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## Meta Analysis of Various Drugs in the Department of Emergency Medicine

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### ABSTRACT

Meta-analysis is the statistical technique that combines the findings of other results and outcomes from independent randomized comparable studies to improve, assess, maintain, promote, and modify health or health outcomes. Emergency drugs are used in life threatening conditions to save the life of the patient; these emergency drugs which have short onset of action for rapid effect mostly are injectables. The study was a Prospective, Retrospective study design in the department of Emergency medicine of tertiary care teaching hospital. This study was done in 300 patients who are admitted in the department of emergency medicine. This study was conducted for 6 months. In the study maximum number of patients reported in the emergency department was 61-70 years and the minimum were in the age group of 21-30 years in that mostly affected are male who are having habits of smoking and alcohol intake with educational level of mostly primary and the least are graduated and reasons for admission is mostly due to severe left ventricular dysfunction. The patients are mostly recovered from the emergency department and the very less are died and some are shifted to higher centres. For the recovery mostly the patients are treated with nitro-glycerine in the emergency department followed by amiodarone, adrenaline and minimum were treated with atropine and number of days stayed in the emergency department were maximum of <7 days and minimum were stayed 14 days and above. Our study concluded that most of patients admitted in Emergency department were due to several complications in health.

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### Introduction

Meta-analysis is the statistical technique that combines the findings of other results and outcomes from independent randomized comparable studies to improve, assess, maintain, promote, and modify health conditions of patients [1-3]. It is the statistical analysis of large collection of analytical results from individual studies for the purpose of integrating the findings. Authors of Meta analysis must sometimes make decisions based on their own judgment. However authors of meta-analysis require that these decisions are made public so they are open to criticism from other scholars.

Meta analysis is most easily performed with the assistance of computer data bases (Microsoft Access, Paradox) and statistical software (DSTAT, SAS) [4, 5]. Some people consider Meta analysis as conducting research about previous research; it is the compilation

of results from a group of studies to arrive at an overall summary estimate of the drug effect, namely benefit or risk. Researchers should be aware that variations in sampling schemes can introduce heterogeneity to results which is the presence of more than one intercept in the solution. Example – For instance, if some studies used 30 mg of a drug and others used 50mg, then we would probably expect two clusters to be present in the data, each varying around the mean of one dosage with the other [6,7].

#### Functions of Meta analysis:

- ✓ Increase the statistical power to detect an effect
- ✓ Develop , refine(remove unwanted ) and test hypothesis
- ✓ Identify heterogeneity in effects among multiple studies
- ✓ Calculate sample size for further studies

#### Steps to conduct Meta-analysis:

1. Define theoretical relationship
2. Collect the population studies to provide the data

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- Code the studies and compute the effect sizes
- Examine the distribution of effect sizes and analyze the impact of moderating variables
- Interpreting the data and report the results. (Illustrated in Fig:01)

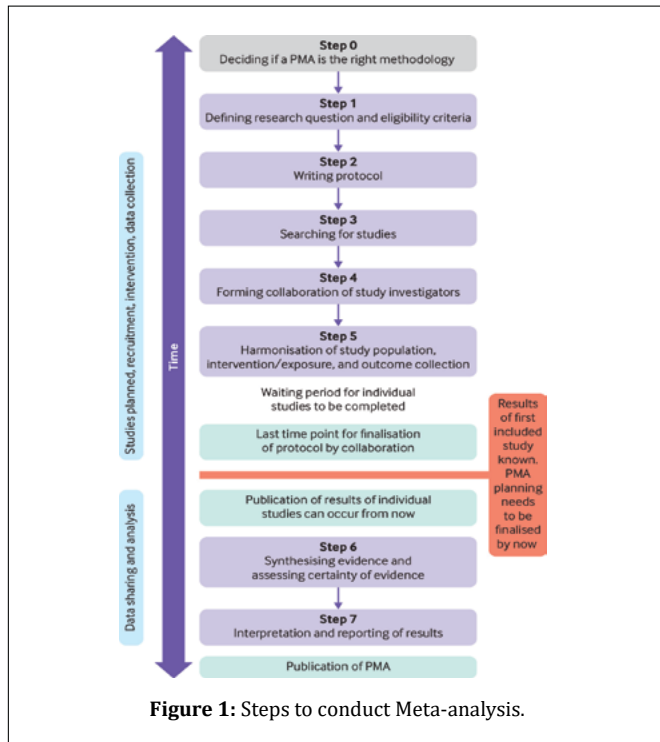


Figure 1: Steps to conduct Meta-analysis.

Emergency medicine is the branch of medicine dealing with acute illness and other medical emergencies. Emergency drugs are used in life threatening conditions to save the life of the patient and these drugs are mostly injectables to produce rapid effect and have short onset of action [8-10].

The purpose of emergency drugs is

- To provide initial treatment for emergency conditions which are life threatening
- To control the symptoms of the patient [11]
- To save the patient from the possible risks
- To overcome further complications or system failures due to emergency medical conditions [12, 13].

Some of the lives threatening medical emergencies are:

- Cardiac arrest
- Anaphylaxis
- Arrhythmias
- Acute exacerbation of Chronic obstructive pulmonary disease and asthma
- Hypovolaemia
- Postpartum hemorrhage and incomplete abortion
- Status epileptics (convulsion for longer than 10 minutes)
- Acute coronary syndrome
- Stroke
- Hepato renal syndrome
- Severe upper airway obstruction [14- 17].

Some common drugs used to treat life threatening conditions are:

- Adrenaline or epinephrine / Nor adrenaline or Nor epinephrine

- Atropine
- Amiodarone, Lidocaine
- Nitroglycerine
- Diphenhydramine
- Salbutamol
- Midazolam ,Diazepam
- Morphine sulfate
- Ephedrine
- Glucagon
- Hydrocortisone, methyl prednisolone
- Esmolol , Labetolol [18, 19].

Aromatic ammonia and others were listed in Table: 01

DRUG	INDICATION	ALTERNATIVE DRUG	CLASS
Adrenaline   Epinephrine	Anaphylaxis Acute allergic reaction Acute asthmatic attack Cardiac arrest		Catecholamine
Atropine	Symptomatic bradycardia		Anticholinergic
Nitroglycerine (sublingual)	Immediate management of chest pain (in Angina or MI)	Amylnitrate	Vasodilator
Amiodarone	Ventricular tachycardia or ventricular dysrhythmias	Lidocaine	Antidysrhythmic
Diphenhydramine	Allergic reaction	Chlorphenamine	Histamine blocker
Salbutamol	Acute asthmatic episodes Allergic reactions		Bronchodilator
Midazolam	Seizure disorders	Diazepam	Anti convulsant
Morphine sulphate	Acute MI, heart failure ,Acute pain or anxiety		Analgesic
Ephedrine	Acute adrenal insufficiency , Syncope(LOC), drug over dosage reactions , allergic reactions		Vasopressor
Hydrocortisone sodium succinate	Acute allergy, Adrenal insufficiency, recurrent anaphylactic episodes	Methyl prednisolone	Corticosteroid
Aromatic ammonia	Respiratory depression		Respiratory stimulant
Hydralazine	Hypertensive urgencies	Nitroglycerine	Antidysrhythmic

Table 1: Some drugs used to treat life threatening medical emergencies.

**Materials and Methods:**

**Place of Study:** The study “Meta analysis of various drugs used in the department of emergency medicine” which is carried out in the Department of emergency medicine IP at Narayana Hospitals, Nellore, a 1200 bedded multidisciplinary hospital, Under the guidance of Dr. ARUN CHAND ROBY PharmD (PB),Msc( Psy), PGDHHM, Assistant professor, Department of pharmacy practice , Narayana pharmacy college , Nellore.

**Study design:**

The study was a Prospective, Retrospective study design in the department of Emergency medicine of tertiary care teaching hospital

**Study population:** This study was done in 300 patients who are admitted in department of emergency medicine

**Study duration:** This study was conducted for 6 months.

**Study Material:** This data extracted from available literature, compared to present observed data through specially designed emergency department questionnaire forms.

**Study Criteria:** Patients are considered for the study based on inclusion and exclusion criteria

**a)Inclusion criteria:** In our study we include

All the patients admitted in emergency department in our study duration who are treated with emergency drugs like

- Atropine
- Amiodarone
- Nitroglycerine
- Nor-adrenaline / adrenaline

- Patients of both the sexes
- Patients age in between 21 years and above

**b) Exclusion criteria:** In our study

- Pediatric population
- Pregnant people are excluded

**Study Method:** The study will be initiated after obtaining permission from the institutional ethical committee. The patients will be enrolled in the study after taking informed consent from them. The data for the present study will be collected from available data, research articles and specially designed emergency department questionnaire forms which includes patient details , past medical or medication history , patient present medical condition, which emergency drugs are used to treat the patient , how long it takes to reduce the symptoms and patient recovery status.

**Study Procedure:** Comparison of literature to the current study.

**Results**

In our study we compare literature data already existing in different sources to present observed data to produce more efficacy or accuracy in using emergency drugs and also to create awareness among health care professionals and public on emergency drugs. *Table: 02* shows the data according to existing literature, various studies on drugs and their effects; *Table 03* Shows demographics of the patients; *Table: 04* Shows reasons for admissions into emergency department; *Table: 05* Shows the drugs used in treating patients admitted in emergency department; *Table: 06* Shows number of patients recovered from emergency after treatment; *Table: 07* Shows number of days stayed in emergency department.

Author name	Emergency drug	Study
1) Lauren A. Siemers, Jason G. Andrade, Jenny MacGillivray et al	Amiodarone	Chronic Amiodarone use did not increase cancer related deaths
2) Dong Keon Lee, Yu Jin Kim, Giwoon Kim et al	Amiodarone	Early Amiodarone administration ( $\leq 20$ min) resulted in better neurological outcomes at hospital discharge for OCHA (out-of-hospital cardiac arrest) patients who presented with initial VF and subsequent RVF.
3) Fereshten Mehraein	Amiodarone	Amiodarone in long term treatment of patients with heart arrhythmia is reduced because of its side effects.
Cherie L. Kunik, Laura P. Kimble et al	Nitroglycerine	Patient should be educated not to use Sublingual Nitro-glycerine as it may lead to severe side effects
4) William .E. Boden, Santosh K Padala, Katherin .P. Cabral et al.,	Nitroglycerine	Admission of short acting Nitro-glycerine in Ischemic Heart disease patients shows positive results as patient conditions was improved
5) Gilbert Postler and Maya Guglin	Nitroglycerine	High dose intravenous nitro-glycerine is very useful in cardiac arrest
6) Peter Jones, B Chir, PhD, Stephane Dager, MD, PhD, Isabelle Denjoy MD	Atropine	Atropine reduces the prevalence of Arrhythmias and conduction disturbances during Intubations ,when atropine was not used during intubations older children experienced more arrhythmias
7) Peter Jones, Mark J. Peters, Nathalia Pintoda costa et al.,	Atropine	Atropine helps in reduction of ICU mortality in Children aged over 1 month.
8) Megan. S. Motosue MD, , Holly. K. Von Houten, BA, M. Fernanda Bellolio et al.,	Epinephrine	Over the past decade, Rates of EAI (Epinephrine Auto Injector ) dispensing and A/I (Allergy/Immunology) after an emergency department visit for anaphylaxis have remained low
9) Jan. G. Stiell, MD, Paul C. Hebert, MD, Brain N. Weitzman, MD et al.,	Epinephrine	High dose epinephrine was not found to improve survival or neurologic outcomes in Adult victims of cardiac arrest. Indeed their results suggest that high dose may have had a worse outcome.

Florence Dumas, MD, PhD, Wulfran Bougouin, MD, MPH, Guillaume Geri, MD, MSC et al	Epinephrine	In this large cohort of patients who achieved ROSC ( Return Of Spontaneous Circulation) pre-hospital use of epinephrine was consistently associated with a lower chance of survival
Ricardo Jose, Gerald J Clesham et al	Epinephrine	Junior doctors may be called to make immediate decisions, but confusion exists regarding the dose and ROA, dose of epinephrine with clear labelling for intramuscular use, may be one solution.
Thomas D. Rea, , John A. Murray, Catherine Edwards et al	Epinephrine	Emergency medical technicians can use epinephrine in a discriminating manner for the treatment of suspected anaphylaxis
Linus B. Grabenhenrich , PD, MD, MPH, Sabine Dolle, PhD, Franziska Rueff , MD, et al	Epinephrine	This study reveals that only a small proportion of anaphylaxis incidents are treated with epinephrine despite the clear medical consensus on epinephrine as the first line drug for anaphylaxis, health professionals do not follow this recommendation.
Shinji Nakahara, Jun Tomio, Hideto Takahashi, et al	Epinephrine	Pre-Hospital administration of adrenaline by emergency medical services improves the long term outcomes in patients with out of hospital cardiac arrest.

Table 2: Existing literature-various studies on drugs and their effects.

Demographics	Number of patients	Frequency (in %)
<b>Age:-</b>		
21-30	26	8.67
31-40	23	7.67
41-50	59	19.67
51-60	38	12.67
61-70	94	31.33
71 and above	60	20.0
<b>Gender:-</b>		
Male	165	55.0
Female	135	45.0
<b>Marital status:-</b>		
Married	284	94.6
Unmarried	16	5.33
<b>Educational level:</b>		
Primary	159	53.0
Secondary	96	32.0
Tertiary	45	15.0
<b>Smoking status :-</b>		
Smoker	195	65.0
Non smoker	105	35.0
<b>Alcoholic status :-</b>		
Alcoholic	185	61.67
Non alcoholic	115	38.33

Table 3: Demographic details of the patients.

S.No	Reasons for admission	Number of patients	Frequency (in%)
1.		125	41.67
2.	Severe Left Ventricular dysfunction (LVD)	69	23.0
3.	Dilated Cardiomyopathy (DCMP)	11	3.67
4.	Ischemic Cardiomyopathy	72	24.0
5.	Coronary Artery Disease(CAD)	75	25.0
6.	Heart failure	39	13.0
7.	Congestive heart failure	19	6.33
8.	Decompensated heart failure	17	5.67
9.	Hypertensive heart failure	22	7.33
10.	Acute coronary syndrome	34	11.33
11.	Atrial fibrillation	9	3.0
12.	Severe myocardial infraction Cerebrovascular attack (CVA)	35	11.67
13.	COPD, Acute asthmatic attack	33	11.0
14.	H/o Consumption of poison	26	8.67
15.	Dimethoate-30% (Opioid poisoning)	9	3.0
16.	Pesticide poisoning	13	4.33
17.	Rodenticide poisoning	4	1.33

**Table 4:** Reasons for admissions into emergency department

Emergency drugs used	Number of patients	Frequency (%)
Nitroglycerine	149	49.67
Atropine	26	8.67
Amiodarone	96	32.0
Adrenaline/Nor-adrenaline	29	9.66

**Table 5:** Drugs used in treating patients admitted in emergency department.

Recovery status	Number of patients	Frequency (%)
Recovered	160	53.33
No response	46	15.33
Died	29	9.67
Shifted to higher centre	65	21.67

**Table 6:** Shows number of patients recovered from emergency after treatment.

Duration	Number of days	Frequency (%)
< 7 Days	123	41.0
7days	97	32.33
7-14 days	55	18.34
14 days & above	25	8.33

**Table 7:** Number of days stayed in emergency department.

**Discussion**

In our study out of 450 patients 300 are willing to provide the information, with the age groups of 21 and above are reported in the emergency department and mostly were in the age group of 61-70 years of 94 patients (31.33%) and minimum were of 26 (8.67%)

in the age group of 21-30 years The patients with sexes are males maximum reported in the emergency department of 165 (55.0%) and the minimum females of 135 (45.0%) and the marital status of patients admitted in emergency department are mostly married of 284 (94.6%) and the least was unmarried of 16 (5.33%) with the educational levels of patients were mostly primary 159 (53.0%)

and the least are with tertiary educational levels of 45 (15.0%) and the personal habits of the patients admitted in the emergency department are maximum of smokers 195 (65.0%) and the minimum were non smokers 105 (35.0%) and also maximum people reported in emergency department are alcoholic of 185 (61.67%) and minimum were non alcoholic of 115 (38.33%).

The reasons for admission in the emergency department are mostly due to Severe left ventricular dysfunction 125 (41.67%), followed by Heart failure 75 (25.0%), Coronary artery disease 72 (24.0%), Dilated Cardiomyopathy 69 (23%), Cerebro vascular attack 35 (11.67%), Atrial fibrillation 34 (11.33%) and with COPD, Acute asthmatic attack 33 (11.0%), Consumption of poison of 26 (8.67%), Ischemic Cardiomyopathy of 11 (3.67%) and the least were reported with Severe myocardial infarction of 9 people (3.0%).

The drugs used to treat patients in the emergency department maximum Nitroglycerine of 149 (49.67%) followed by Amiodarone of 96 (32.0%), Nor-adrenaline of 29 (9.66%) and the minimum treated with atropine of 26 (8.67%) and the patients stayed in emergency also analyzed in that maximum were stayed < 7 days ,123 patients (41.0%) and the minimum were stayed 14 days and above 25 (8.33%) .

**Conclusion**

Our study concluded that most of patients admitted in Emergency department were due to several complicated health issues. The drugs used in the treatment are mostly Nitroglycerine (William .E. Boden, Santosh K Padala, Katherin .P.Cabral et.al., Reported Nitro-glycerine is most effective), Amiodarone (Dong Keon Lee, Yu Jin Kim, Giwoon Kim et al reported Amiodarone is most effective ). Our study also found that Nitro-glycerine & Amiodarone are the most useful drugs in emergency medicine and over usage has to be restricted for the beneficial use of the patients in the department of emergency medicine. So Government, Physicians, Healthcare professionals and clinical pharmacists has to take measures for the beneficial use of patients and to reduce the mortality in the Emergency department.

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