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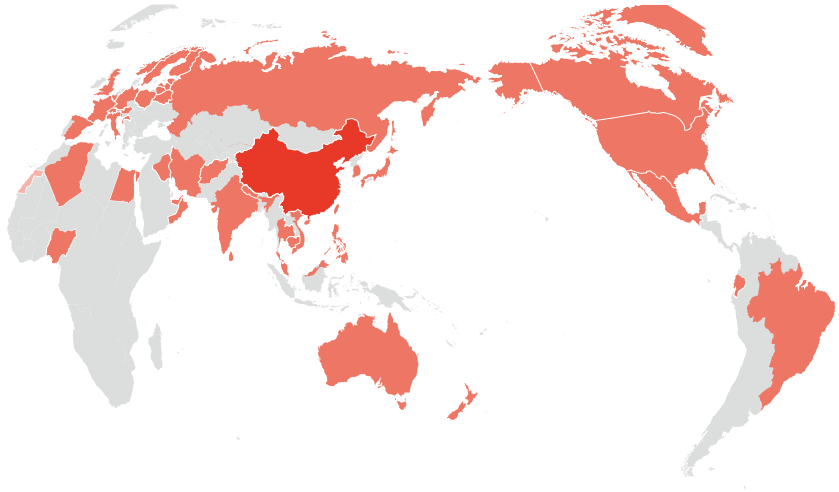
SV300 Ventilator

A Warrior in the Battle against COVID-19

When people were embracing the New Millennium in 2000, none of us had expected that human being would be plagued by several rounds of worldwide SARI outbreaks (i.e. severe acute respiratory infections) in the next two decades, such as SARS (severe acute respiratory syndrome), MERS (Middle East respiratory syndrome) and pH1N1 (pandemic influenza H1N1). On average, 19% to 32% of the patients have been transferred into ICU and requiring respiratory support[1, 2].

Global Cases Reported by WHO



SITUATION IN NUMBERS
total and new cases in last 24 hours

Globally
87 137 confirmed
+1739 new

China
79 968 confirmed
+ 579 new
2873 deaths
+35 new

Outside of China
7169 confirmed
+1160 new
58 countries
+5 new
104 deaths
+18 new

WHO RISK ASSESSMENT

China	Very High
Regional Level	Very High
Global Level	Very High

Source: WHO, updated as of 10AM CET March 1st 2020

Statistics from the WHO shows that tens of thousands of people have been diagnosed with the COVID-19 in this round of epidemic pneumonia. To date, the virus has taken the lives of nearly 3000 people, with China being the worst-hit area.

China has quickly taken steps in response to the epidemic by building two make-shift hospitals in Wuhan for the treatment of COVID-19 patients. Even though the two make-shift hospitals, known as Huoshenshan Hospital and Leishenshan Hospital, could provide up to 1000 beds and 1500 beds respectively, the number was still far from enough to hold all the COVID-19 patients. Soon another program known as mobile cabin hospitals (city stadiums and conference venues carefully renovated for patients with light symptoms) was launched to ensure that all the patients whom were tested positive for the Novel Coronavirus are under professional treatment and quarantined.

Mindray in action to combat COVID-19

The large and fast-growing number of COVID-19 patients means an urgent demand for a respiratory support equipment with strong functions and reliable designs. Mindray's SV Series ventilators (SV300/SV600/SV800) has proven its capability of providing complete and reliable support for patients with severe respiratory failure. These ventilators are now being used in many hospitals for the treatment of COVID-19 patients. In particular, the SV300 Ventilator, compact yet powerful, has been widely favored by the clinical personnel and thus come into the limelight as a 'warrior at the forefront in battling COVID-19.

Ever since the outbreak, thousands of the SV300 ventilators have been newly installed at the hospitals in Wuhan and surrounding regions.

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SV300 Ventilator

Compact yet powerful

Scan the QR code
to learn more about
Mindray SV Series Ventilators

Jingen Xia from Beijing
Working with COVID-19 patients in Wuhan since **February 1st**

> With SV300 we are able to quickly support different stages of respiratory failure with different respiratory support technologies from HFOT, non-invasive ventilation, to invasive ventilation. The turbine design on Mindray SV300 allows it to work independently without air gas source or compressor while preventing cross-infections with the HEPA filter. Therefore, it is commonly selected by many wards or hospitals without high-pressure air source to treat critically ill patients with COVID-19.

Jingen Xia, Respiratory Therapist

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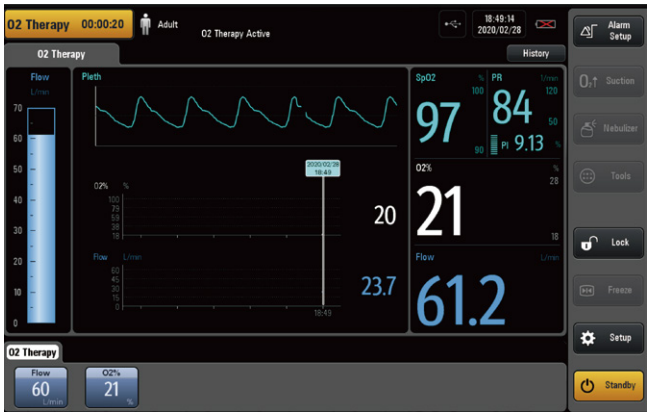
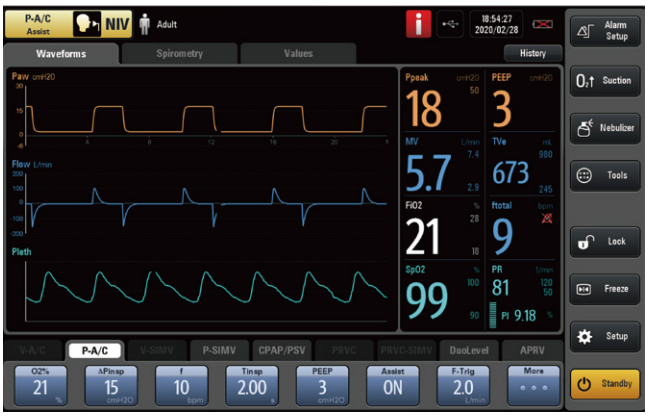
The Need for A Life-Saver in the ICU

COVID-19 is highly infectious with approximately 15-30% of the infected patients developing acute respiratory distress syndrome (ARDS) [3]. Clinical experts are now providing the standard respiratory therapy management for the patients with ARDS, which mainly include high-flow oxygen therapy (HFOT), non-invasive ventilation (NIV) and invasive ventilation with lower tidal volume [4].



High flow oxygen therapy



Non-invasive ventilation therapy

1. Multi-functional, highly compact, readily portable

The SV300 ventilator integrates high-flow oxygen therapy, non-invasive ventilation and invasive ventilation into one device, making it perfectly reliable for satisfying the changing needs of patients in different acuity levels. This also helps hospitals save vital medical resources which are already in extreme shortage due to the large number of COVID-19 patients.

If the patient's health continues to deteriorate, the SV300 allows a gradual transition from HFOT to non-invasive ventilation and, finally, to invasive ventilation. Respectively, when the patient is recovering, the SV300 takes patients through weaning invasive ventilation, non-invasive support to HFOT in a seamless way. The patient does not require to change the ventilator or the breathing circuits: this helps reduce consumables and the workload of caregivers. The SV300 plays an important part in ensuring the maximum use of medical resources, especially key medical supplies, and the minimized risks of cross-infections between caregivers and patients, or among patients themselves.

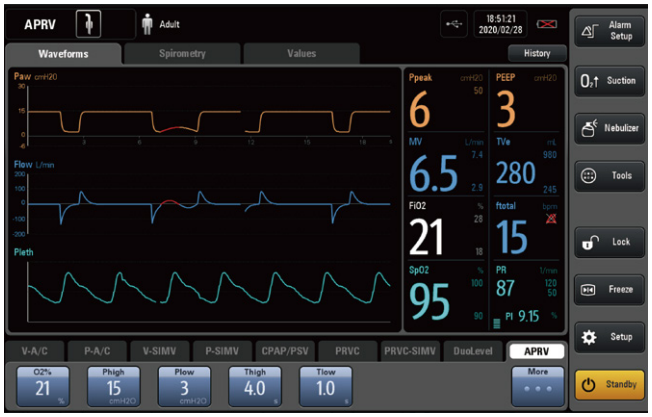
The SV300 is ready-to-move and easy-to-install. Weighing less than 10 kg as an intensive care ventilator, this compact device can be carried around with just one hand or transport together with the patient between different wards, ensuring seamless respiratory support at all times.

On the way of transporting a patient, doctors in Zhongnan Hospital of Wuhan University are carrying an SV300 ventilator with a single hand.
Source: Chutian City Journal 楚天都市报

2. Optimal ventilation support for ARDS patients

When a COVID-19 patient displays severe ARDS, the patient often requires advanced ventilation modes and comprehensive monitoring. The SV300 has all the modes of mechanical ventilation required by high-acute patients, particularly the patients with ARDS, such as Duolevel and APRV, as well as the low-flow P-V Tool and other tools which can be used to guide the PEEP titration.

The SV300 can also measure P0.1, NIF and other key indicators to reflect the patient's respiratory conditions. With a wide range of respiratory mechanics measurement, the ventilator provides comprehensive respiratory monitoring of patients – this is utterly important because it makes clinicians more confident in clinical diagnosis and decision making.



APRV mode

P-V Tool

The Need for A Safeguard for Medical Personnel

According to statistics from the China Centers for Disease Control and Prevention (China CDC), as of February 11, more than 3,000 medical staff from over 400 medical institutions who work with COVID-19 patients were infected. The four main contributors to medical staff infections are: occupational exposure, device-associated infections, improper terminal disinfection, and aerosol infections.

3000+

infected caregivers

Main Factors

- Occupational exposure
- Device-associated infections
- Improper terminal disinfection
- Aerosol infections

1. Detachable and autoclavable ins-/expiratory valves

The SV300 ventilators have both inspiratory and expiratory valves detachable and autoclavable. They can go through the autoclave at a temperature of up to 134℃. This makes it easier for serialization and thus prevent the risk of cross-infections.

The inspiratory/expiratory flow sensors on SV300 are water-resistant, therefore, it removes the concern about condensation and continues to be reliable while the patient receives nebulization therapy. Compared with some other products that stop working in a high-moisture environment, the SV300 is more stable and reliable. In addition, it also reduces the risk of infections for medical staff, because they no longer need to constantly change or replace the sensor.

2. Dual-limb breathing circuits for non-invasive ventilation

Traditionally, non-invasive ventilators mostly adopt the single-circuit design, which means the exhaled air by the patient will be directly discharged to the atmosphere through the outlet on the mask. For the highly infectious COVID-19, however, the use of these kind of non-invasive ventilators may cause leak in the ward and put medical staff at risk of exposure to the virus. WHO believes that non-invasive positive pressure ventilation (NPPV) is one of the main sources for aerosol transmission in the hospital.

The non-invasive ventilation mode provided by the SV300 can achieve the same clinical efficacy that those conventional single-limb non-invasive ventilators do. The design of dual-limb circuits makes the SV300 ventilator stand out in this epidemic. By using a closed and airtight mask, the air exhaled by the patient must go through the expiratory hose and can be processed by an additional filter placed at the end of the hose before venting to the atmosphere. In addition, the turbine’ s inspiratory gas must pass through a level-H14 HEPA filter prior to ventilating the patient, which can eliminate up to 99.995% of bacteria and viruses. This makes the SV300 a "reliable guardian" for both patients and medical personnel.

The Need for "Comrade-in-Arms" & "Clear-cut" Strategy against COVID-19

In order to provide extensive treatment for all patients diagnosed with COVID-19, China has mobilized a large number of medical staff nationwide to the worst-hit area. Since the treatment include a wide range of medical disciplines, many of the personnel are not from respiratory departments (for example, treating some other life-threatening complications). This group of doctors and nurses may find it difficult to use ventilators.

1. Easy-to-use UI design

Mindray's ventilators are user-friendly with easy-to-read UI just like a touchscreen tablet. The medical staff do not need to go down the menu to find the function somewhere in a submenu, as 90% of the operation can be directly reached in one step. Graphic operation guide, interrelated parameter adjustment prompts and other user-friendly designs allow the medical staff to learn how to use the device effortlessly, even for those whom have never touched a ventilator before. In this way the caregivers do not need to spend too much time dealing with setting and can thus concentrate on their patients.

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2. Strong adaptability for demanding environments

In this battle against COVID-19, most of the quarantine and treatment facilities have been built within a short period of time. The infrastructure were built urgently, however, it was still not adequate to fulfill consistent demands of patient care, resulting in challenges such as insufficient medical gas supply, shortage of oxygen, low pressure for air supply etc. These factors have largely impaired the performance of traditional ventilators, which put ARDS patients in danger.

The SV300 adopts the turbine design for air supply and can work without external source of airflow. Both high pressure and low pressure modes are available for oxygen supply. When the pressure of oxygen is insufficient, patients with lower oxygen demands can use low-pressure gas source. When oxygen sources is not available, one oxygen cylinder is enough to support an SV300 ventilator, with a slot on the trolley specially designed for holding the oxygen cylinder. Therefore, SV300 can always fulfill its role to support patients in extremely unfavorable environments.

With powerful functions and easy-to-use design, Mindray SV300 strongly guarantees the safety of both patients and medical personnel. Having the great adaptability to all kinds of demanding clinical scenarios, the SV300 can thus offer the most suitable respiratory support therapy for different patients.

Since the first day of this public health emergency, a large number of Mindray SV Series ventilators have played and will continue playing an important role in the frontline of the battle. It is believed to be the comrade-in-arms of all medical personnel against the COVID-19, and the life-saving angel for the patients.

Reference:

[1] Lee N, Hui D, Wu A, et al. A major outbreak of severe acute respiratory syndrome in Hong Kong. N Engl J Med, 2003, 348(20): 1986-1994.

[2] Yam LY, Chen RC, and Zhong NS. SARS: ventilatory and intensive care. Respirology, 2003, 8 Suppl: S31- S35.

[3] Critical Care Committee of Chinese Association of Chest Physician, Respiratory and Critical Care Group of Chinese Thoracic Society, Respiratory Care Group of Chinese Thoracic Society. Conventional respiratory support therapy for Severe Acute Respiratory Infections (SARI): Clinical indications and nosocomial infection prevention and control.

[4] World Health Organization. Clinical management of severe acute respiratory infection when Novel coronavirus (2019-nCoV) infection is suspected: Interim Guidance.

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