Paper

Anaphylaxis: Are doctors adequately aware? A study on perceptions and practices among first-contact-level doctors in state healthcare institutions in Gampaha district

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Abstract

Background: Anaphylaxis is a potentially fatal condition that needs improved clinical awareness, rapid diagnosis and timely and correct management in order to prevent death and serious complications. Deaths due to anaphylaxis still occur, in both community and hospital settings, in spite of treatment and facilities being readily available in most instances. Suboptimal knowledge and practices of first contact level doctors are likely to cause mismanagement.

Objective: To evaluate the awareness of first-contact-level doctors in Gampaha district on diagnosis and management of anaphylaxis and to describe their current practices in anaphylaxis.

Method: A descriptive study was conducted among first-contact-level doctors in state healthcare institutions in Gampaha district to assess diagnosis, management and practices on anaphylaxis, using a self-administered questionnaire.

Results: Data from 98 doctors were analyzed and 95.9% correctly identified adrenaline as the first line treatment but only 76.5% knew the correct mode of administration and 30.6%, the correct adult dose and strength. Only 59.2% were aware of adrenaline self-administration and 29.6%, about auto-injectors. Only 2% correctly diagnosed all five case scenarios as anaphylaxis or allergy and only 7.2% correctly identified all potential anaphylaxis triggers stated in questionnaire. Only 55.1% have used adrenaline in the past, as the first- line treatment.

Conclusion: Knowledge on many aspects of anaphylaxis including diagnostic criteria, mode of administration and dose of adrenaline, auto-injectors, triggers and risk/co factors is inadequate in this population despite approximately a decade of work experience in most. Use of adrenaline in the treatment of anaphylaxis is unsatisfactory. Measures to improve diagnosis and management of anaphylaxis are essential.

Key words: anaphylaxis, awareness, first-contact-level doctors, Gampaha

Introduction and background

Anaphylaxis is a potentially fatal condition. Nonetheless, improved clinical awareness, rapid diagnosis and prompt and correct management prevents death. It is disconcerting that deaths due to anaphylaxis still occur, not only in the community but also in hospitals, in spite of treatment and facilities being readily available in the hospital-setting to manage this medical emergency.

Current guidelines on anaphylaxis by expert bodies, such as the World Allergy Organization (WAO),[1] the European Academy of Allergy and Immunology (EAACI),[2] American Academy of Allergy, Asthma and Immunology [AAAAI] and American College of Allergy, Asthma and Immunology [ACAAI][3] have concurred on diagnostic criteria and acute and long-term management protocols of anaphylaxis. International Consensus on (ICON) anaphylaxis 2014[4] confirms alignment of major anaphylaxis guidelines. ICON: Anaphylaxis 2014[4] also calls for studies and controlled trials on anaphylaxis epidemiology, risk factors and co-factors, triggers, diagnostic criteria, therapeutic interventions and measures to prevent recurrences.

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Anaphylaxis research is not entirely new to Sri Lanka. Published data are available on prevention of anaphylaxis during anti-venom therapy[5,6] and triggers and co-factors such as food-dependent exercise-induced anaphylaxis, ant bites and wasp stings.[7,8,9] There are also case reports on anaphylaxis following antibiotics.[10,11] A Sri Lankan study has analyzed certainty of clinical diagnosis of anaphylaxis following immunisation.[12]

But to our knowledge, there are no published data on assessing the perceptions of first-contact-level doctors, the knowledge of which is crucial in planning continuous medical education programs and strengthening diagnostic and management protocols in hospital and community settings.

School vaccination and contraceptive programs are among long-standing health care programs in Sri Lanka that have suffered as a result of deaths and complications following anaphylaxis. In addition to the recipients' fear of receiving the injections, the reluctance of the health care providers to administer appropriate treatment have adversely influenced the success and continuity of aforementioned programs.

It is likely that a significant proportion of the patients who develop anaphylaxis may present to the first-contact-level doctors in the outpatients' department (OPD), primary care units (PCU) and emergency therapy units (ETU) of local state hospitals. In addition, the medical officers of health (MOH), who take part in community vaccination programs too, are likely to encounter anaphylaxis in the community settings. Prompt diagnosis and correct and timely management in these instances will prevent death and serious complications of anaphylaxis. This requires a high index of suspicion as well as prompt recognition of signs and symptoms of anaphylaxis correctly.

It is reasonable to believe that inadequacies in first-contact-level doctors' knowledge and lack of confidence which ensues as a result, can influence how they face and manage this medical emergency. Therefore, it is worthwhile to evaluate the perceptions of first contact level doctors, regarding the diagnostic criteria and management aspects and their current practices in anaphylaxis. Gampaha district, which is the second most highly populated district in Sri Lanka was chosen to carry out this study.

Objectives

- To evaluate the perceptions of first-contact-level doctors on diagnosis and management of anaphylaxis.
- To describe their current practices in patients diagnosed to have anaphylaxis.

Methodology

This was a cross-sectional, descriptive study among government medical officers who work as first contact level doctors in the government health care institutions in Gampaha district. A first contact level doctor was defined as a medical officer who worked in the OPD or PCU or ETU in a state medical facility. MOHs who were participating in MOH office-led community health programmes were also included.

The study was carried out from December 2015 to May 2016 among the first contact level doctors of the teaching hospital (TH) Ragama, district general hospital (DGH) Gampaha, base hospitals (BH) Wathupitiwela, Meerigama and Minuwangoda, divisional hospitals (DH) Divulapitiya and Pamunugama, Wijaya Kumaratunge Memorial Hospital, Seeduwa, MOH offices in Attanagalla, Divulapitiya, Gampaha, Jaela, Katana, Kelaniya, Mahara, Meerigama, Minuwangoda, Seeduwa, and Katunayaka and primary care medical units in Ambepussa, Ganemulla, Katunayaka, Maligathenna, Weliweriya, Weweldeniya, Bemmulla, Kalagedihena, Korasa, and Veyangoda. The above state healthcare institutions selected for this study as a convenient sample included institutions of all strata ranging from the only teaching hospital in the district to one-man stations.

A self-administered questionnaire in English was given to the participants to fill at their leisure and return to the investigators within a period of 10 working days. The questionnaire gathered data under 3 domains, namely, 1) limited socio-demographic data 2) awareness on diagnosis and management of anaphylaxis, its triggers, co-factors and risk factors 3) their knowledge on first-line and second-line treatment and experiences and practices in the management of anaphylaxis. Sections 2 and 3 tested their knowledge by evaluating their scores on identifying case scenarios that included both anaphylaxis and allergy. The case scenarios and the other questions were structured so that they would be able to evaluate participants' diagnostic accuracy and management practices according to the current diagnostic criteria and management of anaphylaxis[1,2,3,4], in both hospital and the community. The questionnaire was pre-tested on 5 medical officers in Wijaya Kumaratunge Memorial Hospital, Seeduwa, before being administered to the rest of the study population.

Participants were approached by the investigators in person and over the telephone and their verbal consent was obtained. The questionnaires were then either hand-delivered or posted to their addresses. The completed questionnaires were collected by the investigators after a period of 10 days. Data were described using means, standard deviations and percentages.

Prior permission was obtained by the RDHS and directors/ MOICs of the respective health institutions, to hand over the questionnaires during working hours.

Participants were given the contact information of the principal investigator for any clarifications. Ethical clearance for the study was obtained by the Ethic Review Committee of the Faculty of Medicine, University of Colombo (ERC-15-191).

Results

250 questionnaires were distributed on the basis of the number of employees in a given institution. 50% of the questionnaires were given to employees in the TH Ragama and DGH Gampaha, where the number of first contact level doctors were highest. The rest were distributed proportionately to other institutions. 120 questionnaires were returned, which resulted in a response rate of 48%. 98 questionnaires which were filled to completion were available for further analysis. The mean age of the participants was 44.24±7.34 years. The mean duration of work experience was 15.24±6.9 years.

In the open-ended questions, 95.9% (n=94) correctly identified adrenaline as the first-line treatment. However, only 76.5% (n=74) knew the correct route of administration, with intramuscular, intravenous and subcutaneous injection given as the modes. The correct adult dose and strength was known only by 30.6% (n=30). Head-low and supine positioning of the patient was correctly identified by 68.9% (n=68). On evaluation of the knowledge on self-treatment of recurrences of anaphylaxis, 59.2% (n=59) were aware that the treatment method was self-administered adrenaline, though only 29.6% (n=29) knew about the availability of adrenaline auto-injectors (AAI). However, 6.1% (n=6) and 12.2% (n=12) stated that steroids and antihistamines respectively are the methods of self-treatment for recurrences of anaphylaxis. On their knowledge on prevention, 43.9% thought desensitization is useful in prevention.

In the five case scenarios given in the section 2 of the questionnaire on anaphylaxis, only 2% (n=2) correctly diagnosed all five case scenarios as anaphylaxis or allergy. The percentage of participants that correctly identified each individual scenario as anaphylaxis or allergy ranged from 9.2-90.8%. The majority (69.4% n=68) incorrectly identified case scenario no 4 as anaphylaxis. The use of adrenaline as the first-line treatment in each instance was usually less than the percentage that identified each case as anaphylaxis (Table 1).

When identifying the potential triggers of anaphylaxis, though half the triggers given were identified by 72.5% (n=71), only 7.2% (n-7) correctly identified all triggers stated (Table 2).

When evaluating the knowledge regarding the risk factors/co-factors for anaphylaxis, the most commonly identified risk factor was asthma (84.7%, n=83). However, only 1% correctly recognized all the risk factors/co-factors given (Table 3).

Table 1. The frequency of correct identification of case scenarios as anaphylaxis

Case scenario	*% (n) correctly identifying each case as anaphylaxis/ allergy*	*% (n) using adrenaline as first-line treatment*
1. A 29-year old man allergic to beef, mistakenly eats beef at a wedding and develops wheezing and vomiting	68.4% (67)	39.8% (39)
2. A 50-year old female, with no history of allergies develops and itchy skin rash and hypotension 30 minutes after the injection of a cephalosporin	90.8% (89)	79.6% (78)
3. A 16-year old school boy allergic to nuts, eats a chocolate containing nuts and faints. He has no other system involvement. His systolic BP is 70 mmHg	65.3 % (64)	65.3% (64)
4. A 49-year old man with a history of penicillin allergy develops urticarial and mucosal oedema following administration of amoxicillin	9.2% (9)	51% (50)
5. A 60-year old woman with no history of allergy develops an itchy skin rash and wheezing after coming into contact with a caterpillar	48% (47)	25.5% (25)

Table 2. Frequency of identification of potential triggers of anaphylaxis

Potential triggers of anaphylaxis	*% (n) identifying potential triggers of anaphylaxis*
Egg white	71.4% (70)
Soya bean	48% (47)
Sarana (Hog weed) *Boerhavia diffusa*	29.6 % (29)
Pollen	67.3% (66)
Bee sting	88.8% (87)
Milk	58.2% (57)
Kankung (Water spinach) *Ipomoea Aquatica*	18.4% (18)
Fish	83.7 % (82)
Murunga (Drumstick) *Moringa oleifera*	45.9% (45)
Peanuts	74.5% (73)
Green gram (mung)	20.4% (20)
Coconut	8.2% (8)
Latex rubber	59.2% (58)
Prawns	90.8% (89)
Antivenom serum	98% (96)
Black ant (kadiya) sting	86.7% (85)

Table 3. Frequency of identification of risk factors/co-factors for anaphylaxis

Potential triggers of anaphylaxis	*% (n) identifying potential triggers of anaphylaxis*
General anaesthesia	54.1% (53)
Sleep	8.2% (8)
Coitus	12.2% (12)
Exercise	26.5% (26)
Alcohol consumption	52% (51)
Skin testing	65.3% (64)
Fever	25.5% (25)
Asthma	84.7% (83)
Premenstrual status	6.1% (6)
Acute infection	49% (48)
Emotional stress	38.8% (38)
Cardiovascular disease	35.7% (35)

With regard to the experience and practices in anaphylaxis, 7.1% (n=7) stated they have never encountered anaphylaxis, whereas only 28.6% (n=28) have encountered more than 15 cases of anaphylaxis during their career. Deaths due to anaphylaxis were reported to be encountered by 23.5% (n=23). Only 55.1% (n=54) used adrenaline as the first-line treatment, with 14.3% (n=14) and 1.2% (n=12) stating that they used steroids and antihistamines as first-line treatment respectively. Prophylactic treatment was prescribed by 36.7% (n=36), with the common prophylactic treatment being antihistamines (18.3%, n=18), or a combination of steroids and antihistamines (16.2%, n=16). AAI was prescribed by only 1 participant.

Discussion

We report data on the adequacy of awareness of the first contact level doctors on diagnosis and management of anaphylaxis in a Sri Lankan setting for the first time. Many countries have evaluated perceptions of physicians, other health care professionals, patients and the community in order to identify the gaps in anaphylaxis management[13] and have reported deficiencies in the knowledge and management.

Physician studies on this subject have been done on doctors working in different settings such as emergency care,[14] primary care,[15] paediatrics,[16] radiology,[17] and allergy and immunology.[18] Our participants were medical officers working in OPDs, ETUs, PCUs of all strata of hospitals and MOH offices where they were highly likely to encounter patients with anaphylaxis for the first-time on their presentation to a state health care facility and in community settings such as schools. Most were in their 5th decade with more than 10 years of working experience, indicating the likelihood of them having an acceptable level of exposure to medical emergencies including anaphylaxis. It is known, that most medical officers working in above settings have their own family practices in which they see patients out of working hours. Even though all first-contact-level doctors working in state institutions were not included in this sample, we have attempted to optimise representation of this population who continue to work in the same district, in similar capacities in spite of being transferred every 2-4 years, by including all strata of the state health institutions and by distributing the questionnaires proportionately, according to the number of employees in a given institution.

Although the majority of our participants identified adrenaline as the first-line management, there were significant deficiencies in the knowledge of correct mode of administration and the dose. Awareness studies from the developed parts of the world that evaluated this aspect show contradictory results. In a study conducted among emergency department staff in Singapore, more than 80% of respondents knew the correct dose and

mode of administration.[14] A number of other studies from UK, USA, Canada, New Zealand, Australia, Germany and France showed deficiencies in awareness such as lack of knowledge on anaphylaxis and auto-injectors, sub-optimal use of adrenaline as the first-line drug and delayed administration.[13] However, the accuracy levels on correct dose and mode of administration are better in our study in comparison to an Indian study done among interns, medical students and nurses.[19]

Another significant finding in our study was the unacceptably low level of awareness about the AAI. The knowledge was far from optimal with regard to the status of availability, accessibility and the cost of AAI. We did not find similar results in the literature from the developed world, where usage of adrenaline auto-injectors is a widely prevalent practice among people at risk of developing anaphylaxis. However, even in developed countries, unsatisfactory prescribing practices due to limited awareness by the health professionals is shown to be a barrier to optimal AAI use.[20]

Only 2% (n=2) of our participants had a perfect score in the assessment of diagnostic accuracy. Most participants were unable to spot the single case in the questionnaire that described an allergic reaction, hence over-diagnosed anaphylaxis. Highest percentage of correct responses were for the case scenario that were described in a hospital setting, relating an instance of anaphylaxis following administration of intravenous antibiotics. It is possible that the awareness was better for the above scenario because of the wide-spread publicity received by such scenarios in real-life and the degree of suspicion is higher for iatrogenic anaphylaxis in comparison to community-based situations; It could also be due to the fact that in this case scenario the patient has hypotension since there is a perceived reluctance by the doctors to diagnose anaphylaxis in the absence of hypotension. The lowest diagnostic accuracy that was observed with the 4th case scenario which described an allergic reaction to amoxicillin, could possibly be explained by the fact that the respondents were biased by the majority of questions that were related to anaphylaxis and assumed all the case scenarios were that of anaphylaxis. An international survey on food-induced anaphylaxis that used a case-based approach similar to ours to test the knowledge on diagnosis and management of providers, care givers and other respondents recorded better figures, 49% of all respondents diagnosing anaphylaxis correctly.[21] A study similar to ours, that was carried out among foundation 1 and 2 doctors in a UK hospital reported that their respondents' diagnostic accuracy was higher for anaphylaxis case scenarios than for non-anaphylaxis ones.[22] However, the accuracy rates were not as low in our study.

We assessed the participants' accuracy in identifying potential triggers, risk factors/co-factors of anaphylaxis. We included a diverse range of the above, in order to test their ability to detect potential factors in both hospital and community settings. Strong emphasis was placed on trigger factors encountered locally, as published in a previous Sri Lankan study[7] and those mentioned in anecdotal information. The knowledge on many local food items such as coconut, green gram, sarana *(Boerhavia diffusa)* and kankung *(Ipomoea Aquatica)* as potential triggers was suboptimal, whereas knowledge on snake anti-venom and other well-known triggers such as prawns and bee stings, was excellent. Among the risk factors and co-factors, awareness was lowest for pre-menstrual status, sleep and coitus, whereas recognition of asthma, skin testing, acute infection and general anaesthesia as risk/co-factors was good.

On assessment of their practices and experiences, only about 25% of the respondents said that they had encountered anaphylaxis during their clinical career. This could be an underestimation since their diagnostic skills on anaphylaxis were not optimal, and it is possible that the diagnoses could have been missed. In spite of almost all of respondents (96%) correctly identifying the first line treatment, only a little more than half of the respondents would use adrenaline as the first-line treatment. Approximately 10% would use steroids and antihistamines if they encountered anaphylaxis. Possible causes for this observation include undue fear and lack of confidence in administering adrenaline. Hence, our findings raise similar concerns as those stemming from multiple studies all over the world on suboptimal use of adrenaline and inappropriate use of second-line drugs such as steroids and antihistamines in place of the first line drug.[13,19,20,23]

Limitations of this study include, not including all the first contact level physicians including those who work solely in the private sector and not having a higher response rate. As the questionnaires were not administered then and there, the possibility of the participants obtaining assistance of various sources of knowledge prior to completing the questionnaire, and hence, having a lower actual knowledge than reported in this study cannot be ruled out.

Conclusions and recommendations

Majority of the respondents in this study identified adrenaline as the first-line treatment of anaphylaxis but significant gaps were observed in the knowledge of the dose and strength, the route of administration. In spite of knowing it, the practice of using adrenaline as the first line treatment was far from satisfactory. Recognition of anaphylaxis in diverse presentations and knowledge on triggers encountered locally, was suboptimal. Awareness of adrenaline auto-injector was poor.

We recommend evaluation of awareness of diagnostic and management aspects of anaphylaxis across all strata of medical officers and other health care personnel who are involved in management, for

example, nurses, in both state and private health sectors. Initiation and maintenance of a comprehensive nation-wide anaphylaxis registry similar to that in Germany,[24] with data on clinical presentation, affected organ systems, triggers, aggravating factors, emergency treatment and follow up will strengthen recognition of varied clinical patterns and will help to identify and confirm trigger/co/ risk factors in the local setting. Medical undergraduate teaching, training and assessment on anaphylaxis should be strengthened. It is encouraging that the Ceylon College of Physicians has taken a progressive step forward, to conduct training programmes in diagnosis and management of ana-phylaxis to medical officers and nurses in all parts of the country,[25] and similar programmes should continue on a regular basis.

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