A Nationwide Survey and System Analysis of the Emergency Triage System in The Lao People's Democratic Republic

Lamngeun Silavong, MNS, DNS Student*, Ketsarin Utriyaprasit, Ph.D., RN*, Napaporn Wanitkun, Ph.D., RN*, Chukiat Viwatwongkasem, Ph.D.**

**Faculty of Nursing, Mahidol University, Bangkok 10700 Thailand, **Faculty of Public Health, Mahidol University, Bangkok 10400, Thailand.*

ABSTRACT

Objective: To assess the present status of the emergency department (ED) triage system in 162 hospitals across the Lao People's Democratic Republic (Lao PDR).

Materials and Methods: The nationwide survey participants were ED administrators of all hospitals in Lao PDR. The standard questionnaire package was used for data collection including patients' demographics and triage systemic factors. Descriptive analysis was applied to analysis the outcome of interest.

Results: A majority of triage officers were emergency room nurses (58.6%), general physicians (20.4%), or both (11.1%). Most hospitals (89.5%) used informal triage scales such as clinical experiences or colors to prioritize ED patients. Only 17 hospitals (10.5%) had a formal triage scale in their ED care systems and used it in their practice.

Conclusion: These findings provide knowledge of the ED triage system in the Lao PDR. The results indicate that the Lao PDR lacks a formal ED triage scale but uses a variety of informal scales. Thus, it is necessary to set up a standard triage system at all hospitals to standardize ED healthcare across the country.

Keywords: Health system; triage system; the Lao People's Democratic Republic (Siriraj Med J 2023; 75: 241-247)

INTRODUCTION

The Emergency Department (ED) is a pivotal healthcare entry point and is the busiest department in all hospitals worldwide.The ED has an excessive flow of complicated, often life-threatening cases and a high density of critical clinical decision-making.[1] Statistics of the Mahosot Hospital, the largest hospital in the Lao People's Democratic Republic (Lao PDR), showed the overall rise over five years (2011-2016) was 29.12%.[2] Triage is a treatment process for the timely delivery of emergency care, handling emergencies with an appropriate allocation of medical resources, and sorting for ED treatment.[3,4] The triage concept is used in modern healthcare systems worldwide.[5] The triage system helps patients with life-threatening illnesses access care first for medical services. It is volume management in the ED.

The triage system in the Lao PDR has been partially implemented since 2008 using the Look, Listen, Feel process.[6] Triage ensures resources are allocated where they are most needed.[3,4,7] Despite the well-established benefits of triage, no hospital has fully implemented the triage system.[8,9] The triage system in the Lao PDR employs three different models, the model of clinical experience (Look, Listen and Feel), three zones of patient screening (emergent, urgent, and non-urgent or color codes: red, yellow and green); or an emergency severity index (ESI

Corresponding author: Ketsarin Utriyaprasit
E-mail: ketsarin.utr@mahidol.ac.th
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ORCID ID:http://orcid.org/0000-0001-7932-3395
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with five scales). Different models have contributed to significant disorder in providing emergency service, increased length of stay and left patients feeling confused.[10] Enhancing patient safety through access to appropriate treatment is a crucial matter.

The pivotal triage system has never been examined to reform the Lao PDR's Emergency Medical Services (EMS) and ED processes. There is a lack of standard published articles on the triage system which explain the use and organization of different triage processes in the hospital ED of the Lao PDR. As a first step towards reforming the emergency medical service (EMS) system, a nationwide survey and system analysis to assess the current status and the problems of the ED triage system are needed to develop a formal triage system in Lao PDR hospitals.

MATERIALS AND METHODS

We employed a cross-sectional survey to collect data. All hospital EDs in the Lao PDR were surveyed between December 1, 2018 to March 11, 2019 to collect national data on triage methods. The study was approved by the Institutional Review Broad. (IRB-NS 2018/466.2711) There were totally 1,255 hospitals (1047 community, 148 primary/district, 17 secondary, 7 tertiary and 36 private hospitals) in the Lao PDR during the year 2018-2019. However, a total of 168 hospitals from 1255 hospitals provided emergency care. Since six district hospitals are used same ED service at the province hospital, thus only 162 hospitals participated in this study. These hospitals included 142 primary, 17 secondary, and three tertiary hospitals. Survey subjects were ED administrators or representative ED administrators (hospital directors, heads of EDs, and ED head nurses or nurse supervisors) from each hospital. Inclusion criteria for ED administrator were: 1) working full-time in an ED with at least one year of experience, and 2) responsibility as the official ED administrator.

This nationwide survey used a questionnaire developed by six emergency medicine departments of two institutions in Korea.[11] The survey instrument had an 8-item questionnaire related to the ED triage system. Four items were yes-no questions, and four were multiple-choice. A back-translation to Lao language was using technique by Brislin.[12] ED administrators of the 162 identified EDs were approached by mail invitation package to participate and provide study data. The package included an invitation letter, a brief proposal participant information sheet, and a written informed consent form. First, a representative ED administrator was designated to respond to the eight focus questions. The assigned person was contacted by telephone or face-to-face interview to receive project details and provide consent to participate by setting a schedule of interviews. Primarily telephone interviews were conducted in each hospital with a representative ED care manager (hospital director, head nurse, or assigned other); a face-to-face interview was sometimes used. Of the 162 hospitals, face-to-face interviews were conducted in 16 hospitals (three tertiary, four provincial, and nine district hospitals). Each interview took approximately 20-30 minutes.

The Statistical Package for Social Science (SPSS) for Windows version 23 was used for data entry and analysis.[13] We used descriptive analysis to characterize the findings. Frequency and percentage described categorical variables with mean or median values and standard deviations.

RESULTS

Characteristics of the Sample

Table 1 demonstrates the distribution of hospital levels across Lao PDR. Most of the one hundred and sixty-two hospitals surveyed were in the Lao PDR's northern region (42.6%). All tertiary hospitals were located in the central area. The highest percentage of secondary hospitals was in the southern region of the country (52.9%), while the primary hospitals were in the north of the Loa PDR (44.37%). Most respondents were hospital directors and general physicians who work in EDs (31.5%). The answers related to triage system in Lao PDR came from both hospital policymakers and clinicians, while only approximately 30% of respondents were not hospital directors.

Characteristics of the National Triage System

As shown in Table 2, most triage officers in primary and secondary hospitals (54.3 and 4.3%, respectively) were only emergency room (ER) nurses. Emergency physician specialists performed only 4.9% of triage (EPS). Approximately 50.6% of triage was not completed in separate triage rooms in the primary and secondary hospitals (44.4 and 6.2%, respectively). All three tertiary hospitals triaged their patients in specific triage rooms. One hundred forty-one hospitals (87%) initially triaged all visiting patients across primary, secondary, and tertiary hospitals (75.3, 9.9, and 1.9%, respectively). One hundred and forty-five of the 162 hospitals (89.5%) did not apply any formal triage scale in their ED care systems (80.2%, 8.6%, and 0.6% of primary, secondary, and tertiary hospitals, respectively). Of the 145 hospitals, seven hospitals (4.3%) had a formal scale but did not use it in their practice. While emergent symptoms are defined by law in the National Manual for Emergency Care (ESL), only 27

TABLE 1. The frequency and percentage of different hospitals by geographic region and numbers of respondent.

	Hospital level							
	Primary		Secondary		Tertiary		Total	
	n	%	n	%	n	%	n	%
Northern part	63	44.4	6	35.3	0	0.0	69	42.6
Middle	31	21.8	2	11.77	3	100	36	22.2
South	48	33.8	9	52.94	0	0.0	57	35.2
Total	142	100	17	100	3	100	162	100.0
Respondents								
HD	38	23.5			2	1.2	40	24.7
EPS	3	1.9	2	1.2			5	3.1
HN	21	13.0	4	2.5			25	15.4
GP	19	11.7					19	11.7
HD and EPS	4	2.5	4	2.5			8	4.9
HD and HN	5	3.1	2	1.2	10.6		8	4.9
HD and GP	51	31.5	4	2.5			55	34.0
HD, EPS, and HN			1	0.6			1	0.6
HD, EPS, and GP	1	0.6					1	0.6

Abbreviations: HD: Hospital Director; EPS: Emergency Physician Specialist; HN: Head Nurse; GP: General Physician

hospitals (16.7%) applied this practice guideline to their routine care. In contrast, 110 (67.9%) hospitals relied only on their clinical experience (CE). Only 2 of 162 (1.2%) hospitals applied a formal triage scale in their practice. All hospitals reported similar problems with Triage (45.1%). Most hospitals with triage difficulties, except in the tertiary hospitals (35.8%), used no formal triage scales.

Triage Duration across the Emergency Triage Scale

Time for triage estimated by administrators of the hospital EDs showed that CE for triage assessment took the longest time, with a formal scale requiring the shortest time. A comparison of triage methods showed a mean difference in triage duration across the three forms: CE, informal and formal scales, as shown in Table 3.

Quality Control of ED Triage

More than 52.5% of all EDs had no training plans for their ED staff. The primary hospital ED staff's was mostly significant lack of their training (48.8%). Among the remaining 77 EDs, 60 offered periodic training for their staff (37%) at an average of 1.65 times per year (SD = 0.92, range = 1– 4). Only 10% of EDs had a protocol as a part of initial job training. For quality improvement, all hospital representatives preferred to adopt a formal or standard scale and organize triage-training workshops to incorporate the triage system into their practice, as shown in Table 4.

DISCUSSION

Our nationwide survey investigated the prevailing conditions in all hospitals in the Lao PDR ED triage system. Hospital administrators from 162 hospitals reported (142 districts, 17 provinces, and three tertiary areas) patient emergency services. Eighty-seven percentage of ED hospitals were primary hospitals and located in the northern region (38.9%). In contrast, the secondary hospitals were mainly located in southern areas, and all tertiary hospitals were in the central region. Approximately 54.6% of Laotians live in rural areas, and 45.4% live in

TABLE 2. The frequency and percentage of emergency triage system characteristics in Lao PDR.

Characteristics	Hospital level							
	Primary		Secondary		Tertiary		Total	
	n	%	n	%	n	%	n	%
Who acts as a triage officer?								
ER Nurse	88	54.3	7	4.3			95	58.6
GP	33	20.4					33	20.4
GP and ER Nurse	14	8.6	3	1.9	1	0.6	18	11.1
EPS	4	2.5	3	1.9	1	0.6	8	4.9
EPS and ER Nurse	3	1.9	3	1.9	1	0.6	7	4.3
EPS, GP, and ER Nurse			1	0.6			1	0.6
Where is triage performed?								
In a separate triage room	70	43.2	7	4.3	3	1.9	80	49.4
In the treatment area	72	44.4	10	6.2			79	50.6
Who is triaged initially?								
All visiting patients	122	75.3	16	9.9	3	1.9	141	87.0
Waiting patients only	20	12.3	1	0.6			21	13.0
Is there an official triage scale?								
No	124	76.5	14	8.6			138	85.2
Yes, we use it	12	7.4	3	1.9	2	1.2	17	10.5
Yes, we did not use it	6	3.7			1	0.6	7	4.3
What model is the basis of your triage scale?								
CE	101	62.3	9	5.6			110	67.9
ESL	22	13.6	5	3.1			27	16.7
Color	14	8.6	3	1.9	2	1.3	19	11.7
CE& ESL	4	2.5					4	2.5
CTAS	1	0.6					1	0.6
ESI					1	0.6	1	0.6
Classifying levels								
Five levels					1	0.6	1	0.6
Problems with triage								
No	79	48.8	9	5.6	1	0.6	89	54.9
Yes	63	39.9	8	4.9	2	1.2	73	45.1
Vague context	10	6.2	1	0.6	1	0.6	12	7.4
Over triage	1	0.6	1	0.6	1	0.6	3	1.9
No formal triage scale	52	32.1	6	3.7			58	35.8

Abbreviations: GP: General physician; EPS: Emergency physician specialist; CE: Clinical experience; CTAS: Canadian triage acuity scale; ESL: Emergent symptoms defined in law; ESI: Emergency Severity Index

TABLE 3. The mean, standard deviation, minimum, and maximum of triage duration across the emergency triage scale and hospital level in Lao PDR.

Hospital level	Scale characteristics	N	Mean	SD	Min	Max
Primary	CE	101	9.53	7.37	1	30
	ESL	22	8.05	7.01	1	30
	Color	14	7.53	5.91	1	20
	CE and ESL	4	7.50	2.89	5	10
	CTAS	1	10.00		10	
	Total	142	9.04	7.08	1	30
Secondary	CE	9	8.22	5.60	1	20
	ESL	5	13	9.75	5	30
	Color	3	2.33	2.31	1	5
	Total	17	8.58	7.32	1	30
Tertiary	Color	2	7.50	3.54	5	10
	ESI	1	5.00		5	
	Total	3	6.67	2.89	5	10
Overall*	CE	110	9.43	7.23	1	30
	Informal scale	50	8.08	6.62	1	30
	Formal scale	2	7.50	3.54	5	10
	Total	162	8.94	7.03	1	30

Abbreviations: CE: Clinical experience; CTAS: Canadian triage acuity scale; ESL: Emergent symptoms defined in law; ESI: Emergency Severity Index

TABLE 4. The frequency and percentage of quality control of ED triage in Lao PDR.

Characteristics	Hospital level							
	Primary		Secondary		Tertiary		Total	
	n	%	n	%	n	%	n	%
Triage training								
No plan	79	48.8	6	3.7			85	52.5
Training availability								
As part of initial job training	16	9.9	1	0.6			17	10.5
As periodic training	47	29.0	10	6.2	2	1.2	59	36.4
As both					1	0.6	1	0.6
A review process of the triage scale								
No	136	84.5	16	9.9	2	1.2	154	95.7
Yes	6	3.7			1	0.6	7	4.3

urban areas.[14] As in other low-middle-income countries, healthcare facilities and resource infrastructure are unequal by region.[15]

The nationwide survey analyzed the situation in all Lao PDR ED triage system hospitals. Eighty-five percent of hospitals did not use an official and formal triage scale. Several triage scales have been used across hospital types in the ED triage system. Most triage scales were informal categorizations using clinical experiences (CE, 67.9%), the legally defined emerging symptoms based on the Lao PDR ED medical service (ESL, 16.7%), and by color (11.7%). The scales had different designs and materials, and no more than 80% were confirmed for the accuracy of their methods. The ED triage system in the Lao PDR applied two types of formal scales, including the CTAS and the ESI scales, and others used the CE & ESL (2.5%) mixed scale. Scaling variation made it impossible for patients across the country to receive the same treatment and made it extremely difficult to determine the efficacy and safety of different scales.[11,16]

The average triage time in the Lao PDR EDs was 8.94 ±7.03 minutes, 3-5 min longer than the triage time reported in previous studies.[11,17] CE for triage assessment required the most time, while the standardized scale required the least time at the hospital level. There was a mean difference in triage time across the three methods dropping from CE to informal and formal rankings. Using clinical experiences took longer than informal and formal scales for prioritizing ED patients. Ringström et al.[18] systematically reviewed the literature on triage for prioritization in EDs. Two studies recorded a 36-minute shorter length of stay and a significant reduction in waiting time for doctor assessment, with a mean difference of 16 minutes, contrasting formal triage with informal triage. Verified triage scales quickly enhanced critical access to care for ED patients, reducing waiting time and length of stay in the EDs. The triage scale usually is based on assessing conditions and determines how long the patient will wait before seeing a physician. The correct rating scale is essential to ensure the quality of ED care.[16] Van Der Wulp and Van Stel[19] compared clinical outcomes between triage models. A large Netherlands study reported that the 5-level ESI was more effective in predicting admission to a ward than the 5-level Manchester triage scale (MTS). No general conclusions are possible when comparing different triage models.[18]

Results showed that 58.6% of the EDs in the Lao PDR used an ER nurse, and 20% used a general physician (GP). Additional registered nurses (RNs) have also treated triage patients in other developed countries (the USA and Australia).[11,20] Triage is the first nursing activity occurring when a patient arrives at an ED. However, over 50% of all EDs had no training plan for their ED staff during this study. Many hospital ED personnel were deficient in their education (48.8%). The availability of triage-training facilities and personnel and the scientific verification of method accuracy assessed triage system quality. Quality-management proposals suggest that all hospital members wish to use a standard scale or have a triage learning session to improve triage methods. Government officials, stakeholders, and professionals must take action to establish policies that can resolve critical weaknesses in triage through standard hospital training and human resource development.[15,21]

Hospitals showed almost equivalent numbers for those using standard triage methods and those without (45.1% and 54.9%, respectively). The barriers against the use of a triage method were the absence of a standard scale (35.8 %), the vagueness of context (7.4 %), and over-triage (1.9 %), respectively, as disclosed by 69.7 % of the ED head directors. A tested and verified triage method can help minimize obstacles to successful triage. In addition, triage scale vagueness indicates that officers lack the experience and confidence to interpret the context of patient symptoms.[11] Incentives for professionals regarding ED triage system development skills are needed. Government policymakers should formulate specific policies to strengthen the ED triage system to enhance the professionalism of healthcare providers and ensure that the EMS curriculum includes the use of a triage system in the healthcare program.

Most ED systems in The Lao PDR apply informal triage systems to prioritize patient treatment. Many triage scales were used at different hospital levels in the ED triage system but were not based on a formal or standardized triage scale. ED nurses are the first to perform patient triage. The period of the prioritization process was 8.94±7.03 min., longer than the standard triage time of fewer than 3 minutes.

Limitations

Since only one hospital director in each hospital was interviewed, personal bias from triage experience may be present. Also, the predominant primary hospital findings may not have captured the triage processes of secondary and tertiary hospitals, limiting the generalizability of results. Finally, although valid and reliable instruments were used, data collection tools were developed, tested, and standardized in western populations; cultural differences may result in compromised or incomplete data in a different eastern culture.

CONCLUSION

Triage systems are methods for systematically prioritizing patients' treatment, but the design of these categorizations varies considerably among EDs hospital in the Lao PDR. Many head managers call for a formal triage scale and training plan for their ED staff. Establishing a standard triage system at all hospital levels in the Lao PDR are needed because it would be standardized ED health care throughout the Nation.

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REFERENCES

1. Barma NH, Oksen SR. Lao PDR case study: Ministry of Public Works and Transport; 2014.
2. Japan International Cooperation Agency. Data collection survey on health sector in Lao people's Emocratic republic. System Science Consultants Inc.; 2016.
3. Funakoshi H, Shiga T, Homma Y, Nakashima Y, Takahashi J, Kamura H, et al. Validation of the modified Japanese Triage and Acuity Scale-based triage system emphasizing the physiologic variables or mechanism of injuries. Int J Emerg Med. 2016;9(1):1.
4. Jordi K, Grossmann F, Gaddis GM, Cignacco E, Denhaerynck K, Schwendimann R, et al. Nurses' accuracy and self-perceived ability using the Emergency Severity Index triage tool: a cross-sectional study in four Swiss hospitals. Scand J Trauma Resusc Emerg Med. 2015;23:62.
5. Houston C, Sanchez LD, Fischer C, Volz K, Wolfe R. Waiting for triage: Unmeasured time in patient flow. West J Emerg Med. 2015;16(1):39-42.
6. Aungsuroch Y, Songnavong C, Tantikosoom P, Phanpaseuth S, Sisoulath A, Gunawan J, et al. Determining nursing research priorities in Lao people's democratic republic: A modified delphi study. Nursing and Midwifery Studies. 2020;9(3):157-62.
7. Khursheed M, Fayyaz J, Jamil A. Setting up triage services in the emergency department: Experience from a tertiary care institute of Pakistan. A journey toward excellence. J Ayub Med Coll Abbottabad. 2015;27(3):737-40.
8. Viswanathan K, Hanfling D, Altevogt BM, Gostin LO. Crisis standards of care: A systems framework for catastrophic disaster response: National Academies Press; 2012.
9. Farrohknia N, Castrén M, Ehrenberg A, Lind L, Oredsson S, Jonsson H, et al. Emergency department triage scales and their components: A systematic review of the scientific evidence. Scand J Trauma Resusc Emerg Med. 2011;19:42.
10. Bill & Melinda Gates Foundation. Lao PDR emergency operations center planning and design mission 2018 [Available from: https://www.gatesfoundation.org/~/media/GFO/Documents/How-We-Work/RFP-Lao-PDR-EOC/Lao-PDR-EOC-Planning-and-Design-Mission-Report.pdf?la=en.
11. Park J, Choi H, Kang B, Kim C, Kang H, Lim T. A nationwide survey of Korean emergency department triage systems and scales; A first step towards reform of the emergency medical service system. Journal of the Korean Society of Emergency Medicine. 2014;25(5):499-508.
12. Brislin RW. Back-Translation for Cross-Cultural Research. Journal of Cross-Cultural Psychology. 1970;1(3):185-216.
13. Polit DF, Beck CT. Nursing research: Generating and assessing evidence for nursing practice. 9th ed: China: Lippincott Williams & Wilkins; 2012.
14. Worldmeter. Laos population (live) 2021 [Available from: https://www.worldometers.info/world-population/laos-population/.
15. Sa-angchai P, Phienphommalinh S, Yimsamran S, Kaewkungwal J, Kijsanayotin B, Soonthornworasiri N. Geographical distribution of health workforces in Lao PDR. The Southeast Asian Journal of Tropical Medicine and Public Health. 2016;47(4):868-79.
16. Göransson KE, Ehrenberg A, Ehnfors M. Triage in emergency departments: national survey. J Clin Nurs. 2005;14(9):1067-74.
17. Roodbol PF. Mind the gap: Triage guidelines and their utilisation at the emergency department. Nederlands Tijdschrift voor Evidence Based Practice. 2014;12(2):8-9.
18. Ringström C, Andersson B, Bergh C, Börjesson M, Carlström E, Eriksson M, et al. Triage for prioritisation in the emergency department Region Västra Götaland, HTA-centrum; 2018.
19. Van Der Wulp I, Van Stel HF. Calculating kappas from adjusted data improved the comparability of the reliability of triage systems: A comparative study. J Clin Epidemiol. 2010;63(11):1256-63.
20. Göransson K, Ehrenberg A, Marklund B, Ehnfors M. Accuracy and concordance of nurses in emergency department triage. Scand J Caring Sci. 2005;19(4):432-8.
21. Tandi TE, Cho Y, Akam AJ-C, Afoh CO, Ryu SH, Choi MS, et al. Cameroon public health sector: Shortage and inequalities in geographic distribution of health personnel. Int J Equity Health. 2015;14:43.