

EMERGENCY MANAGEMENT SYSTEM IN INDONESIA: AN EVALUATION OF EMERGENCY PATIENT MANAGEMENT IN 2020

Agung Cahyono^{1,2}, Fatma Lestari², Sabarinah Prasetyo², Mila Tejamaya²

1 Occupational Health and Safety Study Program, Faculty of Health Science and Technology, Binawan University, Jakarta, Indonesia.

2 Occupational Health and Safety Department, Faculty of Public Health Universitas Indonesia: Depok, Jawa Barat, Indonesia.

Correspondence: agungcahyonot@gmail.com

ABSTRACT

Indonesia has its emergency patient management system regulated in Public Safety Center (PSC) 119 as stated in Indonesia's Health Ministry Regulation No. 19 (2016). An evaluation to assess the ongoing management of this system is a must to ensure its continuous development.

This study assessed the ongoing emergency patient management system using instrument indicator questionnaires developed by the authors. The questionnaire consists of 28 indicators from 8 assessment aspects including: policy, planning, program implementation, communication, transportation, referral, management reviews, and emergency services. Questionnaires were distributed and completed questionnaires were received from 88 respondents from 21 provinces of Indonesia. Validity test results counted the coefficient correlation of all indicators above r value table (0.2096) and all Alpha Cronbach's indicators value above 0,80. The value indicator is considered poor if its average score is below the average score of the overall indicators and is considered good if it is above the average overall indicator score. The assessment result there is twelve indicators from this study shows a below average value (66). Data acquired in this study can be used as a preliminary reference for continuous improvement of Indonesia's emergency management system operated by the PSC.

KEYWORDS

emergency department; policy; planning; implementation; management review

INTRODUCTION

The 2016 Indonesia's Minister of Health Regulation No. 19 has required that emergency management to be implemented with continuous improvement.[1] Prehospital ambulance services on emergency management begins when a patient is discovered until he or she receives help and further assistance from the emergency personnel of the required health facilities, in accordance with an agreed action algorithm.[2] The success of emergency

management is strongly influenced by the officer's response time, good coordination and communication as well as access to and quality of integrated and affordable services.[3] In managing patients within the scope of the geographic work area of the responders, distance and response time become the main concerns.[4][5] This is the same for the competencies of the responders and facilities, such as ambulances, which require good emergency management planning.[6] Emergency management planning has to ensure that appropriate

actions are taken in the fastest time possible.[7] In terms of the time required to respond an emergency condition, it will very much depend on the patient's case. Apr 2002 average emergency response times needed from the incident until help is acquired from emergency officers was 6.97 minutes, while the effective response time needed for a life threatening call is less than 5 minutes.[3] Deaths due to emergency situations in Indonesia reached 1.3 million cases in 2016 and it is very challenging to reduce this number despite the establishment of the integrated emergency management system.[8] Emergency management requires actions that can ensure targeted activities, especially when an emergency occurs.[9] This emergency action includes the necessary system preparation before the emergency, during the emergency, and after the emergency. There are several aspects to determine whether emergency management is well executed or not, such as policy, planning, program implementation, communication system, transportation system, referral system, management review, and emergency service aspects. These aspects determine the success of emergency management.[10] The response time of this emergency system should be under 15 minutes, which is very difficult to achieve due to various external factors, such as traffic jams or difficult terrain.[3] The communication and coordination system between emergency department organizations is problematic when an integrated call center, which is Call Center 119 in Indonesia, is not used or bypassed and the PSC is not available yet in the area.[3][11]

The different level of competencies of PSC officers also lead to different service system standards in every PSC areas. Inadequate infrastructure for the system because the procurement budget is not yet available, but the system must still be implemented.[12] Indonesia is a very diverse country, consisting of districts and cities with different local government policies, including for the emergency management system. This diversity creates difficulties in the implementation of the emergency management system despite the continuous development of the system.[13] Therefore, system assessment indicators or system standard instruments are required for the PSC 119 to ensure that evaluation can be carried out at the management review stage.

The results of this review will inform the appropriate planning data for the PSCs in the regions. This has encouraged researchers to conduct studies on the development of PSC's measurement instruments system

when handling emergency in Indonesia. Those instruments will be beneficial for improving and evaluating the current system.

METHODS

SAMPLE

At the time of the study, there were 251 PSCs that had been established in Indonesia. In this study, researchers used sampling method so that all PSCs became the study population. Validity of the questionnaire In this studi has been tasted. Validity test results counted the coefficient correlation of all indicators above r value table (0.2096) and all Alpha Cronbach's indicators value above 0,80. All 251 PSC asked to fill in a survey questionnaire, only 88 of the total had responded. The questionnaire respondents are data owners and have been in charge of running clinical emergency services; including managing health personnel and ambulances which enable them to carry out their finction as a PSC. The survey questioanire was delivered online, utilizing Google Forms. This emergency patient management assessment is a self-assessment of the current management using accessed documents as evidence.

Ethics Clearance approval number Ket-724/UN2.F10. D11. /PPM.00.02/2019 was undertake by The Research and Community Engangement Ethical Committee Faculty Of Public Health Universitas Indonesia .

MEASURES

Eight aspects of emergency management were included in the assessment: policy, planning, program implementation, communication system, transportation system, referral system, management review, and emergency services. For these eight aspects, 28 indicators were created based on a literature study on disaster emergency management cycle (DEMC) theory and a scoring system of 1 to 3 was used. Score 1 represents the lack of a program, while score 2 represents that a program was implemented and score 3 represents the implementation of the program added by follow-up activities. For each indicator, the average score was calculated, which was then compared to the average overall values of all indicator score received in this study. Based on this comparison, the achievement of the PSC in each indicator was determined.

DATA ANALYSIS

Data collected from the responses to the online questionnaires as completed by PSCs as a self-assessment of emergency patient management were analyzed and compiled into a Microsoft Excel spreadsheet table and processed using the SPSS (Version 22) as frequency distribution analysis on 28 indicators derived from 88 PSCs. Results were then presented in a table and a cobweb chart to illustrate the current implementation of emergency patient management in PSCs. For each indicator, proportion and average score were calculated. The average score describes the achievement of the indicators of emergency patient management. To

understand the current situation of the PSC, the average score for individual indicators were compared to the average score for the overall indicators. The indicators with an average score below the overall average score were considered to have poor achievement while those with an average score above the overall average score were considered to have good achievement.[14]

RESULTS

Results of the assessment of indicators for the integrated emergency management system of the PSC 119 as distributed scores from 88 respondents for all indicators (28 indicators) are presented in Table 1.

TABLE 1. PSC 119 INTEGRATED EMERGENCY MANAGEMENT ASSESSMENT

Indicator No.	No	Variable	Indicator	Number of Respondents with the compliance score for each indicator						
				1	%	2	%	3	%	Average
	Pre-Accident									
	1	Policy								
1	1.01		Medical emergency regulations are established and disseminated	8	9.1	25	28.4	55	62.5	74,3
2	1.02		Availability of PSC 119 medical emergency organizational structure	10	11.4	32	36.4	46	52.3	70,7
	2	Planning								
3	2.01		Availability of procedures for planning a medical emergency management program	13	14.8	30	34.1	45	51.1	69,3
4	2.02		Identification of potential medical emergencies from medical emergency information data and then risk assessment analysis and determination of medical emergency control	18	20.5	29	33.0	41	46.6	66,3
5	2.03		Availability of management program plan at PSC 119	23	26.1	29	33.0	36	40.9	63,0
6	2.04		Availability of medical emergency decision making algorithm	21	23.9	14	15.9	53	60.2	69,3
7	2.05		Availability of medical emergency patient management system plan and hospital referral system	13	14.8	15	17.0	60	68.2	74,3
8	2.06		Availability of human resources and facilities	21	23.9	28	31.8	39	44.3	64,7

Indicator No.	No	Variable	Indicator	Number of Respondents with the compliance score for each indicator						
				1	%	2	%	3	%	Average
9	2.07		Availability of budget plan	15	17.0	16	18.2	57	64.8	72,7
	3	Emergency response implementation								
10	3.01		Information systems and communication technology as well as effective emergency information systems	19	21.6	34	38.6	35	39.8	64,0
11	3.02		Readiness of infrastructure, technology and transportation facilities	16	18.2	32	36.4	40	45.5	66,7
12	3.04		Documentation and reports	8	9.1	30	34.1	50	56.8	72,7
13	3.05		Community participation	15	17.0	26	29.5	47	53.4	69,3
14	3.06		Training, simulation, and competency certification	25	28.4	30	34.1	33	37.5	61,3
15	3.07		Medical emergency organization cooperation	46	52.3	24	27.3	18	20.5	49,3
	Accident									
	4	Communication and support system								
16	4.01		Sharing information	27	30.7	23	26.1	38	43.2	62,3
17	4.02		Multi-group decision and action algorithm	31	35.2	27	30.7	30	34.1	58,3
18	4.03		Share resources	14	15.9	17	19.3	57	64.8	73,0
	5	Emergency transportation system								
19	5.01		Transport priority	10	11.4	28	31.8	50	56.8	72,0
20	5.02		Troubleshooting Transport	10	11.4	32	36.4	46	52.3	70,7
	6	Referral system				0.0		0.0		0.0
21	6.01		Comprehensive emergency management	20	22.7	25	28.4	43	48.9	66,3
22	6.02		Hospital response	35	39.8	20	22.7	33	37.5	58,0
	Post-Accident									
	7	Management review								
23	7.01		Recovery response and post-accident reports	28	31.8	35	39.8	25	28.4	57,7
24	7.02		Incident investigation/ analysis and management review	23	26.1	32	36.4	33	37.5	62,0
25	7.03		Continuous improvement with program plan	18	20.5	30	34.1	40	45.5	66,0
26	7.04		Program review and continuous improvement	24	27.3	27	30.7	37	42.0	63,0
	8	Emergency services								
27	8.01		Improving the quality of emergency services	25	28.4	34	38.6	29	33.0	60,0
28	8.02		Speeding up the response time for Emergency Patients	13	14.8	24	27.3	51	58.0	71,3
			Total average of overall indicators							66,0

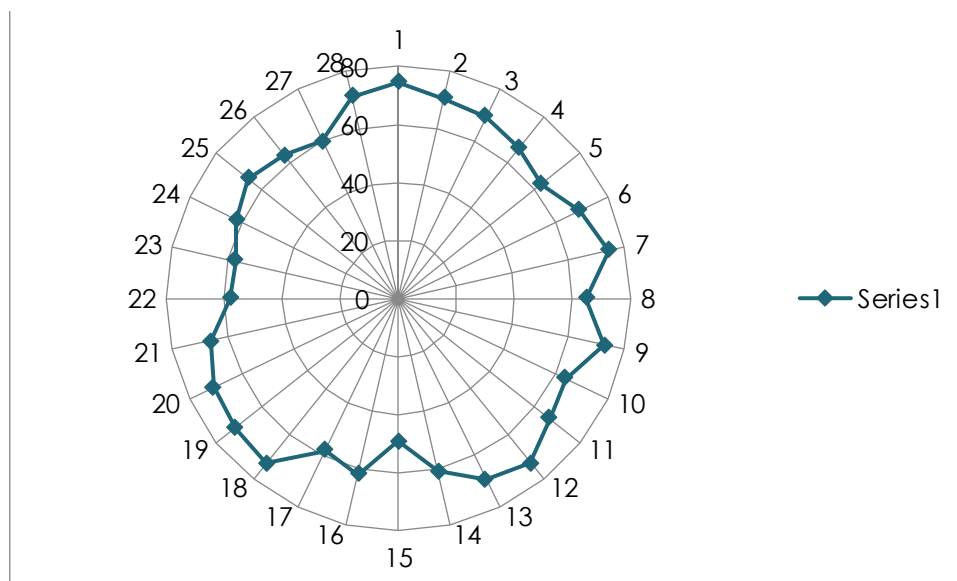
The proportion of each indicator was calculated based on the percentage of the number of PSCs that achieved score 1, 2 and 3 against the overall score of the 88 PSCs while the percentage value was obtained as the proportion of PSC condition for each indicator. The average value of each indicator was calculated by adding the number of PSCs that achieved a score of 1 to the number of PSCs with score 2 and the number of PSCs with score of 3 divided by 3 as reflected in the following formula:

$$\text{National average achievement} = \frac{(n_1 \times 1 + n_2 \times 2 + n_3 \times 3)}{3}$$

The average score of all PSC indicators was 66.0

From the average score of each indicator (Indicators 1 to 28), it was identified that there were several indicators that received a score below the average score of the overall indicators (<66) in the 88 PSCs. Those indicators were indicators 5, 8, 10, 14, 15, 16, 17, 22, 23, 24, 26, and 27. This result is depicted as a chart in Figure 1

FIGURE 1 AVERAGE SCORE ACHIEVEMENT FOR EACH INDICATOR



Those indicators showing that planning activities should be strengthened to ensure the smooth implementation of required actions.[15] The PSCs must have a decision-making algorithm for emergency patient rescue and implement the process of determining or selecting patients who are prioritized to receive treatment first (triage).[16] The PSCs must prepare necessary improvement to support their human resources, including for wage/benefits/insurance; provide training related to emergency patient management; make emergency patient management their main task; and provide facilities needed to manage emergency situation.[17] It is necessary for the PSCs to strengthen the program for the use of these indicators to ensure that programs can be implemented and information can be well-documented. The PSCs need to establish programs for this indicator to ensure the capacity of PSC staff remains good.[18] The small number of PSCs that collaborate with other

institutions may link to the fact that this collaboration is regulated at the national level and it could be that the PSCs feel that they do not need to create their own collaboration network.[19] PSCs need to strengthen programs related to this indicator to ensure that all medical emergency information can be shared to other medical emergency organizations to increase effectiveness and response time.[20] The PSCs need to strengthen programs related to these indicators to ensure that all algorithms can be used in various PSCs to ensure that their actions will be the same in all regions.

PSC 119 should improve its collaboration to coordinate with the emergency service in hospitals through the Public Health Office.[21] PSCs should conduct monitoring evaluations for continuous improvement. Collaborations have been arranged at the national level and PSCs feel that they do not need to collaborate on their own. PSC

119 should improve their medical emergency recovery program, starting from receiving report to the ambulance trip to take patients to health facilities and ensure that patient's medical report is made for medical emergency recovery.[22] It is also important to ensure that reports are complete and standardized in all PSCs. PSC 119 should conduct investigations/analysis of emergency patient cases and use the results of the investigation/ analysis to improve the emergency system. PSC 119 should conduct reviews on emergency management activities and make program follow-up plans for continuous improvement.[23] PSC 119 should have a program to improve the quality of medical emergency services and improve the service system performance audits that are currently not done by most PSCs. Structured program plans for handling high risk cases can ensure that all risks are identified and rated so that correct methods of conduct can be decided and made into an implementation program. This identification can be utilized as information in developing an appropriate emergency guide.[24] Identification for emergency patient care of certain conditions are a concern in planning rescue actions.[25] Appropriate written controls listed as guidelines can reduce death and disability risk in patients.[12] Emergency patient management handling and hospital referral systems need other integrated systems such as communication; ambulance transporting systems; as well as hospital referral systems that require comprehensive coordination.[11]

CONCLUSION

From this study, based on the implementation of emergency management in 88 PSCs in 21 provinces in Indonesia, there are still gaps that should be addressed to achieve good emergency management systems. The results of this assessment study on the 8 aspects and 28 management criteria, demonstrate it is apparent that improvements should be made in emergency management to achieve continuous improvements. This is especially true for indicators that have an average value below the overall average value for all study participating organizations, which includes collaboration among medical emergency collaboration (49.3), multi-group decision and action algorithm (58.3), hospital response (58.0), and recovery response and post-accident reporting (57.7). These indicators need special attention to enable continuous improvement.

In addition, data collected in this study can be used as the reference for initial identification of the parts of the emergency management system that still need to be improved in other PSCs.

A limitation in this study is the number of respondents that represents only 88 PSCs from all 251 PSCs available. For future research, more data is essential in order to have a more appropriate and comprehensive picture of the current state of the implemented management systems.

ACKNOWLEDGMENTS

The authors thank to the participations of PSCs across Indonesia for their participation in this study. The authors would like to thank Universitas Indonesia for funding this research through UI Grant with contract number NKB-0137/UN.R3.1/HKP.05.00/2019

References

- 1 Larsson P, Dekker SWA, Tingvall C. The need for a systems theory approach to road safety. *Saf Sci*. 2010. <https://doi.org/10.1016/j.ssci.2009.10.006>
- 2 Singletary EM, Zideman DA, De Buck EDJ, Chang WT, Jensen JL, Swain JM, et al. Part 9: First Aid: 2015 international consensus on first aid science with treatment recommendations. *Circulation*. 2015. <https://doi.org/10.1016/j.resuscitation.2015.07.047>
- 3 Blackwell TH, Kaufman JS. Response time effectiveness: Comparison of response time and survival in an urban emergency medical services system. *Acad Emerg Med*. 2002. <https://doi.org/10.1197/aemj.9.4.288>
- 4 Paciarotti C, Cesaroni A, Bevilacqua M. The management of spontaneous volunteers: A successful model from a flood emergency in Italy. *Int J Disaster Risk Reduct*. 2018. <https://doi.org/10.1016/j.ijdrr.2018.05.013>
- 5 Pal I, Ghosh T, Ghosh C. Institutional framework and administrative systems for effective disaster risk governance – Perspectives of 2013 Cyclone Phailin in India. *Int J Disaster Risk Reduct*. 2017. <https://doi.org/10.1016/j.ijdrr.2017.01.002>
- 6 Hambridge NB, Howitt AM, Giles DW. Coordination in crises: Implementation of the national incident management system by surface transportation agencies. *Homel Secur Aff*. 2017. <https://www.hsaj.org/articles/13773>

- 7 Bachmann DJ, Jamison NK, Martin A, Delgado J, Kman NE. Emergency preparedness and disaster response: There's an app for that. *Prehospital and Disaster Medicine*. 2015. <https://doi.org/10.1017/S1049023X15005099>
- 8 WHO. NONCOMMUNICABLE DISEASES. 2018. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=WHO.+NONCOMMUNICABLE+DISEASES.+2018&btnG=
- 9 Othman SH, Beydoun G. A metamodel-based knowledge sharing system for disaster management. *Expert Syst Appl*. 2016. <https://doi.org/10.1016/j.eswa.2016.06.018>
- 10 Roberts PS, Wernstedt K. Decision Biases and Heuristics Among Emergency Managers: Just Like the Public They Manage For? *Am Rev Public Adm*. 2019;49(3):292–308. <https://doi.org/10.1177/0275074018799490>
- 11 Power N. Extreme teams: Toward a greater understanding of multiagency teamwork during major emergencies and disasters. *Am Psychol*. 2018. <https://doi.org/10.1037/amp0000248>
- 12 McGrady E, Blanke SJ. Twelve Best Practices to Mitigate Risk Through Continuity Planning and a Scorecard to Track Success. *J Manag Policy Pract*. 2014. http://www.digitalcommons.www.na-businesspress.com/JMPP/McGradyE_Web15_3_.pdf
- 13 Mojtahedi M, Oo BL. Critical attributes for proactive engagement of stakeholders in disaster risk management. *International Journal of Disaster Risk Reduction*. 2017. <https://doi.org/10.1016/j.ijdrr.2016.10.017>
- 14 Lestari F, Bowolaksono A, Yuniatami S, Wulandari TR, Andani S. Evaluation of the implementation of occupational health, safety, and environment management systems in higher education laboratories. *J Chem Heal Saf*. 2019 <https://doi.org/10.1016/j.jchas.2018.12.006>
- 15 Üster H, Wang X, Yates JT. Strategic Evacuation Network Design (SEND) under cost and time considerations. *Transp Res Part B Methodol*. 2018 <https://doi.org/10.1016/j.trb.2017.11.010>
- 16 Li N, Sun M, Bi Z, Su Z, Wang C. A new methodology to support group decision-making for IoT-based emergency response systems. *Inf Syst Front*. 2014. <https://link.springer.com/article/10.1007/s10796-013-9407-z>
- 17 Bachman SL, Demeter NE, Lee GG, Burke R V., Valente TW, Upperman JS. The impact of trauma systems on disaster preparedness: A systematic review. *Clin Pediatr Emerg Med*. 2014. <https://doi.org/10.1016/j.cpem.2014.09.004>
- 18 Khazai B, Anhorn J, Burton CG. Resilience Performance Scorecard: Measuring urban disaster resilience at multiple levels of geography with case study application to Lalitpur, Nepal. *Int J Disaster Risk Reduct*. 2018. <https://doi.org/10.1016/j.ijdrr.2018.06.012>
- 19 McGuire M, Silvia C. The effect of problem severity, managerial and organizational capacity, and agency structure on intergovernmental collaboration: Evidence from local emergency management. *Public Adm Rev*. 2010;70(2):279–88. <https://doi.org/10.1111/j.1540-6210.2010.02134.x>
- 20 Brennan RJ. Rapid health assessment in Aceh Jaya District, Indonesia, following the December 26 tsunami. *Emerg Med Australas* [Internet]. 2005;17(4):341–50. Available from: <http://doi.wiley.com/10.1111/j.1742-6723.2005.00755.x>
- 21 Holgersson A. Review of On-Scene Management of Mass-Casualty Attacks. *J Hum Secur*. 2016 <https://doi.org/10.12924/johs2016.12010091>
- 22 Sabra JP, Cabañas JG, Bedolla J, Borgmann S, Hawley J, Craven K, et al. Medical support at a large-scale motorsports mass-gathering event: The inaugural formula one united states grand prix in Austin, Texas. *Prehosp Disaster Med*. 2014 <https://doi.org/10.1017/S1049023X14000636>
- 23 Hu J, Chen C, Kuai T. Improvement of emergency management mechanism of public health crisis in rural china: A review article. *Iranian Journal of Public Health*. 2018. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5810378/>
- 24 Paton, D. (2003) 'Disaster preparedness: A social-cognitive perspective', *Disaster Prevention and Management: An International Journal*. <https://doi.org/10.1108/09653560310480686>
- 25 Thaler, T. and Seebauer, S. (2019) 'Bottom-up citizen initiatives in natural hazard management: Why they appear and what they can do?', *Environmental Science and Policy*. <https://doi.org/10.1016/j.envsci.2018.12.012>