


History of Anesthesia in Tennessee & the World 1815-2017


Mike Leersnyder, CRNA, MHSc



Movies to Watch

- The Verdict- Paul Neumann 1982
 - Cider House Rules (1999)
 - Something the Lord made (2004)
 - Scream- History of Anaesthetics (youtube)
 - Awake (2007)
 - State of Jones (2016)
- 

Objectives

- State the evolving practice of anesthesia locally, nationally and internationally
 - State the evolution of the title, training and certification of the CRNA
 - Identify the practice of anesthesia as it was at key points during the last 200+ years
- 

Disclosures?

I have no
disclosures



HISTORY IN FOUR PARTS

- 1815-1900
- 1900-1955
- 1955-1996
- 1996-PRESENT

Part One-1815-1900

Surgery Prior to Anesthesia- Early Anesthesia

- Eger- The Wondrous Story of Anesthesia
- *“The horrors of pain, shock and infection hindered surgeons greatly prior to the introduction of anesthesia...”*
- *Common knowledge...*

The three most painful conditions are childbirth, kidney stones and a tooth abscess

What is modern anesthesia?

- A reversible state of unconsciousness characterized by:
 - Amnesia (loss of awareness)
 - Analgesia (freedom from pain)
 - Depression of reflexes (not yet)
 - Muscle relaxation (not yet)
 - Homeostasis and/or intentional manipulation of specific physiologic systems and functions (not yet)


This is the type of anesthesia often referred to as being “put to sleep”



1815

- PARISIAN PHYSICIAN RENE' LAENNEC INVENTED THE STETHOSCOPE





Scream History of Anaesthesia (youtube)

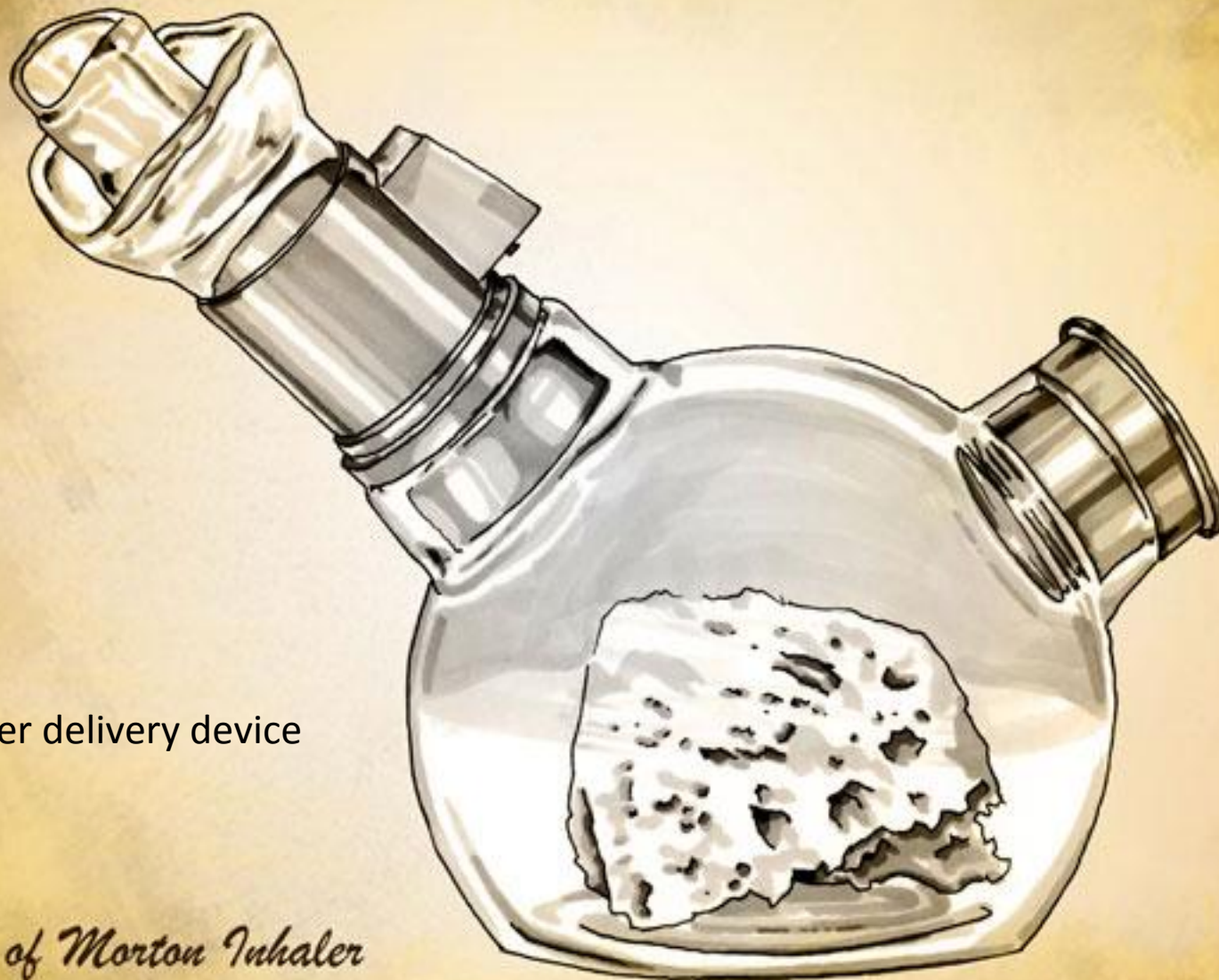


History of Anesthesia



- **19th century** – surgeons used alcohol or opium to intoxicate patients
- **1842** – Dr. Crawford Long used Ether to remove a neck tumor from a patient
- **1844** – Dentist Horace Wells used Nitrous oxide for dental procedures, but later committed suicide after a death occurred from this method
- **1846** – Dentist William Morton experimented with chloric ether and sulfuric ether and persuaded surgeon John Warren to try this anesthetic in a surgical case, which proved to be very successful
- **1847**-Chloroform first prepared in 1831 by the American chemist Dr. Samuel Guthrie, who combined whiskey with chlorinated lime in an attempt to produce a cheap pesticide. In 1847, the Scottish physician Sir James Young Simpson first used the sweet-smelling, colorless, non-flammable liquid as an anesthetic.





Ether delivery device

Replica of Morton Inhaler

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Chloroform Drop Bottles

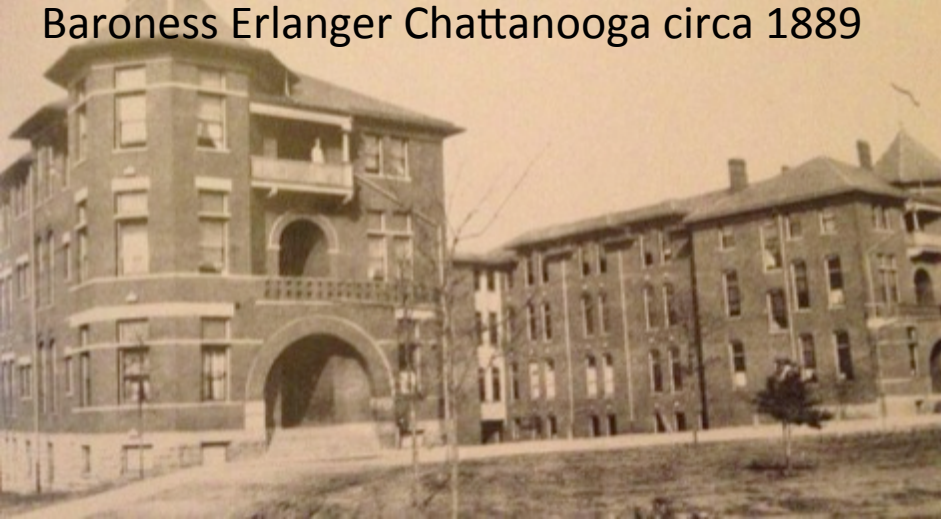
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TENNESSEE'S FIRST HOSPITALS

Baroness Erlanger Chattanooga circa 1889



Memphis
1829



St Marys Knoxville
circa 1937



*AMERICAS FIRST HOSPITALS WERE ONLY
OPEN TO TRAVELERS AND TRANSIENTS BY
LAW.
SICK CITIZENS WERE TREATED IN THEIR
HOMES*

Yellow fever in 1878 almost wiped Memphis off the map but by the 1920s Memphis had one of the largest medical complexes in America

Hospitals in Nashville 1850's



University of Nashville 1850



Shelby 1858



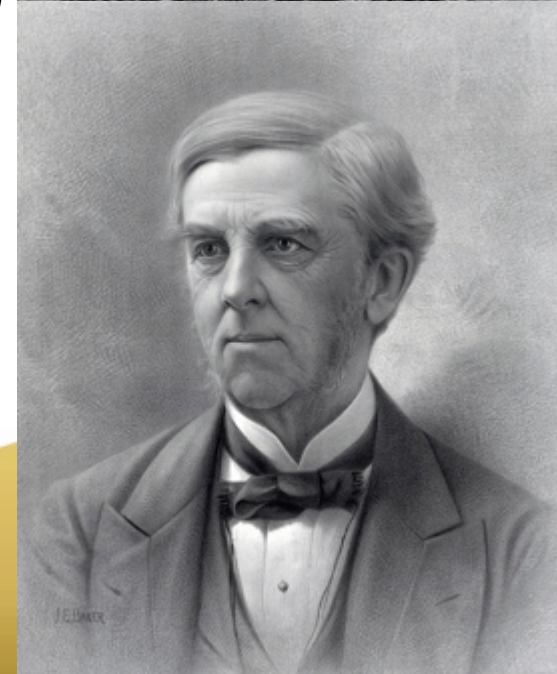
1876

Courtesy Meharry Medical College Archives



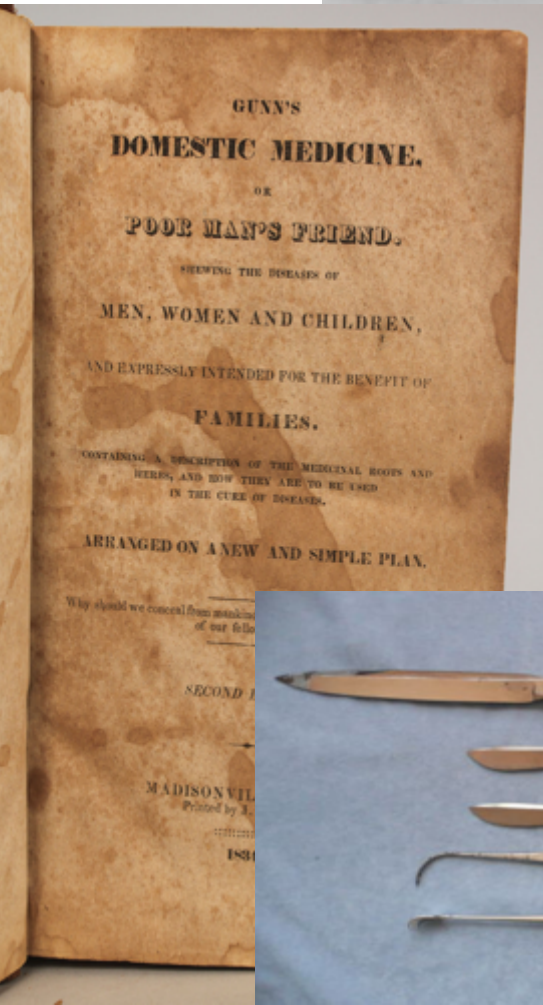
City Hospital 1890

- *Q.2. What was the Original name for Anesthesia given by Morton later changed to Anaesthesia by a suggestion from Oliver Wendell Holmes?*
- *A. Letheon - sulphuric ether used as an anesthetic agent*



Meanwhile in Nashville 1851...

Surgery
fatality rate ~
50%



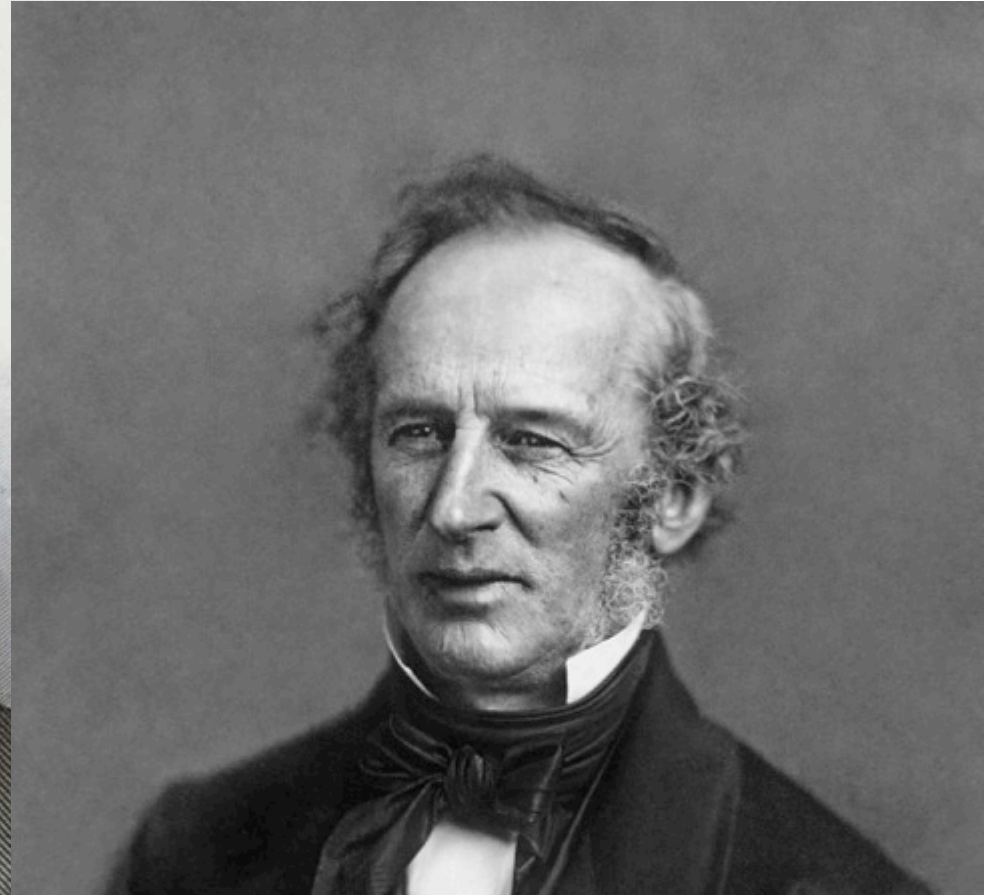
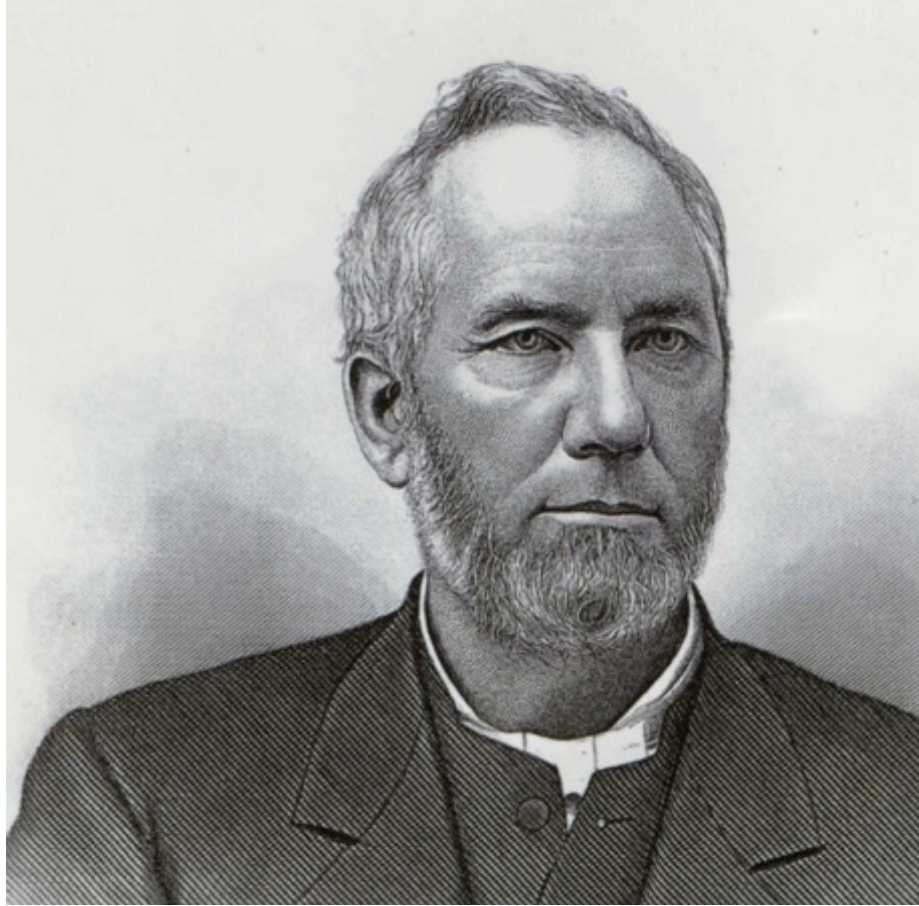
In 1861 Nurse Catherine Lawrence became the first Nurse to give anesthesia in the Civil War



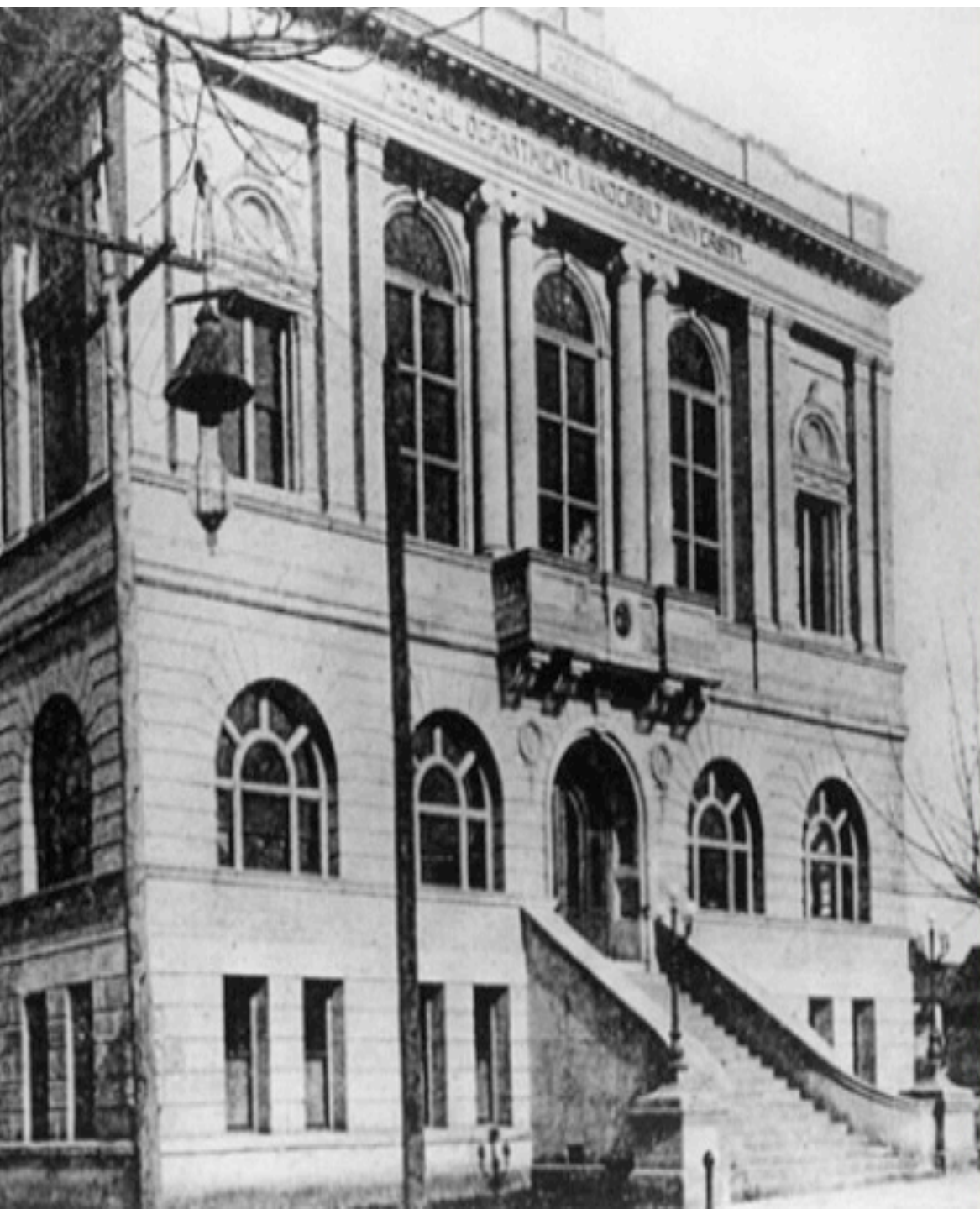
Chloroform concentrate



1874-1925



Left: Bishop Holland McTyerie
Right: Cornelius Vanderbilt



Vanderbilt Medical Department and clinic for ambulatory patients built in 1894 at Fifth and Elm before moving to the West End campus in 1925.





Anesthesia



- **1887**-Credited as the first nurse anesthetist, **Sister Mary Bernard** assumed her duties at St. Vincent's Hospital in Erie, Pennsylvania
- 90 Midwest Catholic Hospitals went on to use Sisters for Anesthesia
- **Alice Magaw** is the most well-known nurse anesthetist of the nineteenth century, she worked at St. Mary's Hospital
- (later the Mayo Clinic) in Rochester, Minnesota. Dr. Charles
- Mayo conferred upon Magaw the title "Mother of Anesthesia"
- for her many achievements, particularly her mastery of the
- open-drop inhalation technique of anesthesia using ether and chloroform.
- **1899-1906** -Magaw subsequently published her findings in one article documenting more than *14,000 anesthetics without a single complication attributable to anesthesia.*



Anesthesia related

- **1867-** Surgeon Joseph Lister (Listerine) introduces carbolic acid to clean the wound
- **1875-** Gotthard Bülau described his use of closed water-seal chest drainage to treat an emphysema and thus re-expand the lung
- **1876-** Ringers IV solution (modified in 1930 by Hartman)
- 1885- James Leonard Corning did first epidural
- 1886- Steam sterilization
- 1895- Xray, First anesthetic record with 5 minute BP and pulse
- **1898-** First spinal- German Surgeon August Bier



It was the first drug used in a spinal and epidural

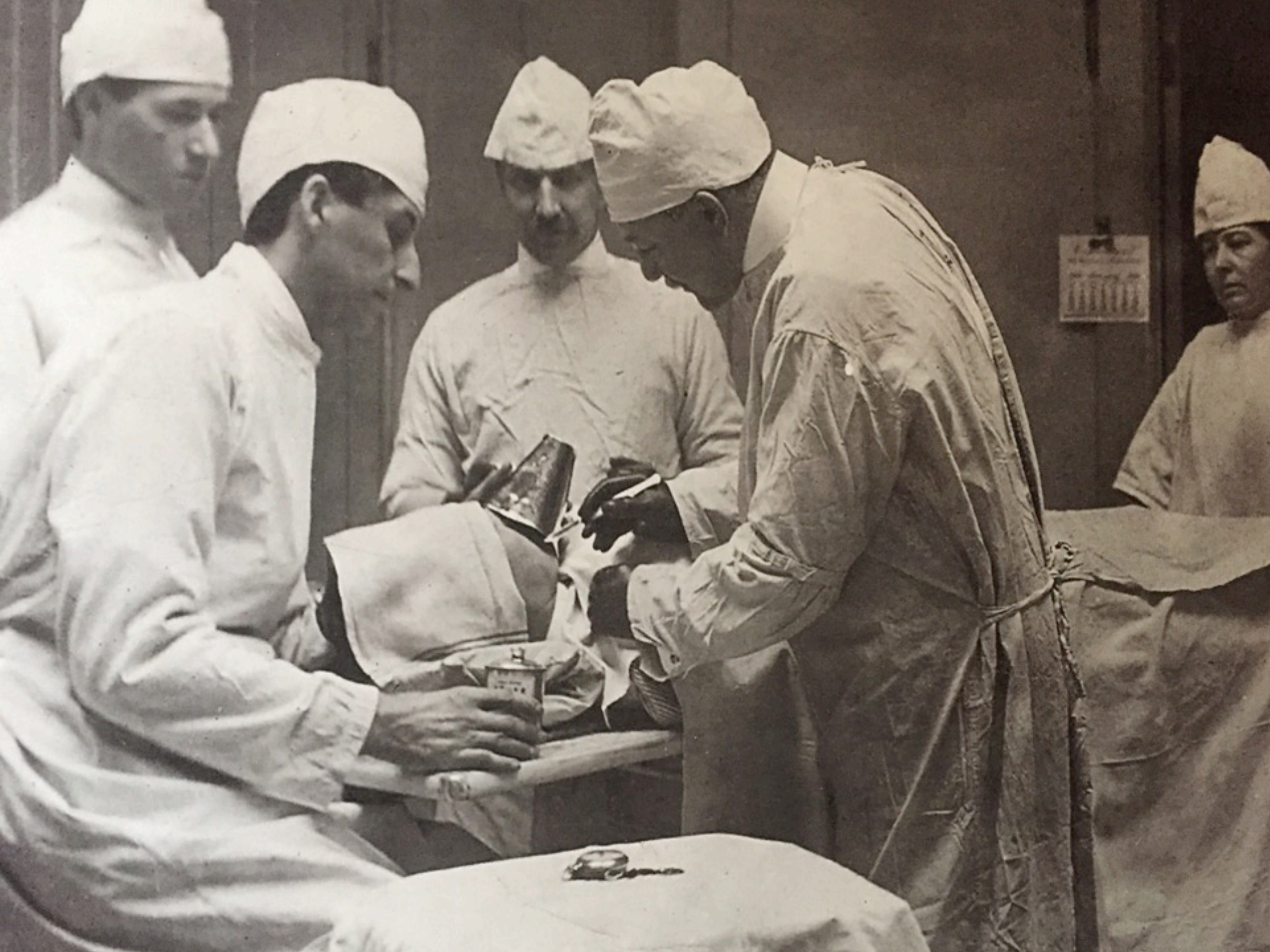
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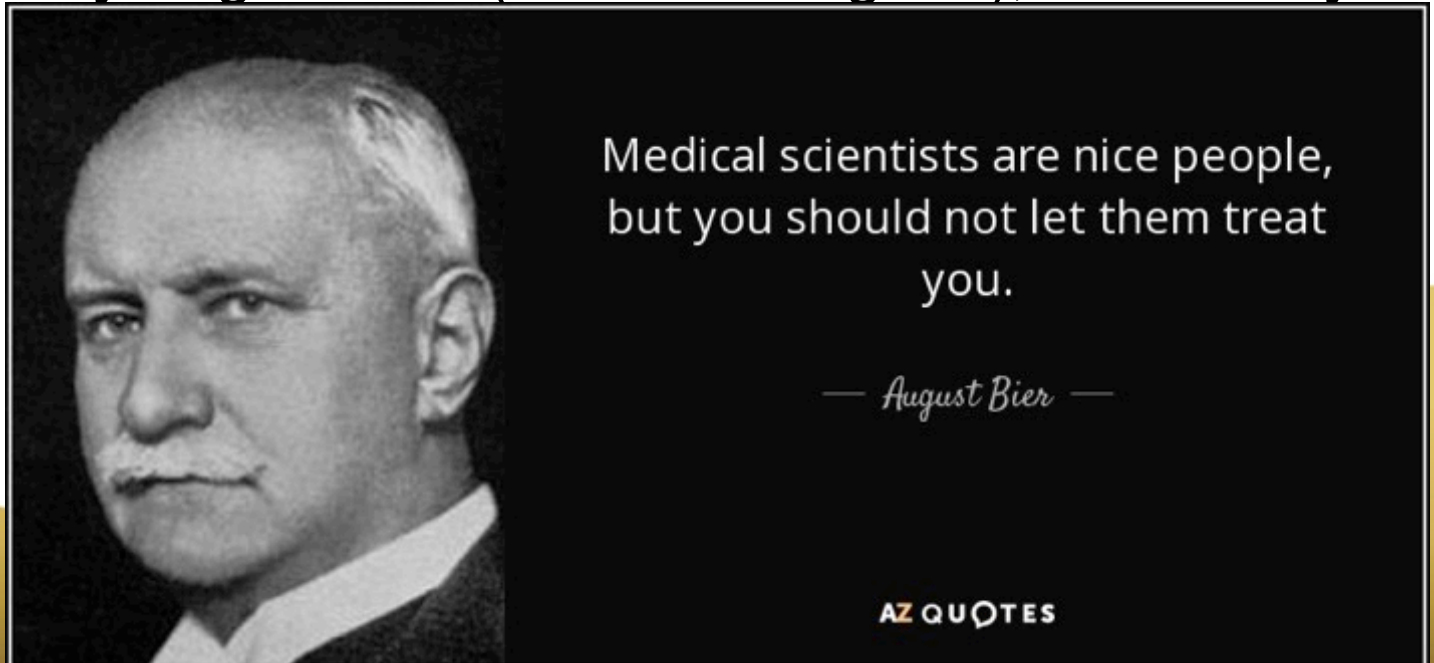
The most famous paragraph ever printed in surgical literature

In the winter of 1889 and 1890—I cannot recall the month—the nurse in charge of my operating-room complained that the solutions of mercuric chloride produced a dermatitis of her arms and hands. As she was an unusually efficient woman, I gave the matter my consideration and one day in New York requested the Goodyear Rubber Company to make as an experiment two pair of thin rubber gloves with gauntlets. On trial these proved to be so satisfactory that additional gloves were ordered. In the autumn, on my return to town, an assistant who passed the instruments and threaded the needles was also provided with rubber gloves to wear at the operations. At first the operator wore them only when exploratory incisions into joints were made. After a time the assistants became so accustomed to working in gloves that they also wore them as operators and would remark that they seemed to be less expert with the bare hands than with the gloved hands



Part Two-1900-1955

- 1900- First case of familial pyrexia of anesthesia (Tuttle, JAMA)
- 1905- Procaine (Nesacaine)
- 1907- Blood grouping but primitive IVs
- 1908- First Spinal (1898) but now Bier Block with procaine by August Bier (German surgeon), oral airway



Dr. Gwathmey describes his vapor inhaler, which used three bottles that could be opened individually to allow for sequencing of the anesthesia agents. "I commenced with either a woman's favorite cologne or a highball (whiskey for the man) using oxygen as a carrier and then introduced chloroform once the mucous membranes were accustomed ..." (Source ASA newsletter, Vol 59, no. 9, September 1995)



Gwathmey & Woolsey Apparatus

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Jackson CO2 Absorber

WLM ID: aiwx

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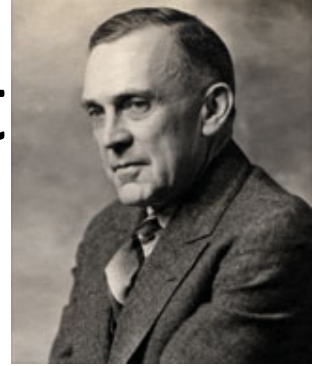
The Nurse Anesthetist

- **1909**-The first nurse anesthesia program opened in Portland with four others added before World War 1.
- **1915**-Agatha Hodgins opened training school at the Cleveland clinic after teaming with Surgeon George Crile during the war to give 10,787 anesthetics without incident using nitrous, oxygen, belladonna and morphine . This spawned 54 new schools over the next two decades.
- **1922**- Yale Medical School appoints Alice M Hunt as Instructor of Anesthesia with University rank. She taught until 1948. Her book Anesthesia: Principles and Practice: A presentation for the nursing profession was published in 1949
- **1923** - Mary A. Ross, M.D. became the first postgraduate trainee in anesthesiology in the United States





Dr Arthur Guedel Motorcyclist Anesthetist (*1883-1956*)



- ***Stages of Anaesthesia***
- ***Stage I*** (Stage of Analgesia or the stage of Disorientation): from beginning of induction of anaesthesia to loss of consciousness.
- ***Stage II*** (Stage of Excitement or the stage of Delirium): from loss of consciousness to onset of automatic breathing. Eyelash reflex disappear but other reflexes remain intact and coughing, vomiting and struggling may occur; respiration can be irregular with breath-holding.
- ***Stage III*** (Stage of Surgical anaesthesia): from onset of automatic respiration to respiratory paralysis.
- ***Stage IV***: from stoppage of respiration till death. Anaesthetic overdose cause medullary paralysis with respiratory arrest and vasomotor collapse. Pupils are widely dilated and muscles are relaxed.

1920's

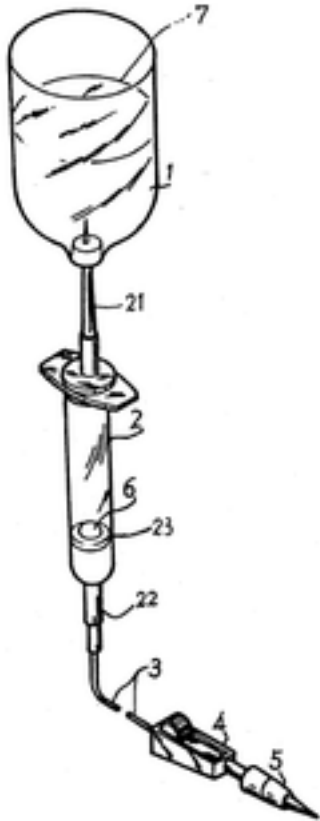
- The Flexner report was taken to heart by Dr. G. Canby Robinson, who was appointed Dean of the School of Medicine in 1920.
- Five years later, on September 16, 1925, the aspirations of the Flexner Report, the will of Canby Robinson, and the funding of Rockefeller Foundation General Education Board and the Carnegie Foundation came to life, as **the School of Medicine was relocated to a new building on the Vanderbilt main campus that housed not only the school, but the hospital, outpatient clinics, laboratory, and library.**



1925—Vanderbilt University Medical Center moved to 21st Avenue South and Garland. The building (which cost \$3,000,000) is a four-story structure with two east-west corridors, S and T (which stood for service and teaching), and intersecting north-south hallways A, B and C



Fluid resuscitation



- From 1909 through to the 1950's the most common practice for additional rehydration was the administration of rectal fluid. Termed proctoclysis, but commonly called the Murphy drip after its inventor Dr John Murphy, an American surgeon. Often used post operatively, one litre for an adult was standardly infused: an effective, widely accessible hydration option, avoiding the alimentary track at a time before intravenous therapy became common place

• *Intravenous therapy then and Now Tracey Kunac, RN, Waikato Hospital, New Zealand*

The Barney Brooks Era-Chief of Surgery 1925-1951

- In 1925, Dr. Brooks accepted the position of Chairman of the Vanderbilt University Department of Surgery and immediately devoted himself to the building of a strong department of surgery. He organized a strong laboratory of surgical pathology using ideas that he had developed in his pioneering efforts in that specialty at Washington University. He introduced his famous Amphitheater Clinic in which medical students were called down to answer questions on the case being presented. For the student, the intensity of the moment was truly an unforgettable experience.



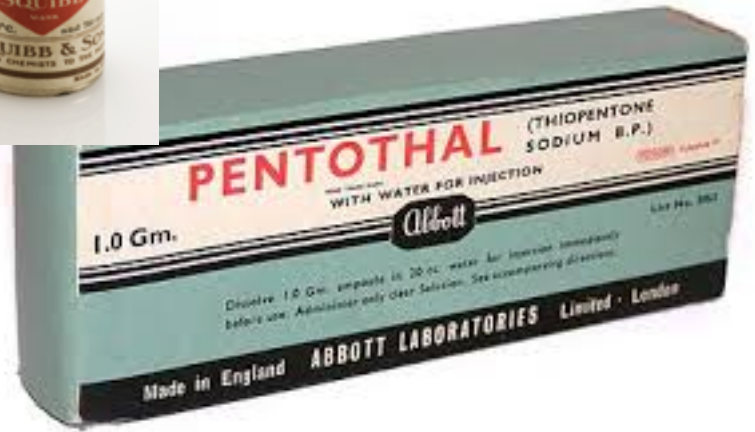
1926-Electrocautery- Bovie and Cushing



1932



1932



1925-1945

- Irene Kellogg (1925-1964) was known as the first nurse anesthetist at VUMC. It wasn't until the department of Anesthesia was set up much later that physician anesthesia training began at Vanderbilt..
- In the early 1940s, Dr. Ernest Goodpasture developed the method of culturing vaccines in chick embryos, which allowed the mass production of vaccines for smallpox, typhus, and **yellow fever**



Barney Brooks and first Chief Resident Dr Alfred Blalock 1925-1927

Johns Hopkins circa 1941



Vivien Thomas (top left) stands behind Dr. Alfred Blalock during an early operation at Johns Hopkins Hospital.
Courtesy Alan Mason Chesney Medical Archives, Johns Hopkins University

1937

- *The first Nurse Anesthetists begin practicing in Tennessee in the early 1900's followed by the inception of the Tennessee Association of Nurse Anesthetists (TANA) in 1937.*



1938-1943

- The Medical Journal of Australia published Geoffrey Kayes survey results of 400,000 anesthetics in 14 hospitals finding a mortality from anesthesia of 1:1000



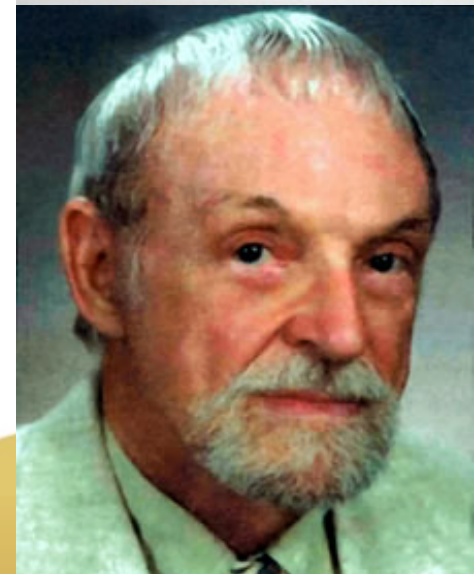
1941 Robert A. Miller invents the " Miller" blade

1943-New Zealander **Sir Robert Reynolds Macintosh** the first professor of anaesthetics outside America invents MAC blade.



History of Anesthesia

- *Prior to World War II, anesthesia was considered more as a nursing specialty in the US.*
- *In 1942, there were 17 nurse anesthetists for every one anesthesiologist.*
- *1942 - First documented "Recovery Room" at Saint Mary's Hospital, Rochester, MN*
- *1942/43- Introduction of IV Curare & the amide local anesthetic Lidocaine*
- *1944 AANA membership was offered to African Americans*
- *1945-The AANA administered its first qualifying examination*

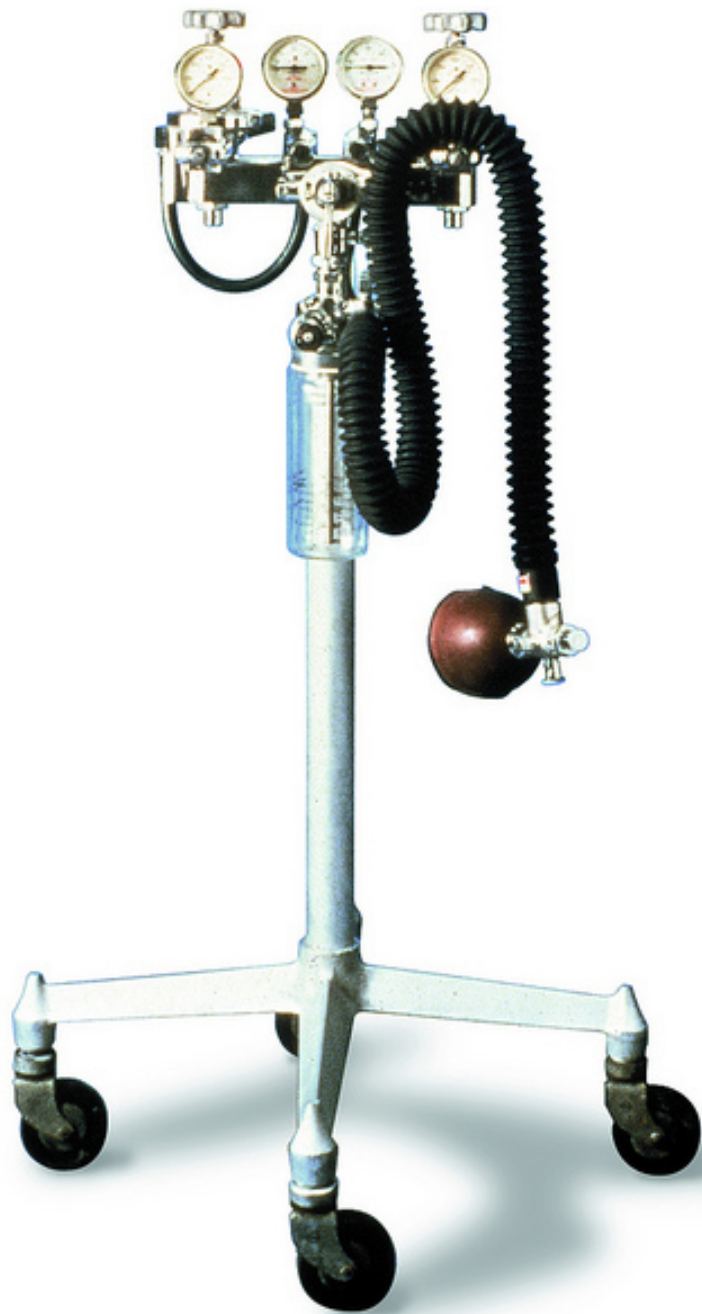


1941

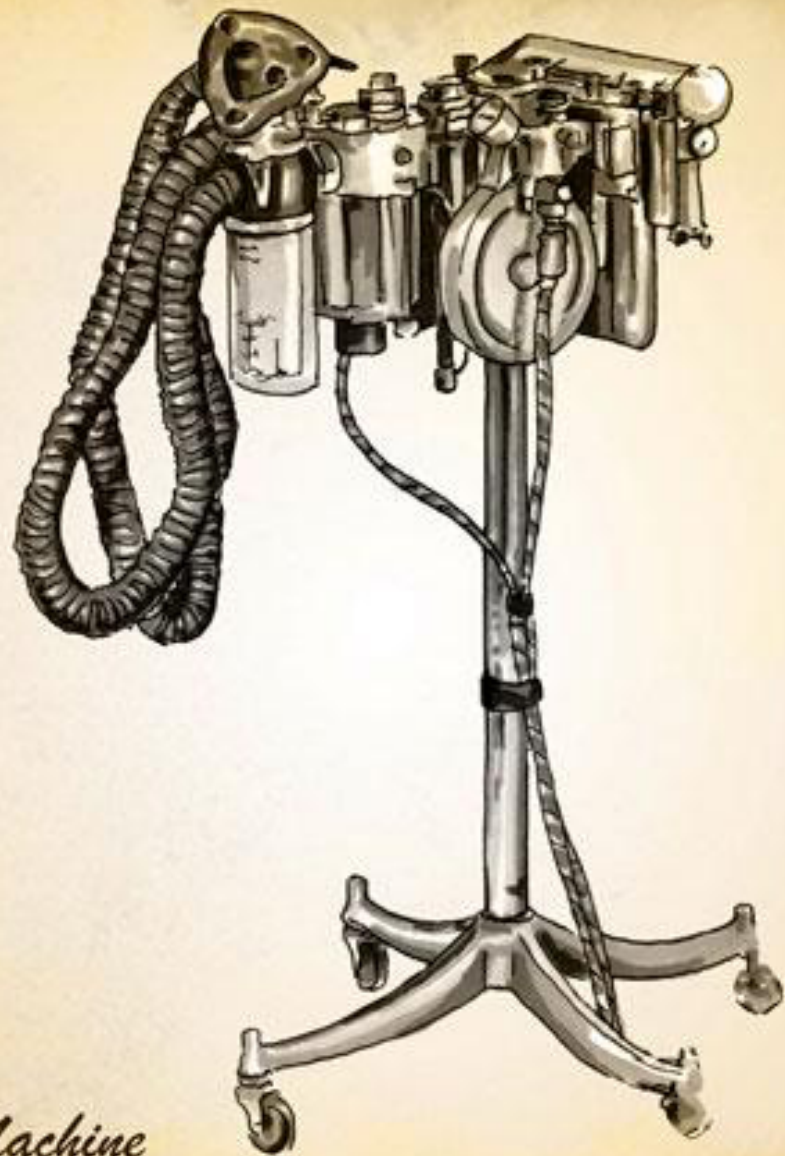
How is a patient's risk related to receiving anesthesia determined?

- The American Society of Anesthesiologists (ASA) created a Physical Status Classification system to provide standard guidelines for evaluating physiologic condition of patients
- Patients receive a classification of P1 - P6 based upon physiological status prior to surgery- P5 and P6 were emergencies in either P1,2 pts or P3,4 pts
- The higher the score, the greater the potential risk of intraoperative difficulties or complications





Machine





History of Anesthesia

Credited with saving lives of
10-15% of all WWII casualties!



- On January 1, 1946, the third in the nations autonomous and independent Department of Anesthesiology at Vanderbilt University was established under the chairmanship of intern Benjamin Howard Robbins, M.D. (Ref: Minute of the Executive Faculty-Vanderbilt University School of Medicine—December 15, 1945).



1946-1960

1946 – The AANA

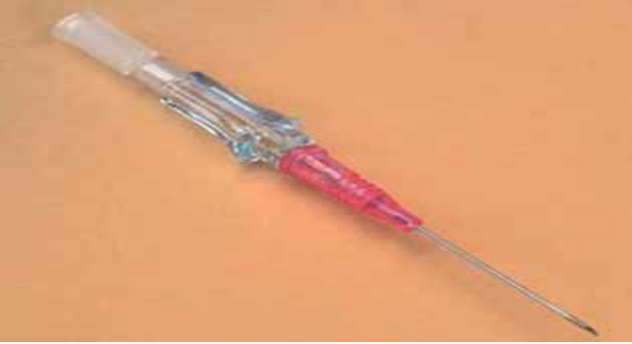
- Third administration of the national qualifying exam for nurse anesthesia.
- Grace Hospital Detroit. “I thought the exam was a good idea-wrote one nurse anesthetist. The exam took all day. I had trained for 9 months (3 months greater than required). I was on call every day and every other weekend. I got paid \$250/month



1947-Saved by a Spoon

- Claude Beck, at the University Hospitals of Cleveland began delivering ac directly to the exposed hearts of animals he had put into ventricular fibrillation.





1950s

- IV therapy prior to the 1950s was a crude affair using steel reusable needles hand filed to keep sharp.
- Dr. David Massa, a resident in anaesthesiology, shortened a 16- gauge Becton Dickinson (Franklin Lakes, NJ) needle and inserting another steel needle as an inner stylet



MASH 1950



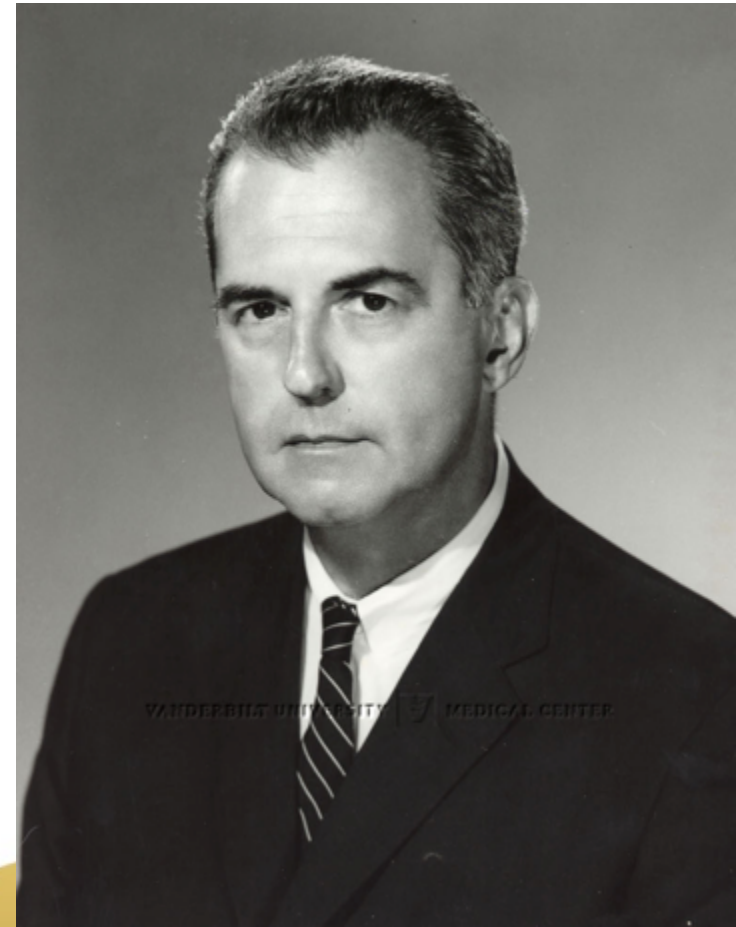
1950's




- Knowledge of postanesthesia complications grew
- Surgical ICU and postoperative respiratory support developed
- “Recovery Rooms” to stabilize patients prior to transfer to other units
- Benefit of early postoperative ambulation accepted
- Specialized education of post anesthesia staff begun

1952-1981

- Dr. H. William Scott, Jr. came to Nashville in 1952. He found a 28 years old building deterioration
- No private clinic
- No Post operative recovery room
- No Surgical Intensive care unit
- No Emergency service (rang the bell)
- Inadequate OR facilities and anyone could walk in...
- 350 beds not enough
- Dr. Scott “...preferred a nurse to do his anesthesia!...and disliked ventilators”



1954-1955

- Beecher & Todd published the first anesthesia outcomes study in the US including incidence of anesthesia related mortality (1: 2100).
 - His study demonstrated the use of curare increased mortality (1:370) AND that nurses had lower mortality rates than physicians giving anesthesia...
 - Anesthesia residency officially starts at Vanderbilt...
- 

Post World War 2 Invention revolutionized and

up

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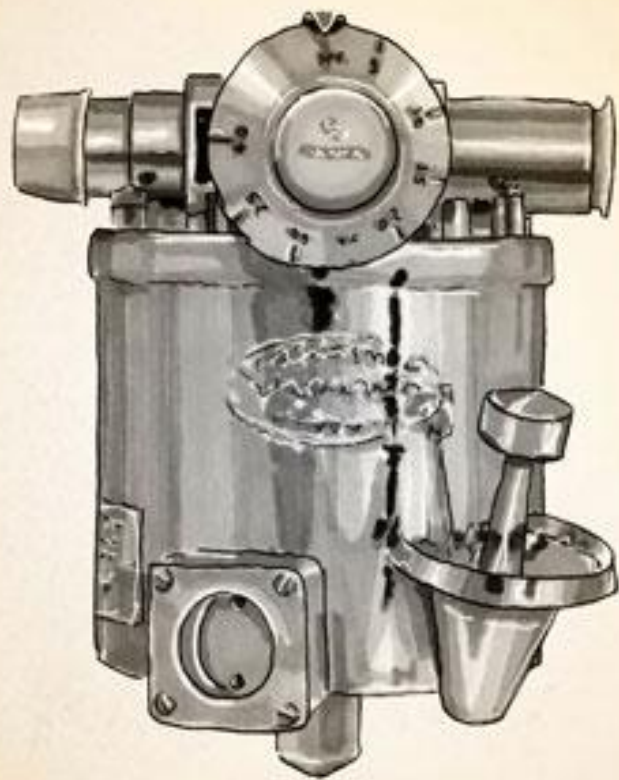
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Part Three-Anesthesia

1955-1996



- Virginia Apgar published the Apgar score
- First edition of “The Management of pain”
- First use of heart lung machine
- Gas analyser
- Birth of mouth to mouth resuscitation
- Birth of World Federation of Society of Anaesthesiologists
- Halothane & the release of Fluorotec Variable bypass vaporizer
- First Pacemaker



Cyprane Fluotec Vaporizer

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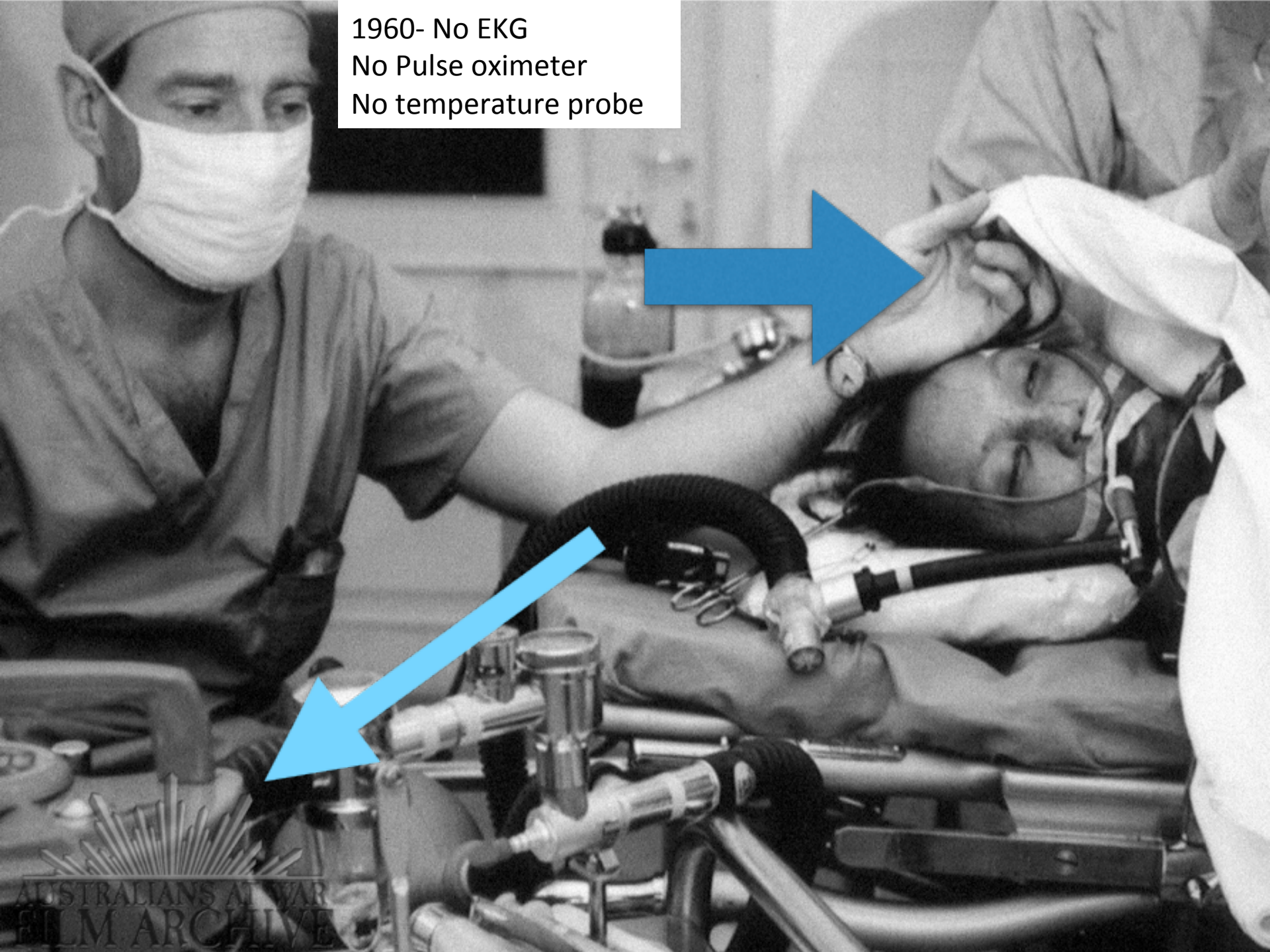


1956

- Nitrous used for treating tetanus pain but over course of days produced severe bone depression and death. Decades later it was discovered that nitrous had an ability to destroy a vital enzyme *methionine synthase* needed to produce folate and thus DNA
- **CRNA** Initials came
- into use in the US
- after now a whole
- year of training.



1960- No EKG
No Pulse oximeter
No temperature probe



Anesthesia 1960s

- 1960- Anesthesia Machines with Halothane vaporizers
- Neostigmine and Atropine
- Pyrexia of anesthesia
- 1962- Concept of MAC with Halothane
- 1964- Hermin's Hermits- Something tells me I'm in for something good
- 1969- Halothane Caffeine contracture test



- 1961 Dr. Mildred T. Stahlman founded the division of Neonatology and began the Vanderbilt NICU,



1960s

- Curare was essentially replaced by a new drug pancuronium-1967
- Introduction of fentanyl initially combined with Droperidol as Innovar and thus coined the phrase neurolept- analgesia
- Ketamine
- 1969 study from Vanderbilt stated halothane hepatitis was 1:120,000





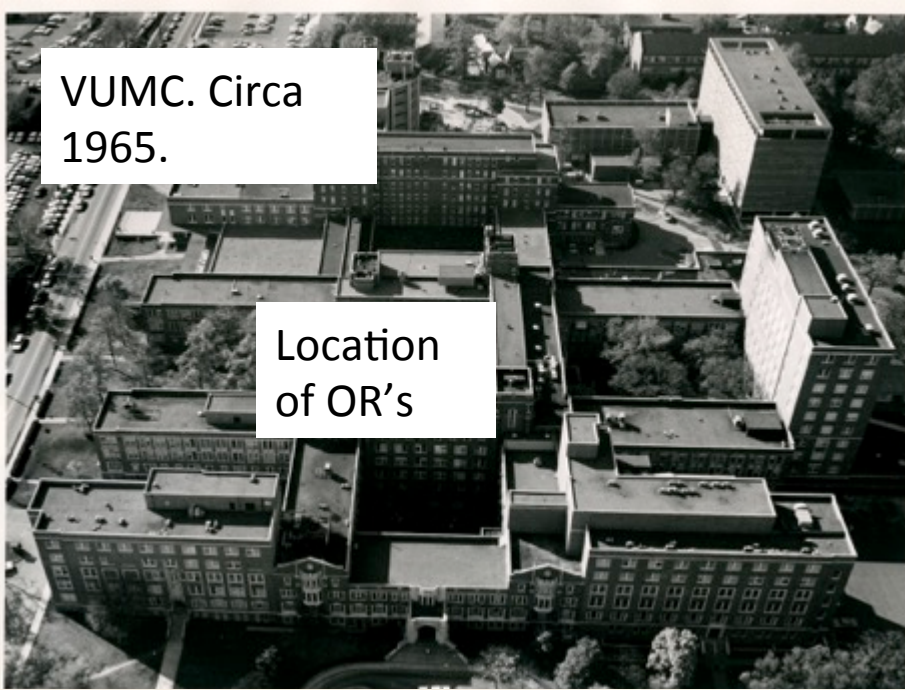


ASA Classes 1963



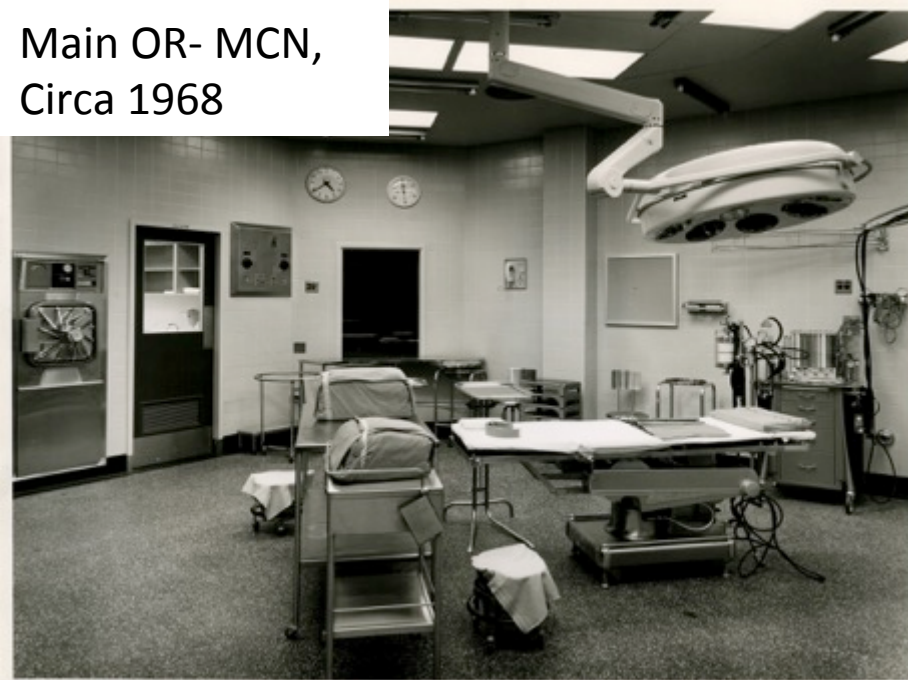
- **P1** = a normal, healthy patient
- **P2** = a patient with mild systemic disease, (ex - well-managed diabetes)
- **P3** = a patient with severe systemic disease that limits activity, but is not incapacitating (ex – poorly controlled hypertension)
- **P4** = a patient with severe systemic disease that is a constant threat to life (ex – severe renal dysfunction)
- **P5** = a patient not expected to survive ≥ 24 hours with or without surgery (ex – major multi-system trauma)
- **P6** = a patient declared brain dead whose organs will be harvested for donation

VUMC. Circa 1965.



Location of OR's

Main OR- MCN, Circa 1968



Recovery Room- MCN circa 1965



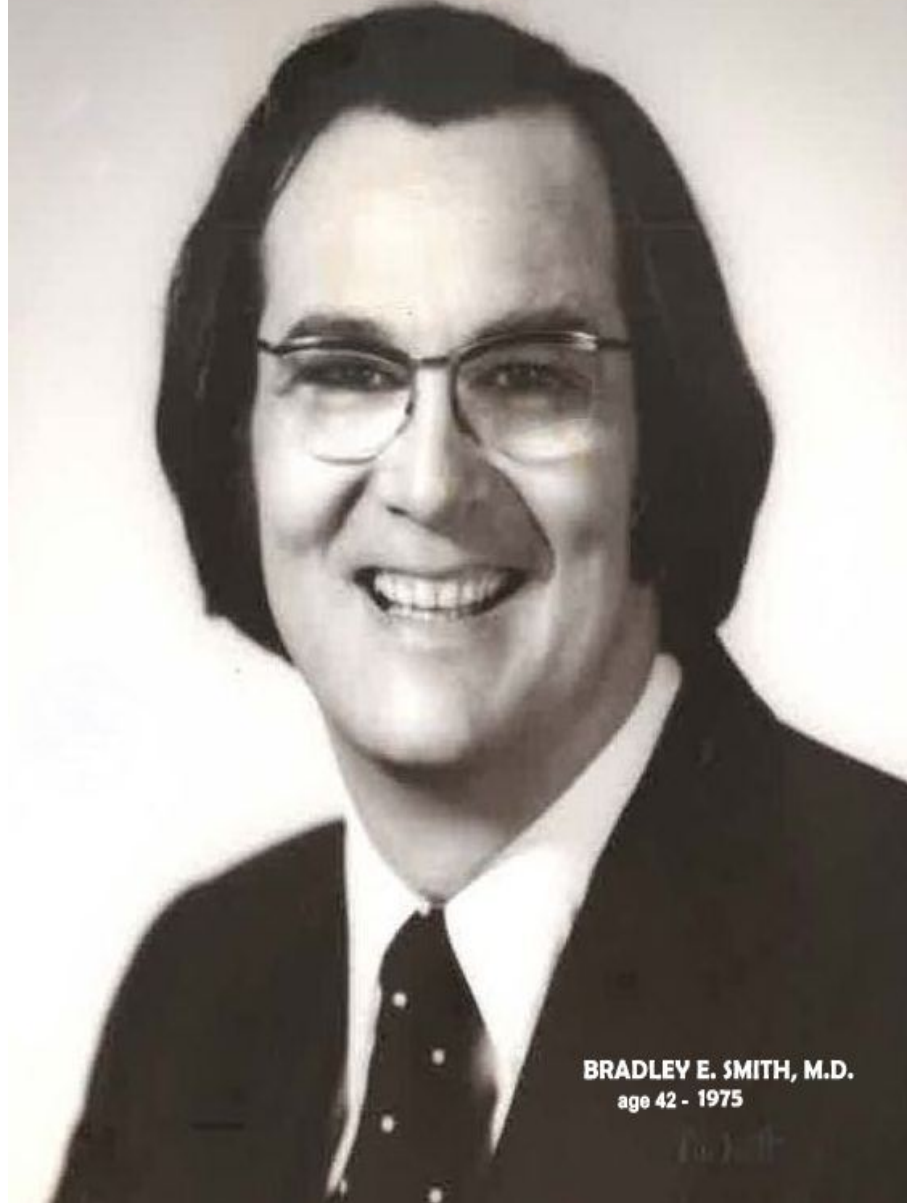
Main OR Entrance MCN circa 1968



1970's

- Care in Recovery Room available 24 hours daily
- “On call” staffing by registered nurses implemented after regular hours
- Aldrete Discharge Score introduced to document patient readiness for discharge from Recovery Room
- Outpatient Surgery Units established
- CPR, BLS and ACLS certification requirements initiated for Recovery Room staff
- Nurses actively organized by geographic regions to educate Recovery Room Nurses
- 1979 - nurses representing state/regional organizations met to discuss forming a national organization, sponsored by American Society of Anesthesiologists (ASA)

- Bradley Edgerton Smith, MD, 1969. Steve Blanks, CRNA 1976.

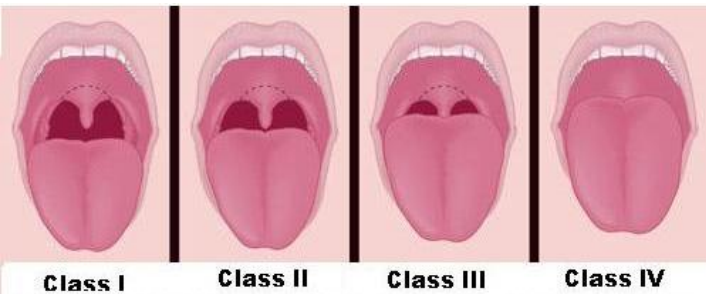


1969-1993

1976-2013

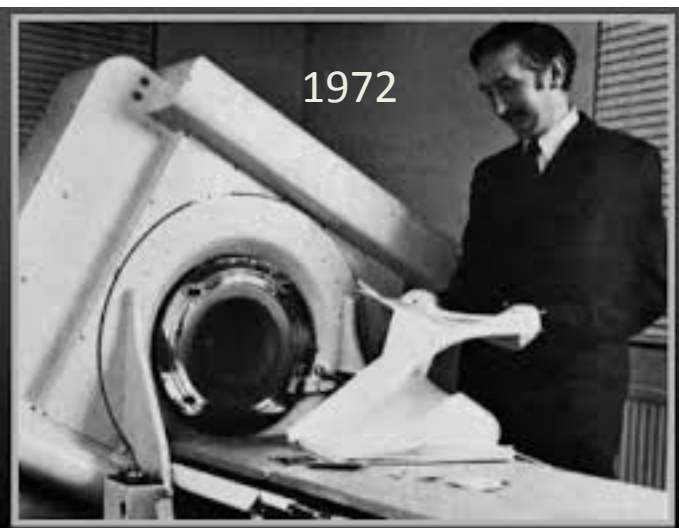
1970's

- **Even as late as 1971, 48.5% of anesthesia was given by CRNAs, while 38.34% was provided by American Society of Anesthesiology members.**
- **The numbers of physicians in this specialty did not greatly expand until the late 1960's and 1970's (only 7775 in 1963).**



1970s

- Anesthesia worldwide is now a specialty
- Formal training of 3-5 years established in most countries for anesthesiologist
- Ketamine first used in the Vietnam war in 1970
- Metal IVs replaced by plastic
- Seshhagiri Mallampati, MD describes airway exam
- GOH –gas (nitrous) oxygen and Halothane
- Enflurane surpasses Halothane due to fear of hepatitis
- Thiopentone, muscle relaxants and opioids



1975
Approved
by FDA in
1979



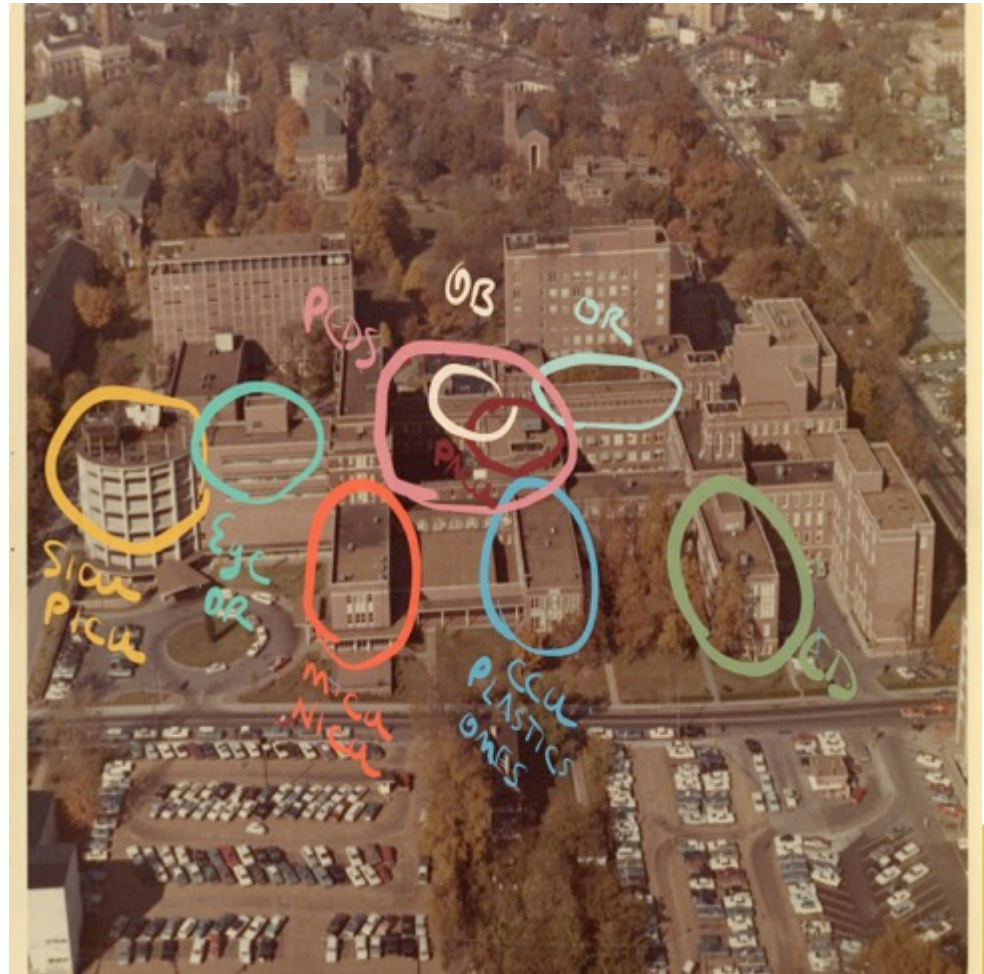
- Twilight sleep replaced by GETA/SAB/Epidural in OB

1979

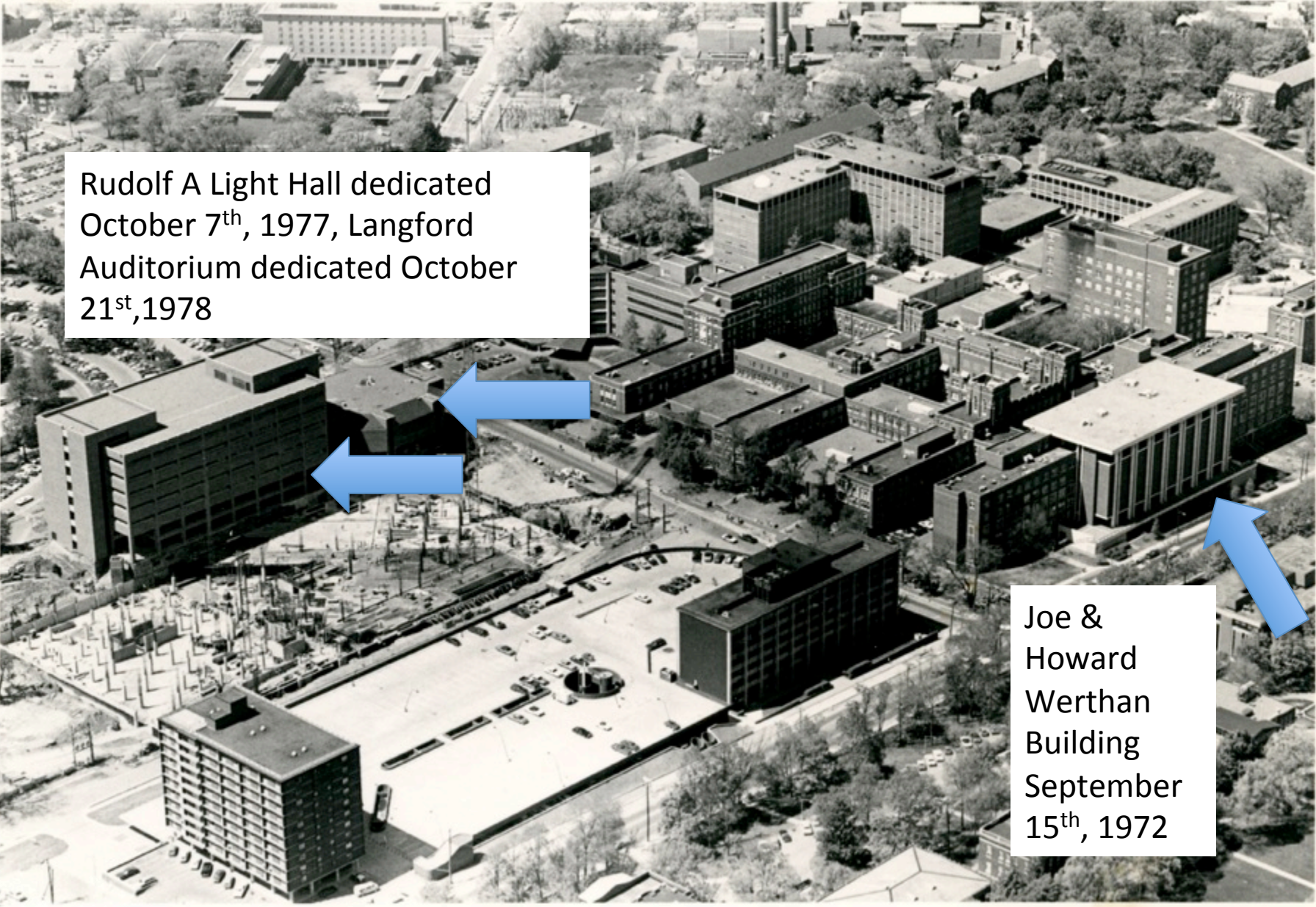


Aerial view of VUMC

- SICU/PICU
- Eye OR
- MICU/NICU
- CCU/Plastics/OMFS
- OB
- ORs
- PACU
- ER
- Peds



DEPARTMENT OF ANESTHESIOLOGY



Rudolf A Light Hall dedicated
October 7th, 1977, Langford
Auditorium dedicated October
21st, 1978

Joe &
Howard
Werthan
Building
September
15th, 1972

Vanderbilt-1978

- Last use of open drop Ether at Vanderbilt on a 9 year old child with a reactive airway as a demonstration for residents. Last use of Cyclopropane & Chloroform



September 12th,
1980- VUMC
opened
increasing
capacity to 515
beds. The new
hospital had 19
state of the art
ORs. Old Hospital
christened
Medical Center
North



Equipment and personnel in the 1980s

- By the late 1970s there was no Ether or Cyclopropane given
- By the late 1970s everyone had an EKG in their room....almost every day
- We had 2 anesthesia techs (Lorraine and George)
 - We had non disposable, re-washed black rubber circuits
 - Most (but not all) ETTs were disposable
- Anesthesia for radiology was limited
 - Occasional CT
 - Never for MRI
 - Frequently done for radiation therapy

is the leading cause of death by Anesthetic a

up

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1981-1982

- The Verdict- Paul Neuman



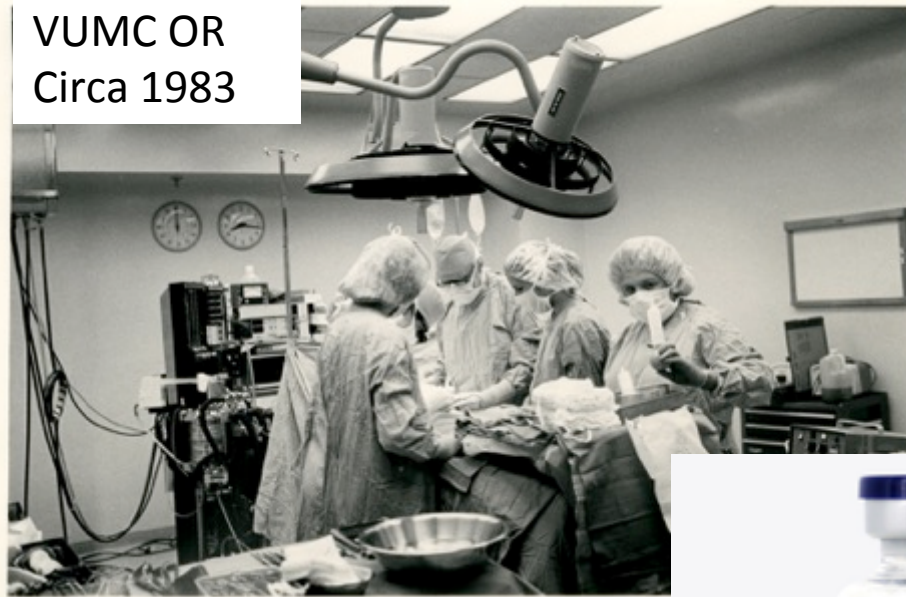
New Equipment



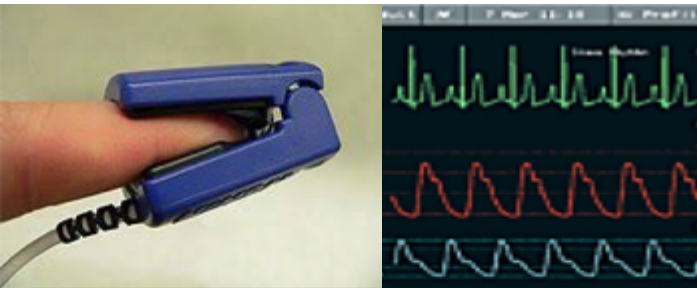
The 80's national

- Until 1980 Nurse Anesthesia training concluded with a Certificate or Bachelors degree.
- 1982 The CRNA “Qualifying exam” became the “Certification exam for Nurse Anesthetists” to reflect that you did not qualify for AANA membership based on your exam
- Masters degrees in Anesthesia began to appear.

VUMC OR
Circa 1983



Lifeflight 1984



1980's



1981- First newsletter published in January (Marie Darcy, Editor). Newsletter re-titled Breathline in August (Anne Allen, Editor)

1982- First ASPAN National Conference held in April, St. Louis, MO

1983- Released ASPAN Guidelines for Standards of Care of the first President's Award

In the mid-1980s, ASPAN members were encouraged to promote a name change in hospitals from "Recovery Room" to Post Anesthesia Care Unit (PACU) to better reflect the type of care provided.

1980's

- 1986- First issue of the Journal of PostAnesthesia Nursing (JoPAN) published in February (Anne Allen and Marie Darcy, Editors)
 - First Certified PostAnesthesia Nurse (CPAN) certification exam administered in November
 - 1987- Standards of Postanesthesia Nursing Practice published
 - 1989-Standards of Postanesthesia Nursing Practice endorsed by ASA. Presentation of the first President's Award
 - Meanwhile... Ambulatory surgery centers proliferate due to legislative action, economics, hospital bed shortages, growth of laparoscopic and fiber optic technology and improved anesthetic medications

1986-1998



Designated a Level One trauma center on August 26th. (Only one in the region)

What 80s invention revolutionized patient safety

up

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What 80s invention revolutionized patient safety

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1990-1991- Dr Pinson first liver transplant

- Vanderbilt Transplant Center opened in 1990 to house kidney, heart, heart/lung, pancreas, kidney/pancreas, liver and bone marrow services
- Dr Wright Pinson performed first Liver transplant at Vanderbilt (his 100th)
- 100th cardiac transplant performed

Dr Pinson- First Liver transplant



VUMC- 1990's

- Patient visits above 31,000 in 1999
- Outpatient visits approaching 600,000.
- VUMC has the only Level I trauma center in the region, including the LifeFlight helicopter ambulance program, which began in 1984
- The only Level 3 Burn Center;
- The only Level IV Neonatal Intensive Care Unit
- The only National Cancer Institute-designated center of its kind in Tennessee.

Anesthesia 1990s

- The Post Anesthetic Discharge Scoring System (PADSS) have received widespread acceptance in assessing postanesthetic recovery .
- PADSS (1991) by Dr Frances Chung to assess the patient's transition from Phase II to Phase III recovery.
- 1993-Harmonic scalpel
- 1994-Argon coagulator

1993

- January 20th 1993 Bill Clinton became the new president.



- Bill Clintons mother was a CRNA!

1996-Present

- I graduated from Anesthesia School...

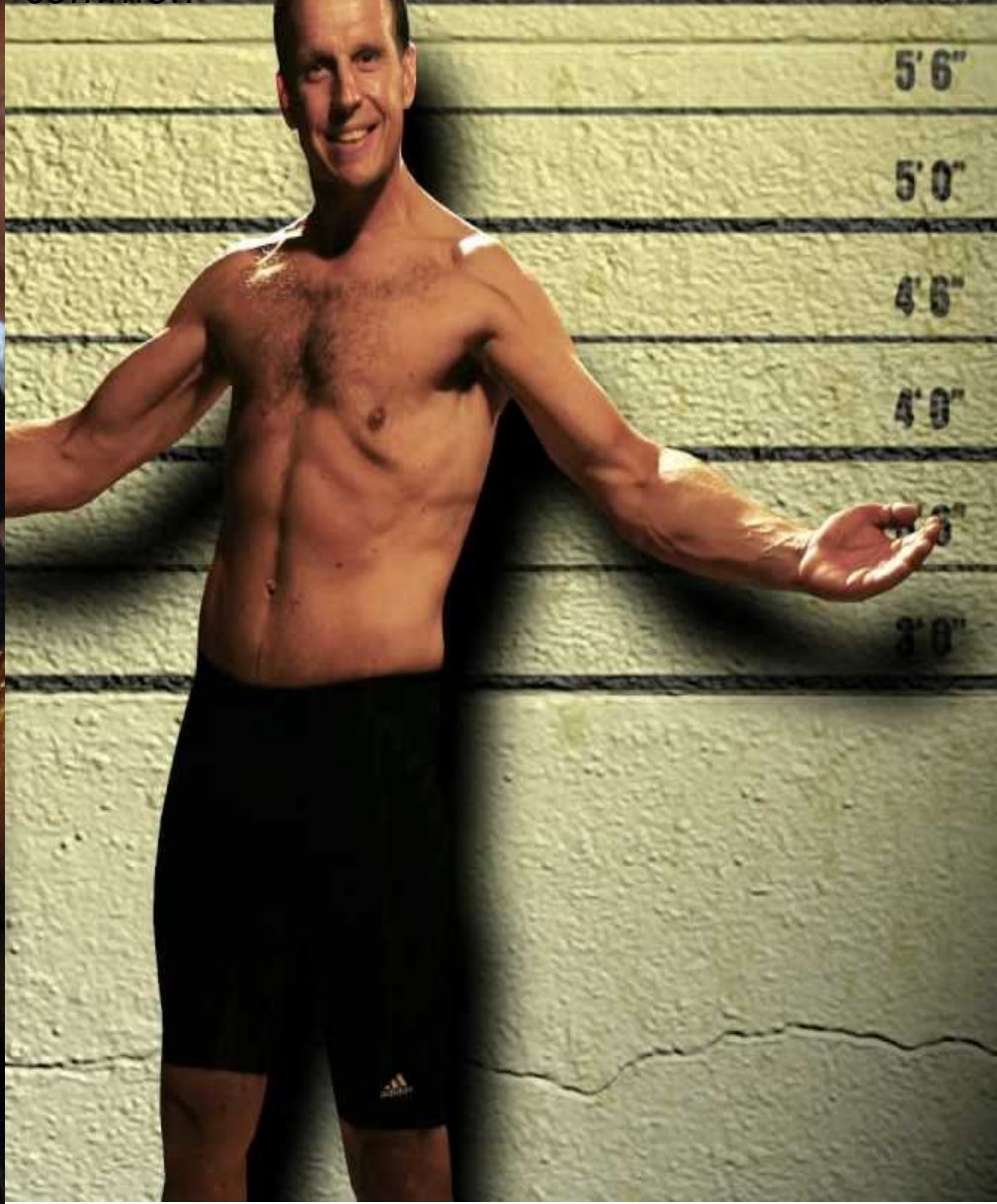


Patent 1984





© Getty Images



1990's

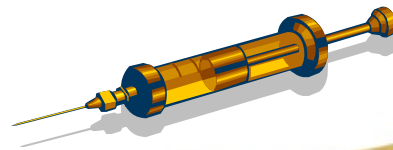
- 1994-Certified Ambulatory PeriAnesthesia Nurse (CAPA) certification exam administered for the first time in November
- Anesthesia Residency program dropped to 4 residents
- SRNA Training and SRNA SIM initiated
- SRNA solo with attending
- 8 CRNAs at Vanderbilt (1995)
- First big hire of new CRNAs
- Research, research, research





Common Sequence of General Anesthesia in 1990's

- A benzodiazapine (versed) is usually administered preop.
- Appropriate monitors are connected to patient after arriving in OR (ECG, pulse oximetry, etc.)
- Patient is preoxygenated with 100% O₂ for 3-5 minutes (builds a large O₂ reserve in lungs and removes nitrogen)
- Opioids administered IV
- Induction agent & paralytic is administered if instrumenting airway



IV Induction Anesthetic Agents



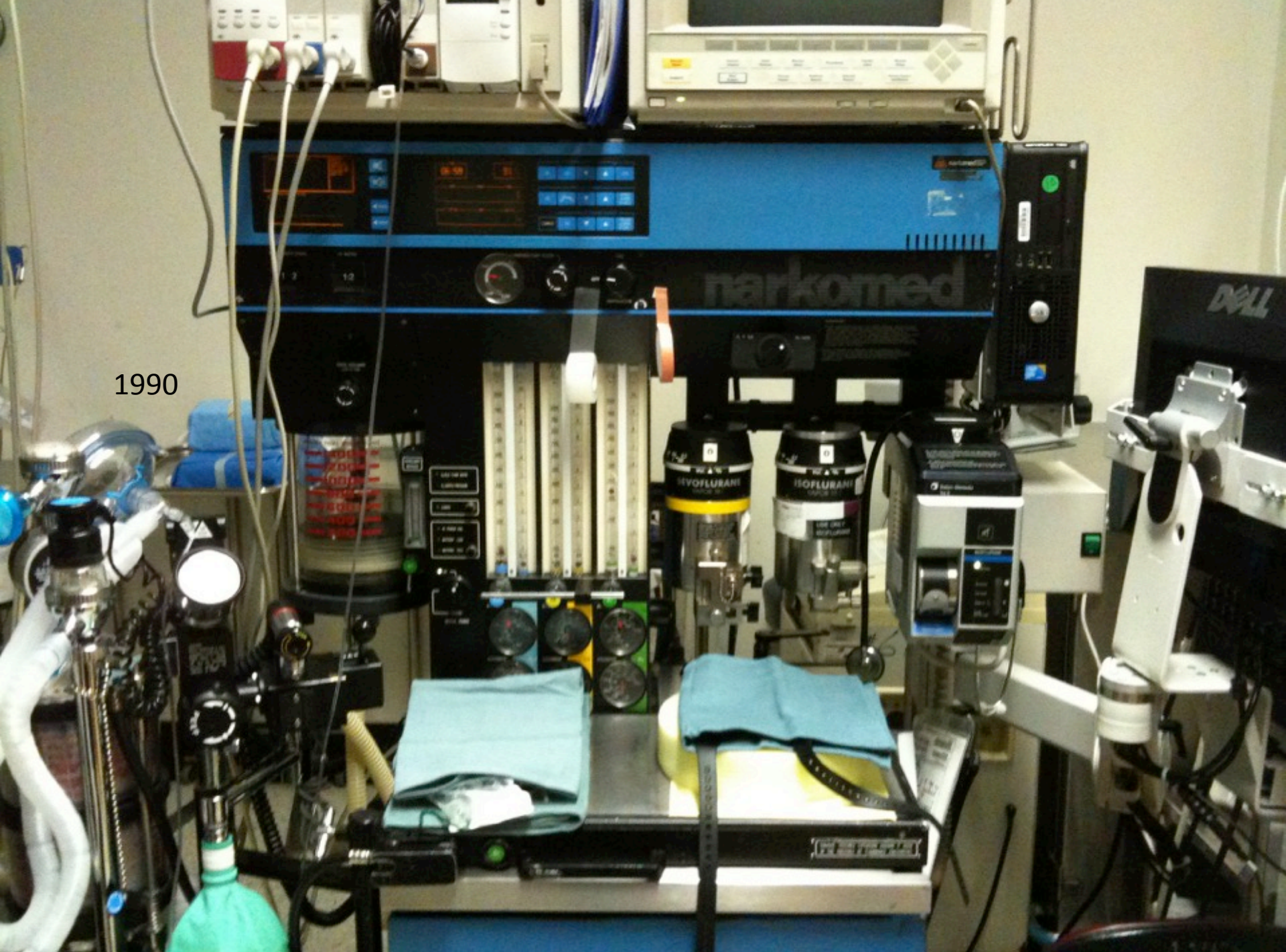
- Propofol Brevital Ketamine Etomidate



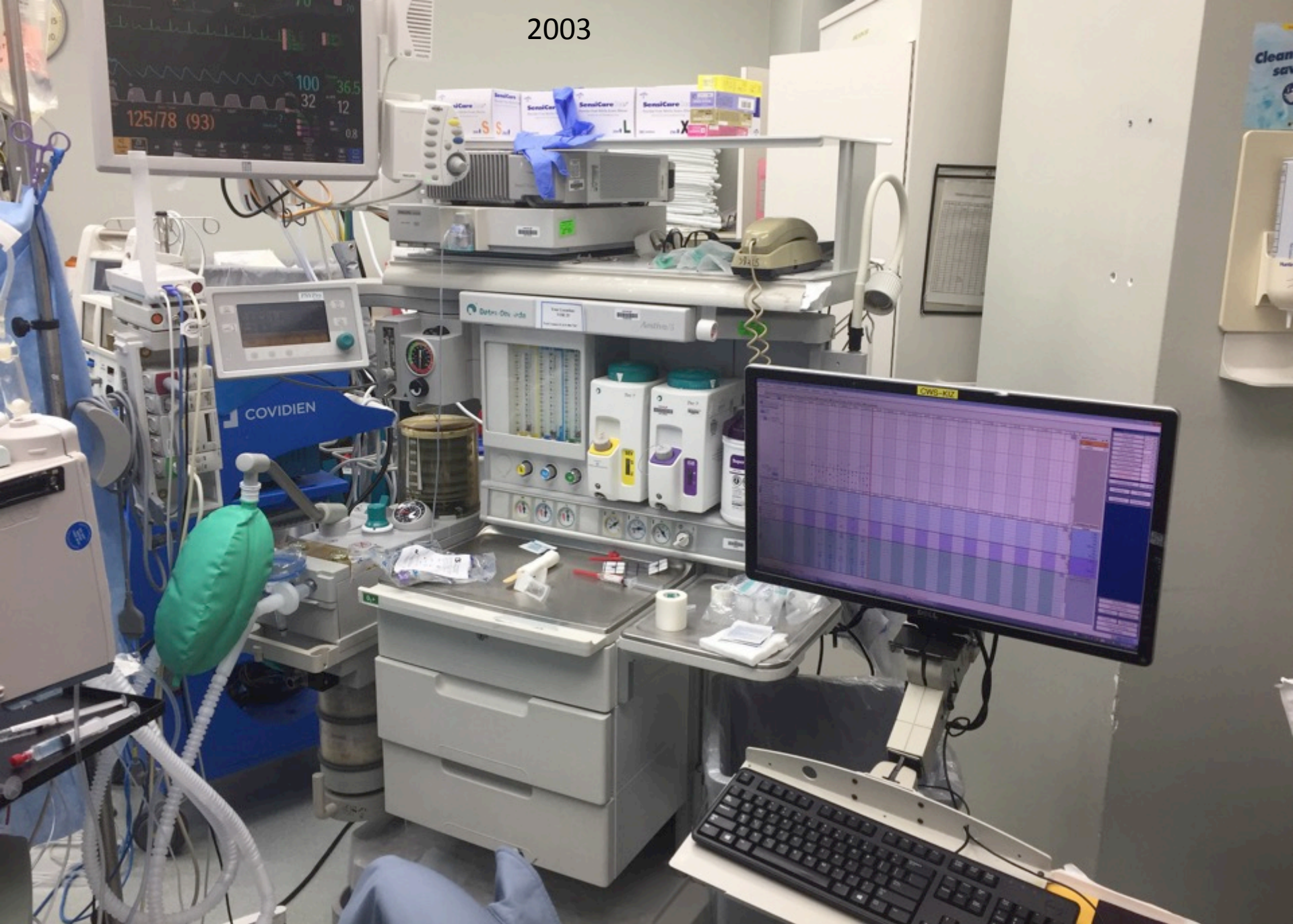
Sodium Pentothal



1990



2003

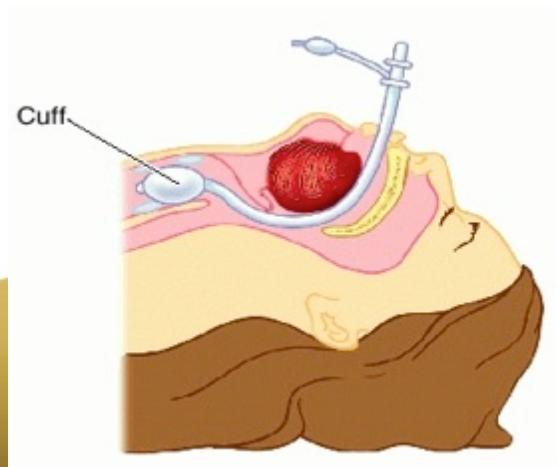


2017



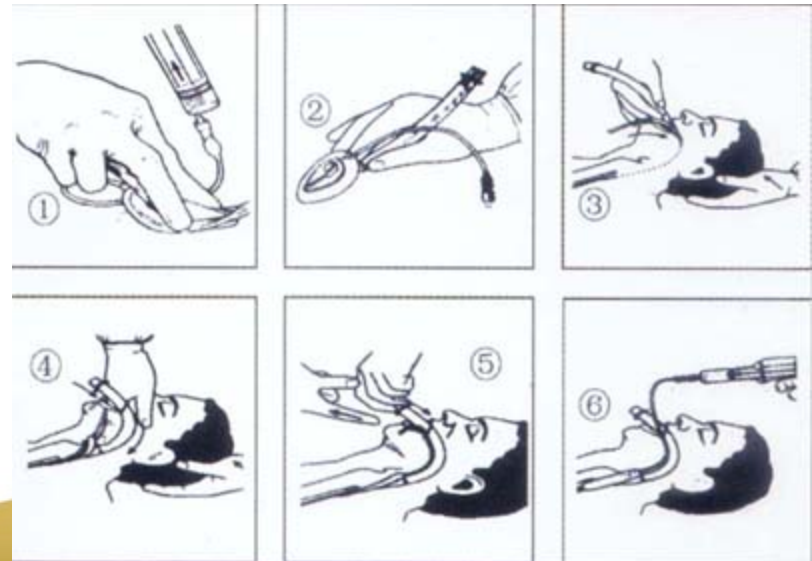
Types of Artificial Airways

- **Endotracheal tube (ETT)** – used when mask anesthesia/LMA is not appropriate for patient and/or procedure; also used to prevent aspiration and/or facilitate respiration when patient is paralyzed
 - intubating dose of muscle relaxant is given to temporarily paralyze muscles and enable ETT to be inserted into the trachea

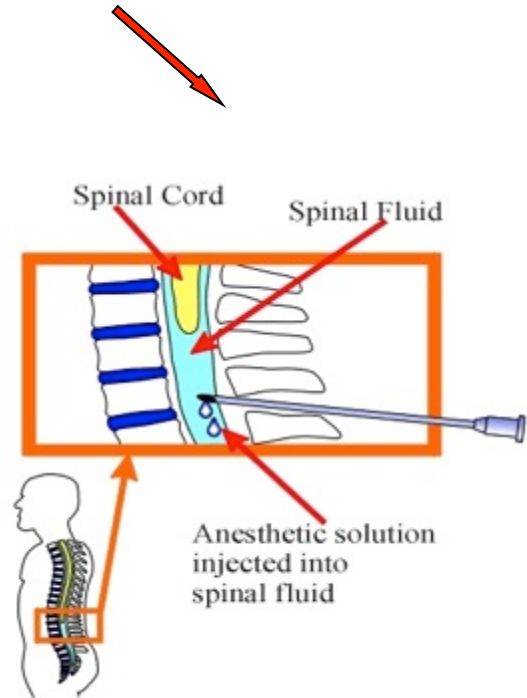
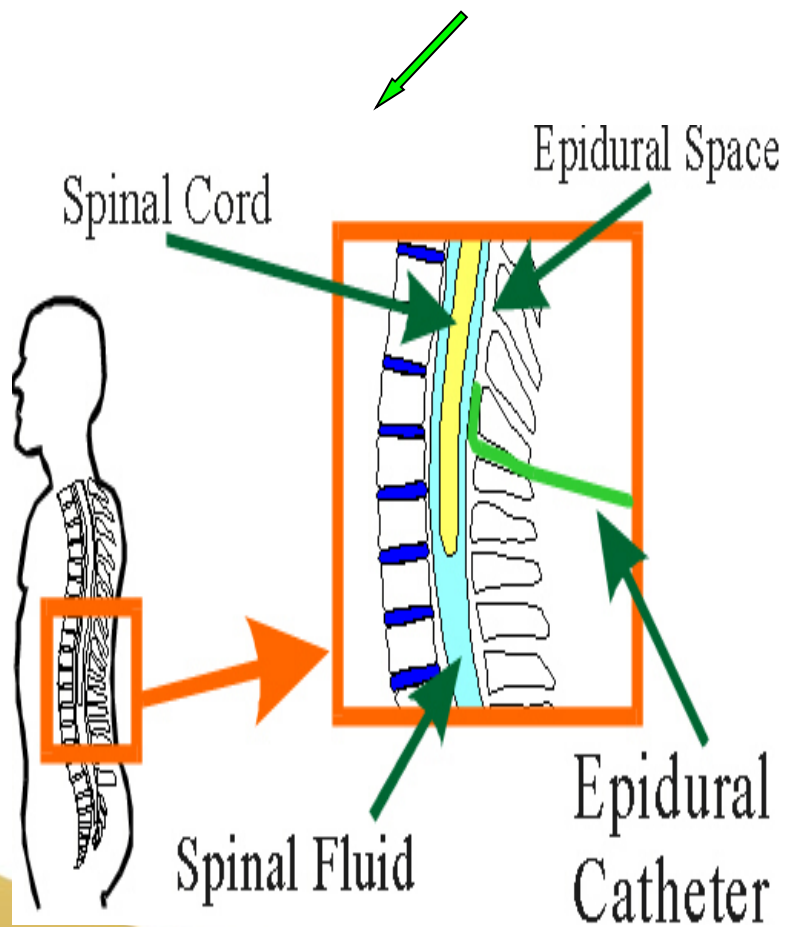


Types of Artificial Airways

- **Laryngeal Mask Airway (LMA)** – used for patient who has good airway, minimal aspiration risk, and is undergoing short procedure that does not involve the head or neck
 - LMAs are usually inserted *without* use of a muscle relaxant



Regional Anesthesia: Epidurals vs. Spinals





Monitored Anesthesia Care (MAC)

- The anesthesia provider supplements with IV medications that provide sedation and systemic analgesia
- +/-Local anesthetic is infiltrated into the surgical site by the surgeon
- Often used in healthy patients undergoing minor and/or short procedures
- Can also be used for patients would not tolerate general anesthesia well due to physiologic instability
- Revolutionized GI procedures due to propofol

1999



- Gaschart Vanderbilts electronic charting system goes “Live”. The core group involved was Dr Higgins, Dr Beattie, Josh Yarbrough and Nimesh Patel.

1999



- Institute of Medicines report on incidence of medical errors as the 8th leading cause of death with 44,000-98,000 deaths/year



Agency for Healthcare Research and Quality

- Develops 20 indicators the first indicator was meant to measure anesthetic safety...

What about the surgeons?

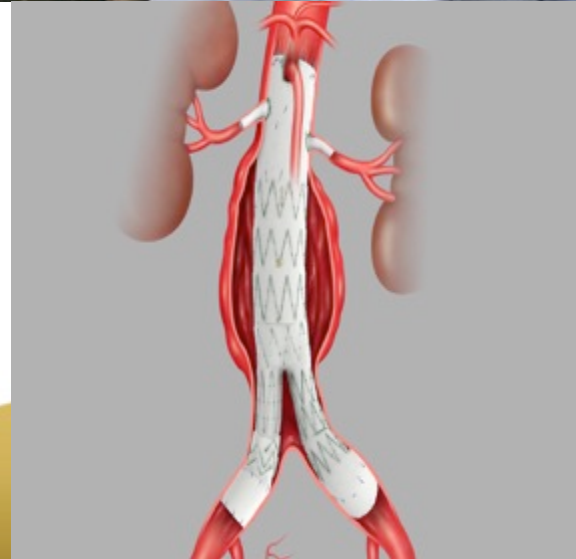
- They studied **Seven** complex surgical procedures, including:
- Abdominal aortic aneurysm repair
- Aortic valve replacement
- Bariatric operations
- Coronary artery bypass grafting
- Esophagectomy
- Pancreatectomy (Whipple)
- Percutaneous coronary intervention.
- Regional (e.g., Tennessee Surgical Quality Collaborative, comprising 10 hospitals)

Strategies

- Deploy Rapid Response Teams
- Deliver Reliable, Evidence-Based Care for Acute Myocardial Infarction to prevent deaths from heart attack
- Prevent Adverse Drug Events
- Prevent Central Line Infections
- Prevent Surgical Site Infections
- Prevent Ventilator-Associated Pneumonia

2000-2003

- 2000- Vanderbilt had 18 CRNAs
- 2001- First lap kidney transplant
- 2003- First Robotic prostatectomy
- Endovascular AAA



2000-2017



Outcome
HEALTH



1996- PRESENT



OBAMACARE

This is going to hurt



RATES IN THE U.S. ON THE RISE

Maternal mortality rates per 100,000 live births (year of data available)

Mexico (2014)

38.9

United States (2016¹)

23.8

Chile (2013)

15.2

Turkey (2014)

15.2

New Zealand (2012)

11.3

¹— U.S. estimate based on Macdorman et al. *Obstetrics & Gynecology* 2016.

SOURCE World Health Organization

USA TODAY



EXHIBIT ES-1. OVERALL RANKING

COUNTRY RANKINGS

Top 2*
Middle
Bottom 2*



	AUS	CAN	FRA	GER	NETH	NZ	NOR	SWE	SWIZ	UK	US
OVERALL RANKING (2013)	4	10	9	5	5	7	7	3	2	1	11
Quality Care	2	9	8	7	5	4	11	10	3	1	5
Effective Care	4	7	9	6	5	2	11	10	8	1	3
Safe Care	3	10	2	6	7	9	11	5	4	1	7
Coordinated Care	4	8	9	10	5	2	7	11	3	1	6
Patient-Centered Care	5	8	10	7	3	6	11	9	2	1	4
Access	8	9	11	2	4	7	6	4	2	1	9
Cost-Related Problem	9	5	10	4	8	6	3	1	7	1	11
Timeliness of Care	6	11	10	4	2	7	8	9	1	3	5
Efficiency	4	10	8	9	7	3	4	2	6	1	11
Equity	5	9	7	4	8	10	6	1	2	2	11
Healthy Lives	4	8	1	7	5	9	6	2	3	10	11
Health Expenditures/Capita, 2011**	\$3,800	\$4,522	\$4,118	\$4,495	\$5,099	\$3,182	\$5,669	\$3,925	\$5,643	\$3,405	\$8,508

Notes: * Includes ties. ** Expenditures shown in \$US PPP (purchasing power parity); Australian \$ data are from 2010.

Source: Calculated by The Commonwealth Fund based on 2011 International Health Policy Survey of Sicker Adults; 2012 International Health Policy Survey of Primary Care Physicians; 2013 International Health Policy Survey; Commonwealth Fund *National Scorecard 2011*; World Health Organization; and Organization for Economic Cooperation and Development, *OECD Health Data, 2013* (Paris: OECD, Nov. 2013).

Anesthesia news

- The rest of the world gets Sugammadex
- Rapacuronium abruptly withdrawn 2001
- Opt out passes into law.
- PONV targetted with 2 & 3 drug remedies
- Movie “Awake” 2007
- Ultrasound explodes
- Airway devices explode



5-mL vial
500 mg sugammadex



Rene' Laennec- 1815



Maxima Carell de
Kinderziekenhuis
in Yerseke

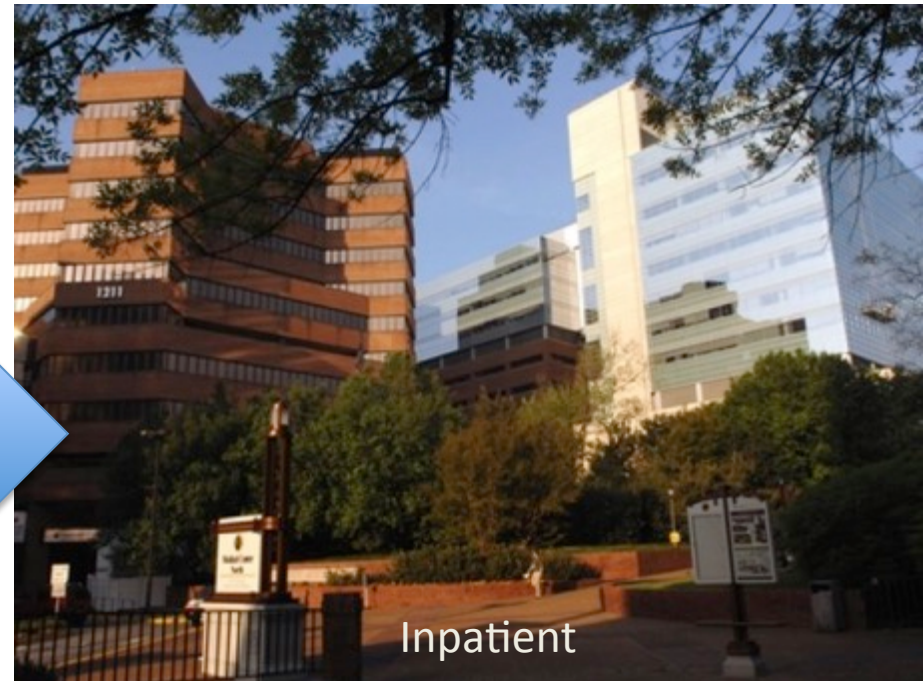
ESa

2003-



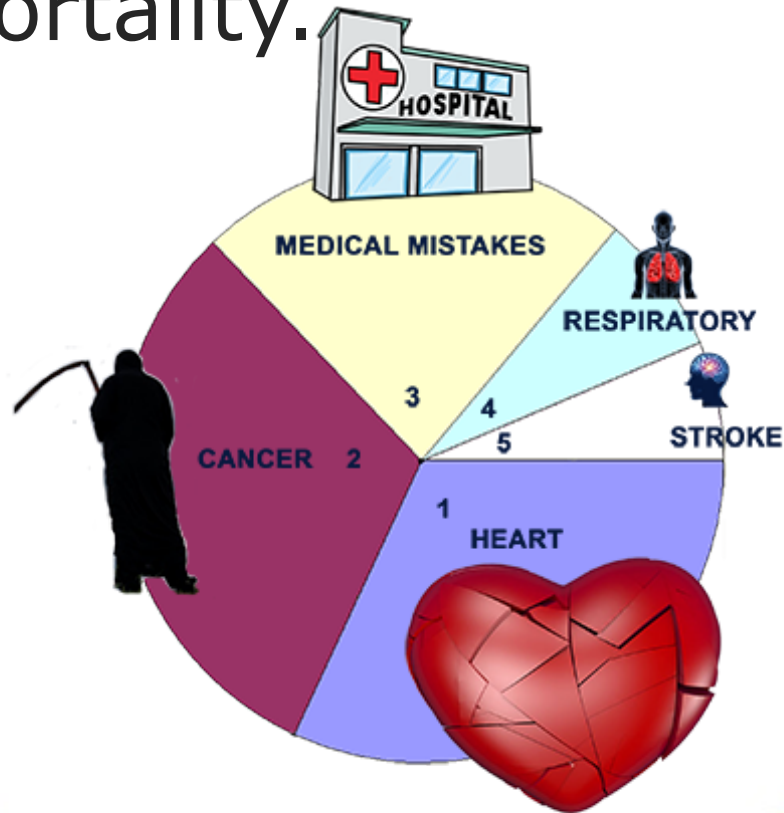
2010

- Number of CRNAs at Vanderbilt exceeds 90
- 50 million Surgeries



2011

- 5 Million Lives Campaign – Data from 2006-2008- No change in hospital mortality.



MEDICAL MISTAKES
3rd LEADING CAUSE OF DEATH IN THE U.S.A.



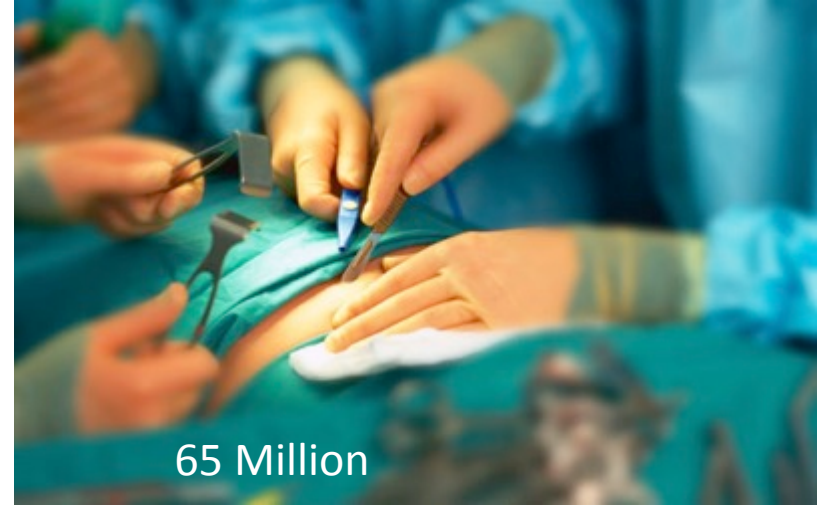
2010 – 2017



- 2016-PACU Nurse at Vanderbilt first known to be involved in research of Anesthesia Delirium

2017

- Narcotic overdose the number 2 cause of death in Tennessee



ERAS

Enhanced Recovery After Surgery
Fast-track patients on the road to recovery



Epic

2017

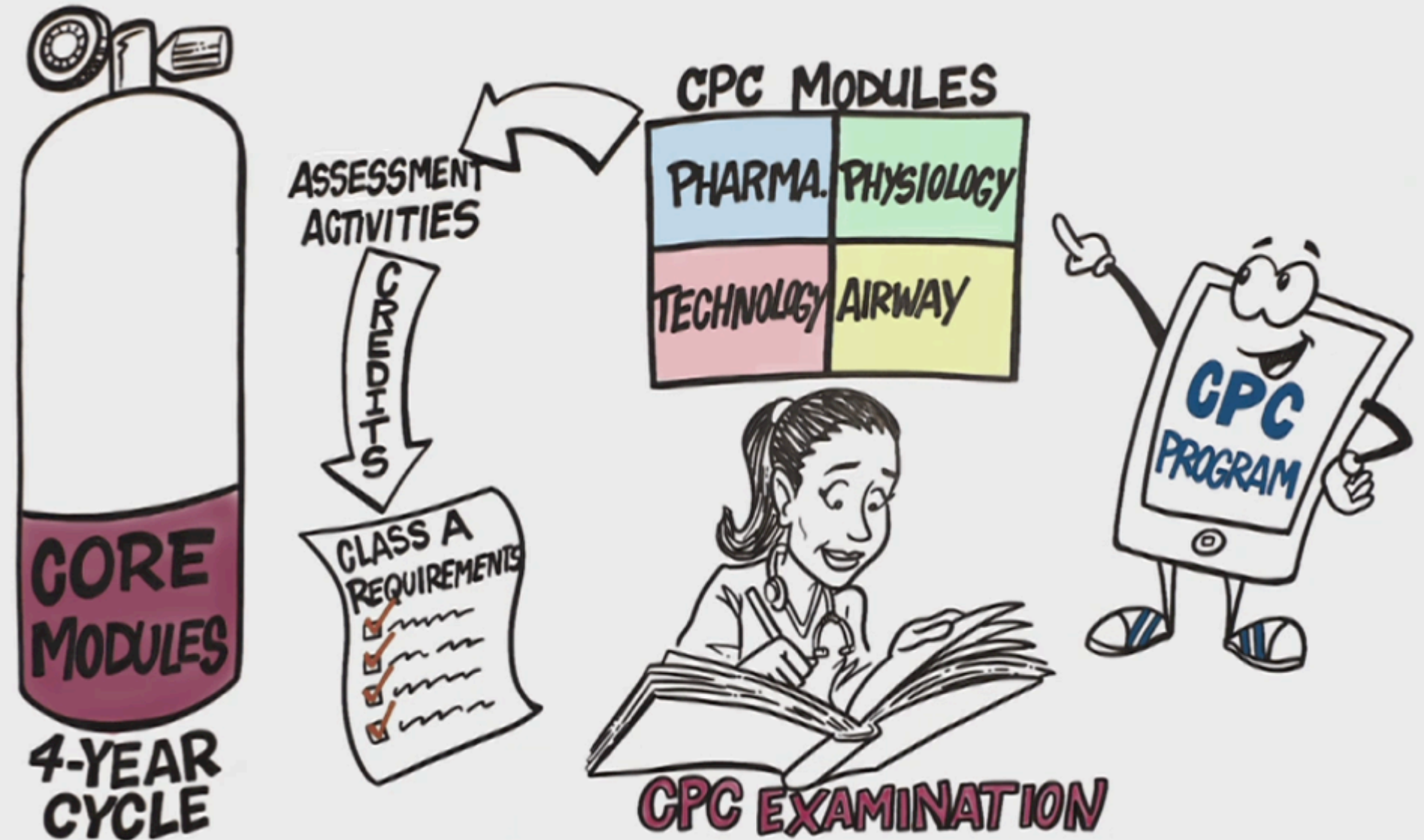


*CRNA programs have transitioned to a
Doctorate degree.*

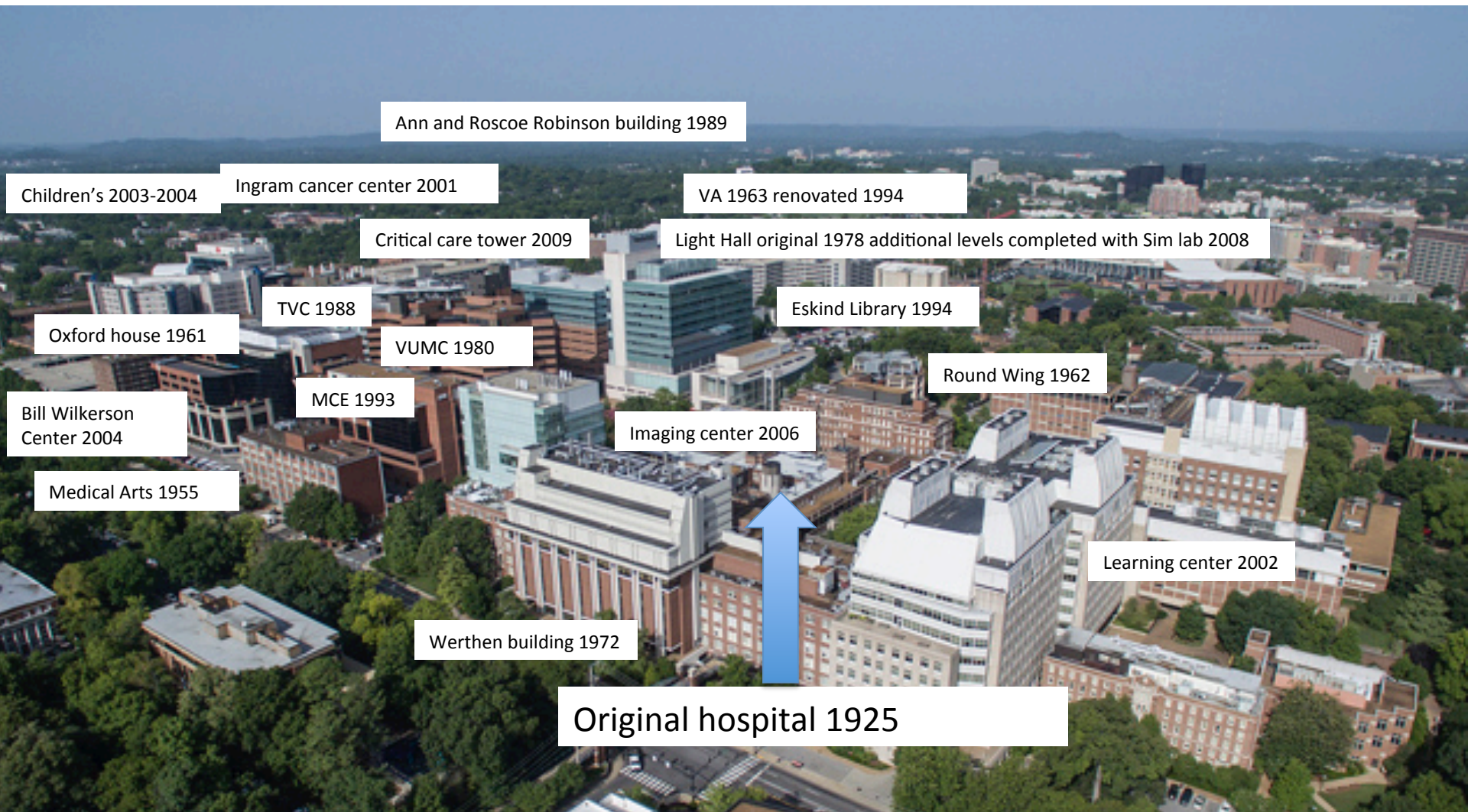
*Tennessee is one of the leaders in anesthesia
education with six anesthesia programs throughout
the state. With the current commitment to higher
education, the anesthesia schools within Tennessee
are able to meet the growing needs for anesthesia
providers within our state...*

Vanderbilt has 153 CRNAs...

Current CRNA recertification



Vanderbilt today > 90 ORs



Ann and Roscoe Robinson building 1989

Children's 2003-2004

Ingram cancer center 2001

VA 1963 renovated 1994

Critical care tower 2009

Light Hall original 1978 additional levels completed with Sim lab 2008

TVC 1988

Eskind Library 1994

Oxford house 1961

VUMC 1980

Round Wing 1962

Bill Wilkerson Center 2004

MCE 1993

Imaging center 2006

Medical Arts 1955

Learning center 2002

Werthen building 1972

Original hospital 1925



Preop Nurse

Anesthesia

Post op Nurse

Scrub Tech

Patient

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