



SLEEPY TIMES

VOLUME 11, ISSUE 3 MARCH 2017



MESSAGE FROM THE CHAIRMAN: WE ARE ONLY ONE MISTAKE AWAY FROM BLOWING IT!!!

-SCOTT T. REEVES, M.D., MBA



Inside This Issue:

| | |
|---|------|
| -Message from Chairman | 1 |
| -ICCE Chief Update | 2 |
| -Annual MyQuest Training Due June 30th | 3 |
| -Anesthesiologists Week | 4 |
| -Journal Club Bowling | 5 |
| -DockDogs Competition | 6 |
| -Joseph Redding, M.D. Endowed Chair | 7 |
| -ACNO Perioperative Services Announcement | 7 |
| -Dr. Warters Has Accepted a New Position | 7 |
| -Anesthesiology History | 8-14 |
| -New Babies in the Department | 15 |
| -Welcome to the Department | 16 |
| -Grand Rounds | 17 |
| -I Hung the Moon | 18 |

This is a common saying of the pastor at East Cooper Baptist Church, Buster Brown. One of the things I am learning as the Interim Chief Physician Executive of MUSC Health is how seriously we take patient privacy. We are subject to federal and state privacy laws and our policies and procedures reflect our desire to assure compliance. MUSC Health uses software called Fair Warning to audit the access of any employee's record who is admitted to the hospital. We also perform random access audits of employee outpatient records for the same reason. It is a breach of organizational trust when employees use their access to Epic to view a patient's record when they are not involved with that patient's payment, treatment, or health care operations such as quality or utilization. I asked for some examples of breaches we have had recently and the disciplinary action the employee received. I want to share these examples with you.

- ◇ Out of concern, an employee accessed her father's record (without a written authorization from her father) to enter an order she had not been asked to enter. The employee was terminated.
- ◇ A care team member was at a doctor's appointment and observed a supervisor at that doctor's office at the same time. Upon returning to work, the care team member used their access to look in the supervisor's record out of curiosity to see why the supervisor was at the physician's office. The care team member was terminated.

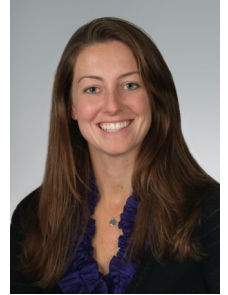
We understand that there may be times when a family member or friend asks you to help them with their medical care or billing. Before accessing that person's record, have the patient complete the [Annual Permission by Patient to Access Protected Health Information](#) form. This form is used to grant another individual access to a patient's medical information without creating a HIPAA privacy issue. Once signed, an employee may have view only medical record access to the requestor's record. You can also use this form to give permission for another individual to receive information about your health care or billing in person or via phone. The permission to access is valid for one year from the date of the signature.

As employees of MUSC Health, we are all required to attend training about patient privacy, which is designed to help us understand the law. Equally important, this training also gives us knowledge so we do not have a serious lapse of judgment with substantial consequences, including termination. We are truly only one mistake away from blowing it. I hope these examples will demonstrate our commitment to keeping our patient's health and billing information private. If you have any questions about HIPAA, please contact Kellie Mendoza, Privacy Manager, at 843-792-4693 or Julie Acker, Senior Director of Compliance, at 843-876-1325.



ICCE CHIEF UPDATE BY CARLEE CLARK, M.D.

Here are some updates for happenings in Anesthesia and Perioperative Services:



Children's Hospital and Women's Pavilion—Construction is coming along ahead of schedule. The hospital is scheduled to open for occupancy in October 2019. [Please click here](#) for a video of the progress of the construction along with a timeline.

Ambulatory Surgery Centers—All centers are still having their certificates of need (CON) contested by our competitors. The trial date for the pediatric facility in North Charleston is scheduled in March with the West Ashley trial date scheduled for this summer. We hope to have both buildings completed within two years.

Employee Engagement—The surveys are now complete. Results should be back within 4-6 weeks.

OR Scheduling—We are working with Periop Exec to improve the process for precertification, identification, and rescheduling of unfunded patients; surgeon scheduling accuracy; and education on OR posting rules. We have a lot of room for improvement in these areas, which would lead to greater efficiency in OR and anesthesia staffing.

OR Block Time—Perioperative Operations Group did a recent block time review and no major block time changes will be happening until the next review in June-July. Rutledge Tower has the most available time right now, but very few changes are expected as all divisions state they have new hires coming.

NORA—NORA continues to grow a little faster than the ORs. The PPA at UH will start to get busier in the next few months with the first Peds ENT cases starting on March 6, 2017. We expect EP, IR, and DDC at ART to grow over the next year as well and are planning to increase staffing to meet these demands.

PACU Boarding and Holds—UH holding room is looking at hiring more FTEs so they can be open until 8pm, which will keep preop patients from taking PACU spots. PACU got more FTEs approved, so this should help with staffing all of the PACU bays. In addition, we are looking at increasing the Meduflex nursing staff to potentially move and cover boarders to the 5th floor and clear out PACU when needed. The same concept will be applied at ART, but possibly decompressing into unused space in the HV prep and recovery.

Quality—We appreciate everyone putting data into Redcaps!!!! We have been reviewing it monthly. No major trends have emerged as of yet, but we will keep reviewing the data. We are simultaneously working with EPIC to generate reports as we work towards the Anesthesia Quality Registry in EPIC with the upgrade in August. PONV is our first report and will be presented at the next QAPI meeting and then distributed to the department. In August, we will have the ability to work on up to 140 reports that will give us data at the department, division, and provider level. We are working towards updating some of the policies and protocols on the website (corneal abrasion, dental injury, etc.) and organizing quality projects within the department. Each division that has Quality data/projects will start giving updates before their M&M Grand Rounds.

Perioperative Nursing Leadership Structure—Tim Brendle has been appointed the new Associate Chief Nursing Officer for Perioperative Services. This means all of the nursing staff in the ORs and Procedural areas report up through Tim to the ECNO, Jerry Mansfield. Tim has a long, successful history with the ORs at MUSC and I look forward to working with him to improve perioperative services.

ERAS—The colorectal official go live date has been delayed because of an issue with the EPIC order sets. From an anesthesia standpoint, we can continue to use our intraoperative ERAS protocols. We have ordered more EV1000s/ClearSights (FloTrac was the previous name) for all three ORs as we have a lot of ERAS programs (colorectal, hysterectomy, and pancreas) in addition to other cases that utilize the equipment (ENT flaps, esophagectomies, liver resections, etc).

APC—APC is now closed. We formerly did cases there on Fridays and the plan is to try and absorb Dr. Maxwell's cases into DDC or the ART OR.

ANNUAL MYQUEST TRAINING DUE BY JUNE 30, 2017

It is time again to complete our MUSC Annual Mandatory Training courses which can be accessed through MyQuest. Training modules are tailored for specific roles in the organization and are due on or before June 30, 2017.



To access your required training modules, use the MyQuest icon found on your desktop and login using your netID and password. Your specific modules will be displayed in the *Enrollments* section of your home screen as seen below.



Remember, these are mandatory and must be completed by June 30.

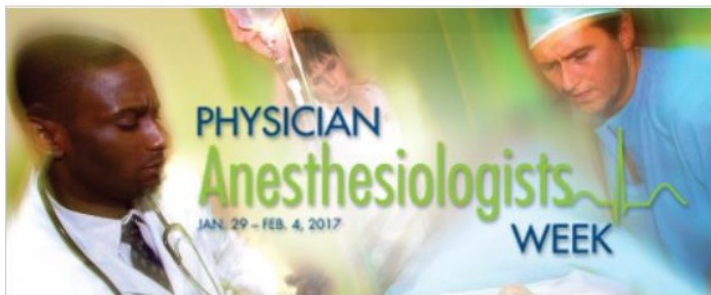
The screenshot displays the MyQuest web application interface. At the top, there is a navigation bar with the MUSC logo, the MyQuest logo, a search bar, and a user greeting: "Welcome, Brenda Doman". Below the navigation bar is a horizontal banner image showing healthcare professionals. The main content area is divided into several sections:

- MUSC HEALTH**: A header section.
- BROWSE CATALOG**: A section with a stack of books icon.
- MY TEAM**: A section with an icon of people around a table.
- REPORTS**: A section with a pie chart and calendar icon.
- NEW COURSES**: A section with a "Logout" button and a course description for "Epic Research View Only Training for Current Epic Users".
- NEWS TICKER**: A section with the text "Looking to improve your performance?—Check out the Career Development Catalog".
- ENROLLMENTS**: A section listing various mandatory training courses, each with a "Not Started" status indicator.
- AVAILABLE LINKS**: A section with links to "MyQuest System Check", "MyQuest Website", "MyQuest Content Request Form", "MUHA Intranet", "MUSCP Intranet", and "University Distance Learning".
- COURSE**: A partially visible section at the bottom left.

The **ENROLLMENTS** section lists the following courses:

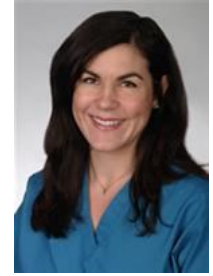
- 2017 Clery Act Training # Not Started
- 2017 Code of Conduct and HIPAA # Not Started
- 2017 Culture of Safety # Not Started
- 2017 DeStaccation # Not Started
- 2017 Emergency Management Campus Security # Not Started
- 2017 Family Educational Rights and Privacy Act (FERPA) # Not Started
- 2017 Harassment # Not Started
- 2017 Infection Control # Not Started
- 2017 Information Security # Not Started
- 2017 Meeting the Unique Care Needs of Patients # Not Started
- 2017 MUSC Active Shooter # Not Started
- 2017 MUSC Health Compliance # Not Started
- 2017 OSHA Review # Not Started
- 2017 Stroke & Heart Early Recognition Signs # Not Started
- MUSC Imagine 2020 # Not Started

PHYSICIAN ANESTHESIOLOGISTS WEEK, JANUARY 29-FEBRUARY 4, 2017



JOURNAL CLUB BOWLING EVENT BY GRAYCE DAVIS, M.D.

On Wednesday, February 8, 2017, the air was thick with tension – would the residents defend their bowling title? Would the attendings regain their dignity after being squashed the previous year? If last year’s Attending-Resident Bowling Tournament were titled “They Came, They Saw, They Conquered – A Story of Residential Triumph,” this year’s title would be “The Beatings Will Continue until the Attendings Show Up!” Perhaps the residents should not have been reminded that attendance and participation in the bowling tournament is mandatory. Perhaps someone should tell the attendings the same!



The beer flowed like wine and the snacks were passed around as everyone poured in and claimed a spot on a team. The same annual rules applied: first game scores were the only ones that counted. No warm ups. Everyone’s first few rolls were tough, but as the game progressed almost everyone found their groove.

As everyone can likely guess, Tony Lawson was the winner with a score of 211. I’m pretty sure our resident director was given instructions to put Dr. Lawson on call that night! Dr. Guldán may be sleeping with the fishes soon – or at least be subject to some departmental disciplinary hearings. No matter as Dr. Lawson will soon be graduating – a fact that manifests a definite boost in attending morale!

Honorable mentions go to Cip with a score of 177 - he will be our next obstacle; Dr. Gelman with a score of 156; and Dr. Lehn with a score of 155.

Since only 3 attendings showed up to bowl, they all deserve participation trophies. Dr. Reeves, aka “the Chief,” brought his always -strong bowling game with a score of 126. Once again, he performed a smooth victory dance, but as always that disco bird proved too elusive to be caught on camera! Drs. Davis and Jeziorski were good only for their entertainment value, bringing in scores of 88 and 78, respectively.

The “Individual Consolation Prize” goes to “Samwise” who scored an amazing 34!!

And we’re all left wondering about Dr. Wester, who showed up but didn’t bowl! Come on, girl, you can’t do worse than Samwise!

Just for fun, Dr. Lawson bowled a second game with the following rules:

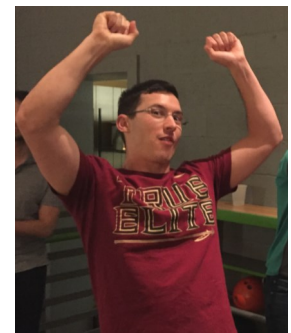
1. He only got 1 roll per frame.
2. If that roll was a strike, great. If not, the second roll mandatorily had to be a gutter ball.

He still pulled out a 205! The attending team is counting the days until graduation, Tony. You’re lucky to graduate with all your fingers intact. There were rumors of a Tanya Harding/Nancy Kerrigan-style plan swirling recently.

Many thanks to everyone for another great year!! Hopefully, the attendings will be less basic and show up in 2018...



| | | | | | | | | | | | |
|-------------------|------|------|------|------|------|------|------|------|------|------|-------|
| 00:07 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Total |
| TLAWS | 9 | X | X | X | X | X | X | 8 | X | 6 | 205 |
| | 9 | 39 | 69 | 99 | 129 | 157 | 175 | 183 | 199 | 205 | |
| TLAWSON Team 5 | | | | | | | | | | | |
| GAME | TOT. | TOT. | TOT. | TOT. | TOT. | TOT. | TOT. | TOT. | TOT. | TOT. | TOT. |
| 205 | 205 | 768 | 768 | 768 | 768 | 768 | 768 | 768 | 768 | 768 | 768 |
| | | | | | | | | | | | |



| | | | | | | | | | |
|------|----------------|-----|--------------|-----|------|-----------------|-----|-------------------|-----|
| 2008 | Matt Springs | 188 | Cal Alpert | 212 | 2013 | Parker Gaddy | 150 | Cal Alpert | 171 |
| 2009 | Wes Hudson | 143 | Scott Reeves | 148 | 2014 | Tony Lawson | 216 | Scott Reeves | 152 |
| 2010 | Missy Reed | 165 | Tom Epperson | 180 | 2015 | Tony Lawson | 194 | GJ Guldán | 132 |
| 2011 | Missy Reed | 161 | Jake Freely | 170 | 2016 | Carey Brewbaker | 142 | Allison Jeziorski | 119 |
| 2012 | Bennett Cierny | 159 | Larry Field | 152 | 2017 | Tony Lawson | 211 | Scott Reeves | 126 |

DOCKDOGS COMPETITION A CONSTANT FAVORITE AT CHARLESTON'S SOUTHEASTERN WILDLIFE EXPOSITION

BY GREGORY YEE FOR THE POST & COURIER

Catherine White was exhilarated as she and her dog Hank climbed down from the platform. Hank had just competed in the Big Air portion of the annual DockDogs competition Friday in Brittlebank Park.

The competition is among one of the most popular at the multi-day Southeastern Wildlife Exposition. The event draws crowds who cheer and whoop as dogs leap into large pools filled with water to retrieve toys. Attendees gather around the tank holding cellphones and GoPro cameras in a bid to capture the gravity-defying moments.

"The atmosphere, especially here in Charleston, is just great," White said. "The crowds really amp the dogs up. The crowds here are just the best."

The dogs and their handlers compete in three categories in the [DockDogs](#) event: Big Air, an equivalent to the long jump; Speed Retrieve, a timed event that measures how quickly a dog can retrieve a toy; and Extreme Vertical, a high jump.

Organizers set up two docks and two large water tanks for the dogs to jump into. Last year marked the first time two tanks were used in Charleston.

As of Friday afternoon, there were 52 adult competitors and three youth competitors.

White, a Charlotte resident, said although the event is a competition, there's a strong sense of camaraderie and that veterans are happy to help newcomers out.

Johns Island residents Laurie Uebelhoer and Deb Feller are two such veterans. The couple has participated in DockDogs for several years and their dog Doni won the event in 2015 and 2016. This year, they brought a new dog, Ella, for the first time.

Ella began competing last spring but wasn't old enough for the Charleston exposition last year, Uebelhoer said.

The couple has made competing in DockDogs events across the country part of their lives, but SEWE holds a special place in their hearts.

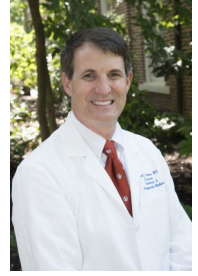
"It's by far the most exciting," Uebelhoer said.

The Southeastern Wildlife Exposition continues at Brittlebank Park, Marion Square and other locations on Saturday and Sunday with features ranging from Birds of Prey demonstrations to cooking demonstrations. For more information, go to [sewe.com](#).



JOSEPH S. REDDING, M.D., ENDOWED CHAIR ESTABLISHED BY SCOTT REEVES, M.D.

I am pleased to announce that the department has been granted approval to establish the Joseph S. Redding Endowed Chair in Critical Care Medicine. Dr. Redding was internationally known as a pioneer in critical care research, which led to modern day concepts of cardiopulmonary resuscitation. He was a dedicated clinician, teacher, and investigator who authored more than 100 publications. Seed money for this endowment occurred through the conversion of the previous critical care lectureship to a new endowment. His article on epinephrine is featured in this month's Anesthesiology History section.



Dr. Joseph Stafford Redding earned his M.D. degree from the University of Maryland in 1948, completed a residency in Internal Medicine, and later returned to UNC where he completed his residency in Anesthesiology. He achieved academic recognition in Anesthesiology as an Associate Professor at Johns Hopkins University, Professor at the University of Maryland, Chief of Service at Baltimore City Hospital, and Professor and Fellow of the Graduate Faculty at the University of Nebraska. Dr. Redding joined the faculty of the Medical University of South Carolina as Professor of Anesthesiology and Head of the Division of Respiratory – Critical Care in 1974. He remained there until his death in 1984. Dr. Redding was recognized as an expert, educator, researcher, and pioneer in Critical Care Medicine and cardiopulmonary resuscitation.

ACNO PERIOPERATIVE SERVICES ANNOUNCEMENT

ICCE & COM Leadership,

I am pleased to announce that Tim Brendle, DNP, RN, CNOR, NE-BC has accepted the dual role as the Associate Chief Nursing Officer for Perioperative and Procedural Services and Clinical Director, Main Unit Operating Room. Tim joined MUSC in 1995 and has brought huge levels of innovation to Perioperative Services and has been a valued member of the leadership team. Tim has been highly influential in the expansion of clinical services and has continued to show an exemplary commitment to his role as an innovator and a nursing leader.

His doctorate is in nursing practice, advanced leadership in nursing healthcare with a focus on healthcare disparities of the LGBTQQ population. Tim has published several articles in peer-reviewed journals and serves as a peer-reviewer for the Association of Operating Room Nurses (AORN). He serves as an item-pool test reviewer for the national perioperative certification exam; Certified Nurse Operating Room (CNOR). Additionally, Tim is a SC Palmetto Gold recipient. Tim follows the servant leadership philosophy and brings an inclusive, collaborative approach to patient-centric care and has a history of leading Tier I nursing teams.

Tim's success has been instrumental to Perioperative Services, and I hope you will all join me in congratulating Tim on his outstanding performance and wish him the best in his new position.

Best Regards,

J. Michael Denham

Chief Perioperative Officer, MUSC Health

DR. DAVE WARTERS HAS ACCEPTED A NEW POSITION



After more than ten years as Director of Anesthesia at the Ralph H. Johnson VA Medical Center and on the faculty of the MUSC Department of Anesthesia and Perioperative Medicine, Dr. Dave Warters has accepted the Chair of the Department of Anesthesia and Pain Medicine at Maine Medical Center. Maine Medical is a 650 bed tertiary care hospital and level one trauma center located in Portland, Maine. The Department of Anesthesia and Pain Medicine has the only anesthesia residency program in Maine. Dr. Warters will be leaving the department in mid-June and starting his new position in July. We wish Dave the best in his new role as Chair; he will be greatly missed by everyone in the department.

ANESTHESIOLOGY HISTORY

THE ROLE OF EPINEPHRINE IN CARDIAC RESUSCITATION

JOHN W. PEARSON, B.M.
JOSEPH S. REDDING, M.D.
Baltimore, Maryland*

"Of those who recover from a state approaching to dissolution a greater number will owe their recovery to unassisted nature, than to the most judicious treatment. But let us not on this account undervalue the knowledge which physiological investigations throw on this interesting subject."

Sir Benjamin Brodie, 1846

SINCE 1960, closed-chest cardiac massage has been accepted as an effective means of treating cardiac arrest. It would now seem appropriate to re-evaluate some of the other measures which might be used with this technic. Much of our knowledge of closed-chest cardiac massage is based on clinical reports, although it is well known that this is a poor basis for the evaluation of any resuscitation method. However, we know experimentally that the combination of closed-chest cardiac massage and intermittent positive pressure ventilation will reoxygenate arterial blood even when profound asphyxia is present.¹ At the same time, this artificial circulation is only about 10 to 20 per cent of normal.²

It seems reasonable, therefore, to suppose that in cardiac arrest, spontaneous circulation should be restored as soon as possible.

One of the measures advocated to restore spontaneous circulation in cardiac arrest is the injection of epinephrine. The use of epinephrine in the treatment of cardiac arrest dates from 1896, a year after the excellent original description of the effects of suprarenal extract by Oliver and Schäfer.³ In 1896, Gottlieb⁴ showed that the infusion of a solution of suprarenal extract would restore circulation when the blood pressure had been lowered to unrecordable levels by chloral hydrate. Since this time, there have been both fervid advocates of epinephrine and equally fervid opponents.

In the last 15 years or so, there have been many suggestions that epinephrine has some use in the treatment of both asystole⁵⁻¹³ and ventricular fibrillation.^{13, 14} However, these suggestions are far from being enthusiastic testimonials; furthermore, the doses vary widely. Beecher and Linton⁵ warn

*Department of Anesthesiology, Baltimore City Hospitals, Baltimore, Maryland.

This investigation was supported by Research Grant H-5439 from the National Heart Institute, Public Health Service.

Read at the 37th Congress of the International Anesthesia Research Society, March 24-28, 1963, Bal Harbour, Florida.

ANESTHESIOLOGY HISTORY CONTINUED...

600 ANESTHESIA and ANALGESIA . . . *Current Researches* VOL. 42, No. 5, SEPT.-OCT., 1963

against the use of doses of more than 0.2 to 0.3 mg. of epinephrine for fear of causing ventricular fibrillation. Others recommend its use only when given simultaneously with procaine.^{6, 7} Martin¹¹ recommends 1 ml. of 1:10,000 epinephrine as a last resort. McCarthy¹⁰ recommends 5 ml. of 1:1000 solution, perhaps a printing error.

Milstein and Brock¹⁴ and Jude and associates¹³ are the only workers to suggest the use of epinephrine before defibrillation. Several authors suggest use of this drug after defibrillation if asystole persists.¹⁶⁻¹⁸ Yet Martin¹¹ is among those who make no mention of the use of epinephrine in ventricular fibrillation either before or after defibrillation. Palomera⁹ explicitly states that epinephrine should not be used at all in cases of ventricular fibrillation. Wood¹⁸ is doubtful of the wisdom of using epinephrine following cardiac massage after standstill, and states that, in the treatment of ventricular fibrillation, this drug "would appear to be contraindicated because of its known propensity to increase cardiac excitability." The indications for the use of epinephrine, then, are not well established. It is clear that further study is needed.

We devised some experiments in order to define the role of epinephrine in

the treatment of both asystole and ventricular fibrillation. Since asphyxia usually plays an important role in the causation of cardiac arrest, we produced circulatory arrest in dogs by acute obstructive asphyxia.

METHODS

Eighty healthy mongrel dogs were anesthetized with intravenous pentobarbital sodium (25 mg. per kilogram). An endotracheal tube was inserted in each animal and the cuff was inflated. Aortic pressure and electrocardiogram were recorded continuously in all animals. Each animal was secured supine on a board. While the animal was breathing room air spontaneously, the endotracheal tube was occluded at the end of an exhalation. At first, there were increasing efforts to breathe, accompanied by great fluctuations in aortic pressure. Between 2 and 4 minutes after airway obstruction, each animal became apneic. Circulation then gradually deteriorated, with the development of hypotension and bradycardia. From 6 to 8 minutes after airway obstruction, aortic systolic blood pressure fluctuations stopped in each animal. Cessation of circulation at this point was confirmed in other experiments by the absence of measurable myocardial contractile force and by cessation of carotid artery blood flow.

About the Authors

★ JOHN W. PEARSON, B.M., B.Ch. is Assistant Anesthesiologist-in-Chief at the Baltimore City Hospitals, Baltimore, Maryland, and Instructor in Anesthesiology at The Johns Hopkins University and the University of Maryland. A native of Ireland, Dr. Pearson graduated from the University of Oxford (England) with the Bachelor of Medicine and Bachelor of Surgery (B.M., B.Ch.) degrees in 1953.



Dr. Pearson

★ JOSEPH STAFFORD REDDING, M.D. is Anesthesiologist-in-Chief at the Baltimore City Hospitals, Baltimore, Maryland, and Associate Professor of Anesthesiology at the University of Maryland and The Johns Hopkins University. He received his M.D. degree from the University of Maryland. Dr. Redding is a Diplomate of the American Board of Anesthesiology and a Fellow of the American College of Anesthesiologists.

ANESTHESIOLOGY HISTORY CONTINUED...

Epinephrine in Cardiac Resuscitation . . . Pearson and Redding

601

Table 1
EPINEPHRINE IN RESTORATION OF CIRCULATION
WITH ASYSTOLE AND ASPHYXIA

| Group | Resuscitation started | Technic of resuscitation | Spontaneous ventricular fibrillation | Restoration of spontaneous circulation |
|-------|-------------------------------------|--|--------------------------------------|--|
| 1 | B.P. fallen to 25 mm. of mercury | IPPB/air | 0/10 | 1/10 |
| 2 | B.P. fallen to 25 mm. of mercury | IPPB/air Epinephrine | 0/10 | 4/10 |
| 3 | 1 minute after circulatory arrest | IPPB/air CCCM | 0/10 | 2/10 |
| 4 | 5 minutes after circulatory arrest | IPPB/air, CCCM Epinephrine EED when needed | 2/10 | 10/10 |
| 5 | 10 minutes after circulatory arrest | IPPB/air, CCCM Epinephrine EED when needed | 5/10 | 9/10 |

B.P.: Aortic systolic blood pressure.

IPPB/air: Intermittent positive-pressure breathing with air.

Epinephrine: 1 ml. of 1:1000 solution injected into a ventricular cavity.

CCCM: Closed-chest cardiac massage.

EED: External electrical defibrillation.

Table 2
EPINEPHRINE IN RESTORATION OF CIRCULATION
WITH VENTRICULAR FIBRILLATION AND ASPHYXIA

| Group | Resuscitation started | Technic of resuscitation | Failure of defibrillation | Restoration of spontaneous circulation |
|-------|--|--|---------------------------|--|
| 6 | 1 minute after circulatory arrest and ventricular fibrillation | IPPB/air, CCCM EED | 0/10 | 1/10 |
| 7 | 1 minute after circulatory arrest and ventricular fibrillation | IPPB/air, CCCM Epinephrine EED | 1/10 | 9/10 |
| 8 | 1 minute after circulatory arrest and ventricular fibrillation | IPPB/air, CCCM Procaine Epinephrine, EED | 1/10 | 8/10 |

IPPB/air: Intermittent positive-pressure breathing with air.

Epinephrine: 1 ml. of 1:1000 solution injected into a ventricular cavity.

CCCM: Closed-chest cardiac massage.

EED: External electrical defibrillation.

Procaine: Procaine amide, 100 mg. injected into a ventricular cavity.

Dogs were divided into 8 groups of 10 dogs each (tables 1 and 2). In group 1, intermittent positive pressure ventilation with room air (25 ml. per kilogram of body weight at a rate of 20 breaths per minute) was begun when the aortic systolic pressure fell to 25 mm. of mercury. In group 2, ventilation was begun at a systolic pressure of 25 mm. of mercury and 1 ml. of epinephrine 1:1000 was injected into one of the ventricles of the heart as ventilation was begun. Since the chest was intact, in-

jection may have been into either cardiac ventricle. In group 3, ventilation of the lungs and closed-chest cardiac massage were started 1 minute after total circulatory arrest. The sternum was compressed toward the vertebral column 5 times during each exhalation phase of the artificial respiration. The chest was compressed firmly enough to produce a systolic pressure of between 50 and 100 mm. of mercury. In group 4, these 2 resuscitative maneuvers were started after 5 minutes of total circula-

ANESTHESIOLOGY HISTORY CONTINUED...

602 ANESTHESIA and ANALGESIA . . . *Current Researches* VOL. 42, No. 5, SEPT.-OCT., 1963

tory arrest, and 1 minute later, 1 ml. of epinephrine 1:1000 was injected into a ventricular chamber. In group 5, ventilation of the lungs and closed-chest cardiac massage were started after 10 minutes of complete circulatory arrest, and 1 minute later the same dose of epinephrine was injected into a ventricular cavity.

In groups 6, 7, and 8, the dogs received a 110-volt A.C. shock to the chest wall at the time of circulatory arrest, producing ventricular fibrillation instantaneously. One minute later, ventilation and closed-chest cardiac massage were started. In group 7, 1 ml. of 1:1000 epinephrine was injected into a ventricle 1 minute after resuscitation was started. In group 8, 100 mg. of procaine amide was injected into a ventricle immediately before the start of closed-chest cardiac massage, and epinephrine was injected 1 minute later, as in the dogs of group 7. Each of these 30 dogs received one or more 480-volt A.C. shocks ($\frac{1}{4}$ second duration) to the chest wall 3 minutes after resuscitation was started.

In each of the 80 dogs, ventilation of the lungs was continued for a period of 20 minutes, and closed-chest cardiac massage was continued for the same period unless an adequate spontaneous blood pressure was restored earlier.

RESULTS

The results are summarized in tables 1 and 2. In the dogs in group 1, when ventilation was started at a blood pressure of 25 mm. of mercury, a spontaneous circulation returned in only 1 animal. In the other 9 dogs, the blood pressure continued to decline and the animals died. When epinephrine was combined with ventilation of the lungs (group 2) a spontaneous circulation returned in 4 animals, and these recovered after a short period of hypertension. All of these dogs seemed normal the next day. The other 6 animals of group 2 died. In none of the dogs of groups 1 and 2 was closed-chest cardiac massage performed.

In group 3, when ventilation and cardiac massage were started after 1 minute of circulatory arrest, a spontaneous circulation was restored in 2 of 10 dogs within a 20-minute period; both these animals appeared normal the next day. When resuscitation was started 5 minutes after circulatory arrest and epi-

nephrine injected 1 minute later (group 4), a spontaneous circulation returned in all cases. Half of the dogs in group 4 appeared normal the next day; half showed signs of brain damage. In group 5, when resuscitation was started 10 minutes after circulatory arrest, a spontaneous circulation was restored in 9 of 10 animals. All of these dogs suffered severe brain damage.

The frequency of ventricular fibrillation following injection of epinephrine is shown in table 1. This occurred only in dogs which received epinephrine and when resuscitation was started at least 5 minutes after cardiac arrest. In 6 of the 7 dogs in which fibrillation occurred (groups 4 and 5), survival followed external electrical defibrillation.

The 30 dogs of groups 6, 7, and 8 received a 110-volt A.C. shock to the chest wall at the time of circulatory arrest and ventricular fibrillation occurred immediately. The 480-volt shocks given after 3 minutes of resuscitation caused defibrillation in 28 of 30 dogs in these 3 groups. In only 1 dog of group 6, however, did a spontaneous circulation return, when epinephrine was not used, in spite of 20 minutes of closed-chest cardiac massage. Nine of the 10 dogs in group 7, which received epinephrine, survived. In group 8, when procaine amide was given as well as epinephrine, a spontaneous circulation was restored in 8 of 10 animals. In 1 dog in each of groups 7 and 8, repeated 480-volt shocks failed to abolish the ventricular fibrillation. Long-term survival was not studied.

DISCUSSION

Clinically, cardiac arrest most often occurs in association with, if not because of, asphyxia. Unconsciousness from any cause can lead to airway obstruction, and this, when uncorrected, will lead to respiratory failure and ultimately to circulatory collapse. Correction of myocardial hypoxia is the first consideration in resuscitation. We produced circulatory arrest by acute obstructive asphyxia to approximate clinical experience.

These experiments would indicate that the use of epinephrine is of distinct benefit in the treatment of both asystole and ventricular fibrillation. At the same time, there are complications associated with its use; for example, the initiation of ventricular fibrillation. There may

ANESTHESIOLOGY HISTORY CONTINUED...

Epinephrine in Cardiac Resuscitation . . . Pearson and Redding

603

be the complications of any intracardiac injection, principally puncture of the lung leading to pneumothorax. The possibility of pneumothorax must be borne in mind, in fact, not only in all cases where an intracardiac injection was made, but also whenever closed-chest massage was performed.

It is probably the fear that the use of epinephrine will convert asystole to ventricular fibrillation which deters many people from using it. We were able to defibrillate almost all animals, 6 of the 7 in groups 4 and 5. However, a defibrillator may not be available in all hospitals. In our experiments, the occurrence of fibrillation following epinephrine was more frequent the longer the delay before resuscitation, and it was in just those groups that epinephrine was most needed. For example, in group 4, one would have had 8 survivors if a defibrillator had not been used. This compares favorably with 2 survivors in group 3 where the duration of circulatory arrest was much shorter.

In groups 1 and 2, a pulse was no longer palpable. Here epinephrine was of only limited benefit. What was needed here was closed-chest cardiac massage.

The Need of Cardiac Massage — It would appear, then, that cardiac massage should be started as soon as the pulse cannot be felt. There should be no delay whatever. In clinical practice, cardiac arrest must be held to have occurred whenever a pulse cannot be felt in a major artery, for example, femoral or carotid. This would correspond to a systolic pressure of about 50 mm. of mercury. It seems reasonable to try the effect of artificial respiration and artificial circulation for about 1 or 2 minutes at the most. If there is still no spontaneous pulse, epinephrine should be used immediately.

Considering that resuscitation is often attempted outside the operating room, many patients do not have a needle in a vein at the moment of death. In most cases, attempts at intravenous medication may result in a considerable loss of time. Intracardiac injection can be performed immediately. For this reason we used intracardiac injections in these experiments, and do so in clinical situations whenever intravenous injection will cause delay. From other experiments we are aware that the same

dose of epinephrine given intravenously is effective. Failure to follow an intracardiac (or intravenous) injection by cardiac massage probably accounts for many of the failures, and much of the dissatisfaction, with this treatment in the past. With circulatory arrest we have never seen any good result solely from needling the heart or from injection of any drug either into the myocardium or into a heart chamber. Cardiac massage must follow the injection of any drug.

Since the probability of restoring a spontaneous circulation decreases with time after circulatory arrest, and the likelihood of brain damage increases, the injection of epinephrine should not await an electrocardiogram. An electrocardiogram is of no use for diagnosing death; electrical activity may persist for a long time after circulatory arrest. Likewise, an electrocardiogram gives no clear indication of the impending success of resuscitation. Its value is that, with it, one can distinguish between asystole and ventricular fibrillation.

The results of resuscitation in groups 6 and 7 indicate that epinephrine is as necessary in cases of ventricular fibrillation as in cases without it. In fact, the sole difference between the treatment of asystole and ventricular fibrillation lies in the need for an electrical defibrillator in the latter situation.

Use of Procaine Amide — Some physicians have recommended the use of procaine amide in the treatment of ventricular fibrillation. We have clinically resisted this suggestion in view of the depressant action of procaine compounds on the strength of myocardial contraction. Since, as can be seen from table 2, we had no difficulty with defibrillation in groups 6 and 7, we felt that we would be unable to show any benefit from procaine alone. For this reason in the dogs in group 8 we injected 100 mg. of procaine amide immediately prior to the start of resuscitation, followed by 1 mg. of epinephrine 1 minute later. It will be seen that the use of procaine did not produce any significant worsening of results. One may add that defibrillation was no easier with procaine (group 8) than when epinephrine was used alone (group 7), or even no drug at all (group 6). From our experiments, we have neither demonstrated the need for procaine nor a contraindication to its use.

ANESTHESIOLOGY HISTORY CONTINUED...

604 ANESTHESIA and ANALGESIA . . . *Current Researches* VOL. 42, No. 5, SEPT.-OCT., 1963

In the dogs of groups 6, 7, and 8, we did not see any instance of spontaneous defibrillation. It follows, then, that in any hospital where closed-chest cardiac massage will be done, an external defibrillator should be available.

The Role of Epinephrine — The role of epinephrine in ventricular fibrillation is essentially the same as in asystole. It is of interest to speculate as to whether the beneficial action of epinephrine is on the myocardium, or on the peripheral vascular system, or at some other site or combination of sites of action. In view of the potential of epinephrine for causing ventricular fibrillation, we performed some experiments using phenylephrine¹⁹ instead of epinephrine. We found that this drug, with no direct action on the heart, was as effective as epinephrine under the circumstances of the tests. We deduce from this that the peripheral, generally vasoconstrictor, action of epinephrine was of prime importance. During the performance of closed-chest cardiac massage with asystole, we observed that when epinephrine raised the artificial diastolic pressure to about 50 mm. of mercury, the heart started beating effectively. This can be seen in figure 1. If we were able, with epinephrine, to

produce a diastolic pressure of about 50 mm. of mercury and then achieve defibrillation, a spontaneous circulation likewise returned (fig. 2). Epinephrine, then, plays the same role in ventricular fibrillation as in asystole. We saw no evidence that epinephrine made defibrillation easier.

We realize that the dose of epinephrine may seem a large one. Inspection of past literature indicates a failure of agreement among our predecessors. We have found 1 ml. of 1:1000 epinephrine satisfactory in clinical situations. Some adult patients appeared to need more than 1 dose before the desired response was obtained. We have used this dose with benefit in children down to 18 months of age. In infants, smaller doses were used.

Our Anesthesiology Department is very active in resuscitation in the Accident Room and on the wards of Baltimore City Hospitals. We have repeatedly seen clinical evidence of the applicability to human resuscitation of the principles demonstrated by these experiments.

SUMMARY

Circulatory arrest was produced in anesthetized dogs by acute obstructive

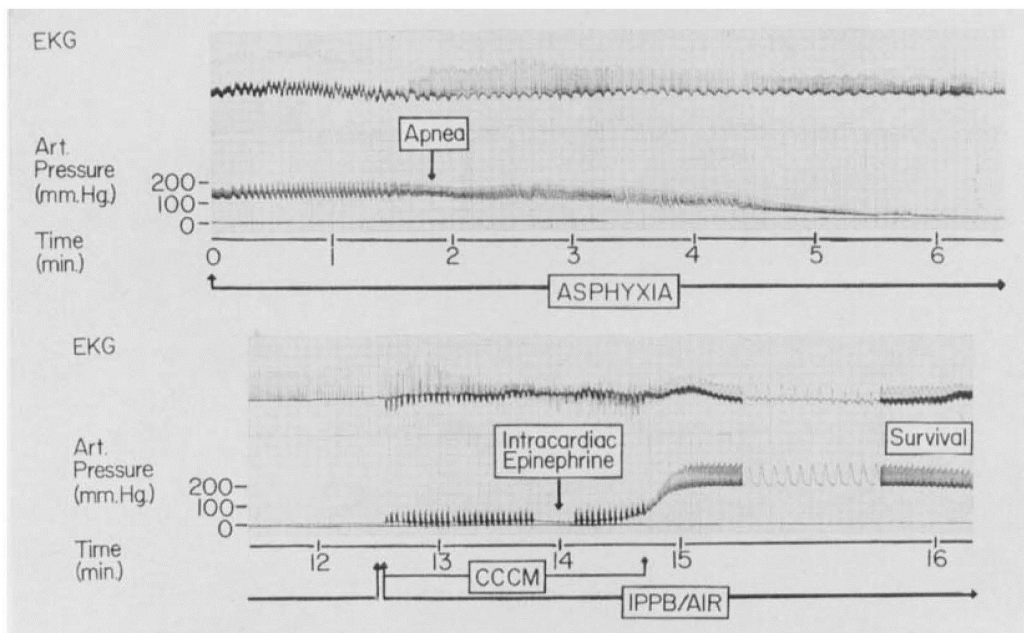


FIG. 1. Resuscitation from circulatory arrest following acute obstructive asphyxia. Closed-chest cardiac massage (CCCM) and ventilation with room air (IPPB/air) started 5 minutes after circulatory arrest. Intracardiac epinephrine (1 ml. of 1:1000 solution) 1 minute later.

ANESTHESIOLOGY HISTORY CONTINUED...

Epinephrine in Cardiac Resuscitation . . . Pearson and Redding

605

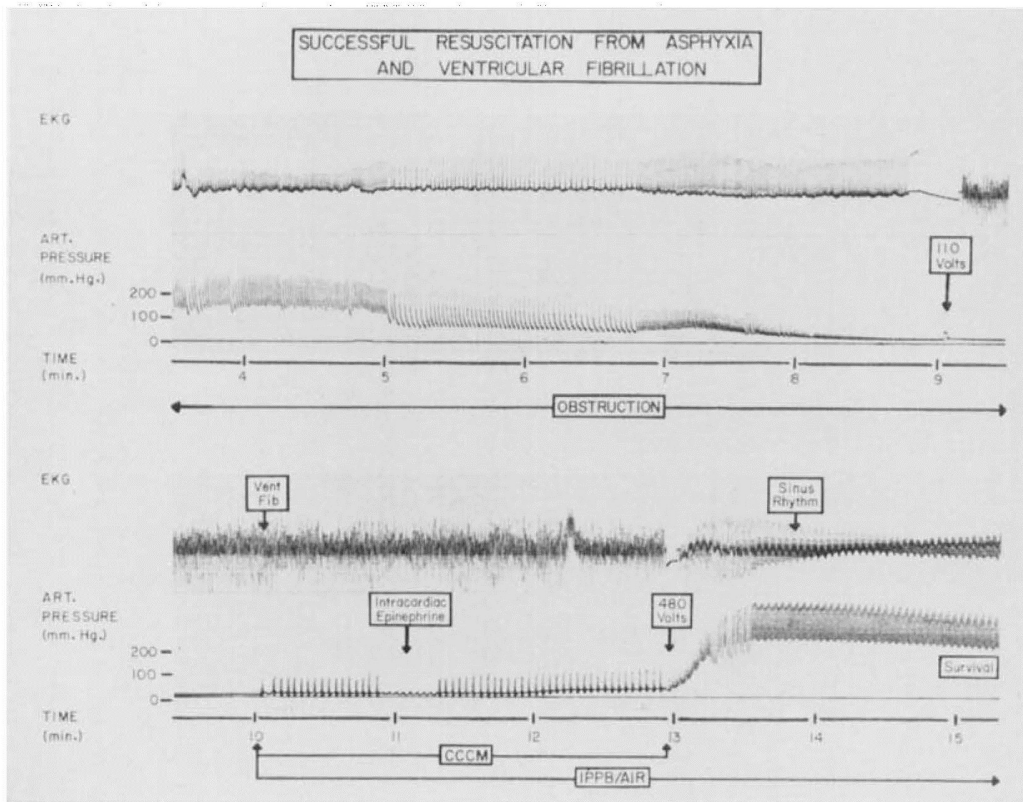


FIG. 2. Resuscitation from circulatory arrest with ventricular fibrillation following acute obstructive asphyxia. Ventricular fibrillation induced with 110-volt A.C. shock at moment of circulatory arrest. Closed-chest cardiac massage (CCCM) and ventilation with room air (IPPB/air) started 1 minute later. Intracardiac epinephrine (1 ml. of 1:1000 solution) given after 1 minute of resuscitation. Defibrillating shocks of 480 volts A.C. given after 3 minutes of resuscitation.

asphyxia. In some animals, ventricular fibrillation was induced.

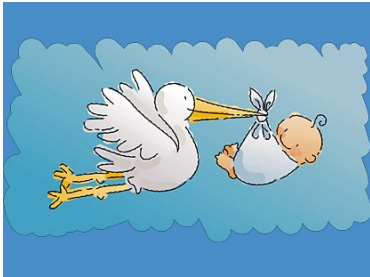
Intracardiac epinephrine was found to be a valuable adjunct to ventilation of the lungs, closed-chest cardiac massage, and, where necessary, external electrical defibrillation in resuscitation from either asystole or ventricular fibrillation.

Similar methods were used in clinical resuscitation. The implications are discussed.

REFERENCES

1. Redding, J. S. and Pearson, J. W.: Resuscitation from Asphyxia. *J.A.M.A.* 182:283 (October 20) 1962.
2. Redding, J. S. and Cozine, R. A.: A Comparison of Open-Chest and Closed-Chest Cardiac Massage in Dogs. *Anesthesiology* 22:280 (March-April) 1961.
3. Oliver, G. and Schäfer, E. A.: The Physiological Effects of Extracts of the Suprarenal Capsules. *J. Physiol.* 18:230 (February) 1895.
4. Gottlieb, R.: Ueber die Wirkung der Nebennierenextracte auf Herz und Blutdruck. *Arch. f. Exper. Path. u. Pharm.* 38:99 (October 22) 1896.
5. Beecher, H. K. and Linton, R. L.: Epinephrine in Cardiac Resuscitation. *J.A.M.A.* 135:30 (September 13) 1947.
6. Lahey, F. H. and Ruzicka, E. R.: Experiences with Cardiac Arrest. *Surg. Gynec. Obstet.* 90:108 (January) 1950.
7. Anderson, R. M., Schock, W. G. and Faxon, H. H.: Cardiac Arrest. *New Engl. J. Med.* 243:905 (December) 1950.
8. Kay, J. H.: The Treatment of Cardiac Arrest. *Surg. Gynec. Obstet.* 93:682 (December) 1951.
9. Palomera, E. S.: Cardiac Resuscitation. *Int. Abstr. Surg.* 95:313 (October) 1952.
10. McCarthy, K. C.: The Problem of Cardiac Arrest. *J.A.M.A.* 168:2101 (December 20) 1958.
11. Martin, S. J.: Considerations of the Etiology and Treatment of Sudden Cardiac Collapse. *Anesth. & Analg.* 39:23 (January-February) 1960.
12. Milstein, B. B.: Cardiac Resuscitation. *Brit. J. Anaesth.* 33:498 (October) 1961.

NEW BABIES IN THE DEPARTMENT



Brandon Nevills and family welcomed Julian Malachi Nevills, born on February 3, 2017, weighing in at 5 pounds, 9 oz. and 18.5 inches long.



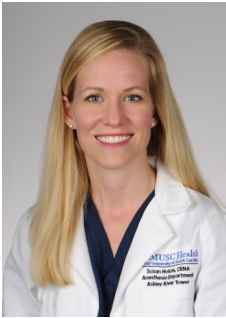
Adrienne West and family welcomed Eve "Evie" Marie Todoran on January 15, 2017, weighing in at 7 pounds, 7 oz. and 19 inches long.



Lawton Hirsch and family welcomed Robert "Rigby" Hirsch. He arrived on February 9, 2017, weighing in at 7 pounds, 5oz. and 19.5 inches long.



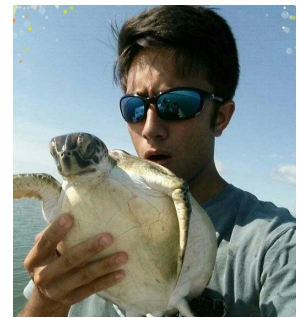
WELCOME NEW CRNA TO ART



Susan Holum joined the ART staff in late October, 2016. Susan went to Auburn University for undergraduate training and is a 2010 graduate of MUSC's Nurse Anesthesia program. Susan and her husband live on James Island and are the proud parents of two towheaded children. She enjoys traveling, reading, going to the beach, spending time with her family, and sweets of all kinds. Susan previously worked as a CRNA at East Cooper Medical Center in Mount Pleasant for six years and is very excited to join the MUSC family.

WELCOME NEW ANESTHESIA TECH TO MAIN HOSPITAL

Ben Miranda is one of our newest anesthesia technicians at Main Hospital. Ben is originally from Cleveland, Ohio and moved to Charleston during high school. Ben received his degree in Biological Sciences from Clemson University in 2016. Along with being an avid sports fan, in his spare time Ben enjoys fishing and exploring new places outside with his Chocolate Lab, Kita. Ben is excited and eager to gain experience in the Anesthesia Department before continuing his education in the medical field.



WELCOME NEW CRNA TO MAIN HOSPITAL



Emily Burton is so happy to be back at MUSC! She completed her BSN and anesthesia training at MUSC, worked as an RN in MUSC's PCICU for five years, and is enjoying being back with some familiar faces. Emily and her husband, Josh, live on Johns Island with their dog, Skylar. They love any and all things involving the Charleston waterways, the beach, all of Charleston's great restaurants, and being with friends. Emily is excited to see some of the really big cases here and enjoys having a sense of fulfillment in making a positive impact on people's lives when they need it the most. She's truly honored to be part of such a great team!

WELCOME NEW ANESTHESIA TECH TO MAIN HOSPITAL

Israel "Izzy" James is the newest addition to our anesthesia tech team. Born and raised in Charleston on James Island, she was always outside on Folly Beach or fishing with her dad. She received a bachelor's degree in Computer Science from The College of Charleston, but soon decided she wanted to be in healthcare. Going back for her BSN, she found herself at MUSC working as a PCT on 4E, CT Surgery, where she knew she wanted to be closer to the surgery setting. When Izzy is not at work, she enjoys being with her family, traveling with her boyfriend, and playing with her Irishdoodle, Finn.

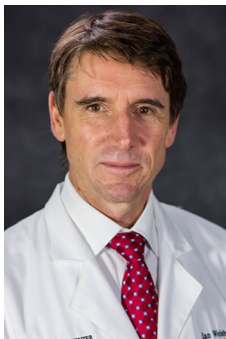


GRAND ROUNDS FOR THE MONTH OF MARCH



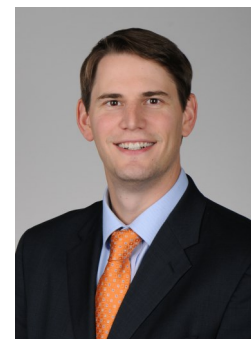
**“Morbidity & Mortality Conference (CT Cases)”
March 7, 2017
Jake Abernathy, M.D., Professor
Dept. of Anesthesia & Perioperative Medicine
Medical University of South Carolina**

**“The Use of NIRS in Cardiac Surgery: Pros & Cons”
March 14, 2017
George Guldán, M.D., Assistant Professor
Jake Abernathy, M.D., Professor
Dept. of Anesthesia & Perioperative Medicine
Medical University of South Carolina**



**“Novel Anticoagulation Reversals—Current & Future”
March 21, 2017
Ian Welsby, M.D., Associate Professor
Dept. of Anesthesiology
Duke University School of Medicine**

**“AV Assessment, Controversies & Ongoing Research”
March 28, 2017
George Whitener, M.D., Assistant Professor
Dept. of Anesthesia & Perioperative Medicine
Medical University of South Carolina**





DEPARTMENT OF ANESTHESIA AND
PERIOPERATIVE MEDICINE

Email: fisherja@musc.edu
Phone: 843-792-7503
Fax: 843-792-9314

CHECK OUT OUR WEBSITE AT:
[HTTP://WWW.MUSC.EDU/ANESTHESIA](http://www.musc.edu/anesthesia)

Future Events/Lectures

Intern Lecture Series

March 9th—Fluids, Electrolytes, Acid/Base,
Dr. Walton, SEI 314

March 23rd—Anesthesia for Pediatrics,
Dr. Sabbagh, SEI 314

CA 1 Lecture Series

March 1st—Pediatric Anesthesia,
Dr. Hassid, CSB 429

March 22nd—Obstetric Anesthesia PBL,
Dr. Tobin, CSB 429

March 29th—Anesthesia for Cardiovascular
Surgery, Dr. G. Whitener, CSB 429

CA 2/3 Lecture Series

March 6th—Pericardial Diseases & Cardiac
Trauma PBLD, Dr. Heinke, Moodle

March 13th—Heart Failure & Cardiomyopathy
PBLD, Dr. Abernathy, CSB 429

March 20th—Visiting Professor Lecture, All
Residents, Dr. Welsby (Duke), CSB 429

March 27th—Anesthesia for Heart & Lung
Transplantation, Dr. Heinke, Moodle

Grand Rounds

March 7th—Morbidity & Mortality Conference
(CT Cases), Dr. Abernathy

March 14th—The Use of NIRS in Cardiac
Surgery: Pros & Cons, Drs. Guldan & Abernathy

March 21st—Novel Anticoagulation Reversals—
Current & Future, Dr. Welsby (Duke)

March 28th—AV Assessment, Controversies &
Ongoing Research, Dr. G. Whitener



I HUNG THE MOON

Please don't forget to nominate your co-workers for going 'Beyond the Call of Duty.' I Hung The Moon slips are available at the 3rd floor front desk and may be turned in to Kim Pompey. Thank you!

Alexis Davis, Anesthesia Tech—For scrubbing in on additional procedures to cover absences. Thank you so much for being positive and always having a smile to offer!

Lisa Crusenberry, Anesthesia Tech—Being a huge help during a code and always willing to help when needed. Great teamwork and very knowledgeable!

Katie Smith, Anesthesia Tech—For working with Main when we were short staffed and helping during a code. Thanks for all your help and being so flexible. You rock!

Treffle Beaupre, Anesthesia Tech—For taking a last minute call shift at ART! Much appreciated!

Lucy Cofran, Anesthesia Tech—Being recognized by many providers on the Tech-Interdepartmental Survey! Great job!

Ben Syracuse, Anesthesia Tech—Being recognized by several providers on the Tech-Interdepartmental Survey! Thank you for all your hard work!

Ben Miranda, Anesthesia Tech—Coming in early when short staffed. He's a quick learner and is going to make a great addition to the team!

Geoff Brown, Anesthesia Tech—Being recognized by several providers on the Tech Survey. Great job!

Save the Date!



Resident Graduation 2017
Friday, June 23, 2017
Founders Hall

Holiday Party 2017
Friday, December 1, 2017
Carolina Yacht Club



[Imagine 2020 Strategic Plan](#)

We Would Love to Hear From You!

If you have ideas or would like to contribute to *Sleepy Times*, the deadline for the April edition will be March 17, 2017.