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ORIGINAL ARTICLE

Analysis of Continuous Training Effectiveness of Doctors and Nurses in Emergency

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ABSTRACT

This article describes Emergency Medical Care (EMC) system covering non-communicable, infectious diseases, obstetrics and trauma. Community-based emergency care, as prehospital, refers to emergency care provided outside the hospital. Emergency medicine (EM) potentially plays a critical role in improving the outcomes of acute conditions in healthcare settings. Team of developers including international experts from Kyrgyz State Medical Institite of post graduate Training (KSMIPGT) has developed and drawn up programs for doctors, hospital-level nurses that meet the needs of practical healthcare.

Keywords: emergency medical aid, medical care, International Federation of emergency medicine,

INTRODUCTION

The Emergency Medical Care (EMF) system covers non-communicable, infectious diseases, obstetrics and trauma. Community-based emergency care, as prehospital, refers to emergency care provided outside the hospital [1]. There are two models of EMF delivery at the prehospital level in the world: Anglo-American and Franco-German [2-4]. In countries with the Anglo-American model, the hospital level of EMF is well established, since all patients are delivered to developed EMA departments. This accepted model of Emergency Medicine Departments (EMUs) employs trained and highly qualified intensive care physicians with strong clinical thinking and versatile procedural skills.

Emergency medicine (EM) is a unique discipline with a well-defined and versatile set of technical and cognitive skills. EM has evolved over the past 50 years to spearhead clinical care by educating not only physicians but other healthcare professionals at all levels of healthcare. Despite being a relatively young specialty, EM is rapidly expanding around the world, and more than 50 national EM organizations are now members of the International Federation of Emergency Medicine (IFEM) [5].

Emergency medicine (EM) is a medical specialty that focuses on recognizing, evaluating, and coordinating the care and treatment of acutely needed patients [6,7].

The Franco-German model of prehospital care facilitates receiving care at the scene, at home, on the way to the hospital, and not all patients are delivered to medical organizations, thereby reducing the frequency of hospitalizations [8,9]. The Franco-German model of EMF delivery is widely used in Europe, where emergency medicine, as a separate specialty, is a relatively young field [10].

The hospital level of EMF is represented by multi-level medical institutions, where they provide final medical care to patients with critical conditions and at this stage, they begin to carry out nosocomial medical care. EMEs in high-income countries are organized in hospitals and are the middle link between the domestic emergency room and the intensive care unit [7]. These departments are associated with surgical, therapeutic and intensive care units, fully equipped with medical equipment, drugs and medical devices (MD).

When a patient is admitted, a nurse conducts a triage of patients according to the severity of the condition. At EMAD care is provided by intensive care physicians and ACNP-Acute care nurse practitioners for adults in gerontology. Resuscitators and other physicians can provide emergency care regardless of bed availability, reducing the adverse effects of overcrowding in intensive care units [11].

EM training is an important component in the development of strong emergency care systems [12]. Despite ongoing work to develop quality indicators for emergency care and research, and to guide the development of emergency care systems as evidenced by the WHO Emergency Program in Trauma Care, there is still not enough research to specifically address the impact of program learning [13-16].

In middle and low income countries (LMICs), formal health care facilities vary by country and within a country. In some countries, this sub-system may be a regional or second-level hospital with specialists, while in others it may be a district or first-level hospital with general practitioners or doctors of various specialties. At the prehospital stage, specialists must carry out the correct triage and determine to which medical institution the patient should be delivered, and not just delivered to the nearest medical institution. When transporting a patient to a medical facility where there is no necessary assistance, precious time can be lost, which threatens the patient's life [17].

Emergency medicine potentially plays a critical role in improving the outcomes of acute conditions in healthcare settings [18,19]. The researchers noted that proximity to a hospital does not guarantee access to emergency care, as many facilities in LMIC lack the trained staff and resources needed to provide quality emergency care [20]. The quality of health care depends on the health care providers.

At the 72nd session of the WHO World Assembly in April 8, 2019, it was indicated that patients with acute illnesses and injuries receive medical care every day by primary care providers of completely different specialties, who often do not have special training in emergency medicine. All over the world, at least emergency care is provided by non-specialists. In LMICs, in most cases, emergency care providers do not have specific EMF training. Effective expansion of systems and the provision of qualified EMF requires initiatives to plan the organization of practical assistance and with the involvement of experienced specialists to train all employees of the EMF service [21].

Currently, EM development in many countries is due to educational partnerships between countries or regions, where one of the partners has more experience with EM as a specialty. Such partnerships can take place regardless of the income level of each country, but often involve partnerships between the high-income country and the LMIC [12,22].

Medical professionals' training of which increases the level of knowledge and improves professional skills is called “continuing medical education” (CME) [23]. CME is one of the main determining factors for assessing and analyzing the quality of acquired knowledge and skills in the learning process during the labor activity of medical workers. CME helps not only to improve the level of knowledge and skills, but also to establish communicative, interpersonal relationships to provide better services to patients, as well as to change behavior in clinical practice [23-26].

METHODS AND MATERIALS

This work includes the results of participants from all regions of the Kyrgyz Republic (KR) and training courses for 10 years, from 2010 to 2019, which were funded by the goverment budget, projects of German Development, Reconstruction Bank kfW, UNICEF, RBF (financing based on results) and Swiss Embassy. The training was conducted by teachers of the Kyrgyz State Medical Institute for Retraining and Advanced Training in Bishkek and Osh. Short-term training cycles were held in the simulation center in Bishkek, Osh, field cycles based on regional medical organizations of the Ministry of Health (MoH) of the Kyrgyz Republic.

A retrospective analysis of the progress of preclinical training of doctors and nurses at the hospital level was carried out based on the developed curricula and an assessment of clinical training of doctors monitoring and evaluation in the workplace. The assessment of the progress of doctors and nurses was carried out following the developed training model for the training cource "In depth life support 1", "Relevant questions EMAD for doctors" and "Relevant questions EMAD for nurses". Accordingly, participants were distributed depending on the type of courses taught, the category of students (doctors and nurses) gender and age, where the results of theoretical knowledge were assessed in the form of pre- and post-tests. The assessment of practical training skills was carried out on innovative dummies simulating various clinical scenarios close to real situations, where medical equipment, drugs, and medical devices were also used. In the practical part of the training, the principles of mentoring and coaching were applied, repetitive practices in a controlled learning environment, meaningful practice.

The content of the training courses was developed based on evidence-based medicine with the adaptation of the material to the conditions of medicine with limited resources.

To measure the quality of the training conducted, the theoretical and practical part of the training was assessed using an assessment sheet (blank) in an open form. Each assessment sheet consisted of three sections and was assessed on a 5-point system (1-very bad, 2-bad, 3-satisfactory, 4-good, 5-excellent), the first section - the assessment of the theoretical part, lectures (8 questions - 40 points), the second section - the practical part - demonstration by the trainer (6 questions - 30 points), the third section - the practical part - the participant's practice (6 questions - 30 points).

One of the feedback methods for integrating curricula into the practical activities of the participants was monitoring and evaluation (M&E) with clinical training in the workplace, where it was possible to conduct training in a real clinical environment with an assessment of the professional competencies of the participants. Statistical processing of the obtained results was carried out using the Excel 2019 and Statistica for Windows programs (10) with the calculation of the arithmetic mean (M), the mean error of the corresponding indicators (m) and determination of the reliability.

RESULTS AND DISCUSSION

A team of developers (KSMIPGT doctors, teachers, international experts) has developed and drawn up training programs for doctors, hospital-level nurses that meet the needs of practical healthcare.

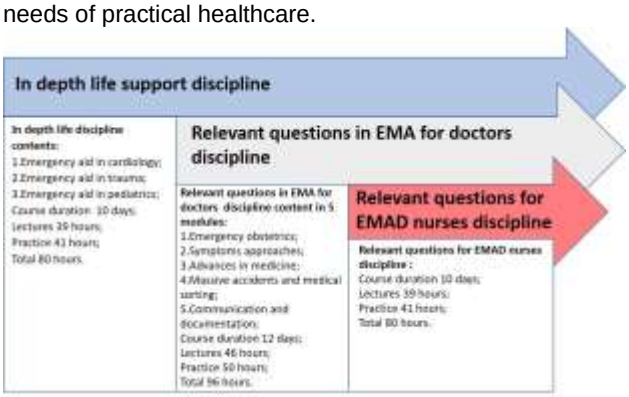

Figure 1. Training programs for doctors and hospital-level nurses with an indication of modules, duration of training, study hours and credit hours.

Figure 1 shows continuing medical education curricula for doctors and nurses. Doctors and nurses of the hospital level passed the curriculum of the in depth life support 1 (IDLS 1) course as the first step of the training. The second step of the training was directed to specialized courses for doctors and nurses of EMAD. In each curriculum, based on professional competencies, learning outcomes were developed that a participant should know and be able to at the end of the training course, aimed at a specific, measurable, achievable, significant, timely result.

The design of the training course, the step-by-step (grading) of training, aimed at changing the clinical environment of the participants, are described.

To develop continuity between healthcare facilities, team principles of work, doctors, paramedics, prehospital level nurses (ambulance) and doctors, hospital-level nurses (admissions, intensive care units) studied together at the IDLS 1 courses, i.e. the groups of participants were multidisciplinary, only a few courses were conducted in isolation for doctors.

Topics included in the curriculum of the course IDLS 1 in three modules: "Emergency care in cardiology", "Emergency care in trauma", "Emergency care in pediatrics" for each module, are indicated in previous works. The curriculum of the specialized course "RQEMAD" for doctors of EMAD is intended only for doctors of admissions, intensive care units of hospitals and is a continuation of the course IDLS 1, consists of 5 modules:

1 Emergency obstetrics;
2 Symptomatic approaches;
3 Recent advances in medicine;
4 Mass accidents and triage;
5 Communication and documentation;

Table 1. The number of trained doctors of secondary/tertiary health care level of the Kyrgyz Republic by age according to the course "In depth life support 1" and "Relevant questions EMAD for nurses".

Age	Sex	IDLS 1 Course				Relevant questions for EMAD doctors			
		Doctors (n=355)		Total:		Doctors (n=165)		Total:	
		Abs. No.	Wt. %	Abs. No.	Wt. %	Abs. No.	Wt. %	Abs. No.	Wt. %
20-29	M	82	23.1	118	33.2	38	23.0	45	27.3
	F	36	10.1			7	4.2		
30-39	M	83	23.4	116	32.7	51	30.9	67	40.6
	F	33	9.3			16	9.7		
40-49	M	31	8.7	62	17.5	15	9.1	30	18.2
	F	31	8.7			15	9.1		
50-59	M	29	8.2	49	13.8	14	8.5	19	11.5
	F	20	5.6			5	3.0		
60 and older	M	5	1.4	10	2.8	3	1.8	4	2.4
	F	5	1.4			1	0.6		
Total:	M	230	64.8	355	100.0	121	73.3	165	100.0
	F	125	35.2			44	26.7		

Table 1 shows that the total number of trained doctors in the courses IDLS 1 was 355 participants, of which 230 men (64.8%), 125 women (35.2%). Doctors main contingent was in the age category 20-29 (33.2%), 30-39 years (32.7%). 165 specialists were trained in the specialized courses "Actual issues of emergency medical care for doctors of EMAD", the predominant participants were young doctors, as well as in the courses IDLS 1 20-29 (27.3%), 30-39 years old (40.6%). The low proportion of participants in the age category 60 and over, which is associated with the specifics of EMF work, retirement and transfer to another job. In total, this work includes the results of 520 participants.

This work (Table 2) includes the results of trained nurses at the hospital level in the course of IDLS 1, which amounted to 298 women. The predominant age category of nurses is young people 20-29 years old (37.2%), 30-39 years old (31.5%). With an increase in the age of participants, the number of employees in the EMA service significantly decreases. This work includes the results of 364 participants. 66 nurses took part in specialized courses for nurses, where a similar situation is observed in the age category, as in the IDLS 1 courses.

Table 3 shows the results of training doctors and nurses in three modules of the course " IDLS 1 ". The results of the initial level of knowledge (pretest) of doctors were 53.4 ± 0.69, posttests 88.1 ± 0.29 ($p < 0.001$), practical exams were 85.2 ± 0.28. At that time, nurses' pretest results were 42.4 ± 0.87, after training they were 82.0 ± 0.33 ($p < 0.001$), practice 78.4 ± 0.29. The rate of increase in knowledge after training increased on average by 65.1% for doctors and 93.6% for nurses (the difference in indicators is statistically significant, $p < 0.001$). The results of the practical exam indicate that, against the background of simulation and simulated training, the level of mastering practical skills and abilities among doctors has significantly increased in the field of emergency cardiology, traumatology and pediatrics. Thus, the acquired knowledge significantly increased the practical skills in the group of doctors, and low results in practical skills and abilities were shown among the nursing staff.

Table 2: The number of trained nurses of the secondary/tertiary level of health care in the Kyrgyz Republic by age according to the course "In depth life support 1" and "Relevant questions EMAD for nurses".

Age/ Course name	In depth life support 1 Nurses (n=298)		Relevant quastions EMAD Nurses (n=66)	
	Abs. No.	Wt. %	Abs. No.	Wt. %
20-29	111	37.2	20	30.3
30-39	94	31.5	27	40.9
40-49	62	20.8	13	19.7
50-59	30	10.1	6	9.1
60 and older	1	0.3	-	-
Total:	298	10.0	66	100.0

Table 3. The results of trained doctors and hospital nurses level at the rate of IDLS 1.

Module	Test results scores		Knowledge growth %	Reliability, p	Practical exam scores
	M±m Pretest	M±m Posttest			M±m
Doctors (n=355)					
Emergency cardiology	52.8±0.64	87.4±0.28	65.5	p<0.001	83.6±0.28
Emergency trauma care	54.9±0.72	89.0±0.30	62.1	p<0.001	86.3±0.28
Emergency pediatrics	52.4±0.71	87.9±0.30	67.7	p<0.001	85.2±0.28
Total:	53.4±0.69	88.1±0.29	65.1	p<0.001	85.2±0.28
Nurses (n=298)					
Emergency cardiology	39.6±0.86	79.1±0.32	99.7	p<0.001	77.1±0.32
Emergency trauma care	42.7±0.87	83.2±0.35	94.8	p<0.001	79.0±0.29
Emergency pediatrics	44.9±0.87	83.6±0.32	86.2	p<0.001	79.1±0.27
Total:	42.4±0.87	82.0±0.33	93.6	p<0.001	78.4±0.29

Table 4. The results of trained doctors at the hospital level in the course "Relevant qusetions EMAD for doctors".

Modules	Test results scores		Knowledge growth %	Reliability, p	Practical exam scores
	M±m Pretest	M±m Posttest			M±m
Doctors (n=165)					
Emergency obstetrics	56.5±1.29	89.1±0.61	57.7	p<0.001	87.7±0.47
Symptomatic approaches	48.0±1.20	91.9±0.44	91.5	p<0.001	86.2±0.47
Recent advances in medicine; mass accidents and sorting; communication and record keeping	52.1±1.21	88.6±0.47	70.1	p<0.001	85.9±0.45
Total:	52.2±1.23	89.9±0.51	73.1	p<0.001	86.6±0.46

Table 4 reflects the results of doctors in specialized training courses. Compared to the IDLS 1 courses (n = 355), a smaller number of participants (n = 165) were trained in these courses, which was associated with the inability to participate in these courses (lack of doctors in the workplace), the refusal of participants, and the dismissal of the trained. The results of assessing the baseline level for all 5-modules showed that knowledge was above 50 points, making up 52.2 ± 1.23, and the results after training (post-test) became high 89.9 ± 0.51, where the indicator of statistical significance was p <0.001, knowledge increased by 73.1%. The practical part of the training was estimated at 86.6 ± 0.46, where the results of the theoretical and practical parts are almost on the same level. After the simulation training, doctors from inexperienced novices switched to more competent medical specialists.

Table 5. The results of trained nurses at the hospital level in the course "Relevant qustions EMAD for nurses".

Modules	Test results scores		Knowledge growth %	Reliability, p	Practical exam scores
	M±m Pretest	M±m Posttest			M±m
Nurses (n=66)					
Recent advances in medicine	43.2±1.49	93.2 ±0.65	115.7	p<0.001	82.4±0.79

Table 5 shows the results of a study of nurses in the second part of training, who passed the IDLS 1 courses, the initial level of knowledge (pretest) was 43.2 ± 1.49 points, after training (posttest) 93.2 ± 0.65, statistical significance p < 0.001, the increase in the level of knowledge showed a high result, amounted to 115.7%. The evaluation of the results for the practical part was 82.4 ± 0.79. Nurses in specialized training courses showed high results, both in theoretical knowledge and practical skills.

To conduct M&E, the place and schedule were determined, the responsible persons, the route list of teachers, a matrix of tests was prepared with the inclusion of questions for application and using questions on tests from the educational process. Final testing was carried out for the course "IDLS 1" (combining 3 modules), "Relevant qustions for EMAD doctors" (combining 5 modules) providing EMA. Doctors filled out patient documents after examination and medical care in a real clinical environment.

M&E with clinical training at stationary level workplaces was carried out by teachers of the Kyrgyz State Medical Institute in Bishkek 7-8 months after training. From the secondary health care level, there were participants from different departments: admissions, surgical, traumatological, children's, maternity departments, but doctors of intensive care departments predominated.

As it can be seen in the table. 4 out of the total number of trained doctors, the results of trained doctors in Batken and Jalal-Abad oblasts were highlighted. When analyzing the assessment of the theoretical part of training for all three modules of the IDLS 1 course, the initial final level (pretest) of doctors (n = 69) during training was 51.1 ± 1.23, long-term results of M&E according to the posttest showed 80.0 ± 1.01 points, where the statistical significance was p <0.001.

The second part of the training showed the results of doctors final training (n = 73) 49.4 ± 1.28, and during M&E the post-test for all 5 modules was 88.6 ± 1.66 points with a statistical significance of p <0.001. With a comparative assessment of the rate of growth of knowledge in both

courses, there is an increase in the level of knowledge by 56.6 and 55.1%.

Table 6. The results of monitoring and evaluation (M&E) with clinical training of the theoretical and practical part of training doctors at the hospital level in Batken and Jalal-Abad oblasts in the course "IDLS 1" and "Relevant qustions for EMAD doctors".

Course names/Modules	Participants quantity, Abs. No.	M±m Course pretest all modules/all module scores	M±m Final posttest/practical assessment skill M&E	Knowledge growth %	Reliability, p
Test results (sores)					
«In depth life support 1»	69	51.1±1.23	80.0±1.01	56.6	p<0.001
«Relevant questions EMAD for doctors»	73	49.4±1.28	88.6±1.66	55.1	p<0.001
Practical exam results (sores)					
«In depth life support 1»	69	85.4±0.59	80.8±0.75	-5.4	p<0.001
«Relevant questions EMAD for doctors»	73	88.1±0.57	78.4±0.73	-10.54	p<0.001

The result of the final assessment of the practical skills of doctors (n = 69) in the course of the EPL 1 (all 3 modules) showed 85.4 ± 0.59 points, during the M&E the assessment of practical skills decreased and amounted to 80.8 ± 0.75, where control test scores on the contrary, it began to decrease and amounted to 5.4%. When assessing practical skills, the results of doctors (n = 73) on specialized courses during training were 88.1 ± 0.57, during training in a real clinical environment they were 78.4 ± 0.73 points, control test scores decreased by 10.54 %.

After the training, the results of the progress of doctors at the hospital level, both theoretical and practical, have significantly improved. Many participants achieved good results in practical skills and abilities, which was shown by the results of providing medical care while working with patients. Changes took place at the level of the organizational environment: healthcare facilities purchased medical equipment, drugs, medical devices.

Thus, effective and quality training is critical for the training of highly qualified health care providers and the acquired knowledge, skills and abilities of health care workers significantly affect the quality of health care delivery. Evaluation of the strength of the simulation has shown that it is a viable method for closing learning gaps. The use of a shortterm continuing education training program Advanced Life Support-2 designed for emergency medical service workers based on innovative approaches to practical training and changes in evidence-based medicine increases the effectiveness of the training process and the quality of medical services [27, 28].

CONCLUSION

Emrgency Medical Aid course raining is an essential component of developing strong emergency care systems. For continuing medical education and improving the quality of medical services, emergency medical care is a priority and therefore requires constant investment, development, strengthening with new technologies with comprehensive, long-term and sustainable training programs. Conducting simulation courses helped to reduce medical errors, reduce complications of diseases and injuries, and improve the quality of medical care to the population. Improvement of the quality of medical care is associated with the introduction and use of the obtained theoretical knowledge, skills and abilities by medical workers in practice.

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