

## Letter to the Editor

# Outcomes of patients with head injuries transported by a physician-staffed helicopter using the keyword method in Japan

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Dear Editor,

When a physician-staffed helicopter, commonly referred to as a “Doctor Helicopter” (DH), is dispatched in Japan to a predetermined rendezvous point near the scene, there are two dispatch subtypes. The first involves dispatch after emergency medical technicians (EMTs) establish a contractual agreement with the patient and assess the severity of the patient’s condition. The second subtype relies on keywords derived from the content of an emergency call to trigger early requests for DH dispatch, aiming to facilitate prompt medical intervention by physicians. Examples of keywords in emergency calls include unconsciousness, paralysis, suffocation, ongoing convulsion, and high-energy trauma. In our previous study, the keyword method was identified as a significant independent predictor of survival outcomes in patients evacuated by a DH.<sup>[3]</sup> However, this study did not delineate the specific types of diseases or trauma for which the keyword method proved most effective. In the prehospital care of patients with traumatic head injuries, early occurrences of hypoxia and hypotension are common and significantly impact survival. Early medical intervention by the DH emergency medical services may enhance outcomes for patients with head injuries by addressing hypoxia and/or hypotension in the prehospital setting. Consequently, we conducted a retrospective investigation into the outcomes of patients with head injuries transported by the DH, utilizing the keyword method based on Japan Doctor Helicopter Reporting System (JDERS) data.

Details of the dispatch activity were extracted from the JDERS database, including patient age and sex, cardiac arrest status at EMT contact, vital signs at DH staff contact, timing of DH dispatch request (pre-contact or post-contact with EMTs), head abbreviated injury scale (AIS), details of medical intervention, outcome (Cerebral Performance Category, CPC), and survival outcome at one month. Subjects were categorized into the Keyword (pre-contact) and Control (post-contact) groups, and variables were compared between the two groups.

In a dataset comprising 41,592 individuals, 3730 patients had head injuries. The Keyword group included 1999 individuals, while the Control group comprised 1731 individuals. No significant differences were observed between the two groups in terms of Glasgow coma scale (GCS), pulse rate, systolic blood

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pressure, CPC, and 1-month survival outcome. However, when comparing the Keyword group to the Control group, statistically significant higher values were noted in the incidence of cardiac arrest and the male-to-female ratio. The Keyword group also exhibited a lower average age, respiratory rate, head AIS, and fluid access rate compared to the control group. Multivariate analysis was conducted to investigate independent factors related to fatal outcomes. The results revealed that age (odds ratio [OR], 54.1; confidence interval [CI] [20.5–153.2],  $P < 0.0001$ ), head AIS (OR, 8.7; CI [4.0–19.2],  $P < 0.0001$ ), systolic blood pressure (OR, 0.03; CI [0.01–0.12]), and GCS (OR, 0.01; CI [0.01–0.03],  $P < 0.0001$ ) were identified as independent factors. However, the keyword method did not emerge as an independent factor. Similar results were observed in the analysis limited to severe head injuries with a GCS of 8 or less.

In this study, the benefits of early medical intervention for head injuries using the keyword method could not be substantiated. Until the DH staff took over the management of patients with head injuries, the EMTs had been responsible for their care. In Japan, EMTs are proficient in performing manual airway securing, providing oxygen, assisting ventilation with a bag-valve mask, achieving hemostasis for skin bleeding, and administering fluid resuscitation for unstable circulation if necessary.<sup>[1]</sup> In addition, Japanese EMTs are capable of providing advanced cardiac life support, including tracheal intubation, mechanical ventilation, and the infusion of adrenaline, for patients experiencing cardiac arrest. The recent introduction of advanced skills by EMTs has contributed to improvements in the outcomes of patients with cardiac arrest or trauma.<sup>[1]</sup> Consequently, patients with head injuries managed by these EMTs exhibited improvement in hypoxia or hypotension before the DH staff initiated medical interventions. These interventions included procedures such as tracheal intubation with sedatives and/or muscle relaxants, infusion of hemostatic drugs, administration of osmotic diuretics, anticonvulsants, and/or blood control drugs. As a result, the early medical interventions provided by the DH staff for patients with head injuries using the keyword method might not demonstrate improvement in patient outcomes. A previous study also demonstrated that the DH was not identified as a significant predictor of survival for patients with severe head injuries in comparison to patients transported by ground ambulances when utilizing the Japan Trauma Data Bank.<sup>[2]</sup>

### Informed consent

We did not obtain informed consent from the patient because we used JDRS. Instead, we provided the opportunity of optout.

### Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Journal or its management. The information contained in this article should not be considered to be medical advice; patients should consult their own physicians for advice as to their specific medical needs.

### Ethical approval

The research/study was approved by the Institutional Review Board at Juntendo Shizuoka Hospital, number 733, dated December 20, 2022.

### Declaration of patient consent

Patient's consent is not required as patients identity is not disclosed or compromised.

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### Conflicts of Interest

There are no conflicts of interest.

### Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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