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Medical

COVID-19

Elmo Rietschle by Gardner Denver

April 2020

Ventilators–Mechanical Ventilation

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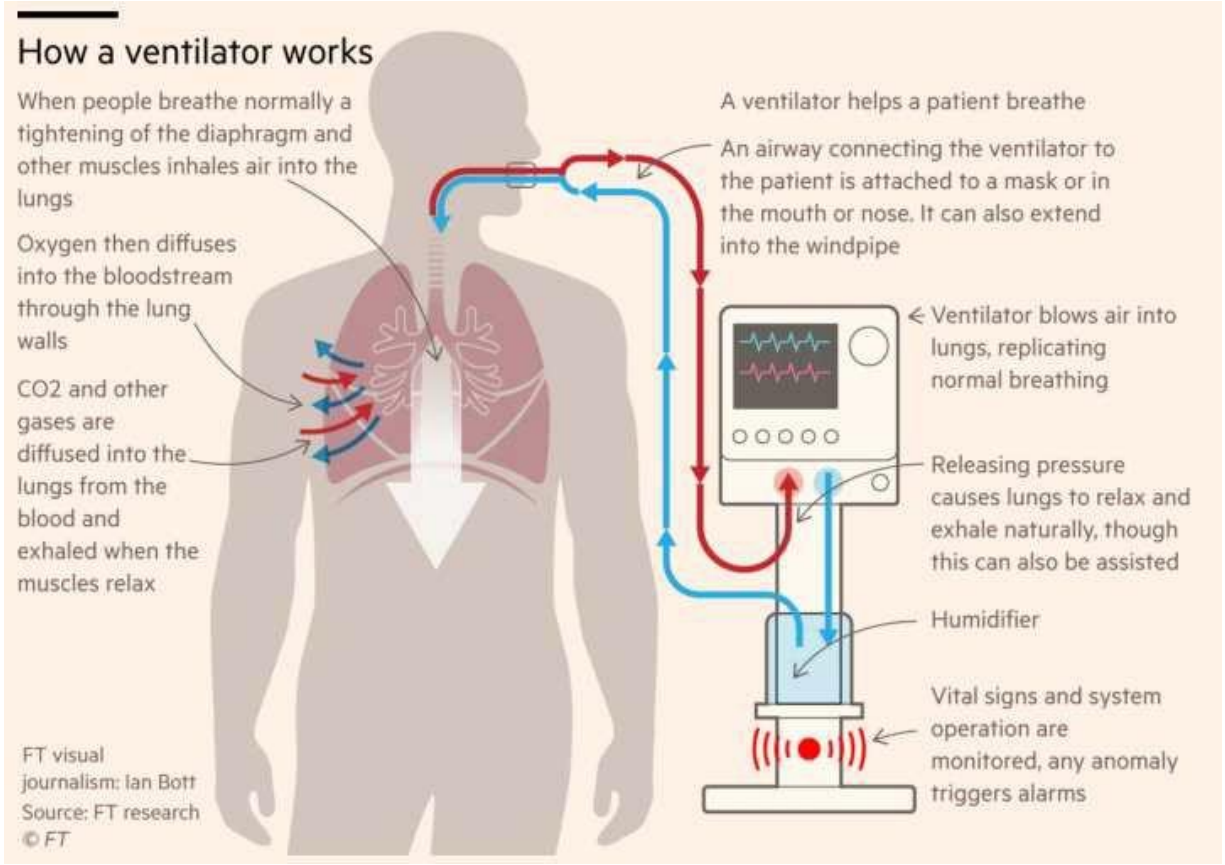

Negative Pressure Ventilation

Only **positive pressure devices** are now mainly in use. **Negative pressure** used mainly for pediatric and were used in past

Positive Pressure Ventilation

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Typical Ventilator Examples

Examples of commonly used intensive care ventilators:

A. Dräger Infinity V500
B. Hamilton G5
C. Maquet Servo I
D. Covidien PB840. (Nellcor Puritan Bennett LLC, Boulder, Colorado, doing business with Covidien)

Ventilator Inputs

Ventilators can be powered by electricity or by compressed gas:

Power

- Electricity, either from wall outlets (e.g., 100 to 240 volts AC, at 50/60 Hz) or from batteries (e.g., 10 to 30 volts DC)
- Batteries are commonly used as the primary power source in the home-care environment but are usually reserved for patient transport or emergency use in hospitals
- Power to expand the lungs is supplied by compressed gas from tanks, or from wall outlets in the hospital (e.g., 30 to 80 pounds per square inch [psi])

Compressed Air

- Wall outlet ➔ Compressed Air through large centralized Hospital Air system. E.g. EnviroAire Compressors
- Regulated Air with Blower ➔ Higher Airflow through side channel blower. E.g. Elmo 2BH100
- System Controls➔ With a built-in integral webserver, BACnet IP protocol via Ethernet connection, these controllers provide visibility to the EnviroAire Scroll compressor system from any computer or mobile device with an internet connection. E.g. Gardner Denver MediTrol-Plus HMI

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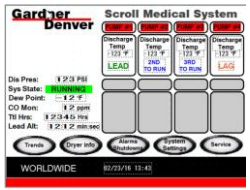

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Ventilators that use Blowers and Hospital Medical Compressors

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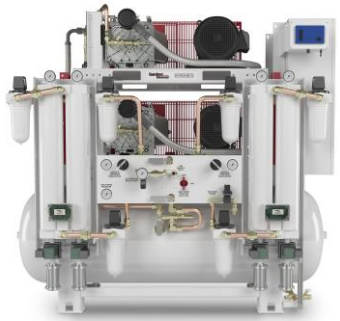
- When input power is electrical, ventilators have to use a compressor or a blower
- The input power of the ventilator is converted to a predefined output of pressure and flow. Many key sub-systems like valve assembly, regulators, etc. are needed

Compressor

- A Scroll compressor is a machine for moving a relatively low flow of gas to a storage container at a higher level of pressure
- Compressors are generally found in every hospital
- 3–10 HP ■ 116–140 PSIG ■ 8–126 CFM



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Blower

- A blower is a machine for generating relatively larger flows of gas as the direct ventilator output with a relatively moderate increase of pressure (e.g., 2 psi).
- Blowers are used for home-care, transportable and mobile ventilators
- 24VDC allows for portability
- Blowers are more compact, consume less electrical power and lightweight.

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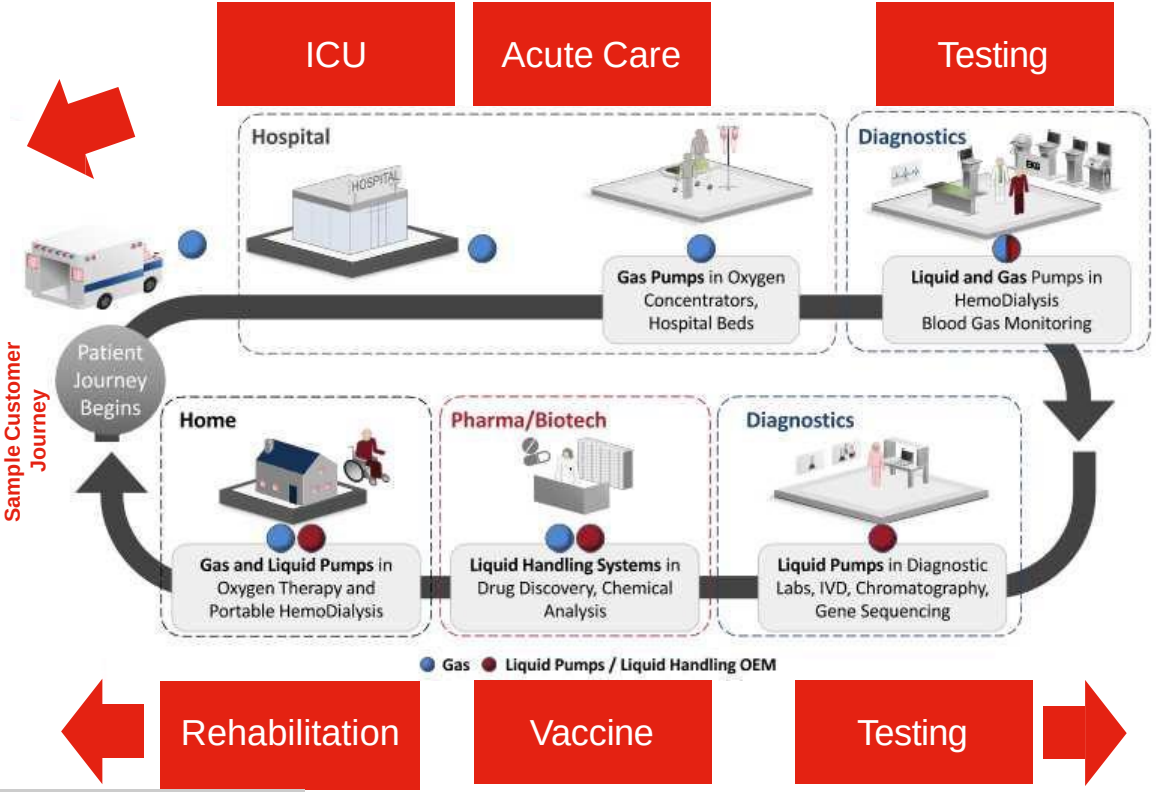
A Patient's Journey through COVID-19 Recovery

Vacuum Systems for ICU

Ventilators have components from Thomas & Elmo-Rietschle SGA0018 & 2BH100



Centralized Compressed Air
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Claw Vacuum Systems for Laboratories

Stationary Oxygen Concentrators help the patient during rehabilitation and improving lung capacity – VC Lubricated Vane

Elmo Rietschle Laboratory Vacuum Contact-less vacuum for greater efficiencies and no contamination, lubricant or pollution

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What happens to COVID-19 Patients in ICU?

We focus on the critical patients which are typically 5% of the infected, who need Intensive Care Unit (ICU), Acute Care or Home Rehabilitation

80%
No or Mild Symptoms

15%
Severe Disease

5%
Critically Unwell

5%
Critically Unwell

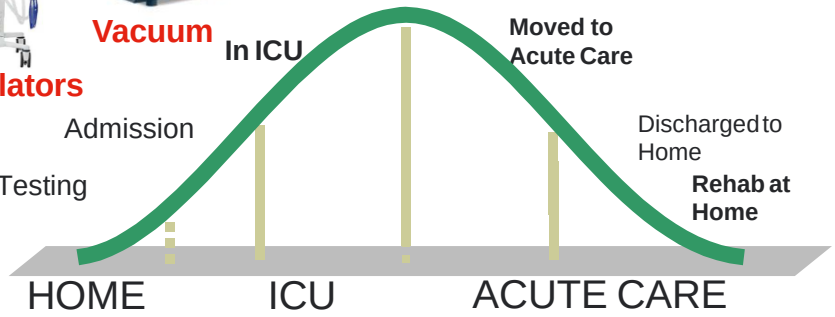
Our components in the ICU and Acute Care devices

ICU focus on critical care in on high-flow oxygen therapy to help lungs as COVID attacks

Ventilators

Vacuum

Aspirators



Beds

Airbed is an alternating pressure mattress system developed for the comfort of the patients under-recovery, confined to the bed for more than 15 hours in a days

Patients recovering at home need oxygen therapy

Dialysis

Lung failure may cause kidney failure which needs dialysis in ICU and Acute Care

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