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Clinical practice of acute respiratory distress syndrome in Japan: A nationwide survey and scientific evidences

Sadatomo Tasaka, MD[a,], Koichiro Tatsumi, MD[b], on behalf of the Assembly of Pulmonary Circulation and Lung Injury, the Japanese Respiratory Society*

[a]*Department of Respiratory Medicine, Hirosaki University Graduate School of Medicine, 5 Zaifucho, Hirosaki 036-8562, Japan*
[b]*Department of Respirology, Chiba University Graduate School of Medicine, Chiba, Japan*

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ABSTRACT

Background: There has been limited information about epidemiology and clinical practice of acute respiratory distress syndrome (ARDS) in Japan.
Methods: An invitation letter to the web-based survey was mailed to all 871 board certified hospitals of the Japanese Respiratory Society. The questionnaires were designed to collect data on epidemiology and clinical practice of ARDS, including diagnostic measures and therapeutics.
Results: Within 4 months of the survey period, valid responses were obtained from 296 (34%) hospitals. The incidence of ARDS was estimated to be 3.13 cases/100 hospital beds or 1.91 cases/ICU bed per year. The most frequent underlying disease was pneumonia (34%), followed by sepsis (29%). In hospitals with fewer ICU beds, pulmonologists tended to be in charge of management of ARDS patients. Routine diagnostic measures included computed tomography of the chest (69.6% of the hospitals) and Swan-Ganz catheterization was rarely performed for diagnosis. In 87.4% of the hospitals, non-invasive ventilation was applied to management of ARDS patients, especially those with mild disease. Prone positioning and extracorporeal membrane oxygenation (ECMO) for ARDS patients was more widely adopted in hospitals with larger numbers of ICU beds and intensivists. In 58.2% of the responding hospitals, corticosteroid was considered as a treatment option for ARDS, among which pulse therapy was routinely introduced to ARDS patients in 35.4%.
Conclusions: The incidence of ARDS in Japan was estimated to be lower than that in the recent international study. The scale and equipment of hospitals and the number of intensivists might influence clinical practice of ARDS.

*Corresponding author. Fax: +81 172 39 5469.
E-mail address: tasaka@hirosaki-u.ac.jp (S. Tasaka).

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1. Introduction

Acute respiratory distress syndrome (ARDS) is an acute inflammatory lung injury, characterized by increases in pulmonary vascular permeability and extravascular lung water and loss of aerated lung areas [1]. Although previous epidemiological studies have provided substantial insights into ARDS, there remains limited information about the epidemiology, recognition, management and outcomes of patients with ARDS, especially in the era of the Berlin definition [2–4]. Furthermore, there has been a limited investigation about epidemiology and management of ARDS in Japan [5]. In the recent Large Observational Study to Understand the Global Impact of Severe Acute Respiratory Failure (LUNG SAFE) study, 29,144 patients were included from 459 intensive care units (ICUs) in 50 countries, [6]. Whereas they confirmed that ARDS is common, accounting for 10.4% of all ICU admissions, the rate of clinician recognition was low [6]. In addition, a large gap still exists between evidence and practice. In other words, clinicians frequently failed to deliver interventions with proven efficacy, such as low tidal volume ventilation, higher positive end-expository pressure (PEEP) and ventilation in the prone position [6].

In contrast to ventilator management, there has been little progress in pharmacotherapy for ARDS during the past decades [7]. Moreover, there exist substantial differences in drug treatment for ARDS between Japan and Western countries. For example, the efficacy of corticosteroid and neutrophil elastase inhibitor, which are often chosen as treatment for ARDS in Japan, is still controversial in many Western countries [8,9]. Although the LUNG SAFE study included 28 ICUs from Japan, it remains unclear how these interventions are applied in routine practice in the general hospitals in Japan.

In Japan, some of ARDS patients are managed by physicians or surgeons in charge of the treatment of underlying disease before the onset of ARDS, partly due to low sufficiency of intensivists among smaller hospitals. Since some expertise is required for ventilator and other management of ARDS patients, we speculated that clinical practice might be influenced by the hospital size and sufficiency of intensivists.

In the present study, we conducted an internet survey of ARDS on the members of the Japanese Respiratory Society (JRS), aiming to understand the hospital and ICU incidences, underlying diseases, doctor-in-charge and routine clinical practice of ARDS, including ventilatory management, pharmacotherapy and adjunctive interventions.

2. Materials and methods

2.1. Questionnaires

The questionnaires were designed to survey the beliefs of the JRS members regarding the epidemiology, diagnosis and therapy of ARDS. The respondent was asked to make a diagnosis of ARDS in accordance with the Berlin definition. The questionnaires consisted of seven question items with 23 details (Table 1). In addition to obtaining basic demographic information, the survey sought to determine the number of ARDS cases identified, underlying diseases, background of practicing physicians (i.e., pulmonologist, intensivist or others) and tools for diagnosis and evaluation of ARDS. The percentage of ARDS patients who received mechanical

Table 1 – Survey questionnaires.

1. Basic demographic information
   - 1-1 Location (prefecture)
   - 1-2 Number of hospital beds
   - 1-3 Number of ICU beds
   - 1-4 Number of full-time doctors
   - 1-5 Number of intensivists
   - 1-6 Number of board-certified pulmonologists
   - 1-7 Number of board-certified intensivists
   - 1-8 Designation of emergency medical facility (Not designated · Primary · Secondary · Tertiary)
2. Epidemiology of ARDS
   - 2-1 Number of ARDS patients in the last 12 months
   - 2-2 Underlying disease of ARDS patients
     Sepsis ( )% Pneumonia ( )% Aspiration ( )% Trauma ( )% Surgery ( )% Other ( )%
   - 2-3 Who is primarily responsible for management of ARDS patients?
     Intensivists Pulmonologists · Physicians or surgeons who had treated the underlying disease Other
3. Tools for diagnosis and management of ARDS
   - 3-1 Choose the measure that you use for most patients with ARDS (multiple answers allowed)
   - 3-2 Choose the measure that you use for some patients with ARDS (multiple answers allowed).
     (Chest CT · Echocardiography Swan-Ganz catheterization CVP monitoring Continuous cardiac output monitoring)
4. Ventilatory management of ARDS patients
   - 4-1 Do you use non-invasive ventilation for patients with ARDS?
     No · Only for mild ARDS · Also for moderate or severe ARDS · Other (Please explain in detail:)
   - 4-2 Do you adopt lung protective ventilation for patients with ARDS?
     Not adopted · Adopted for all ARDS patients Adopted for some patients with ARDS Other (Please explain in detail:)
   - 4-3 Do you adopt prone positioning during mechanical ventilation for patients with ARDS?
     Not adopted Adopted for all ARDS patients Adopted for some patients with ARDS Other (Please explain in detail:)
5. Drug and supportive treatment of patients with ARDS
   - 5-1 Steroid therapy
     - 5-1-1 Do you administer corticosteroids to patients with ARDS?
       No · Only to ARDS patients with sepsis · Yes (If your answer is No, please go to 5-2)
     - 5-1-2 What percentage of ARDS patients do you administer corticosteroids to?
     - 5-1-3 Please describe a typical administration schedule of corticosteroids for patients with ARDS.
   - 5-2 Neutrophil elastase inhibitor, sivelestat
     - 5-2-1 Do you administer sivelestat to patients with ARDS? (If your answer is No, please go to 5-3)
     - 5-2-2 What percentage of ARDS patients do you administer sivelestat to?
   - 5-3 Extracorporeal membrane oxygenation (ECMO)
     - 5-3-1 Is ECMO considered to be salvage therapy in patients with severe ARDS? (If your answer is Yes, please go to 5-3-2)
     - 5-3-2 When after the onset of ARDS do you typically start ECMO?

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