Summary

The Establishment and Operation of Emergency Medical Centers

- Objective:
  - To scrutinize the status of operating and managing emergency medical services delivered in the phases of transfer and treatment of patients
- Duration: 36 days (October 18 – December 6, 2017)

1. Overview

With a view to protecting citizens' lives and health by providing them with prompt and appropriate emergency medical services in emergency situations, the government has been developing advanced emergency medical service systems through various quantitative measures: Starting off with establishing the *Emergency Medical Service Act* in 1994, the government expanded the size of the Emergency Medical Service Fund from 1.7 billion KRW (approximately 1.7 million USD) in 1995 to 328 billion KRW (approximately 328 million USD) in 2016. Also, those medical institutions that satisfy the strengthened requirement for the numbers of emergency medical personnel and facilities have been designated as government-certified emergency medical centers.

Despite these efforts, the concern over the appropriate delivery of emergency medical services has been on the rise. With the explosion of the number of patients visiting emergency rooms, which exceeded 10 million each year (i.e., 1.07 million persons in 2016), the number of medical accidents also escalated: In many cases, there was a delay in transporting emergency patients to an emergency room, and patients could not get treated appropriately in the course of inter-hospital transfer. The preventable death rate of people with bodily injury, which is the percentage of lives that could have been saved only if treated appropriately in a timely manner, recorded 30.5% in 2016, higher than that of other advanced countries.

In September 30, 2016, a two-year old child was transferred to an emergency room in Jeonju City, Jeollabuk-do, after getting severely injured in a car crash. The child, however, was not provided with appropriate emergency medical treatment and transferred to another hospital. After being unable to receive emergency care there, too, the child lost his/her life. Afterwards, on October 28, 2016, a petition* was filed (jointly submitted by AA and AB) to the Board of Audit and Inspection (BAI) against this case. They requested BAI to examine whether the Ministry of Health and Welfare (MoHW) investigated this case thoroughly, and issued proper administrative orders to the right institutions and/or persons.

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* Translator's Note: Citizens can request BAI to conduct an audit on the matters that are deemed to have harmed the public good, when (1) the implementation of public policies and projects are delayed because of institutional or administrative self-interest, (2) public measures and systems need to be improved because they are irrational, and (3) public institutions break the law while conducting their work or use unfair practices thereby causing undue harm to the public good. To file an audit request for public interests, a petition signed by more than 300 citizens over 19 should be submitted to BAI.

Summary

As requested, BAI reviewed the problems explained in the petition. Furthermore, it scrutinized whether the emergency medical service system has been operating properly by looking into: (1) how emergency patients have been transported to emergency rooms and treated after arrival; and (2) how the subsidies for emergency medical services have been spent. Also, in order to see how emergency rooms normally operate, BAI auditors conducted field investigations into emergency medical centers, as well as their medical personnel with the consent of the MoHW and the National Medical Center (NMC), and conducted polls among medical personnel together with paramedics.

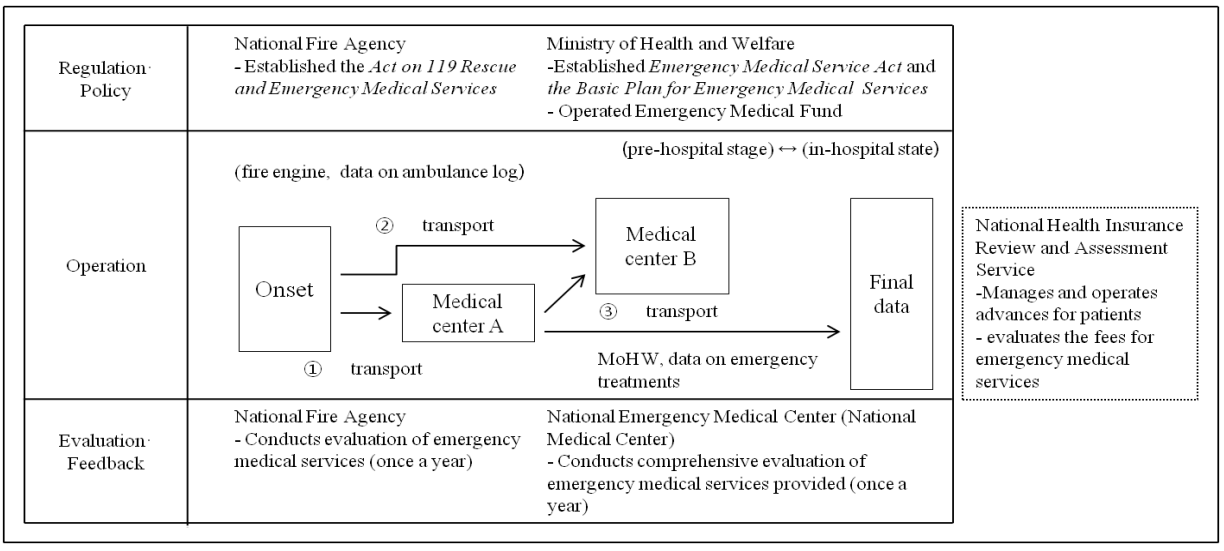
Having in mind that this audit requires a high level of medical expertise, BAI sought expert opinions on the findings of this audit from emergency medicine experts. This audit was conducted from October 18 to December 6, 2017, on the MoHW, the National Fire Agency (NFA), the National Medical Center, the National Health Insurance Review and Assessment Service, and Jeonbuk National University Hospital together with Jeonnam National University Hospital, where the medical accident of the two-year old child described above had taken place in September 2016.

2. Depiction of audited matters

(1) Concept and structure of emergency medical service

Emergency medical service refers to the treatment provided to an emergency patient in the forms of consultation, rescue, transport, and first aid treatment from the point of time when an emergency case is found to the point where the patient's life is saved or the significant factors threatening the patient's bodily/mental health are removed. The emergency medical service system can be categorized into two phases, depending upon the place of service: pre-hospital phase and in-hospital phase. Pre-hospital service refers to the on-sight first-aid treatment provided upon the arrival of an ambulance by request through an emergency call, while the in-hospital service includes the diagnosis/treatment offered at an emergency room as well as the transport of emergency patients from one hospital to another.

Figure 1. Emergency Medical Service System of South Korea



(2) Status of pre-hospital phase (transport of patients)

Emergency patients visit emergency medical institutions on foot, by personal car (76.5%) or 119 ambulance (18.5%). However, severe trauma patients use 119 ambulances the most (44%).

Table 1. Mode of Arrival to Emergency Medical Centers

(As of 2016, unit: no. of persons, %)

Category	119 ambulance	Commercial ambulance	On foot/ personal car	Helicopter	Other	Total
All emergency patients[1)]	820,765 (18.5)	204,193 (4.6)	3,387,548 (76.5)	3,387 (0.1)	12,501 (0.3)	4,428,394 (100.0)
Severe trauma patients [2)]	87,405 (44.3)	29,657 (15.0)	79,619 (40.4)	659 (0.3)	499 (2.5)	197,839 (100.0)

Notes:

1) Pursuant to Article 2 of the *Enforcement Rules of Emergency Medical Service Act*, those patients with non-emergency matters or illness/injury whose urgency was not determined are excluded.

2) It refers to those patients with less than 0.9 point of ICISS (ICD-based Injury Severity Score), which is calculated based on survival risk ratio derived from the codes of diagnosis.

For emergency patients, it is critically important to treat them within the golden hours[1] to heighten the likelihood of survival.[1] However, in reality, only 39.9% of severe trauma patients got to emergency rooms within golden hour (one hour) after onset, as of 2016.

Table 2. Number of Hours Taken by Severe Trauma Patients to Arrive at Emergency Medical Centers

(As of 2016, unit: no. of persons, %)

Category	Less than 1 hour	More than 1 hour, less than 3 hours	More than 3 hours, less than 6 hours	More than 6 hours	Unknown	Total
Number of patients (percentage)	79,006 (39.9)	44,096 (22.3)	19,100 (9.7)	51,765 (26.2)	3,872 (2.0)	197,839 (100.0)

[1] "Golden hours" refer to the period of time following a traumatic injury, during which there is the highest chance that medical/surgical treatment will prevent death. It is used interchangeably with "golden time." The golden hour varies depending upon the types of illness: for example, 30 minutes for myocardial infarction, 3 hours for cerebrovascular disease, and 1 hour for traumatic injuries.

(3) Status of In-hospital phase (treatment and inter-hospital transfer)

As can be seen in the "Annual Statistics of Emergency Medical Services" for 2016, which shows that 10,752,764 persons visited emergency rooms across the nation in the year, the number of patients visiting emergency rooms has been on a constant rise since 2009, when it exceeded ten million for the first time. Also, the number of patients with three major critical diseases increased by 1.56 times in 2016 compared to 2012, recording higher than the rate of the increase in the number of entire emergency patients (4.98%). Furthermore, due to the high rate of car accidents (1.9 persons died per 10,000 vehicles in 2015, the largest number among the OECD nations), one of the major causes of death in youth has been bodily injuries. It is thus inevitable to witness the demand for emergency medical services go up continuously.

Table 3. Number of Emergency Patients Per Year (2012-2016)

(Unit: no. of person)

Category	2012	2013	2014	2015	2016
Total number of patients who visited ER	10,243,040	10,186,341	10,419,983	10,343,985	10,752,794
Three major critical diseases	213,211	222,637	231,773	240,097	333,092
Acute myocardial infarction	24,889	26,208	28,711	30,651	32,724
Stroke	90,602	91,924	93,670	94,813	102,529
Severe bodily injury	97,720	104,505	109,392	114,633	197,839

(4) Status of the operation of Emergency Medical Service Fund

With a view to delivering emergency medical service effectively, the Emergency Medical Service Fund was established in 1995 with the financial resource collected through 50% of the penalties paid by the medical institutions recognized in the *National Health Insurance Act*. Later in 2003 and 2010, additional financial resource was added to the Fund from 20% of the penalties and fines collected through the *Road Traffic Act*. Aside from these government investments, which have been expanded over time, the Fund is operated based on its own revenues ― the paybacks of loan principals and the Fund operation ― and the roll-overs from the previous year's balance. Established with 1.7 billion KRW (approximately 1.7 million USD) in 1995, the Fund was enlarged in size to 291.4 billion KRW (approximately 291.4 million USD) in 2017. The purposes of this Fund include: to provide citizens with emergency medical service safety net, such as paying medical bills for emergency services on behalf of insolvent patients, and to support emergency medical institutions for resources needed on rescue scenes as well as transport processes.

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Table 4. Expenditures ofEmergency Medical Service Fund in 2013-2017

(Unit: 1,000,000 KRW, approx. 1,000 USD)

Category	2013	2014	2015	2016	2017
Total	220,901	218,105	242,291	248,455	291,421
Support for operation of emergency medical service system	207,465	207,157	229,205	230,937	219,879
Support for emergency medical safety net	15,091	19,122	26,871	35,103	28,864
Support for rescue operations	13,115	13,494	14,713	16,693	17,105
Supporting emergency medical institutions	130,042	123,053	135,015	137,437	131,274
Support for emergency medical service improvement	3,978	3,978	4,127	4,184	4,351
Support for operation system of 119 paramedics	41,595	44,422	45,102	33,355	32,620
Establishment of emergency medical information system	1,075	939	939	979	889
Establishment of response mechanism for new infectious disease	2,569	2,149	2,432	3,226	4,776
Other operational fees	13,436	10,948	13,086	17,518	71,542

3. Audit Result

As a result of auditing the establishment and operation of the emergency medical service system, it was found that: the administrative orders issued on some emergency medical personnel were inappropriate, and the supervision/oversight of inter-hospital transfer of emergency patients was also inappropriate. On May 31, 2018, BAI notified the MoHW to establish measures for improving the aforementioned matters, whose details are as follows.

① Inappropriate administrative orders on emergency medical personnel

After conducting an investigation into the case of the death of the child in Jeonju City in November 2016, the MoHW put forward a proposal for issuing an administrative order on the medical institution of the said case to the Central Emergency Medical Service Committee (CEMSC), and the Committee adopted it.

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False testimony about calling the doctors on-call: In September 2016, a pediatric patient visited Jeonbuk National University Hospital for treatment of his/her pelvic fracture injured from a car accident. At 6:31 p.m. that day, the hospital called two doctors who were on-call: one orthopedic surgeon and one trauma specialist. Unlike the trauma specialist, the orthopedic surgeon responded only through a phone call to give verbal direction on the patient two hours and 41 minutes later, at 9:12 p.m. When the MoHW investigated this case in October 2016, the university hospital testified that there was no call made to the orthopedic physician at all. Afterwards, there were several more chances for the hospital to correct its testimony, but it did not do so, repeating the same testimony at a hearing held on November 17. The hospital did not reverse its testimony until the MoHW made its final decisions for the case on November 30 of that year.

Insufficient fact-checking during field investigation: When investigating this case, the MoHW checked that there was a phone call at 9:12 p.m., but did not look up the call log for the emergency doctors on-call to ensure that there was no other phone calls made, thus missing the record of the phone call made at 6:31 p.m. At the end of the investigation, the Ministry concluded that there was no call for an orthopedic surgeon, as testified.

After holding an expert advisory group meeting with the wrong information, the MoHW placed this case before the CEMSC to propose that the university hospital be held accountable for the case, not mentioning the negligence on the side of the orthopedic surgeon. With the proposal adopted by the Committee, it took effect on November 30, 2016.

Insufficient follow-up investigation: On October 20, 2016, the Central Emergency Medical Service Committee decided to annul the designation of Jeonbuk National University Hospital as a certified regional emergency medical center. On the same day, the MoHW announced through a press release that it will conduct further investigation to establish measures for improving relevant systems, and also put forth additional administrative measures against medical personnel if an individual doctor is found to be responsible.

Nonetheless, the MoHW did not go any further. It conducted neither field inspection nor legal review to see if there had been any negligence of duty on the side of individual physicians, and if so, why. Instead, on October 25 and 26 that year, the Ministry only received affidavits from the chief physician responsible for the emergency room that day and the orthopedic surgeon on-call that the previous testimonies were all true.

After this, Jeonbuk National University Hospital, which furnished a misleading testimony around the emergency call, continued to bury the fact later on by not correcting it. Also, the MoHW's insufficient investigation led the CEMSC to not deliberate on the fault of the orthopedic physician who refused to treat an injured child even upon an emergency call, enabling the physician to dodge due punishment.

Summary

As a result of this audit, BAI **notified** the Minister of Health and Welfare to:

- ✓ review whether the orthopedic physician of Jeonbuk National University Hospital who refused to respond to a request from the emergency room for treating an emergency patient, without any justifiable reason, should be subject to punishment; and if so,
- ✓ establish appropriate measures to either revoke or suspend the physician's license; and
- ✓ find an appropriate responsive measure to punish the head of Jeonbuk National University Hospital for obstructing the MoHW's investigation with false affidavits and testimony, such as imposing a fine.

BAI also **warned** the Minister of Health and Welfare to ensure that their future investigations be conducted based on thorough fact-checking, so that no more disciplinary actions on emergency medical institutions and medical personnel will be deliberated based on false evidence.

In response, the MoHW established plans for: (a) verifying concealed facts; (b) and requesting the provincial and local governments with jurisdictional power over the university hospital for issuing administrative orders.

② Inappropriate supervision of additional inter-hospital transfer of emergency patients

The MoHW established the Emergency Medical Resource Information System (EMRIS) to help people in emergency situations receive swift and appropriate medical treatment. The system enables the heads of emergency medical institutions and ambulance operators to request and provide necessary emergency medical information on: (a) emergency room medical personnel, including emergency medicine physicians on-call, (b) the number of available beds in emergency rooms, (c) the lists of treatable illnesses/injuries, and (d) the status of emergency patients being treated as well as those transferred to other hospitals.

Also, as per Article 17 of the *Emergency Medical Service Act*, the MoHW evaluates how appropriately emergency medical institutions provide services to emergency patients. Then, the Ministry provides them with different levels of administrative or financial support to the emergency medical institutions in commensurate with the evaluation results.

Inappropriate supervision and oversight over managing the information on acceptability of critically-ill patients being taken to emergency rooms: "The Rules of Utilizing Emergency Medical Information" obliges each emergency medical institution's managers of such information to have knowledge on the conditions for accepting emergency patients; for instance, what kinds of and how many emergency specialists can avail themselves of treating which of the 11 major critical diseases at their emergency unit. They then input the information in the EMRIS periodically. If there are any changes made, such as the absence of a physician of a specific field, the EMRIS should be updated immediately to indicate the unavailability of the physician.

Meanwhile, the MoHW is supposed to monitor the EMRIS to oversee whether it has been

kept updated for smooth operation of emergency rooms and reflected the monitoring results in the evaluation of emergency medical institutions as a means to ensure reliability of the EMRIS.

To do this, the MoHW itemized each of the conditions to be entered in the EMRIS, including the number of beds available at emergency rooms. However, the availability of physicians was not itemized at all, making it impossible for the MoHW to evaluate whether emergency medical institutions are making due efforts to share important information on the (un)availability of its emergency medical personnel.

Noticing this, BAI examined the reliability of the EMRIS. It was found that the emergency medicine physicians for 11 critical diseases, who were listed in the EMRIS as "available" between September 2016 and March 2017, cumulatively traveled abroad on 4,558 instances during that period. However, only 4,057 cases (89%) of the vacancies were applied in the EMRIS, indicating the rest were "available."

Under these circumstances, there were instances where the 119 Emergency Control Center would guide ambulances to transport emergency patients to certain hospitals, which, according to the EMRIS, appeared available for treating patients. Once they arrived, however, the patients had to be re-transferred to other hospitals, as there were no physicians available there. It was difficult for emergency patients to receive timely and appropriate emergency treatment in many cases.

Absence of supervision and oversight of inappropriate transferring of emergency patients: Article 6 of the *Emergency Medical Service Act* stipulates that when emergency medical personnel receive a request for emergency medical services or find an emergency patient while on duty, they should immediately provide emergency medical services. They should neither refuse nor evade providing emergency medical services without justifiable grounds. Article 11 of the said law reads that "Where medical personnel deem the relevant medical institution is incapable of providing appropriate emergency medical services to an emergency patient within its capacity, they shall immediately transfer such patient to another medical institution capable of providing appropriate emergency medical services."

When an emergency patient is admitted to an emergency medical institution, but transferred to another hospital later, the MoHW assesses the propriety of the transfer and reflects the result in its evaluation toward the medical institution in question. However, in cases where a hospital transfers an emergency patient to another hospital without registering him/her, the Ministry has been neglecting its duties of supervising and overseeing emergency medical institutions by not establishing a set of criteria for assessing the propriety of the transfer, even though 33,650 such cases were made from 2015 to June 2017.

In connection with this, BAI looked into 2,387 cases where emergency patients were refused by the initial hospital on their arrival due to the "lack of available beds" and then re-transferred to another hospital. In 1,641 cases, the comprehensive data set for emergency

medical service confirmed that the re-transfer was due to the lack of available beds. BAI checked these cases against the EMRIS and found that those patients were refused by the hospitals even when the hospitals had available beds as indicated in the EMRIS. In a total of 599 cases (36.5%) from 2015 to June 2017, emergency patients were re-transferred to other hospitals due to the same reason: the hospitals of their initial arrival had available beds not indicated in the EMRIS.

These practices not only made some emergency patients unable to receive swift and appropriate emergency treatment, but they also required medical resources to be invested unnecessarily in transferring emergency patients.

Therefore, BAI **notified** the Minister of Health and Welfare to establish ways to evaluate whether:

- the hospital's manager for the EMRIS applies the acceptability of critical diseases/injuries appropriately in due course, and
- emergency medical institutions transferred emergency patients to other hospitals without any justifiable reason.

③ Inappropriate management and supervision of inter-hospital transfer by emergency medical institutions

The MoHW manages and supervises emergency medical institutions including regional emergency medical centers by evaluating their works, and the Central Emergency Medical Center is in charge of controlling inter-hospital transfers through its Inter-hospital Transfer Coordination Center (IHTCC).

Insufficient management and supervision of inappropriate inter-hospital transfer by regional emergency medical centers: According to the *Emergency Medical Service Act*, and the Terms of Reference of Regional Emergency Medical Centers, regional emergency medical centers should serve as the final medical destination of emergency patients, providing emergency patients with appropriate treatment until they are recovered from life-threatening risks or mental harm is removed. Emergency medical centers should not transfer patients visiting emergency rooms to other medical institution unless there is an exceptional reason, such as lack of medical resources.

When evaluating emergency medical institutions, the MoHW assessed the "propriety of inter-hospital transfer of emergency patients by regional emergency medical centers," but only based on a sample-testing approach. Moreover, even when an improper inter-hospital transfer is found, it has little impact on the evaluation of the emergency medical institution. With such insufficient supervision mechanisms, it has been difficult to induce regional emergency medical centers to stay in compliance with the principle "regional emergency medical centers should not transfer emergency patients in serious conditions."

In line with this, BAI conducted an analysis, over the last five months (from May to

September 2017), of a total of 711 cases where emergency patients had been transferred to other hospitals due to the "internal situations of emergency medical institutions," such as the lack of beds or intensive care units, and the unavailability of urgent surgical operation or more specialized operations. The result showed that in many cases, regional emergency medical centers transferred emergency patients without acceptable justifications, even when all necessary medical facilities, equipment, or personnel were readily available.

Absence of measures against the decline of accepting emergency patients from other hospitals by emergency medical institutions: In the aftermath of the death of the child in Jeonju City in December 2016, the MoHW decided to have the Inter-hospital Transfer Coordination Center (IHTCC) evaluate emergency medical institutions in terms of their acceptance rate of emergency patients transferred from other hospitals. However, it has not been as effective as intended because the Ministry has yet to include the acceptance rate of emergency patients transferred from other hospitals in the Evaluation Criteria for Medical Institutions, which the coordination center uses as a reference for evaluating emergency medical centers.

Consequently, among 3,705 emergency medical institutions, from which the IHTCC has requested inter-hospital transfers, only 1,266 institutions (34.2%) accepted emergency patients. In 130 out of 468 cases, regional emergency medical service centers refused such requests due to the lack of available beds in intensive care units. However, 95 (73.1%) out of the 130 cases were found in this audit to have actually had available beds. Nonetheless, the MoHW did not investigate, even in the form of a follow-up action, into the appropriateness of the decline by emergency medical institutions.

For these findings, BAI **notified** the Minister of Health and Welfare to establish measures for:

- effectively stemming inappropriate inter-hospital transfers by regional emergency medical centers through, for example, strengthening the evaluation mechanisms for examining the reasons of and the procedures for inter-hospital transfer; and
- managing emergency medical institutions' acceptance of transferred patients by reflecting the acceptance rate in the evaluation scheme.

In response, the Ministry of Health and Welfare did establish plans on adding an index of "appropriateness of inter-hospital transfer" to the Ministry's evaluation scheme for 2019.