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Managing Cardiovascular Emergencies: Collaborative Approaches Involving Nursing, operations, Anesthesia, Public Health, and Health Administration

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Abstract

Healthcare professional's management of cardiovascular emergency situation in patient with critical illness is important to be analyzed. The multidisciplinary approaches across health care team and their collaboration can improve the quality of the management and reduce the complication that may occur. Cardiogenic shock, acute heart failure and myocardial infarction are from the life-threatening cardiovascular emergency issues that need a critical and instant intervention and management. Healthcare professional frequently encounter difficult clinical situations by selecting drugs based on comorbidities, the assessment of hemodynamics should be used to carefully guide treatment. Vasopressors, inotropes, and mechanical circulatory support are useful in some patients but are not always advised. In order to effectively manage cardiovascular emergency situations, early diagnosis, precise hemodynamic assessment, and timely therapeutic intervention are essential. In addition, healthcare providers should close the knowledge gap between evidence-based medicine and clinical practice.

Keywords: "Cardiovascular", "Emergencies", "heart failure", "health worker", "vasopressor", "Management",' cardiogenic shock'.

Introduction

The most prevalent illness in the world is cardiovascular disease and It is the primary cause of death worldwide, with 15 million deaths attributed to it in 2015 **(WHO.,2021).** Emergency room visits are common for cardiovascular disease; early intervention is crucial to lower mortality. The motto of cardiovascular emergency care has always been "time is gold," since every 30 minutes lost between door-to-balloon time results in a 7.5% relative increase in mortality **(De Luca et al.,2004).**

At least 75% of CVD-related deaths worldwide take place in low- and middle-income nations. People in low- and middle-income nations frequently lack access to primary healthcare programs that would enable early identification and treatment of those who have cardiovascular disease risk factors **(WHO.,2021).**

Quick advances in knowledge, technology, and the effectiveness of the healthcare system all contribute significantly to the survival of patients experiencing cardiovascular emergencies. These days, the most serious cardiovascular emergencies are acute ST elevation myocardial infarction, acute heart failure with cardiogenic shock, and out-of-hospital cardiac arrest. Numerous initiatives have been undertaken to enhance the effectiveness of the healthcare system and reduce mortality even further. Internationally recognized authors contributed priceless research on the treatment of cardiogenic shock, acute heart failure, acute myocardial infarction, and cardiac arrest in this special issue **(chang et al.,2017).**

An emergency network connecting the emergency center, clinic, community medical service, primary hospital, and ambulance is made possible by the modern Internet assistance model. This helps rescue personnel arrive at the scene of the incident with precision and speed and significantly shortens the time it takes to admit patients **(Prabhakaran et al.,2020).**

The signs and symptoms of heart failure that worsen gradually or quickly and require immediate medical attention are known as acute heart failure (AHF) **(Gheorghiade et al.,2005).** 1. The most frequent presenting complaint that drives patients with AHF to seek acute care is dyspnea **(Fonarow et al.,2004; Adams et al.,2005).** In the United States, one million emergency department (ED) visits are attributed to a primary diagnosis of AHF **(Storrow et al.,2014)** Even though AHF is quite common in the emergency department (ED), it can be difficult to diagnose in patients who have undifferentiated dyspnea, particularly if they have comorbid conditions and are older. While getting a patient with cardiac arrest into the Emergency Medical Services system quickly is crucial to ensuring they receive advanced care, defibrillation, and CPR **(Maisel et al.,2010).**

Over 90% of patients who experience out-of-hospital cardiac arrest die **(Jollis and Granger.,2016).** Despite timely resuscitation and restoration of spontaneous circulation, many of these patients go on to develop cardiogenic shock, which necessitates inotropic and mechanical support in addition to emergency revascularization. In order to improve cardiac output, reverse

multiorgan failure, normalize acidosis and electrolyte imbalance, and promptly correct hypoxia, aggressive adjunctive treatments are needed. An additional function of cooling therapy is to lessen hypoxic brain injury **(Nielsen et al., 2014).**

Critically sick patients often receive inotropes and vasopressors to enhance their hemodynamic performance and reestablish proper organ perfusion. Nonetheless, a few researches have hinted at a potential link between the use of inotropes and higher death rates **(Belletti et al.,2015).**

This special issue's topics are highly engaging and grounded in scientific evidence, giving a deeper understanding of the management of high-risk cardiovascular emergencies.

Literature Review

1-Aim

The purpose of the present systematic review is to evaluate the emergency management of cardiovascular critical ill patient across Healthcare specialists through previous studies that focus on the same title (health administration, emergency medical services, nursing, anesthesia, operation room and public health technician).

2- Methods

There were 14 articles included in the review according to certain criteria using electronic research of the following databases of CINAHIL, PubMed, Medline and manual search of Google Scholar. In addition, the websites of the World Health Organization. English was the language used for the studies. and a selection of bibliographies were searched using MeSH terms "heart failure" "cardiogenic shock," "emergency care," "healthcare," "nursing", vasopressor". To find more research, a manual review of the reference lists of the pertinent papers was done.

3-Inclusion and Exclusion Criteria:

Evaluate original research studies, randomized controlled trials, and systematic reviews evaluating the cardiovascular emergency management via healthcare staff include the following specialists (health administration, emergency medical services, nursing, anesthesia, operation room and public health technician) Research released between 2010 to January 2020 that were written in English and include human subject, and concerns emergency care approaches, Research on various emergency management of cardiac critical ill patient include heart failure, cardiogenic shock and cardiac arrest ., healthcare professional subjects collaborated in the management process were also included and no geographical restrictions were considered. Publications, without peer review, webcasts, surveys, secondary data analysis, non-original reports, editorials, case study, letters, cost assessments, publication of pregnant and pediatric populations, studies before 2010 were also rejected

4. Selection Process:

A selected group of the authors looked through the full texts of the relevant papers that were discovered, as well as the titles and abstracts of every article that surfaced during the searches. The published full-text papers were assessed by the reviewers for inclusion using the following criteria; those that did not meet all the requirements were rejected. Conflicts arose during the full-text review, abstract and title screening, and full-text evaluation; these were resolved by other party adjudication.

Data Extraction and Quality Assessment

The review's authors separately assessed and compiled the information from the 14 publications that satisfied the requirements for inclusion. Following a detailed analysis of the included studies, relevant data was extracted from each publication according to the following standards: An author extracted and recorded the study design, the setting and demographics, the critical illness that caused it, the details of other emergency management interventions, the outcome and the conclusion. The process included reviewing earlier research, and to select and evaluate the data from the literature search, the authors employed methodological, trustworthy, health worker interventional, and emergency department management techniques.

To ensure transparency and rigor in reporting methods and results, authors follow the established reporting guidelines for systematic reviews, known as PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses).A standardized tool suited for the different study designs were used to evaluate the quality of the integrated research. The research findings from the included studies were combined narratively.

Synthesized Result

There were 536 items located from 2010 to June 2020 of them, 455 did not meet the inclusion criteria, consequently 81 full-text publications were examined. After further revision,14 articles were finally included in the systematic review.

In the study of **Johnson et al.,2013** that identified patients with diagnoses of atraumatic cardiac arrest or ventricular fibrillation (ICD-9 427.5 or 427.41) in Nationwide Emergency Department Sample (NEDS), A nationally representative estimate of all Emergency Department admissions in the United States. And defined SCA as cardiac arrest in the out-of-hospital or ED settings. Found that Overall ED SCA survival to hospital admission was 26.2% and survival to discharge was 15.7%. Greater survival to admission was seen in teaching hospitals (OR 1.3 95% CI 1.1–1.5, p = 0.001) **(Song et al.,2021).**

The study of **lvey et al 2011** demonstrate the effect of epinephrine on Thirty patients with a cardiac index of <2.2 L/min−1/m−2 and a mean arterial pressure of <60 mm Hg and they randomized to receive an infusion of either norepinephrine-dobutamine or epinephrine, the main result was elevated oxygen-derived parameters and cardiac index in a comparable way. Individuals in the dobutamine-norepinephrine group showed heart rates that were lower (p <.05) than those in the epinephrine group.

12 studies from 2010-2015 shows the effect of vasopressor and inotropes in mortality of cardiovascular patient with cardiac arrest or acute heart failure the result has shown in the table (1)

Table (1) effect of vasopressor and inotropes in patient with cardiovascular emergency setting

Author	setting	No of patient	Study drug	outcome
(Giamouzis et al.,2010	Cardiology – Acute heart failure	Treated group=30	Dopamine	The same mortality (3 patient) of

		Control group=30		patient in both treated and control group
(Biteker et al.,2011)	Cardiology – Acute heart failure	Treated group=13 Control group=13	Levosimendan	The same mortality (3 patient) of patient in both treated and control group
(Chen et al.,2013)	Cardiology – Acute heart failure	Treated group=238 Control group=122	Dopamine	13% Mortality of patient treated group compared with 14% mortality of patient in control group
(Ducros et al.,2011)	Cardiac arrest	Treated group=14 Control group=30.	Vasopressin	Mortality of patient treated group is the same with mortality of patient in control group
(Husebye et al.,2013)	Cardiology – AMI	Treated group=30 Control group=31	Levosimendan	3% Mortality of patient treated group compared with 12% mortality of patient in control group
(jacobes et al.,2011)	Cardiac arrest	Treated group=272 Control group=262	Epinephrine	96% Mortality of patient treated group compared with 98% mortality of patient in control group
(jia et al.,2015)	Cardiology – Acute heart failure	Treated group=30	Levosimendan	Mortality of patient treated group is the same

		Control group=12		with mortality of patient in control group
(Kurt et al.,2010)	Cardiology – Acute heart failure	Treated group=31 Control group=29	Levosimendan	3% Mortality of patient treated group compared with 13% mortality of patient in control group
(Packer et al.,2013)	Cardiology – Acute heart failure	Treated group=20 Control group=25	Levosimendan	6% Mortality of patient treated group compared with 14% mortality of patient in control group
(Pasqui et al.,2011)	Cardiology – Acute heart failure	Treated group=35 Control group=32	Levosimendan	14% Mortality of patient treated group compared with 15% mortality of patient in control group
(Triposkiadis et al.,2014)	Cardiology – Acute heart failure	Treated group=56 Control group=105	Dopamine	34% Mortality of patient treated group compared with 35% mortality of patient in control group
(Liorens et al.,2012)	Cardiology – Acute heart failure	Treated group=299 Control group=235	Levosimendan	25% Mortality of patient treated group compared with 20% mortality of patient in control group

the overall analysis demonstrated that patients receiving inotropes or vasopressors did not have a higher mortality rate, when compared to controls, Among the different drugs, only levosimendan

was associated with a significant improvement in survival, Additionally, a reduction in mortality in the treatment group was observed when pooling all studies

Discussion

Numerous studies have demonstrated that providing timely and efficient care to AMI patients is essential to lowering mortality and raising the quality of survival. Since, A study demonstrates the effect of a graded emergency nursing group under the assistance of multidisciplinary first aid knowledge Internet-based approach on the first aid of acute myocardial infarction (AMI). the patients with AMI were divided into the observation group(multidisciplinary approach) and the routine group(conventional first aid measures) according to the first aid order, with 45 cases each the result showed that, patients in the observation group obtained significantly lower various fast reaction indicators and quality of life score ($p<0.001$), higher nursing satisfaction score ($p<0.001$), lower total complication rate ($p<0.05$), higher successful rescue rate ($p<0.05$), and lower AMI recurrence rate and PCI reuse rate ($p<0.05$) **(song et al.,2021).**

The study's most significant conclusion is that there is no negative impact on survival from inotropic and vasoconstrictors, based on published randomized evidence. In order to stabilize hemodynamics in critically ill patients, this is crucial for clinicians to know. It may surprise some people who are aware that some Randomized CTs have shown a negative impact on survival.

Levosimendan has been shown in recent meta-analyses to improve survival in cardiac surgery and cardiology settings **(Landoni et al.,2012).** Additionally, pulsed levosimendan has been demonstrated to lower mid-term mortality in patients with advanced heart failure **(Salvetti et al.,2014).**

The impact of inotropes is less clear when we specifically take acute or decompensated heart failure into account. Observational studies have provided some evidence that catecholamines in particular and inotropes in general may increase mortality **(Mebazza et al.,2011).** However, no randomized study has yet to show that inotropic medications have a definite beneficial or detrimental impact on survival. In the biggest experiment, Levosimendan was assessed in the majority of other significant trials conducted in the context of acute or decompensated heart failure. The findings of these trials were conflicting, with levosimendan either having a positive or neutral effect on survival (**Landoni et al.,2012).**

Higher survival to hospital admission was correlated with ED volume, teaching status, and percutaneous coronary intervention capability. Lower survival rates were found in emergency departments with higher annual SCA volume, maybe as a result of fewer patient transfers. Our knowledge of how to best set up a care system to guarantee the best outcomes for patients with SCA may advance with a better understanding of the role that ED care plays in survival after SCA **(Johnson et al.,2013)**

Vasopressors, occasionally vasodilators, and medications for positive inotropic support are frequently used to stabilize individuals with CS or LCOS. Levosimendan, istaroxime, milrinone, amrinone, dopexamine, enoximone, and other medications are used to induce further reduction of

SVR for left ventricular unloading and to increase cardiac contractility. **(Pietrangelo 2010; Rognoni 2011; Sehgal 2011).**

Overall, we believe that the potential advantages of inotropic support in CS offer a chance to improve hemodynamics through improved myocardial function. These possible advantages of higher doses of inotropic support must be weighed against the increased oxygen consumption of the myocardium in the ischemic heart. In the absence of myocardial revascularization, infarct-related CS inotropic support may have brief but advantageous hemodynamic effects on top of an increasing AMI. These drawbacks could be viewed as standard hazards or unintended consequences of receiving inotropic support. For one of the studied inotropic medications, there is currently only weak evidence for decreased risks of increased cellular damage or superiority in myocardial protection of the ischemic myocardium **(Schumann et al.,2018)**

Conclusion

Higher survival to hospital admission related to setting up an effective emergency management system through collaboration of emergency department specialists to improve the outcome of cardiac shock and other cardiac emergency related issues

Rescue procedures carried out by the graded emergency nursing group using an Internet-based approach and multidisciplinary first aid knowledge are a dependable way to improve AMI patients, and they also significantly improve the patients' quality of life. In order to provide AMI patients with a better solution, more research will be necessary

Epinephrine is equally effective as norepinephrine-dobutamine when considering global hemodynamic effects. However, adrenaline is linked to a brief lactic acidosis, an elevated heart rate and arrhythmia, and insufficient gastric mucosa perfusion. Therefore, the norepinephrine-dobutamine combination seems to be a more dependable and secure approach.

According to published randomized evidences, our study demonstrates that the use of inotropes and vasopressors was not linked to an increase in mortality in the overall analyses and in various cardiovascular emergency settings.

Finally, there is a lack of solid and persuasive evidence to suggest that a particular inotropic or vasodilator medication-based therapy is a better way to lower mortality in individuals with cardiogenic shock who are hemodynamically unstable. It should be emphasized that, given the limited evidence derived from the current data due to a generally high risk of bias and imprecision, large, well-designed randomized trials on this topic are still desperately needed in order to bridge the knowledge gap between the body of evidence and routine critical care medicine practice.

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