

## A hospital for post-ICU patients on long term mechanical ventilation in Japan

A.Okamura, T.Ishitani, M.Fukuda, T.Yamamura  
Heiseikai InoUE hospital  
S7W2 Chuo-ku, Sapporo 064-0807 Japan

### [Introduction]

Emergency medicine and intensive care have facilitated the increased survival of severely ill patients. However, among these survivors, some are difficult to wean from ventilators. In the United States, these ventilator-dependent patients are treated at Long Term Acute Care (LTAC) Hospitals<sup>1)2)</sup>. In Japan, such hospitals have not yet been organized. Therefore, we created the first of this kind of hospital in Japan.

The estimated total number of the long-term ventilator-dependent patients in Japan is approximately 15,800. Among these, 2,000 have neuro-muscular diseases and are mainly treated in national hospitals. Another 10,000 are on home mechanical ventilation. The remaining 3,800 post-ICU ventilator-dependent patients are treated in ordinary hospital wards. We believe that a hospital that specializes in post-ICU mechanical ventilation is necessary to improve the outcome of the ventilator dependent patients and to minimize possible incidents/accidents.

### [Methods]

We acquired a private hospital with 82 beds in 2003, and renovated it to our purpose.

The hard-ware added during the renovation included: ventilators, patient monitors, central monitors, oxygen and artificial air gas supplies, co-generation power supplies for ventilators and monitors, and a patient information system (receipt claiming, medical records, radiology images, and laboratory data).

We have organized special teams, including those focused on risk management, infection control, medical records, education, pressure ulcer treatment, and process KAIZEN (improvement). Physicians, nurses and other hospital staff members worked together with these teams to improve the processes throughout the hospital.

### [Results]

Within the first year of opening, we took care of 35 ventilator-dependent patients. Since 2007, we have constantly been taking care of 75 ventilator-dependent patients. In the meantime, the patient-bed occupancy rate has risen to almost 100%. The successful weaning rate was 31% which was similar to the result reported by Carson et al<sup>3)</sup> (35%) but lower than the results of a multicenter outcome study<sup>4)</sup> (54%). The ADL (activity of daily life) of the patients was evaluated by a score from 1 (bed-bound) to 5 (able to walk). The average ADL score slightly improved in our patients from 1.6 (on admission) to 2.1 (on discharge/ in March 2009). With regard to the staff education, increased compliance with standard precautions decreased the incidence of hospital-acquired infections, and resulted in spending cuts of antibiotics (from ¥ 300 million in 2004 to ¥ 100 million in 2008). Our microbiological study of tracheal suction catheters permitted the reuse of the suction catheter within 12 hours under the circumstances of our strict suction manual. We have found many other divergent processes and have worked with the teams to improve the efficiency of the processes in the hospital. These staff education methods and clinical studies at our hospital have decreased wasteful expenditures and increased the process efficiency, finally resulting

in increased ordinary profit. We had 500 to 600 reports of incidents and accidents each year. One of the indices of the risk management activity is the (number of reports)/(number of beds) ratio. Our LTAC ratio of 6.9 is higher than that of non-LTAC hospitals 4.4 in Japan. However, during its 6 years in operation, there have been no accidental ventilator-related patient deaths in our hospital. The ordinary profit rate is currently 16% which is higher than the average rate of Japanese private hospitals (6%). We were certified by the Japan Council for Quality Health Care (JCQHC) Version 5 which assures the functional quality of the hospital in 2007. The national tax administration accredited our hospital with tax reduction for the transparent business management in 2009.

[Discussion]

The problem with prolonged mechanical ventilation (PMV) in Japan is that there is no specialized hospital for post-ICU PMV. There is no data about post-ICU PMV in Japan, so we cannot compare the successful weaning rate out-side the hospital in Japan. The difference in the successful weaning rate between our hospital and the rate reported by Scheinhorn comes from the patient demographics and exclusion criteria (end-of-life care, terminal weaning and so on). If we adopted the same exclusion criteria, our successful weaning rate would be 52%. The improvement of ADL also seemed to be slight, because of the involvement of difficult-to-wean patients. Our efforts to improve the successful weaning rate include: respiratory physical therapy, CASS (continuous aspiration of subglottic secretions) for preventing VAP, and nutrition management using a metabolic analyzer during mechanical ventilation to measure basic energy expenditure (excessive caloric intake results in hypercapnia).

Our enterprise proved that the hospital is useful not only for the care of post-ICU ventilator-dependent patients but also is economically feasible. Continuous education of hospital staff and process KAIZEN seem to be the key elements for the success of this enterprise.

[References]

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