Saudi Toxicology Journal (STJ)

Journal home page: https://uqu.edu.sa/s.toxicology.s/S.T.J

Article

Awareness of Epinephrine Pen Use among Students of Faculty of Applied Medical Sciences at Umm Al Qura University, Saudi Arabia 2024

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Citation: Shammah, A. A., Awareness of Epinephrine Pen Use among Students of Faculty of Applied Medical Sciences at Umm Al Qura University, Saudi Arabia 2024. *STJ*,**2024**,1,51-62 https://doi.org/10.70957/uqu.edu.sa/s.toxicology.s/stj.2024.1.6

Received: 15 December 2024

Accepted: 12 January 2025

Published: 15 January 2025

Abstract:

Introduction: Anaphylaxis is a dangerous hypersensivity reaction that is characterised by generalised allergic response. Epinephrine is significant treatment for managing anaphylaxis. Moreover, epinephrine pens consider important first-aid kits in universities.

Background and Aims: This research aims to explore awareness and usage of epinephrine pen between the student in faculty of Applied Medical Science, Umm Al-Qura University, Saudi Arabia and to explore their practices and knowledge in anaphylaxis management.

Methodology: A cross-sectional study conducted using a structured questionnaire distributed to students across various departments and academic years within the faculty. A quota sampling method employed to ensure diverse representation. Data were collected through Microsoft Forms, and both descriptive and inferential statistics were applied to analyze the results.

Results: The research examine that around 55.21% of students have low knowledge and approximately 28.22% exhibited appropriate practices, and 41.10% of demonstrated positive attitude regarding the management of anaphylaxis. The main source of information on anaphylaxis is social media and internet in this regard, significant factors linked with attitude, better knowledge, and practices included year of study, gender, and personal experience with observing witnessing anaphylaxis.

Conclusion: The entire knowledge, practices, and attitude regarding epinephrine pen and anaphylaxis use among student found to be insufficient. Research highlights need for increase educational initiatives to enhance understanding of student and allergic reaction management especially using epinephrine pens.

1. Introduction

Anaphylaxis is a serious, dangerous condition that requires immediate treatment. Among the most critical aspects of managing anaphylaxis is the use of epinephrine, commonly delivered through an auto-injector, such as the EpiPen. However, despite the potential for life-threatening allergic reactions, awareness regarding proper management, particularly the use of epinephrine auto-injectors, remains insufficient in many healthcare settings. Currently, there is limited data regarding the awareness of EpiPen use among students of the Faculty of Applied Medical Sciences at Umm Al-Qura University, which is the focus of this study. The goal of this study is to assess the level of awareness, knowledge, and preparedness of FAMS students in managing anaphylaxis and using the EpiPen during emergencies. By identifying the current knowledge and practices, this study aims to contribute to the development of targeted educational programs and courses to better prepare students in handling anaphylactic reactions. Given the lack of region-specific studies on the topic, this research is particularly relevant in addressing the awareness gaps among medical students in Saudi Arabia. However, prevalence of allergy increase, school-age children at greater risk of developing reaction of anaphylactic (Irani & Akl, 2015).

These activities can cause a potential damaging and sudden allergic reaction known as anaphylaxis in susceptible individual. In these cases, carrying an (EpiPen) as an auto-injector, which offers a dose of epinephrine, can be lifesaving during the emergency (Gallagher et al., 2011). EpiPen may need one and who use them in this regard, EpiPen is a device, which contain cartridge fill with epinephrine that is medication used to treat with severe allergic reaction. When it is pressed against skin this auto-injects medication through a small needle at pen end. There are various EpiPens brands available, and these dosages are dependent on particular need (Vickers et al., 1997). For example, children got different amount of medication than adults in this regard, your doctor would describe appropriate EpiPen for you. The most essential treatment for anaphylaxis usage of EpiPen that is auto-injector containing epinephrine (Topal et al., 2013). This medication helps reduce the body's allergic reaction by:

1. Relaxing the muscles in the airways to ease breathing,
2. Helping to reverse the rapid and dangerous decrease in blood pressure,
3. Relaxing the muscles in the stomach, intestines, and bladder.

Raising awareness of allergic responses and how to control them is our goal in this research additionally, this research aims to teach students how to use epinephrine auto-injectors correctly by providing training on the subject. The research is currently available indicates that no research on FAMS students' awareness of EpiPen use has done in our area. According to WebMD (n.d.), "Epinephrine Injection: Uses, Side Effects, Interactions, Pictures, Warnings & Dosing" Therefore, the purpose of this study is to explore the understanding of FAMS students at Umm Al-Qura University regarding the usage of the EpiPen in emergency situations. (MedicAlert Foundation, "What Is an EpiPen and Who Needs It?" n.d.) In the US, anaphylaxis affects 30 out of every 100,000 people each year, with a 2% documented fatality rate (Anagnostou, 2018). It is unidentified how common anaphylaxis occurs in Saudi Arabia. However, urticaria and angioedema were most common symptoms, whilst food and medication allergies were the most common causes of anaphylaxis, according to a study done in Riyadh, Saudi Arabia (Sheikh and others, 2015). Foods like peanuts, tree nuts, lobster, fish, cow's milk, eggs, and wheat are the most frequent causes of anaphylaxis worldwide. Anaphylaxis can bring on by exercise, natural rubber latex, and medications (most frequently penicillin). Avoiding triggers is not always possible, and certain reasons may not be identified sooner in this regard, evidence-based guidelines recommend that first line of therapy for an allergic episode should be prompt epinephrine injection due to anaphylaxis is a dangerous disease that need early identification (Coutinho et al., 2020; Bălan & Gurghean, 2015).

2. Methodology

2.1. Study Design: This study employed a cross-sectional design to evaluate the awareness and knowledge of Anaphylaxis and EpiPen use among Umm Al-Qura students in the Faculty of Applied Medical Sciences.

2.2. Study Population and Sampling: The target population for this study consisted of students from various departments within the College of Applied Medical Sciences, including Department of Clinical Technology, Department of Clinical Nutrition, Department of Medical Rehabilitation Sciences, and Department of Clinical Laboratory Sciences. The total number of students in the research population was 1,627, comprising both male and female students. The participants were sampled using a proportion sampling method to ensure that the sample was representative of participants from different academic years and different departments from the college, and 163 participants filled the questionnaires. The sample size estimated by using confidence level of 95% and margin of error of 5% as recommended by survey research formula. This approach used to reduce the level of selection bias and increase external validity of the study. As a measure that would enhance credibility of results collected through the questionnaire, tool was pilot tested on a percentage of students before the actual data collection. In case of this study, the pre-test facilitated modification of the questions as well as recognise any unnecessary complexity regarding the questions as well as an opportunity to ensure that instrument measured the right variables as was intended. In the current study, reliability was tested using Cronbach's alpha coefficient; validity tested by subjecting the measures to an expert review and pilot testing. Data collected when participants completed the informed consent form before engaging them in the study to understand the purpose of the study, and their rights in case they declined to be involved. In deductive analysis, Chi-square tests and t-tests used to test the significance of differences between the identified groups and to analyse relationships between participants' demographic variables as well as their level of anaphylaxis awareness and EpiPen use.

2.3. Data Collection Tool: Data were collected using a self-administered questionnaire consisting of 15 structured questions. The questionnaire covered Demographic information (academic year, department, gender), Knowledge of severe allergies (anaphylaxis) and experience with others who have such allergies, Recognition of symptoms and substances that may cause severe allergic reactions, Understanding of emergency procedures and the correct use of the EpiPen (e.g., intramuscular injection-method). Awareness of first aid plans and availability of medications for anaphylaxis in their department, the questionnaire included a combination of multiple-choice to gather comprehensive quantitative data.

2.4. Data Collection: The questionnaire was distributed through Microsoft forms platform to reach as many students as possible. Students were given sufficient time to complete the questionnaire, ensuring they could provide accurate and thoughtful responses.

2.5. Inclusion Criteria: All students enrolled in the College of Applied Medical Sciences, across all academic years and departments, who were willing to participate.

2.6. Exclusion Criteria: Students who were not currently enrolled or declined to participate in the study. The data were then handed over to a professional analyst for statistical analysis. Descriptive statistics were used to summarize the overall awareness levels, while inferential statistics were employed to identify any significant relationships or patterns among different groups of students.

2.7. Rationale for Method Selection: The cross-sectional design was chosen for its efficiency in capturing the level of EpiPen awareness at a single point in time, making it suitable for this type of study. The use of a questionnaire allowed for the collection of structured data, essential for statistical analysis. The measures taken to mitigate biases and assurance of confidentiality, aimed to enhance the reliability and validity of the findings.

2.8. Data Analysis: Data have been analysed using descriptive statistics by a biostatistician (percentages of students who are aware or unaware), and comparisons can be made across disciplines, gender, or year of study. Chi-square tests or t-tests can be used to find significant differences in knowledge levels.

3. Results:

Table 1: Table showing percentage of responses:

S. No	Questions	Options	Response %
1	Year of study	First year	20.25%
		Second year	23.31%
		Third year	20.86%
		Fourth year	35.58%
2	Department	Clinical technology	31.29%
		Clinical Nutrition	25.77%
		Medical Rehabilitation Sciences	23.93%
		Clinical Laboratory Sciences	19.02%
3	Gender	Male	50.31%
		Female	49.69%
4	Do you know a student who has a previous anaphylaxis?	Yes	22.70%
		No	77.30%
5	Do you know what anaphylaxis is?	Yes	55.21%
		No	44.79%
6	Do you know the symptoms of anaphylaxis?	Yes	52.15%
		No	47.85%
7	Substances that can cause anaphylaxis?	Medicines	64.42%
		Mosquito bite	55.83%
		Seafood	63.19%
		Balloons	36.81%
		Nuts	55.21%
		Do not know	13.50%
8	What first aid measures should be taken in cases of anaphylaxis?	Administering an Epinephrine (EpiPen) injection	47.85%
		Informing his/her family to take him/her to the hospital	60.12%
		Telling the Red Crescent.	53.99%
		Performing CP	23.93%
		Giving him/her oxygen	34.36%
9	The first medication that should be given in cases of anaphylaxis?	Painkillers	17.18%
		Sedatives	22.70%
		Epinephrine	41.10%
		Don’t know	19.02%
10	Have you heard of epinephrine as a medication?	Yes	46.63%
		No	53.37%
11	Have you heard of the auto-injector (EpiPen) before?	Yes	44.17%
		No	55.83%
12	If yes, do you have knowledge about the auto-injector (EpiPen)?	Yes	25.15%
		No	74.85%
13	What is the method for administering an Epinephrine injection?	Intramuscular	28.22%
		Intravenous	14.11%
		Subcutaneous	18.40%
		Don’t know	39.26%
14	In cases of anaphylaxis, is there a plan to handle it in your classroom?	Yes	22.09%
		No	38.04%
		Don’t know	39.88%
15	Are there first aid medications for anaphylaxis available in your classroom?	Yes	21.47%
		No	38.65%
		Don’t know	39.88%

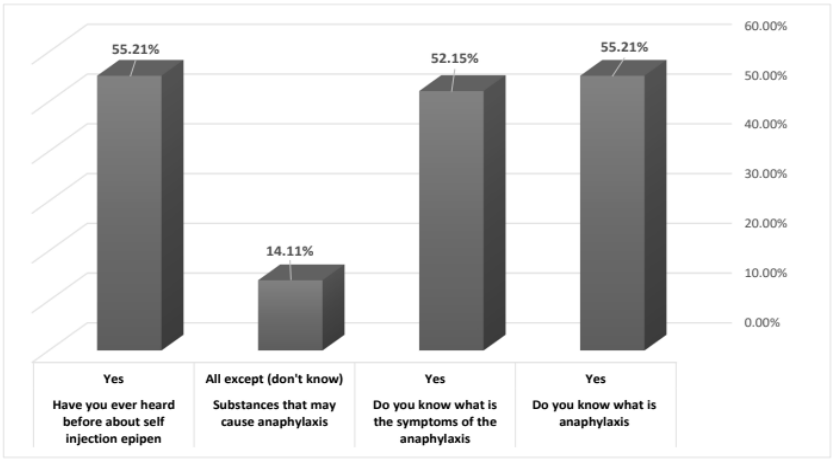

Figure 1 Bar graph showing the percentage of correct or positive answers given by respondents for awareness-related questions

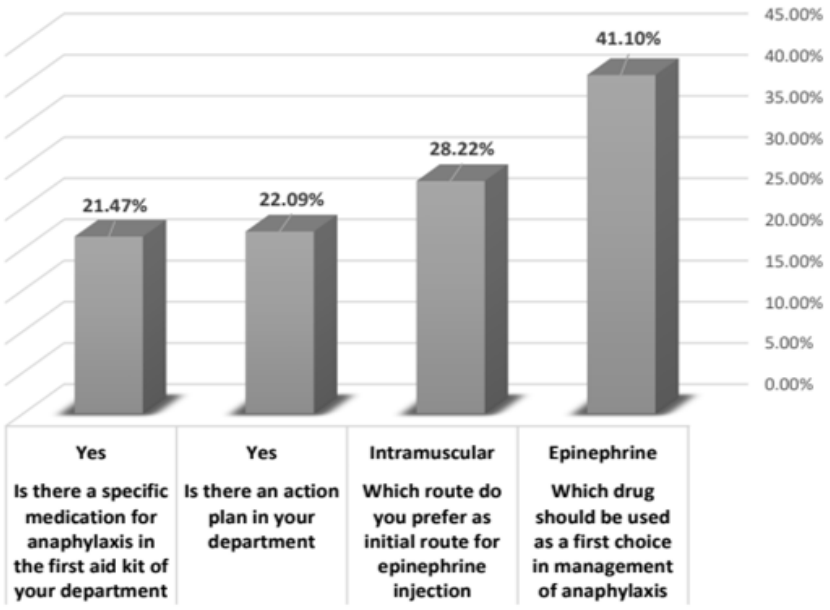

Figure 2 Bar graph showing the percentage of correct or positive answers given by respondents for knowledge and attitude-related questions

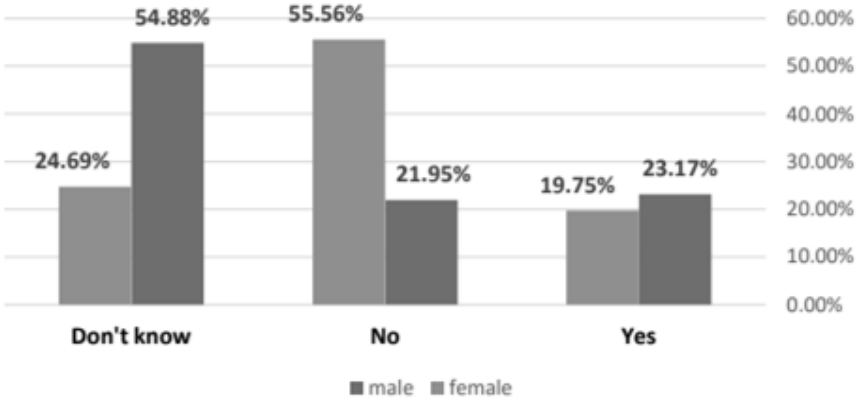

Figure 3 Bar graph illustrating the chi-square analysis comparing male and female medical students regarding the availability of a first aid kit for managing anaphylaxis

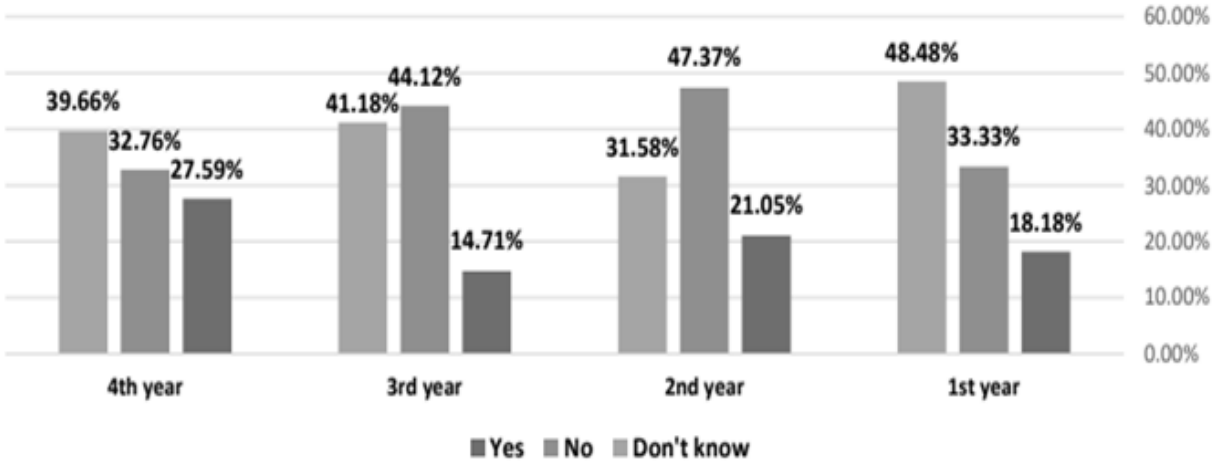

Figure 4 Bar graph illustrating the chi-square analysis comparing students from different academic years regarding the availability of a first aid kit for managing anaphylaxis

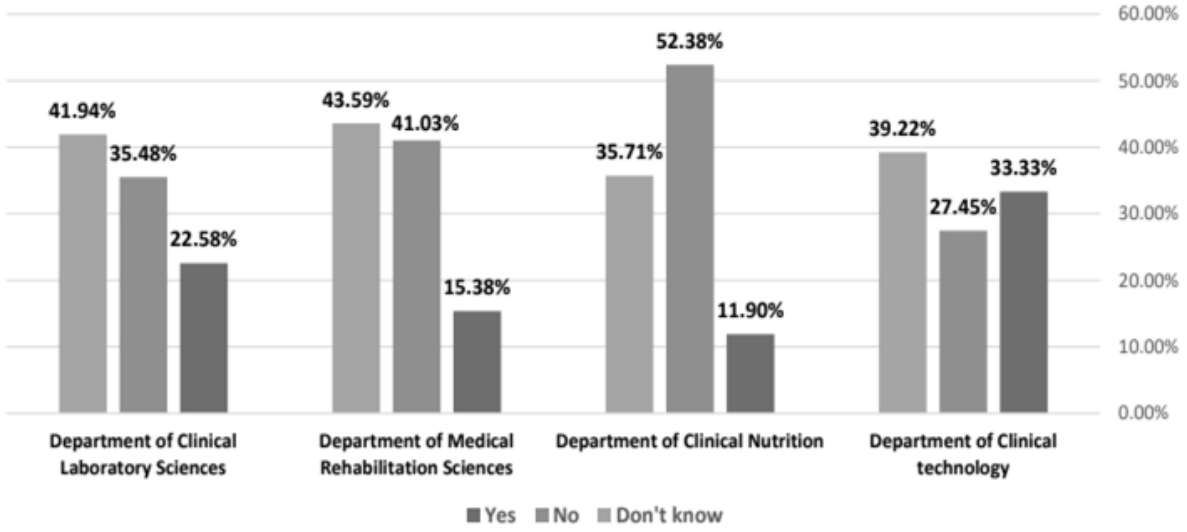

Figure 5 Bar graph illustrating the chi-square analysis comparing students from different departments regarding the availability of a first aid kit in the workspace.

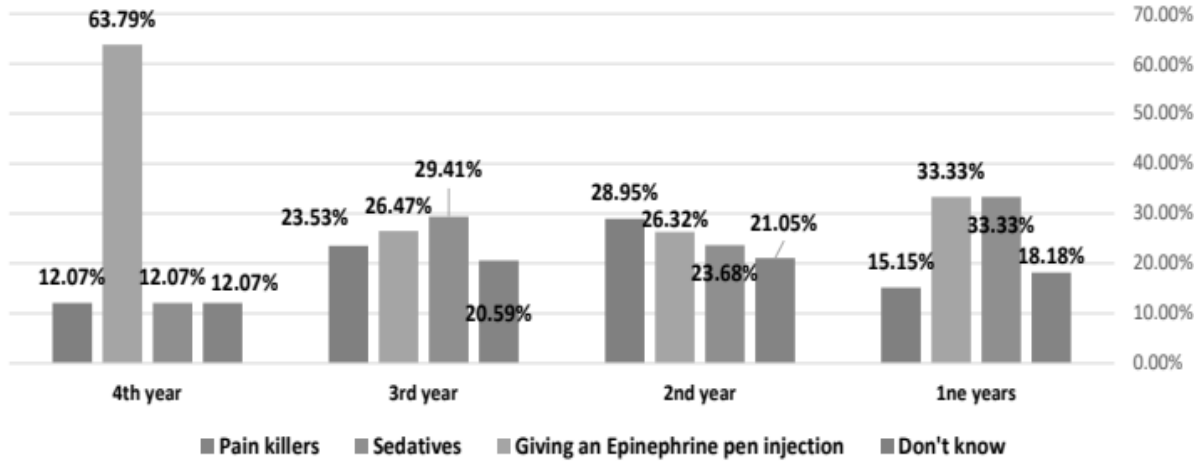

Figure 6 Bar graph illustrating the chi-square analysis comparing medical students from different academic years regarding their knowledge of the importance of the epinephrine pen

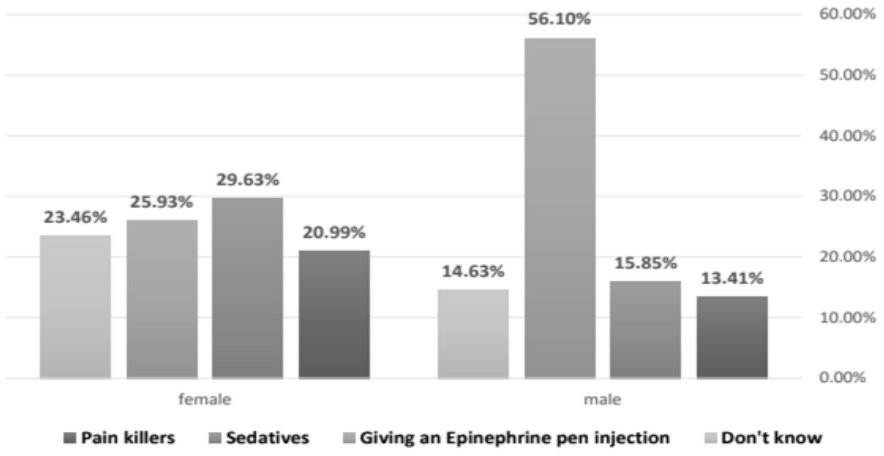

Figure 7 Bar graph illustrating the chi-square analysis comparing male and female students regarding their choice of drugs for managing anaphylaxis

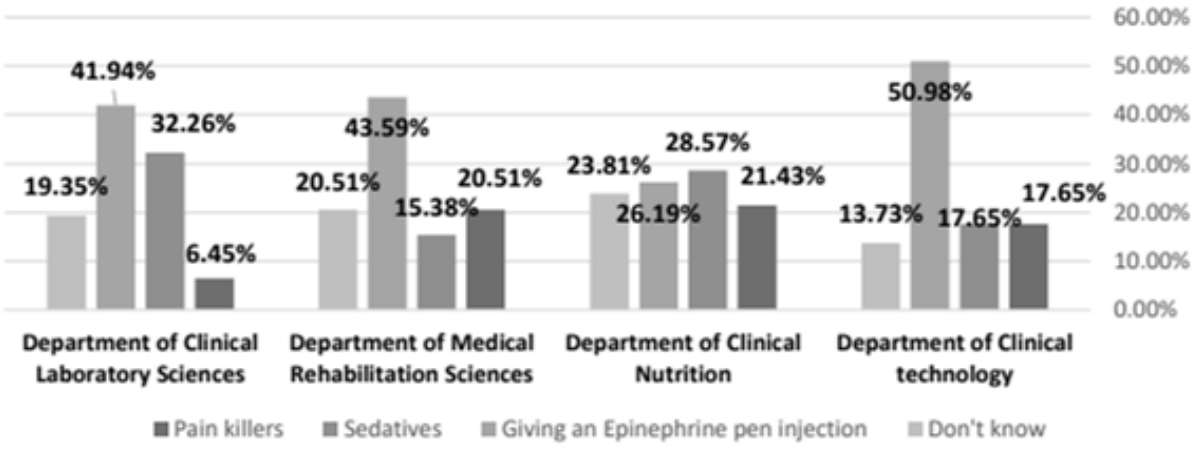

Figure 9 Bar graph illustrating the chi-square analysis comparing students from different departments regarding their choice of medications for managing anaphylaxis

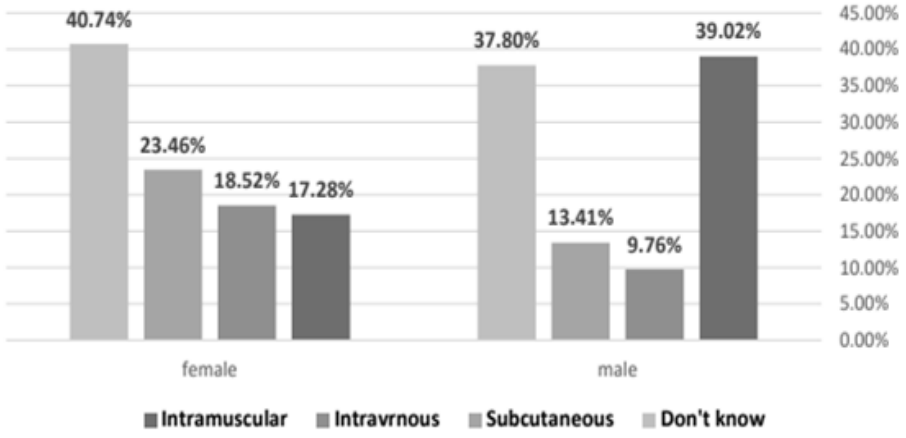

Figure 8 Bar graph illustrating the chi-square analysis comparing students from different genders regarding their knowledge of the correct route for epinephrine injection

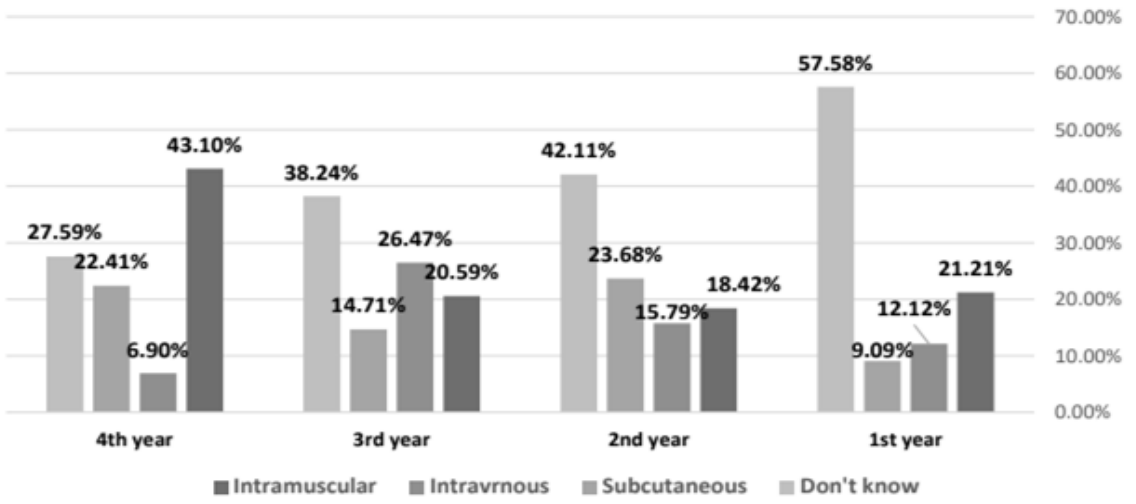

Figure 10 Bar graph illustrating the chi-square analysis comparing students from different academic years regarding their knowledge of the correct route for epinephrine injection

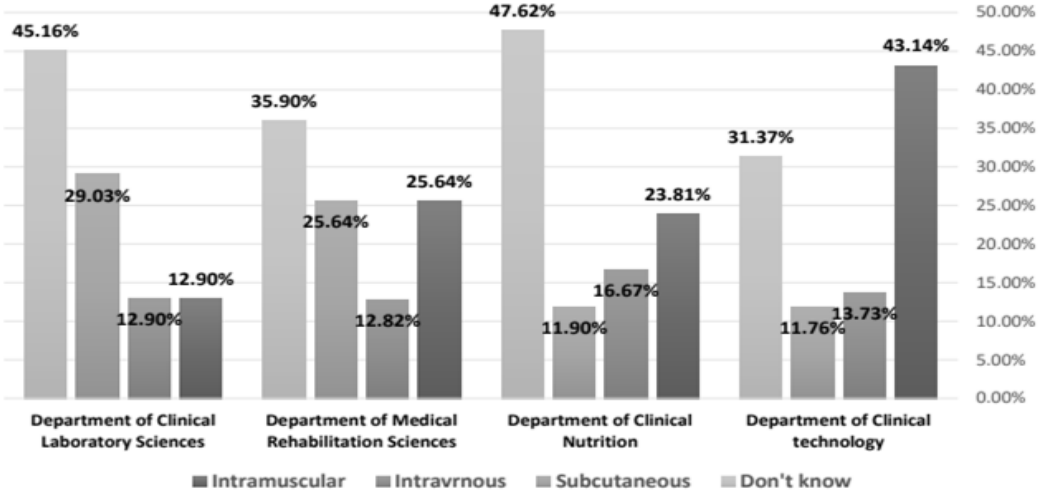

Figure 11 Bar graph illustrating the chi-square analysis comparing students from different departments regarding their knowledge of the correct route for epinephrine injection

Approximately 55.21% of the students had knowledge about anaphylactic reactions, which is considered moderately low compared to the acceptable threshold of 60% (Fig. 1). The most common first medication administered by the students in our study during an anaphylactic event was epinephrine (41.10%) (Fig. 2). A significant number of male students (54.88%) and a smaller portion of female students (24.69%) were unsure whether the correct medication was included in the first aid kit (Fig. 3). The highest awareness of first aid kit contents was observed among 4th-year students (27.59%) (Fig. 4). About 52.38% of students reported that their kits lacked the necessary medication, the highest percentage among all groups. This contrasts with the Medical Rehabilitation Sciences department, where 43.59% had the appropriate medication (Fig. 5). Among 4th-year medical students, 63.79% recognized the importance of the epinephrine pen, the highest percentage among all academic years (Fig. 6). Figure 7 shows 56.10% of male students choose giving epinephrine, which is the largest percentage. Nearly half of the respondents correctly identified the appropriate medication to be used during an anaphylactic emergency, whilst rest selected other options (Fig. 8). Around 40.74% of female students were unaware of the correct route of epinephrine administration, compared to 37.80% of male students (Fig. 9). Most first-year students did not know the correct route for epinephrine administration. However,

knowledge improved among second- and third-year students, with the highest improvement seen in fourth-year students (Fig. 10). The highest percentage of respondents who knew the correct route for epinephrine pen administration during an anaphylactic emergency was 43.14% (Fig. 11).

4. Discussion

It is the responsibility of college students to look out for one another. Therefore, it is imperative that pupils understand the health status of their peers. Acute anaphylaxis is a potentially fatal illness that should be treated quickly and effectively. We assessed students' attitudes, awareness, and knowledge of anaphylaxis in this study (Bălan & Gurghean, 2015). According to our findings, students general understanding of anaphylaxis was just moderate. Furthermore, this study is the first to assess the general awareness, attitudes, and behaviours of anaphylaxis among FAMS students at UQU in Saudi Arabia. 22.70% of the students in this study were able to determine which of their peers experienced anaphylactic reactions (Coutinho et al., 2020). In contrast, one-fourth of teachers in the Alqaseem region are aware of which of their students suffer from anaphylaxis. Furthermore, 52% of Turkish educators were aware if any of the students in their classes had experienced anaphylaxis (Sheikh and others, 2015). Only 3.5% of educators in Spain, however, reported having seen student experience an anaphylactic response.

For the purpose of early detection and intervention, students must be aware of which of their peers have a history of anaphylaxis. It is crucial that students comprehend the warning signs, symptoms, and treatments of anaphylactic reactions because they could endanger their lives during allergic reactions (Sheikh and others, 2015). In line with a Slovenian study that examined future teachers' attitudes and knowledge regarding the management of potential students and life-threatening allergic reactions, FAMS students had low attitudes towards anaphylaxis. The study found that 85% of Slovenian future teachers had a positive attitude towards learning more about how to manage life-threatening allergic reactions in potential students (Anagnostou, 2018). In keeping with this, we need to design a lesson that can significantly enhance students' understanding and practice of anaphylaxis. To avoid allergic responses, one must be aware of the signs and causes of anaphylaxis.

According to this study, 52.15% of the students knew that the most common causes of anaphylaxis were pollen, insects, and medications. Common symptoms of anaphylaxis include shortness of breath, itching, and skin rash (Topal et al., 2013). It is essential to understand how to administer first aid in the event of an anaphylactic reaction. According to 27% of the students in this survey, telling the student's family would be their first course of action in the event of an anaphylactic reaction, while 24% of the students decided to call the Red Crescent (Vickers et al., 1997). Dumpier, on the other hand, released a study that was based on a 4 to 12 week training program for preschool teachers that included auto-injector administration, allergies, and anaphylactic situations (Gallagher et al., 2011). Only 11% of participants felt ready for an anaphylactic emergency prior to the educational session; after 4–12 weeks of instruction, this number rose to 79%. Consequently, these results validated the significance of teaching students how to handle anaphylaxis.

5. Limitation

There were certain limitations in this study. First, the research was carried out in the limited scope of the FAMS in UQU which may not be extended to other colleges in the same university. Perhaps, adding students from other faculties would increase a grander perspective in terms of awareness to anaphylaxis and EpiPens. Furthermore, the study used self-report only, which may have affected the results by participants providing the data; indeed, participants might have overestimated or underestimated their knowledge or practises (Topal et al., 2013)). There is also a likelihood of unequal gender representation in the sample to that in the population of students with regard to knowledge and attitudes being tested. Third, it should also be noted that cross sectional design hampers the assessment of causality or studying

change in awareness through time. However, the study has some limitation; the findings are useful in increasing understanding on anaphylaxis awareness as well as EpiPen usage among the students from FAMS.

6. Conclusion and Recommendations

This research focuses on low knowledge about the use of epinephrine pens among students studying at the Faculty of Applied Medical Sciences at Umm Al-Qura University. Anaphylaxis is a potentially fatal allergic reaction, and every minute with this disease is fatal, making the administration of epinephrine mandatory. Regrettably, in this medical emergency many students appeared to lack basic knowledge concerning anaphylactic reactions or the proper application of epinephrine pens. This apparently is a dangerous area of unawareness particularly in educational facilities where allergic reactions may occur. In addition to that it was established that epinephrine pens and adequate first aid tools are still hard to come by within the university. These results call for an integrated approach to people's education involving practical training on anaphylaxis management with particular emphasis of the proper administration of epinephrine. Thus, for the situation involving student and faculty preparedness for anaphylaxis it is obvious that a strategy has to be developed that involves raising awareness, having appropriate medical equipment, and creating an action plan that would guarantee resistant and fast reactions to emergency conditions. Lack of knowledge and preparedness not only reduces the capacity to responding appropriately during such emergencies but may possibly be a factor that results in negative consequences in events of an emergency. It becomes important to fill this gap in knowledge in order to improve protection of the university community.

To tackle this problem, there are several effective recommendations to be employed. An educational course on anaphylactic reactions identification and appropriate administration of the epinephrine pen should be created for students and teaching staff. To increase the number of participants who would embrace this programme, it should taught as a unit of compulsory health education in any university. Second, it requires all university department and administrative buildings include complete first aid kits and contains epinephrine pens; further, we have training sessions periodically to ensure that students and faculty are capable of successfully using this pen in case of emergency.

Self-directed learning module should be developed which presents information about anaphylaxis awareness and first-aid management; users should be able to access this learning module whenever a refresher is required. In addition, steps for the management of anaphylaxis should be outlined especially in the event a disaster occurs, calling emergency services, Basic Life Support (BLS), and administering to the epinephrine pen. With the help of these recommendations, the university has an opportunity to create safer atmosphere and to prepare its community to provide the necessary actions within the case of anaphylactic emergency.

Acknowledgement

I would like to express my appreciation to those people who assisted me in this research especially Saloom Saad Alotaibi, Jarah Hassan Alotibi, Ibrahim Alqurashi, Waseem Hassan Mayajan, Khaled Alnfiae, and Turki Alsururi. We also would like to extend our sincere appreciation to all the students who spared their time to fill our questionnaire and Umm Al Qura university for the support

References

1. Alsuhaibani, M., Alharbi, S., Alonazy, S., Almozeri, M., Almutairi, M., & Alaqeel, A. (2019). Saudi teachers' confidence and attitude about their role in anaphylaxis management. *Journal of Family Medicine and Primary Care*, *8*(9), 2975. https://doi.org/10.4103/jfmpc.jfmpc_562_19
2. Anagnostou, K. (2018). Anaphylaxis in Children: Epidemiology, Risk Factors and Management. *Current Pediatric Reviews*,

14(3), 180–186. https://doi.org/10.2174/1573396314666180507115115

3. Bălan, H., & Gurghean, A. (2015). Anaphylactic Shock: Are We Doing Enough and with the Right Timing and Order? *Romanian Journal of Internal Medicine = Revue Roumaine de Médecine Interne*, *53*(3), 191–198. https://doi.org/10.1515/rjim-2015-0026
4. Coutinho, I. A., Ferreira, D., Regateiro, F. S., Pita, J., Ferreira, M., Martins, J. F., Fonseca, I. A., Loureiro, C., & Todo-Bom, A. (2020). Anaphylaxis in an emergency department: a retrospective 10-year study in a tertiary hospital. *European Annals of Allergy and Clinical Immunology*, *52*(1), 23–34. https://doi.org/10.23822/EURANNACI.1764-1489.98
5. *Epinephrine Injection: Uses, Side Effects, Interactions, Pictures, Warnings & Dosing - WebMD*. (n.d.). Retrieved October 27, 2024, from https://www.webmd.com/drugs/2/drug-76758/epinephrine-injection/details
6. Ewan, P., Brathwaite, N., Leech, S., Luyt, D., Powell, R., Till, S., Nasser, S., Clark, A., & Clark, A. T. (2016). BSACI guideline: prescribing an adrenaline auto-injector. *Clinical & Experimental Allergy*, *46*, 1258–1280. https://doi.org/10.1111/cea.12788
7. Fischer, D., Vander Leek, T. K., Ellis, A. K., & Kim, H. (2018). Anaphylaxis. *Allergy, Asthma and Clinical Immunology*, *14*(2), 1–8. https://doi.org/10.1186/S13223-018-0283-4/TABLES/4
8. Gallagher, M., Worth, A., Cunningham-Burley, S., & Sheikh, A. (2011). Epinephrine auto-injector use in adolescents at risk of anaphylaxis: a qualitative study in Scotland, UK. *Clinical and Experimental Allergy : Journal of the British Society for Allergy and Clinical Immunology*, *41*(6), 869–877. https://doi.org/10.1111/J.1365-2222.2011.03743.X
9. Irani, A. M., & Akl, E. G. (2015). Management and Prevention of Anaphylaxis. *F1000Research*, *4*, F1000 Faculty Rev-1492. https://doi.org/10.12688/F1000RESEARCH.7181.1
10. McIntyre, C. L., Sheetz, A. H., Carroll, C. R., & Young, M. C. (2005). Administration of epinephrine for life-threatening allergic reactions in school settings. *Pediatrics*, *116*(5), 1134–1140. https://doi.org/10.1542/PEDS.2004-1475
11. McLendon, K., & Sternard, B. T. (2023). Anaphylaxis. *StatPearls*. https://www.ncbi.nlm.nih.gov/books/NBK482124/
12. Sheikh, F., Amin, R., Rehan Khaliq, A. M., Al Otaibi, T., Al Hashim, S., & Al Gazlan, S. (2015). First study of pattern of anaphylaxis in a large tertiary care hospital in Saudi Arabia. *Asia Pacific Allergy*, *5*(4), 216–221. https://doi.org/10.5415/APALLERGY.2015.5.4.216
13. Tanno, L. K., Gonzalez-Estrada, A., Olivieri, B., & Caminati, M. (2019). Asthma and anaphylaxis. *Current Opinion in Allergy and Clinical Immunology*, *19*(5), 447–455. https://doi.org/10.1097/ACI.0000000000000566
14. Topal, E., Bakirtas, A., Yilmaz, O., Ertoy, I. H., Arga, M., Demirsoy, M. S., & Turktas, I. (2013). A Real-Life Study on Acquired Skills from Using an Adrenaline Autoinjector. *International Archives of Allergy and Immunology*, *160*(3), 301–306. https://doi.org/10.1159/000341367
15. Turner, P. J., DunnGalvin, A., & Hourihane, J. O. B. (2016). The emperor has no symptoms: the risks of a blanket approach to using epinephrine autoinjectors for all allergic reactions. *J Allergy Clin Immunol Pract*, *4*(6), 1143–1146. https://doi.org/10.1016/j.jaip.2016.05.005
16. Vickers, D. W., Maynard, L., & Ewan, P. W. (1997). Management of children with potential anaphylactic reactions in the community: a training package and

proposal for good practice. *Clinical & Experimental Allergy*, *27*(8), 898–903. https://doi.org/10.1111/J.1365-2222.1997.TB01230.X

17. *What is an EpiPen and Who Needs It? | MedicAlert Foundation*. (n.d.). Retrieved October 27, 2024, from https://www.medicalert.org/epipen/