Factors affecting primary health-care physicians’ emergency-related practice; Eastern Province, KSA

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ABSTRACT

Background: Being the first in-line care providers, primary health-care (PHC) physicians may encounter all forms of emergencies, ranging from minor complaints to life-threatening events. This wide variation of cases challenges the physicians to be competent in emergency medicine. Informative literature describing and assessing the factors affecting PHC physicians' emergency medical services (EMS)-related practice is deficient (nationally and internationally). The aim of this study is to assess PHC physicians’ practice related to EMS, the factors affecting it, as well as their learning needs and preferred methods of continuous training in emergency medicine. Methods: All physicians working in the selected centers were invited to complete a self-administered questionnaire addressing their EMS-related practice. Moreover, physicians were invited to participate in face-to-face semi-structured interviews and focus group discussions. Results: The study revealed that 87.3% of physicians had a good diagnostic knowledge score while only 47.6% had a good management score. Nonetheless, 63.5% of physicians had a neutral attitude toward EMS. The most common reported emergencies encountered were bronchial asthma (86.51%), cut wounds (83.33%), and burns (76.19%). About 62% of participants reported that their greatest needs for further training were in cardiovascular and central nervous system emergency management, preferably by practical training in hospital emergency department (80%). Conclusions: Dammam PHC physicians have a good knowledge, neutral attitude, and fair practice concerning the emergency cases encountered. The majority of physicians reported their need for further hands-on training in emergency medicine. Settings and Design: A cross-sectional, mixed methods study was conducted in 13 out of 26 PHC centers of Dammam, Saudi Arabia.

Keywords: Emergency medical services, emergency medicine, physicians, primary health care, qualitative methods

Introduction

Primary health care (PHC) was defined by the World Health Organization in 1978 as an essential health care based on practical, scientifically sound, and socially acceptable methods and technology made universally accessible to all individuals and families in the community.[1] In accordance with the Alma-Ata declaration,[1] the need of PHC development was recognized by health-care authorities in the Kingdom of Saudi Arabia (KSA).[2,3]

As communities continue to grow and age, increasing demand for acute medical services is required in response to life-threatening emergencies, acute exacerbation of chronic diseases, and numerous ordinary health problems that nevertheless necessitate rapid action.[4] Emergency medical services (EMS) must be integrated with primary care and public health measures to ensure the presence of strong comprehensive health systems.[4-8]

Being the first in-line care providers, PHC physicians may encounter all forms of medical emergencies, ranging from minor complaints to major life-threatening events.[4-9] This wide variation of encountered emergency cases poses a challenge for physicians to be properly updated and competent in emergency
Up to the authors’ current knowledge, there is only one published study regarding the EMS in PHC centers in KSA, done in 2003, on all PHC centers in Asir, Southern KSA. It showed that most PHC physicians had practiced in wound (95.7%) and burn (93.6%) management. Almost 80% of physicians in Asir study believed that EMS was an essential component of PHC and felt confident to deal with emergency cases at PHC level.[17] However, few international studies were done in Sri Lanka, Turkey, France, Asia, and the United States, and these revealed that PHC physicians’ knowledge and attitude were not satisfactory, and their skill level in dealing with emergencies in PHC setting was extremely poor.[11–13]

Regarding the need for continuous medical education (CME) among PHC physicians, both national[7,16,17] and international[18–21] studies revealed that training in emergency medicine was one of the highest in-demand CME courses. The PHC physicians’ preferred methods for receiving CME training vary between practical training,[7] clinical round,[7,17] specialist consultation,[7,18] video conferencing,[14] seminars,[19] interactive workshops,[20,21] and e-learning methods.[21]

A methodological evaluation of factors affecting PHC physicians’ ability to effectively and efficiently handle emergency cases at the PHC level has not been previously performed in Dammam city, Eastern Province, KSA.

The current study aims to objectively and systematically assess PHC physicians’ practice as related to EMS, the factors affecting clinical practice, physicians’ learning needs, and preferred methods of training in emergency medicine. This would highlight the areas of strengths and weaknesses and provide a solid background for future improvement of the current EMS at PHC centers.

Subjects and Methods

A cross-sectional observational study with mixed (quantitative and qualitative) methods was carried out in the Ministry of Health (MOH) PHC centers in Dammam, Eastern Province, KSA, during the period of September 2014 to January 2015.

Dammam is the largest city and the capital of the Eastern Province of KSA and the most oil-rich region in the world.[22,23] It is located on the coast of the Arabian Gulf at about 400-kilometer east of Saudi Arabia’s Capital city of Riyadh, covering an area of more than 800 km² with a population of 949,939.[22–24] PHC services in Dammam are delivered through a widespread network of 26 PHC centers providing services to nearly 843,580 people.[24]

Thirteen out of all 26 PHC centers in Dammam were selected by systematic sampling technique as follows: all 26 centers were ordered in a descending manner depending on their catchment population. Then, all centers corresponding to the odd follow-order numbers in this list (1, 3, 5, etc…) were selected [Appendix 1].[25] Subsequently, all physicians working in these selected centers, who directly involved in the management of emergency cases, were invited to participate in this study. Of these, consenting physicians were asked to complete a self-administered questionnaire with the aim of assessing their KAP concerning the emergency cases encountered during their practice, their perceived CME need, and preferred methods of training. Physicians working in administrative jobs and not directly involved in patient care, dentists, and medical interns were excluded from this study.

The research ethical approval was obtained from the Research Committee of the Saudi Board of Family Medicine and Saudi MOH and the medical directors of all participating PHC centers before the start of data collection [Appendix 2]. The participation in the study was completely voluntary, and the confidentiality of the collected information was assured. The purpose of the study was explained to all participants and they were asked to provide “verbal” informed consent before the start of data collection.

Physicians’ questionnaire was constructed through the integration of previously validated questionnaires used in a national published study[7] and data from a nonpublished local study. This questionnaire was piloted on 10 PHC physicians (equivalent to 10% of the study sample) working in 3 PHC centers different from those included in this study, 1 month before the start of data collection. This ensured that the questionnaire was understandable and acceptable to the proposed study population and to determine the time needed to complete it. The final questionnaire used here consisted of a total of 22 items divided into 3 sections, namely, participants’ demographic data, KAP questions, and training need assessment [Appendix 3].

The researcher themselves collected and analyzed the data. All collected information was screened for completion of information before analysis; one questionnaire was discarded because of missing data. The remaining questionnaires were entered, managed, coded, and analyzed using SPSS stands for statistical package for social sciences (released 2007,SPSS for windows, version 16.0. Chicago, SPSS Inc).

P < 0.05 was considered statistically significant. The descriptive analysis of all the variables was expressed as mean, standard deviation, or median if not normally distributed.

The total physicians’ knowledge score was expressed using summation of knowing how to diagnose and knowing how to manage questions, and then, a Likert scale of 3 scales was used. Scores of <50%, 50%–85%, and >85%–100% was considered as poor, fair, and good levels of knowledge, respectively.

The physicians’ attitude was assessed through 7 statements, each one has a Likert scale of 5 (1 = strongly disagree; 2 = disagree;
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A Likert scale of 3 was developed for each statement after summation of the physicians’ answer; scores of <50%, 50%–85%, and >85%–100% were considered negative, neutral, and positive attitude, respectively. The overall attitude of each physician was handled in the same manner.

In the qualitative study, PHC physicians were invited to participate in face-to-face semi‑structured interviews and focus group discussions from 7 out of 13 centers. The interviews were conducted after taking participants’ permission and completion of the questionnaire. Field notes were recorded by the researchers during the interviews.

The authors generated a conceptual framework by which the data were labeled and sorted. This process involved identifying the recurring themes of the interviewee and group discussion. Subsequently, a list of main themes and subthemes was applied systematically to the whole dataset.

Results

Based on the figures documented in the Saudi MOH statistical system, a total of 70 physicians were expected to be encountered in the targeted centers. However, only 65 physicians were found; the remaining 5 physicians were on study leave due to engagement in training elsewhere. All 65 physicians were invited to participate in the study, 64 gave consent to participate and 1 apologized due to being too busy, yielding a response rate of 99%.

The participants’ ages ranged between 26 and 57 years with a median of 30 years. Female physicians constitute 71.4% (n = 45) of the total sample with a female-to-male ratio of 2.5:1. Almost all participants, i.e., 61 (96.8%) were able to communicate with patients in Arabic language, 50 (79.4%) were Saudis, 48 (76.2%) have an MBBS degree, and 34 (54%) graduated from the local Imam Abdulrahman Bin Faisal University (IAU).

Their overall clinical experience ranged from 3 months to 35 years, with a median of 4 years. Their experience in PHC practice ranged between 2 weeks and 26 years with a median of 2.5 years. A total of 27 (42.9%) physicians have had previous experience in emergency medicine, ranging between 1 and 36 months with a median of 3.5 months.

The PHC emergency cases encountered were mapped using a bar chart and demonstrated that bronchial asthma, cut wounds, burns, acute abdomen, and palpitations represent the most common emergency cases encountered [Figure 1 and Appendix 4].

The total knowledge score, an objective measure of knowledge about how to diagnose and manage emergency cases, demonstrated that 42 (66.6%) physicians had a good total knowledge score while 21 (33.3%) physicians had a fair total knowledge score [Table 1 and Appendix 5].

There was a strong and significant positive correlation (r ≥ 0.6, P <.01) between the encountered emergency cases and the actually managed cases for shock, anaphylactic reaction, burns, and corneal abrasion. Contrariwise, the correlation was weak (r ≤ 0.39) for chest pain, palpitation, epilepsy, dislocation, hyperglycemic emergency, cardiac arrest, and per vaginal (PV) bleeding. For fractures, the correlation was very weak (r ≤ 0.19)

Figure 1: Bar chart demonstrating the most common emergency cases encountered in primary health care centers
between the encountered cases and the actually managed ones \( r = 0.185 \) [Appendix 6].

The total number of actually managed cases had a very strong correlation with the physicians’ highest qualification \( r = 0.813 \), a weak correlation with the physicians’ age \( r = 0.328 \), and overall experience since graduation \( r = 0.394 \). However, years of experience working in PHC centers and duration of work in hospital emergency room (ER) had no correlation to the total number of actually managed cases [Table 2].

The study showed that those physicians with a higher knowledge score had actually managed more cases at their PHC centers than those with a lower knowledge score \( P = 0.005 \). Furthermore, none of these specific physicians’ characteristics (age, overall experience since graduation, years of experience in PHC centers, and duration of work in hospital ER) were found to be correlated with the physicians’ total knowledge score.

When probed about their attitudes toward the concept of providing EMS at their centers, 40 (63.49%) physicians had a neutral attitude, 21 (33.33%) had a negative attitude, and only 2 (3.17%) had a positive attitude toward managing emergency cases at their PHC centers [Table 3].

Regarding the CME need, almost 50%–70% of the participants admitted a need for further training in one or more of the major and common emergencies. For example, management of hypertensive emergencies was recognized as an educational need by 42 (67%) of the physicians followed by management of central nervous system (CNS) emergencies 39 (62%), coronary artery disease emergencies 36 (57%), diabetic ketoacidosis/hypoglycemic emergencies 35 (56%), anaphylactic reactions 34 (54%), cardiopulmonary resuscitation, and wound care/trauma both training needs expressed by 31 (50%) of physicians [Table 4].

The most preferred training methods in emergency medicine were hospital training in ER \( 79.37\% \) followed by practical training through a qualified trainer at the respective PHC centers \( 68.25\% \). The least preferred methods were lectures \( 49.2\% \) and printed materials \( 28.57\% \).

PHC physicians were invited to participate, in the interviews for the qualitative part of this study, until data saturation was apparent. In total, 14 physicians from 7 different centers were interviewed. Eight of them were interviewed individually in face-to-face semi-structured interviews while the remaining 6 were interviewed in 2 focus group discussions each contains 3 physicians. All participants were Saudi, 3 male and 11 female physicians. Field notes were noted down by the authors. Each interview lasted between 15 and 20 min.

When interviewees were asked in-depth about the status of EMS in their PHC centers, their role in this vital service, and the factors that affect their KAP in emergencies, most interviewees believed
that PHC EMS is not functioning well, and they attributed this to many structural as well as workforce-related factors [Table 5].

**Discussion**

Most of the sampled physicians, who provide PHC services in Dammam, KSA, were Saudi (79.4%), female (71.4%) and aged between 26 and 57 years. More than half of them are graduates of the IAU who have no further postgraduate qualifications (76.2%). Moreover, almost half of the participants have previously worked in hospital ER for an average duration of 1 year.

**Most common medical emergency encountered**

Dealing with critical patients necessitates proper preparation which requires knowing the spectrum of anticipated medical emergencies in that specific practice's catchment population; for example, a practice with many epileptic patients must be more prepared to manage epileptic seizures.[27,28] This study shows that, in Dammam area, bronchial asthma, cut wounds, burns, acute abdomen, and palpitation represent the most common cases encountered. However, in 2007, the American Academy of Family Physicians reviewed many articles and reported that asthma, anaphylaxis, shock, seizures, and cardiac arrest are the most common adult and childhood emergencies encountered in PHC setting which apart from bronchial asthma is much different than the commonly described cases in our study.[27-34] This demonstrates the wide variety of emergency cases encountered in different communities where demographic, cultural, and geographic factors play an important role.

Almost all types of medical emergencies encountered are actually managed in the respective PHC centers apart from PV bleeding, cardiac arrest, and fractures which were managed less frequently compared to their encounters rate. This can be partially explained by the fact that dealing with such cases necessitates the presence of special requirements. For instance, PV bleeding cases require the presence of well-trained physicians, and functioning ultrasound, this point has been emphasized on by a number of interviewed physicians “…we have US in our center, but no one is trained to used it in emergencies, it is used only for regular antenatal-care follow-up…” interviewee #1. Cardiac arrest cases require the presence of essential equipment such as crash cart, ECG machine, monitor, defibrillator, pulse oximetry, intubation equipment, and resuscitation drugs.[6] As for fractures, many prerequisites are needed, for example, X-ray machine, cast, splint, and trained personnel. The equipment shortage was further explained by a number of interviewees “…once we had a staff nurse collapsed in the center, with previous history of cancer and pulmonary-embolism, she was hardly breathing, we didn’t have pulse-oximetry, portable oxygen-cylinder, ECG-machine nor X-ray facility, we felt helpless…” interviewee #6.

| **Table 5: Opinion of primary health-care physicians regarding the status of and factors affecting primary health-care emergency services** |
| **Theme** | **Supporting quotes** |
| Factors related to knowledge | The need for continuous medical education in emergency medicine |
| | “…I need more training in managing emergency cases…” interviewee #4 |
| | “…although we have 14 days a year for educational purposes, we cannot use them for such purpose because of shortage of staff…” interviewee #1 |
| | “…we need lectures in dealing with emergency cases but of course lectures alone are not beneficial…practical training is a must.” interviewee #7 |
| Factors related to clinical practice | Human factors |
| | Patient crowdedness and shortage of health-care staff |
| | “…it is not feasible for me to spend long time in treating one emergency case while a queue of other patients are waiting for me to attend to them too.” interviewee #12 |
| | “…we need more staff number in order to deal with emergency cases…” interviewee #3 |
| | “…I know how to manage myocardial infarction theoretically but in real life I am not sure if I can handle such a case…” interviewee #7 |
| | Lack of experience |
| | “…first of all, in order to deal with emergency cases, emergency tools and equipment need to be available, followed by staff training…” interviewees #7, 14 |
| | “…I will never suture my patients with old rusty tools…in such a situation ER referral is a better option…” interviewee #12 |
| | Nonhuman factors |
| | Lack of patient privacy |
| | “…there is no regard for patient privacy…in our clinics, 3 to 4 physicians share the same room with one examination bed without a partition.” interviewee #2 |
| | “…we need more training in managing emergency cases…” interviewee #4 |
| | “…I need more training in managing emergency cases…” interviewee #4 |
| | Lack of emergency equipment |
| | “…it is not feasible for me to spend long time in treating one emergency case while a queue of other patients are waiting for me to attend to them too.” interviewee #12 |
| | “…we need more staff number in order to deal with emergency cases…” interviewee #3 |
| | “…I know how to manage myocardial infarction theoretically but in real life I am not sure if I can handle such a case…” interviewee #7 |
| | Suitability of the tool |
| | Inadequate supporting equipment (X-ray, US, laboratory screening, ambulance car) |
| | “…we immediately refer suspicious cases to the hospital because we do not have lab facilities which provide immediate and rapid results…” interviewee #9 |
| | “…in our center we do not have an ambulance car…sometimes we ask patients with suspicious cardiac chest pain to go by their own car to the hospital ER to save time rather than waiting for the ambulance…which is unacceptable…” interviewee #11 |
| | “…we have US in our center, but no one is trained to used it in emergencies… it is used only for regular antenatal care follow up.” interviewee #1 |

Contd...
The current study demonstrated a role of PHC physicians in dealing with emergency cases. Data regarding PHC physicians’ KAP in dealing with emergency cases are deficient both nationally and internationally. However, one study performed in Asir, KSA, reported that most PHC physicians had practiced in wound (95.7%) and burn (93.6%) management. These findings were similar to the physicians’ practices in this study where bronchial asthma (78.6%), burns (65.9%), and cut wound (64.3%) management were commonly practiced.

When assessing the attitude of PHC physician toward the role of PHC centers in providing EMS, an obvious discordance and disparity were revealed. Whereas 86% of participants admit that EMS is an essential component of PHC services: “…EMS is an extremely important part of a PHC center…” interviewee 10, almost half of them still consider the current PHC setting neither ready (42.22%) nor supportive (45.39%) to deal with emergency cases. This attitude can be partially attributed to the current deficiencies in the infrastructure and supporting facilities of PHC centers as has been stated by many interviewees “…we should have a purpose-built building, higher number of health-care staff and well-trained qualified nurses in order to manage emergency-cases and decrease the load on the hospital-ER…” interviewee #5.

These findings are similar to Asir-study findings were majority of the physicians (78.2%) believed that EMS are essential components of PHC and 80% of them felt that Talley are competent to deal with emergency-cases at PHC-level.

Primary health-care physicians’ continuous medical education needs in emergency medicine

As in previous studies, the current study demonstrated a role for CME programs targeting emergency medicine (particularly in the management of CVS and CNS emergencies) taking into considerations PHC physicians’ needs, workplace setting, and circumstances. In addition, as emergency medicine is a life-saving specialty, higher authority must establish clear systematic policies to ensure training of PHC physicians in emergency medicine, especially since physicians have no incentives to attend such educational activities. This point was repeatedly mentioned and emphasized by many of our participants: “…the national health-care authorities should assign one qualified-nurse and give her training in emergency-care so she/he can train the staff in the center…” interviewee #14.

Although 42.9% of sampled physicians have previous practical experience in managing medical emergencies nevertheless, a strong perceived need for further hands-on training in emergency medicine was expressed by all physicians in this study, preferably through clinical rotations in a hospital ER: “…we need lectures in dealing with emergency-cases but of-course lectures alone is not beneficial, practical training is a
must..” interviewee #7. However, in contrast to this declared preference by the study participants, our objective assessments reveal an interesting fact: The proportion of actually managed emergency cases was found to be significantly higher in physicians with more experience in a PHC setting when compared to those with a previous experience in hospital ER. This is also reflected by the authors’ personal practical clinical experience in different local PHC settings, where each setting has its own dynamics that independently impact the quality of services provided there.

Of special importance here is our finding that although medical emergencies such as hypertensive emergencies, wound care, and bronchial asthma exacerbations were frequently encountered by sampled PHC physicians, constituting 70%–85% of the cases, still more than 50% of participants admitted a need for further hands-on training in the management of these common medical emergencies. This finding is further emphasized by the fact that only 47.6% of our participants had a good management score and almost half of them had an unfavorable attitude toward managing emergency cases at their respective PHC centers, as discussed above.

**Limitation of our study**

Although 20.6% of our participants were non-Saudi, all physicians who took part in our qualitative study interviews were Saudi by random chance. The reason was that, for the purposes of acquiring representative information for the qualitative study, we targeted the larger PHC centers in our study sample, where the chance of encountering ER cases is higher due to a greater patient volume. However, as it turned out, most of the non-Saudi participating physicians were working in the smaller PHC centers of our sampled PHC centers.

**Strength of our study**

This is the first study done in Dammam city, the capital of Eastern Providence of Saudi Arabia, the most oil-rich region in the world, and the fifth largest city in KSA in its population size and health infrastructure. Moreover, it is an important study since it provides information regarding PHC physician KAP in emergency medicine through both quantitative and qualitative methods expressing the reality of the current situation of PHC emergency services and its vital role on the reduction of future mortality and disability.

**Conclusions**

Dammam PHC physicians have a good knowledge, neutral attitude, and fair practice concerning the emergency cases encountered in PHC setting. All physicians reported the need for CME in emergency medicine preferably by practical training.

We recommend that all PHC physicians should be certified in BLS and preferably ACLS and ATLS. In addition, to provide PHC physicians CME training in Emergency-medicine that is focused on practical rather than theoretical methods.

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**Conflicts of interest**

There are no conflicts of interest.

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Appendices

Appendix 1: Primary health care centers in Dammam

| Sample + 10% | Sample | Total | Population | Physicians, n | PHC name |
|--------------|--------|-------|------------|---------------|----------|
|              |        |       |            |               |          |
|              | 133    | 121   | 74,778     | 107           | 74,671   | Bader    |
| 72           | 66     | 40,641| 9,433      | 51            | 31,208   | Jalawiah |
| 34           | 31     | 19,283| 146        | 19,137        | 16,949   | Mubarakiah |
| 30           | 27     | 17,000| 51         | 12,304        | 3        | Qadisiah |
| 26           | 23     | 14,427| 185        | 14,242        | 6        | Rawdhah |
| 23           | 21     | 12,739| 145        | 12,594        | 5        | Anood |
| 21           | 19     | 11,755| 936        | 10,819        | 4        | Budaie |
| 20           | 18     | 11,116| 69         | 11,047        | 4        | Eskan |
| 18           | 16     | 10,151| 3505       | 6646          | 5        | Mohamadiah |
| 16           | 15     | 9,103 | 55         | 9048          | 8        | Manar |
| 12           | 11     | 6,888 | 90         | 6798          | 3        | Etsalat |
| 11           | 10     | 6,215 | 47         | 6168          | 3        | Faisalah |
| 8            | 7      | 4,306 | 271        | 4035          | 6        | Bin Khaldoon |
| 425          | 385    | 238,402|          | 70            |          | Total |

Appendix 2: Primary health-care physicians’ questionnaire

This questionnaire aims at assessing the human resources of PHC centers for emergency care.

Your individual privacy and confidentiality of the information provided will be maintained throughout the study.

If you agree to participate in the study, please fill in the following questionnaire, it should take only few minutes.

If you have any questions, please contact any one of the researchers.

Your participation is highly encouraged and appreciated, thank you for your time.

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1. Sex? [ ] Male (1) [ ] Female (2)
2. Age? ________ Years old.
3. Last medical degree?
   [ ] MBBS (1)
   [ ] Family medicine diploma (2)
   [ ] Saudi board degree in family medicine (3)
   [ ] Master degree (4)
   [ ] Others (5) please specify
4. Place of graduation?
   - University of Dammam (1)
   - Other governmental Saudi medical college (2)
   - Other private Saudi medical college (3)
   - International (Non-Saudi) medical college (4)

5. Years of experience as a physician since graduation? _____
6. Years of experience in primary health care in Saudi Arabia? _____
7. Did you work in hospital emergency department? _____
   - Yes (1), for how long _____
   - No (2) _____
8. Are you able to communicate with patients in Arabic language?
   - Yes (1)
   - No (2)
   - Sometimes (3)
9. What is your nationality?
   - Saudi (1)
   - Non-Saudi (2)
   - please specify……….

| Diagnosis                                      | 9. You have encountered in your practice | 10. You know how to diagnose | 11. You know how to manage | 12. You have actually managed in your PHC |
|-----------------------------------------------|-----------------------------------------|-----------------------------|----------------------------|-----------------------------------------|
|                                               | Often (1) Rarely (2) Never (3)           | Yes (1) No (2)              | Yes (1) No (2)             | Most of the time (1) Sometimes (2) Never (3) |
| 1. Epilepsy                                   |                                         |                             |                            |                                         |
| 2. Acute stroke                               |                                         |                             |                            |                                         |
| 3. Abrasion of the cornea                     |                                         |                             |                            |                                         |
| 4. Foreign body in the eye                    |                                         |                             |                            |                                         |
| 5. F. body in ENT                             |                                         |                             |                            |                                         |
| 6. Epistaxis                                  |                                         |                             |                            |                                         |
| 7. Fracture                                   |                                         |                             |                            |                                         |
| 8. Dislocation                                |                                         |                             |                            |                                         |
| 9. Cut wound                                  |                                         |                             |                            |                                         |
| 10. Anaphylactic reaction                     |                                         |                             |                            |                                         |
| 11. Cardiac arrest                            |                                         |                             |                            |                                         |
| 12. Hypertension emergencies                  |                                         |                             |                            |                                         |
| 13. Shock                                     |                                         |                             |                            |                                         |
| 14. Acute dyspnea                             |                                         |                             |                            |                                         |
| 15. Chest pain                                |                                         |                             |                            |                                         |
| 16. Palpitation                               |                                         |                             |                            |                                         |
| 17. Acute bronchial asthma                    |                                         |                             |                            |                                         |
| 18. Acute hemolysis                           |                                         |                             |                            |                                         |
| 19. SCD crisis                                |                                         |                             |                            |                                         |
| 20. GIT bleeding                              |                                         |                             |                            |                                         |
| 21. Acute abdomen                             |                                         |                             |                            |                                         |
| 22. Hypoglycemia                              |                                         |                             |                            |                                         |
| 23. Hyperglycemic emergencies                 |                                         |                             |                            |                                         |
| 24. Renal colic                               |                                         |                             |                            |                                         |
| 25. Acute urine retention                     |                                         |                             |                            |                                         |
| 26. PV bleeding                               |                                         |                             |                            |                                         |
| 27. Abdominal pain in pregnancy               |                                         |                             |                            |                                         |
| 28. Burns                                     |                                         |                             |                            |                                         |
| 29. Chemical accident                         |                                         |                             |                            |                                         |
| 30. Animal bines and stings                   |                                         |                             |                            |                                         |

To what extent do you agree or disagree with the following statements:

Note: please tick one box for each statement,
1=Strongly disagree  2=Disagree  3=Not sure  4=Agree  5=strongly agree
Statement

|   | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 13. | Emergency services is an essential component of PHC centers |   |   |   |   |
| 14. | You are willing to treat emergency cases at your PHC center |   |   |   |   |
| 15. | You are confident to deal with emergency cases at your PHC level |   |   |   |   |
| 16. | Your PHC center is ready to deal with emergency cases |   |   |   |   |
| 17. | Your PHC center is capable to deal with emergency cases |   |   |   |   |
| 18. | Your PHC setting is supportive to deal with emergency cases |   |   |   |   |
| 19. | The overall emergency medical services in your PHC center are efficient |   |   |   |   |

20. Which of the following emergency medicine courses do you need to be trained in?
   Note: you can choose more than one choice

|   |   |   |   |   |
|---|---|---|---|---|
| Do not need any training (1) | Ophthalmological emergencies (7) |
| Central nervous system emergencies (2) | DKA/hypoglycemia (8) |
| Cardiopulmonary resuscitation (3) | Anaphylactic reactions (9) |
| Coronary artery disease emergencies (4) | Wound care/trauma (10) |
| Hypertension emergencies (5) | Obstetrics/gynecology emergencies (11) |
| Bronchial asthma exacerbations (6) | Others (12) please specify |

21. What is your preferred method for training in emergency medicine?
   Note: you can choose more than one choice

- Practical training in PHC center by a qualified staff (1)
- Hospital rotation training in emergency department (2)
- Printed materials (3)
- Lectures (4)
- I do not need any training in emergency medicine (5)

**Appendix 3: Approvals of ministry of health**
Appendix 4: Frequency of common emergency cases encountered in primary health-care centers

The frequency of common emergency cases encountered in PHC centers

| Cases encountered in PHC                              | n (%)          |
|--------------------------------------------------------|----------------|
| Acute bronchial asthma                                 | 109 (86.51)    |
| Cut wounds                                             | 105 (83.33)    |
| Burns                                                  | 96 (76.19)     |
| Acute abdomen                                          | 91 (72.22)     |
| Palpitation                                            | 90 (71.42)     |
| Hypertension emergencies                               | 85 (67.46)     |
| Animal bites and stings                                | 85 (67.46)     |
| Epistaxis                                              | 84 (66.67)     |
| Chest pain                                             | 84 (66.67)     |
| Renal colic                                            | 84 (66.67)     |
| Fracture                                               | 77 (61.11)     |
| Dyspnea                                                | 77 (61.11)     |
| Abdominal pain in pregnancy                            | 64 (50.79)     |
| FB in ENT                                              | 61 (42.06)     |
| Anaphylactic reaction                                  | 55 (42.06)     |
| Abrasion of the cornea                                 | 52 (41.27)     |
| SCD crisis                                             | 51 (40.47)     |
| FB in the eye                                           | 47 (38.41)     |
| Dislocation                                            | 47 (38.41)     |
| Epilepsy                                               | 40 (31.74)     |
| Chemical accident                                       | 40 (31.74)     |
| GIT bleeding                                           | 34 (26.98)     |
| Shock                                                  | 33 (26.19)     |
| Acute urine retention                                  | 33 (26.19)     |
### Appendix 5: Number of primary health-care physicians who know how to diagnose/manage emergency cases

| Emergency cases               | Knowing how to diagnose | Knowing how to manage |
|------------------------------|--------------------------|------------------------|
|                              | Yes, n (%) | No, n (%) | Yes, n (%) | No, n (%) |
| Epilepsy                     | 60 (95.2)  | 3 (4.8)   | 47 (74.6)  | 16 (25.4) |
| Acute stroke                 | 59 (93.7)  | 4 (4.8)   | 44 (69.8)  | 19 (30.2) |
| Abrasion of the cornea       | 52 (82.5)  | 5 (4.8)   | 48 (76.2)  | 15 (23.8) |
| Foreign body in the eye      | 58 (92.1)  | 4 (4.8)   | 40 (63.5)  | 23 (36.5) |
| E. body in ENT               | 59 (93.7)  | 7 (4.8)   | 48 (76.2)  | 15 (23.8) |
| Epistaxis                    | 63 (100)   | 8 (4.8)   | 60 (95.2)  | 3 (4.8)   |
| Fracture                     | 61 (96.8)  | 9 (4.8)   | 45 (71.4)  | 18 (28.6) |
| Dislocation                  | 53 (84.1)  | 10 (4.8)  | 38 (60.3)  | 25 (39.7) |
| Cut wound                    | 63 (100)   | 11 (4.8)  | 59 (93.7)  | 4 (6.3)   |
| Anaphylactic reaction        | 62 (98.4)  | 12 (4.8)  | 57 (90.5)  | 6 (9.5)   |
| Cardiac arrest               | 58 (92.1)  | 13 (4.8)  | 51 (81)    | 12 (19)   |
| Hypertension emergencies     | 62 (98.4)  | 14 (4.8)  | 57 (90.5)  | 6 (9.5)   |
| Shock                        | 55 (87.3)  | 15 (4.8)  | 47 (74.6)  | 16 (25.4) |
| Acute dyspnea                | 61 (96.8)  | 16 (4.8)  | 60 (95.2)  | 3 (4.8)   |
| Chest pain                   | 62 (98.4)  | 17 (4.8)  | 57 (90.5)  | 6 (9.5)   |
| Palpitation                  | 61 (96.8)  | 18 (4.8)  | 52 (82.5)  | 11 (17.5) |
| Acute bronchial asthma       | 62 (98.4)  | 19 (4.8)  | 59 (93.7)  | 4 (6.3)   |
| Acute hemolysis              | 54 (85.7)  | 20 (4.8)  | 44 (69.8)  | 19 (30.2) |
| SCD crisis                   | 61 (96.8)  | 21 (4.8)  | 59 (93.7)  | 4 (6.3)   |
| GIT bleeding                 | 59 (93.7)  | 22 (4.8)  | 42 (66.7)  | 21 (33.3) |
| Acute abdomen                | 61 (96.8)  | 23 (4.8)  | 60 (95.2)  | 3 (4.8)   |
| Hypoglycemia                 | 62 (98.4)  | 24 (4.8)  | 60 (95.2)  | 3 (4.8)   |
| Hyperglycemic emergencies    | 63 (100)   | 25 (4.8)  | 55 (87.3)  | 8 (12.7)  |
| Renal colic                  | 62 (98.4)  | 26 (4.8)  | 56 (88.9)  | 7 (11.1)  |
| Acute urine retention        | 53 (84.1)  | 27 (4.8)  | 44 (69.8)  | 19 (30.2) |
| PV bleeding                  | 58 (92.1)  | 28 (4.8)  | 41 (65.1)  | 22 (34.9) |
| Abdominal pain in pregnancy  | 55 (97.3)  | 29 (4.8)  | 47 (74.6)  | 16 (25.4) |
| Burns                        | 63 (100)   | 30 (4.8)  | 61 (96.8)  | 2 (3.2)   |
| Chemical accident            | 57 (90.5)  | 31 (4.8)  | 43 (68.3)  | 20 (31.7) |
| Animal bites and stings      | 60 (95.2)  | 32 (4.8)  | 57 (90.5)  | 6 (9.5)   |

### Appendix 6: The correlation coefficient ($r$) between emergency cases encountered and the actually managed cases (including initial stabilization)

| Disease                        | Correlation coefficient ($r$) | P  | Disease                        | Correlation coefficient ($r$) | P  |
|--------------------------------|-------------------------------|----|--------------------------------|-------------------------------|----|
| Epilepsy                       | 0.374**                       | 0.003 | Palpitation                   | 0.376**                       | 0.002 |
| Acute stroke                   | 0.437**                       | 0.000 | Acute bronchial asthma        | 0.567**                       | 0.000 |
| Abrasion of the cornea         | 0.597**                       | 0.000 | Acute hemolysis               | 0.400**                       | 0.001 |
| Foreign body in the eye        | 0.501**                       | 0.000 | SCD crisis                    | 0.468**                       | 0.000 |
| E. body in ENT                 | 0.525**                       | 0.000 | GIT bleeding                  | 0.466**                       | 0.000 |
| Epistaxis                      | 0.434**                       | 0.000 | Acute abdomen                 | 0.475**                       | 0.000 |
| Fracture                       | 0.185                         | 0.148 | Hypoglycemia                  | 0.594**                       | 0.000 |
| Dislocation                    | 0.364**                       | 0.003 | Hyperglycemic emergencies     | 0.322**                       | 0.010 |
| Cut wound                      | 0.409**                       | 0.001 | Renal colic                   | 0.502**                       | 0.000 |
| Anaphylactic reaction          | 0.659**                       | 0.000 | Acute urine retention         | 0.496**                       | 0.000 |
| Cardiac arrest                 | 0.321*                        | 0.010 | PV bleeding                   | 0.248*                        | 0.050 |
| Hypertension emergencies       | 0.543**                       | 0.000 | Abdominal pain in pregnancy   | 0.534**                       | 0.000 |
| Shock                          | 0.662**                       | 0.000 | Burns                         | 0.598**                       | 0.000 |
| Acute dyspnea                  | 0.477**                       | 0.000 | Chemical accident             | 0.594**                       | 0.000 |
| Chest pain                     | 0.399**                       | 0.001 | Animal bites and stings       | 0.521**                       | 0.000 |

*Correlation is significant at the 0.05 level, **Correlation is significant at the 0.01 level, Correlation coefficient ($r$) <0.19 very weak, 0.2‑0.39 weak, 0.4‑0.59 moderate, 0.6‑0.79 strong and >0.8 very strong correlation (BMJ)