Letter to the Editor

Upper limb movements and the risk of unplanned device removal in mechanically ventilated patients

Dear Editor,

In the coronavirus disease 2019 (COVID-19) outbreak, unplanned extubation is a threat due to viral spread.[1] Restricted staffing may increase the use of physical restraint or unnecessary deep sedation. Even in patients without COVID-19, 43% of nurses reported that physical restraints were used in more than 75% of mechanically ventilated patients.[2] Frequent upper limb movements are a threat for nurses because it may cause unplanned device removal. It is important to know the risks and how the upper limb contributes to bed-ridden patients. In this study, we measured upper limb movements in detail and the frequency of risk behavior related to unplanned device removal.

We conducted a single-center observational study at the intensive care unit of Tokushima University Hospital. We enrolled mechanically ventilated adults and excluded patients with physical restraints or Richmond Agitation–Sedation Scale (RASS) ≥3. A nurse monitored the upper limb movements for 1 h during the daytime shift. A series of movements were counted as one movement. Upper limb movements were classified into no-risk behavior or risk behavior, such as grabbing the intubation tube or catheter.

Eighty-two patients were enrolled. The mean age was 69 ± 12 years, 53 (65%) patients were men, and the median Acute Physiology and Chronic Health Evaluation II score was 19 (14–27). Opioids and sedatives were used in 42 (51%) and 32 (39%) patients, respectively. During the monitoring, median RASS was −2 (−1 to −3), maximum behavioral pain scale was 3 (3–4), and Confusion Assessment Method for the Intensive Care Unit was positive in 27/55 (49%) patients. Of the 82 patients enrolled, upper limb movements were observed in 49 (60%) patients with risk behaviors in 15 (18%) patients (Fig. 1A). There were 331 total movements with 27 (8%) risk movements such as grabbing the intubation tube (n = 26) or catheter (n = 1) (Fig. 1B). No-risk movements were classified into reaction (n = 268; 81%), expression (n = 16; 5%), and activity (n = 20; 6%). Reaction included touching, rubbing, and scratching. Expression included calling, answering, writing, and greeting, and activity included fetching, exercising, positioning, and grooming.

In this observational study, we found that 92% of upper limb movements were safe and 18% of patients had risk behaviors. Most of the upper limb movements were reactions to pain and itching. Early recognition of pain by closely monitoring the patients' upper limbs as well as facial expression is important. In this study, we observed that patients used their hands for calling nurses, answering questions, writing, and greeting. The use of the upper limb is the only means of communication for patients, and uncommunicative situations are stressful for them.[3] Nursing support is required to help patients' communication. Mechanically ventilated patients need to do their usual activities such as fetching a towel, exercising their limbs, and grooming on the bed; it may be effective to prevent upper limb muscle atrophy.[4] However, some movements unintentionally may

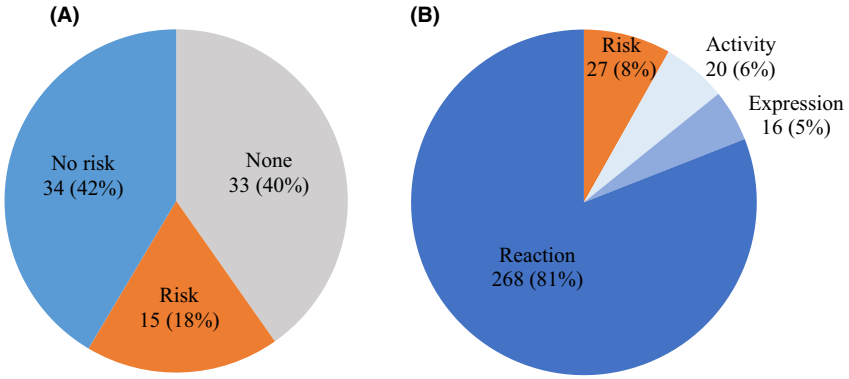

Fig. 1. Upper limb movements in 82 mechanically ventilated patients and total movements. A, Number of patients with and without risk behavior related to unplanned device removal. B, Number of movements of the upper limb. The risk behavior was observed in 15 patients (18%) and 27 movements (8%).

remove medical devices. It is important to help patients understand their environment. Due to the fact that patients' sight is limited, mirrors may be useful as well as explanations from the staff.[5] One limitation of this study is that the intention of movements may include misclassification because these were based on nurses' observations. Another limitation is that this study may underestimate the risk of device removal due to the exclusion of high-risk patients. We conclude that the proper understanding of upper limb function may reduce unnecessary anxiety related to the risk of unplanned device removal and use of physical restraint.

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DISCLOSURE

Approval of the research protocol: This study was approved by the clinical research ethics committees of nursing department in Tokushima University Hospital.
Informed consent: Informed consent was obtained from all participants.
Registry and the Registration No. of the study/Trial: This trial was registered as a clinical trial (UMIN-Clinical Trials Registry: 000040319).
Animal Studies: N/A.
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AUTHORS' CONTRIBUTIONS

YK WAS INVOLVED in study concept and design, analysis, and interpretation of the data. NN took part in interpretation of the data and drafting of the manuscript. KN was involved in the acquisition and interpretation of data. JO took part in the critical revision of the manuscript. All authors read and approved the final manuscript.

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