

# Perception of Pharmacists about Cardiopulmonary Resuscitation Pharmacy Services in Saudi Arabia

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## ABSTRACT

**Objectives:** To demonstrate the Pharmacist's perception of CPR pharmacy services in Saudi Arabia. **Materials and Methods:** The study analyzed a cross-sectional survey that discussed the perception of Pharmacists about Cardiopulmonary Resuscitation (CPR) pharmacy service in Saudi Arabia. The survey consisted of respondents' demographic information about pharmacists, The Perception of pharmacists about a CPR pharmacy service, and barriers, which factors may affecting implementing a CPR pharmacy service. The 5-point Likert response scale system was used with closed-ended questions. The survey was validated through the revision of expert reviewers and pilot testing. Besides, various tests of reliability, McDonald's  $\alpha$ , Cronbach alpha, Gutmann's  $\lambda_2$ , and Gutmann's  $\lambda_6$  were carried out with the study. The data analysis of the perception of Pharmacists about Cardiopulmonary Resuscitation (CPR) pharmacy service is done through the survey monkey system. Besides, the statistical package of social sciences (SPSS), Jeffery's Amazing Statistics Program (JASP), and Microsoft Excel sheet version 16 were implemented. **Results:** A total number of 439 pharmacists responded to the questionnaire. Of them, more than one-third responded from the Central region (122 (31.69%)), one Quarter responded from the Eastern part (91 (23.64%)), and one-fifth responded from the southern region (79 (20.52%)). Males responded more than females (203 (53.14%)) versus 179 (46.86%), with statistically non-significant differences between all levels ( $p=0.219$ ). Most of the responders were in the age group of 36-45 years (152 (39.48%)) and 46-55 years (134 (34.81%)), with statistically significant differences between all age groups ( $p=0.000$ ). The majority of pharmacists had training courses in Basic Life Support (BLS) (293 ((77.11%)), Advance Cardiac Life Support (ACLS) (289 ((76.05%)), Pediatric Cardiac Life Support (PCLS) (287((75.53%)), and Neonatal Cardiac Life Support (NCLS) (203 ((53.42%))), with statistically significant differences between all levels ( $p=0.000$ ). The average score of perception of pharmacists about the CPR pharmacy service was (4.32). The element "Pharmacist participation in CPR code led to positive changes" obtained the highest score (4.50). The pharmacists believe that The hospital promotes itself as an organization that pharmacist responds to CPR codes and other emergency-related issues (4.50). The average score for the element "Factors affected to prevent you to shares in the CPR codes" was (3.95). The highest score for the component "Competency/ Clinical knowledge" was (3.38). The score for the element "Shortage of pharmacy staff" was (4.41), and level of clinical knowledge makes it difficult to decide whether or not the Pharmacist participates in the CPR team "was (4.39). Followed the element "Uncertain association between the CPR medications and occurrences of Medication Errors (MEs) during CPR code" was (4.34), and the element "Fear of legal liability" was (4.34). **Conclusion:** The pharmacist's perception of CPR code services is appropriate. Eliminating obstacles to CPR services implementation during undergraduate and postgraduate studies is required. The pharmacist's role needs to clarify, and periodic education and training are highly critical in pharmacy practice in Saudi Arabia.

**Keywords:** Perception, Pharmacists, Cardiopulmonary Resuscitation, Pharmacy Services.

## INTRODUCTION

In past years, the pharmacist established and provided various programs in the clinical pharmacy and pharmacy practice.<sup>[1-9]</sup> Those services were provided to patients in acute, ambulatory care, and community services. In acute or critical care, the pharmacist provides essential Emergency medication emphasizes CPR medication, prevents drug-related problems, including mistakes, drug therapy review, participation in the CPR coding with related teams, and procurements of the best and appropriate drugs with drug formulary of

Healthcare Organization.<sup>[11-12]</sup> The pharmacist provides medication education, answers drug information and poisoning control inquiries, dispenses and educates medications devices, immunization services, and basic life support to the public if required.<sup>[11-12]</sup> The main question that anyone might ask is whether we need to let the pharmacist share with the CPR team and what are the impacts for that decision?<sup>[13,14]</sup> Various literature showed the reduction of mortality and saving of lives if a pharmacist is involved in CPR.<sup>[13,14]</sup> Besides, there is a reduction in the economic burden on the healthcare system and avoiding unnecessary additional costs.<sup>[13,14]</sup> Another

question might be raised why not all healthcare organizations involve the pharmacist in the CPR code system.<sup>[15,16]</sup> Does the reason related to the pharmacist's perception or attitude toward the CPR code services? Do any barriers prevent the CPR services provided by the pharmacy department? Few studies discussed this matter locally or internationally.<sup>[7,15,16]</sup> Clarifying the perception or attitude and barriers preventing CPR code services will explore the real reasons. The current cross-sectional approach with a survey distributed to all types of pharmacists about perception and avoiding obstacles to continue implementing the CPR pharmacy services is our aim of the investigation.

## MATERIALS AND METHODS

It analyzes a cross-sectional survey that discussed the perception of Pharmacists about CPR pharmacy service in Saudi Arabia. It self-reported an electronic survey of the pharmacist, including pharmacists from internship to consultant, pharmacist specialties, and Saudi Arabia. All non-pharmacist or students, non-completed, non-qualified surveys will be excluded from the study. The survey consisted of questions regarding respondents' demographic information about pharmacists, pharmacists' perceptions of a CPR pharmacy service, and obstacles that would deter pharmacists from implementing a CPR pharmacy service.<sup>[15-23]</sup> The 5-point Likert response scale system was used with closed-ended questions. According to the previous literature with an unlimited population size, the sample was calculated as a cross-sectional study, with a confidence level of 95% with a z score of 1.96 and a margin of error of 5%, a population percentage of 50%, and drop-out rate 10%. As a result, the sample size will equal 380-420 with a power of study of 80%.<sup>[24-26]</sup> The response rate required for the calculated sample size is at least 60-70 % and above.<sup>[26,27]</sup> The survey was distributed through social media of what's applications and telegram groups of pharmacists. The reminder message had been sent every 1-2 weeks. The survey was validated through the revision of expert reviewers and pilot testing. Besides, Various tests of the reliability of McDonald's  $\omega$ , Cronbach alpha, Gutmann's  $\lambda_2$ , and Gutmann's  $\lambda_6$  were carried out with the study. The data analysis of the Perception of Pharmacists about Cardiopulmonary Resuscitation Pharmacy Services is done through the survey monkey system. Besides, the statistical package of social sciences (SPSS), Jeffery's Amazing Statistics Program (JASP), and Microsoft Excel sheet version 16. It included a description and frequency analysis, good of fitness analysis, and correlation analysis.

Beside, inferential analysis of factors affecting pharmacists about a CPR pharmacy service, and barriers, which factors may Discourage you from implementing a CPR pharmacy service with linear regression. The STROBE (Strengthening the reporting of observational studies in epidemiology statement: guidelines for reporting observational studies) guided the reporting of the current study.<sup>[28,29]</sup>

## RESULTS

A total number of 439 pharmacists responded to the questionnaire. Of them, more than one-third responded from the Central region (122 (31.69%)) one Quarter responded from the Eastern region (91 (23.64%)), and one-fifth responded from the southern region (79 (20.52%)), with statistically significant differences between the provinces ( $p=0.000$ ). Most of the responders were from University hospitals (91 (20.92%)), National Guard Hospitals (80 (18.39%)), and Private ambulatory care clinics (68 (15.63%)), with a statistically significant difference between working sites ( $p=0.000$ ). Males responded more than females (203 (53.14%)) versus 179 (46.86%), with statistically non-significant differences between all levels ( $p=0.219$ ). Most of the responders were in the age group of 36-45 years (152 (39.48%)) and 46-55 years (134 (34.81%)), with statistically significant differences between all age groups ( $p=0.000$ ). Most of the responders held Doctor of Philosophy (130 (34.21%)), Pharm D (89 (23.42%)), Bachelor Pharmacy (73 (19.21%)), Postgraduate year three PGY-3 (66 (17.37%)), and Doctor of Philosophy in Pharmacy (65 (14.01%)). Most pharmacists had a work experience of 1-3 years (82 (21.41%)), 4-6 years (80 (20.89%)), and less than one year (74 (19.32%)), with a statistically non-significant difference between years of experience ( $p=0.364$ ). Most of pharmacists works at outpatient pharmacy (248 ((65.26%)), Inpatient Pharmacy (237 ((62.37%)), Satellite Pharmacy (224 ((58.95%)), and Narcotics (204 ((53.68%)). The majority of pharmacists had training courses in Basic Life Support (BLS) (293 ((77.11%)), Advance Cardiac Life Support (ACLS) (289 ((76.05%)), Pediatric Cardiac Life Support (PCLS) (287 ((75.53%)), and Neonatal Cardiac Life Support (NCLS) (203 ((53.42%)), with statistically significant differences between all levels ( $p=0.000$ ). There was a medium positive correlation between age (years) and academic qualifications based on Kendall's tau\_b (0.426) and Spearman's rho (0.511) correlation coefficients, with a statistically significant difference between the two factors ( $p<0.000$ ). There was a medium positive correlation between site of work and academic qualifications based on Kendall's

tau\_b (0.524) and Spearman's rho (0.553), with a statistically significant difference between the two factors ( $p<0.000$ ) (Tables 1 and 2).

The average score of perception of pharmacists about the CPR pharmacy service was (4.32). The element "Pharmacist participation in CPR code led to positive changes" obtained the highest score (4.50). The pharmacists believe that The hospital promotes itself as an organization that pharmacist responds to CPR codes and other emergency-related issues (4.50). In contrast, the lowest score was obtained for the element "The system in my hospital including pharmacist participation in CPR policy and procedure is good to minimizing the occurrence of Medication Errors (MEs)" (4.17). The score for the element "I think there are under-activities of Pharmacist involved in CPR at the hospital (4.20), with a statistically significant difference between the responses ( $p<0.000$ ). All aspects of the perception of pharmacists about the CPR pharmacy service were statistically significant between responses ( $p<0.000$ ) (Table 3). The average score for the element "Factors affected to prevent you to shares in the CPR codes" was (3.95). The highest score for the element "Competency/ Clinical knowledge" was (3.38). The score for the element "Shortage of pharmacy staff" was (4.41), and level of clinical knowledge makes it difficult to decide whether or not the Pharmacist participates in the CPR team "was (4.39). Followed the element "Uncertain association between the CPR medications and occurrences of Medication Errors (MEs) during CPR code" was (4.34), and the element "Fear of legal liability" was (4.34). In contrast, low scores were obtained for the elements "The CPR team facilitates not exist" (3.44) and "Lack of administration support" (3.44), with statistically significant differences between the responses ( $p<0.000$ ). All responses about aspects of perception of Factors affected to prevent you to shares in the CPR codes were statistically significant ( $p<0.001$ ) (Table 4). The score for single-test reliability analysis of McDonald's  $\omega$  was 0.898, Cronbach's  $\alpha$  was 0.919, Gutmann's was  $\lambda_2$ , 0.936, Gutmann's  $\lambda_6$  was 0.978, and Greater Lower Bound was 0.990 with statistically significant ( $p<0.05$ ).

### Factors affecting the perception of pharmacists about a CPR pharmacy service

Factors affecting the perception were analyzed. We adjusted the significant values using the independent samples Kruskal-Wallis test and the Bonferroni correction for multiple tests. The perception of pharmacists about a CPR pharmacy service includes location, worksite, age, gender, Academic qualifications, years of experience, present of adults, pediatrics, and neonate CPR teams at an institution. Besides, Participations in the Adult, Pediatrics, and

| Table 1: Demographic, social information. |                |                  |              |
|---|----------------|------------------|--------------|
| Nationality                               | Response Count | Response Percent | p-value (X2) |
| Central area                              | 122            | 31.69%           | 0.000        |
| North area                                | 64             | 16.62%           |              |
| South area                                | 79             | 20.52%           |              |
| East area                                 | 91             | 23.64%           |              |
| West area                                 | 29             | 7.53%            |              |
| <b>Answered question</b>                  | <b>385</b>     |                  |              |
| <b>Skipped question</b>                   | <b>54</b>      |                  |              |
| Site of work                              | Response Count | Response Percent | p-value (X2) |
| MOH Hospitals                             | 44             | 10.11%           | 0.000        |
| Military hospitals                        | 13             | 2.99%            |              |
| National Gaurd Hospital                   | 80             | 18.39%           |              |
| Security forces hospitals                 | 19             | 4.37%            |              |
| University Hospital                       | 91             | 20.92%           |              |
| MOH primary care centers                  | 65             | 14.94%           |              |
| Private hospitals                         | 25             | 5.75%            |              |
| Private ambulatory care clinics           | 68             | 15.63%           |              |
| Private primary healthcare center         | 3              | 0.69%            |              |
| Community pharmacy                        | 19             | 4.37%            |              |
| Pharmaceutical company                    | 6              | 1.38%            |              |
| University                                | 2              | 0.46%            |              |
| <b>Answered question</b>                  | <b>435</b>     |                  |              |
| <b>Skipped question</b>                   | <b>4</b>       |                  |              |
| Gender                                    | Response Count | Response Percent |              |
| Male                                      | 203            | 53.14%           | 0.219        |
| Female                                    | 179            | 46.86%           |              |
| <b>Answered question</b>                  | <b>382</b>     |                  |              |
| <b>Skipped question</b>                   | <b>57</b>      |                  |              |
| Age                                       | Response Count | Response Percent |              |
| 24–35                                     | 94             | 24.42%           | 0.000        |
| 36–45                                     | 152            | 39.48%           |              |
| 46–55                                     | 134            | 34.81%           |              |
| > 55                                      | 5              | 1.30%            |              |
| <b>Answered question</b>                  | <b>385</b>     |                  |              |
| <b>Skipped question</b>                   | <b>54</b>      |                  |              |

| Table 2: Demographic, social information.          |                |                  |              |
|--|----------------|------------------|--------------|
| The last academic qualifications                   | Response Count | Response Percent | p-value (X2) |
| Bachelor Pharm                                     | 73             | 19.21%           | 0.000        |
| Pharm D  | 89             | 23.42%           |              |
| Master   | 18             | 4.74%            |              |
| Ph D   | 130            | 34.21%           |              |
| Residency R1                                       | 2              | 0.53%            |              |
| Residency R2                                       | 2              | 0.53%            |              |
| Residency R3                                       | 66             | 17.37%           |              |
| Fellowship   | 0              | 0.00%            |              |
| <b>Answered question</b>                           | <b>380</b>     |                  |              |
| <b>Skipped question</b>                            | <b>59</b>      |                  |              |
| Years of experience pharmacy career                | Response Count | Response Percent |              |
| < 1  | 74             | 19.32%           | 0.364        |
| 1 – 3  | 82             | 21.41%           |              |
| 4 – 6  | 80             | 20.89%           |              |
| 7 - 9  | 62             | 16.19%           |              |
| > 9  | 85             | 22.19%           |              |
| <b>Answered question</b>                           | <b>383</b>     |                  |              |
| <b>Skipped question</b>                            | <b>56</b>      |                  |              |
| The practice area                                  | Response Count | Response Percent |              |
| Inpatient Pharmacy                                 | 237            | 62.37%           |              |
| Outpatient Pharmacy                                | 248            | 65.26%           |              |
| Satellite Pharmacy                                 | 224            | 58.95%           |              |
| Narcotics  | 204            | 53.68%           |              |
| IV admixture                                       | 137            | 36.05%           |              |
| Extemporaneous Preparation                         | 72             | 18.95%           |              |
| Clinical Pharmacy                                  | 90             | 23.68%           |              |
| Inventory Control                                  | 75             | 19.74%           |              |
| Drug Information                                   | 13             | 3.42%            |              |
| Emergency pharmacy                                 | 5              | 1.32%            |              |
| Medication safety                                  | 5              | 1.32%            |              |
| Repacking  | 4              | 1.05%            |              |
| Pharmacy Education and Training                    | 134            | 35.26%           |              |
| Pharmacy Research                                  | 121            | 31.84%           |              |
| Primary care pharmacy                              | 56             | 14.74%           |              |
| Community pharmacy                                 | 64             | 16.84%           |              |
| <b>Answered question</b>                           | <b>380</b>     |                  |              |
| <b>Skipped question</b>                            | <b>59</b>      |                  |              |
| Did you take any of the following training courses | Response Count | Response Percent |              |
| Basic Life Support (BLS)                           | 293            | 77.11%           | 0.000        |
| Advance Cardiac Life Support (ACLS)                | 289            | 76.05%           |              |
| Pediatric Cardiac Life Support (PCLS)              | 287            | 75.53%           |              |
| Neonatal Cardiac Life Support (NCLS)               | 203            | 53.42%           |              |
| Nothing  | 6              | 1.58%            |              |
| <b>Answered question</b>                           | <b>380</b>     |                  |              |
| <b>Skipped question</b>                            | <b>59</b>      |                  |              |



| Table 3: The Perception of CPR pharmacy service. |   |                |               |              |             |                   |       |                  |              |
|--|---|----------------|---------------|--------------|-------------|-------------------|-------|------------------|--------------|
| No   | Item  | Strongly agree | Agree         | Uncertain    | Disagree    | Strongly disagree | Total | Weighted Average | p-value (X2) |
| 1  | The system in my hospital, including pharmacist participation in CPR policy and procedure, is suitable for minimizing the occurrence of Medication Errors (MEs) | 182<br>42.52%  | 175<br>40.89% | 43<br>10.05% | 19<br>4.44% | 9<br>2.10%        | 428   | 4.17             | 0.000        |
| 2  | Pharmacist participation in the CPR code led to positive changes  | 324<br>75.17%  | 34<br>7.89%   | 49<br>11.37% | 13<br>3.02% | 11<br>2.55%       | 431   | 4.50             | 0.000        |
| 3  | The hospital promotes itself as an organization where pharmacist responds to CPR codes and other emergency-related issues                                       | 319<br>74.53%  | 36<br>8.41%   | 46<br>10.75% | 21<br>4.91% | 6<br>1.40%        | 428   | 4.50             | 0.000        |
| 4  | I think there are under-activities of Pharmacist involved in CPR at the hospital  | 195<br>45.88%  | 162<br>38.12% | 36<br>8.47%  | 20<br>4.71% | 12<br>2.82%       | 425   | 4.20             | 0.000        |
| 5  | I feel comfortable to provide for help or support from my colleagues or peers concerning during CPR code  | 197<br>48.05%  | 160<br>39.02% | 25<br>6.10%  | 16<br>3.90% | 12<br>2.93%       | 410   | 4.25             | 0.000        |
| 6  | I have the opportunity to discuss and receive feedback about my CPR performance with other staff  | 196<br>49.12%  | 147<br>36.84% | 31<br>7.77%  | 14<br>3.51% | 11<br>2.76%       | 399   | 4.26             | 0.000        |
| 7  | Medical staff feel like their mistakes are held when pharmacists shares in CPR codes  | 183<br>46.92%  | 143<br>36.67% | 39<br>10.00% | 18<br>4.62% | 7<br>1.79%        | 390   | 4.22             | 0.000        |
| 8  | The pharmacist shares in CPR code to ensure all medications are available during CPR codes.   | 197<br>51.04%  | 150<br>38.86% | 26<br>6.74%  | 13<br>3.37% | 0<br>0.00%        | 386   | 4.38             | 0.000        |
| 9  | I think the pharmacist during the CPR code can reduce and avoid unnecessary economic burden on the healthcare system  | 187<br>48.83%  | 162<br>42.30% | 19<br>4.96%  | 14<br>3.66% | 1<br>0.26%        | 383   | 4.36             | 0.000        |
| 10   | The pharmacist prevents any drug-related problems with CPR medications  | 192<br>51.06%  | 150<br>39.89% | 23<br>6.12%  | 11<br>2.93% | 0<br>0.00%        | 376   | 4.39             | 0.000        |
|  | Answered  |                |               |              |             |                   | 439   |                  |              |
|  | Skipped   |                |               |              |             |                   | 0     |                  |              |

Neonates CPR teams at an institution. The north and south regions showed the lowest scores (1.1938) and (1.2424), respectively, with statistically significant differences between regions ( $p=0.000$ ). Twelve worksites affected the perception of pharmacists about a CPR pharmacy service. The working site affected the factors of the perception of pharmacists about a CPR pharmacy service. The lowest scores (1.4182) and (1.4739) were obtained from National Guard hospitals and MOH Hospitals, respectively, with statically significant differences among all sites ( $p=0.000$ ). The gender female (1.6916) was more affects the perception of pharmacists about a CPR pharmacy service than males (1.4993), with statistically significant differences between them ( $p=0.000$ ). The responders' age affected pharmacists' perception of a CPR pharmacy service. Pharmacists aged >55 years showed the lowest score (2.3295), with a statistically significant difference between all age groups ( $p=0.008$ ). Eight levels of the last academic qualifications affected perception of pharmacists about a CPR pharmacy service, with the lowest score (1.4365) and (1.5712) obtained for the Pharm D and Bachelor Pharm, respectively, with a statistically significant difference between all levels ( $p=0.000$ ). Five levels of work experience did not affect the perception of pharmacists about a CPR pharmacy service, with non-statically significant differences among all levels ( $p=894$ ). The pharmacist does not know that the presence of Adults CPR team at the institution (2.5013) affected the perception of pharmacists about a CPR pharmacy service with a statistically significant difference between all answers ( $p=0.000$ ). The pharmacist does not know that the presence of the pediatrics CPR team at the institution (2.5560) affected the perception of pharmacists about a CPR pharmacy service, with a statistically significant difference between all answers ( $p=0.000$ ). The pharmacist does not know that the presence of a neonatal CPR team at the institution (2.2993) affected the perception of pharmacists about a CPR pharmacy service, with a statistically significant difference between all answers ( $p=0.000$ ). The pharmacist who participated in the Adults CPR code with the lowest score (1.4333) affected the perception of pharmacists about a CPR pharmacy service with a statistically significant difference between all answers ( $p=0.000$ ). The pharmacist who participated in the pediatrics CPR code with the lowest score (1.2971) affected the perception of pharmacists about a CPR pharmacy service with a statistically significant difference between all answers ( $p=0.000$ ). The pharmacist who participated in the neonatal CPR code with the lowest score (1.3531) affected the perception of

Table 4: Perception of factors Discourage or prevent you to shares in the CPR services.

| No | Item  | Strongly agree | Agree         | Uncertain     | Disagree     | Strongly disagree | Total | Weighted Average | p-value (X2) |
|----|---|----------------|---------------|---------------|--------------|-------------------|-------|------------------|--------------|
| 1  | The level of clinical knowledge makes it difficult to decide whether or not the Pharmacist participates in the CPR team | 59.80%<br>238  | 27.89%<br>111 | 6.53%<br>26   | 3.52%<br>14  | 2.26%<br>9        | 398   | 4.39             | 0.000        |
| 2  | Uncertain association between the CPR medications and occurrences of Medication Errors (MEs) during CPR code            | 59.45%<br>239  | 23.13%<br>93  | 10.70%<br>43  | 5.72%<br>23  | 1.00%<br>4        | 402   | 4.34             | 0.000        |
| 3  | The pharmacist shares in CPR code is trivial activities   | 59.60%<br>236  | 22.73%<br>90  | 7.07%<br>28   | 8.08%<br>32  | 2.53%<br>10       | 396   | 4.29             | 0.000        |
| 4  | Concern that participation in the CPR code will generate extra work.  | 59.80%<br>235  | 21.63%<br>85  | 9.92%<br>39   | 6.11%<br>24  | 2.54%<br>10       | 393   | 4.30             | 0.000        |
| 5  | Lack of confidence in discussing the CPR medications with the prescriber.   | 40.57%<br>157  | 28.68%<br>111 | 4.39%<br>17   | 24.29%<br>94 | 2.07%<br>8        | 387   | 3.81             | 0.000        |
| 6  | Lack of time to participate in the CPR code   | 41.78%<br>160  | 23.76%<br>91  | 9.92%<br>38   | 22.98%<br>88 | 1.57%<br>6        | 383   | 3.81             | 0.000        |
| 7  | Did not know how to participate in the CPR code   | 41.36%<br>158  | 23.56%<br>90  | 9.16%<br>35   | 23.56%<br>90 | 2.36%<br>9        | 382   | 3.78             | 0.000        |
| 8  | Fear of legal liability.  | 59.32%<br>226  | 25.98%<br>99  | 6.56%<br>25   | 6.04%<br>23  | 2.10%<br>8        | 381   | 4.34             | 0.000        |
| 9  | Unaware of the need to participate in the CPR code  | 25.59%<br>97   | 24.27%<br>92  | 43.27%<br>164 | 4.49%<br>17  | 2.37%<br>9        | 379   | 3.66             | 0.000        |
| 10 | Lack of financial reimbursement.  | 26.26%<br>99   | 25.73%<br>97  | 42.44%<br>160 | 3.45%<br>13  | 2.12%<br>8        | 377   | 3.71             | 0.000        |
| 11 | Consider it the doctors' responsibility   | 27.54%<br>103  | 22.99%<br>86  | 42.78%<br>160 | 4.81%<br>18  | 1.87%<br>7        | 374   | 3.70             | 0.000        |
| 12 | The negative consequences associated with pharmacists participating in CPR code   | 59.37%<br>225  | 24.54%<br>93  | 6.33%<br>24   | 7.39%<br>28  | 2.37%<br>9        | 379   | 4.31             | 0.000        |
| 13 | Shortage of pharmacy staff  | 61.58%<br>234  | 25.26%<br>96  | 7.89%<br>30   | 3.16%<br>12  | 2.11%<br>8        | 380   | 4.41             | 0.000        |
| 14 | Lack of administration support  | 19.84%<br>76   | 45.95%<br>176 | 12.01%<br>46  | 2.35%<br>9   | 19.84%<br>76      | 383   | 3.44             | 0.000        |
| 15 | Lack of education and training in participation in the CPR code   | 22.31%<br>85   | 48.03%<br>183 | 6.56%<br>25   | 2.89%<br>11  | 20.21%<br>77      | 381   | 3.49             | 0.000        |
| 16 | The CPR team facilitates not existed  | 21.84%<br>83   | 43.68%<br>166 | 11.84%<br>45  | 2.37%<br>9   | 20.26%<br>77      | 380   | 3.44             | 0.000        |
|    | Answered  |                |               |               |              |                   | 416   |                  |              |
|    | Skipped   |                |               |               |              |                   | 23    |                  |              |

pharmacists about a CPR pharmacy service with a statistically significant difference between all answers ( $p=0.000$ ). (Table 5).

The relationship between the pharmacist's Perception of CPR pharmacy services and factors such as; location, worksite, age (years), gender, academic qualifications, and years of experience in a pharmacy career. Besides, the Presence of Adults CPR team at the institution. Presence of a pediatrics CPR team at the institution, presence of a neonates CPR team at the institution, Participate of an Adults CPR team at the institution, Participate of a pediatrics CPR team at the institution, and Participate of a neonates CPR team at the institution. The multiple regression analysis considered perception as the dependent variable and factors affecting it as an explanatory variable. There was a strong relationship ( $R=0.787$  with  $p=0.000$ ) between the basic knowledge of the Cardiopulmonary Resuscitation (CPR) medications and its factors. Nine out of twelve were non-significant differences ( $p>0.05$ ). However, multiple regression analysis confirmed that one factor (i.e., Present of Adults CPR team at the institution) explained 49.1 % of the negative relationship to the variation in perception, with a statistically significant difference ( $p=0.000$ ). Therefore, the bootstrap model was also confirmed. Furthermore, the relationship was verified by non-presenting multicollinearity with a variance inflation factor (VIF) of 3.483, more than three or five as a sufficient number of VIF.<sup>[30-32]</sup> Besides, two factors (i.e., Participate of Adults CPR team at the institution, and Participate of the pediatrics CPR team at the institution) explained 47.8% and 26.5%, respectively, of the positive relationship to the variation in knowledge, with a significant statistical difference ( $p=0.000$ ), and ( $p=0.001$ ). The bootstrap model was also confirmed. Furthermore, the relationship was verified by the non-existence of multicollinearity with a variance inflation factor (VIF) of 2.442, less than three or five as an adequate number of VIF. Except, Participate of the Pediatrics CPR team at the institution had an existence of multicollinearity with with a variance inflation factor (VIF) of 5.384 (Table 6).<sup>[30-32]</sup>

#### Factors affecting the Factors to barriers Discourage shares in the CPR code

Factors affecting the perception were analyzed. We adjusted the significant values using the independent samples Kruskal-Wallis test and the Bonferroni correction for multiple tests. Barriers Discourage shares in the CPR code include location, worksite, age, gender, Academic qualifications, years of experience, Present of Adults CPR team at the institution, Present of the Pediatrics CPR team

at an institution, Present of Neonate CPR team at the institution, Participate of Adults CPR team at the institution, Participate of Pediatrics CPR team at the institution, and Participate of Neonates CPR team at institution. The central and northern regions showed the lowest scores (1.5406) and (1.5919), respectively. Fourteen worksites affected the barriers Discourage prevent to shares in the CPR code. The working site affects the barriers Discourage claims in the CPR code. The lowest scores (1.3938) and (1.4298) were obtained from MOH primary care centers and MOH Hospitals, respectively, with statically significant differences among all sites ( $p=0.000$ ). Gender did not affect perception of the barriers Discourage prevent to shares in the CPR code with non-statistically significant differences between them ( $p=0.887$ ). The age of the responders affected the *barriers Discourage prevents shares in the CPR code*. Pharmacists aged >55 years showed the highest score (2.8142), with a statistically significant difference between all age groups ( $p=0.013$ ). Eight levels of the last academic qualifications affected perception of the barriers Discourage prevent to shares in the CPR code, with the lowest score (1.8301) and (1.8426) obtained for the Pharm D and Bachelor Pharm, respectively, with a statistically significant difference between all levels ( $p=0.000$ ). Five levels of work experience did not affect the *barriers Discourage shares in the CPR code* with non-statically significant differences among all levels ( $p=0.91$ ). The pharmacist does not know about the presence of Adults CPR team at the institution (3.1155) or the presence of Adults CPR team at the institution (2.2679) affected *barriers Discourage shares in the CPR code service* with a statistically significant difference between all answers ( $p=0.000$ ). The pharmacist does not know about the presence of Adults CPR team at the institution (2.9548) or the presence of a pediatrics CPR team at the institution (2.2204) affect *barriers Discourage shares in the CPR code service* with a statistically significant difference between all answers ( $p=0.000$ ). The pharmacist does not know about the presence of a neonatal CPR team at the institution (2.9394), or the presence of a neonatal CPR team at the institution (2.2521) affects CPR pharmacy services implementations with a statistically significant difference between all answers ( $p=0.000$ ). The pharmacist participated in the Adults CPR code with the lowest score (1.9000) affected *barriers Discourage shares in the CPR code service* with a statistically significant difference between all answers ( $p=0.000$ ). The pharmacist who participated in the pediatrics CPR code with the lowest score (1.7978) affected *barriers Discourage shares in the CPR code service* with a statistically significant difference between

all answers ( $p=0.000$ ). The pharmacist who participated in the neonatal CPR code with the lowest score (1.8195) affected *barriers Discourage shares in the CPR code service* with a statistically significant difference between all answers ( $p=0.000$ ) (Table 5).<sup>[20-22]</sup>

The relationship between the pharmacist's Perception of *barriers Discourage shares in the CPR code* and factors such as location, worksite, age (years), gender, academic qualifications, years of experience in a pharmacy career, Present of Adults CPR team at the institution, The presence of the pediatrics CPR team at the institution, the presence of the neonate CPR team at the institution, the Participate of Adults CPR team at the institution, and the Participate of the pediatric CPR team at the neonate CPR team at the institution. The multiple regression analysis considered perception as the dependent variable and factors affecting it as an expletory variable. There was a strong relationship ( $R=0.753$  with  $p=0.000$ ) between the *barriers Discourage shares in the CPR code* and its factors. Nine out of twelve were non-significant differences ( $p>0.05$ ). However, multiple regression analysis confirmed that one factor (i.e., gender) explained 24.9 % of the negative relationship to the variation in perception, with a statistically significant difference ( $p=0.000$ ). Therefore, the bootstrap model was also confirmed. Furthermore, the relationship was verified by the non-existence of multicollinearity with the gender factor with a variance inflation factor (VIF) of 1.702, more than three or five as a sufficient number of VIF.<sup>[20-22]</sup> Besides, three factors (i.e., location, age, and the presence of the Neonates CPR team at the institution) explained 33.7%, 19.8%, and 44.6%, respectively, of the positive relationship to the variation in perception, with a statistically significant difference ( $p=0.000$ ), ( $p=0.000$ ) and ( $p=0.000$ ). Therefore, the bootstrap model was also confirmed. Furthermore, the relationship was verified by the non-existence of multicollinearity with a variance inflation factor (VIF) of 1.883, 2.526 respectively, less than three or five as an adequate number of VIF. Except, the presence of the Neonates CPR team at the institution had an existence of multicollinearity with a variance inflation factor (VIF) of 5.616 (Table 6).<sup>[30-32]</sup>

## DISCUSSION

The pharmacist participated in CPR for over twenty years.<sup>[18,33]</sup> The role of the pharmacist in CPR was clarified by various kinds of literature.<sup>[16,18,19,34]</sup> Pharmacists' impact on the CPR code is well documented.<sup>[13,35]</sup> However, still, some hospital pharmacies have not implemented it, or the pharmacist is not participating in the

CPR code.<sup>[7,15,16,19]</sup> That might have been related to pharmacist perception of attitudes toward CPR codes services or various barriers preventing the services from being implemented in practice.<sup>[15,16,18]</sup> Current cross-sectional investigations with different types of pharmacists, various ages, positions, working sites, and practice areas. Which it was similar to previous studies.<sup>[15,16,18,19]</sup> Besides, it had reliability results better than the earlier studies,<sup>[15,16,18,19]</sup> appropriately calculated sample size better than previous studies,<sup>[15,18,19]</sup> and lower than one published report.<sup>[16]</sup> The survey was distributed to them to explore the perception of CPR codes and if any obstacles prevent or delay CPR service in pharmacy practice.

The findings showed that the average pharmacist perception score was high, similar to the earlier report.<sup>[18]</sup> That reflected most of the statements mentioned in the survey agreed with the pharmacist's positive perception. Most pharmacists believe that the pharmacist's participation in the CPR code led to positive patient changes. The pharmacist found good support and promotion to fully involve pharmacists in CPR code services, similar to the previous report.<sup>[16]</sup> That is a remarkable parameter which is very easy to start and implement CPR code services with full functionality. However, the score is high and a little bit lower than the high score but still considered high with the policy and procedures of CPR code services and the activities under pharmacist working, which beneficial perception in practice. Moreover, the pharmacist believes that participation in the CPR code can reduce medication errors, help the healthcare staff, provide enough CPR medications, and avoid unnecessary costs associated with the healthcare system. Those are benefits of pharmacists involved in the CPR code services. Thus, there is no previous investigation to compare with the current findings

Various demographic factors might affect the pharmacist's perception of the pharmacy's CPR code services. In some locations, working sites where the pharmacist has not commonly participated in the CPR had low perception, which was expected because they experienced CPR codes services and the benefits. The female had a perception because therapy does not commonly participate in the CPR code at most healthcare organizations. Besides, the old generation of pharmacists had the lowest perception because they were not widely shared in the CPR codes and the low academic qualifications. Unawareness of the presence of CPR services might have false positive results. In the contract, the participants in the CPR codes had the most inadequate perception

Table 5: Multiple regression of Factors with the Perception of CPR pharmacy services.

| Model   | R                 | R Square | F      | Sig.              | Unstandardized Coefficients |            | Standardized Coefficients |  | t      | Sig. | 95.0% Confidence Interval for B |             | Collinearity Statistics |       |
|---|-------------------|----------|--------|-------------------|-----------------------------|------------|---------------------------|--|--------|------|---------------------------------|-------------|-------------------------|-------|
|   |                   |          |        |                   | B                           | Std. Error | Beta                      |  |        |      | Lower Bound                     | Upper Bound | Tolerance               | VIF   |
| 1 (Constant)  | .787 <sup>b</sup> | .620     | 48.646 | .000 <sup>b</sup> | .608                        | .144       |                           |  | 4.232  | .000 | .325                            | .891        |                         |       |
| Location  |                   |          |        |                   | -.013                       | .020       | -.030                     |  | -.680  | .497 | -.052                           | .025        | .528                    | 1.895 |
| Site of work  |                   |          |        |                   | .041                        | .010       | .177                      |  | 4.010  | .000 | .021                            | .060        | .548                    | 1.825 |
| Age (years)   |                   |          |        |                   | .024                        | .040       | .031                      |  | .601   | .548 | -.054                           | .102        | .394                    | 2.540 |
| Pharmacist gender   |                   |          |        |                   | .068                        | .050       | .057                      |  | 1.364  | .173 | -.030                           | .165        | .605                    | 1.652 |
| Academic qualifications                                   |                   |          |        |                   | .017                        | .021       | .059                      |  | .838   | .402 | -.023                           | .058        | .214                    | 4.674 |
| Years of experience in a pharmacy career                  |                   |          |        |                   | -.025                       | .014       | -.059                     |  | -1.754 | .080 | -.052                           | .003        | .934                    | 1.071 |
| Presence of Adults CPR team at the institution            |                   |          |        |                   | -.522                       | .065       | -.491                     |  | -8.075 | .000 | -.650                           | -.395       | .287                    | 3.483 |
| Presence of the Neonates CPR team at the institution      |                   |          |        |                   | .206                        | .090       | .207                      |  | 2.285  | .023 | .029                            | .383        | .129                    | 7.733 |
| Participate of Adults CPR team at the institution         |                   |          |        |                   | .078                        | .074       | .082                      |  | 1.050  | .294 | -.068                           | .224        | .176                    | 5.674 |
| Participate in the Pediatrics CPR team at the institution |                   |          |        |                   | .560                        | .060       | .478                      |  | 9.391  | .000 | .443                            | .677        | .410                    | 2.442 |
| Participate in Neonates CPR team at the institution       |                   |          |        |                   | .291                        | .083       | .265                      |  | 3.508  | .001 | .128                            | .454        | .186                    | 5.384 |
|   |                   |          |        |                   | -.073                       | .067       | -.099                     |  | -1.079 | .281 | -.205                           | .060        | .126                    | 7.963 |

a. Dependent Variable: Perception of CPR pharmacy services, Predictors: (Constant), Location, Age (years), Pharmacist gender, Position Held, and Years of experience in a pharmacy career, Presence of Adults CPR team at the institution, presence of pediatrics CPR team at the institution, presence of neonatal CPR team at the institution, Pharmacist's participation in the Adult CPR team at the institution, Pharmacist's involvement in the pediatrics CPR team at the institution, and Pharmacist's participation in the neonatal CPR team at the institution

## Bootstrap for Coefficients

| Model   | B     | Bias  | Std. Error | Sig. (2-tailed) | Bootstrap <sup>a</sup>  |       |
|---|-------|-------|------------|-----------------|-------------------------|-------|
|   |       |       |            |                 | 95% Confidence Interval |       |
|   |       |       |            |                 | Lower                   | Upper |
| 1 (Constant)  | .608  | -.014 | .201       | .010            | .195                    | .984  |
| Location  | -.013 | -.001 | .035       | .684            | -.086                   | .053  |
| Site of work  | .041  | .002  | .021       | .054            | .001                    | .082  |
| Age (years)   | .024  | .001  | .063       | .697            | -.104                   | .156  |
| Pharmacist gender   | .068  | .010  | .064       | .302            | -.040                   | .204  |
| Academic qualifications                                   | .017  | .002  | .034       | .594            | -.047                   | .086  |
| Years of experience in a pharmacy career                  | -.025 | .001  | .013       | .065            | -.049                   | .000  |
| Presence of Adults CPR team at the institution            | -.522 | -.011 | .118       | .001            | -.769                   | -.283 |
| Presence of the Pediatrics CPR team at the institution    | .206  | .001  | .169       | .199            | -.154                   | .526  |
| Presence of the Neonates CPR team at the institution      | .078  | .002  | .136       | .556            | -.173                   | .354  |
| Participate of Adults CPR team at the institution         | .560  | .014  | .094       | .001            | .385                    | .768  |
| Participate in the Pediatrics CPR team at the institution | .291  | -.001 | .117       | .013            | .047                    | .506  |
| Participate in Neonates CPR team at the institution       | -.073 | -.013 | .094       | .435            | -.287                   | .083  |

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples



**Table 6: Multiple regression of Factors with the perception of the barriers Discourage or prevent shares in the CPR services.**

| Model   | R                 | R Square | F      | Sig.              | Unstandardized Coefficients |            | Standardized Coefficients |      | t      | Sig. | 95.0% Confidence Interval for B |             | Collinearity Statistics |       |
|---|-------------------|----------|--------|-------------------|-----------------------------|------------|---------------------------|------|--------|------|---------------------------------|-------------|-------------------------|-------|
|   |                   |          |        |                   | B                           | Std. Error | Beta                      | Beta |        |      | Lower Bound                     | Upper Bound | Tolerance               | VIF   |
|   |                   |          |        |                   |                             |            |                           |      |        |      |                                 |             |                         |       |
| 1 (Constant)  | .753 <sup>b</sup> | .566     | 38.866 | .000 <sup>b</sup> | -.065                       | .193       |                           |      | -.335  | .738 | -.445                           | .316        |                         |       |
| Location  |                   |          |        |                   | .187                        | .027       | .337                      |      | 7.054  | .000 | .135                            | .240        | .531                    | 1.883 |
| Site of work  |                   |          |        |                   | .000                        | .014       | -.001                     |      | -.016  | .987 | -.027                           | .026        | .549                    | 1.823 |
| Age (years)   |                   |          |        |                   | .190                        | .053       | .198                      |      | 3.573  | .000 | .086                            | .295        | .396                    | 2.526 |
| Pharmacist gender   |                   |          |        |                   | -.371                       | .068       | -.249                     |      | -5.473 | .000 | -.504                           | -.238       | .588                    | 1.702 |
| Academic qualifications                                   |                   |          |        |                   | -.005                       | .028       | -.013                     |      | -.169  | .866 | -.060                           | .050        | .212                    | 4.715 |
| Years of experience in a pharmacy career                  |                   |          |        |                   | -.004                       | .019       | -.008                     |      | -.212  | .832 | -.041                           | .033        | .933                    | 1.072 |
| Presence of Adults CPR team at the institution            |                   |          |        |                   | .123                        | .089       | .092                      |      | 1.383  | .167 | -.052                           | .297        | .276                    | 3.629 |
| Presence of the Pediatrics CPR team at the institution    |                   |          |        |                   | -.063                       | .125       | -.050                     |      | -.508  | .612 | -.308                           | .182        | .124                    | 8.063 |
| Presence of the Neonates CPR team at the institution      |                   |          |        |                   | .539                        | .100       | .446                      |      | 5.406  | .000 | .343                            | .735        | .178                    | 5.616 |
| Participate of Adults CPR team at the institution         |                   |          |        |                   | .099                        | .084       | .068                      |      | 1.176  | .240 | -.067                           | .265        | .369                    | 2.713 |
| Participate in the Pediatrics CPR team at the institution |                   |          |        |                   | .367                        | .114       | .263                      |      | 3.216  | .001 | .143                            | .592        | .181                    | 5.514 |
| Participate in Neonates CPR team at the institution       |                   |          |        |                   | .118                        | .090       | .128                      |      | 1.306  | .193 | -.060                           | .295        | .127                    | 7.898 |

a. Dependent Variable: perception of the barriers Discourage or prevent shares in the CPR services, Predictors: (Constant), Location, Age (years), Pharmacist gender, Position Held, and Years of experience in a pharmacy career, Presence of Adults CPR team at the institution, presence of pediatrics CPR team at the institution, presence of neonatal CPR team at the institution, Pharmacist's participation in the Adult CPR team at the institution, Pharmacist's involvement in the pediatrics CPR team at the institution, and Pharmacist's participation in the neonatal CPR team at the institution

**Bootstrap for Coefficients**

| Model   | B     | Bias  | Std. Error | Sig. (2-tailed) | Bootstrap <sup>a</sup> 95% Confidence Interval |       |
|---|-------|-------|------------|-----------------|--|-------|
|   |       |       |            |                 | Lower  | Upper |
|   |       |       |            |                 |  |       |
| 1 (Constant)  | -.065 | .013  | .234       | .800            | -.502  | .395  |
| Location  | .187  | -.001 | .046       | .001            | .088   | .274  |
| Site of work  | .000  | .001  | .022       | .995            | -.042  | .042  |
| Age (years)   | .190  | -.007 | .083       | .022            | .008   | .344  |
| Pharmacist gender   | -.371 | -.025 | .103       | .001            | -.621  | -.213 |
| Academic qualifications                                   | -.005 | -.001 | .054       | .921            | -.106  | .098  |
| Years of experience in a pharmacy career                  | -.004 | .000  | .016       | .804            | -.034  | .028  |
| Presence of Adults CPR team at the institution            | .123  | .010  | .158       | .404            | -.162  | .471  |
| Presence of the Pediatrics CPR team at the institution    | -.063 | .014  | .198       | .744            | -.408  | .376  |
| Presence of the Neonates CPR team at the institution      | .539  | -.005 | .160       | .001            | .200   | .844  |
| Participate of Adults CPR team at the institution         | .099  | -.024 | .153       | .528            | -.245  | .351  |
| Participate in the Pediatrics CPR team at the institution | .367  | .027  | .205       | .071            | .023   | .808  |
| Participate in Neonates CPR team at the institution       | .118  | .000  | .139       | .398            | -.153  | .394  |

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples



for unknown reasons and gave false positive attitudes. The most dependable factors affecting the perception were sharing in the adults and pediatrics CPR codes that might be due to more practice and more education and training at both services, similar to previous studies.<sup>[16]</sup> In contrast, the knowledge of presenting adult's CPR codes had negative perceptions. That might be related to being unaware of the services or the pharmacists were not involved with them.

The findings also showed that pharmacist believes in the majority of barriers mentioned in the survey with high scores. The biggest obstacles were the pharmacist's competency in the CPR code and a staff shortage similar to the previous report.<sup>[15,18]</sup> Those significant barriers can prevent the Pharmacist participated in the CPR code. That's expected; the pharmacist needs education and training to share in the codes, and the pharmacy services need enough staff to cover all services during the emergency codes. Besides, the pharmacist's fear of liability for any mistakes occurs because of the low background of CPR codes. That's expected because a lack of full competency will lead to participation anxiety. The pharmacist disagrees that CPR code facilities did not exist or lacked administration support. That means the Healthcare setting is to start and shred in the CPR codes. Moreover, the pharmacist believes that sometimes there was lacking time or unawareness to participate in the code, it is extra work, and there is no connivance to discuss with physicians in the CPR code. All those properly prevent or delay the pharmacist shares in the CPR code services.

Several factors might affect the perception of barriers preventing pharmacist participants in the CPR code services. The low perception was from locations and working sites which properly was not implemented the CPR codes, and there are not entirely familiar with barriers. The old generation of pharmacists had a high perception of obstacles to excuse them from not participating in the codes because most of them were unaware of CPR skills. The academic qualifications had low perception because there is no sharing in the CPR codes because they are new with low competency and little clinical knowledge in this matter. The non-competency had high percentages of barriers related to their not being aware of the services and related obstacles. The pharmacist patriating in the codes had a low perception of barriers because they might enjoy sharing with CPR codes and saving patients' lives. The most dependable factors that might affect the barrier perception were location and age, with a high perception of barriers. Because both of them mainly did not participate in the CPR code and

dramatically mentioned high walls to defend or not participate with CPR codes services. Thus, there is no previous investigation to compare with the current findings

### Limitations

The current cross-sectional study demonstrated the perception and attitude of pharmacists toward CPR pharmacy services. Besides, the barriers prevent the pharmacist from participating in the CPR code as emergency services. Again, it had high-reliability results with a suitable sample size. However, it had several limitations, such as the results expressed perception and attitude during a temporary cross-examination period, and sampling techniques were non-randomized. In addition, it included various demographic characteristics and was not representative of all types of pharmacist's cultures. Therefore, further periodic research with randomized sampling methods is highly suggested to overcome all limitations of the current study.

### CONCLUSION

The pharmacist had positive attitudes towards the CPR pharmacy services, emphasized that the pharmacist be promoted by hospitals to involve in the emergency services, including CPR services, and the pharmacist had positive changes when participating during CPR codes. However, CPR pharmacy services need in-depth policies and procedures with clarification of the role of the pharmacist. The most significant barriers that prevent pharmacist participation in CPR are pharmacist competency in CPR and background of clinical knowledge, and pharmacy staff shortage. Besides fear and legal liability, despite the existence of CPR teams and administrative support. Therefore, basic and advanced education, training, and continuous improvement of CPR pharmacy services will encourage all pharmacy staff to participate in the CPR services, improve patients' clinical outcomes, and reduce economic burden on the healthcare system in pharmacy practice.

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### CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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### Consent for Publications

Informed consent was obtained from all the participants

### Ethical Approval

This research was exempted from research and ethical committee or an institutional review board (IRB) approval.

<https://www.hhs.gov/ohrp/regulations-and-policy/decision-charts-2018/index.html>

### ABBREVIATIONS

**IV:** Intravenous; **ADR:** Adverse Drug Reaction; **MOH:** Ministry of Health; **KSA:** Kingdom of Saudi Arabia; **MOH:** Ministry of Health; **IV:** Intravenous; **ADR:** Adverse Drug Reaction; **CBAHI:** Saudi Central Board for Accreditation of Healthcare Institutions; **BLS:** Basic Life Support; **ACLS:** Advance Cardiac Life Support; **PCLS:** Pediatric Cardiac Life Support; **NCLS:** Neonatal Cardiac Life Support; **CPR:** Cardiopulmonary Resuscitation; **SPSS:** Statistical Package of Social Sciences; **JASP:** Jeffery's Amazing Statistics Program; **STROBE:** Strengthening the reporting of observational studies in epidemiology statement; **VIF:** Variance Inflation Factor; **AHA:** American Heart Association.

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