



ORIGINAL RESEARCH PAPER

Medical Science

EVALUATION OF AVAILABILITY AND EFFECTIVENESS OF CRASH CART IN PUBLIC AND PVT HOSPITALS

KEY WORDS: Crash Cart policy , checklist , emergency care

Capt (Dr) Aakash Raj

Medical officer , 322 Fd Hospital c/o 56 APO

Dr (Brig) Ravinder Singh Saini*

(Retd) Corresponding author, Assoc Prof & HoD Dept of Hospital Administration , Himalayan Hospital , Jolly Grant Doiwala , Dehradun , Uttarkhand, 248140
*Corresponding Author

Col (Dr) Madhav Madhusudan Singh

Commanding officer , Commanding officer 322 Field Hospital C/O 56 APO

ABSTRACT

INTRODUCTION: A crash cart or code cart /crash trolley "MAX cart" is a set of trays/drawers/shelves on wheels used in hospitals for transportation and dispensing of emergency medication/equipment at site of medical/surgical emergency for life support protocols (ACLS/ALS) to potentially save someone's life.

AIM: To evaluate of availability and effectiveness of crash cart in Public and Pvt hospitals

OBJECTIVE: To assure that an emergency supply cart containing age appropriate drugs, supplies, and monitoring equipment used in the care and initial treatment of cardiopulmonary arrest victims, including emergency airway and defibrillator components is available and ready for use.

METHODS: A Crash Cart program were implemented in the wards and department of public and private hospital under study since last 5 yrs as per record. The program focused on checking crash cart every day to provide emergency care at the point of requirement . A standardized checklist was developed by taking inputs from all stakeholders and it was validated and implemented. The checklist was checked in three public hospital and two private multispecialty hospital by checking on ground.

RESULTS: Five multispecialty hospitals were assessed three public and two pvt multispecialty hospital in Meerut and Dehradun. The crash cart of all these hospitals assessed as per crash cart checklist. None of the hospitals were following the standard checklist. The public hospitals were following crash cart policy only in ICU , PICU and OT were all the contents were kept but not in emergency dept and other wards. All the wards of public hospitals were having crash cart but items were missing. It was available in Acute medical, Surgical, PICU, ICU , OT with most of the contents . Both Pvt Hospitals have crash carts in all wards and departments. But completely maintained only ICU , OT , PICU and emergency dept.

CONCLUSIONS: A crash cart is the trolley for storing lifesaving equipment and drugs in a hospital emergency room, intensive care unit, clinics and other areas. The Crash Carts have to be inspected in each shift by the Nursing Officers as per the "Crash Cart Checklist". The Crash cart policy as well as Annexures should be displayed on each of the crash carts. By improving the efficiency and reliability of the crash cart, and preventing unnecessary delays, we can improve patient outcomes following a crisis event.

INTRODUCTION

A crash cart or code cart /crash trolley "MAX cart" is a set of trays/drawers/shelves on wheels used in hospitals for transportation and dispensing of emergency medication/equipment at site of medical/surgical emergency for life support protocols (ACLS/ALS) to potentially save someone's life. The cart carries instruments for cardiopulmonary resuscitation and other medical supplies while also functioning as a support litter for the patient.

AIM

To evaluate of availability and effectiveness of crash cart in Public and Pvt hospitals

OBJECTIVE

To assure that an emergency supply cart containing age appropriate drugs, supplies, and monitoring equipment used in the care and initial treatment of cardiopulmonary arrest victims, including emergency airway and defibrillator components is available and ready for use.

Material and Method

A Crash Cart program were implemented in the wards and department of public and private hospital under study since last 5 yrs as per record. The program focused on checking crash cart

every day to provide emergency care at the point of requirement . A standardized checklist was developed by taking inputs from all stakeholders and it was validated and implemented. The checklist was checked in three public hospital and two private multispecialty hospital by checking on ground.

RESULT

Five multispecialty hospitals were assessed three public and two pvt multispecialty hospital in Meerut and Dehradun. The crash cart of all these hospitals assessed as per crash cart checklist shown in figure 1.

None of the hospitals were following the standard checklist. The public hospitals were following crash cart policy only in ICU , PICU and OT were all the contents were kept but not in emergency dept and other wards. All the wards of public hospitals were having crash cart but items were missing. It was available in Acute medical, Surgical, PICU, ICU , OT with most of the contents . Both Pvt Hospitals have crash carts in all wards and departments. But completely maintained only ICU , OT , PICU and emergency dept. No written policy were available in any of public hospitals only few lines were mentioned in SOPs of ICU and OT , which state only that crash cart will be available in those dept and it will be maintained. In Pvt hospitals written policy were there but it was not covering all aspects .



Fig 2: Crash Cart

Following observation were common in all hospitals as under:

- Chances of Medication errors and mix-ups were very high because there were mixing of medicine.
- Some expired medicine were present in all three public hospital and one out two hospital.
- Some equipment or medications were unavailable. In public hospitals 30 % medicine was not available in two hospitals and 40 % equipment were available but nonfunctional.
- In all hospitals during inspection in some wards Empty oxygen tanks were found.
- There were drained batteries on equipment were present and employee mentioned equipment failure occurs due to this.
- In one of the hospital there was unsecured carts.
- One of the public hospital have Carts secured with heavy duty tape and/or padlocks, which was preventing immediate access
- 6 - 8 % of Incorrect size of equipment were present in all hospitals
- Other than ICU / OT / PICU , Carts not checked or inspected according to policy and procedure
- In Two Public hospital , Staffs were unable to locate the crash cart, resulted in a delay getting emergency equipment to the bedside
- In one of the public hospital , Staffs were unfamiliar with the items regularly stored within the crash cart
- Some Staffs of all hospitals were unfamiliar with the procedures for using the crash cart when responding to a life-threatening emergency which indicate lack of training .
- In Most Hospitals some Staffs were unfamiliar with procedures regarding how to stock or restock the crash cart . Some of these issues may appear minor, but alone or in combination, they may produce delays in providing care, thereby creating a patient safety risk.

DISCUSSION

A crash cart is the trolley for storing lifesaving equipment and drugs in a hospital emergency room, intensive care unit, clinics and other areas. The cart is characterized by being easily movable and readily accessible into all sides of the cart for quickly viewing and removing equipment and drugs during a crisis situation. The crash cart was originally designed and patented by ECRI Institute founder, Joel J. Nobel, M.D., while a surgical resident at Philadelphia's Pennsylvania Hospital in 1965. MAX helped enhance hospital's efficiency in emergencies by enabling doctors and nurses to save time, thereby increasing the chances of saving a life.

Purposes:

1. To enhance the Code Blue team's response to patients with emergency medical situations by providing immediate access to supplies and medications.
2. An emergency cart or crash cart is a cart that facilitates

- coordination of emergency equipment.
- 3. A specific crash cart type facilitates staff familiarity with equipment
- 4. It is help to ensure a properly stocked emergency cart will be readily available
- 5. It also ensures a properly functioning defibrillator will be readily available.
- 6. It helps to save the valuable time at the time of emergency.

Location of crash carts hospital⁶

- Radiology Department
- Laboratory Department
- Emergency Department
- Cath Lab
- Critical Care
- Operating Room
- OR – Receiving Area
- OR – Recovery Room
- All the in-patient wards
- Medical/ Nursing Education Area

Contents of crash cart

The contents of a crash cart vary from hospital to hospital, but typically contain the tools and drugs needed to treat a person in or near cardiac arrest. These include but are not limited to:

- Monitor/defibrillators, suction devices, and bag valve masks (BVMs) of different sizes
- Advanced cardiac life support (ACLS) drugs such as epinephrine, atropine, amiodarone, lidocaine, sodium bicarbonate, dopamine, and vasopressin
- First line drugs for treatment of common problems such as: adenosine, dextrose, diazepam or midazolam, epinephrine for IM use, naloxone, nitroglycerin, and others
- Drugs for rapid sequence intubation: succinylcholine or another paralytic, and a sedative such as etomidate or midazolam; endotracheal tubes and other intubating equipment
- Drugs for peripheral and central venous access
- Pediatric equipment (common pediatric drugs, intubation equipment, etc.)
- Other drugs and equipment as chosen by the facility

Standard policy for crash cart

Emergency Code Crash Carts should be maintained in all designated Patient Care Areas and checked on a daily basis. The defibrillators will be checked and tested daily.

Who will check / responsibility

Nurse in charge of dept or ward /Anesthesia Tech or ORA / Operations theater / Tech in charge / Technical Care Associate / MO in charge.

The responsible person will complete the Code Cart Daily Checklist including date/sign/initial upon completion of procedure.

Red / yellow seal mark to know about readiness status of cart

- Code carts will be plugged in and secured with a breakaway RED OR YELLOW numbered seal when not in use.
- Replacement of numbered seal can be obtained from pharmacy.
- Red Seal is applied when the cart is complete and ready for use
- Yellow Seal is applied when cart is need of exchange example post code or non-intact.

Checking of cart

- Emergency equipment/code carts are to be checked for integrity and function daily by designated staff members of each area
- Code Carts should be located in all patient care areas open 24 Hours will be checked by 10 AM daily or as per policy.
- Check integrity of Crash Cart plastic lock that secures the chain over the cart
- Check cart for supplies and Restock according to "Procedure/policy for Restocking Crash Cart"

- Check all crash cart supplies fortnightly, as assigned. Assure all equipment is in working order. Check medication expiration dates (Pharmacy also checks monthly). Check all supplies for expiration dates.
- Sign crash cart sheet
- Drawers of crash carts are to be clearly labeled to identify contents by general categories (drugs, cardiac/chest procedures, circulation, breathing, and airway).
- Special procedure trays are kept on the bottom shelf in selected units.
- Drawers are organized and arranged from top to bottom in the following order: medications, airway, circulation, IV solution and tubing, miscellaneous.
- All units will set up their carts to include age-appropriate equipment based on the ages of patients to be served, as needed using the appropriate supplies from the appendices
- The pediatric equipment indicated in appendix IV will be maintained for those adult units and patient care areas that routinely see a mixture of pediatric and adult patients. Pediatric Code sheets are generated for each patient.
- Laryngoscopes will be checked prior to placement on the cart and monthly.
- Oxygen cylinders are replaced when the tank has < 500 psi. Full tanks are obtained from General Stores on an exchange basis
- The medication drawer will not be opened if it is sealed and intact.
- Unused kits are opened and inspected by pharmacy staff at least once every 90 days.

Inspection of external contents

The cart should be inspected for the following External contents:

- Portable suction apparatus with connecting tubing. If wall suction is not available in each patient's room, then a wall suction apparatus may also be kept in the bottom large drawer of the cart.
- Portable monitor/defibrillator unit with charged batteries, multi-function cable, multifunction pads (pedi, adult or both as appropriate), pacer cable (if pacer capable machine), EKG electrodes, appropriate sized paddles (adult, pediatric), defibrillation gel, monitor paper, blood pressure cuff (adult carts), SpO2 probe.
- Sharps container.
- Cardiopulmonary Resuscitation records
- Emergency Crash Cart Check Sheet.
- List of cart contents.
- Emergency drug information sheets as appropriate for unit. (Appendix ? for adults Nd appendix ? for pediatrics)
- Cardiac board on the back of the cart.

Start with a risk assessment:

The responder should identify the risk points; drill down to find the issues and where they originated. Risk points can include:

- **Staff training and educational needs**
- Identify who responds; ensure that the staff person has appropriate education and training¹.
- Identify who checks the crash cart and how frequently it is checked (e.g., daily, once per shift, once during hours of operation) (per policy or written plan)
- Identify who checks emergency equipment (per policy or written plan)
- **Location of crash carts :**
- Maintain the cart in a location that is easily accessible to the clinical area
- Make sure staff know where and how the cart and/or emergency equipment is stored
- **Contents of the crash carts² :**
- Clearly arrange drugs in the medication drawer so that they are easy to locate and the names are clearly visible (or clearly labeled and visible).
- Segregate and clearly label pediatric medications. Plastic bags can be used to separate the pediatric drugs from other

medications. Label the outside of the drawers that house pediatric drugs.

- Keep references handy, particularly for medications and proper medication dosages for pediatric emergencies
- Determine who restocks or replaces emergency equipment and medications in the cart
- Create a process for restocking and replacing the contents of the cart
- Communicate the crash cart restocking and/or replacement process to all applicable clinical staff

Daily Defibrillator Checks

- Make sure the power is off;
- Connect the 50 ohm test load to the multifunction patient cable;
- Connect patient multifunction cable to monitor;
- Unplug the AC power cord
- Press and hold "Strip" while turning the Energy select knob to MANUAL ON to start the test;
- Follow prompts;
- Plug the AC power cord back in;
- If machine does not pass test, remove from service and contact Clinical Technology Management.
- Check expiration dates on multifunction defibrillator electrodes pads - replace them if expiration date has passed.
- The multifunction electrode pads should be disconnected for the 50 ohm test and reconnected upon completion
- The AC power cord is disconnected to make sure the battery is functional
- IMPORTANT: The AC power cord must be reconnected to maintain the integrity of the battery
- A report will be printed when the check is complete; all systems will read passed. The data card will read as "data card not present" unless there has been one installed in your device.

RECOMMENDATION

1. All hospital should develop their plan of action, implement it, and continuously reassess, and revise to ensure that crash carts and staff in hospitals are ready for life-threatening medical emergencies⁴.
2. At a minimum, the written plan should address equipment, supplies, medications, inventory management, emergency protocols, training and competency of staff, emergency drills and /or simulation exercises, and assignment of responsibility for continued oversights of the process.
3. All hospital should determine which items are needed for the specific clinical area and who needs to be involved in the selection process (e.g., hospital administration, pharmacy, central supply).
4. All hospitals should conduct continuing education and training, which can include mock codes and/or crash cart training events⁵.

CONCLUSION

A crash cart is the trolley for storing lifesaving equipment and drugs in a hospital emergency room, intensive care unit, clinics and other areas. Defibrillators/AEDs and Crash Carts are only effective during an emergency when all of the equipment is in proper working order. Crash carts should be located in areas of patient care in case of a life-threatening occurrence. Physicians, nurses, pharmacists, and respiratory therapists must become familiar with the contents of this cart. The Crash carts in their respective patient care zones(OPDs, Wards, ICUs/OTs/Cath Labs/Dialysis Room) should be arranged uniformly as per the by the nursing officers in charge. The Crash Carts have to be inspected in each shift by the Nursing Officers as per the "Crash Cart Checklist". The Crash cart policy as well as Annexures should be displayed on each of the crash carts. By improving the efficiency and reliability of the crash cart, and preventing unnecessary delays, we can improve patient outcomes following a crisis event.

REFERENCES

1. Pennsylvania Patient Safety Authority: Clinical Emergency: Are You Ready in Any Setting? Pennsylvania Patient Safety Advisory, June 2010;7(2)52-60
2. S Sones: Is Your Code Cart Ready? Outpatient Surgery, October 2008.

3. M Davies, et al: A Simple Solution for Improving Reliability of Cardiac Arrest Equipment Provision in Hospital. *Resuscitation*, 2014(85)1523-1526
4. Are You Ready for an Emergency? Don't Get Caught Unprepared. *Same-Day Surgery*, September 2010;34(9)97-101.
5. The Joint Commission, Division of Health Care Improvement, *Quick Safety Issue 32*, April 2017
6. Chitkara, R., Rajani, A. K., Lee, H. C., Snyder, & Halamek, L. P. (2013). Comparing the utility of a novel neonatal resuscitation cart with a generic code cart using simulation: a randomised, controlled, crossover trial. *BMJ Quality & Safety*, 22(2), 124-129.