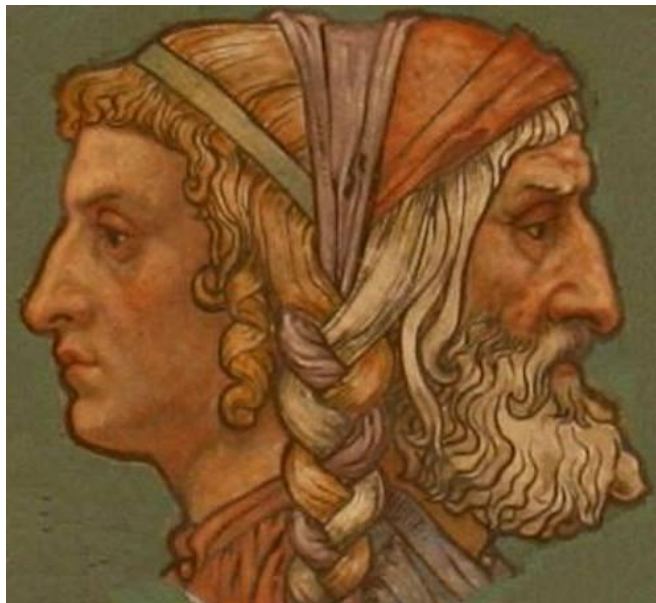


# Life Sustaining Measures in Common Practice

Benefits, Risks and Unintended Consequences

David S. Pratt, MD



In emergency situations when the goal is to sustain life, there are several critical care measures available. These can be used to prolong life until recovery.

Ironically, these same measures may be used to prolong the inevitable dying process.

C P R

Cardio-pulmonary resuscitation



## CPR: Why?

The subject is found without breathing or heartbeat.

## How?

Rapid chest thrusts, over the heart are done to re-establish circulation after 30 compressions two breaths are given. Early defibrillation is critical.

## Results?

Most subjects receiving CPR DO NOT survive. Results vary but between 6 and 12% survive to hospital discharge.

## Unintended consequences?

Often ribs are broken - especially in the elderly. Moral dilemma when to stop. Knowing "code status" is vital.

# Endotracheal Intubation

## Oral Intubation: Why?

The subject is found with dangerously low oxygen or high CO<sub>2</sub>. Patients are blue or are tired and have very labored breathing

## How?

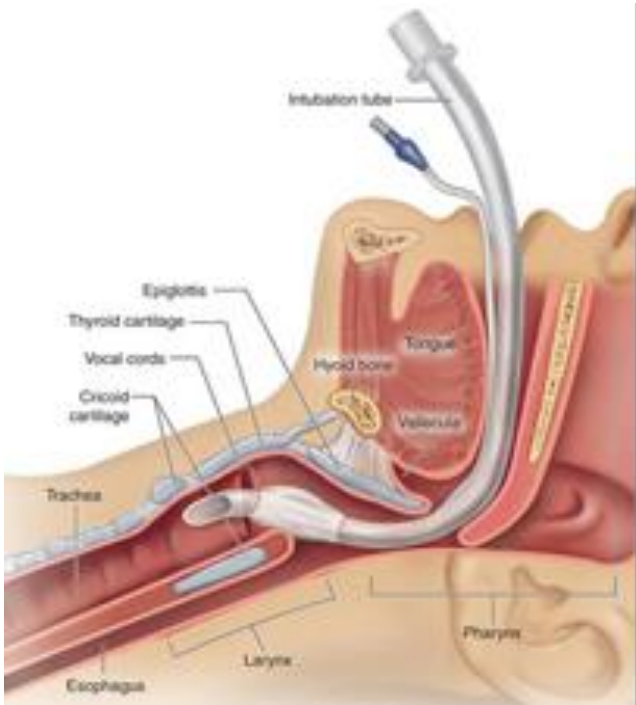
Using an instrument to see the vocal cords a pliant plastic tube is passed into the windpipe secured by a balloon.

## Results?

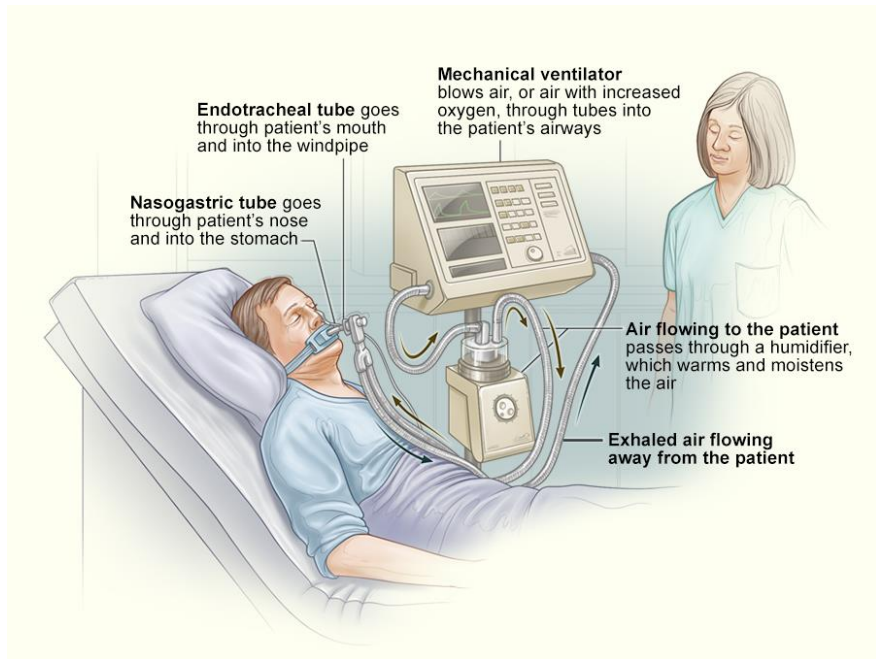
Intubation secures the airway, allows care givers to breath for the patient with a bag or ventilator. Oxygen levels can be improved by giving oxygen rich breaths. CO<sub>2</sub> levels fall.

## Unintended consequences?

Esophagus entered; oxygen falls, teeth, vocal cord damaged, windpipe eroded, no vocalization, no oral feeding, tracheostomy needed, pneumonia, ruptured lung



# Assisted Ventilation



## Assisted Ventilation : Why?

If the patient cannot breathe on her own; if oxygen by mask does not bring blood oxygen to a safe level; if CO<sub>2</sub> remains too high.

## How?

A machine called a ventilator is connected to the sealed tube in the throat. These machines add oxygen, control the speed of exchanged breaths and can add pressure to the air moving through the lungs

## Results?

Oxygen levels rise, CO<sub>2</sub> falls. The medical team has control of the patient.

## Unintended consequences?

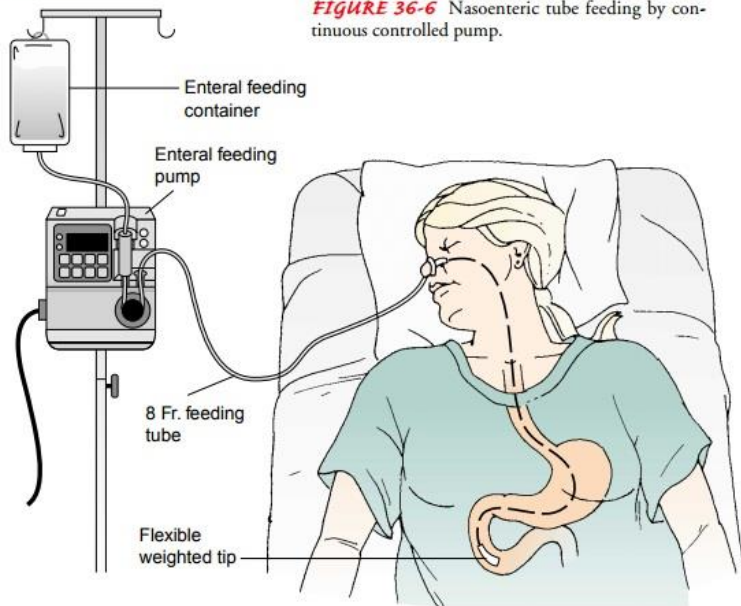
Assisted ventilation can be distressing. Too much oxygen or pressure can damage the lung (collapse or oxygen toxicity). Often the patient must be sedated “medically induced coma”. If the machine get disconnected patients can be injured. Mortality of those receiving ventilatory support is between 30-50%



# Supplemental Nutrition

## Tube Feeding

**FIGURE 36-6** Nasoenteric tube feeding by continuous controlled pump.



## Tube Feeding: Why?

Prolonged endotracheal intubation will not allow oral nutrition. Critically ill patients need calories to preserve muscle and promote healing.

## How?

There are several ways to provide calories. A tube can be passed through the nose to the stomach, or a hole can be made in the abdominal wall to the stomach. Additionally, calories can be given by vein (TPN)

## Results?

Tube feedings can provide sustaining, healing calories, nutrients and vitamins. Medications can also be delivered via the tube.

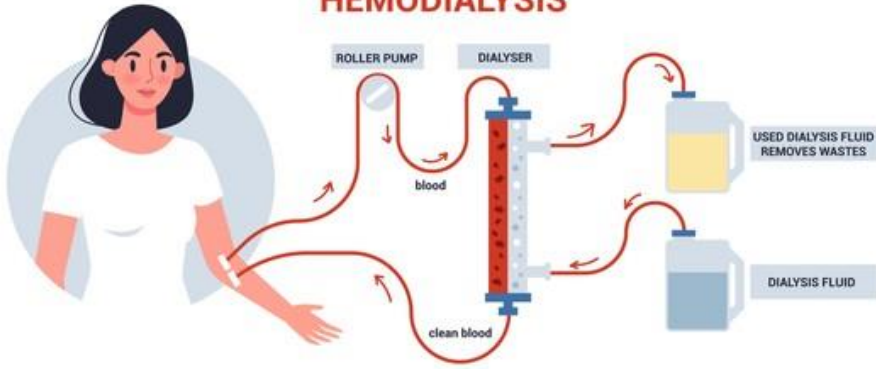
## Unintended consequences?

An NG tube can erode the nose or the pharynx. Nutritional mixture can reflux up into the throat and slide into the lungs (aspiration). PEG tubes can dislodge or erode the wound. Glucose control can be difficult. Thirty-day mortality is 22%, one year 50%.

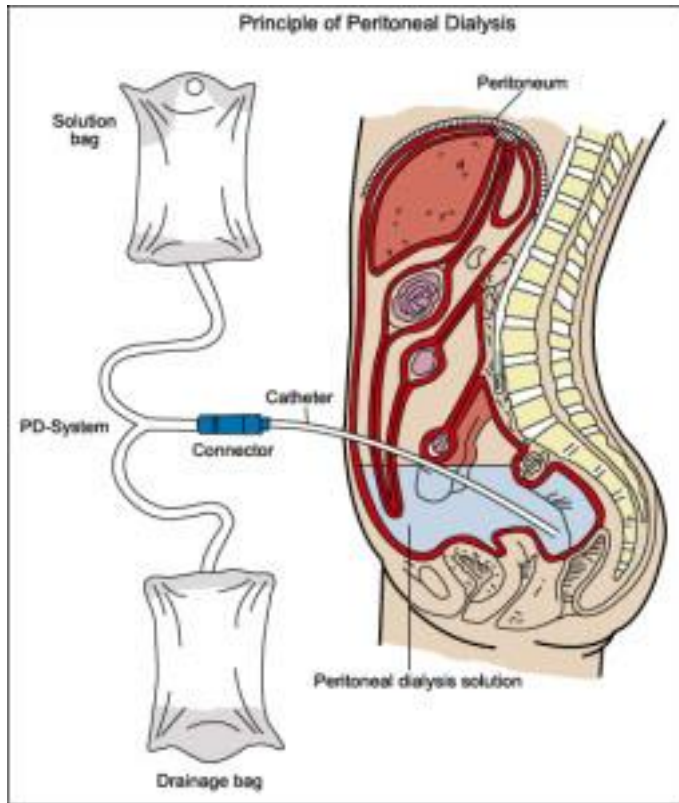


# Dialysis

## HEMODIALYSIS



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### Dialysis: Why?

When the kidneys either fail or no longer do an adequate job, wastes and salts build up in the blood.

### How?

There are several ways to clear the blood. The lining of the abdomen can be used by flooding the peritoneum with dialysate and then removing it. Alternatively, blood can be removed and returned after cleaning with an artificial membrane.

### Results?

Toxins and salts are removed over several hours. The process is repeated on a regular basis until kidney function returns.

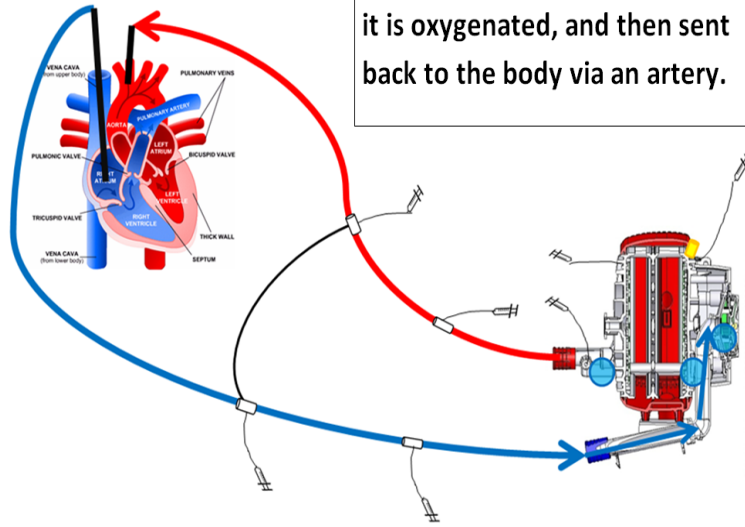
### Unintended consequences?

The peritoneum can become scarred and less efficient. Infection may occur. The bowel may be punctured. Gaining access to the circulation may be difficult, patients can become too "dry" - blood pressure falls. Blood infections may occur. Dialysis takes a psychological toll. Mortality after an acute start on dialysis is 50% in one year.

ECMO

### Veno-Arterial (VA) ECMO:

Blood is pulled from a vein, sent through the ECMO machine where it is oxygenated, and then sent back to the body via an artery.



### Extracorporeal Membrane Oxygenation : Why?

If assisted ventilation with oxygen enrichment is inadequate the lungs can be bypassed and the blood oxygenated by a membrane outside the body.

### How?

An ECMO machine pulls blood from a vein and pushes it by a membrane that has oxygen on the other side. As the blood moves it gains oxygen turning red. The oxygen rich blood is returned to an artery.

### Results?

The lungs are effectively bypassed. Oxygen levels rise, CO<sub>2</sub> falls. The lungs rest and heal as ECMO continues. ECMO must run continuously to keep the patient alive.

### Unintended consequences?

This is an intervention of last resort. ECMO can be used while a patient waits for a lung transplant, or until the lungs are healthy enough to maintain safe levels of O<sub>2</sub> and CO<sub>2</sub>. Psychologically challenging. Bleeding and infection can occur. The lung may not heal. 50% survival at 90 days. Strokes and clots can occur.



# Full Life Support Looks Like This





# MEMENTO MORI

Our plight at the end of life?

“The waning days of our lives are given over to treatments that addle our brains and sap our bodies for a sliver’s chance of benefit. They are spent in institutions – nursing homes and intensive care units - where regimented, anonymous routines cut us off from all the things that matter in life....

We have allowed our fates to be controlled by the imperatives of medicine, technology and.... strangers.”



# MEMENTO MORI

We all should consider whether we want these kinds of heroic treatments - should we become critically ill.

Recognize that your perspective may change, in either direction, as you age and face the end of life.