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Regionalization of pediatric emergency care in Korea

Do Kyun Kim, MD

Department of Emergency Medicine, Seoul National University College of Medicine, Seoul, Korea

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Corresponding author: Do Kyun Kim, MD
Department of Emergency Medicine, Seoul National University College of Medicine, 101 Daehak-ro, Jongno-gu, Seoul 110-744, Korea
Tel: +82-2-2072-3257, Fax: +82-2-741-7855
E-mail: birdbeak@snuh.org

In order to care for an ill or injured child, it is crucial that every emergency department (ED) has a minimum set of personnel and resources because the majority of children are brought to the geographically nearest ED. In addition to adequate preparation for basic pediatric emergency care, a comprehensive, specialized healthcare system should be in place for a critically-ill or injured victim. Regionalization of healthcare means a system providing high-quality and cost-effective care for victims who present with alow frequency, but critical condition, such as multiple trauma or cardiac arrest. Within the pediatric field, neonatal intensive care and pediatric trauma care are good examples of regionalization. For successful regionalized pediatric emergency care, all aspects of a pediatric emergency system, from pre-hospital field to hospital care, should be categorized and coordinated. Efforts to set up the pediatric emergency care regionalization program based on a nationwide healthcare system are urgently needed in Korea.

Key words: Emergency services, Pediatric, Regional hospital, Korea

Introduction

Despite a gradual reduction in the pediatric population in Korea due to low birth rates, the number of children's visits to emergency departments (EDs) each year has been increasing[1]. According to the National Emergency Department Information System (NEDIS) data from 2008, the percentage of pediatric patients who visited EDs was about 31.2% of total ED patients (Fig. 1)[2]. This figure is larger even considering a proportion of pediatric aged population (<19 years) in Korea (23.8%) and higher than that of US data[3].

However, a significant number of children who visit an ED do not receive appropriate level of care and are pushed back on the priority list. This is because their symptoms are usually relatively mild compared to that of adult patients, and the care of children in ED is considered very time-consuming and cumbersome. Recently, due to a decreased number of pediatric residents, who are responsible for the care of the majority of pediatric patients in ED, the neglect of pediatric patients in ED has become an increasing concern. This situation is also exacerbated due to a lack of sufficient numbers of emergency physicians having adequate knowledge and skill to care of children.

Current state of pediatric emergency medicine in Korea

The results of a survey by the Korean Society of Pediatric Emergency Medicine in April 2010 revealed a lack of preparation for pediatric emergency care throughout the country[4]. Among 81 EDs that responded to the survey, only a quarter were equipped with pediatric emergency carts, and just about 60% of the EDs had pediatric endotracheal tubes for every age. Intraosseous needles which are essential for vascular access in critically-ill children were prepared only in 40% of the EDs. Moreover, the nighttime or weekend consultations to pediatric departments were mainly addressed by relatively inexperienced resi-

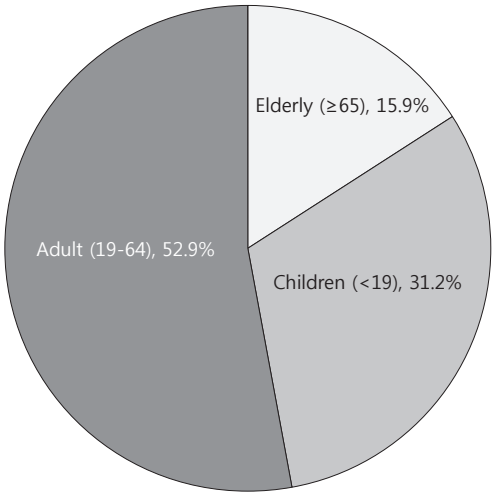

Fig. 1. Emergency department visits by age, 2008.

dents (first- and second-year). Monitoring services for children sedated for radiologic studies were not available in 53.1% of the EDs. The survey showed that a huge unpreparedness exists in current pediatric emergency service in Korea.

An analysis of the NEDIS data for 3 years, from 2006 to 2008, provides us an estimate of the point of preparedness for pediatric emergency care in Korea[2]. The main reason for seeking pediatric ED was different between age groups. For children younger than 9 years, fever was a major complaint, while abdominal pain and headache were the most common symptoms for children over the age of 10. Admission to the hospital was required in 15% of patients, and the admission rate was above 20% in infants younger than 1 year. During the 3 years, about 6,000 patients were critically ill or injured so as to require care in intensive care units (an average of 16 patients per day).

Need for regionalization in pediatric emergency care

Originally, the emergency medical system was initiated to provide proper care for adult patients, and the need for pediatric emergency care has not been met adequately for a long time. The resources that need to be established for pediatric patients who visit the ED are different from those needed for adult patients. For adequate care for children, experienced staff, who understand the anatomical and physiological differences between adults and children is needed. Considering the growth and development of children, emergency medical equipment and appliances of various appropriate sizes must also be prepared. Moreover, a child-friendly environment, preferably separated from adult patients, is strongly recommended in order to reduce the psychological trauma and discomfort to the child.

A comprehensive and regionalized system should be prepared, in addition to proper preparation for basic pediatric emergency care. Without specialized pediatric emergency and critical care, the outcome of critical pediatric illnesses is poor[5,6]. In reality, it is impossible that all EDs can be made ready to support high-quality pediatric emergency care. The occurrence of serious pediatric emergency cases is not only relatively low compared to adult cases, but also the pool of experts for pediatric advanced care is limited. Especially in Korea, the facilities and human resources for the pediatric field are greatly limited. Considering both cost-effectiveness and efficiency, a critically-ill or severely-injured child should be transferred to a specified referral center, which can take a charge of the definite treatment[7]. In addition, a child who needs a special procedure such as air-reduction or endoscopic foreign body removal, should be directed to a center with adequate personnel and equipment without delay.

The term "regionalization" in healthcare refers to the development of a structured system of care "to improve patient outcomes by directing patients to facilities with optimal capabilities for a given type of illness or injury"[8]. Historically, the landmark report 'Accidental Death and Disability: The Neglected Disease of Modern Society'[9] has been a powerful driving force for regionalization in the United States (US) since the 1970s. Regionalization improves patient outcomes through 2 primary mechanisms: specialized care at high-volume, high-specialty centers and increased coordination of care within a given geographic area[10]. The first successful model for regionalization is a trauma care system in the US. There is substantial evidence that regionalization of services to designated hospitals with greater experience improves outcomes and reduces costs of care for severely injured patients[11,12]. Although the number of studies addressing pediatric experience of trauma centers is limited compared to adult trauma centers, the main results are that regionalized pediatric trauma system reduced the mortality of pediatric patients with severe damage[13,14]. Another successful regionalization model in pediatrics is neonatal care system. All hospitals cannot be prepared to house neonatal intensive care units (NICUs) for a fraction of complex preterm neonate. With regard to consideration of efficiency, the US and European countries have operated a regionalized NICU, which is invested in facilities and personnel. Substantial data from NICUs in these regions showed that NICU regionalization programs contributed to a low infant mortality[15,16].

Regionalization of pediatric emergency care

The 2006 Institute of Medicine (IOM) Report "Emergency Care for Children: Growing Pains" concluded that pediatric emergency care is uneven in the US[17]. Fifty percent of all US EDs see fewer than 10 pediatric patients per day. In the US, a comprehensive and definite care for critically-ill or injured pediatric emergency cases has been performed mainly at 226 children's hospital and 170 trauma

centers with pediatric capabilities. As a categorization model for the regionalization of pediatric emergency care, the Emergency Department Approved for Pediatrics (EDAP) model was established in Los Angeles County in 1985[18]. In this model, only those hospitals meeting requirements as an EDAP in Los Angeles County could receive children brought in by emergency medical services (EMS). However, parents or guardians usually transport their child directly, by themselves, rather than by using EMS system and they tend to visit the ED nearest to their home, and not necessarily one with pediatric capabilities. This is referred to as one of the barriers to developing the regionalized network of pediatric emergency care in the US[10].

Based on previous reports[8,10,17], there are some suggestions for success of the regionalization of pediatric emergency care in Korea. First of all, the appropriate categorization should be achieved in all areas in pediatric emergency care. While a transfer of patient by EMS must be achieved according to a level of patient's acuity, properly assessed at pre-hospital field, a critically-ill child should be transferred to an ED with staffed with certified personnel and equipment. Training and continuing education of pediatric emergency care for EMS providers should be introduced as an essential EMS education course and the classification of pediatric patients must be made using well-established protocols. Information from emergency information center should also be properly matched with the patient's severity level, along with efforts to better inform the community about the level of critical care and services available for pediatric emergency care at the ED within a region.

The categorization of EDs according to their capability for pediatric emergency care is essential for a successful regionalization program. To eliminate controversies, the development of categories should be evidence-based and supported by multidisciplinary expertise. Further, as the IOM report recommended, the coordination of all elements of child healthcare from an EMS system to hospital care, should be governed by legislation and be followed as a matter of policy. A process of accreditation, to dedicate and approve a healthcare facility as a specialized provider of pediatric care from a certifying authority, is also required. In this respect, the current "pediatric exclusive emergency department projects" conducted by Ministry of Health and Welfare should be reviewed. The role of the pediatric exclusive ED in the current project is not a comprehensive regional pediatric emergency center for resource-intensive care of critically-ill children, but rather just a well-equipped pediatric ED without a higher level function. Rather, a flock of children with low acuity to the center could make a delay of adequate care for critically-ill patient. This program has been initiated without a sufficient thought and long-term planning, and is focused only the facilities and equipment supply. Actually, it does not provide a plan for managing the human resource, which is the most important factor for the success of pediatric emergency care system.

One of the concerns surrounding regionalization of pediatric emergency care is that transfer of too many patients from community hospitals would reduce the chance of appropriate pediatric care, raising the concern that there may be an eventual degradation of the quality of pediatric emergency care in whole community. However, the basis for regionalization is that all emergency center scaring for pediatric patients must be prepared to some baseline extent. Further, regionalized systems need a back-transport of patients to non-specialty hospitals after they have been stabilized and their condition improved. Parents or guardians may be reluctant to back-transport, because of their comfort and belief in the high level hospital[19]. However, if not supported by a re-distribution system, the referred hospital could become crowded with patients awaiting treatment.

Other aspects to be addressed in establishing regionalization are a specialist on-call system and financial incentives. It may be difficult to get the on-call personnel to come to the ED, even though their privacy has been compromised by calling them directly, since financial incentives for their participation in emergency care cannot be provided easily under current Korean health insurance policies. For these reasons, it has become increasingly difficult for EDs to find specialists who will be ready for on call for the ED, and the resulting shortage of on-call specialists in pediatric emergency care leads to sometimes tragic results. Currently, the Korean Society of Pediatrics and the Korean Society of Emergency Medicine have been carrying out some efforts to increase medical insurance fees for emergency and pediatric areas. In addition to an introduction of appropriate medical fees, a special compensation and/or financial incentives must be offered to regional pediatric emergency centers to attract highly qualified pediatric emergency care personnel.

Summary

The pediatric emergency care system in Korea is still in its infancy. We took a first step towards understanding the basic status of pediatric emergency care and for determining its preparedness in providing adequate pediatric emergency care. Many resources have been focused on pediatric emergency care regionalization in some developed countries. We need to take some different regionalization strategies in consideration of the different circumstances in medical practices in Korea. To do so, medical personnel, resources, and facilities that are closely related to pediatric emergency care should be identified and adequately categorized before implementation of a regionalization system. Based on this, information in all phases of emergency medical systems, including data from patients, paramedics, and hospitals, should be collected and share efficiently for building an information

system in regionalization. A win-win strategy, to create a bi-directional flow of the patient between referral center and referring community hospitals that participate in the regionalization should be established. Efforts to set up a pediatric emergency care regionalization program based on the national healthcare system are urgently needed. The first step to building a safe and effective pediatric emergency system will be made possible through regional networks of health care.

References

1. Yoo I, Her T, Shin SD. (Ministry of Health and Welfare Report, Seoul, Korea). The basic study for a solution program of emergency department overcrowding. Seoul: Ministry of Health and Welfare, 2007:1-330.
2. Jang HY, Kim DK, Kwak YH. Use of pediatric emergency department in Korea: nation-wide data analysis [abstract I2H2-6]. In: The Korean Society of Emergency Medicine 2010 Fall Scientific Meeting; 2010 Oct 21; Seoul, Korea. Seoul; Korean Society of Emergency Medicine; 2010.
3. Niska R, Bhuiya F, Xu J. National Hospital Ambulatory Medical Care Survey: 2007 emergency department summary. Natl Health Stat Report 2010;(26):1-31.
4. Lee SJ, Kim HB, Kim DK, Kwak YH. A national survey of current practice pattern and preparedness of pediatric emergency care in Korea [abstract I2H2-1]. In: The Korean Society of Emergency Medicine 2010 Fall Scientific Meeting; 2010 Oct 21; Seoul, Korea. Seoul; Korean Society of Emergency Medicine; 2010.
5. Ramenofsky ML, Luterman A, Quindlen E, Riddick L, Curreri PW. Maximum survival in pediatric trauma: the ideal system. J Trauma 1984; 24:818-23.
6. Pollack MM, Alexander SR, Clarke N, Ruttimann UE, Tesselaar HM, Bachulis AC. Improved outcomes from tertiary center pediatric intensive care: a statewide comparison of tertiary and nontertiary care facilities. Crit Care Med 1991;19:150-9.
7. Menke TJ, Wray NP. When does regionalization of expensive medical care save money? Health Serv Manage Res 2001;14:116-24.
8. Institute of Medicine, Committee on the Future of Emergency Care in the United States Health System, Board on Health Care Services. Emergency medical services at the crossroads. Washington, DC: National Academies Press, 2007.
9. National Research Council (US), Committee on Trauma; National Research Council (US), Committee on Shock. Accidental death and disability: the neglected disease of modern society. Washington, DC: National Academy of Sciences, National Research Council, 1966.
10. Lorch SA, Myers S, Carr B. The regionalization of pediatric health care. Pediatrics 2010;126:1182-90.
11. MacKenzie EJ, Rivara FP, Jurkovich GJ, Nathens AB, Frey KP, Egleston BL, et al. A national evaluation of the effect of trauma-center care on mortality. N Engl J Med 2006;354:366-78.
12. MacKenzie EJ, Weir S, Rivara FP, Jurkovich GJ, Nathens AB, Wang W, et al. The value of trauma center care. J Trauma 2010;69:1-10.
13. Potoka DA, Schall LC, Gardner MJ, Stafford PW, Peitzman AB, Ford HR. Impact of pediatric trauma centers on mortality in a statewide system. J Trauma 2000;49:237-45.
14. Hulka F, Mullins RJ, Mann NC, Hedges JR, Rowland D, Worrall WH, et al. Influence of a statewide trauma system on pediatric hospitalization and outcome. J Trauma 1997;42:514-9.
15. Rautava L, Lehtonen L, Peltola M, Korvenranta E, Korvenranta H, Linna M, et al. The effect of birth in secondary- or tertiary-level hospitals in Finland on mortality in very preterm infants: a birth-register study. Pediatrics 2007;119:e257-63.
16. Neto MT. Perinatal care in Portugal: effects of 15 years of a regionalized system. Acta Paediatr 2006;95:1349-52.
17. Institute of Medicine (US), Committee of the Future of Emergency Care in the US Health System. Emergency care for children: growing pains. Washington, DC: National Academies Press, 2006.
18. Los Angeles Pediatric Society. Information Handbook for Emergency Departments Approved for Pediatrics and Pediatric Critical care Centers. Los Angeles, CA: Los Angeles Pediatrics Society, 1984.
19. Donohue PK, Hussey-Gardner B, Sulpar LJ, Fox R, Aucott SW. Parents' perception of the back-transport of very-low-birth-weight infants to community hospitals. J Perinatol 2009;29:575-81.