

**Original Article**

**Treatment of Anaphylaxis in Adults: A Questionnaire Survey**

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**Abstract:**

**Objective:** To identify the medications that medical students, interns and casualty medical officers are likely to prescribe when treating an adult patient with anaphylaxis, and to ascertain the dose and route of administration of adrenaline they would use. **Design:** A questionnaire study survey. **Setting:** Kasturba medical college hospital, Manipal (Udupi District) and public health centers of Udupi district, Karnataka. **Subjects:** Data collected from 39 second year medical students, 35 interns and 35 casualty medical officers. **Main outcome measure:** To determine the percentage of use of adrenaline for the treatment of anaphylaxis in the correct dose, strength and route. **Results:** Majority (73 .3%) of participants correctly opted to use adrenaline. Only 9 participants have written the correct dose, route and concentration of adrenaline. 41.28% and 66.05% participants preferred to use antihistamines and corticosteroids respectively. **Conclusion:** This study has shown that confusion exists regarding the correct route of administration and dose of adrenaline to be used when treating anaphylaxis. This confusion applied to medical students, interns and medical officers. Therefore doctors must be made aware of the guidelines to treat anaphylaxis effectively.

**Key Words:** Anaphylaxis, Adrenaline

### Introduction:

Anaphylaxis is a life threatening systemic allergic condition. It is characterised mainly by hypotension, bronchospasm and angioedema of lips and mucous membrane. Anaphylaxis is a type I reaction caused by release of mediators from mast cells and basophils following binding with IgE. The term anaphylactoid reaction refers to a non IgE mediated mast cell or basophil activation. The most common trigger factors are food substances like peanuts, milk, shellfish, drugs like penicillins, cephalosporins, radiocontrast media or idiopathic.

Adrenaline is the life saving drug for anaphylaxis. But, it is also dangerous as it can cause cardiac arrhythmias and myocardial ischemia. Oxygen, anti-histamines, corticosteroids, nebulised  $\beta_2$ -agonists, IV fluids may also be indicated<sup>(1)</sup> Previous studies have shown that there exists confusion in the treatment of this emergency condition.<sup>(2-4)</sup> Hence it is essential that doctors working in the emergency department should be aware of the correct drug, route and dose of adrenaline.

Since junior doctors, also can be called upon to treat this emergency condition we planned to conduct this study in interns working at Kasturba Medical College Hospital, Manipal and also in casualty medical officers (CMO) working at public health centres in Udupi district, who are the first medical responders. We also included the medical students who are being taught on this subject during second year of medical curriculum. The aim of this study was to identify the medications that medical students, interns and casualty medical officers are likely to prescribe when treating an adult patient with anaphylaxis, and to ascertain the dose and route of administration of adrenaline they would use. The use of antihistamines and corticosteroids were also studied.

### Materials and Methods:

Second year medical students (n=39), interns (n=35) and casualty medical officers (n=35) were asked to answer a questionnaire under supervision which contained two hypothetical adult cases of anaphylaxis. The questionnaire used in a previous

study<sup>(2)</sup> was modified and used in the present study (Annexure 1). The identity of the participants was not revealed. However, they were asked to fill in their designation. There was no compulsion to partake and subjects were informed that they were participating in a study.

### Results:

A total of 109 questionnaires were collected. 80 (73.3%) participants correctly opted to use adrenaline. 84.61% of second year students, 74.28% of interns and 60% of medical officers opted for adrenaline. The percentage of participants in each group opting for the different routes of adrenaline is given in the Table 1. But 10.3% of students, 25.7% of interns and 40% of medical officers preferred hydrocortisone and 5.1% of students preferred salbutamol inhaler. The percentage of participants in each group preferring the different concentrations of adrenaline is given in Table 2. Only 9 students have written the correct dose (0.5mg), route (IM) and concentration (1:1000). However 13 participants (8 students, 3 interns and 2 medical officers) did not know the dose of adrenaline though they knew the correct concentration of adrenaline as 1:1000. Two medical officers have preferred IV route (1ml) of 1:10000 dilution. One and eight participants have proposed to give a higher dose of adrenaline in 1:10000 and 1:1000 dilutions respectively.

Regarding the time for the next dose, 43.11% of the participants (14 medical students, 18 interns and 15 medical officers) have correctly said that the next dose of adrenaline can be given as early as 5 minutes. But ten participants did not know when to give the second dose and 17 participants proposed not to give a second dose of adrenaline. The preferences opted by the individual groups regarding the time for next dose is given in Table 3. As an answer to the question regarding second line drugs for anaphylaxis, 41.28% and 66.05% participants preferred to use antihistamines and corticosteroids respectively. The preferences for other second line treatments preferred by the participants are given in Table 4. The participants were ignorant of any existing guidelines for the management of anaphylaxis.

Group number	Group	Adrenaline All routes/doses	Adrenaline IM	Adrenaline 1:1000 IM - correct dose	Adrenaline IV	Adrenaline SC
1	Medical students (39)	33 (84.61%)	20 (51.3%)	9 (45%)	11 (28.2%)	2 (5.1%)
2	Interns (35)	26 (74.28%)	9 (25.7%)	0 (0%)	11 (31.4%)	6 (17.1%)
3	CMO (35)	21 (60%)	1 (2.9%)	0 (0%)	7 (20%)	13 (37.1%)
4	Total (109)	80 (73.3%)	30 (27.5%)	9 (9%)	29 (26.6%)	21 (19.3%)

Group	1:100	1:1000	1:10000	1:100000	1:200000	Don't know
Medical students	1(2.56%)	24(61.5%)	6(15.4%)	-	1(2.56%)	7(19.4%)
Interns	-	8(22.85%)	20(57.14%)	3(8.57%)	1(2.85%)	3 (8.57%)
CMO	-	10(28.57%)	18(51.42%)	1(2.85%)	-	6(17.14%)

Group	Don't know	1min	5min	15min	Any other	No second dose
Medical students	6 (15.38%)	1(2.56%)	14 (35.89%)	10(25.64%)	0 (0%)	8 (20.51%)
Interns	2(5.71%)	7(20%)	18(51.42%)	7(20%)	0	1(2.85%)
CMO	2(5.71%)	8(22.85%)	15(42.85%)	1(2.85%)	1(2.85%)	8(22.85%)

Group	NSAIDS	Diuretics	IV fluids	Oxygen	Nebulisation
Medical students	2	2	3	0	0
Interns	0	2	0	0	0
CMO	0	1	7	3	3
Total	2(1.8%)	5(4.6%)	10(9.2%)	3(2.8%)	3(2.8%)

**Discussion:**

The main aim of this study was to identify the medications that doctors would administer when treating an adult patient with anaphylaxis and to ascertain the routes and doses of adrenaline that they would use. The first problem describes a patient with anaphylaxis for which 73.3% of participants in this study stated that they would give adrenaline as their first line of treatment. The other 26.7% would give either IV hydrocortisone, or nebulised salbutamol. Although these are useful in the treatment of anaphylaxis, adrenaline is the life saving drug in anaphylaxis as it acts on  $\alpha$ ,  $\beta_1$ ,  $\beta_2$ , all of which are required to reverse the pathophysiologic processes of anaphylaxis. <sup>(5)</sup> This study has shown that confusion exists regarding the correct route of administration and dose of adrenaline to be used when treating anaphylaxis. This confusion applied to medical students, interns and medical officers. In this study, 26.6% and 19.3% of participants chose to give adrenaline by IV route and subcutaneous routes respectively. The

absorption of adrenaline is unpredictable when given by subcutaneous route as the blood flow to the skin would be decreased in anaphylactic shock. Adrenaline by IM route should be used as first line treatment in the majority of situations to treat anaphylaxis. Injection in the anterolateral aspect of thigh may lead to more predictable and rapid absorption of adrenaline. <sup>(6)</sup> Previous studies have shown that plasma levels are higher when given by intramuscular route than when given by subcutaneous route and also it avoids the potentially lethal effects of large IV bolus injections. In some patients with impaired cardiovascular function, intravenous injection of epinephrine may be required. Adrenaline should be given intravenously only during cardiac arrest or to profoundly hypotensive patients who have failed to respond to multiple injections of epinephrine and IV fluid replacement. Intravenous adrenaline should be administered by experienced clinicians and requires constant monitoring. <sup>(7)</sup>

This study has shown that many doctors are unaware of the correct dose of adrenaline to use when treating anaphylaxis. In response to Question 2, only 9 medical students (9% of all participants) who chose the IM route, and 2 medical officers (1.83% of total) opting for the IV route actually knew the correct dose.

Surprisingly, 13 participants did not know the correct dose of adrenaline though they knew the correct concentration of adrenaline and 9 participants have written higher dose of adrenaline. 8 participants have asserted that the second dose of adrenaline cannot be given. However 40% to 70% of patients with severe anaphylaxis will require more than one dose of adrenaline. The dose of adrenaline can be repeated every 5-15 minutes.<sup>(6)</sup> The findings of this study highlight the need to educate clinical staff regarding the correct dose, route and concentration of adrenaline to be used in anaphylaxis.

Antihistamines (H<sub>1</sub>- and H<sub>2</sub>-receptor antagonists) such as diphenhydramine (25–50 mg orally, intramuscularly, or intravenously every 4–6 hours) and ranitidine (150 mg orally every 12 hours or 50 mg intramuscularly or intravenously every 6–8 hours) may be useful adjuvant therapies for alleviating the cutaneous manifestations of urticaria or angioedema and pruritus and for the gastrointestinal and uterine smooth muscle spasms. Inhalation of selective adrenergic agonists such as albuterol, and intravenous administration of aminophylline (0.5 mg/kg/h IV with 6 mg/kg loading dose over 30 minutes) for bronchospasm and corticosteroids may reduce prolonged reactions or relapses.<sup>(6)</sup> In this study most of the participants preferred to use corticosteroids and antihistamines as second line drugs. Very few participants have preferred to use oxygen, salbutamol nebulisation and IV fluids. Diuretics and nonsteroidal anti-inflammatory drugs have no role in the treatment of anaphylaxis.

#### Conclusion:

This survey reflects the knowledge of students and doctors who may be called upon to treat patients with anaphylaxis. The lifetime risk of anaphylaxis is presumed to be 1% to 3% per individual with mortality rate of 1%.<sup>(7)</sup> Therefore, all doctors should be able to diagnose anaphylaxis and treat it effectively. There are resuscitation guidelines put forward by various countries for the management of

anaphylaxis that are found to be almost similar.<sup>(3-4)</sup> The same needs to be implemented by our doctors for an effective treatment of anaphylaxis

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