Technology: Advancing the Practice and Profession of Nurse Anesthesia

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Disclosure:

- No financial conflicts
- Owner and developer of PROCRNA.COM
- Texas State Advocate for the AANA Foundation
- Products described in this talk are meant to represent the technology and not the individual vendor.

Evolution of Technology

- Better
- Newer
- Easier
- Larger (or smaller)
- Faster (or slower)
- Less Expensive
- Energy Efficient
- Safer



Then and Now







Early Anesthetics



Risks of Early Anesthetics:

- Airway management
- Composition of inhaled gas (O2 & N2O)
- Concentration of Anesthetic agent

Then and Now

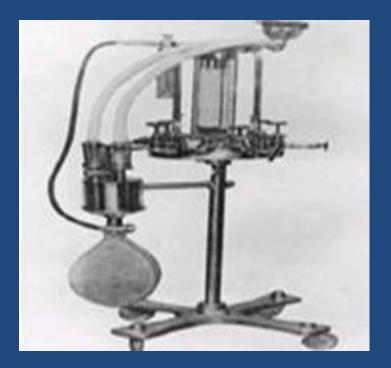
Gauze Mask



Modern Vaporizer



100 Years of Progress





Moving From Then to Now

• Creative Thinking:

- **Creativity** refers to the invention or origination of any new thing that has value.
- Those giving the anesthetic best know what needs to be improved

Act on your Ideas

- Thoughts are just day dreams until you put them to use.
- Dare to think outside the box...then follow through.

Thinking inside the Box

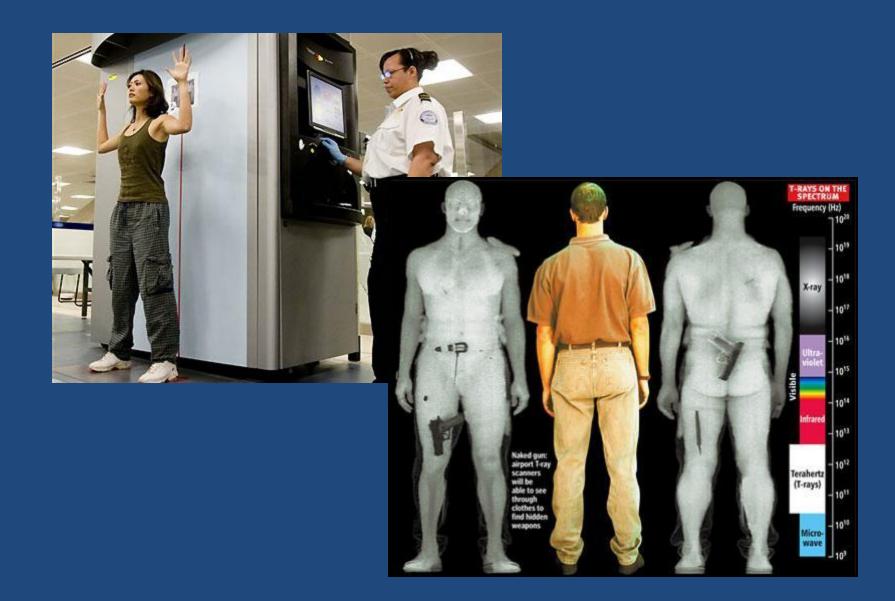
- To think in traditional fashion, bound by old, nonfunctional, or limiting structures, rules, or practices.
- "make a better mouse trap"

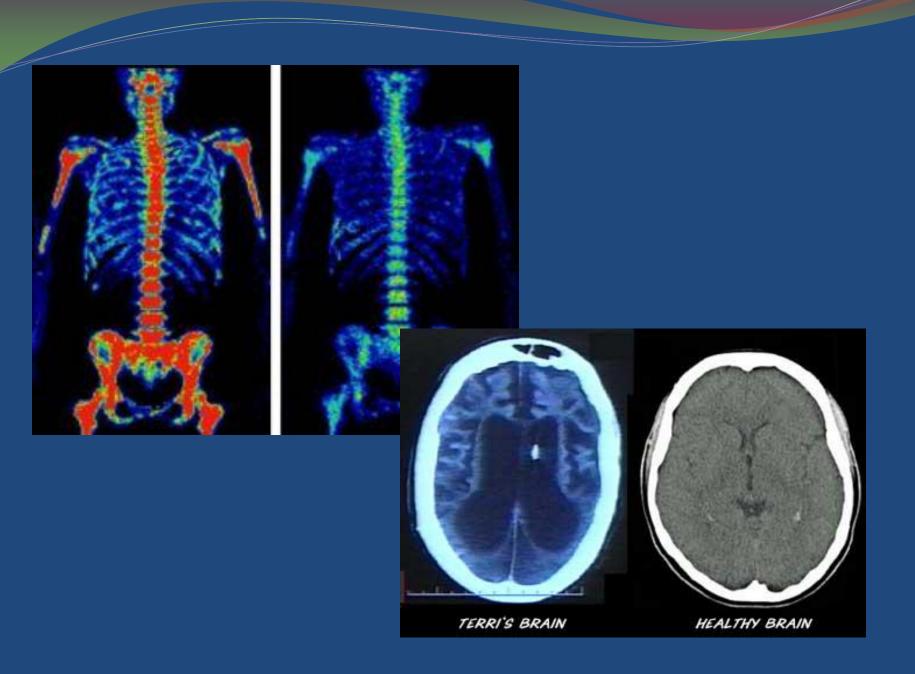


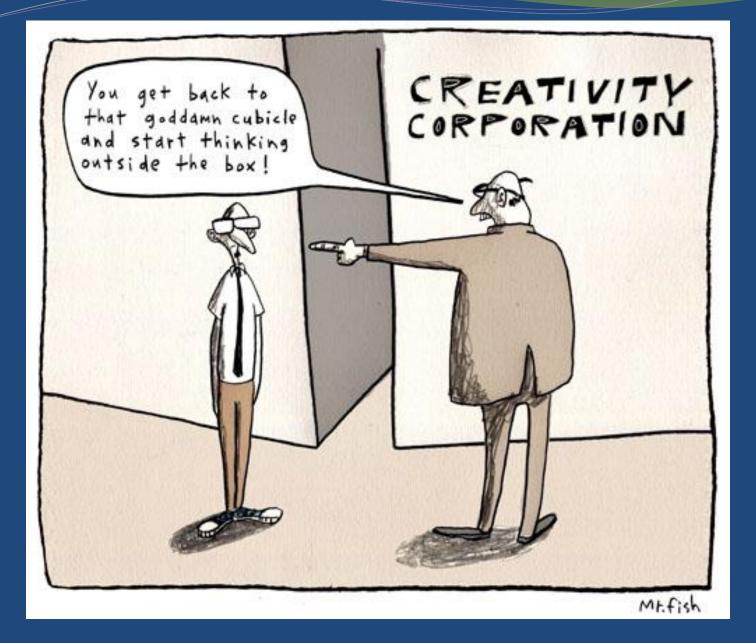
Thinking Outside the Box

- "To think differently, unconventionally, or from a new perspective.
- Star Trek Anesthesia









Moving from Then to Now **Gauze Mask**



Modern Vaporizer



Ether Inhaler



Home Study



Creative Thinking Mask

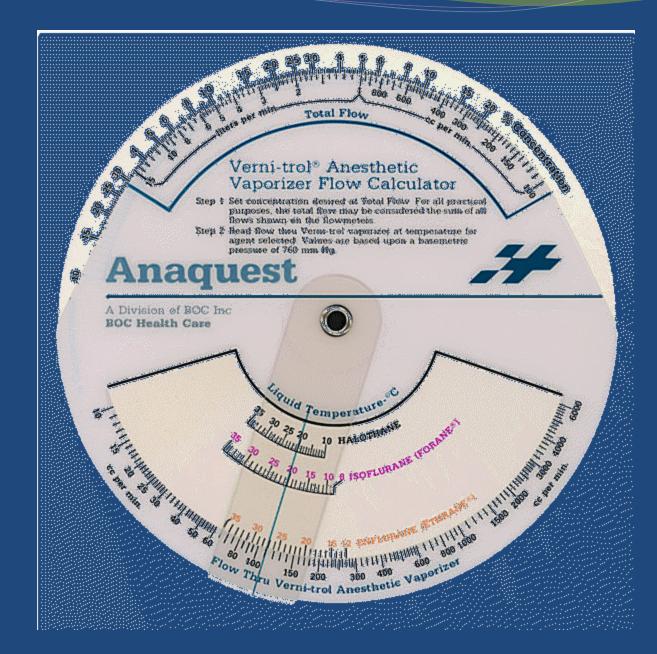
Gas Delivery





Vaporizer

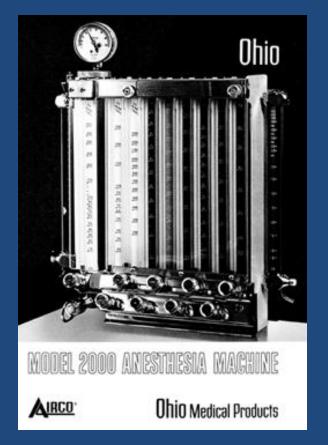




Vernitrol / Copper Kettle

Vernitrol variable bypass

"Prayer wheel"





However.....

• Patients were still injured with hypoxic injuries

- "Fail safe" was not fail safe
- Gas flows were manually set
- Machines could deliver 100% N2O
- Pulse oximetry had not yet been introduced to practice
- OB and Anesthesia had highest number of law suits
- Anesthesia made an industry wide commitment to improving patient safety
 - Anesthesia Patient Safety Foundation.

Anesthesia Patient Safety Foundation

- Established to improve patient safety
- Crosses all professional lines
 - CRNAs
 - MDs
 - Engineers
 - Manufacturers
 - Vendors



Culture of safety

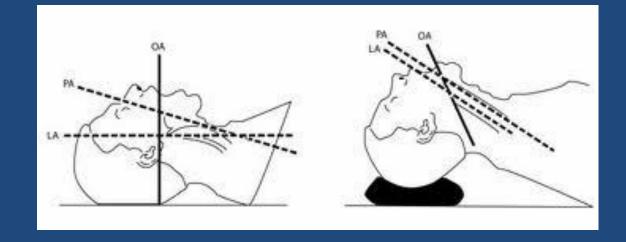
- Shared values
- Anticipate events
- Inform and teach
- Develop a plan
- Engage
- Empower
- Recognize & reward

Technology Breakthroughs for Anesthesia Safety

• Pulse Oximetry

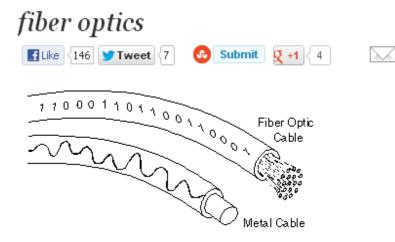
- Became "standard of care" almost overnight.
- Anesthetic gas analysis
 - First systems were multiplexers serving the entire OR
 - Now standard on every machine.
- Fiberoptic imaging.
 - Quickly adapted for intubation

Airway Management



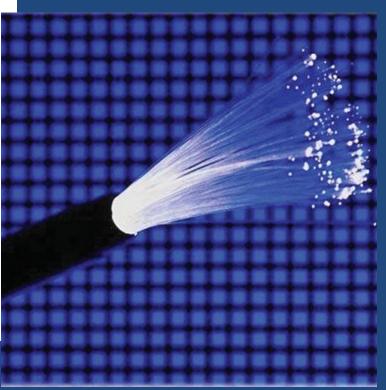
Standard intubation is based on line of sight visualization

Fiberoptic Technology



)A technology that uses glass (or plastic) threads (fibers) to transmit data. A fiber optic cable consists of a bundle of glass threads, each of which is capable of transmitting messages modulated onto light waves.

Fiber optics has several advantages over traditional metal communications lines:



Just for fun.....



Video Laryngoscopes

- Reliable Airway management
- Replacing fiberoptic intubations
- Standard of Care?

McGRATH[®]

Video Laryngoscope Series 5

The McGRATH[®] Video Laryngoscope is the first fully portable video laryngoscope designed for difficult airways and wherever a laryngoscope would normally be used.

Into the Future

Anesthesia Staffing: First Robotic Tracheal Intubations in Humans Using the Kepler Intubation System Author : Lindsey Crawford

T. M. Hemmerling; R. Taddei; M. Wehbe; C. Zaouter; S. Cyr; J. Morse Authors

Br J Anaesth. 2012;108(6):1011-1016. Copyright 2012 Oxford University Press

Abstract

Background Intubation is one of the most important anaesthetic skills. We developed a robotic intubation system (Kepler intubation system, KIS) for oral tracheal intubation.

Methods In this pilot study, 12 patients were enrolled after approval of the local Ethics board and written informed consent. The KIS consists of four main components: a ThrustMaster T.Flight Hotas X joystick (Guillemot Inc., New York, NY, USA), a JACO robotic arm (Kinova Rehab, Montreal, QC, Canada), a Pentax AWS video laryngoscope (Ambu A/S, Ballerup, Denmark), and a software control system. The joystick allows simulation of the wrist or arm movements of a human operator. The success rate of intubation and intubation times were measured.

Results Eleven men and one woman aged 66 yr were included in this study. Intubation was successful in all but one patient using KIS at a total time of Imedian (inter-quartile range: range) 93 (87, 109; 76, 153) stin one patient forging of the video larvngoscope prevented.

Kepler Intubation System



Controller is a standard gaming joystick with the possibility to program up to 12 buttons

Keys to Medical Technology

Sensors

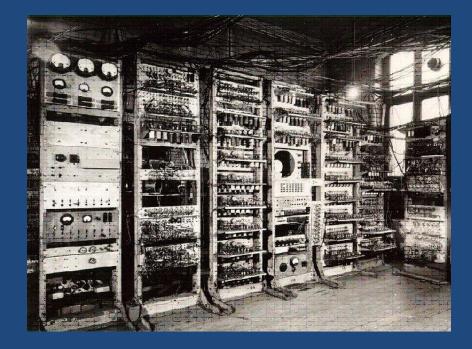
Data processing

• Display



Early Computers

- Large in size
- Produced large amount of heat
- Had to be programmed separately for each task.



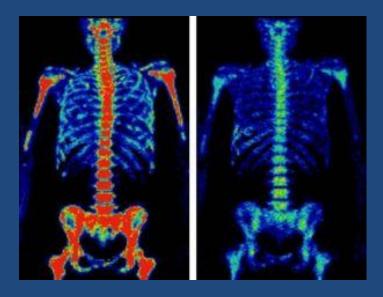
1980's: Computers become main stream

- Word processing
- Supply ordering
- Data storage



Digital Technology Enhances Clinical Practice

• Digital imaging and algorithms for data analysis have lead to many breakthroughs to enhance patient care.





Sensors Processors Display

Radiology / Ultrasound images

- Vascular access
- Regional blocks
- Standard of care?



Resuscitation, 2011 Oct;82(10):1279-84. Epub 2011 Jun 1.

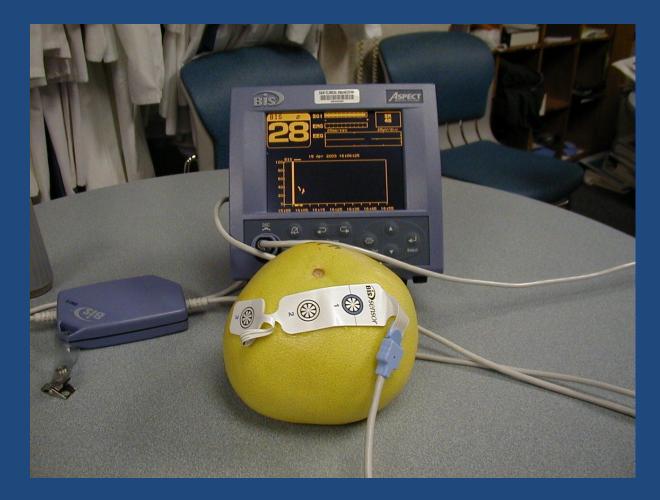
Tracheal rapid ultrasound exam (T.R.U.E.) for confirming endotracheal tube placement during emergency intubation.

Chou HC, Tseng WP, Wang CH, Ma MH, Wang HP, Huang PC, Sim SS, Liao YC, Chen SY, Hsu CY, Yen ZS, Chang WT, Huang CH, Lien WC, Chen SC.

Source: Department of Emergency Medicine, National Taiwan University Hospital, Taipei, Taiwan. erichaochang@gmail.com Abstract

OBJECTIVES: This study aimed to assess the diagnostic accuracy and timeliness of using tracheal ultrasound to examine endotracheal tube placement during emergency intubation.

To BIS or Not to BIS?

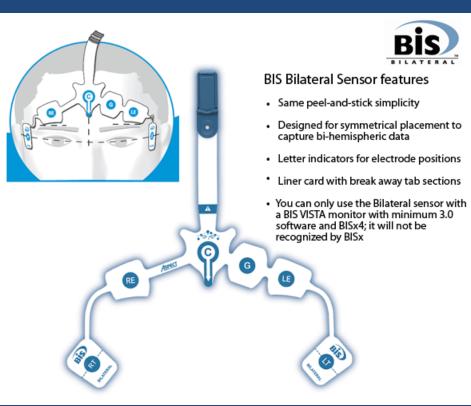


Sensor Processor Display

- "Awake during Anesthesia" is a major fear
- Well known by Lawyers and Media
- Indicates
 - Depth of anesthesia
 - Trends



Bilateral BIS





Cerebral Oximetry





Cerebral Oximetry in Cardiac Surgery

By: Thomas J. May, D.O.
& Phillip E. Greilich, M.D., FAHA
University of Texas Southwestern Medical Center at Dallas
Department of Anesthesiology and Pain Management

"The development of a neurological monitor capable of detecting ischemic events during cardiac surgery is long overdue. Emerging evidence suggests that cerebral oximetry may be capable of detecting ischemic events, guiding therapeutic interventions, and possibly reducing the incidence of neurological and systemic insults during cardiac surgery."

Fluid Management

Vigileo monitor

- Stroke Volume Variation
- "if it's below 12, give albumin"



Minimally Invasive Hemodynamic Monitoring Vigileo Monitor

- "Getting ml/beat from mmHg"
- Arterial Pressure-based Cardiac Output

FloTrac SensorArterial pressure based COMeasured from A-LineApplied physics in complex algorythm



Nexfin

Noninvasive, continuous hemodynamic monitoring

- CO/CI
- Sys/Dias
- MAP
- HR
- **SV**
- SVV
- SVR

Immediate and Reliable Hemodynamic Picture

ccNexfin system provides a hemodynamic overview within two minutes of starting and connects to the patient by simply wrapping an inflatable cuff around the finger.¹⁰ The pulsating finger artery is 'clamped' by applying equivalent counter pressure that results in a pressure waveform.

This is how ccNexfin system provides beat-to-beat, continuous blood pressure in a totally noninvasive manner, thus without the need for arterial cannulation. The resulting blood pressure waveform serves as the basis for the measurement of continuous cardiac output. ccNexfin system measures real-time continuous cardiac output and other hemodynamic parameters by a pulse contour method (Nexfin CO-Trek), which is based on the systolic pressure area and a physiological three-element Windkessel model for cardiac afterload.⁶



If something were wrong, how would you know?

"Triple Low"

- Hypotension
- Low BIS
- Low end tidal agent

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Clinical Anesthesiology 🛛 🖬 🖸 🐼 🔊							Most Read
ISSUE: NOVEMBER 2009 VOLUME: 35:11						OB Anesth Inspector (
"Triple Low" During Surgery Tied To Greater Post-Op Mortality Risk for Death, Other Poor Outcomes Rise as Markers Fall							 Opioid-Rela Stays Fully Robott Acute Airwa Clinical Dile
New Orleans—If the phrase "triple low" is not part of every anesthesiologist's professional vernacular now, it may be in the near future.							
Retrospective analyses by researchers at the Cleveland Clinic in Ohio have found that patients who simultaneously experience low-normal bispectral index score (BIS; BIS Monitor, Aspect Medical), mean arterial pressure (MAP) and end-tidal volatile anesthetic concentration (MAC) have nearly triple the risk for 30-day mortality as those whose numbers are higher. Mortality was						A	

Video Amplification

Researchers amplify variations in video, making the invisible visible

New software amplifies changes in successive frames of video that are too subtle for the naked eye.

Larry Hardesty, MIT News Office

June 21, 2012

or



At this summer's Siggraph the premier computergraphics conference researchers from MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) will present new software that amplifies variations in successive frames of video that are imperceptible to the

te naked eye. So, for instance,



In these frames of video, a new algorithm amplifies the almost imperceptible change in skin color caused by the pumping of the blood.

PHOTO: MICHAEL RUBINSTEIN

Eularian Video Magnification

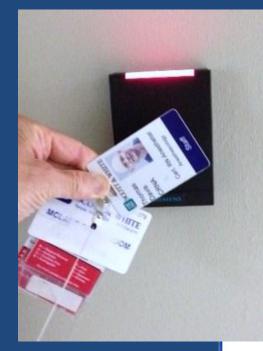
• New technology from MIT

- Filters image to seek variation
- Magnifies variation x 100
- Displays new image
- Shows motion / color change not detected by the eye

Patient Identification



Anesthesia Cart Security







Home | Medical Carts | Anesthesia Carts | AC Anesthesia Carts | Overview

Track Your Equipment





Internet, iPhone and iPad







Text message on phone:

"Your husband's induction was smooth. Anesthesia autopilot has been set and now we are programming the procedure into the surgical robot."

The Internet

- Safety
- Communication
- Education (patient and provider)
- Data collection and storage
- Facilitates "top of license" practice
- Anesthesia related APPs

Patient use of internet

- Know about procedure
- Know safety concerns
- Know about you and your group / hospital
- Patient access to national quality forum

Google "questions to ask about anesthesia"

- Are there different kinds of anesthesia?
- Is anesthesia safe?
- What are the risks of anesthesia?
- How do they know how much to give?
- Should I continue my medications?
- What happens during the pre-op visit?
- What is the difference between an Anesthesiologist and a Nurse Anesthetist?

From the Internet:

 "As physicians, anesthesiologists go through years and years of rigorous training. Anesthesiologists have at least eight years of post-graduate education and training, while nurse anesthetists have two-three years." "Nurse anesthetists are able to perform the technical aspects of the administration of anesthesia, but anesthesiologists have the education, skills and training to fully manage patients and respond to medical complications. "

The good, the bad and the ugly





What is your favorite Medical App?



AliveCor iPhone ECG http://alivecor.com/



Ford Driving Health, Safety With Mobile Apps

The new programs may eventually warn patients with chronic disorders of an impending emergency, or let them upload data directly to a personal health record.

By Marianne Kolbasuk McGee InformationWeek May 18, 2011 01:00 PM

Ford Motors is working to bring new meaning to the term "mobile healthcare apps." The automobile maker is researching in-car health and wellness connectivity services and applications for people with chronic conditions such as diabetes and allergies. And if you're prone to road rage, a stress monitoring app may help you "tame the beast."



The apps leverage the Bluetooth connectivity, voice control, and cloud-based services of <u>Ford's Sync</u> "infotainment" system that allows drivers to make hands-free calls from their cellphones, use voice commands to change the music playing on their MP3 players, as well as access

Lifecomm MPERS

• A far cry from the 1980s "I've fallen and I can't get up" panic buttons, today's mobile personal emergency response service (MPERS) devices include GPS locators, accelerometers to detect falls automatically, and embedded cellular chips to summon help even if the wearer blacks out and is unable to push a button.



Intelligent M Handwashing Bracelet

Enforces Compliance

- Records length of time for washing
- Vibrates when hands have been washed a sufficient time
- Alerts observers about level of compliance

A new wristband measures hand washing compliance by healthcare providers

Mar 28, 2013 by Cory Schultz



Hand washing is one of the most important and easy ways of reducing the transfer of pathogens from person to person. It is so important, that most hospitals have guidelines on proper hand washing techniques. However, it is not always consistently done.

Like < 30

Tweet 59

According to the CDC, nearly 2 million people get infections while in US hospitals annually and around 100,000 of those people die.

Even the best efforts can sometimes go awry, which is why a new startup, IntelligentM, has a novel solution.

Electronic Medical Records

CMS incentives

- Funded by stimulus package money
- \$44,000 from Medicare
- \$63,750 from Medicaide

Q 14 Comments

The future of electronic medical records, in one doctor's visit

The future of electr...

Posted by Sarah Kliff at 09:40 AM ET, 10/05/2011

🕞 🛞 Text Size ຝ Print 🖂 E-mail 📑 Reprints

Share: 🛐 匡 More >



If you want a glimpse into the future of health care, there's a good crystal ball here in our nation's capital: <u>the D.C. Primary and Immediate Care</u> <u>Clinic</u>. I spent Tuesday morning there, not as a reporter, but as a patient with a fever and earache. Still, the visit turned out to be incredibly illuminating in ways that had nothing to do with my diagnosis, and everything to do with the future of electronic medical records.

Both the health reform law and the stimulus put serious money behind moving our health care system off paper and onto electronic medical records. The Recovery Act alone puts <u>\$19 billion</u> into incentive programs to reward doctors who meet "meaningful use" standards for electronic records. The Affordable Care Act builds on that, providing <u>additional funds</u> to get doctors to go digital.

The Official Web Site for the Medicare and Medicaid Electronic Health Records (EHR) Incentive Programs

The Medicare and Medicaid EHR Incentive Programs provide incentive payments to eligible professionals, eligible hospitals and critical access hospitals (CAHs) as they adopt, implement, upgrade or demonstrate meaningful use of certified EHR technology. Eligible professionals can receive up to \$44,000 through the Medicare EHR Incentive Program and up to \$63,750 through the Medicaid EHR Incentive Program.

From the moment I walked in the dear, the clinic

👩 Microsoft PowerPoi... 🔛 Technol

Protected Patient Information

- Department of HHS
 <u>Office of Civil right</u>
- Pilot program to investigate 20 medical centers for HIPAA violations
 - \$50K fine per occurrence.

PROCRNA

Chief CRNA: Are your Electronic Records Secure?

BY ADMIN ON SEPTEMBER 16, 2012 · O COMMENTS



Patient privacy and the security of protected health information is a hot issue throughout healthcare from the primary physician's office through diagnostic testing and including records of hospitalization. The Federal Government is urging health care workers to move to total electronic records and have initiated bonus money to encourage compliance. However, the move to electronic records presents the challenge of security.

Writing for the on line blog The Anesthesiology Insider, Tony Mira

states

"Collecting, analyzing, reporting and storing electronic patient information present perhaps even greater HIPAA challenges than does the use of paper records, however. Data entered on a computer can be copied more easily, more cheaply, more prolifically and even passively. Once unsecured data are moved from the computer on which they are created to other media, manually or wirelessly, controlling the information becomes nearly impossible."

"The internet has opened the door to consumer driven health care. Patients can process and store their own data on personal devices and receive diagnosis and treatment from computer based algorithms."

Operating Room Management

- "Wouldn't it be great if..."
- "Somebody ought to..."
- Remember, you are on the front line know what needs to be done. If you can't do it yourself, find somebody who can and getterdone.

The Electronic Chalk Board

😹 Case Schedule Display HR-MPH:762-0816 AAU-EAM:762-2237 OB-GWL;2301 APMS-GWL:2301 Desk-DONNA & LUANN	- 7 🗙
Case Display Staff Bage BBoard Messages PACU NewDay Options Help	
OR Surgeons Anesthesia 🥑 9 10 11 12 13 14 15 16 17 18 19 20 21 22	23
05 ROW+ TAD RF	
10 TCL KFE <u>KT</u>	
15 LQS TKM <u>GL</u>	
16 LAR • KFE <u>SA</u>	
17	
20 GJJ DAC JL France	
24 BZS WEJ <u>DC</u>	
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Add-on cases: Add case	ALE-1150L MOG/ROS-477				
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	Anesthesia: WA	AS ra	Other Cmds		
	Circs/Scrubs:	1	Other Critics		
	Patient: JOHN	NSON, ALMA	X-rays: O		





		460 through 5934					Tues	
		1460 through 5834	Est. Time	Pt #	OR	Status Est. Time		OR
		Status	E.St. THITE	4868	24		2	
1460	0.3	Finishing surgery		5118	14	In Recovery		
1490		In Post-Op	0:54	5286	20	In Recovery		
1686	15	Surgery in progress	1:13		07	In Post-Op		
1834		Surgery in progress		5481	21	Surgery complete		
1850		In Post-Op	0:55		05	In Recovery		
2371		Surgery in progress In Post-Op		5693	07	In Recovery		
2435		In Post-Op		5778	10	Finishing surgery		
2512 2538	13.3	In Pre-Op Prep, scheduled for	2:12 PM	5834	09	Waiting, scheduled for 2:20 PM		
2618		In Post-Op						
2685		Surgery in progress	2:25					
2729		In Recovery		1.0.1.0				
		Surgery in progress	2:03					
		Scheduled for 6:30 PM						
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		In Recovery	MAN DO NOT A SUBJECT OF					
		Surgery complete						
		In Post-Op						
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		In Recovery						
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		Discharged to Pt Room						
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Welcome to Scott and White Memorial Hospital Please enjoy our wireless internet on TimeWarnerAccess

VIZIO

Education / Information



<u>'hone/Mobile</u> version <u>Sequoia 5</u> <u>OR Status</u> –									
oday's OR Schedule Tomorrow's OR Schedule Lexicomp (drug info)									
Dept of Anes Preferences and Suggestions POC Testing Info (iStat, HemoCue)									
Mirage (includes DocuSafe) Acquire Scanned Records Archive									
fetric Conversion Body Mass Index (BMI) Calc OR/PACU Forms									
Operating Room Transfer of Care Pyxis Drug Location List (searchable pdf)									
OR Information:									
esident ACGME Caselog Stat Reading of Xrays DocuSys Info and FAQs									
hone Lists Outlook OWA - email Patient Watch Paper Anesthesia Record Checklist									

Does your group need a Dedicated web site?

Dedicated web site

Communication

- Email and text
- Education
 - Inform and teach
- Scheduling
- Staff engagement
- Recruiting
- Social



Communication



Department M&M Conference 9/13/12

The next departmental M&M Conference will be this Thursday at the usual place and time.

The following cases are scheduled to be presented.

1) Management of postop hypotension in the PACU/DSU -TAD/NAL/DC

- 2) Extubation in the IR suite GWL/JR
- 3) Postop median nerve neuropathy GWL

Hope to see you there. Feel free to contact with any questions or concerns.

Thank you, Ben Vacula

CRNA Meeting

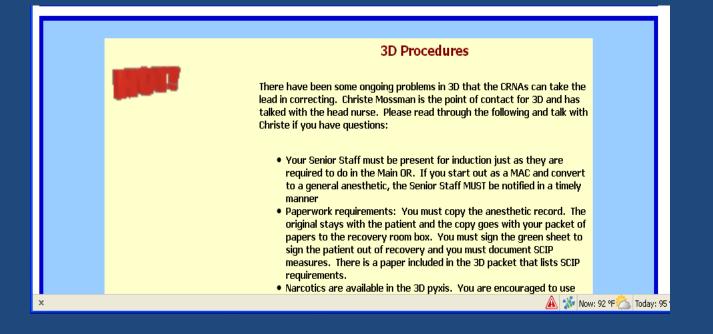
Thursday August 2nd, 0645 Department Conference Room We've been bounced the last 2 times we tried to meet....this time we are going to have a meeting. Please plan to attned.

Check the Schedule

Next week is the "overlap" week that appears on both the July and August schedules. As changes are made, sometimes they don't show up on both schedules so they get out of sync. Next week we will go by the AUGUST schedule. Click below to view the latest version of the schedule.

click here to download August

Education



Scheduling



Recruiting

Are you a CRNA who is interested in joining a great team at Scott & White?

Name:	
* required	
email address:	
* required	Contact: Mike Walsh, Chief
Where are you located?	CRNA
	<u>mwalsh@swmail.sw.org</u>
How many years have you been a CRNA?	Tom Davis, CRNA recruiter
	<u>tsdavis@swmail.sw.org</u>
When are you available?	Tous Maana uhusisian
	Tara Moore, physician recruiter
Would you like to be contacted by our CRNA recruiter?	tmoore@swmail.sw.org
	Scott & White Health System
	2401 South 31st St.

Social

Book club

Book club info:

We are reading Unbroken by Laura Hillenbrand. We will meet Saturday, October 13th at 10:00. See you there!

October 13th



Open House at Jan VanCleave's House

September 16th 1-5 PM

Check back for details.







Happy Birth Day

Reid Anthony LeFrere

Kynlie Clare FeFrere



Our Anesthesia Group

Home | About Scott & White | Recruiting | Education | CRNA Log in

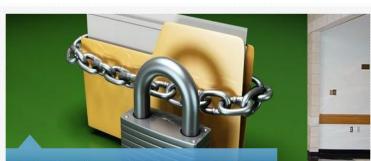
Welcome to our Anesthesia Group web pages. As CRNAs, we are fortunate to work in a high tech environment with an employer who has a stated goal of becoming the most valued name in health care in America. Please browse our pages and learn about who we are and what we do. If you are interested in a great CRNA job working with an exceptional group of Nurse Anesthetists, please check out our recruiting page. If you are a Registered Nurse or student nurse interested in learning more about the Nurse Anestnetists, please refer to our p profession of Nurse Anesthesia, please check out our "CRNA for a day" page. page. Leading the way Watch our site grow.....give us you Full name: 🙈 🐝 Now: 92 °F 选 Today: 95 °F 🥖 Email address: Comments: Submit 42144

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TOPICS CHIEF CRNA

MEETING REVIEW CRNA FOR A DAY FEATURE SRNA

PROCRNA



Chief CRNA: Are your Electronic Records Secure?

Welcome to PROCRNA.COM Promote your practice, promote your profession, and promote yourself in a proactive, professional way. Keep current with the latest developments in equipment, pharmacology and technology. Read and review original, unpublished research done by anesthesia students and providers. Incorporate the latest technology into your clinical practice and department management. Click on the **Services page** for a free consultation.

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Clinical Topic: Predicting Sleep Apnea

Tom Davis, CRNA, MAE

www.procrna.com