

Short Communication

Simulated transport time to nearest level 1 trauma center in eastern Gyeongnam province, Korea

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Received: 06 November 2018

Accepted: 12 December 2018

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ABSTRACT

Severe traumatic patients should be transported to level 1 trauma center within one hour. We investigated simulated transport time and distance from eastern Gyeongnam province to nearest level 1 trauma center in South Korea. This scenario was simulated on web mapping service. Transport time and distance was measured by motor vehicle. We decided that one hour is optimal for appropriate trauma care. Estimated transport time were 40 min, 48 min, 55 min and 1 hour 8 min, respectively (Gimhae, Yangsan, Changwon and Miryang). Nearest level 1 trauma center was Pusan National University Hospital outside Gyeongnam province. Transport of traumatic patient was based on real transfer time above administrative district.

Keywords: Trauma center, Transport time, Korea

INTRODUCTION

Trauma is the second main cause of death in people aged between 10 and 40 years in South Korea. Suicide is the first leading cause in that age.¹ Gyeongnam (Gyeongsang-namdo) province is located in southeast part of Korean peninsula. It has 3.5 million populations and 10537.97 km².² Ministry of health and welfare designated level 1 trauma center in nationwide, total 14 hospitals since 2011.³ We investigated that simulated transport time and distance to level 1 trauma center in eastern Gyeongnam province, South Korea.

METHODS

This study was simulated on scenario. We hypothesized that ambulance transported patient from downtown to nearest level 1 trauma center in eastern Gyeongnam province.³ Three main trauma centers and four cities were included in this scenario. Two of level 1 centers are located outside Gyeongnam province. We assumed that

appropriate trauma care should be performed within one hour. Transport time and distance were calculated by internet mapping service.

RESULTS

Estimated arrival time from each cities to nearest level 1 trauma center is 40 min, 48 min, 55 min and 1 hour 8 min, respectively (Gimhae, Yangsan, Changwon and Miryang). The distance and time to nearest level 1 trauma center were listed in Table 1. Nearest level 1 trauma center was Pusan National University Hospital outside Gyeongnam. Miryang city has no level 1 trauma center with one hour transport time.

DISCUSSION

Traumatic injury is the major cause of death especially in young population.⁴ South Korea had 28,359 victims of trauma in 2007.⁵ Ministry of health and welfare declared that reduce mortality of trauma and establish transfer

system since 2011.⁶ Gyeongnam province has relatively large territory and population. Gyeongsang national university hospital is the only level 1 trauma center in Gyeongnam province. It is located in Jinju city, western part of Gyeongnam province. Eastern region of

Gyeongnam is concentrated in factories and workers. Therefore, lots of accidents happened from industrial complex. Level 2 or 3 trauma center is not suitable for these severe injured patients. The Injury Severity Score (ISS) is commonly used for access of traumatic patient.⁷

Table 1: The simulated transport time and distance from city to level 1 trauma center in eastern Gyeongnam province.

City	Population	Level 1 trauma center	Distance(kilometers)	Expected transport time
Changwon	1,072,657	Gyeongsang Univ. Hosp.	69.67	1 hour 6 min
		Ulsan Univ. Hosp.	101.89	1 hour 52 min
		Pusan Univ. Hosp.	40.44	55 min
Gimhae	551,450	Gyeongsang Univ. Hosp.	92.16	1 hour 12 min
		Ulsan Univ. Hosp.	79.96	1 hour 25 min
		Pusan Univ. Hosp.	24.09	40 min
Yangsan	345,055	Gyeongsang Univ. Hosp.	105.47	1 hour 25 min
		Ulsan Univ. Hosp.	64.10	1 hour 10 min
		Pusan Univ. Hosp.	32.77	48 min
Miryang	109,599	Gyeongsang Univ. Hosp.	91.93	1 hour 32 min
		Ulsan Univ. Hosp.	81.95	1 hour 46 min
		Pusan Univ. Hosp.	61.56	1 hour 8 min

The causes of trauma are various like falls, burn, blast, gunshot and unintentional motor vehicle injury.⁸ Gunshot is extremely rare in South Korea because permission of gun is not common.

Many nuclear reactors are operated for electrical demand in South Korea.⁹ Gori nuclear power plant is 15km far from eastern Gyeongnam province border.¹⁰ This region could be influenced in case of accident. Eastern Gyeongnam province is close to Haeundae beach, famous tourist destination.¹¹ Various traumatic emergency could happen in eastern Gyeongnam province.

We suggest three kinds of solution for this problem.

First, additional level 1 trauma center is constructed in eastern Gyeongnam province. This is most ideal, but it requires plenty of budgets for medical personnel, equipment, and device.

Second, minimize transport time by efficient traffic access. For example, establish rescue system or road condition.

Third, transport the patient to neighborhood province regardless of administrative district. This is most cost effective way. Local government should collaborate to share their resources.

CONCLUSION

Eastern Gyeongnam province has no optimal level 1 trauma center within one hour transport. Therefore, additional trauma center or collaboration with nearby region is necessary.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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Cite this article as: Kim YH. Simulated transport time to nearest level 1 trauma center in eastern Gyeongnam province, Korea. *Int J Community Med Public Health* 2019;6:437-9.