

# A study on types of shock and pattern of inotropes used in the treatment of shock among adults admitted in the ICU

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## Abstracts-

### Background

Shock is a state of circulatory failure to deliver sufficient oxygen to meet the demands of tissues which result in cellular dysoxia leading to multiple organ failure. Management of shock requires an early treatment plan based on bedside assessment of the patient. The use of inotropes plays a major role in the treatment of shock. So the present study was done to assess the type of shock in adults and the pattern of inotropes used in the treatment of critically ill patients.

### Objectives

- To determine the type of shock among adults admitted in ICU
- To assess the pattern of inotropes used in the treatment of shock among adults admitted in ICU
- To associate the types of shock and selected demographic variables among adults admitted in ICU.

### Methods:

A quantitative approach with descriptive design was adopted for this study. The sample consist of 100 subjects admitted with shock. The tool used for this study was proforma for observation and monitoring parameters and data collected by observation method.

### Results:

About 56 % of the subject had distributive shock followed by Cardiogenic shock with 22% ,11% with obstructive shock and 11% with hypovolemic shock. The overall mortality was 11 % during the study and the majority of the patients were treated with single inotropes which is noradrenaline 89%.

The study also shows there was a significant association between age, gender, comorbidities and types of shock. A significant association found between age, comorbidities and severity of shock.

### Interpretation & Conclusion:

In this present study distributive shock was the most common types of shock and nor adrenaline was the most common types of inotropes used in our ICU settings. And as shock has a high mortality rate in ICU patients, the early recognition and treatment is important.

**Key words:** Types of shock; Inotropes; patients admitted in ICU

## INTRODUCTION

Oxygen is one of the most important elements, in living beings to sustain life. It acts as a fuel for our body to obtain energy. It is believed that most of our body function need oxygen for the biological and metabolic activities.

Traditionally shock was defined as an arterial hypotension resulting from impaired cardiac output, blood loss, or decreased vascular resistance, but with modern technology and better understanding of shock, the cellular definition was introduced. Here it states that shock is a state of circulatory failure to deliver sufficient oxygen to meet the demands of the tissues, that is the imbalance between oxygen delivery and oxygen consumption in the tissues; which results in cellular dysoxia leading to multiple organ failure and death.

## METHODOLOGY:

A quantitative approach with descriptive design was adopted for this study. The sample consist of 100 subjects admitted with shock at St Martha's hospital Bangalore. The inclusion criteria consist of patient who are medically diagnosed with shock during admission or on hospital stay the age group of 30 to 80 years with minimal of one or more inotropes and are diagnosed with shock within 48 hours of admission the exclusion criteria were patient who are diagnosed with shock and are treated else were and the patient who are medically diagnosed with shock and died within 1 hour after admission. The tool used for this study was develop by the researcher base on the objective of the study and by doing extensive review of literature and by consulting with the experts, the tool was made and was validated by 12 experts under the following settings demographic variables and proforma for observation and monitoring parameters and the data was collected by observation method. The reliability of the tool was assessed by using inter rater method. The data collection was done by taking Formal permission from the Hospital Director and from hospital ethical committee. Subjects who belong to the inclusion criteria were selected by purposive sampling technique informed consent was obtained from the subject's/family members Demographic variables were used to collect baseline information. Proforma for

observation and monitoring parameters was used to collect the data from patient case files After the research data collection, the relationship was terminated by the researcher

## RESULTS

Data was organized under the following sections

Section I: Distribution of subjects according to baseline variables.

Section II: (a) Distribution of subjects according to etiology of shock

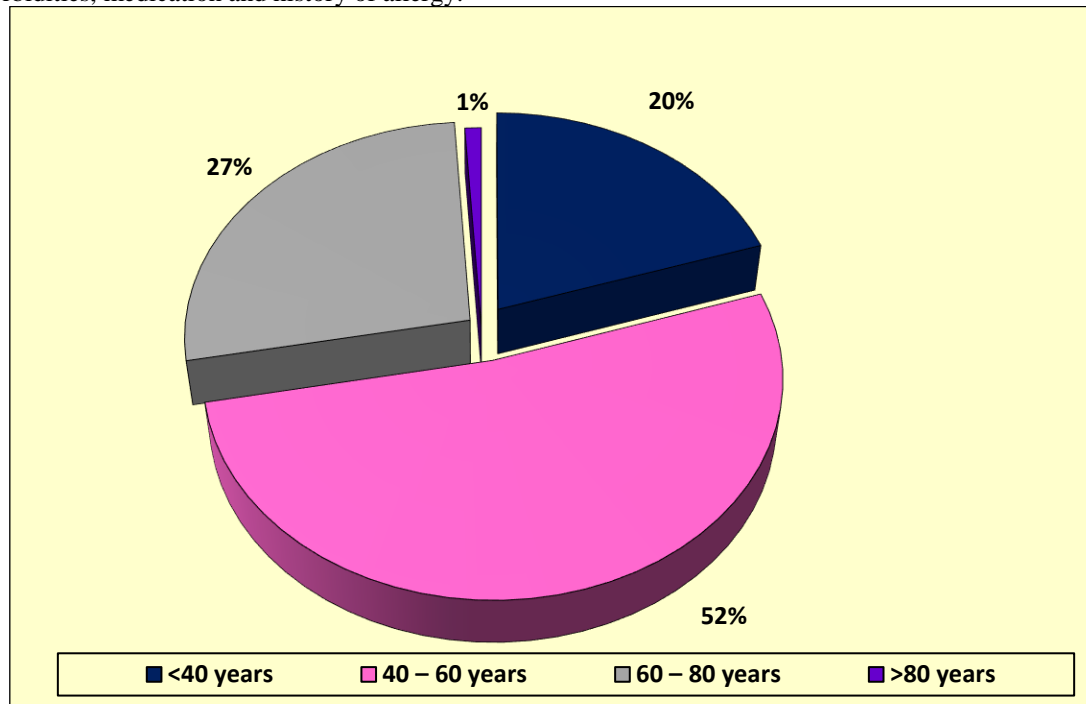
Section II: (b) Distribution of subjects according to the pattern of inotropes and vasopressors used in the treatment of shock.

Section III: (a) Association on types of shock among adults with the selected demographic variables.

Section III (b) Association on severity of shock among adults with the selected demographic variables.

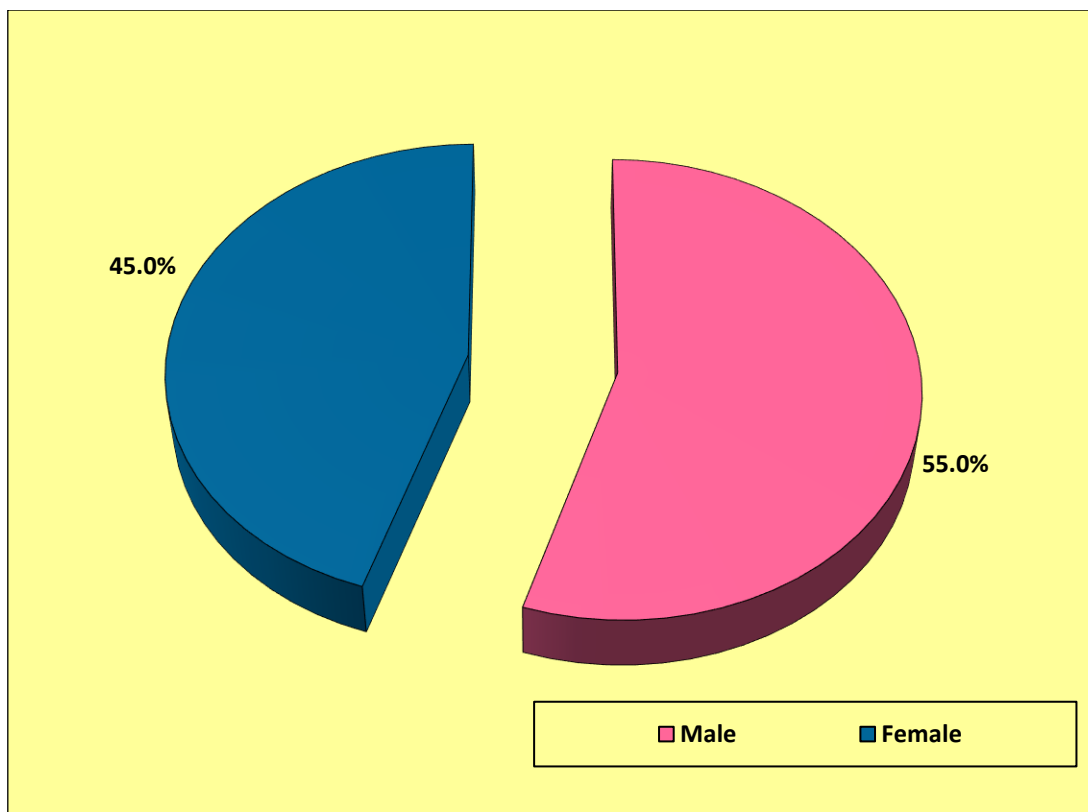
### Section 1: Distribution of subjects according to baseline variables.

This section deals with the description of baseline characteristics of 100 subjects in terms of frequency and percentage such as age, gender, comorbidities, medication and history of allergy.



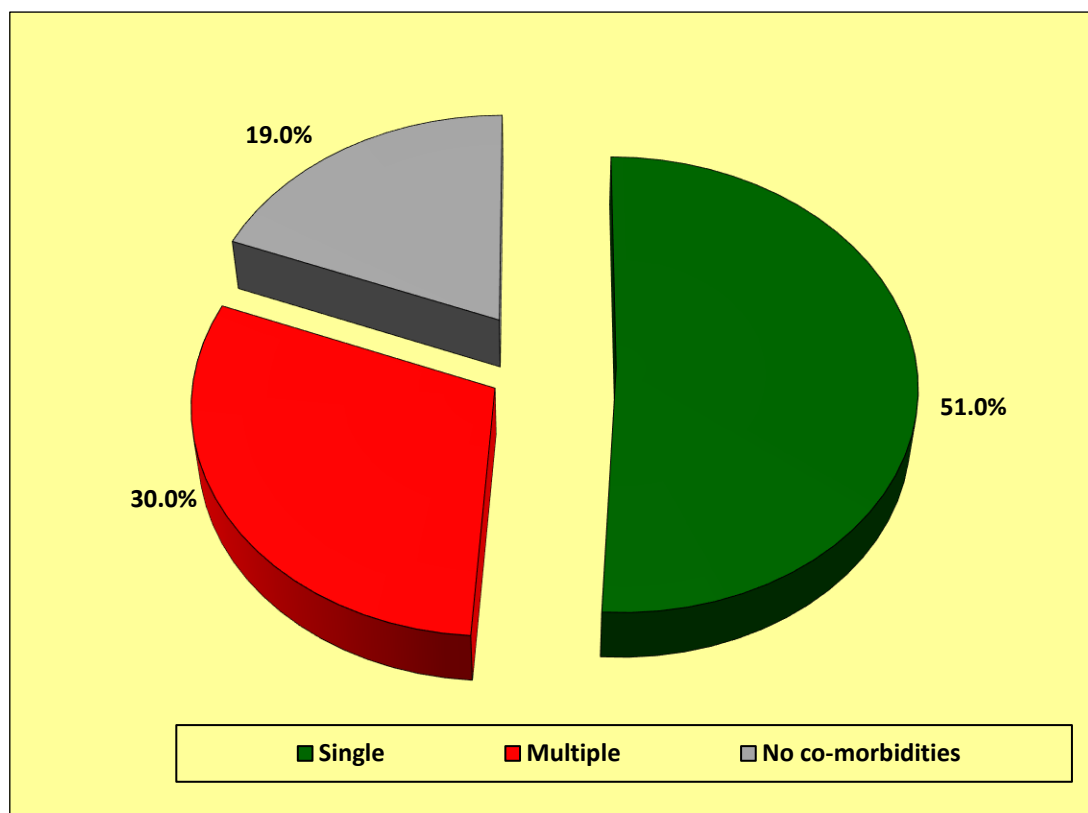
**Figure1. Distribution of subjects according to age**

Figure 1 indicates that the majority (52 %) of the subjects belonged to the age group of 40-60 years.



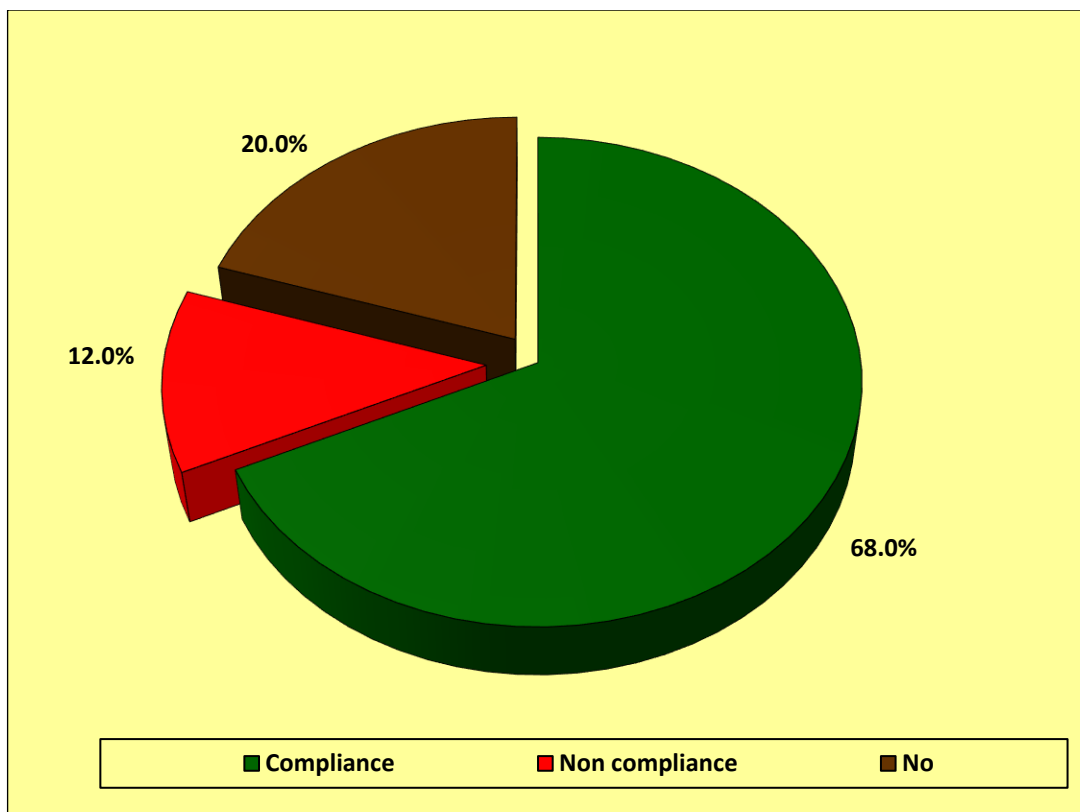
**Figure 2 Distribution of subjects according to gender**

Figure 2 shows that more than half (55%) of the subjects are male and remaining 45% were female.



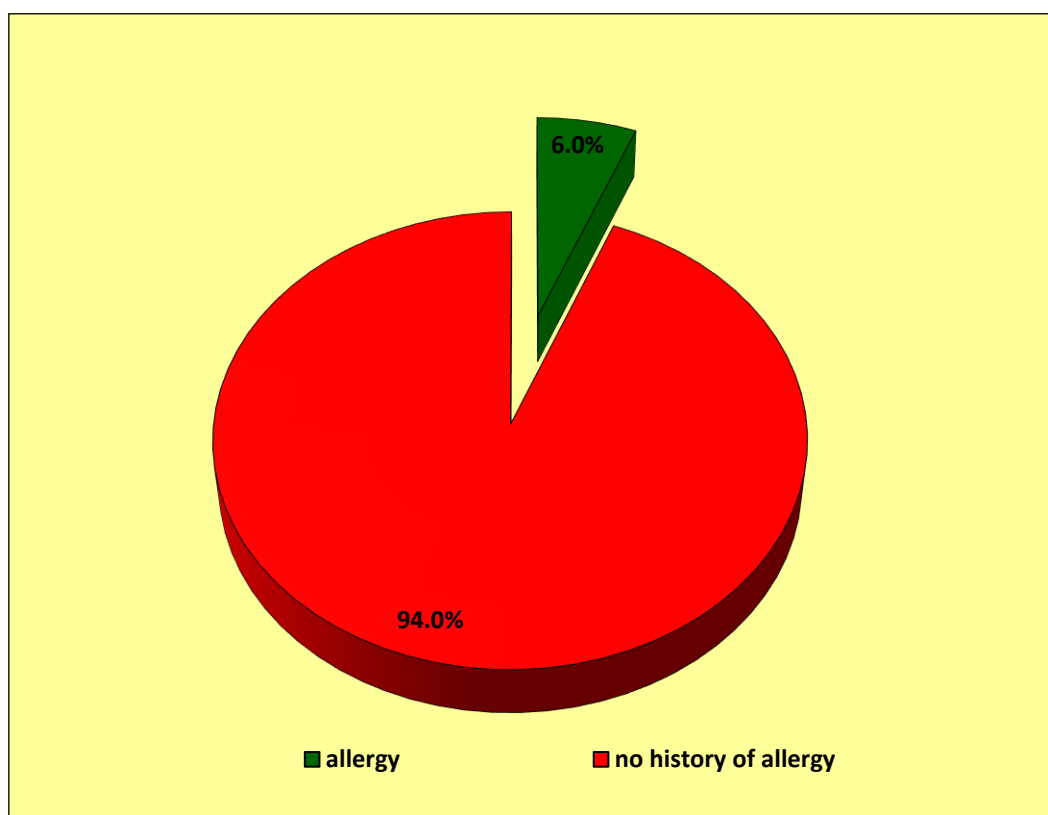
**Figure 3: Distribution of subjects according to comorbidities**

Figure 3 shows that more than half of the subjects had single comorbidities of (51%) and 30 % had multiple comorbidities and 19% had no comorbidities



**Figure 4: Distribution of subjects according to medication compliance**

Figure 4 shows that 68 % of the sample population had medication compliance with 12 % non-compliance and 20% of the subjects with shock does not have any history of medication.

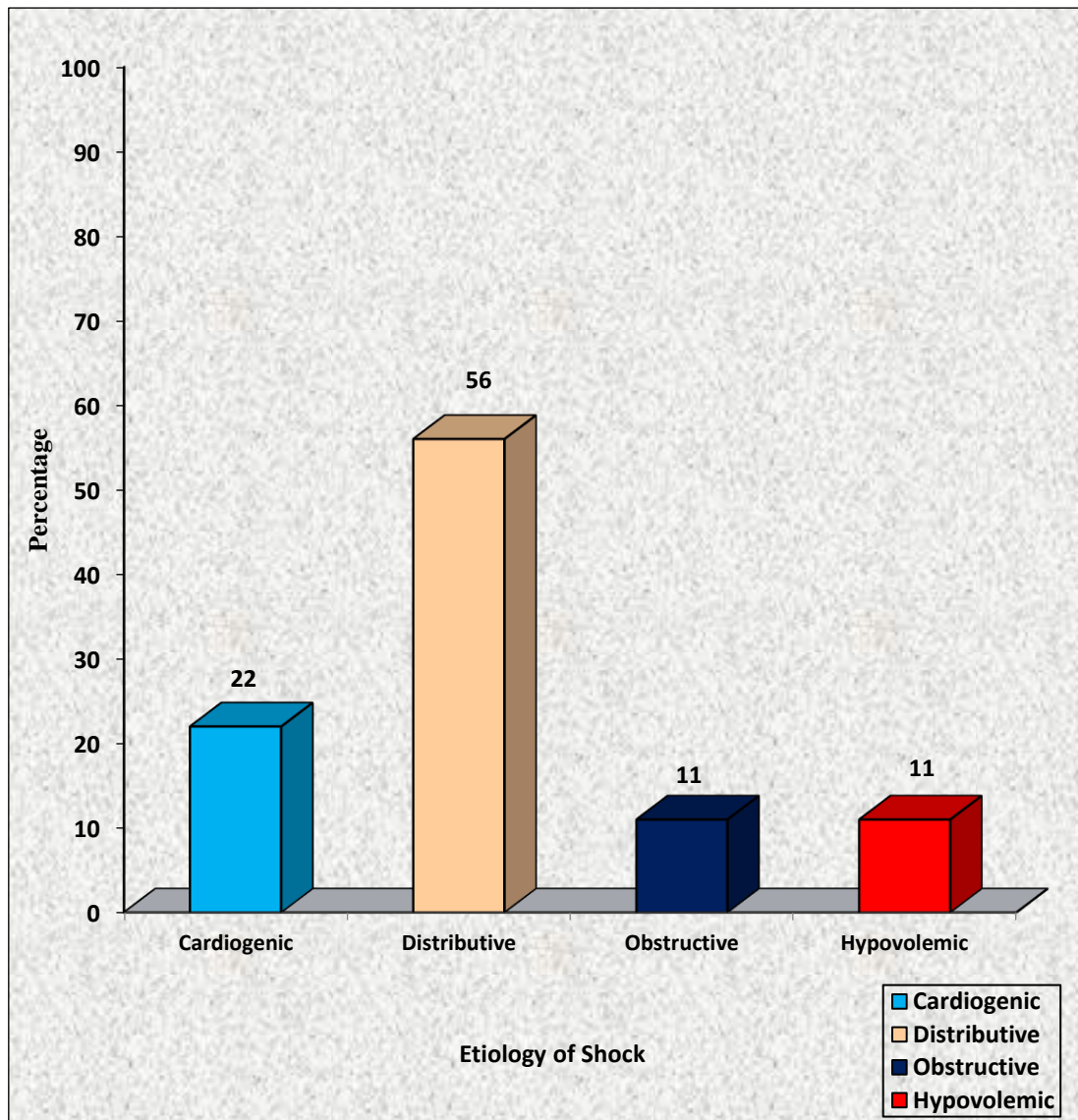


**Figure 5: Distribution of subjects according to allergy**

Figure 5 shows that 94% of the subjects had no history of allergic reaction, other 6 % had history of allergy.

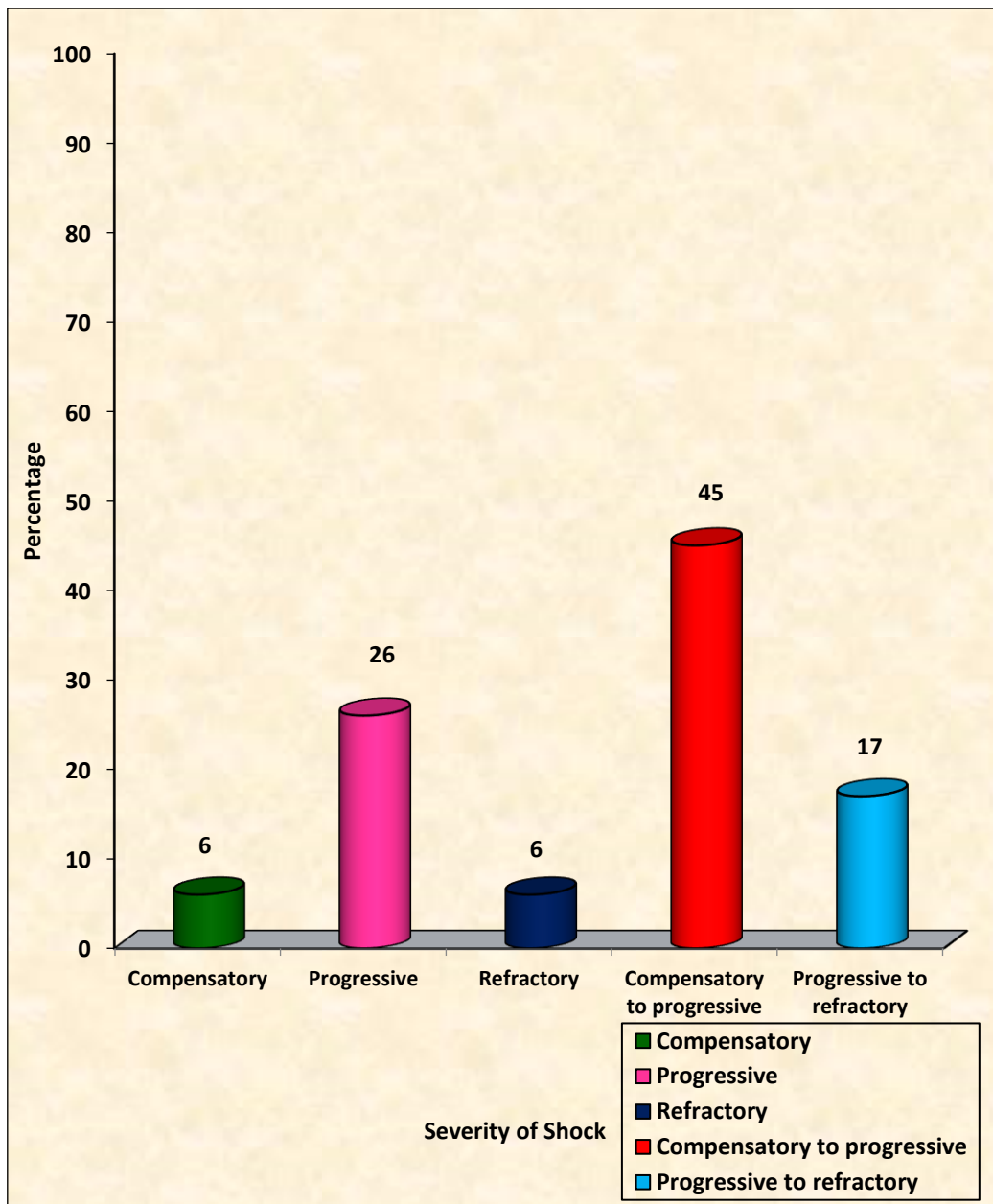
**Section II (a): Distribution of Subjects according to etiology of shock**

This section deals with the description of subjects according to the frequency and percentage in etiology of shock and stages of shock.



**Figure 6: Distribution of subjects according to etiology of shock**

Figure 6 shows that distributive shock was the most common types of shock with (56 %) of the total subjects followed by 22% with cardiogenic shock, 11% with obstructive shock and 11 % with hypovolemic shock.

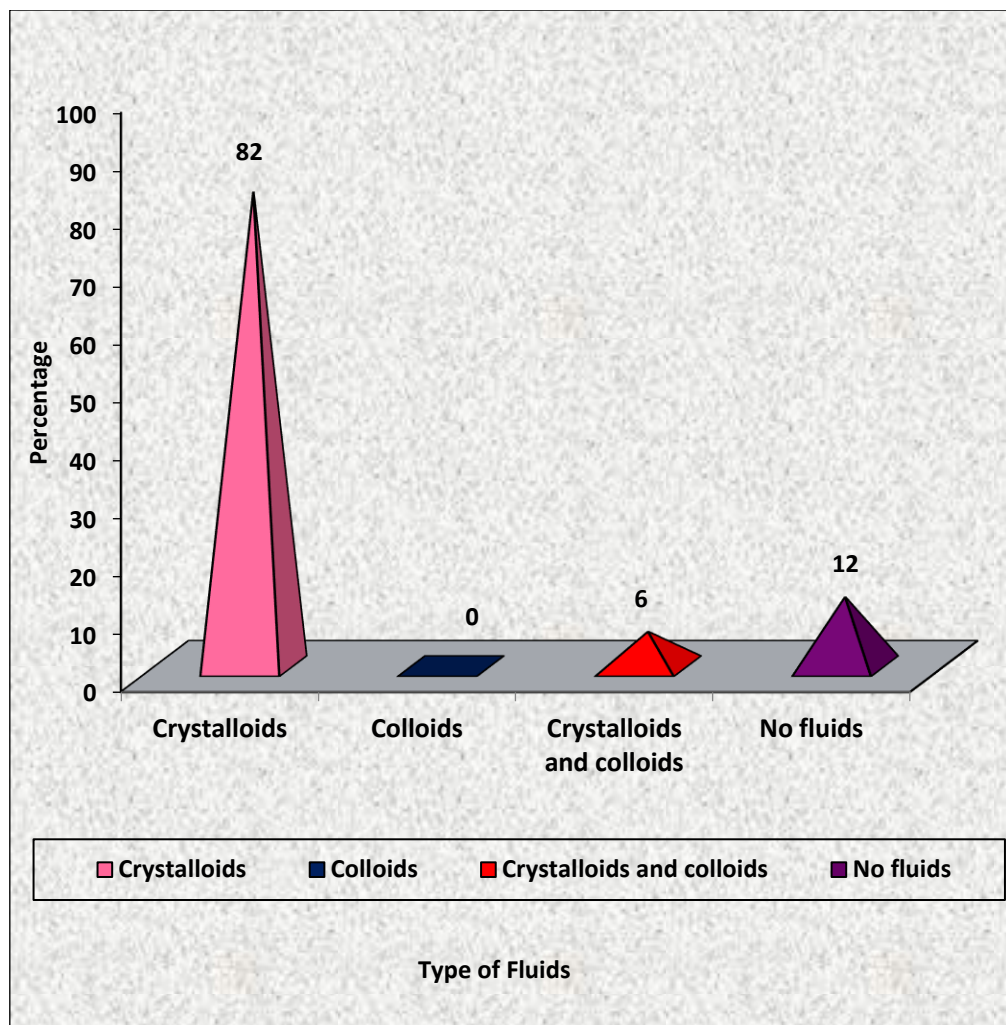


**Figure 7: Distribution according to the stages of shock**

Figure 7 shows that majority (45%) of the subjects was in compensatory to progressive, 26% was in progressive, 17% was in progressive to refractory, 6% was in compensatory and 6% of the subjects comes under refractory stages of shock.

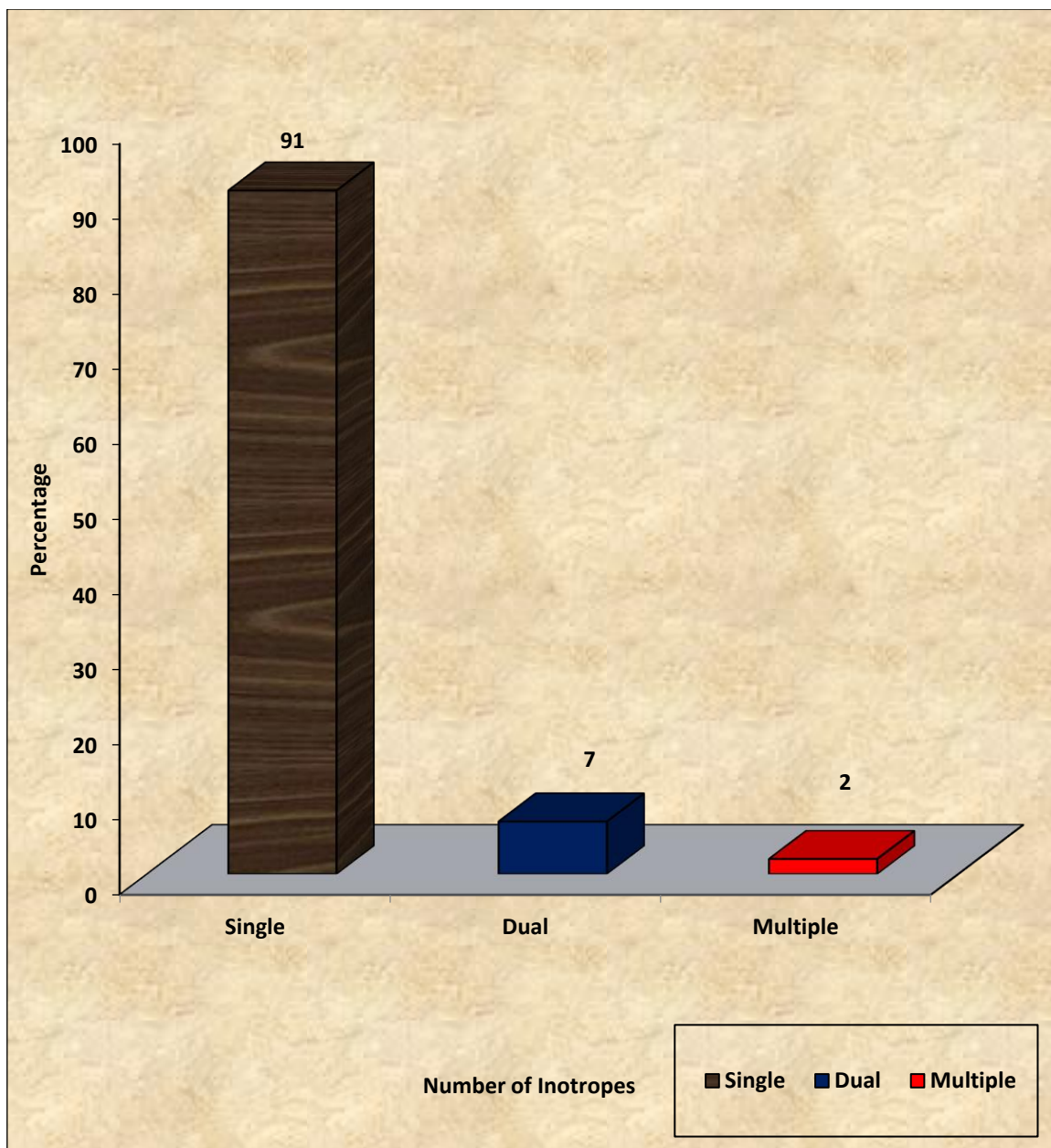
**Section II (b): Distribution of subjects according to the pattern of inotropes and vasopressors used in the treatment of shock**

This section deals with the description of the subjects according to the frequency and percentage of types of fluids used, number of inotropes used, number of vasopressors used, number of steroids used, and distribution of subjects according to the outcome of shock.



**Figure 8: Distribution according to the types of fluids used**

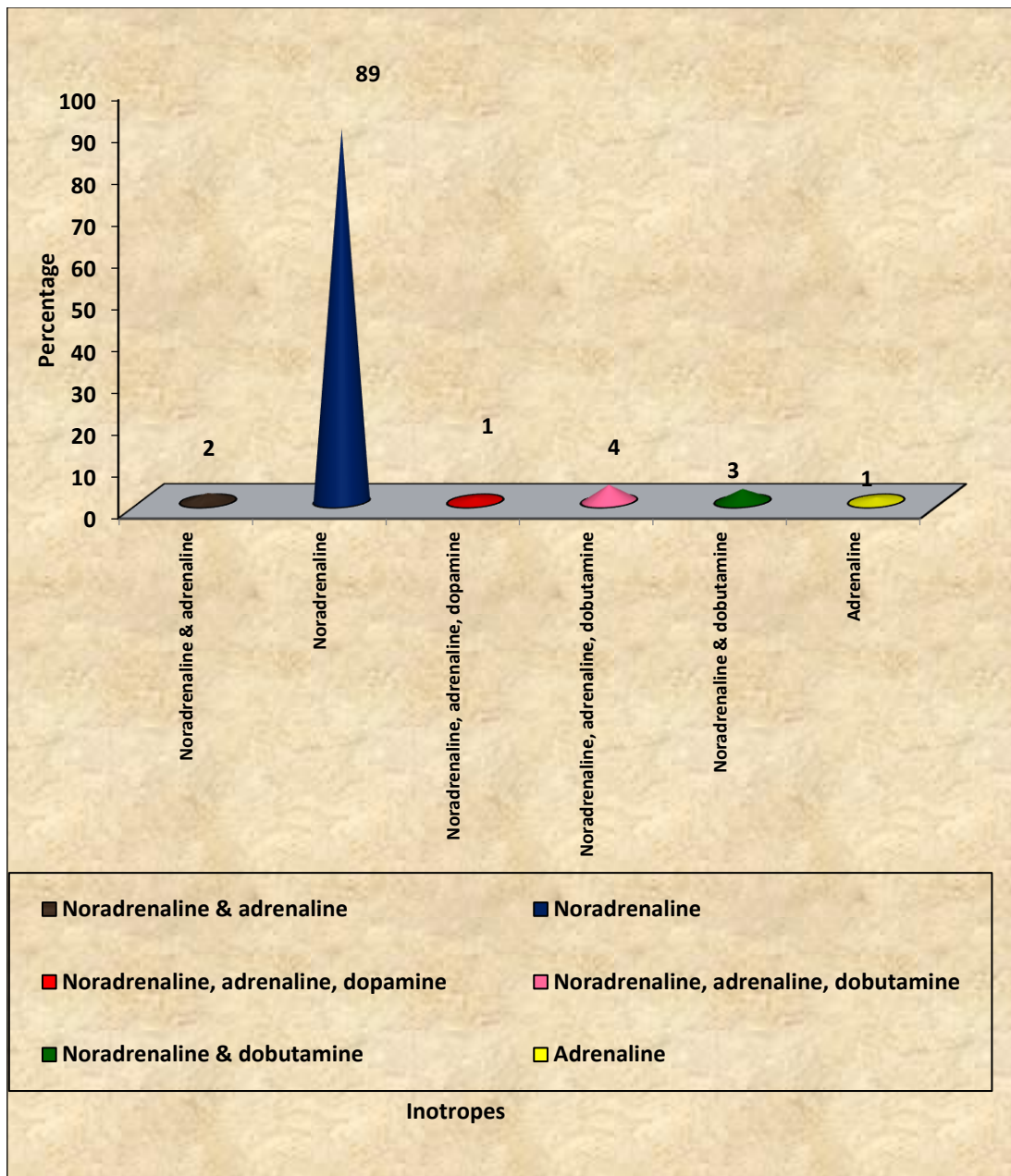
Figure 8 shows that majority of subjects (82%) were treated with crystalloids, 6% of the subjects were treated with both crystalloids and colloids and 12 % of the subjects does not receive any fluids.



**Figure 9: Distribution according to the number of inotropes used**

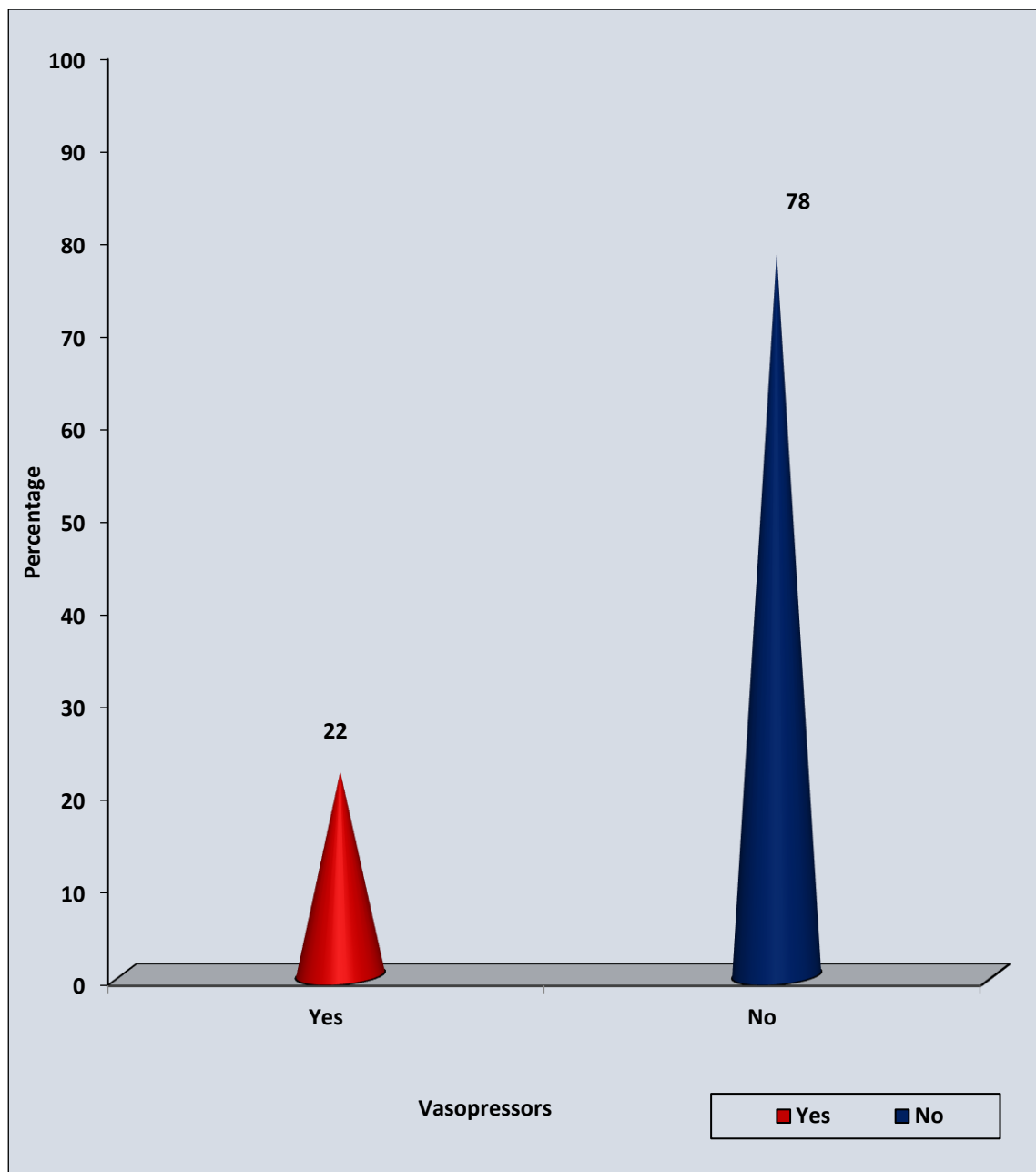
Figure 9 shows that (91 %) of the subjects were treated with single inotropes, 7% of the subjects with dual inotropes and 2 % were treated with multiple inotropes.





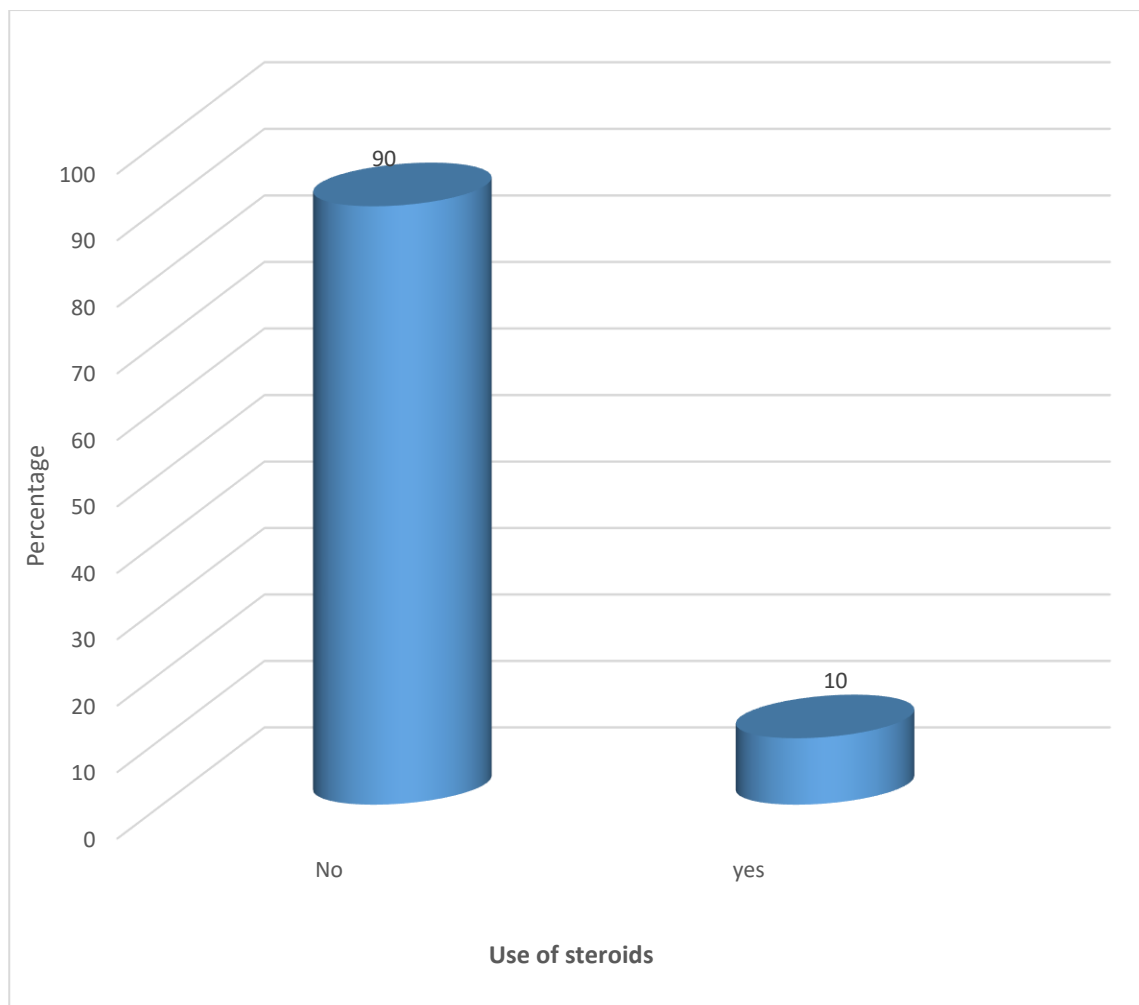
**Figure 10: Distribution according to the label of inotropes used**

Figure 10, shows that 89 % of the patient were treated with noradrenaline, 4% of the subjects were treated with noradrenaline, adrenaline and dobutamine, 3% were treated with nor adrenaline and dobutamine, 2% were treated with noradrenaline and adrenaline and only 1 % were treated with adrenaline alone.



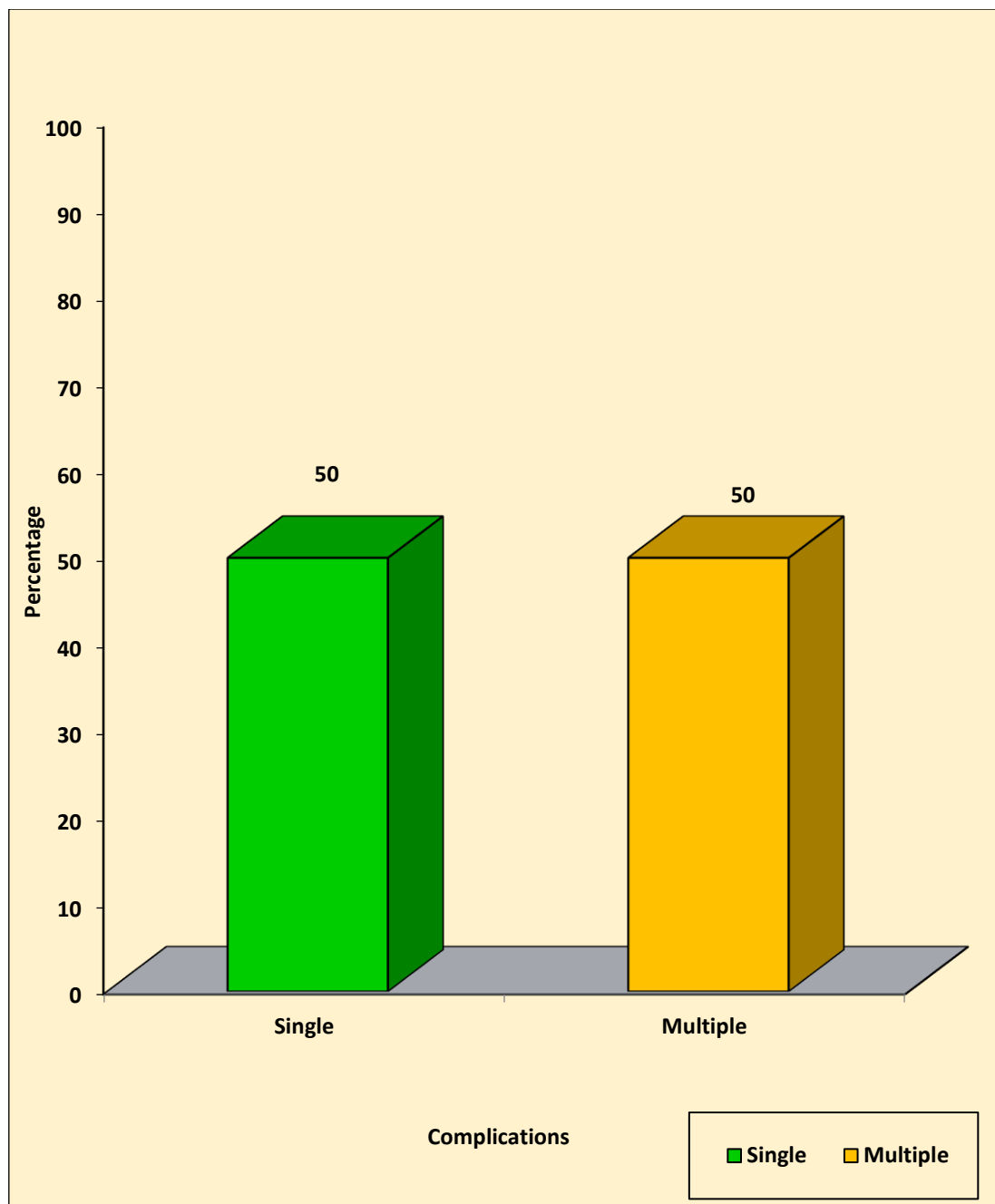
**Figure 11: Distribution according to the Vasopressors used**

Figure 11 states that 22% of the patient were treated with vasopressors and majority (78%) of the study subjects does not receive any vasopressors



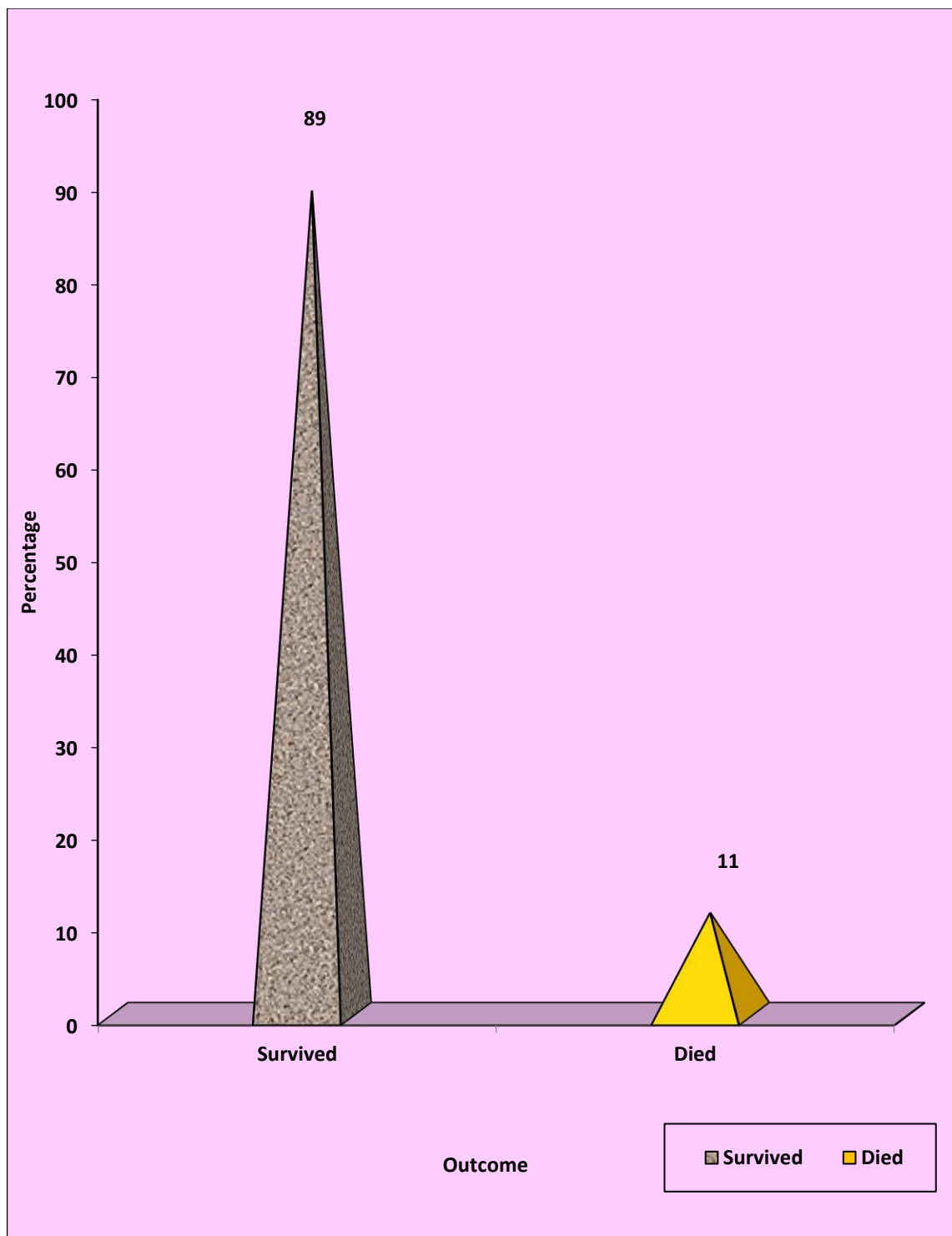
**Figure 12: Distribution according to the use of steroids in adults**

Figure 12 states that 90 % of the subjects were not treated with steroids and 10% were treated with Steroids.



**Figure13: Distribution of complications among the adult**

Figure 13 states that 50 % of the subjects developed single complication and 50 % of the subjects developed multiple complication.



**Figure 14: Distribution according to the mortality**

Figure 14, shows that 89% of the subjects survived and 11% died as a result of shock.

### Section III (a): Association of type of shock among adults with their selected demographic variables. n=100

In order to determine the association between types of shock and selected demographic variables,  $\chi^2$  test was computed.  $H_1$ : there is significant association between types of shock and selected demographic variables.

Demographic Variables	Cardiogenic		Distributive		Obstructive		Hypovolemic		Chi square Test
	F	%	F	%	F	%	F	%	
Age									
<40 years	4	4.0	6	6.0	3	3.0	7	7.0	$\chi^2=23.724$ <b>d.f=9</b> <b>p=0.002</b> <b>S**</b>
40 – 60 years	12	12.0	28	28.0	8	8.0	4	4.0	
60 – 80 years	6	6.0	21	21.0	0	0	0	0	
>80 years	0	0	1	1.0	0	0	0	0	
Gender									$\chi^2=8.592$ <b>d.f=3</b> <b>p=0.036</b> <b>S*</b>
Male	14	14.0	24	24.0	9	9.0	8	8.0	
Female	8	8.0	32	32.0	2	2.0	3	3.0	
Co-morbidities									$\chi^2=16.420$ <b>d.f=6</b> <b>p=0.012</b> <b>S*</b>
Single									
Multiple	11	11.0	34	34.0	2	2.0	4	4.0	
No co-morbidities	5	5.0	18	18.0	5	5.0	2	2.0	
Medication									$\chi^2=16.098$ <b>d.f=6</b> <b>p=0.013</b> <b>S*</b>
Yes									
Compliance	11	11.0	44	44.0	5	5.0	8	8.0	
non compliance	2	2.0	8	8.0	2	2.0	0	0	
no	9	9.0	4	4.0	4	4.0	3	3.0	
History of allergy									$\chi^2=0.496$ <b>d.f=3</b> <b>p=0.709</b> <b>N.S</b>
Yes									
No	1	1.0	3	3.0	1	1.0	1	1.0	
	21	21.0	63	63.0	10	10.0	10	10.0	

\*\*p<0.01, \*p<0.05, S – Significant, N.S – Not Significant

The table 1, shows that the demographic variables age ( $\chi^2=23.724$ , **p=0.002**) had shown statistically significant association with type of shock among adults at p<0.01 level.

The demographic variables such as gender ( $\chi^2=8.592$ , **p=0.036**), co-morbidities ( $\chi^2=16.420$ , **p=0.012**) and medication ( $\chi^2=16.098$ , **p=0.013**) had shown statistically significant association with type of shock among adults at <0.05 level. So the hypothesis is accepted. The variable, history of allergy has no association with the types of shock

### Section III(b): Association on severity of shock among adults with their selected demographic variables. n=100

**H2:** There is significant association between severity of shock and selected demographic variables.

\*\*p<0.01, \*p<0.05, S – Significant, N.S – Not Significant

Demog-raphic Variables	Compensa-tory		Progr-essive		Refractory		Compensatory to progressive		Progressive to refractory		chi Square Test
	F	%	F	%	F	%	F	%	F	%	
Age											$\chi^2=29.253$ d.f=12 p=0.004 S**
<40 years	0	0	5	5.0	2	2.0	6	6.0	7	7.0	
40-60 years	1	1.0	15	15.0	3	3.0	27	27.0	6	6.0	
60-80 years	4	4.0	6	6.0	1	1.0	12	12.0	4	4.0	
>80 years	1	1.0	0	0	0	0	0	0	0	0	
Gender											$\chi^2=2.749$ d.f=4 p=0.601 N.S
Male	4	4.0	16	16.0	3	3.0	21	21.0	11	11.0	
Female	2	2.0	10	10.0	3	3.0	24	24.0	6	6.0	
Co-morbidities											$\chi^2=18.832$ d.f=8 p=0.016 S*
Single											
Multiple	1	1.0	16	16.0	1	1.0	24	24.0	9	9.0	
No co-morbidities	5	5.0	2	2.0	3	3.0	15	15.0	5	5.0	
	0	0	8	8.0	2	2.0	6	6.0	3	3.0	
Medication											$\chi^2=9.523$ d.f=8 p=0.300 N.S
Yes											
Compliance	5	5.0	13	13.0	4	4.0	36	36.0	10	10.0	
Non compliance	1	1.0	5	5.0	1	1.0	3	3.0	2	2.0	
No	0	0	8	8.0	1	1.0	6	6.0	5	5.0	
History of allergy											$\chi^2=2.093$ d.f=4 p=0.719 N.S
Yes											
No	0	0	2	2.0	0	0	2	2.0	2	2.0	
	6	6.0	24	24.0	6	6.0	43	43.0	15	15.0	

The table 2, shows that the demographic variables age ( $\chi^2=29.253$ ,  $p=0.004$ ) had shown statistically significant association with severity of shock among adults at  $p<0.01$  level.

The demographic variable co-morbidities ( $\chi^2=18.832$ ,  $p=0.016$ ) had shown statistically significant association with severity of shock among adults at  $<0.05$  level and the other demographic variables had shown no statistically significant association with severity of shock among adults.

This chapter deals with the results of data collected using both descriptive and inferential statistics. The selected sample were assessing with observational checklist. the obtained data were entered in the master sheet and computed using descriptive and inferential statistics the result concluded that there was significant association between types of shock and selected demographic variables and association between severity of shock with age and comorbidities.

### CONCLUSION

According to this study the results indicates that majority 52 % of the subjects who are diagnosed with shock belong to the age group of 40-60 years and more than half 55% of the subjects are male. The study also show that distributive shock was the most common types of shock in ICU with 56 % of the total subjects followed by 22% with cardiogenic shock, 11% with obstructive shock and 11 % with hypovolemic shock. And majority of subjects which is (82%) were treated with crystalloids, 6% of the subjects

were treated with both crystalloids and colloids and 12 % of the subjects does not receive any fluids it shows that majority of the patient were treated with noradrenaline. The study shows that Shock is the leading cause of death in ICU for any critically ill patient with associated co-morbidity, aging etc. Early recognition of shock by meticulous assessment of physiological status and treatment improves the outcome and decreases the complications of shock and thus the duration of hospital stay, and resources that are being utilized.

### Acknowledgement

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### REFERENCE:

1. Joon G essential of shock management scenario-based approach. Published by the registered company Springer Nature Singapore Ltd: 2018,978-981 Singapore
2. <https://www.msmanuals.com/en-in/professional/critical-care-medicine/sepsis-and-septic-shock/sepsis-and-septic-shock>
3. Godara H, Hirbe A, Nassif M, Otepka H, Rosentock A The Washington manual of therapeutics 34<sup>th</sup> edition lippin cott Williams and wilkins printed in china 2014
4. Webb A, Angus D, Finfer S, Gattiononi L, Singer M Oxford text book of critical care 2<sup>th</sup> edition oxford university press printed in china through Asian pacific ltd 2016
5. Xiushui, Lenneman. An on cardiogenic shockheart.org Medscape August 6 2019 from <https://emedicine.medscape.com/article/152191-overview#a7>
6. Venkatesh B, JhaB, Hammond N, Ghosh A sepsis in India prevalence study. The George institution for global Health India: November 2018  
From <https://www.georgeinstitute.org/projects/sepsis-in-India-prevalence-study-sips>
7. Danoff T, Borish L, Ma L . case fatality and population mortality associated with anaphylaxis anaphylaxis in united states. The Journals of Allergy and Clinical Immunology: April 2014, 12 Vol 133(4); 107521083 doi: from 10.1016/j.jaci.2013.10.029 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3972293/>
8. Intropin. Dopamine the heart.org Medscape; from <https://reference.medscape.com/drug/intropin-dopamine-342435#10>
9. Epipen Jr, auviq, symjepi, adrenalín, epinephrine.org From Medscape <https://reference.medscape.com/drug/epipen-jr-epinephrine-342437#10>
10. Levaterenol, levophed norepinephrine from Medscape <https://reference.medscape.com/drug/levarterenol-levophed-norepinephrine-342443>
11. Vasopressin, ADH. vasopressin.org From Medscape <https://reference.medscape.com/drug/vasopressin-adh-vasopressin-342073#10>
12. Dobutrex the heart.org Medscape From <https://reference.medscape.com/drug/dobutamine-342434>
13. Kumar S, Kotha J, kothapally H, pinnoju S, CS, Kumar S. a prospective observational study on assessment of types of shock in children and requirement of inotropes in treatment of shock in tertiary care hospital International Journal of Contemporary Pediatrics; 2021 vol 8(5); 234923291 from <https://www.ijpediatrics.com/index.php/ijcp/article/view/4120>
14. Parker E M Nursing theories and nursing practice, second edition printed in India published by jaypee brothers vol 81844
15. Ravali S, kancherla V. A study on the Pattern of Inotropes use in an Intensive Care Unit journal of international Pharmaceutical research; November 2019; 46(6) 71-77A Study on the Pattern of Inotropes use in an Intensive Care Unit from <https://www.researchgate.net/publication/337759910>
16. Holler G, Jensen J, Kildegaard H, Pilsgaard D, Melholt L, Annmarie Touborg etiology of shock in the emergency department: A 12-Year Population-Based Cohort Study Journals of shock; July 2021 vol 56(1); 124 from [https://journals.lww.com/shockjournal/fulltext/2019/01000/etiology\\_of\\_shock\\_in\\_the\\_emergency\\_department.8.aspx](https://journals.lww.com/shockjournal/fulltext/2019/01000/etiology_of_shock_in_the_emergency_department.8.aspx)
17. Belletti A, Castro ML, Silvetti S, Greco T, Biondi-Zoccai G, Pasin L, Zangrillo A, Landoni G. The Effect of inotropes and vasopressors on mortality: a meta-analysis of randomized clinical trials. BJA: British Journal of Anaesthesia. 2015 Nov 1; 115(5): 656-75.
18. Jagrwal S, Goyal GK, Shrimali K, Sharma V, Bhattacharjee P. Etiological, Clinical, and Mortality Profile of Shock in Children at PICU of Southern Rajasthan Hospital. International Journal of Health and Clinical Research. 2021 Jan 10; 4(1): 1824. From <https://www.ijhcr.com/index.php/ijhcr/article/view/683>
19. Ma L, Danoff TM, Borish L. Case fatality and population mortality associated with anaphylaxis in the United States. Journal of Allergy and Clinical Immunology. 2014 Apr 1; 133(4): 107583 from <https://www.sciencedirect.com/science/article/abs/pii/S0091674913016424>.
20. Jung PY, Yu B, Park CY, Chang SW, Kim OH, Kim M, Kwon J, Lee GJ. Clinical Practice Guideline for the Treatment of Traumatic Shock Patients from the Korean Society of Traumatology. Journal of Trauma and Injury. 2020; 33(1): 1-2. From <https://www.koreascience.or.kr/article/JAKO202010060597096.page>
21. Bonello L, Laine M, Puymirat E, Ceccaldi V, Gaubert M, Paganelli F, Thuny PF, Dabry T, Schurtz G, Delmas C, Mancini J. Etiology and prognosis of cardiogenic shock in a secondary center without surgical back-up. Cardiology Research and Practice. 2019 Dec 9; 2019.



22. Scheeren TW, Bakker J, Kaufmann T, Annane D, Asfar P, Boerma EC, Cecconi M, Chew MS, Cholley B, Cronhjort M, De Backer D. Current use of inotropes in circulatory shock. *Annals of intensive care*. 2021 Dec;11(1):1-3. <https://annalsofintensivecare.springeropen.com/articles/10.1186/s13613-021-008068>
23. Fox S, Vashisht R, Siuba M, Dugar S. Evaluation and management of shock in patients with COVID-19. *Cleve Clin J Med*. 2020 Jul 17;10.
24. Yeo HJ, Lee YS, Kim TH, Jang JH, Lee HB, Oh DK, Park MH, Lim CM, Cho WH. Vasopressor Initiation Within 1 Hour of Fluid Loading Is Associated With Increased Mortality in Septic Shock Patients: Analysis of National Registry Data. *Critical Care Medicine*. 2021 Sep 29;50(4):e351-60.
25. Kuttab HI, Lykins JD, Hughes MD, Wroblewski K, Keast EP, Kukoyi O, Kopec JA, Hall S, Ward MA. Evaluation and predictors of fluid resuscitation in patients with severe sepsis and septic shock. *Critical care medicine*. 2019 Nov;47(11):1582.
26. Roberts RJ, Miano TA, Hammond DA, Patel GP, Chen JT, Phillips KM, Lopez N, Kashani K, Qadir N, Cairns CB, Mathews K. Evaluation of vasopressor exposure and mortality in patients with septic shock. *Critical care medicine*. 2020 Oct 30;48(10):1445-53.
27. Polit DF, Hungler BP. *Nursing research principles and methods*. Philadelphia: J.B. Lippincott Company; 1999.
28. Brakenridge SC, Efron PA, Stortz JA, Ozrazgat-Baslanti T, Ghita G, Wang Z, Bihorac A, Mohr AM, Brumback BA, Moldawer LL, Moore FA. The impact of age on the innate immune response and outcomes after severe sepsis/septic shock in trauma and surgical intensive care unit patients. *The journal of trauma and acute care surgery*. 2018 Aug;85(2):247.
29. Kuttab HI, Lykins JD, Hughes MD, Wroblewski K, Keast EP, Kukoyi O, Kopec JA, Hall S, Ward MA. Evaluation and predictors of fluid resuscitation in patients with severe sepsis and septic shock. *Critical care medicine*. 2019 Nov;47(11):1582.
30. Meyhoff TS, Hjortrup PB, Wetterslev J, Sivapalan P, Laake JH, Cronhjort M, Jakob SM, Cecconi M, Nalos M, Ostermann M, Malbrain M. Restriction of intravenous fluid in ICU patients with septic shock. *New England Journal of Medicine*. 2022 Jun 30;386(26):2459-70.
31. Failla KR, Connelly CD, Ecoff L, Macauley K, Bush R. Does Gender Matter in Septic Patient Outcomes? *Journal of Nursing Scholarship*. 2019 Jul;51(4):438-48.