admitted in the ICUs and In-patient wards, all visitors, and staff of Jaypee Hospital.

3.4 Inclusion Criteria: If a patient, visitor, or member of staff experiences a cardiac or respiratory arrest and displays any of the following signs, a Code Blue will be commenced:

- Unresponsiveness
- Lack of breathing
- There is no neck pulse (this must be witnessed by a healthcare provider).

3.5 Duration of the Study: 6 months, from Jan 2022-March 2022 (the quantitative data) and April-June 2022 for observational study.

3.6 Data Analysis: Analysis of the collected data was done through MS Excel.

Chapter 4: Results:

4.1: For the months of Jan 2022-March 2022, the numbers of CPR forms received by the Quality department:

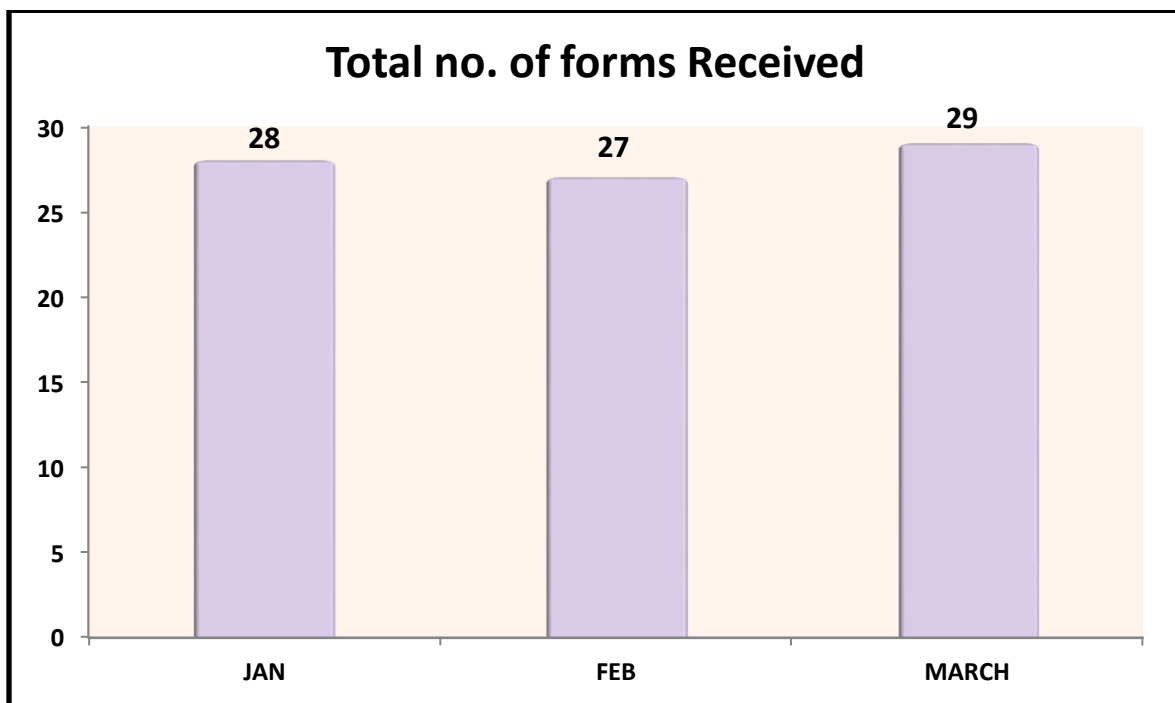


Figure 4.1: Total number of CPR forms received (Jan 2022-March 2022)

- From Fig. 4.1, we can see that the total number of CPR forms received by the quality department is inclining toward the total number of times the hospital has experienced a code blue. The overall number of code blues for the month of January 2022 was 28, with 27 and 29 for the months of February and March 2022, respectively.

4.2: From Jan 2022 to March 2022, total number of Code Blue & Non-Code Blue CPRs performed:

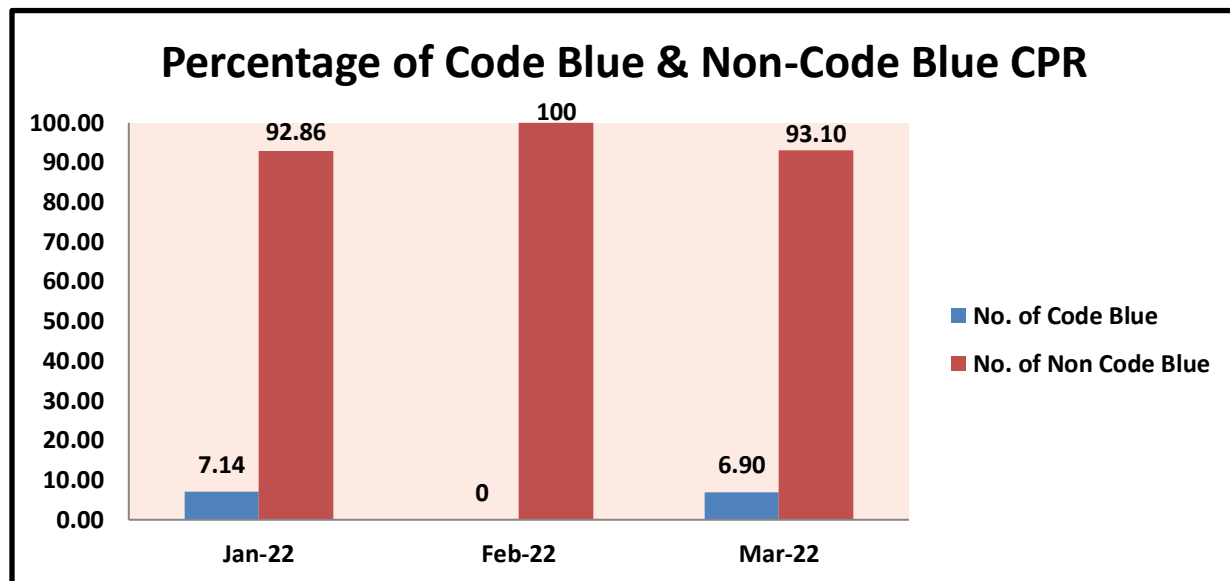


Figure 4.2: Total number of Code Blue & Non-Code Blue CPRs

- If the need for resuscitation happens in a critical care area, the code is announced as non-code blue; if the need for resuscitation occurs in an in-patient, outpatient, emergency department, or any other place other than critical care areas, the code is announced as code blue. From Fig 4.2, we can see that non-code blues were reported to be 92.86% in January 2022, while code blues were around 7.14%. Non-code blues were 100% for the month of February 2022, while no code blues were reported. Similarly, non-code blues were 93.10% in March 2022, while code blues were around 6.90%.

4.3: Patient Status (After CPR) from Jan 2022-March 2022:

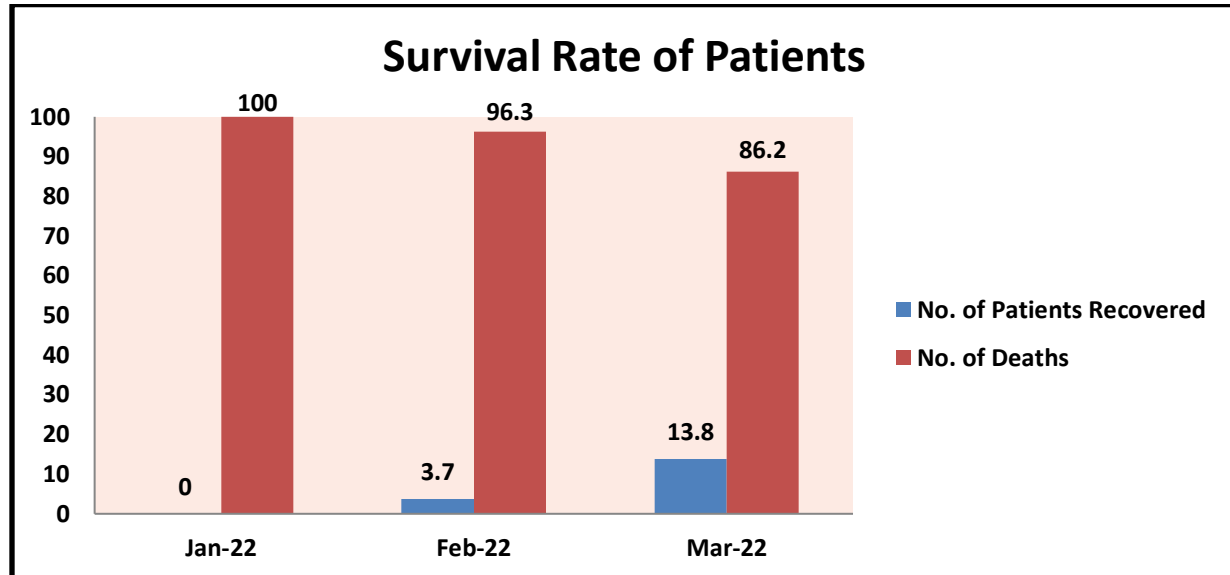


Figure 4.3: Patient Status (After CPR)

- In the month of January, survival rates after cardiopulmonary resuscitation were found to be zero. The survival rates for the months of February and March were 3.7% and 13.8%, respectively. Death rates were 100% in January, 96.3% in February, and 86.2% in March.

4.4: Age-wise Distribution of Patients:

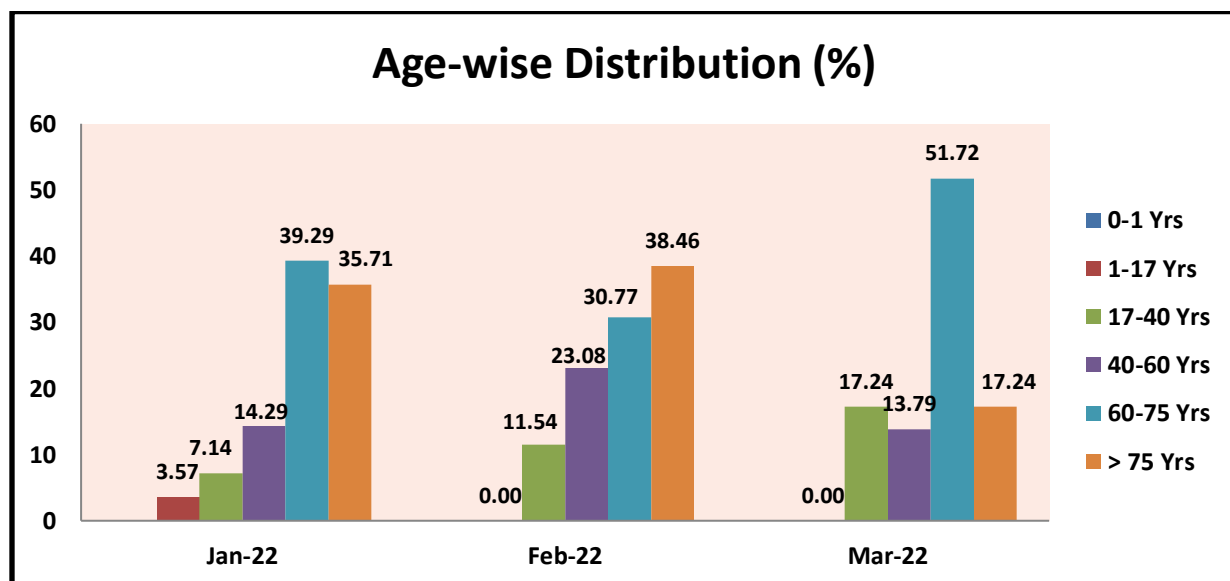


Figure 4.4: Patient's age-wise distribution

- For the month of January, the age group 60-75 years had the highest number of patients

receiving CPR, accounting for 39.29%, followed by geriatric patients (>75 years) accounting for 35.71%. Patients aged >75 years required CPR the most, accounting for 38.46%, and patients aged between 60-75 years also required it subsequently, accounting for 30.77% in February. For the month of March, patients aged between 60-75 years required CPR the most, accounting for 51.72%, and the patients aged between 17-40 years and >75 years also required it subsequently, accounting for 17.24%. From Fig. 4.4, it is evident that the pediatric patients were in a better state and did not require the CPR and the geriatric patients (aged between 60-75 years and >75 years) required it the most.

4.5: Area-wise Distribution of the occurrences of Code Blue:

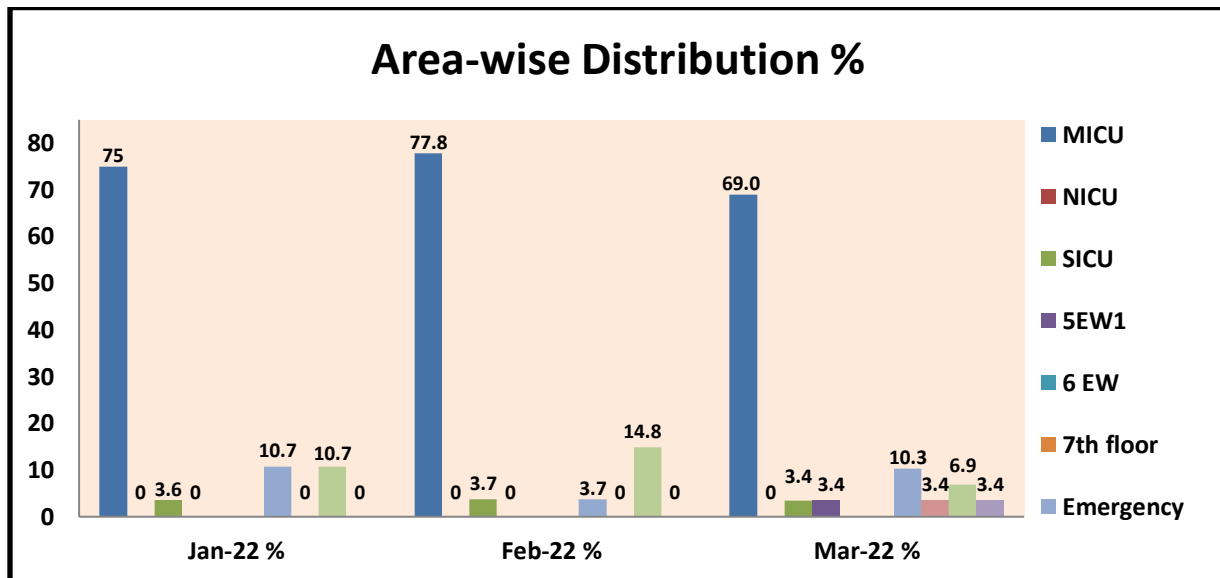


Figure 4.5: Code Blue Processes' Area-wise distribution

According to Fig. 4.5, most code blues were initiated in ICUs, particularly the MICU, accounting for 75% in January, 77.8% in February, and 69% in March. The obvious reason is that most of the patients that are admitted to the MICU are terminally ill.

4.6: Gaps Identified in the Code Blue Processes (April-June 2022):

Gap Analysis method is used for determining the discrepancy amid present understanding, skills, and/or practices and the aspired optimum practice (or the Desired State).

Gaps in both quantitative and qualitative data were discovered while doing the analysis.

4.6.1: Gaps Identified from the Quantitative data:

➤ Gap 1:

Current State	Desired State	Identified Gap	Gap due to knowledge, skill and/or practice	Mechanism used to identify Professional Practice Gap
CPR is divided into code blue and non-code blue CPR on the CPR Record sheet.	<u>All code blues</u> whether in intensive care or any other area of the hospital are known as code blue.	The staff is currently marking non-code blue & code blue in the CPR form, as it the hospital policy.	Practice: Hospital Policy, which is to be followed by the staff.	By observing the CPR review sheets of the patients.

Table 4.6.1 (a): Differentiation of Code Blue

4.6.2: Gaps Identified from Direct Observation:

➤ Gap 2:

Current State	Desired State	Identified Gap	Gap due to knowledge, skill and/or practice	Mechanism used to identify Professional Practice Gap
Debriefing meetings for identifying deficiencies in the CPR process and implementing changes does not take place.	Debriefing meetings for identifying deficiencies in the CPR process and implementing changes are <u>taking place regularly.</u>	No debriefing meetings are taking place after a code blue.	Practice: There is no protocol for holding a debriefing meeting following a code blue.	Direct observation after conducting a Code Blue mock drill.

Table 4.6.2 (a): No Protocol of Debriefing Meetings post CPR

➤ Gap 3:

Current State	Desired State	Identified Gap	Gap due to knowledge, skill and/or practice	Mechanism used to identify Professional Practice Gap
Lack of task	<u>The clinician</u>	During a code	Practice: There	Direct

distribution and leadership skills among the ERT team.	<u>who comes first at the site</u> should accept task distribution and leadership skills.	blue, clinicians are hesitant to take the lead.	is no team-building aptness shown in the ERT team.	observation during a simulated Code Blue mock drill.
--	---	---	--	--

Table 4.6.2 (b): Lack of team-building & leadership skills

➤ **Gap 4:**

Current State	Desired State	Identified Gap	Gap due to knowledge, skill and/or practice	Mechanism used to identify Professional Practice Gap
Most of the registered nurses do not have BLS certification or training. And the majority of the ERT team's clinicians aren't ACLS-certified. NALS & PALS training is also required amongst the clinicians and support staff.	All <u>registered nurses must have BLS certification. ACLS, NALS & PALS training and certification are essential for medical personnel who work in emergency or critical care units</u> , and it is also essential for registered nurses working in the intensive care unit or with adults.	Some clinicians and nurses lack certain knowledge about the recent guidelines and steps that are followed during a code blue, as they lack BLS, ACLS, NALS & PALS certification/training.	Knowledge: Some nurses are unfamiliar with the fundamentals of CPR. As some practitioners are unaware of the new AHA guidelines since they are not ACLS certified. Skill: Lack of skill, as some registered nurses are unsure how to use their knowledge in a real-life situation.	Direct observation and questioning with nurses revealed that some of the nurses are hesitant to use their knowledge during a code blue.

Table 4.6.2 (c): Need for BLS, ACLS, NALS & PALS training

4.7: Actions taken to close gaps in the CPR processes:

4.7.1: CPR Review Committee Meeting:

On April 26, 2022, the CPR Review Committee met and decided that the analysis of CPR occurrences in the hospital should be represented in percentages rather than numbers. The protocol for holding a debriefing meeting following CPR, as well as the requirement for BLS and

ACLS training, were all discussed. Appendix B contains the meeting's MOM and attendance sheet.

To close **Gap 1** (as discussed in Table 4.6.1(a)), the CPR review committee is still debating whether to refer to all instances of CPR (whether they occur in critical care areas or any other areas of the hospital) as CODE BLUE and not differentiate them as Code Blue and Non-Code Blue, as is the hospital's policy. Following the meeting, all the data in figures 4.2 through 4.5 were corrected and presented in percentages.

4.8: Bridging the identified Gaps:

For rectifying **Gap 2** (as discussed in Table 4.6.2(a)), treating a cardiac arrest patient is difficult, and things do not always go as planned. When the resuscitation attempt ends, either because the patient did not regain ROSC or because the patient is transported to the Cath lab, this can lead to negative feelings. Negative emotions can lead to a pessimistic outlook, especially when no progress is made to improve quality of care. As a result, debriefing meetings were added to the hospital's protocol after each Code Blue incident. Two images of the debriefing meetings are included in Appendix C.

In relation to **Gap 3**, it was discovered during a mock Code Blue exercise that was held on April 04, 2022, that the ERT team members lacked leadership qualities. This might be because no one wanted to assume the role of a leader or because there was no sense of camaraderie among the ERT members. To resolve it, members of the CPR review committee sat down with the physicians and emphasized the value of teamwork and leadership abilities. Following this, another mock Code Blue exercise was held on June 16, 2022, in OBGYN triage area, to test the leadership skills of the ERT members & the supporting staff. This time, all the ERT members were familiar with one another and demonstrated excellent leadership and team-building abilities. The code was led by the anesthetist, and the procedure went smoothly. The images of the same is included in Appendix D.

To close **Gap 4**, BLS+PALS training was scheduled for doctors and support staff on May 18th and 19th, 2022. NALS training for the NICU and PICU clinicians and support staff was also scheduled on May 18th, 2022. Training and attendance sheet along with training images of the same is included in Appendix E.

Chapter 5: Discussion & Suggestions:

Worldwide, hospital emergency codes are used to notify workers of a range of emergencies. The purpose of using codes is to immediately communicate critical information to hospital workers with the least amount of misunderstanding possible while minimizing anxiety or dread amid hospital visitors. The term "blue code" is typically used to describe a patient who needs resuscitation or other urgent medical care, typically because of a respiratory or cardiac arrest. Cardiac arrest occurs often in hospital settings, and postponing treatment is linked to a worse survival rate. This study aimed to assess whether human variables have an impact on CPR procedures & to identify gaps (if any) in the Code Blue processes at Jaypee Hospital in Noida, as well as to propose and implement changes that would result in improved CPR outcomes.

Before initiating the study, a mock code blue was performed. Information from the mock code was used to change and enhance the study design. We timed the first responder's arrival, the crash cart's arrival at the code site, the arrival of the first six ERT responders, the start of the first chest compression, and the start of the first electrical shock.

We found mistakes that might have affected CPR responses using group debriefings, CPR review forms, and observations. The organization's CPR Review Committee was then informed of the mistakes for further action and correction. Further analysis of both quantitative and qualitative data, the gaps or errors were rectified.

This study is akin to the previous studies done in terms of taking human variables into consideration and provides more information and suggestions that can help the clinicians, support staff and hospital administrators to further improve the CPR processes that takes place in a hospital.

5.1: Limitations:

- Identification of specific effective aspects influencing the results was challenging to evaluate, factors such as time effect, dynamic team unit, and code site locations may have contributed to the study and affected the outcome.
- Several support staff members and clinicians stated after debriefing that the simulation was not "realistic," therefore the training was partially effective.

Chapter 6: Conclusion:

Emergency codes are used to communicate critical information to hospital workers. The term "Code Blue" is typically used to describe a patient who needs resuscitation or other urgent medical care. Cardiac arrest occurs often in hospital settings, and postponing treatment is linked to a worse survival rate.

The Jaypee Hospital's Cardio-Pulmonary Resuscitation (Code Blue) Committee is a multidisciplinary body that promotes high quality patient care standards. It monitors and evaluates the effectiveness and appropriateness of all major cardiopulmonary resuscitation functions.

CPR survival rates after cardiopulmonary resuscitation were found to be zero in January 2022. The survival rates for the months of February and March were 3.7% and 13.8% respectively. Non-code blues were 100% for the month of February 2022, while no code blues were reported. The age group 60-75 years had the highest number of patients receiving CPR, followed by geriatric patients. Patients aged between 17-40 years and >75 years also required it subsequently. From Fig.4, it is evident that the pediatric patients were in a better state and did not require the CPR. Most code blues were initiated in ICUs, particularly the MICU, accounting for 75% in January, 77.8% in February, and 69% in March. The obvious reason is that most of the patients that are admitted to the MICU were found to be terminally ill.

After executing several Code Blue mock exercises in the hospital, there were a few Gaps that were discovered by direct observation. These gaps are documented in Tables 4.6.1 (a) through 4.6.2 (c). Following that, specific actions were made to close these gaps.

Data in figures 4.2 through 4.5 were corrected and presented in percentages following a meeting. To close Gap 1, the CPR review committee is still debating whether to refer to all CPR as CODE BLUE and not differentiate them as Code Blue and Non-Code Blue. To rectify Gap 2, debriefing meetings were added to the hospital's protocol after each Code Blue incident. To solve Gap 3, a mock Code Blue exercise was held on June 16, 2022, to test the leadership skills of the ERT & supporting staff. This time, all ERT were familiar with one another and demonstrated excellent leadership abilities. BLS+PALS and NALS training were held in the hospital, to close Gap 4.

Exercises including mock code simulations offered a special and practical way to orient healthcare staff. This study offered a thorough gap analysis that was used to create and put into practice a tailored system-wide CPR protocol.

7. Appendices:

➤ 7.1: Appendix A:



Patient Label

CARDIOPULMONARY RESUSCITATION RECORD

Patient Name _____ UHID _____ Age/Gender _____ DOA _____ Body Wt. (Paediatric/Neonate) _____
 Consultant _____ Speciality _____ Diagnosis _____

(Kindly Mark the appropriate column. Write NA wherever not applicable)

Code Blue ☐ CPR ☐ Date of CPR/Code Blue _____
 Location of CPR/Code Blue _____

1. Time Cardiac Arrest identified _____ 2. Time Code Blue Activated _____
 3. Witnessed () Yes () No Terminally ill () Yes () No

ERT Members	Time of arrival	Remarks
Anesthetist (On call)		
ICU Doctor (On call)		
EMO on duty		
NICU Doctor (On call)		
PICU Doctor (On call)		
PAEDS CTVS Doctor		
Emergency In-charge Nurse (On call)		
Nursing Supervisor (On call)		
Manager-On-Duty (On call)		
Security Supervisor (On call)		
Internal Medicine- Doctor (on call)		

4. Illness category () Medical Cardiac () Medical Non-cardiac () Trauma () Surgical Cardiac
 () Surgical Noncardiac () Other _____

5. Condition when need for chest compression/defibrillation was identified () Pulseless () Pulse (poor perfusion)

6. Cardiac Arrest confirmed by ECG at the time _____

7. Compressions

7.1 First Rhythm Requiring compressions () Asystole () PEA () VT () VF

7.2 Compressions () None () Manual

7.3 Time chest compressions / CPR started _____

8. Airway / Ventilation

8.1 Breathing at Onset - Spontaneous / Apnoeic / Agonal / Assisted

8.2 Time of First Assisted Ventilation _____

8.3 Ventilation () Bag-Valve- Mask () Endotracheal Tube () Tracheostomy () Other _____

8.4 Intubation Time _____ Size _____ By whom _____

9. Bolus – Dose/route

Time	Breathing Pulse			Bolus (Drugs)							
	Spontaneous	Assisted	Compression (manual)	BP	Rhythm	Joules	Amiodarone Dose/IV	Atropin Dose/IV	Epinephrine Dose/IV	Lidocaine Dose/IV	Vasopressin Dose/IV

10. Infusion – Dose (µg/kg/min) / (ml/hour)

Dopamine	Dobutamine	Epinephrine	Nor Epinephrine	Comments: Central line/ Peripheral line/ Chest Tube/Vital Sign/ACG/ Response to Investigation

11.1 Time of starting Defibrillation _____

11.2 Rhythm on which defibrillator used () VT () VF

11.3 Energy Used _____

12. Time Resuscitation Ended: _____ Status () Alive () Dead

13. Reason Resuscitation Ended () Return of Circulation (ROC) >20 min () Efforts Terminated (No Sustained ROC)

14. Total CPR Duration _____

15. Any Gap Identified during Code Blue Process : _____

Recorder Name (Intensivist/EMO/Internal Medicine Doctor) Name _____ Signature _____

Nurse Supervisor Name _____ Signature _____

JHN/Quality/F/047/Ver 4.0



Patient Label

CARDIOPULMONARY RESUSCITATION REVIEW SHEET

Instructions:

- Needs to be filled for all patients who require Emergency assisted ventilation & Chest compressions or Defibrillation
- Please complete the form and submit to Code Blue Coordinator/Quality Department
- The following sections should be completed during or at the conclusion of the event
- Form is Confidential for Peer Review Only & not to be placed in Medical Record
- Form is to be filled by Doctor who witnessed the event

Patient's status : () Inpatient () Emergency Department () Ambulatory/ Outpatient () Visitor

Patient name : _____ UHID No. _____ AGE: _____ Sex: _____

Event Date _____ Time _____ Location _____

Was a Hospital-wide resuscitation response activated (in case of Code Blue) () Yes () No () NA

If Yes, when was call made _____

Rhythm when intervention was started _____

Interventions in place ; prior to the patient requiring Emergency Assisted Ventilation /Chest compressions or defibrillation

- Vascular Access ☐ Yes ☐ No
If Yes ; Peripheral () Central ()
- Invasive ventilation ☐ Yes ☐ No
- Non Invasive ventilation ☐ Yes ☐ No
- Pacemaker ☐ Yes ☐ No
- Transcutaneous Pacing ☐ Yes ☐ No
- Internal Cardiac Defibrillator (ICD) ☐ Yes ☐ No
- Intra-Aortic balloon pump (IABP) ☐ Yes ☐ No
- PA catheter ☐ Yes ☐ No
- Dialysis or extracorporeal filtration therapies ☐ Yes ☐ No
- Chest Tubes (s) ☐ Yes ☐ No
- Cervical collar/surgical Halo ☐ Yes ☐ No

• IV infusion of Vasoactive Agents ☐ Yes ☐ No
 Specify Type _____

• IV infusion of Anti-Arrhythmic agents ☐ Yes ☐ No
 Specify Type _____

• Other _____

Kindly tick mark/fill specific Quality Management issues encountered under each category:

1. AIRWAY : () Delay () Multiple intubation attempts & No. of attempts made _____
 () Aspiration () Misplacement / Displacement () Trauma/Injury
 Comments : _____

2. VASCULAR ACCESS : () Delay () Extravasation /Disconnection () Pneumothorax
 () Inadvertent Arterial Cannulations () Other
 Comments : _____

3. CHEST COMPRESSIONS : () Delay () Inadequate depth/ force to generate pulse
 () Rib Fractures () No Board () Other
 Comments : _____

4. DEFIBRILLATION : () Initial Delay () Problem with defibrillator access
 () Problem with pad or paddle placement () Equipment malfunction
 () Problem with pad or paddle placement () Indicated but not given
 () Personnel not available to operate defibrillator () Wrong Energy Level
 () Removal of Adult Flap in case of Paediatric () Other
 Comments : _____

Signature of Doctor

JHN/Quality/F/235/Ver 1.0

➤ 7.2: Appendix B:


Minutes of C.P.R Committee Meeting
Monday, 26th April 2022, 3:30 pm
Venue- Board Room (UB)

Present

1. Dr. Pankaj Goyal (Committee Convener)
2. Dr. Deepak Singhal
3. Dr. Jamshed
4. Dr. Naveen
5. Dr. Sarbani Mukherjee
6. Dr. Ashish Govil
7. Dr. Pooja
8. Cpt. Indiraw Rani
9. Mr. Suresh Kumar
10. Ms. Kavita Nehwal
11. Mr. Prince Sharma

Current Minutes of meeting

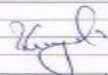


S.No	Discussion	Action Plan	Responsibility	Status
1.	As discussed that Code blue & Non Code Blue data to be presented in percentage.	Data should be proper to display in the meeting, it should be expressed in percentage. Each age group should contain a certain percentage of all expired patients.	Quality Team	Next Committee Meeting
2.	Patient age wise distribution to be modified, it should be appropriate age distribution.	Age should be distributed and more column can be added i.e., 0-1, 1-17, 17-40, 40-60, 60-75 and 75 years & above.	Quality Team	Next Committee Meeting
3.	Heading of patient status can be written terminally ill instead of patient status that will be clearer to understand what data is representing.	Heading of patient status to be changed to Normal Patients and terminally ill patients.	Quality Team	Next Committee Meeting
4.	Distribution of area wise should be more clear and correct in PPT, area to be defined floor	Area wise code blue to be mentioned with floor wise distribution, i.e., MICU, CCU, SICU, ER, PICU, and STICU should be Transplant ICU.	Quality Team	Next Committee Meeting

5.	Format of CPR form needs to be reviewed for changes.	CPR committee members will check & make necessary changes in the format of CPR form.	C.P.R Committee members	05 th May 2022
6.	Work sharing to be done among the CPR team.	Work distribution among the CPR response team during code blue in non-critical areas. Work to be divided is as follows: Documentation, Procedure, CPR, History taking/counseling and Medication.	Quality Team	02 nd June 2022
7.	If CPR is performed in wards only then mention the response time, do not mention it if CPR takes place in the critical area.	No need for response time in MICU/ER/ other ICUs. Mention response time only in wards and non-critical areas.	Quality Team	02 nd June 2022
8.	CPR duration could be 10 minutes or more than that.	As advised by committee meeting members that CPR duration time not to be present in meeting because it could be 10 minutes or more than that (usual timing > 20 minutes).	Quality Team	Next Committee Meeting
9.	BLS Training Of all Staff	Training & development dept. will ensure that every staff is BLS trained.	Training & Development	05 th May 2022
10.	ACLS training of all medical staff mainly Doctors & Nursing (Critical care) should be done	Training & development dept. will ensure that every doctor & Nurses (mainly critical care) is ACLS trained.	Training & Development	05 th May 2022

MOM Recorded by: - Dr. Rashi Rana

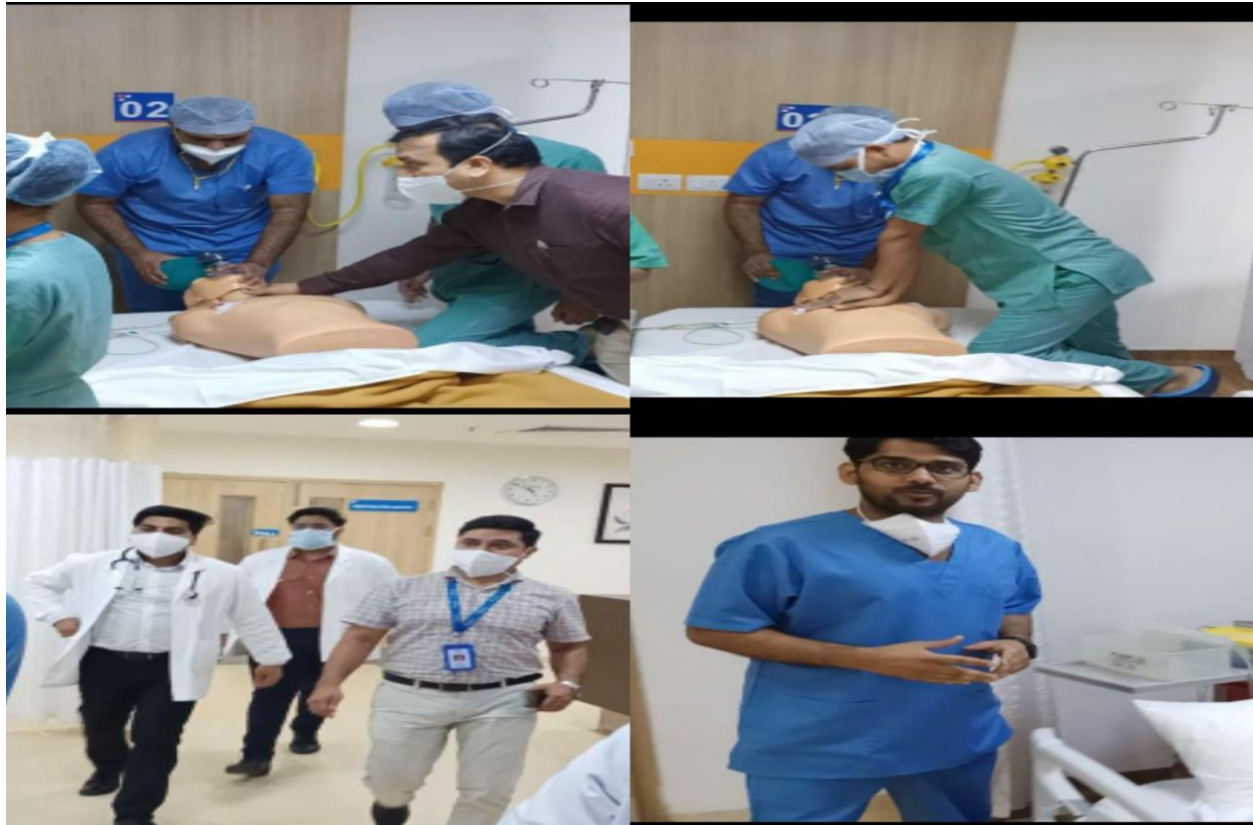
MOM Vetted by: - Dr. Pankaj Goyal

JAY PEE HOSPITAL		COMMITTEE ATTENDANCE RECORD		Doc No: 18/N/C/65/6/03 Rev No: 03	
DATE: 26 th April 2022					
VENUE: Board Room					
COORDINATOR: Dr. Parthaj Gopal		COORDINATOR SIGNATURE: 			
COMMITTEE TYPE: CPR committee					
S.No.	Name	Employee ID	Designation	Signature	
1.	Prince Sarno	21002372	Quality Ex		
2.	Dr. Mousumi	NR000002	Gen. Enrolled		
3.	Dr. S. Mahajan	21000248	Quality		
4.	Dr. Parthaj Gopal	DR000737	Q.A. Officer		
5.	Suresh Khande	21004357	Manager		
6.	Capt. Indira Rao	21000023	Chief - N/A		
7.	Dr. Vojta	DR 000385	President, Hospital		
8.	Dr. Jamsheer	DR 000348	President, Hospital		
9.	Dr. Archana Kanti	DR 000774	President, Hospital		
10.	Dr. Deepak Singh	DR 000395	President, Hospital		
11.	Kavita Nalimal	21003029	Sr. Executive		

➤ 7.3: Appendix C:



➤ 7.4: Appendix D:



➤ 7.5: Appendix E:

JAYPEE UNIVERSITY		TRAINING ATTENDANCE & EVALUATION RECORD		Date Recd - JAYPEE UNIVERSITY, DELHI (LDR) 10/01/2021 Page No. 01 Name - ANJALI					
TRAINING TOPIC: NALS Functional Skills 18/01/2021 Dr. Dimple				Evaluation Method (if applicable)					
DATE OF TRAINING: 18/01/2021				(To be filled by the trainer)					
TRAINER NAME: Dr. Dimple				(To be filled by the trainer)					
TRAINER SIGNATURE: [Signature]				(To be filled by the trainer)					
Sl. No.	Trainee Name	Trainer Name	Postgraduate	Attended	Not Attended	Marked	Not Marked	Pass	Fail
1.	Fauzia	Jatin	LDR	5	10	9	10		
2.	APRajita	Anjali	LDR	5	10	8	10		
3.	Firdas	Jatin	LDR	4	10	8	10		
4.	Rukam	Anjali	LDR	4	10	8	10		
5.	Ganiti	Anjali	LDR	5	10	8	10		
6.	Pooja	Anjali	LDR	5	10	9	10		
7.	Anamika	Anjali	LDR	5	10	8	10		
8.	Arvika	Anjali	LDR	3	10	8	10		
9.	Meera	Anjali	LDR	4	10	8	10		
10.	Kamla	Anjali	LDR	5	10	8	10		
11.	Ashwini	Anjali	LDR	4	10	9	10		
12.	Rupinder	Anjali	LDR	5	10	9	10		
13.	Mangla	Anjali	LDR	5	10	9	10		
14.	Anjali	Anjali	NICU	7	10	9	10		
15.	Singh	Anjali	NICU	8	10	9	10		
16.	Chauhan	Anjali	NICU	9	10	10	10		
17.	Savani	Anjali	NICU	8	10	10	10		
18.	Kamra	Anjali	NICU	4	10	8	10		
19.	Singh	Anjali	NICU	4	10	8	10		
20.	Anjali	Anjali	NICU	4	10	8	10		
21.	Singh	Anjali	NICU	4	10	8	10		
22.	Anjali	Anjali	NICU	5	10	9	10		
23.	Anjali	Anjali	NICU	5	10	9	10		
24.	Anjali	Anjali	NICU	5	10	9	10		
25.	Anjali	Anjali	NICU	9	10	10	10		

Duty JP. PALS

JAYPEE
UNIVERSITY

Post: PALS Post 8th Grade
Mon, 04 May 2022
Dr. Chaslam
Shilpi (Shilpi Chaslam)

Evaluation Method (If applicable)
Clinical Observation / Written Examination

S.No.	Name	Signature	Department	Pre Test		Post Test		Remarks
				Mark Obtained	Top Marks	Mark Obtained	Top Marks	
1	SHIVANI	Shani	PICU					
2	SHIVKESH	Shivkesh	PICU					
3	Vashta	Vashta	GEW					
4	Shu Patel	Shu	PICU					
5	Vaishali Saini	Vaishali	ACTUS					
6	Parul Singh	Parul	ACTUS					
7	Anita Mathur	Anita	ACTUS					
8	Rishi	Rishi	ACTUS					
9	DINO THOMAS	Dino	ACTUS					
10	Dr. Abhishek M.	Abhishek	Paeds					
11	Dr. Varun H	Varun	Paeds					
12	Dr. Priyanka	Priyanka	Paeds					
13	Dr. Alexander	Alexander	Paeds					

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