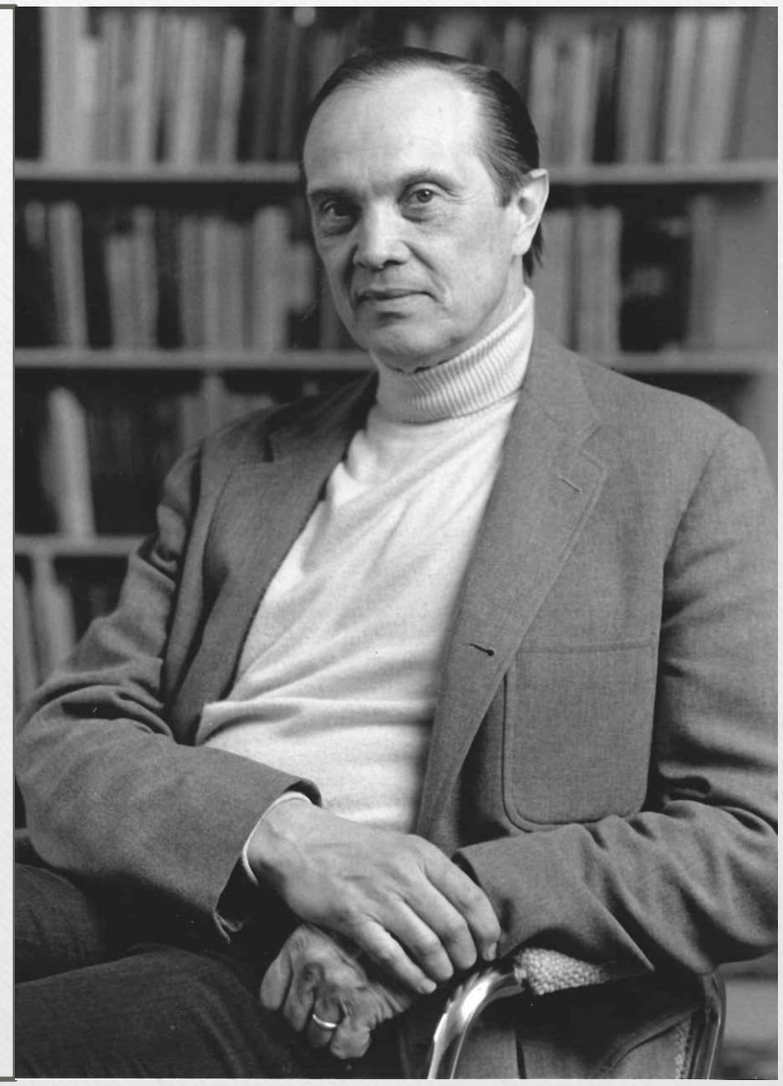
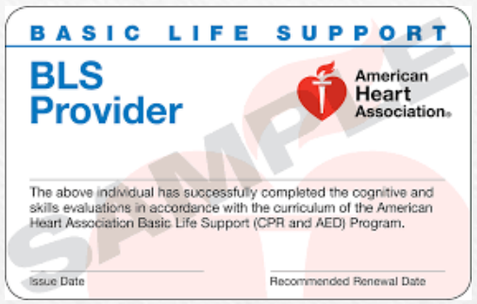
1956

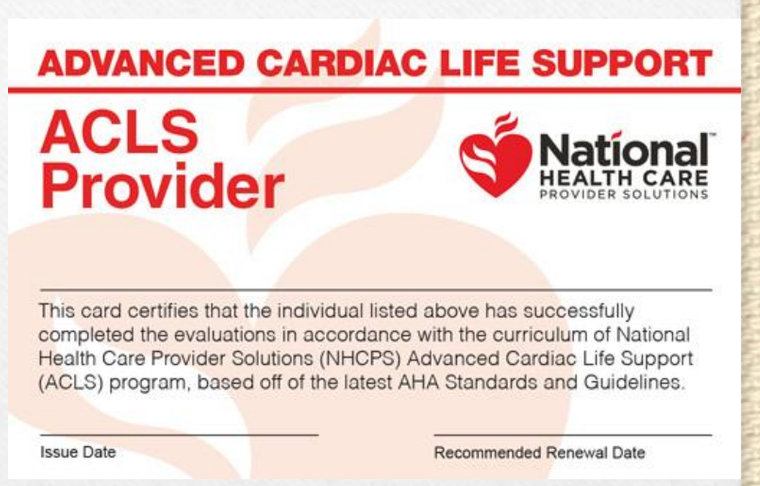
In 1956, a cognitive psychologist at Princeton University named George A. Miller published what would become one of the most frequently cited papers in his field. His ideas were so popular that you've probably heard them even if you've never read his name. He's responsible for what's known as Miller's law: at any given time, the average human can only hold about seven items in their short-term memory.

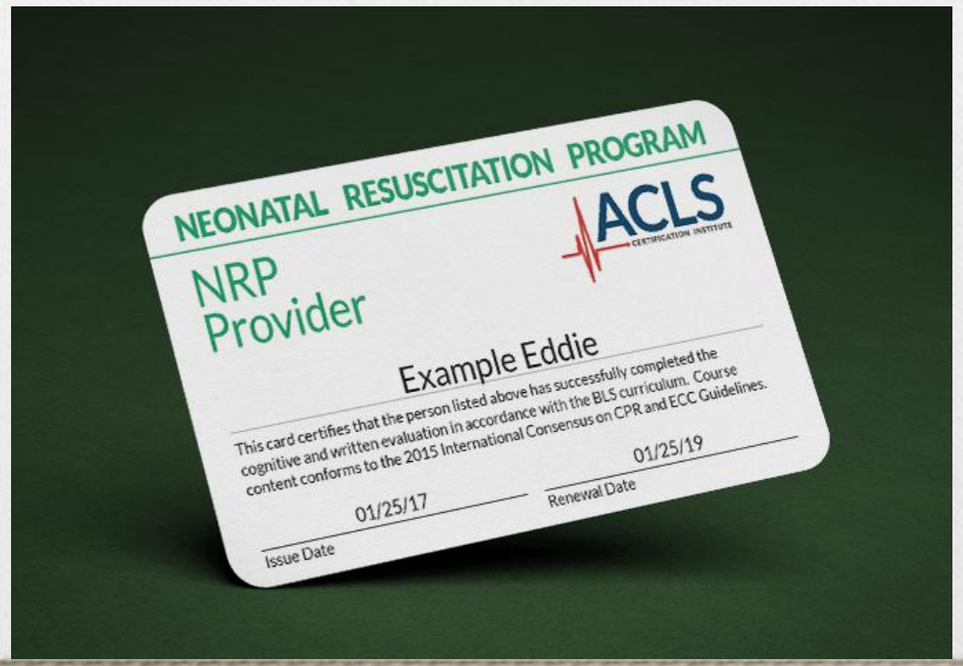


But there are exceptions!

1960







H's of ACLS

Causes	Signs	Treatment
Hypovolemia	-Rapid heart rate -Narrow QRS -Blood loss	-Obtain IO/IV Access -Administer fluid/blood -Use fluid challenge
Hypoxia/ Hypoxemia	-Slow heart rate -Cyanosis	-Ensure airway is open -Ventilate -Ensure oxygen supply is adequate
Hydrogen Ion Excess (Acidosis)	-Low amplitude QRS complex	-Atriel blood gas -Provide adequate ventilations -Sodium bicarbonate (metabolic)
Hypokalemia/ Hyperkalemia	-Flattened T waves & a U wave (Hypokalemia) -Peaked T waves & a widened QRS (Hyperkalemia)	-Ventilate (respiratory) -Sodium bicarbonate (metabolic)
Hypothermia	-Shivering -Previous exposure to cold temperatures	-Active warming measures -Temperature should be above 30°C

T's of ACLS

Causes	Signs	Treatment
Tamponade (Cardiac)	-Rapid heart rate -Narrow QRS -JVD -No pulse -Muffled heart sounds	-Pericardiocentesis -Thoracotomy
Toxins	-Prolonged QT interval	-Based on overdose agent -Supportive care
Tension Pneumothorax	-Slow heart rate -Narrow QRS -Unequal breathing -JVD -Tracheal deviation	-Needle decompression -Insertion of a chest tube
Thrombosis (Pulmonary)	-Rapid heart rate -Narrow QRS -Shortness of breath -Decreased oxygen -Chest pain	-Embolectomy -Fibrinolytic therapy -Anticoagulant therapy
Thrombosis (Coronary)	-Abnormal ECG	-Angioplasty -Stent placement -Coronary bypass surgery

1975

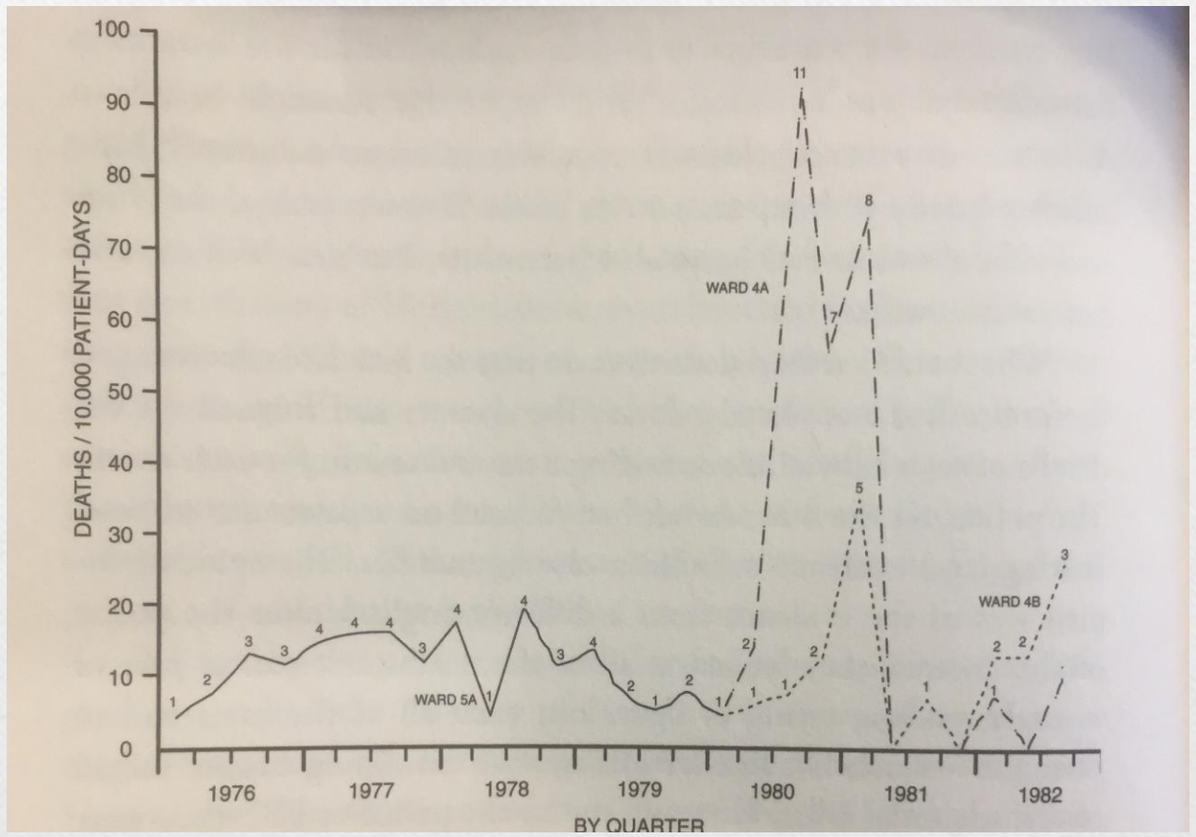
- **JOURNAL ARTICLE**
- **Toward a Theory of Medical Fallibility**
- Samuel Gorovitz and Alasdair MacIntyre
- *The Hastings Center Report*
- Vol. 5, No. 6 (Dec., 1975), pp. 13-23

- Two reasons humans fail-
- Ignorance (inexperience)
- Ineptitude (a bad preop, or bad clinical skills, lack of vigilance)

1981

- Toronto Hospital for Sick Children
- Susan Nelles

- Phyllis Trayner



Leavitt A. Deadly Outbreaks. 1st ed. New York: Skyhorse; 2015:p64.

1981

- MHAUS

MALIGNANT HYPERTHERMIA

By Stanford Anesthesia Cognitive Aid Group and Henry Rosenberg, MD

SIGNS

EARLY:
1. Increased $ETCO_2$
2. Tachycardia
3. Tachypnea
4. Mixed Acidosis (ABG)
5. Masseter spasm/ trismus
6. Sudden cardiac arrest in young person due to hyperkalemia

May be LATER:
1. Hyperthermia
2. Muscle rigidity
3. Myoglobinuria
4. Cardiac Arrest

CALL FOR HELP **CALL FOR MH CART**

INFORM TEAM

START PREPARING DANTROLENE!

DDX

- Light anesthesia
- Hypoventilation
- Over-heating (external)
- Thyroid storm
- Pheochromocytoma
- Hypoxemia
- Insufflation of CO_2

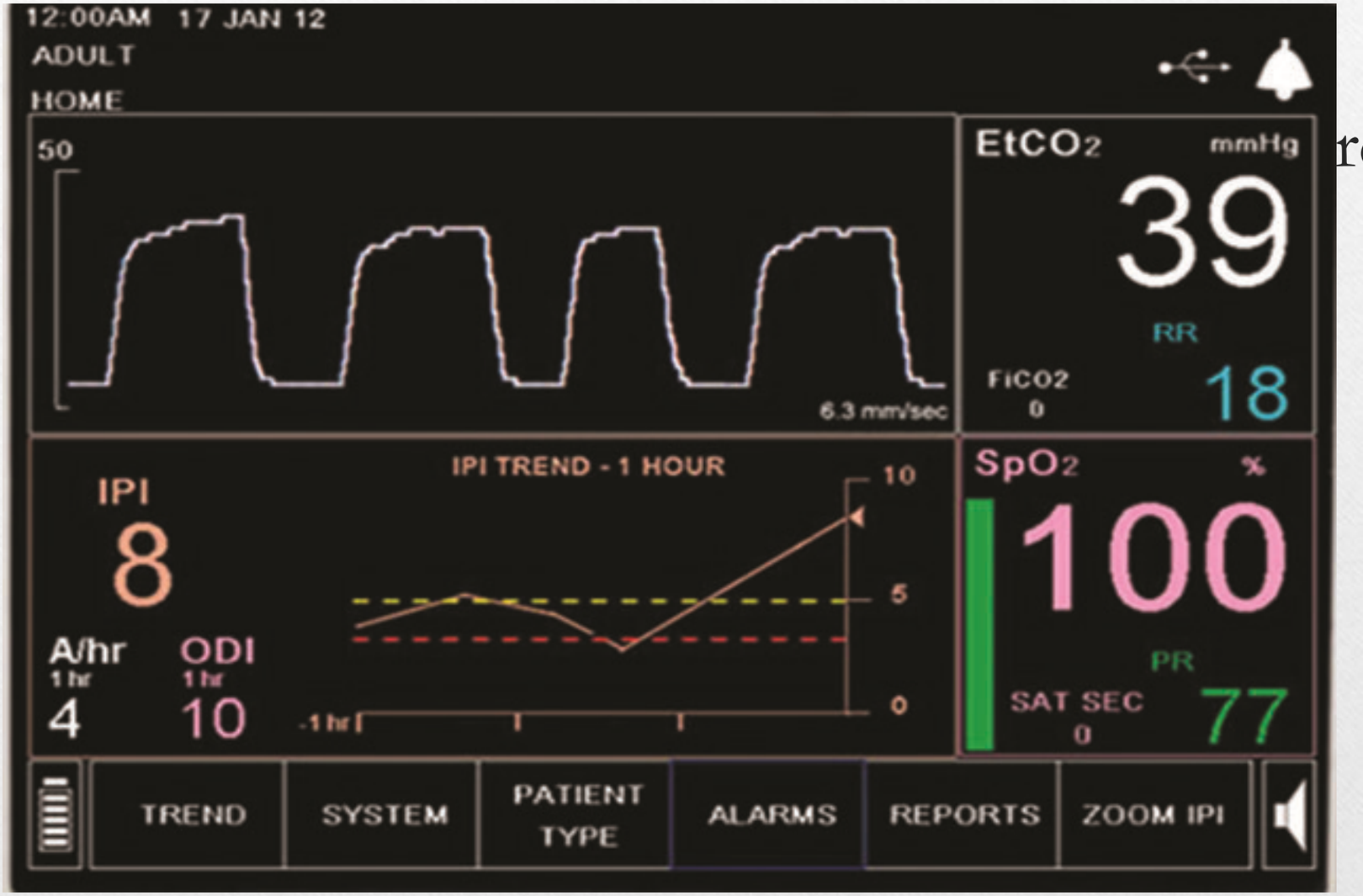
Continued on Next Page

TREATMENT

1. **Discontinue** anesthetic triggers (volatiles and succinylcholine) and **increase** fresh gas flow to 10 L/min. Do **NOT** change machine or circuit
2. **Halt procedure**. If emergent, continue with non-triggering anesthetic
3. **Hyperventilate**, FiO_2 100%, high flow O_2
4. **Assign several people to prepare 2.5 mg/kg IV Dantrolene bolus.** Dilute **each 20 mg Dantrolene vial in 60 mL** preservative-free **sterile water** (for **70kg person give 175 mg so prepare 9 vials** of 20 mg Dantrolene each as above)
5. **Rapidly administer dantrolene**. Continue giving until patient stable (may give up to 10 mg/kg)
6. **Administer** sodium bicarbonate 1-2 mEq/kg for metabolic acidosis/hyperkalemia

EMERGENCY MANUAL MARCH 2013

1986

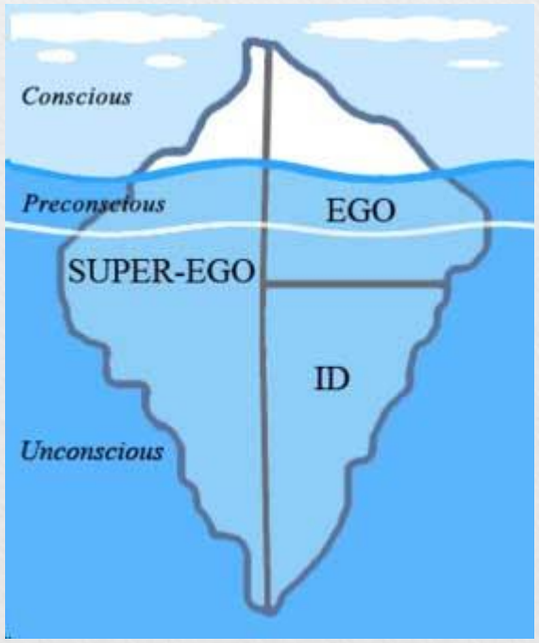

12:00AM 17 JAN 12
ADULT
HOME
50
6.3 mm/sec
EtCO2 mmHg
39
RR
FiCO2
0
18
IPI TREND - 1 HOUR
IPI
8
10
5
0
-1 hr
A/hr
1 hr
4
ODI
1 hr
10
SpO2 %
100
PR
SAT SEC
0
77
TREND
SYSTEM
PATIENT TYPE
ALARMS
REPORTS
ZOOM IPI

rd


20 mL
PROPOFOL
Injectable Emulsion
CONTAINS BENZYL ALCOHOL
SHAKE WELL BEFORE USING.
Hospira

1999

- Institute of Medicine report-To Err is human. Medical error 8th leading cause of death
- First morbidity/mortality report from Australia
- So what is wrong in Healthcare?



Results!

- 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-SCIP
- Prevent Ventilator-Associated Pneumonia

2001

Peter Pronovost, MD.
Johns Hopkins

The Pronovost Checklist

Central venous catheters, or lines, are used for medications, blood, fluids or nutrition and can stay in for days or weeks. But bacteria can grow in the line and spread a type of infection to the bloodstream, which causes death in one out five patients who contract it. This five-step checklist for doctors and nurses to use before inserting a line can prevent infections and death.

1. **Wash hands** with soap and water or an alcohol cleanser

2. **Wear sterile clothing**—a mask, gloves, and hair covering—and cover patient with a sterile drape, except for a very small hole where the line goes in

3. **Clean patient's skin** with chlorhexidine (a type of soap) when the line is put in

4. **Avoid veins in arm and leg,** which are more likely to get infected than veins in chest

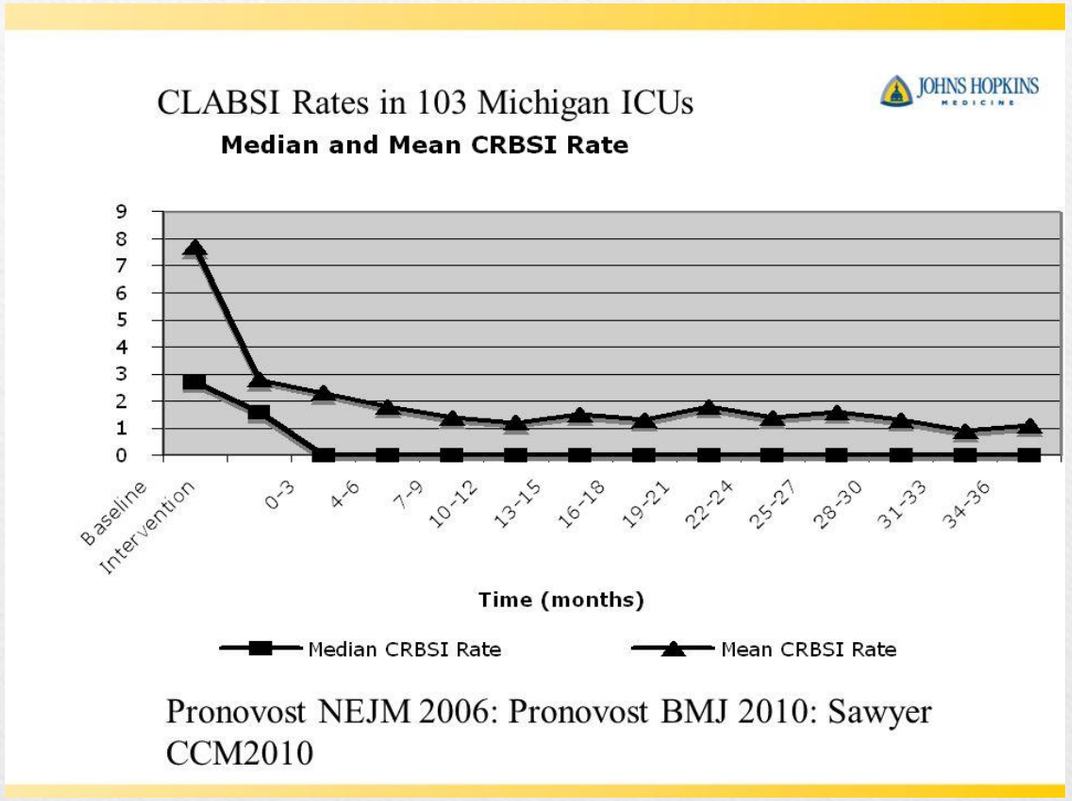
5. **Check the line for infection** each day and remove when no longer needed

Source: Dr. Peter Pronovost

Gawande A. The Checklist manifesto. 1st ed. New York: Picador; 2011:p86-113.

Central Line infections - 2001

- Infections dropped from 11 percent to zero
- Pain from 41 percent to 3%
- Vent pneumonia dropped by 25 %



Pronovost NEJM 2006: Pronovost BMJ 2010: Sawyer CCM2010

Gawande A. The Checklist manifesto. 1st ed. New York: Picador; 2011:p38-44.

How about in more modern times

2006-2007

- CHECKLIST FOR HEART ATTACK less than 50% of hospitals can meet the 90 min requirement
- Code stroke implemented
- Inadequate care for stroke 30%, asthma 45%, pneumonia 60%
- WHO asked to reduce morbidity and mortality in surgery worldwide- the result= WHO checklist?
- Trauma Alert- the leveled case.

Gawande A. The Checklist manifesto. 1st ed. New York: Picador; 2011:p10.
http://jaoa.org/article.aspx?articleid=2094025

2006- 2010

Surgical Safety Checklist

World Health Organization | Patient Safety

Before induction of anaesthesia

(with at least nurse and anaesthetist)

Has the patient confirmed his/her identity, site, procedure, and consent?
- ☐ Yes

Is the site marked?
- ☐ Yes
- ☐ Not applicable

Is the anaesthesia machine and medication check complete?
- ☐ Yes

Is the pulse oximeter on the patient and functioning?
- ☐ Yes

Does the patient have a:

Known allergy?
- ☐ No
- ☐ Yes

Difficult airway or aspiration risk?
- ☐ No
- ☐ Yes, and equipment/assistance available

Risk of >500ml blood loss (7ml/kg in children)?
- ☐ No
- ☐ Yes, and two IVs/central access and fluids planned

Before skin incision

(with nurse, anaesthetist and surgeon)

- ☐ **Confirm all team members have introduced themselves by name and role.**
- ☐ **Confirm the patient's name, procedure, and where the incision will be made.**

Has antibiotic prophylaxis been given within the last 60 minutes?
- ☐ Yes
- ☐ Not applicable

Anticipated Critical Events

To Surgeon:
- ☐ What are the critical or non-routine steps?
- ☐ How long will the case take?
- ☐ What is the anticipated blood loss?

To Anaesthetist:
- ☐ Are there any patient-specific concerns?

To Nursing Team:
- ☐ Has sterility (including indicator results) been confirmed?
- ☐ Are there equipment issues or any concerns?

Is essential imaging displayed?
- ☐ Yes
- ☐ Not applicable

Before patient leaves operating room

(with nurse, anaesthetist and surgeon)

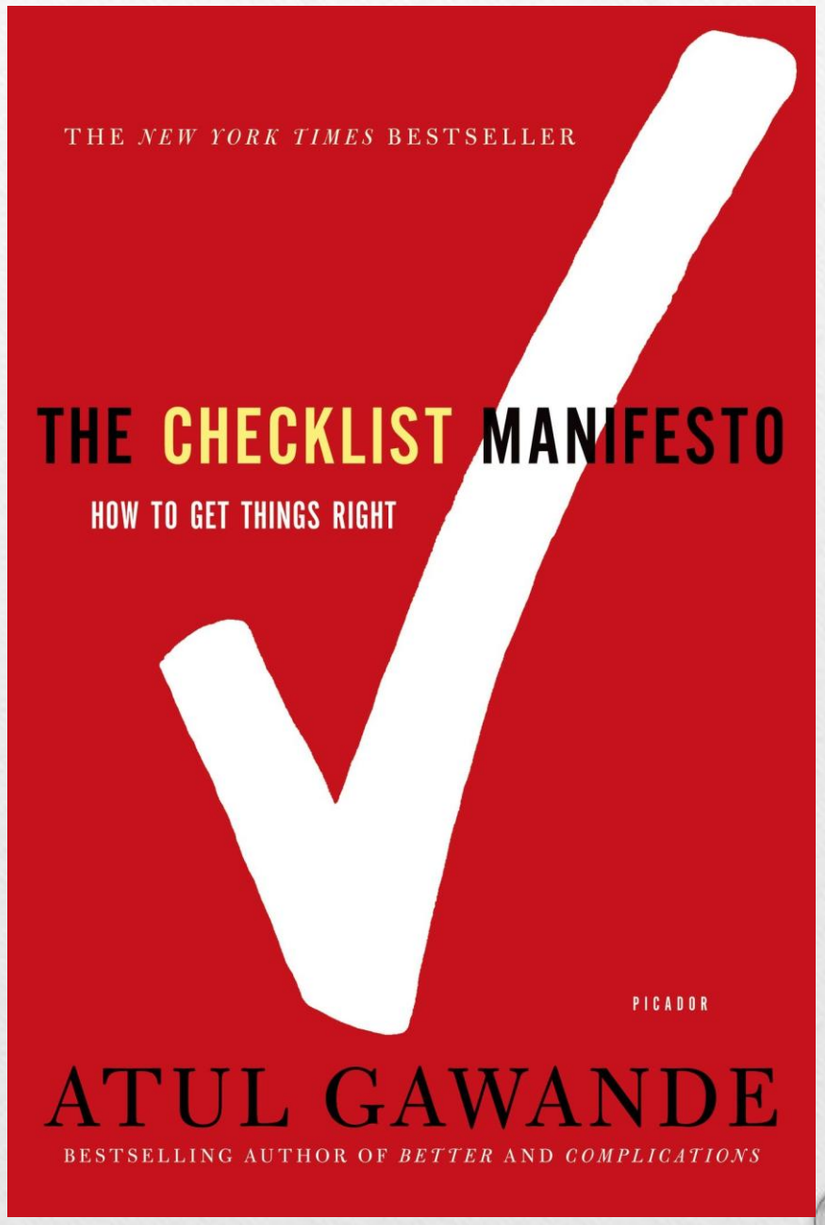
Nurse Verbally Confirms:
- ☐ The name of the procedure
- ☐ Completion of instrument, sponge and needle counts
- ☐ Specimen labelling (read specimen labels aloud, including patient name)
- ☐ Whether there are any equipment problems to be addressed

To Surgeon, Anaesthetist and Nurse:
- ☐ What are the key concerns for recovery and management of this patient?

This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

Revised 1 / 2009

http://www.who.int/patientsafety/topics/safe-surgery/checklist/en/



The information age

- The Information Age began around the **1970s…**
- **Internet- 1990**
- **Iphone- 2007**
- **2017- Vanderbilt got a Electronic Health Record**

2008 Trial of WHO checklist

Results- Major complications fell 36%, Death rate fell 47%

- St Francis Designated District Hospital in Ifkara,Tanzania (national healthcare budget ½ Billion) 7/20k
- St Stephens Hospital in New Delhi, India
- Philippines General Hospital in Manila
- Prince Hamza Hospital in Amman, Jordan
- University of Washington Medical Center in Seattle (budget $1Billion)
- St Marys hospital in London
- Auckland City Hospital, New Zealand 92/20k
- Toronto General Hospital in Canada

Gawande A. The Checklist manifesto. 1st ed. New York: Picador; 2011:p143-154

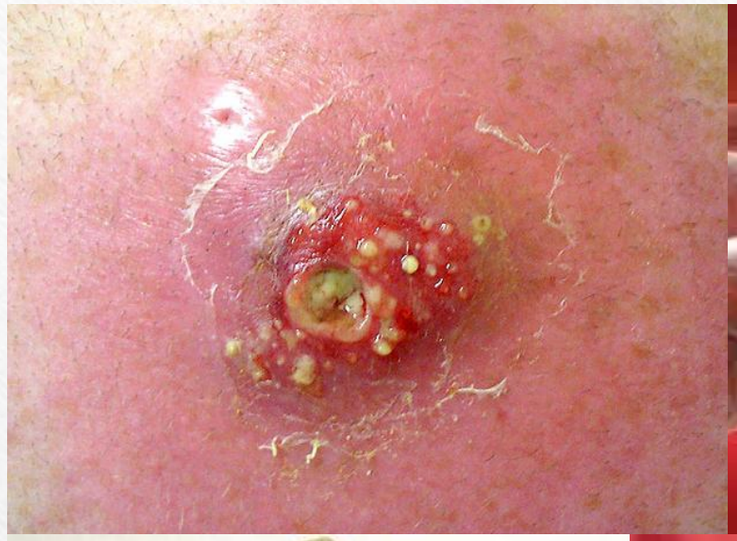
2010
Outpatient vs Inpatient

50 million surgeries in the US-150,000 deaths after surgery… 3 x road fatalities

Gawande A. The Checklist manifesto. 1st ed. New York: Picador; 2011:p86-113.

The four big killers in Surgery

- Infection √
- Bleeding √
- Unsafe Anesthesia
- The Unexpected



Gawande A. The Checklist manifesto. 1st ed. New York: Picador; 2011:p86-113.

Safety of Anaesthesia

- Australian study published in 2014 has mandatory reporting of morbid and mortal events.
- Of the 156 patient deaths directly related to anesthesia 20% were attributable to a poor preop
- 81% of deaths were attributable to the patients chronic medical condition
- http://www.anzca.edu.au/documents/soa-mortality-report_p4.pdf

What about the US?

On behalf of Dan Luginbill of Wilson & Luginbill LLC posted in Medical Malpractice on Friday, February 24, 2017. If something goes wrong with a surgery or a minor medical procedure and the patient dies, could the anesthesiologist be to blame? What factors could lead to a patient's death from anesthesia-related complications?

In recent years, anesthesia has become safer than ever, with the rate of complication dropping from 11.8 percent in 2010 to only 4.8 percent in 2013. However, the death rate from anesthesia complications remained the same, at about three per 10,000 procedures.

There are a couple of different possible causes of anesthesia mistakes:

-- A failure to do a complete review of the patient's medical history.

-- Inadequate experience and training for the level of care needed for a particular patient.

http://www.w-llawfirm.com/blog/2017/02/what-factors-can-lead-to-an-anesthesia-related-death.html

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).

So what does ***your*** preop look like ?

- After 8 years of teaching preops to students the average student with a blank sheet of paper misses between 20% and 80% of the questions on the preop questionnaire …
- And what about the patient who fails to disclose…

https://www.youtube.com/watch?v=Y6YkeNHA7oU

Preop evaluation sheet	Name of CRNA evaluator : Date:
Handwash	
introduction	
Verification of family members to remain	HIIPPA
Verification of person and procedure and diagnosis	
Verification of NPO	
Verification of medsand meds taken this am	
Verification of allergies	
Medical history	
Cardiac	CAD, chest pain,CHF, valve problems, rythym problems, Blood pressure Hi/Low (has anyone ever told you you have…), congenital heart defects
Exercise tolerance	poor, fair, good, very good,excellent and limiting factor (review MET score)
pulmonary	smoking, (present vs past) asthma (ER last 6 months) , Bronchitis, Seasonal allergies(NOW), COPD, productive cough, emphysema
GI	reflux, hiatal hernia, ulcer, Liver problems (hepatitis, cirrhosis), pancreatitis
GU	Kidneys, bladder, prostate, transplant
Musculoskeletal	Broken bones, Major car accidents, athritis, (Muscular dystrophy, myaesthenis gravis, MS)
Neurologic	seizure, TIA, stroke, neuropathy, cervical stenosis instability, concussions, back/neck issues
hematologic	Sickle, thrombo, DVT, anemia, history of abnormal bleeding, HIV
Endocrine	diabetes, thyroid, steriod use
infectious diseases	Pneumonia, UTI, bronchitis, URI (recent i.e last 6 months, past any residual),
OB/GYN	pregnant, hysterectomy, post menopausal
Pediatric	congenital premie etc
other	Anyone ever told you you have cancer?
Social history	ETOH, Drugs past & present
Genetic history/problems with anesthesia	Family- ask about problems with anesthesia and MH (if no prior GA)
labs/pregnancy test	
Past surgery, date and/or year, type, problems	
Physical exam	
Height, Weight, BMI	
Airway (Mallampati, 331 rule, ROM etc)	
Dentition (teeth missing, loose, edentulous)	
Lungs (anterior, posterior, upper airway if indicated	
heart (site for all four valves)	
Abdomen (if applicable)	
musculosketal (if applicable)	
neurologic (if applicable)	
breasts N/A	
extremities (range of motion, pulses)	
Risk assessment with patient	Chipped tooth busted lip, sore throat, n&V, aspiration, stroke, seizure, heart attack and death
Anesthetic plan	general versus regional versus mac expectations

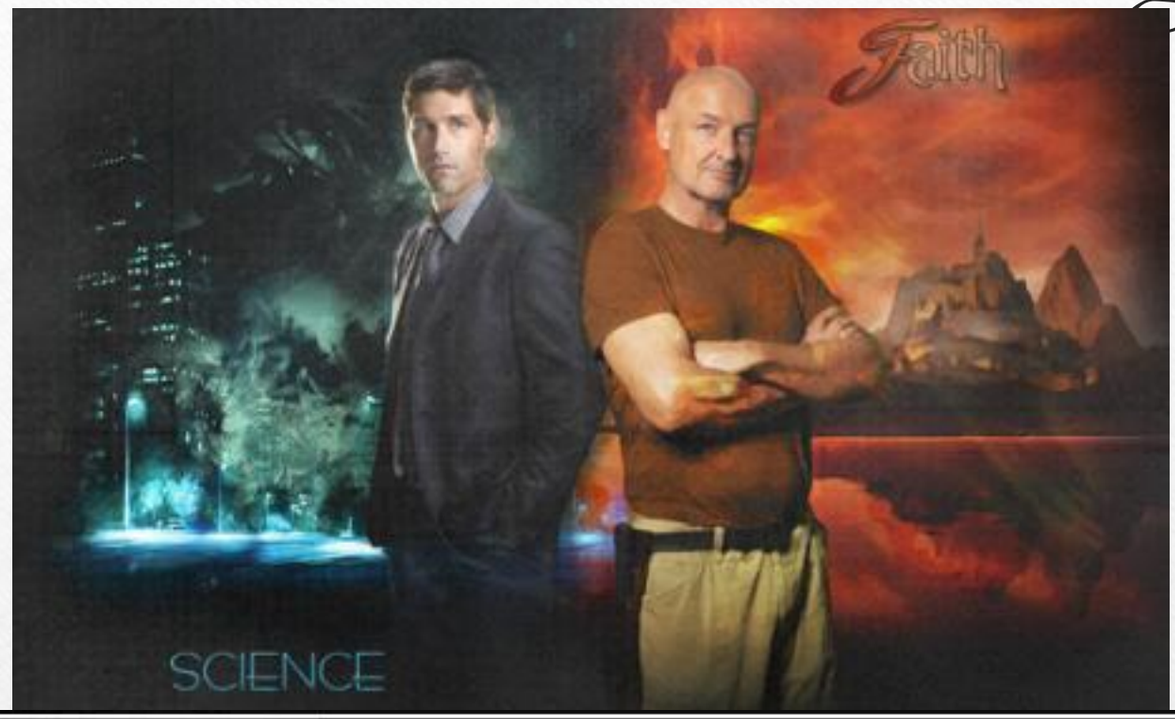
HPI: 59 Year old WM presents for excision split thickness skin graft of torso

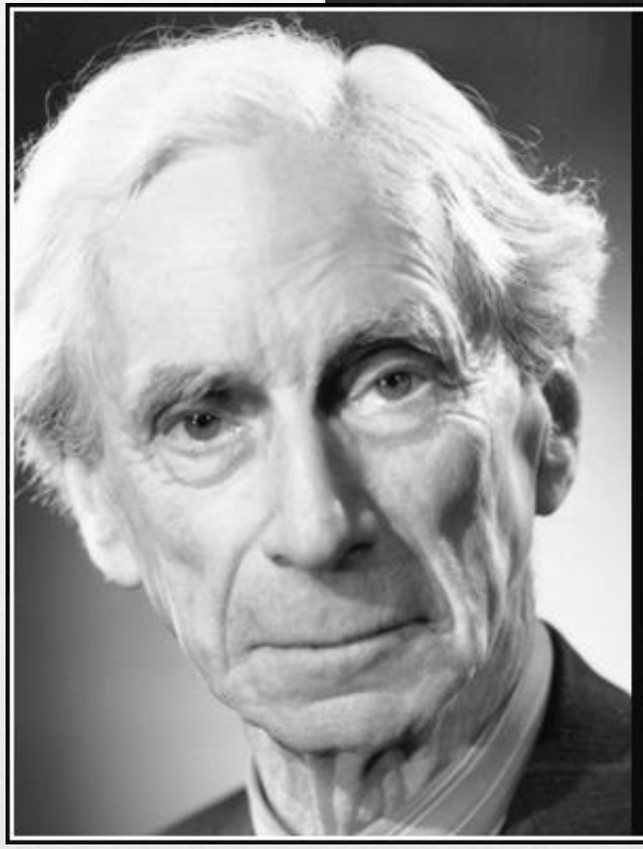
Cardiovascular:	Function
	HTN
	Hyperlipidemia
	Coronary artery disease
	Past MI
	Stent
Exercise Tolerance:	good (4 METs)
Pulmonary:	COPD
GI:	Hepatitis
Renal:	*
Neurologic:	Depression
Hematologic:	
Endocrine:	Type 2 diabetes
Musculoskeletal:	Chronic pain
Infectious Disease	
HEENT	HEENT ROS comments: diabetic retinopathy
OB	*
Other	substance abuse (hx of IV drug use over 40 years ago)

HPI: 59 y.o. WM PMH HTN, COPD, DM 2, Hep C, hx of IVDU (40 years ago), CAD s/p AMI and drug eluding stents 8/31/17 presented to ED 2/17/18 with 30-39% TBSA mixed partial and full thickness burns to his face, neck, chest, back, bilateral upper extremities. He was working under a car to repair a gas leak, and a spark caught his clothes on fire. Course has been complicated by: delirium; protein calorie malnutrition; deconditioning; hyperglycemia; acute blood loss anemia; and s/p OR trips 2/21 and 2/23 for excision and grafting. Patient presents to OR 3/15 for excision split thickness skin graft of torso.

Cardiovascular:	Function
	Hypertension (well-controlled with meds x 10 years per pt.)
	Hyperlipidemia (well-controlled with meds x 10 years per pt.)
	Coronary artery disease (60% blockage of RCA and LAD)
	Past MI 8/31/2017
	Last PCI Date: 8/31/2017
	Last stent type: drug eluting
	drug eluding stents placed on 8/31/17. Was on dual antiplatelet therapy with aspirin and Brilinta. Brilinta has been d/c while having surgeries
	2/21/18 Rt TL CVL and Rt femoral art line placed after surgery. Non-ST elevation myocardial infarction (NSTEMI), type 2 after 2/21/18 procedure, hypotension caused troponin to rise up to 0.12. Has since resolved.
Exercise Tolerance:	good (4 METs)
Pulmonary:	COPD (Pt denies COPD, but states that he uses an inhaler that he obtained for shortness of breath on occasion.)
	Intubated 2/21/18 in OR left intubated on vent after proc.
GI:	Hepatitis (s/p treatment per pt (~2015))
	Hepatitis type: C
	Dobhoff in place for TF.
	speech and swallow following - repeat FEES Friday 3/9/2018- failed, repeat 3/14/2018 failed
Renal:	*
Neurologic:	Depression
	Pt's course has been c/b delirium, but has since resolved.
Hematologic:	Has received multiple units PRBC since initial presentation. - Last PRBC transfusion 3/13
Endocrine:	Type 2 diabetes (Pt reports that he has been diabetic his entire life)
	poorly controlled Hgb A1C 2/18 10.5
Musculoskeletal:	Chronic pain
	spinal cord stimulator implant, unknown when or reason
	30-39% TBSA deep partial and full thickness burns to head, face, neck, anterior and posterior trunk, BUE. His back, flank and LUE
	Impaired mobility and ADLs
Infectious Disease	*
HEENT	HEENT ROS comments: diabetic retinopathy
OB	*
Other	substance abuse (hx of IV drug use over 40 years ago)

What is a differential diagnosis?





It is not what the man of science believes that distinguishes him, but how and why he believes it. His beliefs are tentative, not dogmatic; they are based on evidence, not on authority or intuition.

— Bertrand Russell —

AZ QUOTES

What about the man of faith or philosophy?

The 7 Deadly Sins	**The 7 Virtues**	**Aristotle/Plato The Book of Wisdom**
Lust	Chastity	Wisdom
Gluttony	Temperance	Temperance/ Moderation
Greed	Charity	The Common Good
Sloth	Diligence	Fortitude
Wrath	Patience	Prudence
Envy	Kindness	Justice
Pride	Humility	Courage

Experience vs Knowledge

- CPC exam?

MOCA

10,000 hours ?

In Anesthesia what DO we care about?

- **<u>Patient Factors</u>**
- Chipped tooth, busted lip, sore throat
- Oxygenation, airway, ventilation
- Aspiration, Anaphylaxis
- End organ perfusion- hypo perfusion vs hemorrhage
- Coronary, cerebral, kidneys, liver damage, blood clot

Other factors

- Equipment failure
- Personnel failure
- System and process failures
- Resources being overwhelmed- bus crash, hurricane , tornado, flood, gun violence
- Limited resources- power outage, drug shortage, staff shortage, experience shortage

Pre flight checklist R22 Helicopter

BEFORE STARTING ENGINE

Seat belts . . . . . Fastened
Fuel shut-off valve . . . . . ON
Cyclic/collective friction . . . . . OFF
Cyclic, collective, pedals . . . . . Full travel free
Throttle . . . . . Full travel free
Collective . . . . . Full down, friction ON
Cyclic . . . . . Neutral, friction ON
Pedals . . . . . Neutral
Rotor brake . . . . . Disengaged
Circuit breakers . . . . . In
Carb heat . . . . . OFF
Mixture . . . . . Full rich
Mixture guard* . . . . . Installed
Primer (if installed) . . . . . Down and locked
Landing lights . . . . . OFF
Avionics switch (if installed) . . . . . OFF
Clutch . . . . . Disengaged
Altimeter . . . . . Set
Governor switch . . . . . ON

* Mixture guard is not used on aircraft with vernier mixture control on console face.

STARTING ENGINE AND RUN-UP

Throttle twists for priming . . . . . As required
Throttle . . . . . Closed
Battery, strobe switches . . . . . ON
Area . . . . . Clear
Ignition switch . . . . . Start, then Both
Starter-On light . . . . . Out
Set engine RPM . . . . . 50 to 60%
Clutch switch . . . . . Engaged
Blades turning . . . . . Less than 5 seconds
Alternator switch . . . . . ON
Oil pressure within 30 seconds . . . . . 25 psi minimum
Avionics, headsets . . . . . ON
Wait for clutch light out . . . . . Circuit breakers in
Warm-up RPM . . . . . 70 to 75%
Engine gages . . . . . Green
Mag drop at 75% RPM . . . . . 7% max in 2 seconds
Carb heat . . . . . CAT rise/drop, set as required
Sprag clutch check . . . . . Needles split
Doors . . . . . Closed and latched
Limit MAP chart . . . . . Check
Cyclic/collective friction . . . . . OFF
Governor On, increase throttle . . . . . RPM 102-104%
Warning lights . . . . . Out
Lift collective slightly, reduce RPM . . . . . Horn/light at 97%

What about resources?

- The BIS
- The cerebral oximeter
- The cardiac output monitor
- The NIMS tube
- The Robot
- ECMO vs Bypass machine
- The Belmont
- The TEG
- The TEE
- The Reboa
- LVAD
- Dialysis
- CVVHD

Samuel Gorovitz and Alasdair MacIntyre in 1975

- **Two reasons humans fail-**
- Ignorance (inexperience)
- Ineptitude (a bad preop, or bad clinical skills, lack of vigilance)

Dan Luginbill of Wilson & Luginbill LLC *posted in Medical Malpractice, 2017*

- -- A failure to do a complete review of the patient's medical history.
- -- Inadequate experience and training for the level of care needed for a particular patient.

A tale of two cases?

- Axilla Abdominal aortic aneurysm repair scheduled for 12 hours
- A pelvic exenteration scheduled for 12 hours

What about emergencies?

- **Do I know what to do for:**
- Code Blue
- Difficult airway
- Splash in the eye or laser injury
- Fire
- Massive exsanguination- IV access, ezio, belmont, central line
- Malignant hyperthermia- who do I call, what do I do, how long do I have?
- Local anesthetic toxicity
- Anaphylaxis

What about Simulation?

- Not standardized

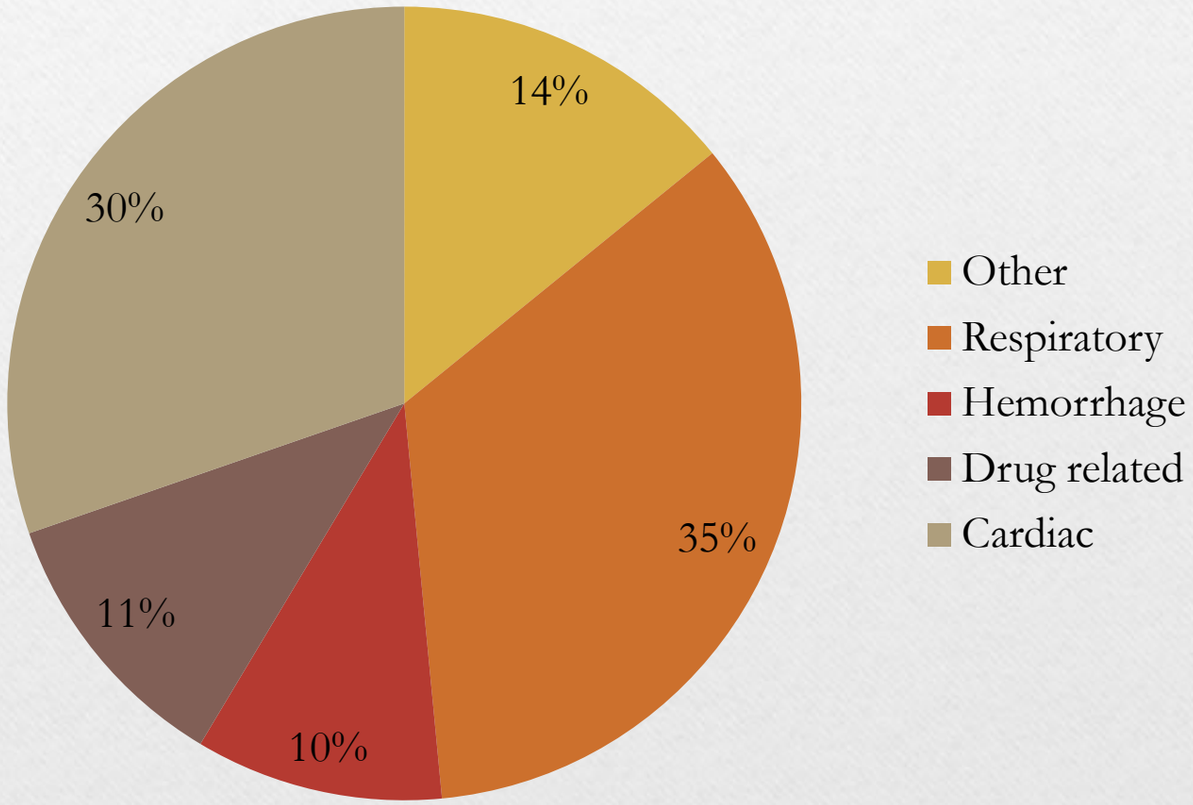
A good CRNA vs a Great one!

I did 17 cases in endo today…but the last one coded!!!

I did 14 cases in endo today but the last one took a while because I had to optimize him

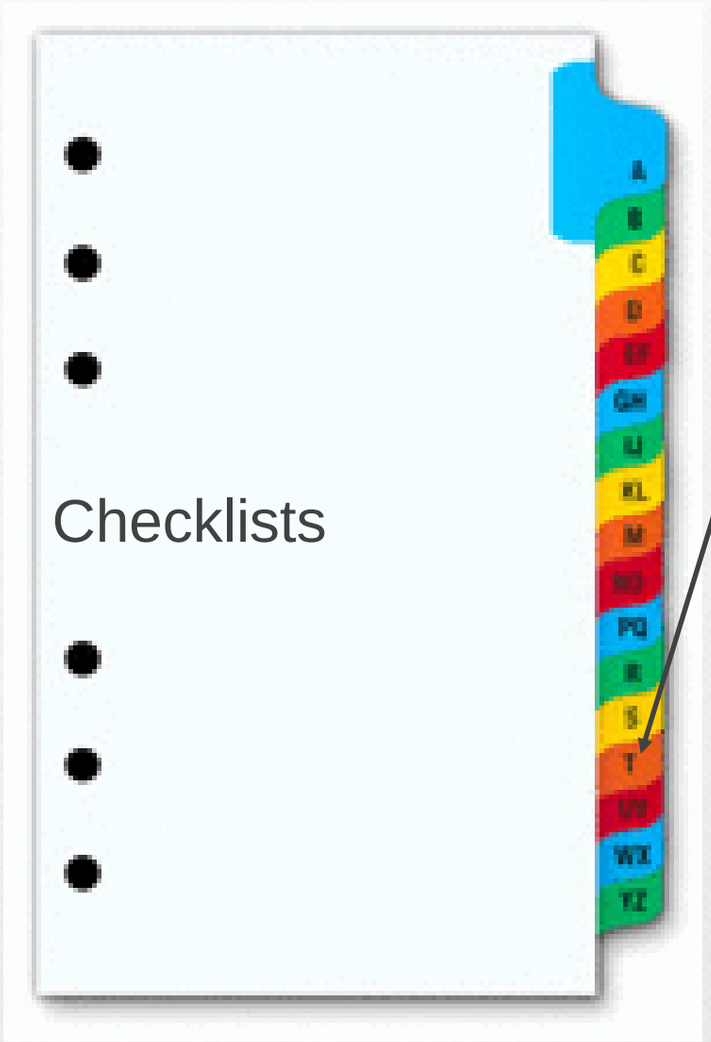
What about US closed claims data- Events leading to death

- 245 cases from 2003 -2012
- Overall 36% injury leading to death, 64% injury
- Patient factors- pre existing conditions, lack of disclosure, self medication
- Provider factors- Failure to communicate, inappropriate response, knowledge deficit, failing to obtain patient information



AANA Congress 2018. AANA Foundation closed claims data. Boston ,MA

Triple low phenomena



- Hypotension (low MAP)
- Low MAC- loss of cardiac output has a concentrating effect on anesthetic gases
- Hypoperfusion (low BIS) (low urine output) (increased lactate)
- An intraoperative concurrence of mean arterial pressure less than 75 mmHg, minimum alveolar concentration less than 0.8, and

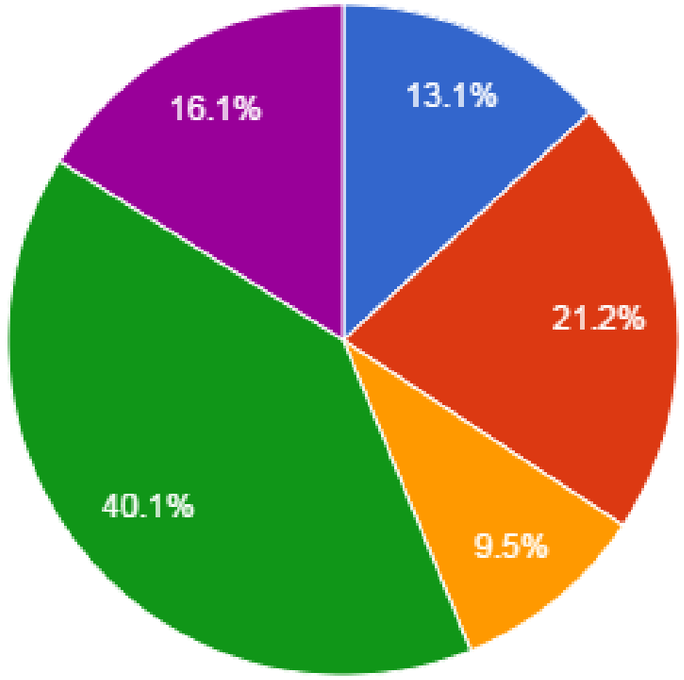
  bispectral index less than 45 has been termed a “triple low” state.

1-Sessler et al. **Hospital stay and mortality are increased in patients having a "triple low" of low blood pressure, low bispectral index, and low minimum alveolar concentration of volatile anesthesia.** Anesthesiology. 2012 Jun;116(6):1195-2032.
2. Willingham M et al. Concurrence of intraoperative hypotension, low minimum alveolar conetration and low bisprectral index is associated with postoperative death. Anesthesiology 2015; 123: 777-85
3. Sessler et al. Triple-low Alerts Do Not Reduce Mortality: A Real-time Randomized Trial. *Anesthesiology 2018 ,October 12*

OR Survey results- 137 surveys

Code Blue
Exanguination
Needlestick/Laser/Eye injury
Airway Emergency
Fire/Smoke
Level One

- Anesthesiologist 16.1%
- SRNA- 13.1%
- CRNA-21.2%
- Resident 9.5%
- Circulator 40.1%



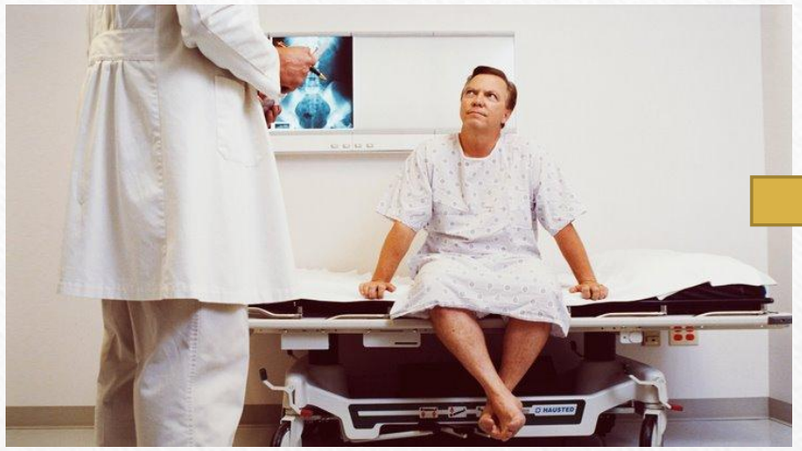
PERCENT POSITIVE COMMUNICATION PRE-AND-POST INTERVENTION

	Pre-Observation % yes	Post-Observation % yes	$\chi 2$	P value
Surgical Procedure	71.20%	100.00%	14.79	0.001
Anesthetic Type/Plan	68.50%	92.60%	12.91	0.001
Attending Anesthesiologist	47.90%	82.40%	13.50	0.001
Patient Allergies	53.40%	89.70%	16.66	0.001
Preoperative Co-Morbidities	60.30%	94.10%	16.04	0.001
IV Access/Lines	45.20%	86.80%	20.14	0.001
Neuromuscular BlockingDrugs / Reversal Agent Given	57.50%	95.60%	22.89	0.001
Intraoperative Analgesia	63.00%	95.60%	15.96	0.001
Estimated Blood Loss	24.70%	82.40%	55.05	0.001
Intraoperative Course/Complications	58.90%	100.00%	29.77	0.001

Gilman-Mays,M. Development, Implementation, and Evaluation of a Meal Relief Handover Checklist To Improve Consistency and Standardization of Communication Between Anesthesia Providers . Duke University, 2013

So lets make it Ideal!

- Your Mother/Father needs surgery



The Machine Check- ~ 5 minutes

UPDATED 2/2015

YOUR LOCATION : OR 30

FIRE

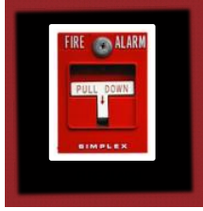
IN CASE OF FIRE OR SMOKE

RESCUE-If patient in immediate danger turn off oxygen source, douse flames with saline/water and place wet cloth on site
Call the Board- 22090

ALARM & ALERT-Pull the fire alarm located outside OR

CONFINE-If indicated move patient to safe location and close the door

Extinguish-Fire Alarm and Extinguisher
Location- left outside OR proceed 20ft look left on wall for alarm & extinguisher




Your Location: OR 30

Airway Emergency Surgical Airway Call 615-480-1149 24/7 trauma team

Next Call AIC
OR Board 23090

Provide Airway support as needed until help arrives

Your Location: OR 30

Code Blue

There is No Code Blue alarm located in your room
Call the Board: 22090 announce Code and location

Code cart location
in the core
outside OR28

Emergency Code book location
4th drawer anesthesia
Blue bell cart & On Gaschart

0630-1700 Charge nurse will bring Code cart
Circulator will be recorder

1700-0630- Circulator will bring code cart
Next RN to arrive will be recorder

Your Location: OR 30

Malignant Hyperthermia Call 1-1111 Activate MH Emergency Response

Emergency Management will text page the R1, AIC & Call pharmacy 24897 24/7 to deliver MH cart to bedside
Provide support as needed until help arrives
MH Flowsheet is located on the MH cart

Level One Trauma Team In OR Checklist:

Intro of Surgeons, Anesthesiologists, RNs (ED, Scrub, Circulator #1 +/- #2) [*All Readback*]
- ❑ Summarize Injuries, Known or Suspected
- ❑ Outline Skin Preparation, Positioning, and Surgical Draping [*Scrub/Circulator Team Readback*]
- ❑ Request or Confirm Instruments, Trays, Equipment [*Scrub/Circulator Team Readback*]
- ❑ Request Antibiotic & DVT prophylaxis (and Re-dosing plans) [*Anesthesia Team Readback*]
- ❑ Summarize pre-OR Resuscitation (IVF, Blood, Massive Transfusion, Colloid, Rewarming with Response)

Delivering Nursing Team (from Emergency Room, ICU, Ward) Checklist:
- ❑ Clarify any pre-OR Resuscitation (IVF, Blood, Massive Transfusion, Colloid and Response)
- ❑ Summarize pre-OR sedation and analgesia (Requirements and Response)
- ❑ Outline Intravenous/Intraosseous Access
- ❑ Relay any threat features (e.g., weapons, hazardous materials, prisoner, restraints)
- ❑ Hand-off Blue Identification Card to Receiving Nursing Team [*Circulator Readback*]

Receiving Nursing Team (OR Scrub/Circulator) Checklist:
- ❑ Ask for clarification about above
- ❑ Outline plan for any threat features
- ❑ Designate point-person for Pagers, Phones, and Consultant Communication (e.g. Radiology, Bloodbank)

Anesthesiology Team Checklist
- ❑ Ask for clarification about above
- ❑ Relay new Access plans (e.g., Intravenous, Central line, Arterial line, Intraosseous)
- ❑ Outline OR Resuscitation and Rewarming plan

Move Patient to Operating Room table

Last revision: October 28, 2016

Your Location: OR 30

Exanguination Call the Board 22090

Surgeon and Anesthesiologist may declare a Massive transfusion
Board notifies the anesthesia tech to bring the Belmont

CTA will bring blood, FFP and platelets in a cooler
Check blood with Anesthesia as needed

Call 22090 as needed for assistance

Your Location: OR 30

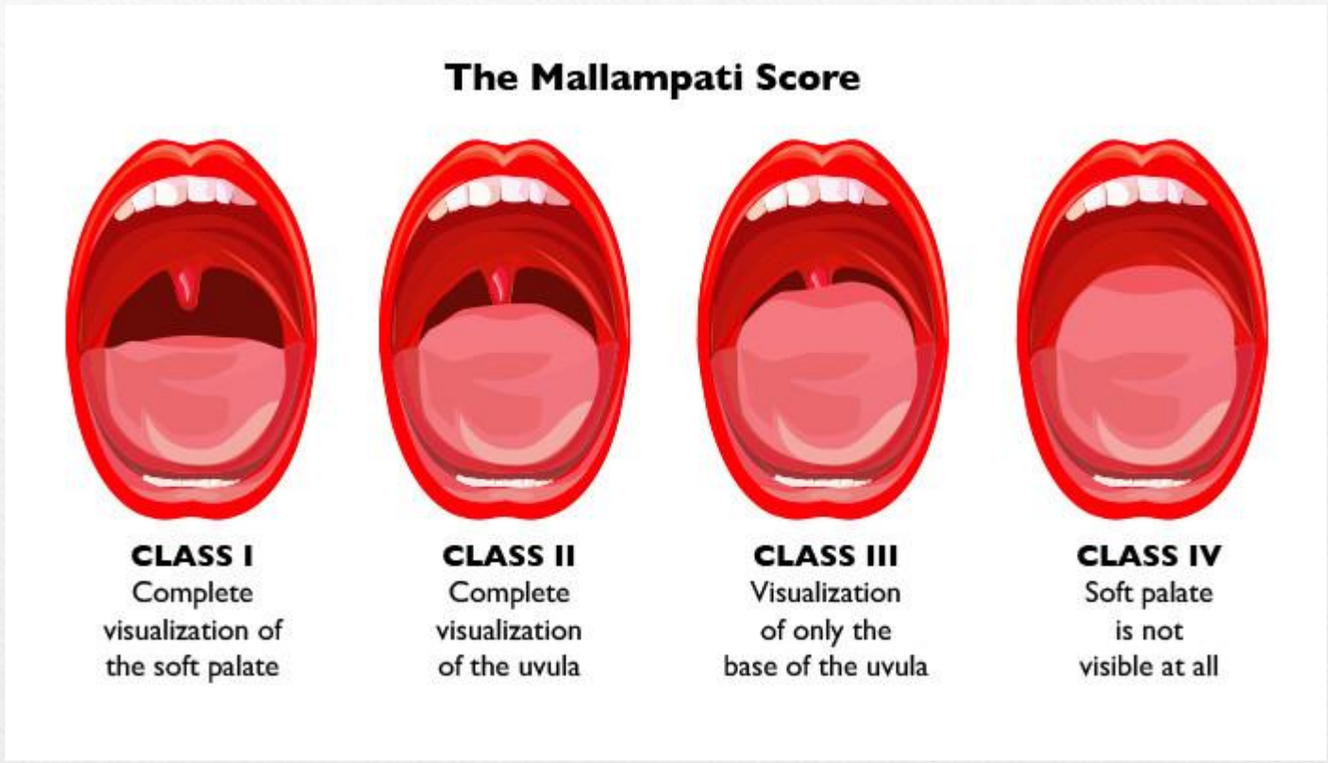
Eyewash/ Needle stick/ laser injury

The nearest eyewash station is accessed via the core between ORs 25 & 26
Call the Board: 22090 announce Emergency Eyewash/needlestick or laser injury

They will send replacement staff as need

Minimum irrigation for an eyesplash or needle stick is 15 minutes
Laser injury will depend on injury site
Complete Veritas and send provider to Occupational health or if between 1700-0630-to the ER

The Preop Checklist



Preop evaluation sheet	Name of CRNA evaluator : Date:
Handwash	
introduction	
Verification of family members to remain	
Verification of person and procedure and diagnosis	
Verification of NPO	
Verification of medsand meds taken this am	
Verification of allergies	
Medical history	
cardiac	CAD, chest pain,CHF, valve problems, rythym problems, Blood pressure Hi/Low (has anyone ever told you you have…), congenital heart defects
Exercise tolerance	poor, fair, good, very good,excellent and limiting factor (review MET score)
pulmonary	smoking, (present vs past) asthma (ER last 6 months) , Bronchitis, Seasonal allergies(NOW), COPD, productive cough, emphysema
GI	reflux, hiatal hernia, ulcer, Liver problems (hepatitis, cirrhosis), pancreatitis
GU	Kidneys, bladder, prostate, transplant
Musculoskeletal	Broken bones, Major car accidents, athritis, (Muscular dystrophy, myaesthenis gravis, MS)
Neurologic	seizure, TIA, stroke, neuropathy, cervical stenosis instability, concussions
hematologic	sickle, thrombo, DVT, anemia, history of abnormal bleeding
Endocrine	diabetes, thyroid, steriod use
infectious diseases	pnuemonia, UTI (recent i.e last 6 months, past any residual)
OB/GYN	pregnant, hysterectomy, post menopausal
Pediatric	congenital premie etc
other	Anyone ever told you you have cancer?
Social history	ETOH, Drugs past & present
Genetic history/problems with anesthesia	Family- ask about problems with anesthesia and MH (if no prior GA)
labs/pregnancy test	
Past surgery, date and/or year, type, problems	
Physical exam	
Height, Weight, BMI	
Airway (Mallampati, 331 rule, ROM etc)	
Dentition (teeth missing, loose, edentulous)	
Lungs (anterior, posterior, upper airway if indicated	
heart (site for all four valves)	
Abdomen (if applicable)	
musculosketal (if applicable)	
neurologic (if applicable)	
breasts N/A	
extremities (range of motion, pulses)	
Risk assessment with patient	Chipped tooth buted lip, sore throat, n&V, aspiration, stroke, seizure, heart attack and death
Anesthetic plan	general versus regional versus mac expectations

Vanderbilt University Medical Center
Department of Anesthesiology

HOLDING ROOM to OR
Preoperative Handoff Checklist

PATIENT STICKER

- ☐ Patient ID (Name, MRN, DOB)
- ☐ Surgical Procedure
- ☐ Allergies
- ☐ *DVT Prophylaxis
- ☐ Preop Anesthesia Orders
- ☐ Preop Procedures
- ☐ Isolation Status
- ☐ Blue Card & ID Band
- ☐ H&P, Consent, Site Mark
- ☐ *Plan for Antibiotics
- ☐ NPO Status
- ☐ Preop Surgical Orders
- ☐ Operating Room Destination
- ☐ Are Antibiotics and Medications compatible with allergies?

Pregnancy Test: ☐ N/A ☐ Negative ☐ Positive
Type & Screen: ☐ N/A ☐ Current ☐ Expired ☐ Pending ☐ Antibody Neg
Glucose: _____ **Other:** _____

Medications Given (e.g. midazolam, fentanyl, etc.):

Preop Vitals:		Medication:	Time Given:	Given By:
BP				
HR				
RR				
SpO2				
Temp				

NOTES:

*May proceed to OR if surgeon's orders are unknown at time of Handoff. Verify upon arrival to the OR.

Holding Room Nurse: Name:_____ Signature:_____ Pager:_____ Date: _____ Time:_____

Anesthesia Provider: Name:_____ Signature:_____ Pager:_____ Date: _____ Time:_____

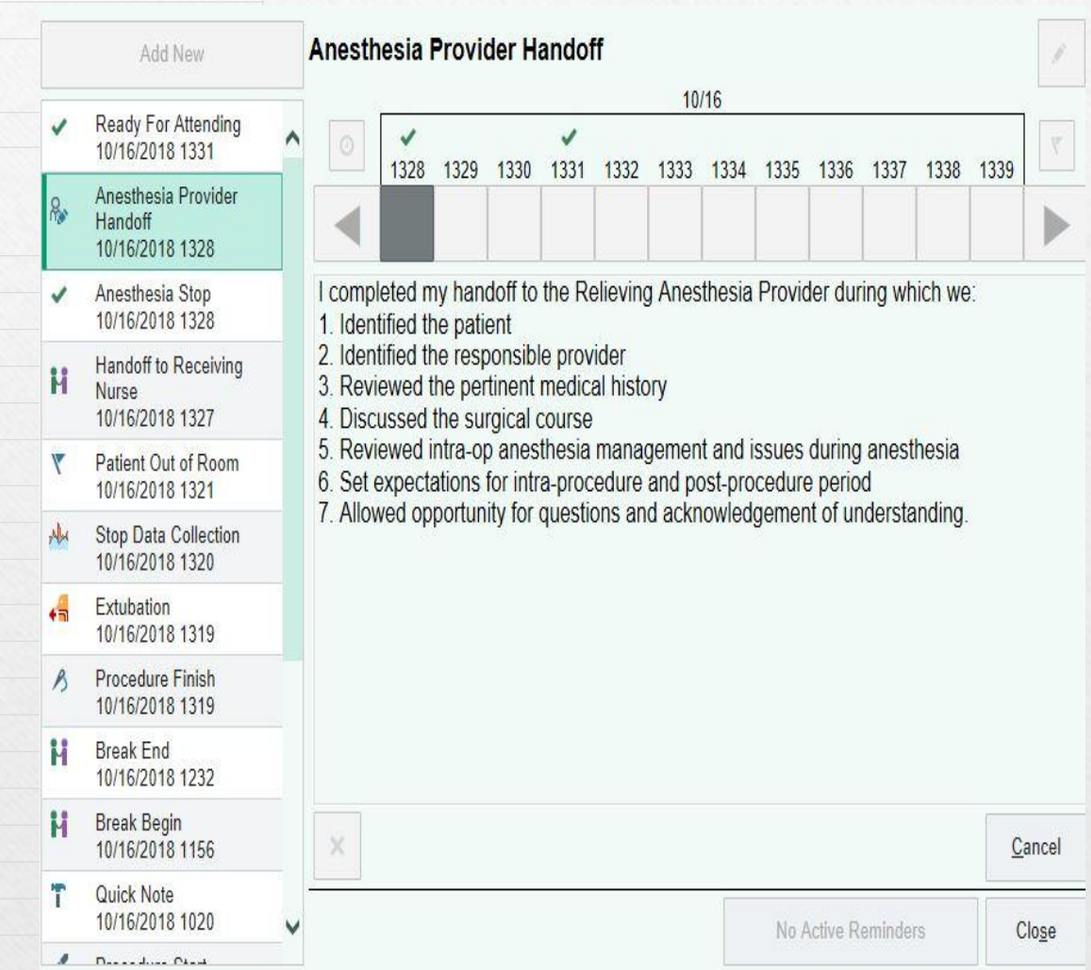
"This Handoff Form is to remain in the chart"

Date Modified: January 12, 2015

Do I need any other anesthesia equipment
Airway
IVs
Invasive monitors
BIS
Labs
T and S

Intraop/Post op

Once preop checklist is complete check eOrBoard for surgeon ready (Blue symbol) & Room is ready- "Ready" in green on eOR board-then proceed to OR with patient
Entering OR Checklist
Circulator asks patient to state (not confirm) full name, Date of birth, procedure, and site
Verify with ID band, marked site and side, consent, H&P and OR schedule, White
Open EPIC backtime your anesthesia start and select start data collection. You will be prompted to scan patients armband in areas where a scanner is present. Scan the CPC portion of ID band and the override screen should disappear
In OR- Time out-verify with EPIC
Give full attention to time-out
Correct patient
Correct procedure, site and side
Correct site initials
Availability of correct implant and/or blood
Have antibiotics been administered
IV access confirmed-size, location and patency
Imaging Data confirmed by two or more members
Post OP Plan verified-PACU or ICU
SBAR HANDOFF-Universal Protocol
Situation:
Pt. Name, Age, Armband, type of procedure, site and indication, allergies
Special Precautions
Background:
Nature of Injury, pertinent medical history
Medications administered
Estimated Blood Loss (fluid deficit if applicable
Assessment:
Current condition, IVs, infusions, blood products (two individuals MUST verify)
Critical Lab values
Recommendations:



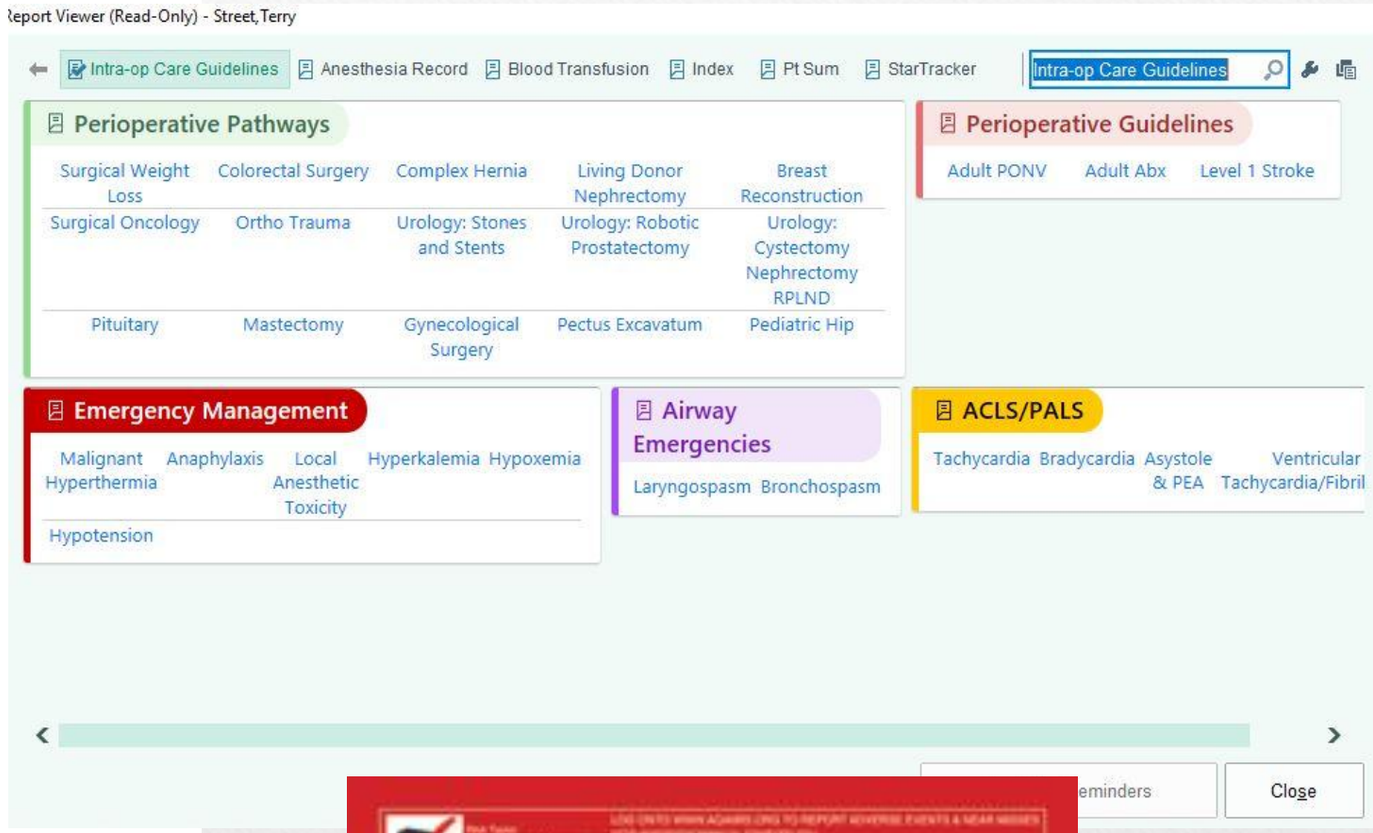
Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10
Antibiotic	**Class**	**standard IV dose**	**Weight Based**	**How fast can I give it**	**What if I give it too fast**	**Redosing Interval**	**Spectrum of Activity**	major side effects	comments
Aztreonam	monobactam	2gm	2gm max	bolus 3-5min intermittent infusion 20-60mins	unknown	3-5 hrs	only g(-)	toxic epidermal necrolysis (rare sometimes fatal), diarrhea, nausea, vomiting	OK to give with pencillin allergies
Nafcillin	anti-staph penicillin (narrow spectrum beta lactam)	1-2gm	N/A	30 min	pain, phlebitis	2-4 hrs	MSSA, some strept	N,V, diarrhea, abdo pain, yeast infections	
Zosyn (piperacillin-tazobactam)	anti-pseudomonal penicillin (combination beta lactam and beta lactamase inhibitor)	3.375gm	N/A	30 min	pain, phelbitis, GI disturbances, hyperkalemia	6-8hrs (being revised)	MSSA, strept, enterococci; extensive gram(-) including Pseudomonas; anaerobes	rash, pruritis, GI disturbances	
Ciprofloxacin	fluroquinolone	400mg	400mg	60 min	venous irritation, phlebitis	4-10 hrs	MSSA; extensive gram(-) including some Pseudomonas	urticaria, angioedema, anaphylaxis,photosensitivity, Stevens Johnson syndrome, toxic epidermal necrolysis	
Cefazolin	1st generation cephalosporin	2gm	20-30mg/kg	3-5min	pain, phlebitis, seizures in compromised BBB	2-5 hrs	MSSA, strept; limited gram(-); no aneorobes	urticaria, angioedema, anaphylaxis, Stevens Johnson syndrome, toxic epidermal necrolysis, renal dysfunction,toxic nephropathy, hepatic dysfunction, aplastic anemia	
Cefuroxime	2nd generation cephalosporin	1.5gm	50mg/kg	3-5min	pain, phlebitis, seizures in compromised BBB	3-4 hrs	MSSA, strept; limited gram(-); no aneorobes	as above	
Cefoxitin	2nd generation cephalosporin	2gm	20-40mg/kg	3-5min	pain, phlebitis, seizures in compromised BBB	2-3 hrs	MSSA, strept; some gram (-); aneorobes	as above	
Cefotetan	2nd generation cephalosporin	2gm	20-40mg/kg	3-5min	pain, phlebitis, seizures in compromised BBB	3-6 hrs	MSSA, strept; some gram (-); aneorobes except b.fragilis	as above	
Ceftriaxone	3rd generation cephalosporin	1gm 2gm	NA	30 min 60mins	pain, phlebitis, seizures in compromised BBB	12-24 hrs	MSSA, strept; extensive gram (-) except Pseudomonas; some aneorobes	as above	
Ertapenem	carbapenem	1gm	N/A	30min	phebitis, extravasation	24 hrs	MSSA, strept; extensive gram (-) except Pseudomonas; aneorobes	nausea, vomiting, diarrhea, seizures in renal impairment	
Gentamicin	aminoglycoside	2-5 mg/kg	2-5 mg/kg	30-60 minutes	pain, muscle spasm, hypotension, shock, urticaria, venous irritation, ototoxicity	3-6 hrs	MSSA, enterococci; extensive gram(-) including Pseudomonas; no anaerobes	ototoxicty 1-5% of patients if used for more than a few days. Nephrotoxicity if used longer than 3 days	
Metronidazole	nitroimidazole	0.5-1gm	15mg/kg adult initial; 7.5 subsequent	30-60 minutes	pain, phlebitis	6-8 hrs	only aneorobes	nausea, headache, metallic taste, dry mouth	
Clindamycin	liconsamide	600-900mg	37.5mg < 10kg; 3-6mg/kg adult	10-60min not exceeding 30mg/min	pain, phlebitis,refractive bradycardia, hypotension	3-6 hrs	MSSA, some community MRSA, strept; no gram(-); aneorobes	diarrhea, severe colitis, skin rashes, elevated liver enzymes, neutropenia, profound prolongation of muscle relaxants	
Vancomycin	glycopeptide	1gm	10-15mg/kg	60 min	Redman syndrome, pain, muscle spasm, hypotension, shock, urticaria, venous irritation, tissue necrosis, nephrotoxicity	6-12 hrs	MRSA, strept, enterococci; no gram (-); limited aneorobes (no b.fragilis)	Anaphylaxis,, Stevens-Johnson Syndrome, toxic epidermal necrolysis, vasculitis, ototoxicity, nephrotoxicity	
Linezolid	oxazolidinone	600mg	N/A	30 min	uknown	12 hrs	MRSA, strept, enterococc, VRE; no gram (-); limited aneorobes (no b.fragilis)	diarrhea, headache, nausea, vomiting, thrush, pancreatitis	
Daptomycin	cyclic lipopeptide	4mg/kg	4mg/kg	30 min	uknown	24 hrs	MRSA, strept, enterococc, VRE; no gram (-); no aneorobes	hypotension, hypertension, edema, cardiac failure, supraventricular tachycardia etc. headache , insomnia , dizziness, anxiety, confusion, vertigo, paraesthesia rash, pruritus , eczema hypokalaemia, hyperglycemia, hypomagnesemia, increased serum bicarbonate, other electrolyte disturbances , N & V, diarrhea, thrombocytopenia acute renal failure	$$$$
MSSA = methicillin sensitive staph aureus(VS methicillin resistant MRSA)									

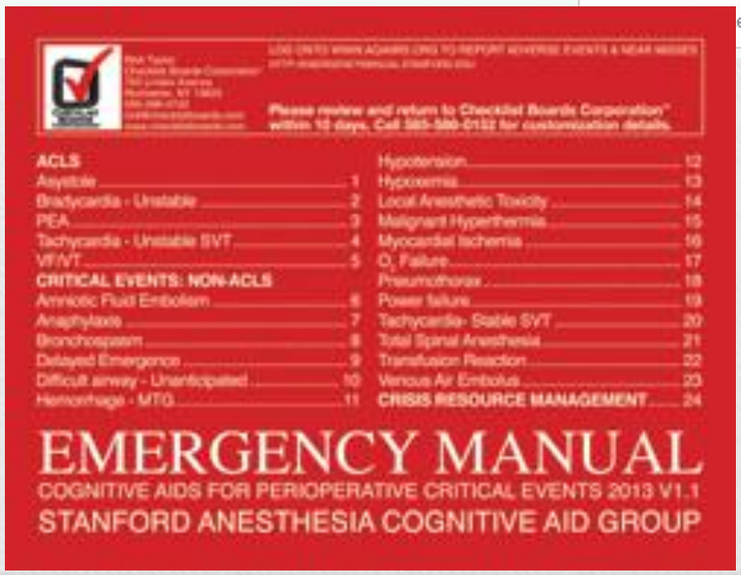
ICU Handoff/Emergency

OR->ICU PHONE REPORT

TICU: (615) 479-1791 SICU: (615) 414-7201 NCU: (615)491-4475
BICU: (615) 473-7583 CVICU: (615) 473-6148
NCU: (615) 491-4475

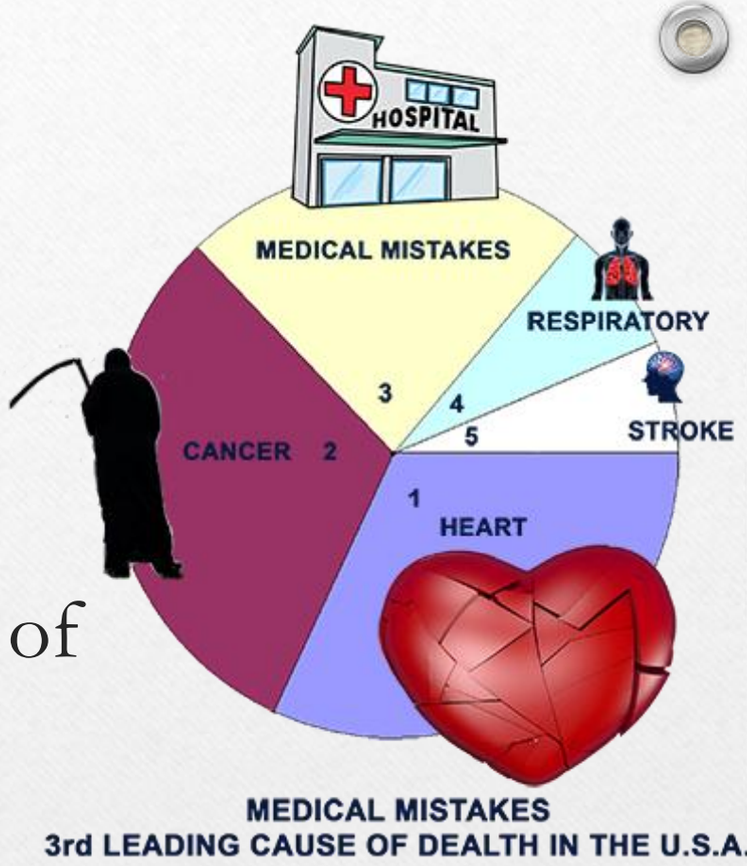
1. PATIENT NAME
2. SURGICAL PROCEDURES
3. AIRWAY STATUS (INTUBATED/EXTUBATED/TRACHED)
4. VENOUS ACCESS (PIV/CVL/PICC)
5. ARTERIAL LINE/PAC (IF PLACED)
6. IV FLUIDS ADMINISTERED (VOLUME & TYPE)
7. BLOOD PRODUCTS ADMINISTERED (VOLUME & TYPE, MTP?)
8. FLUID LOSSES (EBL/UOP/OTHER)
9. CURRENT INFUSIONS
10. DRAINS/CHEST TUBES/FOLEY
11. ISOLATION STATUS
12. SPECIAL CONSIDERATIONS (OPEN ABDOMEN/DIFFICULT AIRWAY)





A final Word!

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



- All learned occupations have a definition of professionalism, a code of conduct.
- Selflessness, skill, trustworthiness
- Aviators who just celebrated 8 years in the US without a death prior to April's Southwest add discipline…. maybe healthcare needs to add this to our profession

Gawande A. The Checklist manifesto. 1st ed. New York: Picador; 2011:p182.

https://www.businessinsider.com/southwest-passenger-torso-sucked-out-window-after-engine-explosion-2018-4

The End!