PROBLEM SOLVING APPROACH

Crash cart system in the emergency ward

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INTRODUCTION

Problem-solving is a mental process that involves discovering, analyzing and solving problems. The ultimate goal of problem-solving is to overcome obstacles and find a solution that best resolves the issue\(^1\). The very nature of modern nursing practice demands that nurses have the ability to solve patient related problems. Problem-solving takes time and effort, but once a problem has been addressed the nurse can feel satisfied that the issue has been resolved and is therefore less likely to re-emerge\(^2\).

A crash cart is a cart stocked with emergency medical equipment, supplies, and drugs for use by health professionals especially during efforts to resuscitate a patient experiencing cardiac arrest. Adequate storage of disposable and non-disposable medical equipment should be available in the crash cart as it functions to provide emergency management to patient who present with wide variety of critical, urgent and semi urgent conditions. An organized crash cart contains supplies and equipments necessary to treat life threatening situations\(^3\).

A well organized crash cart can serve a lot of time and confusion during an emergency, which in turn serve much life. It was developed for the ready for situations that require prompt action by more, how to recover consciousness or to restore the vital signs of patient\(^4\).

Every unit will have a crash cart with purpose built portable trolley. Crash cart will be kept in an accessible place & routinely monitored by staff nurse to ensure that all supplies are replaced & weekly checked by registrar & monthly by hospital inspection team. All the equipment will be in working condition & emergency life saving drugs up-to date\(^5\).

Nurses and doctors, the first in line to provide life support and resuscitation should always be clearly aware of the placement of the emergency cart and their contents and their use until the contents of each drawer. Staff must be familiar with the location of all resuscitation equipment within their working area\(^6\)

BACK GROUND OF THE PROBLEM

Emergency carts contain a variety of medications to treat an even wider variety of ailments. In addition to drugs crash contain equipment that may become necessary in life threatening situations. Drawers are organized and arranged from top to bottom in the following order medications, airway, circulations, IV solution and tubing, miscellaneous\(^5\).
The function of crash carts is to provide a mobile station within the hospital that contains everything needed to treat a life threatening situation. The advantage of mobility is that it allows the treatment to come to the patient when needed.\(^2\)

Many studies have proved that missing or faulty equipment can significantly compromise advanced life support. It is important that all crash cart equipment can be securely stored, ready for good health. Resuscitation equipment must be checked daily.\(^7\)

A speedy and efficient response is essential in the event of a cardiac arrest. Procedures should therefore be in place to ensure that all the necessary resuscitation equipment is immediately available and in good working order. Lack of, or faulty, equipment during a resuscitation attempt can prejudice a successful outcome, increase stress levels and may cause conflict within the team responding to an emergency.\(^3\)

It is often the nurse's role to undertake the routine checking of the resuscitation trolley and cardiopulmonary equipment. As nurses play a major role in the provision of health care, it is the nurses who frequently discover patient with cardiac arrest and it is necessary for them to restock the crash cart after every shift, verifying the presence and expiry date of every item in the crash cart.

Here the investigator felt the need to assess the practice of organized crash cart among staff nurses and develop a protocol to help them in practicing the organized crash cart system.

**PROBLEM IDENTIFICATION**

**Problem identified:** unorganized crash cart system

A crash cart or code 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 to potentially save someone's life. 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 and suction devices
- 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 intubation 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
During clinical posting the investigator observed that health team members are not adequately following the organized crash cart system. Nurse being the part of health team have the responsibility to follow organized crash cart system to have readily availability of emergency equipment and supplies when a life-threatening emergency arises.

**REVIEW OF LITERATURE**

The content of the literature review is divided into

1. Practice of organized crash cart
2. Knowledge of staff nurses on organized crash card technique

**Practice of organized crash cart**

A study was conducted to retrospectively review the checking policy for resuscitation trolley on medical, surgical and pediatric wards. The finding revealed that basic trolley checking procedure was not followed, leaving the trolley unchecked and possibly unprepared. Study recommended that hospital should regularly review compliance with policies and procedures for the checking of resuscitation trolley.

A study was conducted to explore the current status of cardiopulmonary resuscitation in Malaysia and highlighted the factors that negatively impact on its rate of success. The study finding showed that resuscitation is first attempted by junior doctors or nurses lacking in the skill and experience needed and resuscitation trolley were often inadequately equipped.

**Knowledge of staff nurses on organized crash card technique**

A study was conducted to describe and explore the perception, barriers and needs as experienced by nurses in Botswana during the provision of CPR. The focus group discussions and semistructured interviews among registered nurses and senior nurse manager revealed that there was lack of organizational support and resources, lack of knowledge on equipments and skill factors affecting the registered nurses performance in the provision of CPR.

A study was conducted to assess the knowledge, skill and competency regarding medical emergency event was conducted. Study finding revealed that there is superficial knowledge on medical emergencies, drug and equipments among health professionals working emergency unit.

**ASSESSMENT FORMAT FOR PROBLEM IDENTIFICATION**

To identify the problem emergency crash cart check list was prepared. Data collected by using checklist from 24 wards and 6 intensive care units.
### Table 1

**Frequency and percentage of organized and unorganized Crash cart system**

<table>
<thead>
<tr>
<th>Content</th>
<th>Yes f(%)</th>
<th>No f(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Are the emergency crash cart available</td>
<td>7 (23.33)</td>
<td>23 (76.66)</td>
</tr>
<tr>
<td>2. Do the emergency crash cart conveniently located</td>
<td>5 (16.66)</td>
<td>25 (83.33)</td>
</tr>
<tr>
<td>3. Do the emergency crash cart have a list of medication and equipments</td>
<td>4 (13.33)</td>
<td>26 (86.66)</td>
</tr>
<tr>
<td>4. Does the emergency crash cart have the stock list of equipments</td>
<td>2 (6.66)</td>
<td>28 (93.33)</td>
</tr>
<tr>
<td>5. Are the medication and IV fluids were labeled properly</td>
<td>1 (3.33)</td>
<td>28 (96.66)</td>
</tr>
<tr>
<td>6. Are the medication arranged according to their action</td>
<td>2 (6.66)</td>
<td>28 (93.33)</td>
</tr>
<tr>
<td>7. Are the drawers of the crash cart clearly labeled</td>
<td>3 (10)</td>
<td>27 (90)</td>
</tr>
<tr>
<td>8. Are the medication arranged in sequence and in order</td>
<td>2 (6.66)</td>
<td>28 (93.33)</td>
</tr>
<tr>
<td>9. Are the medication checked periodically and exchanged based on expiry date</td>
<td>16 (53.33)</td>
<td>14 (46.66)</td>
</tr>
<tr>
<td>10. Are the sterile package checked for package integrity</td>
<td>3 (10)</td>
<td>27 (90)</td>
</tr>
<tr>
<td>11. Is the inventoried equipment checked daily on each shift</td>
<td>0 (30)</td>
<td>30 (100)</td>
</tr>
<tr>
<td>12. Is the crash cart periodically monitored by ward in charge</td>
<td>25 (83.33)</td>
<td>5 (16.66)</td>
</tr>
<tr>
<td>13. Is the equipment inventory documentation updated</td>
<td>11 (36.66)</td>
<td>19 (63.33)</td>
</tr>
<tr>
<td>14. Is the defibrillator checked daily for working condition</td>
<td>4 (13.33)</td>
<td>26 (86.66)</td>
</tr>
<tr>
<td>15. Does the crash cart contain articles for intubation</td>
<td>25 (83.33)</td>
<td>5 (16.66)</td>
</tr>
<tr>
<td>16. Is the skilled nursing personal assigned to monitor crash cart</td>
<td>11 (36.66)</td>
<td>19 (63.33)</td>
</tr>
<tr>
<td>17. Is the in charge paying attention to rearrange the crash cart after use</td>
<td>21 (70)</td>
<td>9 (30)</td>
</tr>
<tr>
<td>18. Is the oxygen cylinder secured to the crash cart by a portable stand</td>
<td>1 (3.33)</td>
<td>29 (96.66)</td>
</tr>
<tr>
<td>19. Does the crash cart contain sufficient emergency drugs</td>
<td>17 (56.66)</td>
<td>13 (43.33)</td>
</tr>
</tbody>
</table>
Table 1 show that 7 wards are having emergency crash cart and 23 wards is not having it. In 5 wards emergency crash cart is conveniently located and in 25 wards it is not conveniently located. Emergency crash cart have list of medication and equipment in 4 wards and 26 wards are not having it. Emergency crash cart have stock list of equipment in 2 wards and 28 wards are not having it.

In 1 ward medications and IV fluids were labeled properly and in 29 wards it is not maintained. Medications are arranged according to their action in 2 wards and in 28 wards medicines were not arranged according to their action. In 3 wards drawers are clearly labeled and in 27 wards drawers are not clearly labeled. Medications are arranged in sequence and in order in 2 wards and not in 28 wards.

Medication checked periodically and exchanged based on expiry date in 16 wards and not in 14 wards. The sterile package checked for package integrity in 3 wards and not in 27 wards. Inventoried equipment not checked daily on each shift in any wards. Crash cart periodically monitored by ward in charge in 25 wards and not in 5 wards.

Equipment inventory documentation updated and in 11 wards and not in19 wards. Crash cart contain articles for intubation in 21 wards and not in 9 wards. Skilled nursing personal assigned to monitor crash cart in 1 ward and not in 29 wards. Crash cart contain sufficient emergency drugs in 17 ward and not in13 wards

GENERATION OF SOLUTION

- Development of protocol on organized crash cart system
- Structured teaching program on organized crash cart system
- Conduct in service education program
- Provide self instruction module (SIM) on organized crash cart system
- Provide leaflet on organized of crash cart system

CONSEQUENCE OF EACH SOLUTION

- A well organized crash cart can serve a lot of time and confusion during an emergency, which in turn serve much life
- It enhances knowledge and practice
- It helps nurses’ to the wrong method they are following
• It provide a chance for clarification of doubts
• Enhances collaborative health team work
• Shows responsibility of each health team members

SELECTION OF SOLUTION

On the basis of possible solutions and their consequences it was found that, all the solutions will help to maintain organized crash system. Among various solutions, the investigator selected the solution of development of protocol on organized crash cart system

IMPLEMENTATION OF SOLUTION

To provide emergency management to patient who present with wide variety of critical, urgent and semi urgent conditions developed a protocol on organized crash cart system.

EVALUATION

The protocols are designed to assist and educate nursing staff. It is recognized that nursing staff are responsible to review the changes that have been implemented, and understand the proper use of the Nursing Protocols. The effectiveness of the health care team is enhanced by empowering nurses to apply their knowledge and skills through the use of the nursing protocols. The Nursing Protocols have been in place for many years. The inception and subsequent reviews and revisions of the nursing treatment protocols have been the concerted effort of many staff within the health services program.

CONCLUSION

PROBLEM: Unorganized crash cart system in the ward and intensive care units

Identify the problem

Observed the practice of unorganized crash cart System in wards and intensive care units

Data collection

Observation check list on crash cart maintenance

Generation of solution

Development of protocol
• Structured teaching program
• Conduct in service education program
• Provide self instruction module (SIM)
  Provide leaflet
Selection of solution

Develop a protocol on organized crash cart

Implementation

Display protocol on organized crash cart

Evaluation

Help nurses to update their knowledge and improve their practice

PROTOCOL

Definition

Crash cart is a cart stocked with emergency medical equipment, supplies, and drugs for use by medical personnel especially during efforts to resuscitate a patient experiencing cardiac arrest.

Purposes

1. To facilitate coordination of emergency equipment.
2. Organized crash type facilitates staff familiarity with equipment location.
3. To ensure a properly stocked emergency equipment and drugs.
4. To ensure a properly functioning defibrillator readily available.
5. An easy access to resuscitation drugs, equipment for airway management, circulatory access and fluid administration.
6. A well-organized crash cart can serve a lot of time and confusion during an emergency.

Nurses’ responsibility

- Crash cart must be conveniently located.
- All nurses should be familiar with the content and location of all medication and equipment in the crash cart.
- Drawers are organized and arranged from top to bottom in the following order: medication, airway, circulation, IV solution and tubing, miscellaneous.
- Defibrillator must be checked in every shift.
• A licensed staff nurse must be responsible for checking crash cart
• Each emergency cart is equipped with a number lock and kept lock unless in use
• Drawers of crash cart are to be clearly labeled to identify contents by general categories
• Oxygen cylinder are replaced when tank has < 500 psi
• Articles for intubation must be readily available
• Proper drug storage, stock level and documentation must be maintained Crash card checklist must be maintained by the ward in charge

Crash cart
# Crash Cart Inventory Checklist

## Top
- Defibrillator
- Electrodes
- Suction
- Adult & Pedi Ambubag
- Stethoscope
- CPR Book
- CPR Board
- Oxygen Tanks

## Fourth Drawer:
- Gloves 6-1/2 – 3
- Gloves 7-1/2 – 3
- Machine Tape
- Introcan 22ga – 2
- Introcan 20ga – 2
- Tourniquet – 1
- Alcohol Swabs
- Syringes 60ml – 2
- Syringes 20ml – 2
- Syringes 10ml – 5
- Syringes 5ml – 5
- Syringes 3ml – 5
- Needles 18ga – 10
- Conductivity Gel
- KY Gel
- Injectable Saline 30ml – 2

## First Drawer:
- Atropine 1/mg/10ml – 1
- Adenosine 6mg/2cc -- 2
- Calcium 1gm/10ml – 1
- Epinephrine 1:1000/1ml – 4
- Dexamethasone 4mg/1ml – 1
- Neo-Synephrine 10mg/1 ml – 1
- Epinephrine 1:10,000/10ml – 2
- Lanoxin 0.5mg/2ml – 1
- Diltiazem – 3 (refrigerated)
- Benadryl 50mg/1ml – 1
- Romazicon 1mg/10ml – (anesthesia cart)

## Fifth Drawer:
- Dantrium 20mg – 36
- Laryngoscope Handle
- Miller Blade #2 – 1
- Miller Blade #3 – 1
- Macintosh Blade #2 – 1
- Macintosh Blade #3 – 1
- ET Tubes 4 – 1
- ET Tubes 7 – 1
- ET Tubes 8 – 1
- Airways 6 – 1
- Airways 8 – 1
<table>
<thead>
<tr>
<th>Second Drawer:</th>
<th>Sixth Drawer:</th>
</tr>
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<tbody>
<tr>
<td>- Narcan 0.4mg/1ml – (anesthesia cart)</td>
<td>- Batteries C – 2</td>
</tr>
<tr>
<td>- Tongue Blades – 5</td>
<td>- Glucagon Emergency Kit – 1</td>
</tr>
<tr>
<td>- Oxygen Wrench</td>
<td>- Vasopressin 20 units/cc – 2</td>
</tr>
<tr>
<td>- Thermal Paper</td>
<td>- Dextrose 50gm/50ml – 1</td>
</tr>
<tr>
<td></td>
<td>- Amiodarone 150mg/3ml – 2</td>
</tr>
<tr>
<td></td>
<td>- Nitroglycerine 50mg/10ml – 1</td>
</tr>
<tr>
<td></td>
<td>- Sodium Bicarb 8.4%/50ml – 1</td>
</tr>
<tr>
<td></td>
<td>- Dopamine 400mg/10ml – 1</td>
</tr>
<tr>
<td></td>
<td>- Microshield – 2 NACL</td>
</tr>
<tr>
<td></td>
<td>- Yankeur Tip – 2</td>
</tr>
<tr>
<td></td>
<td>- Suction Tubing – 2</td>
</tr>
<tr>
<td></td>
<td>- Cric Kit w/Trach Tube (adult) – 1</td>
</tr>
<tr>
<td></td>
<td>- D5½ NS 250cc – 1</td>
</tr>
<tr>
<td></td>
<td>- Lactated Ringers 500cc – 2</td>
</tr>
<tr>
<td></td>
<td>- NACL 0.9% 500cc – 2</td>
</tr>
<tr>
<td></td>
<td>- IV tubing – 5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Third Drawer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Lasix 40mg/10ml – 2</td>
</tr>
<tr>
<td>- Mag Sulfate 5gm/10ml – 1</td>
</tr>
</tbody>
</table>

**BIBLIOGRAPHY**


