Learning Objectives

2020 GSA Winter Forum

Matthew T. Popovich, PhD
ASA Director of Quality and Regulatory Affairs
Burden Reduction Myths and Opportunities: An Assessment of Recent Regulatory Actions Affecting Anesthesiologists

1. *Describe goals of federal regulatory policy on burden reduction as it relates to healthcare and patient safety*
2. *Identify three federal policy decisions related to burden reduction on the Quality Payment Program and Conditions of Physician Participation*
3. *Explain the impact standard setting organizations and medical society guidelines and standards have on facility accreditation, physician workflow, and regulatory burden*

Ellen Basile, DO
Director, Pediatric Anesthesia, Department of Anesthesiology, Augusta University, Medical College of Georgia
Second Victim

1. Define second victim
2. Describe signs and symptoms of second event with potential outcomes from an event
3. Review interventions and care options for second victims

Judith Handley, MD
Associate Professor, Department of Anesthesiology
Augusta University, Medical College of Georgia
You've Been Served: Strategies to Survive a Medical Malpractice Suit

1. Discuss recent statistical trends in medical malpractice
2. Identify the key parts of the legal process involved in a medical malpractice case
3. Discuss specific physician experiences to a medical malpractice case
4. Identify strategies to decrease stress if involved in a medical malpractice case.

Michele Au, MD
Physician Specialists in Anesthesia
Emory – St. Joseph's Hospital, Atlanta
This Won't Hurt a Bit (and other white lies): Career, Family, and Balance in Anesthesia

1. Address the stressors physicians face in timing and balancing the dual demands of clinical work and home responsibilities
2. Address the tension between the two stressors that can lead to burnout
3. Engage strategies to help other physicians better manage responsibilities, time and thought processes regarding these stressors

Dr. Francis Wolf, MD
Assistant Professor of Anesthesiology, Emory University, School of Medicine

Topic 1: Rethinking Penicillin Allergies in the Perioperative Period: An Opportunity for Stewardship

1. Describe how a penicillin allergy listing impacts surgical patients
2. Cite the basis of cefazolin's lack of cross-reactivity with other beta-lactam agents
3. Describe a focused allergy assessment to determine the history of a severe delayed reaction
4. Describe the importance of a multi-disciplinary approach in perioperative antibiotic stewardship

Topic 2: Residual Paralysis: Is Our Silent Epidemic of Weakness Finally Over?

1. Provide the definition of residual neuromuscular blockade (rNMB)
2. Cite some of the main causes of rNMB
3. Compare qualitative and quantitative nerve monitoring
4. Describe the advantages and limitations of sugammadex as a reversal agent

AGENDA

Friday, January 10

4:00 - 6:30p **Registration**
Second Floor Landing (Azalea)

4:00 - 6:30p **Exhibit Assembly**
Azalea Prefunction

4:30 - 6:30p **Board of Directors Meeting**
TBD

7:00 - 8:30p **Hospitality Suite Networking**
*see registration for location
Hors d'oeuvres and refreshments provided

8:00p **Dinner on Your Own or join Group Dinner (self pay)**

Saturday, January 11

All sessions will take place in Azalea Ballroom unless otherwise noted.

6:00a **Exhibit Assembly**
Azalea Prefunction

6:30 - 7:20a **Registration**
Second Floor Landing
Breakfast with Exhibitors
Azalea Prefunction

7:20 – 7:30a **Welcome**
Dr. Steve Sween, MD
GSA President
Introductions
Rachel Steckelberg, MD, MPH
Dr. Philip Mills, DO
Winter Forum Activity Directors

7:30 - 8:30a **This Won't Hurt a Bit (and other white lies): Career, Family, and Balance in Anesthesia**
Michelle Au, MD
Emory – St. Joseph's Hospital

8:30 - 9:30a **Second Victim**
Ellen Basile, DO
Director, Pediatric Anesthesia, MCG

9:30 - 10:00a **Break with Exhibitors**
Azalea Prefunction

9:30 - 11:00a **Resident Section Meeting**

10:00a – 11:00a ***You've Been Served: Strategies to Survive a Medical Malpractice Suit***
Judith Handley, MD
Associate Professor, MCG

11:00a – 12:00p **Burden Reduction Myths and Opportunities: An Assessment of Recent Regulatory Actions Affecting Anesthesiologists**
Matthew Popovich, PhD
ASA Director of Quality and Regulatory Affairs

12:01 – 1:00p **Lunch/Exhibitor Conversations**
GSA Semi-Annual Business Meeting
Azalea

1:00 - 2:00p **Topic 1: Rethinking Penicillin Allergies in the Perioperative Period: An Opportunity for Stewardship**
Topic 2: Residual Paralysis: Is Our Silent Epidemic of Weakness Finally Over?
Francis Wolf, MD
Emory University School of Medicine

2:00 – 2:10p **Resident Abstract Presentation**
Mayank Mehrotra MD (MCG)

2:10 – 2:20p Chocolate/Caffeine Break

2:20 -- 3:30p Healthcare Policy Panel

3:30p GSA Committee Meetings

4:30p Committee Reports – General Session

5:00 – 6:30p Adjourn/Evening Hospitality

Sunday, January 12

8:30a Continental Breakfast
9:00 – 11:00a **Advocacy Workshop**
(All are welcome to participate. There is no charge for this training. Please confirm your attendance at the registration desk on Friday or Saturday.)

Accreditation and Designation Statement

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the American Society of Anesthesiologists® and the Georgia Society of Anesthesiologists. The American Society of Anesthesiologists is accredited by the ACCME to provide continuing medical education for physicians.

The American Society of Anesthesiologists designates this live activity for a maximum of *6 AMA PRA Category 1 Credits*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Disclaimer

The information provided at this activity is for continuing education purposes only and is not meant to substitute for the independent medical judgment of a healthcare provider relative to diagnostic and treatment options of a specific patient's medical condition.

Disclosure Statement

The American Society of Anesthesiologists remains strongly committed to providing the best available evidence based clinical information to participants of this educational activity and requires an open disclosure of any potential conflict of interest identified by our faculty members. It is not the intent of the American Society of Anesthesiologists to eliminate all situations of potential conflict of interest, but rather to enable those who are working with the American Society of Anesthesiologists to recognize situations that may be subject to question by others. All disclosed conflicts of interest are reviewed by the educational activity course director/chair to ensure that such situations are properly evaluated and, if necessary, resolved. The American Society of Anesthesiologists educational standards pertaining to conflict of interest are intended to maintain the professional autonomy of the clinical experts inherent in promoting a balanced presentation of science. Through our review process, all American Society of Anesthesiologists activities are ensured of independent, objective, scientifically balanced presentations of information. Disclosure of any or no relationships will be made available for all educational activities.

No speakers and/or planning committee members have indicated that they have relevant financial relationships with commercial interests to disclose:

Commercial Support

None

Claiming Credit for this Activity

Thank you for attending the ***2020 Georgia Society of Anesthesiologists Winter Forum*** on **January 11-12, 2020**. Please follow the directions below to complete the meeting survey, claim your credits, and print your certificate. *Note that this activity may not be loaded into the system until next week.*

- Click the following link and log in using your ASA credentials: https://education.asahq.org/totara/course/view.php?id=3607
- Complete the meeting survey, claim credits, and print your certificate.

OR

- Log in to the ASA Education Center at: http://education.asahq.org/.
- Once you have logged on to the ASA Education Center homepage, click the tab that says "MY COURSES" to select the link: **2020 Georgia Society of Anesthesiologists Winter**.
- Complete the meeting survey, claim credits, and print your certificate.

NOTE: To retrieve your username and/or password, enter your email address at: https://www.asahq.org/member-center/forgot-password.

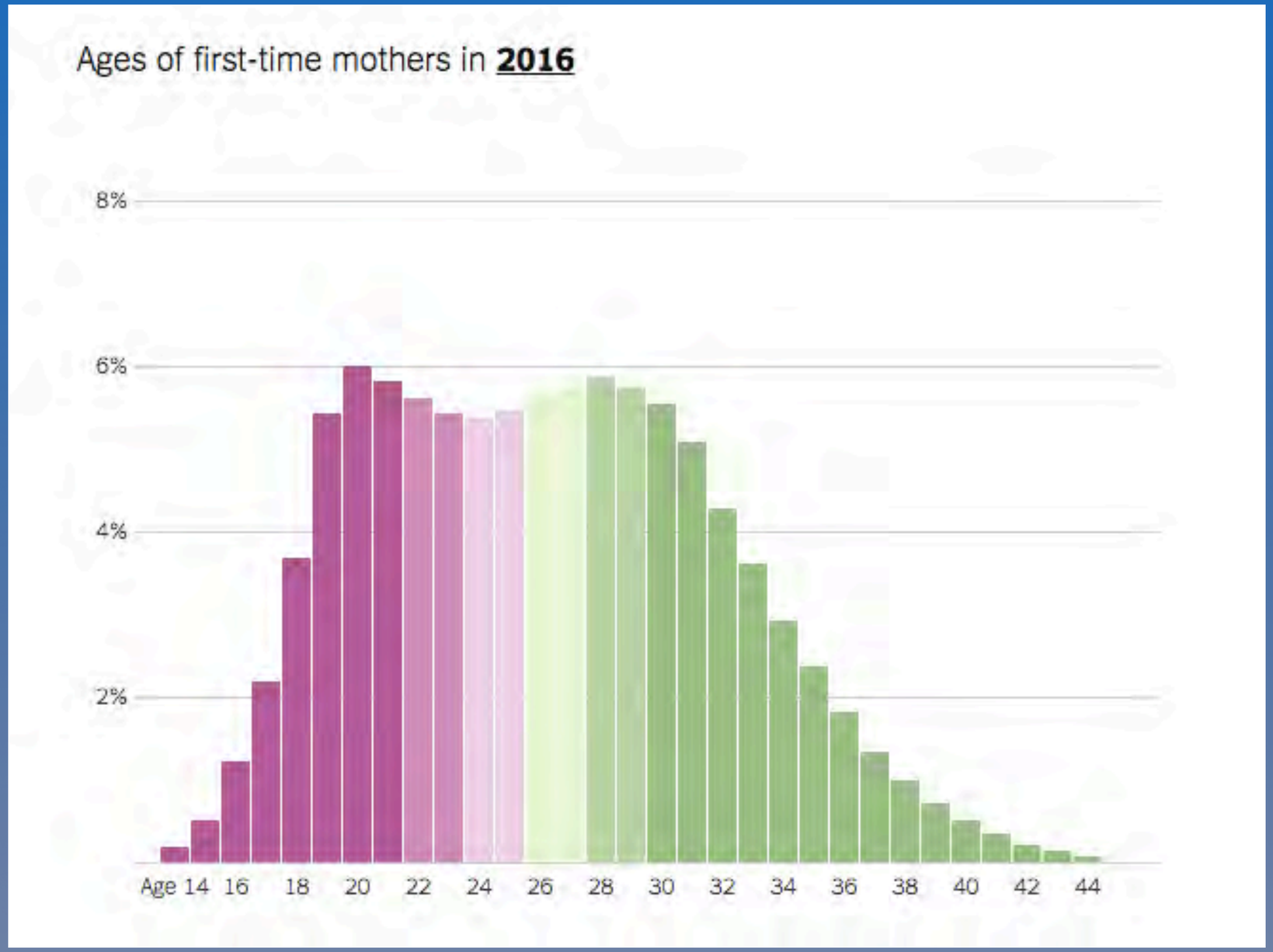
Please note: you must claim your credits for this course by November 30, 2019. You will NOT be able to claim credits after this date.

THIS WON'T HURT A BIT (AND OTHER WHITE LIES)

CAREER, FAMILY, AND BALANCED ANESTHESIA

Michelle Au, MD, MPH

PHYSICIAN SPECIALISTS IN ANESTHESIA



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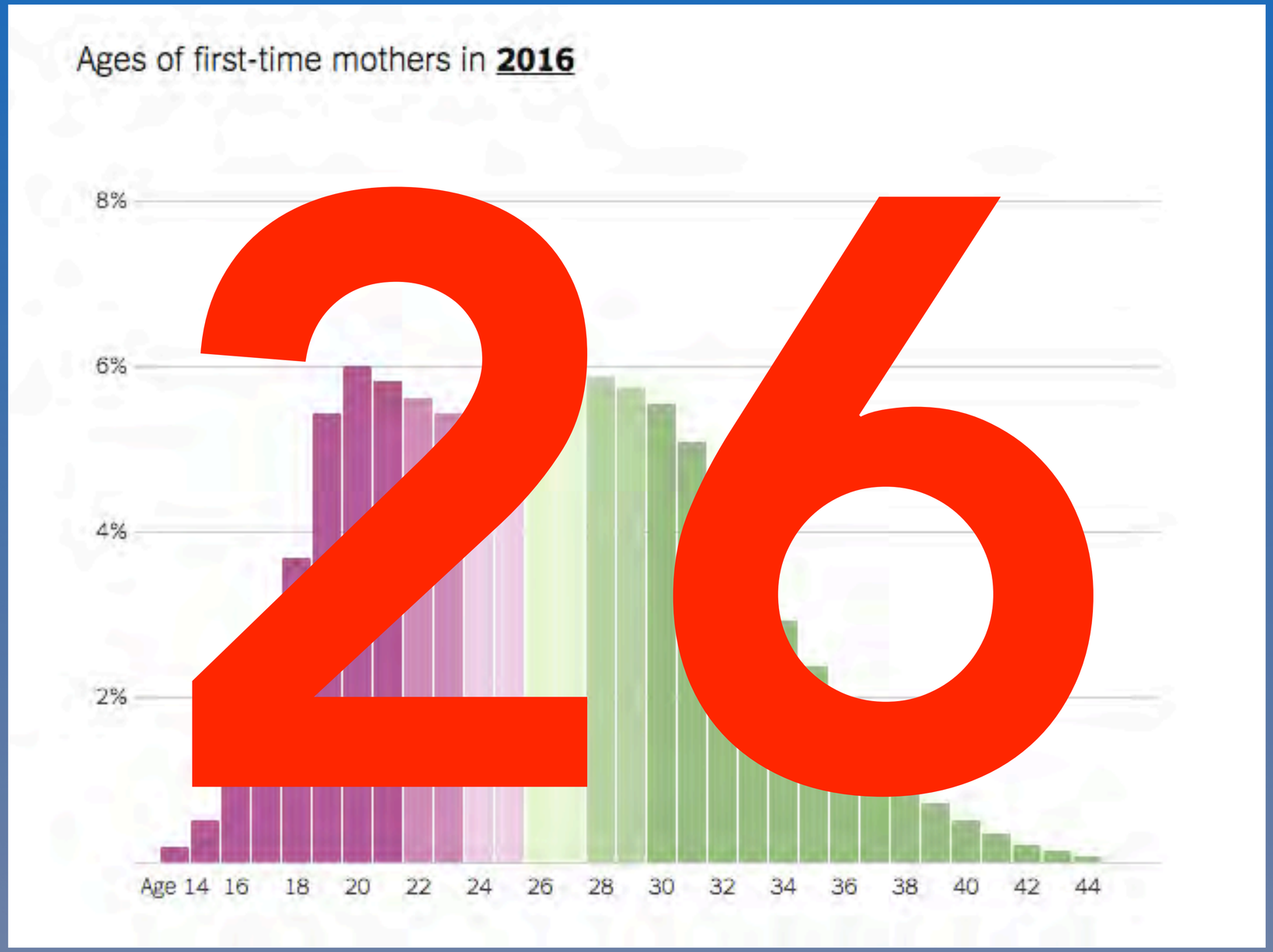

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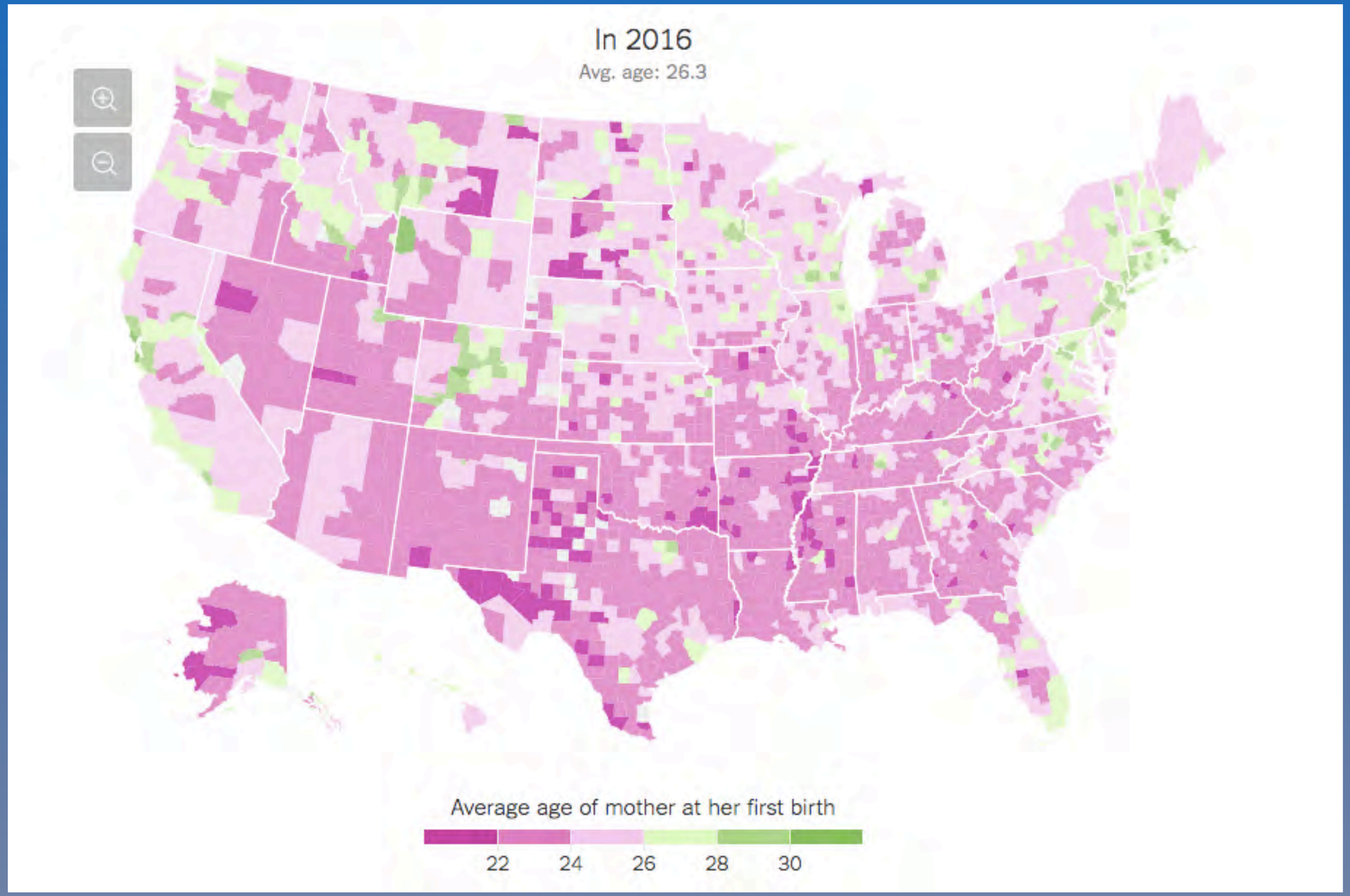

https://www.nytimes.com/interactive/2018/08/04/upshot/up-birth-age-gap.html

Table A-6: Age of Applicants to U.S. Medical Schools at Anticipated Matriculation by Sex and Race/Ethnicity, 2014-2015 through 2017-2018

The table below displays the self-identified racial and ethnic characteristics of applicants to U.S. medical schools from 2014-2015 through 2017-2018. The "Multiple Race/Ethnicity" category includes those who selected more than one race/ethnicity response. Please email datarequest@aamc.org if you need further assistance or have additional inquiries.

Mean Age of Applicants at Anticipated Matriculation		2014-2015			2015-2016			2016-2017*			2017-2018		
		Matriculated		All	Matriculated		All	Matriculated		All	Matriculated		All
		No	Yes		No	Yes		No	Yes		No	Yes	
Women	American Indian or Alaska Native	27	25	26	26	24	25	27	24	26	27	25	26
	Asian	24	23	24	24	23	24	24	23	24	24	23	24
	Black or African American	26	24	25	25	24	25	26	24	25	26	24	25
	Hispanic, Latino, or of Spanish Origin	25	24	24	25	24	24	25	24	24	25	24	24
	Native Hawaiian or Other Pacific Islander	28	25	26	26	24	25	27	24	26	25	25	25
	White	24	24	24	24	24	24	24	24	24	24	24	24
	Other	24	24	24	25	23	24	24	24	24	24	24	24
	Multiple Race/Ethnicity	25	24	24	25	24	24	25	24	24	25	24	24
	Unknown Race/Ethnicity	25	24	24	25	24	24	25	23	24	25	24	24
	Non-U.S. and Non-Permanent Resident	24	24	24	24	24	24	24	24	24	24	24	24
	Total	***25***	***24***	***24***	***25***	***24***	***24***	***25***	***24***	***24***	***25***	***24***	***24***
Men	American Indian or Alaska Native	26	26	26	27	25	26	27	25	26	25	25	25
	Asian	24	23	24	24	23	24	24	23	24	24	23	24
	Black or African American	27	24	26	27	24	26	26	24	26	26	24	26
	Hispanic, Latino, or of Spanish Origin	25	24	25	25	24	25	25	24	25	25	24	25
	Native Hawaiian or Other Pacific Islander	27	27	27	27	24	26	27	29	28	27	24	26
	White	25	24	25	25	24	25	25	24	25	25	24	25
	Other	25	24	24	25	24	25	25	24	24	25	24	24
	Multiple Race/Ethnicity	25	24	25	25	24	25	25	24	25	25	24	25
	Unknown Race/Ethnicity	25	24	25	25	24	25	26	25	26	26	24	25
	Non-U.S. and Non-Permanent Resident	24	24	24	24	24	24	24	24	24	24	24	24
	Total	***25***	***24***	***24***	***25***	***24***	***25***	***25***	***24***	***25***	***25***	***24***	***24***

https://www.aamc.org/download/321468/data/factstablea6.pdf

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		Matriculated		All	Matriculated		All	Matriculated		All	Matriculated		All
		No	Yes		No	Yes		No	Yes		No	Yes	
Women	American Indian or Alask		25	26	26				24	26	27	25	26
	Asian		23	24	24				23	24	24	23	24
	Black or African Americ		24	25	25				24	25	26	24	25
	Hispanic, Latino, or of Spanish Origin		24	24	25				24	24	25	24	24
	Native Hawaiian or Other Pacific Islander		25	26					24	26	25	25	25
	White		24	24		24			24	24	24	24	24
	Other		24	24		23			24	24	24	24	24
	Multiple Race/Ethnicity	25	24	24		24			24	24	25	24	24
	Unknown Race/Ethnicity	25	24			24			23	24	25	24	24
	Non-U.S. and Non-Permanent Reside	24	24		24				24	24	24	24	24
	Total	***25***	***24***							***24***	***25***	***24***	***24***
Men	American Indian or Alaska	26	26							26	25	25	25
	Asian	24	23	24	24	23			23	24	24	23	24
	Black or African Ameri		24	26	27	24			24	26	26	24	26
	Hispanic, Latino, or of		24	25	25	24			24	25	25	24	25
	Native Hawaiian or Ot		27	27	27	24			29	28	27	24	26
	White	25	24	25	25	24	25	25	24	25	25	24	25
	Other	25	24	24	25	24	25	25	24	24	25	24	24
	Multiple Race/Ethnicity	25	24	25	25	24	25	25	24	25	25	24	25
	Unknown Race/Ethnicity	25	24	25	25	24	25	26	25	26	26	24	25
	Non-U.S. and Non-Permanent Resident	24	24	24	24	24	24	24	24	24	24	24	24
	Total	***25***	***24***	***24***	***25***	***24***	***25***	***25***	***24***	***25***	***25***	***24***	***24***

24

https://www.aamc.org/download/321468/data/factstablea6.pdf

MATH TIME!

24 + 4 + 3 = 31

to

24 + 4 + 8 = 36

years old at end of training

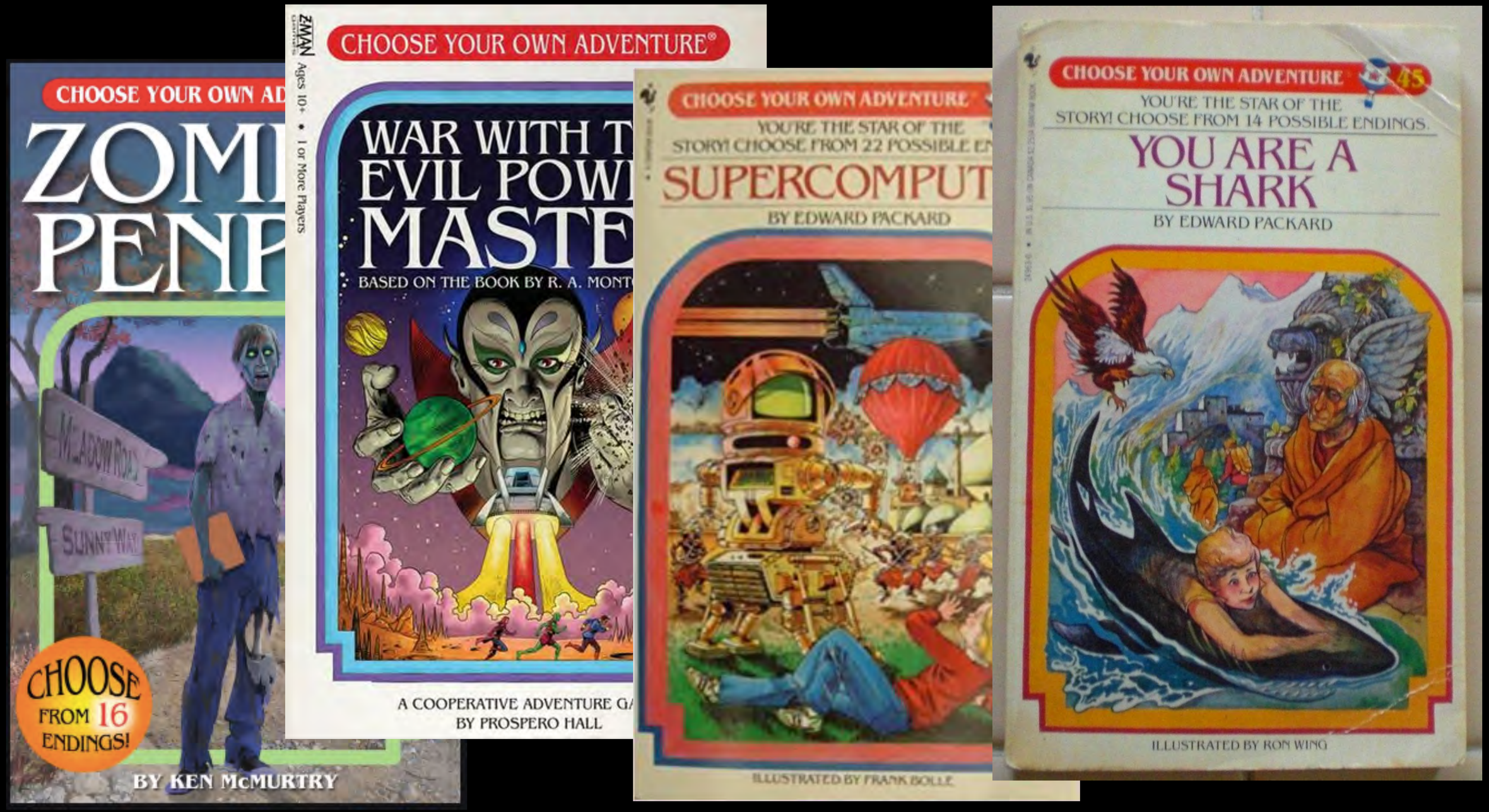
https://www.healthline.com/health/fertility-timeline#1


12
1
2
3
4
5
6
7
8
9
10
11
WESTCLOX

(INTERNAL SCREAMING INTENSIFIES)


WORK
LIFE


stryker
stryker
18


CHOOSE YOUR OWN AD
ZOMI
PENP
MEADOW ROAD
SUNNY WAY
CHOOSE FROM 16 ENDINGS!
BY KEN McMURTRY
CHOOSE YOUR OWN ADVENTURE®
ZMAN
Ages 10+ • 1 or More Players
WAR WITH T
EVIL POW
MASTE
BASED ON THE BOOK BY R. A. MONT
A COOPERATIVE ADVENTURE GA
BY PROSPERO HALL
CHOOSE YOUR OWN ADVENTURE
YOU'RE THE STAR OF THE
STORY! CHOOSE FROM 22 POSSIBLE EN
SUPERCOMPUT
BY EDWARD PACKARD
ILLUSTRATED BY FRANK BOLLE
CHOOSE YOUR OWN ADVENTURE 45
YOU'RE THE STAR OF THE
STORY! CHOOSE FROM 14 POSSIBLE ENDINGS.
YOU ARE A SHARK
BY EDWARD PACKARD
ILLUSTRATED BY RON WING


CAMP


BURNOUT-O-METER

“The patient comes first.”

“Nothing is more important than family.”

“Never show weakness.”


WE HAVE TO FIX IT
xtra normal

THE ART OF TRIAGE

	URGENT	NON-URGENT
IMPORTANT	DO IT NOW	SET A TIME AND DO IT LATER
UNIMPORTANT	DELEGATE IT	GET RID OF IT


15

TEAMWORK *makes the* DREAMWORK

PAY IT BACK

&

PAY IT FORWARD

THANKS

michelleau@gmail.com

@scutmonkey

michelleaumd

SECOND VICTIM

Ellen Basile, DO

Associate Professor

Department of Anesthesiology

Children's Hospital of Georgia

Augusta University

DISCLOSURE

Under Accreditation Council for Continuing Medical Education guidelines, disclosure must be made regarding relevant financial relationships with commercial interests within the last 12 months:

Ellen Roark Basile, DO

Department of Anesthesiology

Children's Hospital of Georgia

Augusta University

has no relevant financial relationships or affiliations with commercial interests related to this topic to disclose.

MARIAH

Girl Dies Following Tonsillectomy

$6 Million Recovery

PACU

- Fentanyl
- Monitor alarms silenced
- Lack of nursing assessments

SECOND VICTIM

ALBERT WU, MD

JOHNS HOPKINS

MEDICAL ERROR: THE SECOND VICTIM BMJ. 2000 MAR 18;320(7237):726-7.

SECOND VICTIM

Healthcare worker involved in an adverse patient outcome…

with predictable emotional response

SECOND VICTIM

- Signs/ Symptoms
- Risk factors
- Potential outcomes
- Recovery Phase
- Interventions/ Treatment options

SECOND VICTIM

Predictable Response

Think PTSD

SECOND VICTIM

Risk Factors

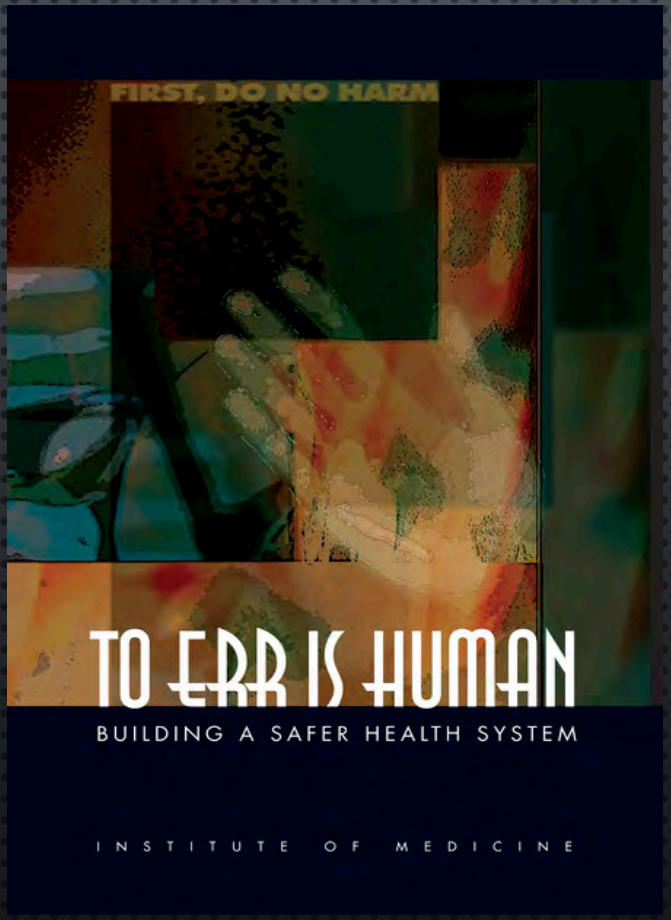
PEDIATRICS

ASA 5/6

HONOR WALK

FIRST DEATH

MEDICAL ERROR

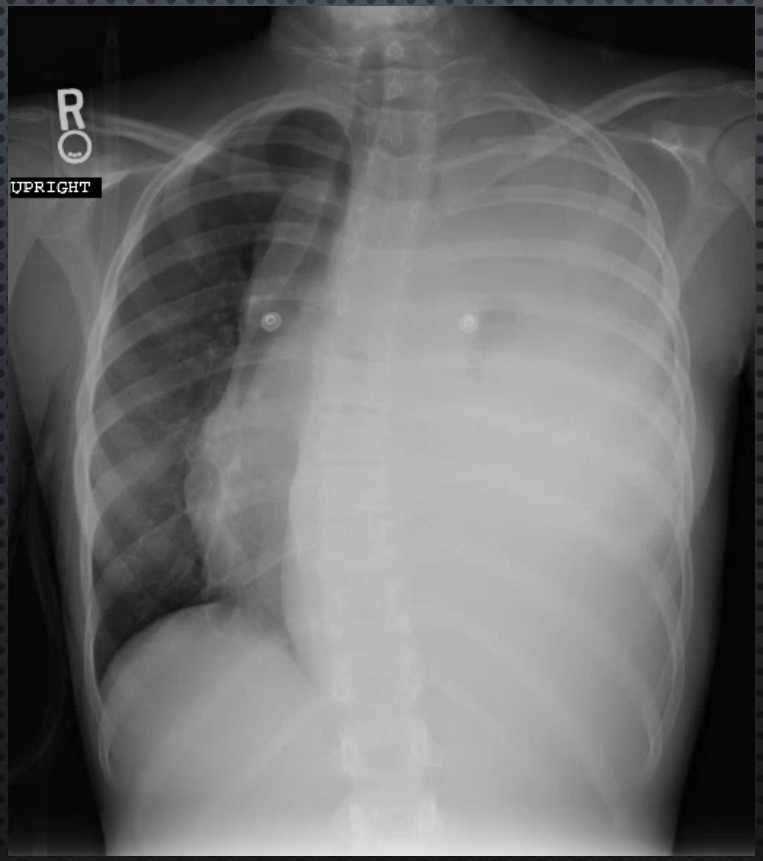


LAWSUITS

TRAINING

GOODNIGHT, SWEET PRINCE... AND FLIGHTS OF ANGELS SING THEE TO THY REST

OH SH!T



DENIAL

EGO

GUILT

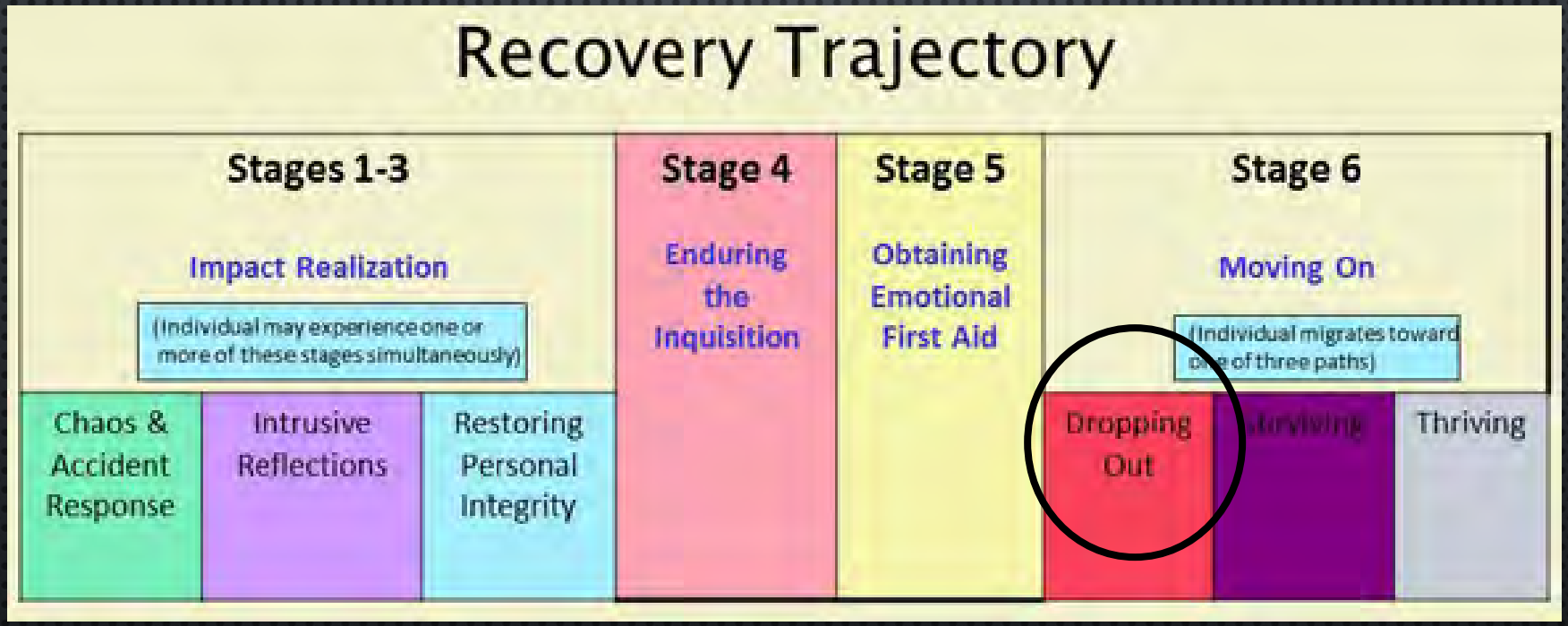
MEDICINE ASIDE

AIR FRANCE , FLIGHT 447- 228 DEATHS

"DAMN IT, WE'RE GOING TO CRASH...

THIS CAN'T BE HAPPENING!"

STAGES OF RECOVERY



400

SUICIDE RATES PER 100,000

General Public	13.0
Army	23.8
Physicians	40

PHYSICIAN SUICIDE RISK

MALES **70%** > THAN PUBLIC

FEMALES **250-400%** > THAN PUBLIC

SPECIAL REPORT: SI AMONG SURGEONS

2011 SURVEY

7,905 SURGEONS RESPONDED

6.3% REPORTED SI

(3.3% GENERAL POPULATION)

SI AMONG SURGEONS

TOP THREE REASONS FOR SI

#1 + SCREEN FOR DEPRESSION

#2 BURNOUT

#3 MEDICAL ERROR IN PAST 3 MOS

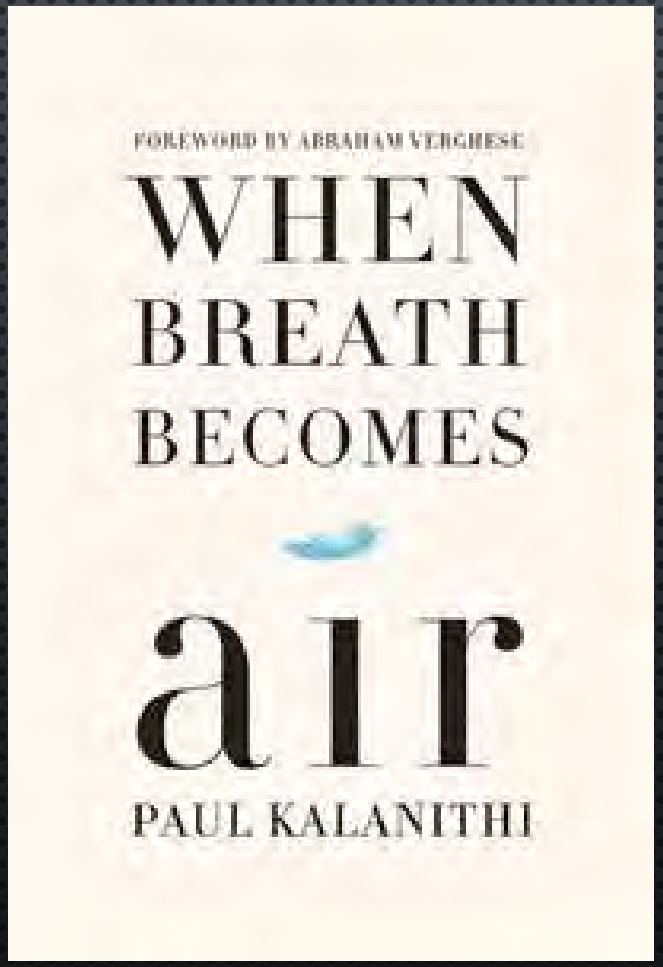
SI AMONG SURGEONS

SURGEONS WHO REPORTED PERCIEVED MEDICAL ERROR

16.2% REPORTED SI

= 4 FOLD INCREASE

PAUL KALANITHI, MD



RECOGNIZED PROGRAMS

STANFORD

BRIGHAM AND WOMEN'S HOSPITAL

UNIVERSITY OF MISSOURI

SUSAN SCOTT, PhD, RN

University of Missouri Health System

ForYOU Team - Peer to peer

Survey questions adapted from her work

MITTS.ORG

MITSS

Medically Induced Trauma Support Services

YOU'RE NOT ALONE
WE CAN HELP

"November 18, 1999 marks a day that changed my life for ever."

STRONGLY RECOMMENDED

- 24 HRS OFF –NO CLINCIAL DUTY
- DEBRIEFING

CAPTAIN SULLY

CONTACT INFO

EBASILE@AUGUSTA.EDU

QUESTIONS

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To Err is Human Building a Safer Health System. Institute of Medicine. 1999.

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You've Been Served

Strategies to Survive a Medical Malpractice Suit

Judith L.P. Handley M.D.

Associate Professor

Department of Anesthesiology and Perioperative Medicine

Children's Hospital of Georgia

January 11th, 2020

Relevant Disclosure and Resolution

Judith L.P. Handley, M.D.

I have no relevant relationships or affiliations with commercial interests to disclose

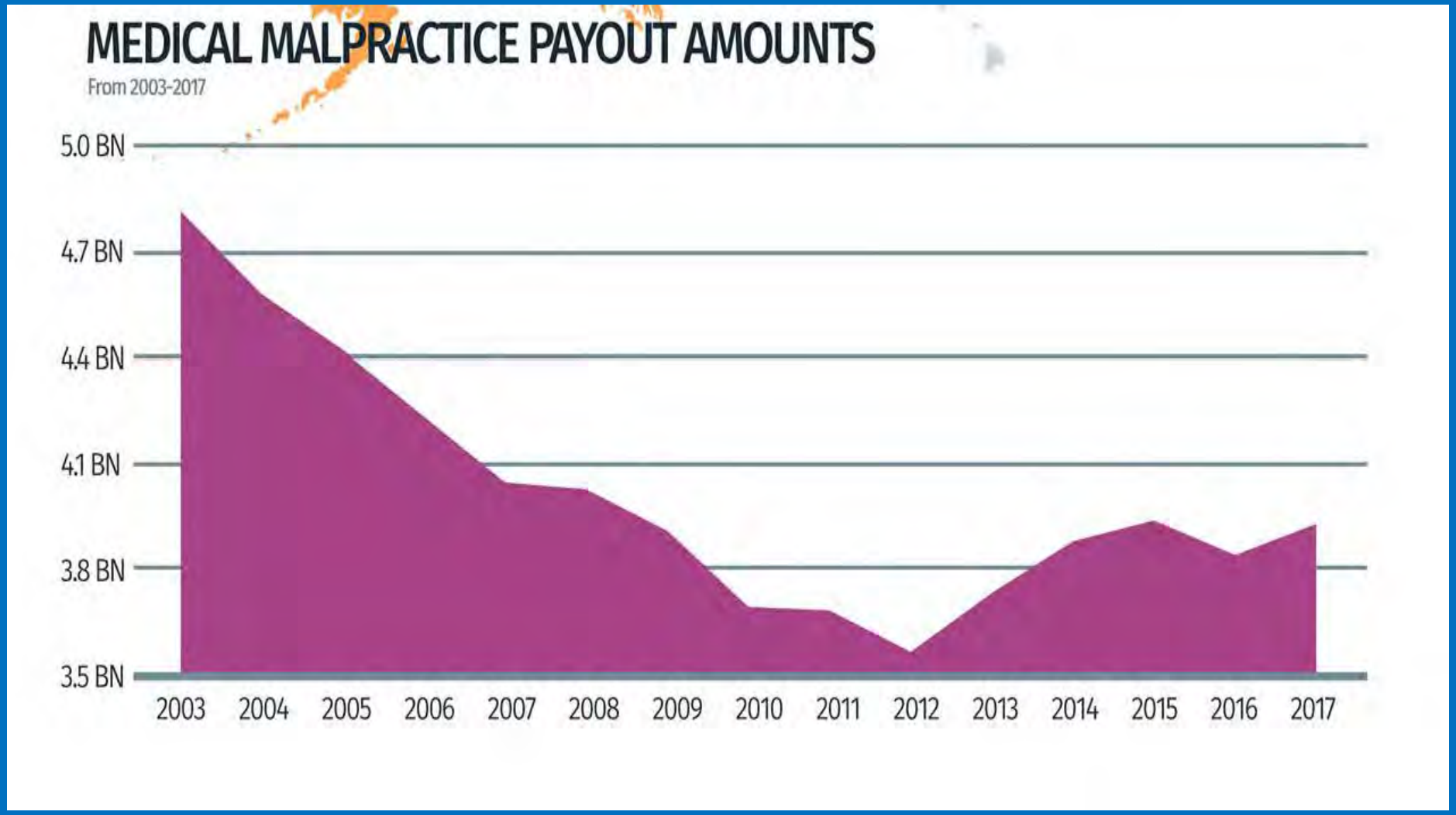
Learning Objectives

- Review recent statistical trends in medical malpractice.
- Identify the key parts of the legal process involved in a medical malpractice case.
- Discuss specific physician experiences and reactions to a medical malpractice case.
- Identify strategies to decrease stress if involved in a medical malpractice suit.

Some Interesting Information

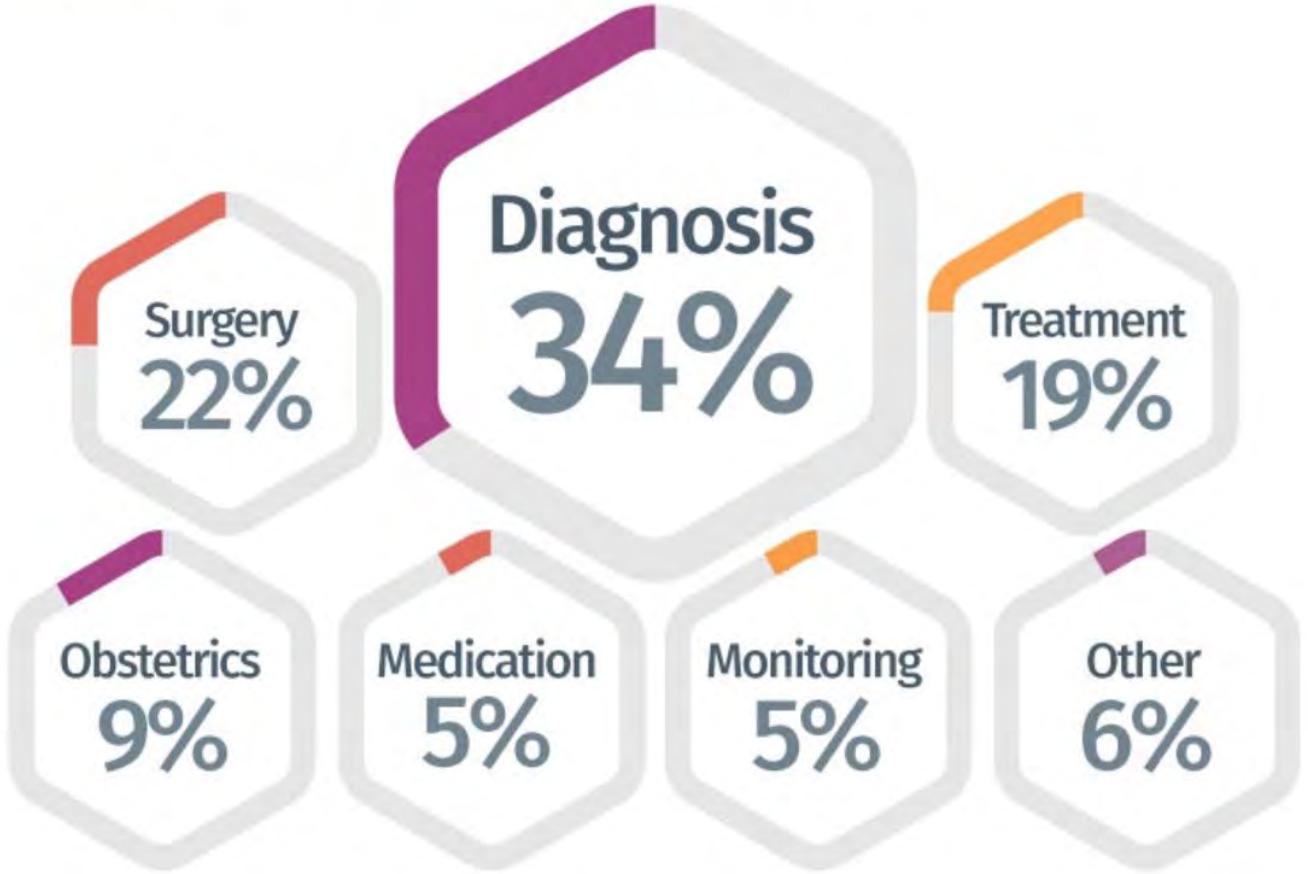
2018 Medical Malpractice Payout Analysis

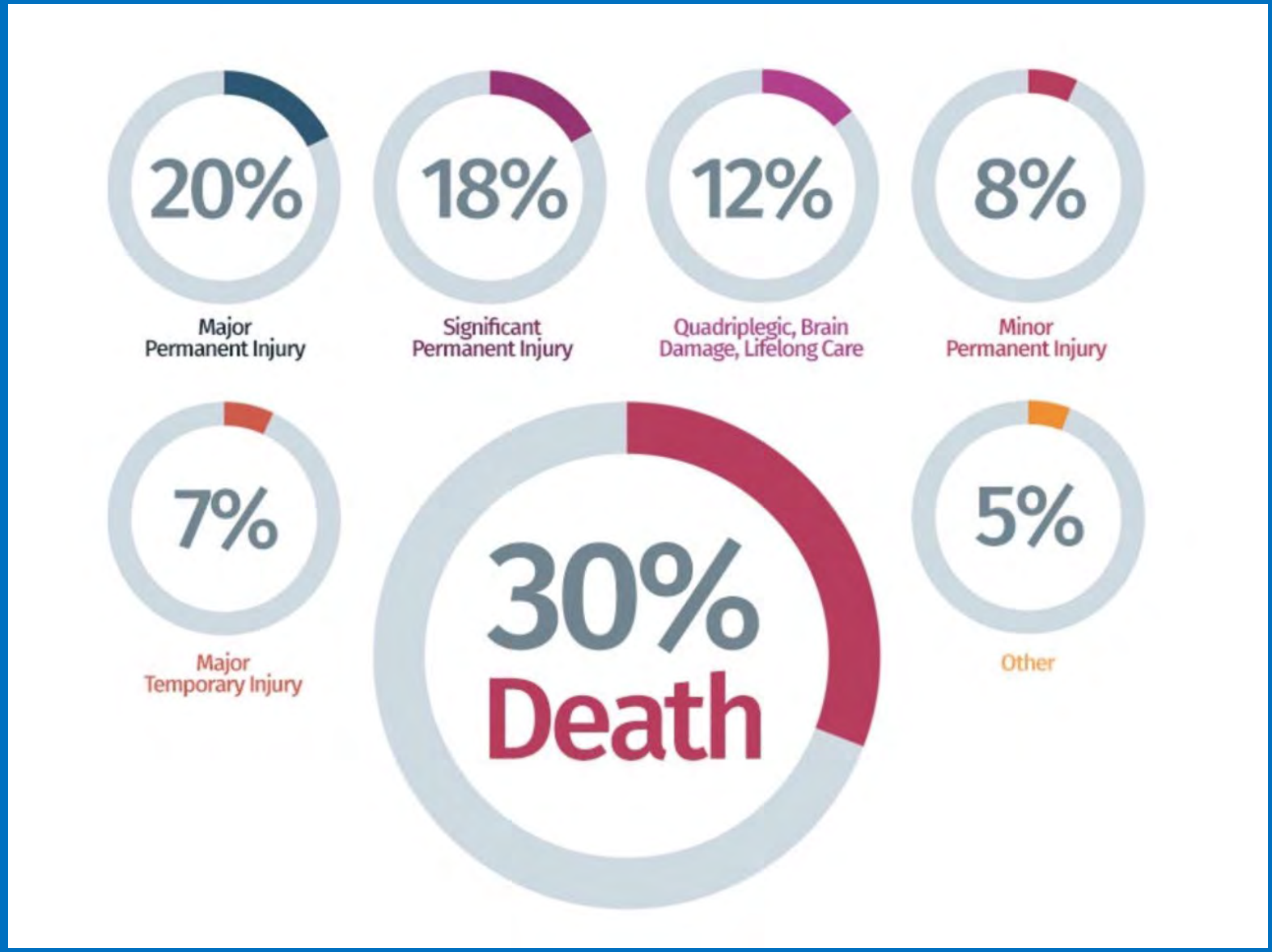
- Payouts in 2017 as reported to the National Practitioner Data Bank
- 3.9 Billion total payouts
- Top States: New York, Rhode Island, New Jersey
- Bottom States: Wisconsin, South Dakota, Vermont


MEDICAL MALPRACTICE PAYOUT AMOUNTS
From 2003-2017
5.0 BN
4.7 BN
4.4 BN
4.1 BN
3.8 BN
3.5 BN
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017

PAYMENT AMOUNTS BY MALPRACTICE ALLEGATION

Percentages rounded.




20%
Major
Permanent Injury
18%
Significant
Permanent Injury
12%
Quadriplegic, Brain
Damage, Lifelong Care
8%
Minor
Permanent Injury
7%
Major
Temporary Injury
30%
Death
5%
Other

AVERAGE PAYMENT AMOUNTS

Payment amount by severity of the alleged outcome.

QUADRIPLEGIC, BRAIN DMG, LIFE CARE	$ 1,029,105
MAJOR PERMANENT INJURY	$ 600,797
SIGNIFICANT PERMANENT INJURY	$ 424,645
DEATH	$ 374,530
MINOR PERMANENT INJURY	$ 236,057
MAJOR TEMPORARY	$ 214,407
CANNOT BE DETERMINED	$ 109,583
EMOTIONAL INJURY	$ 91,678
MINOR TEMPORARY	$ 72,850
INSIGNIFICANT INJURY	$ 34,333

- Medscape Malpractice Report 2017

Methodology

Survey Method
Physicians were invited to participate in a 10-minute online survey.

Screening Requirements
Respondents were required to be practicing medicine in the United States.

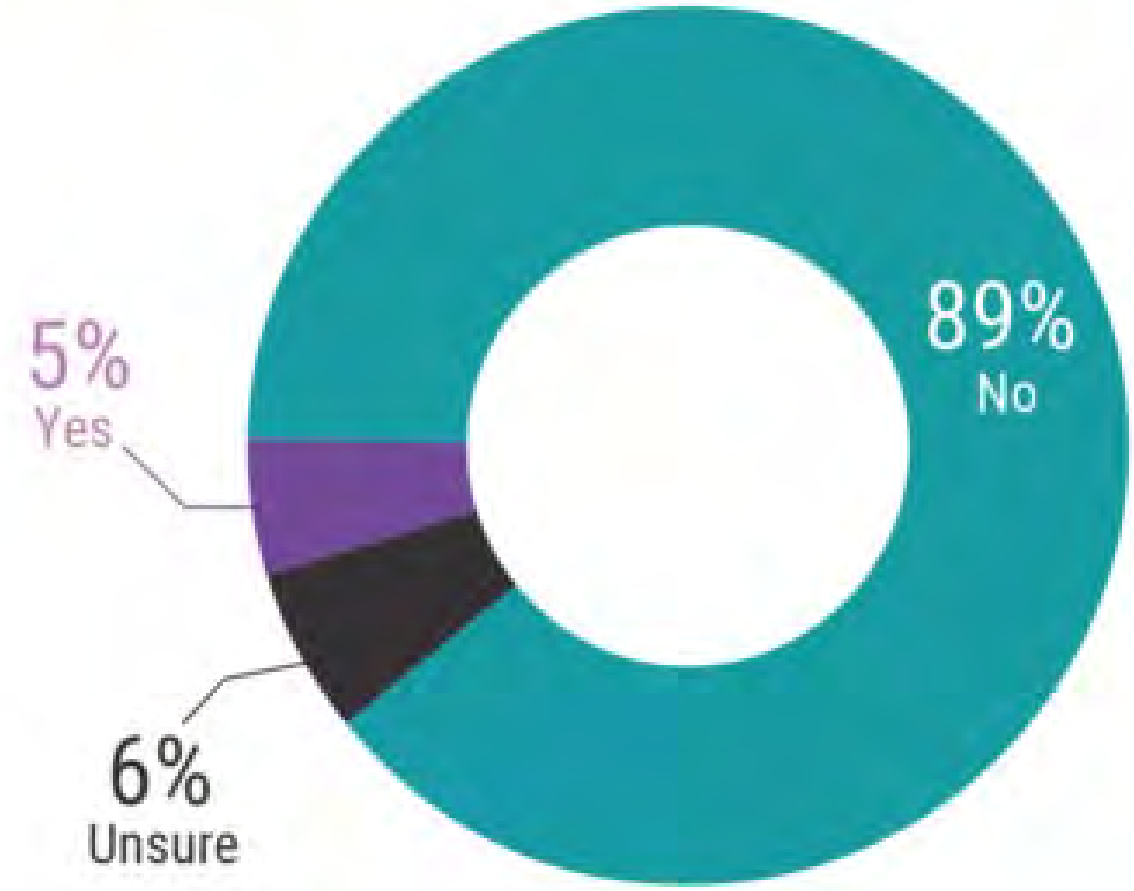
Sample Size
A total of 4137 physicians across 25+ specialties met the screening criteria and completed the survey; weighted to the AMA's physician distribution by specialty.

Recruitment Period
August 25 to October 6, 2017

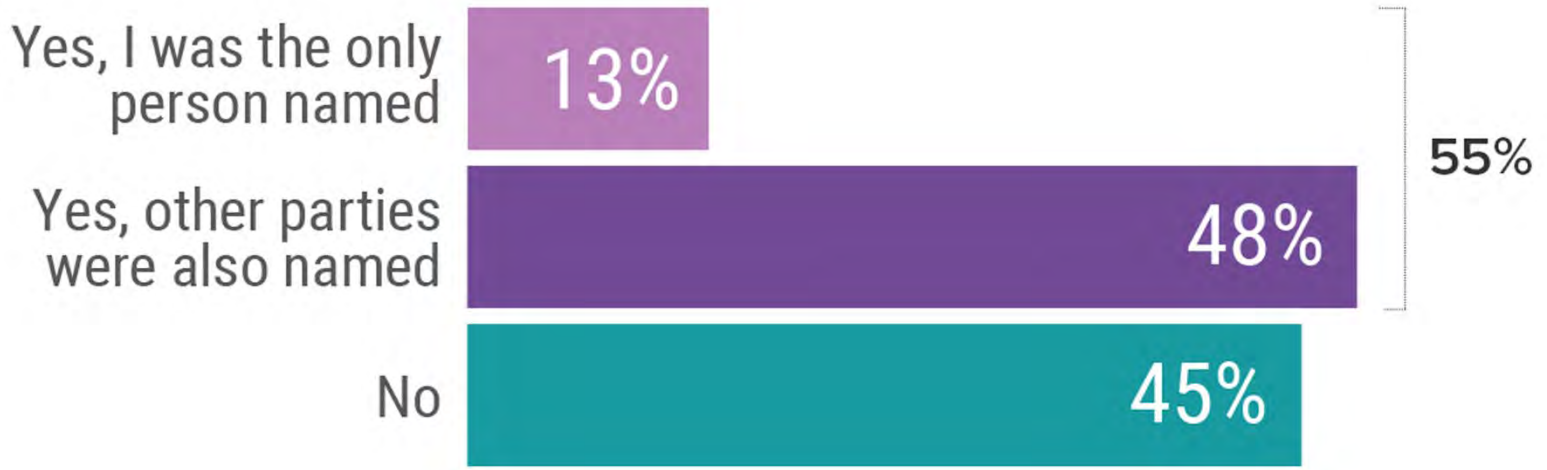
Sampling Error
The margin of error for the survey was ± 1.52% at a 95% confidence level using a point estimate of 50%.

Demographics

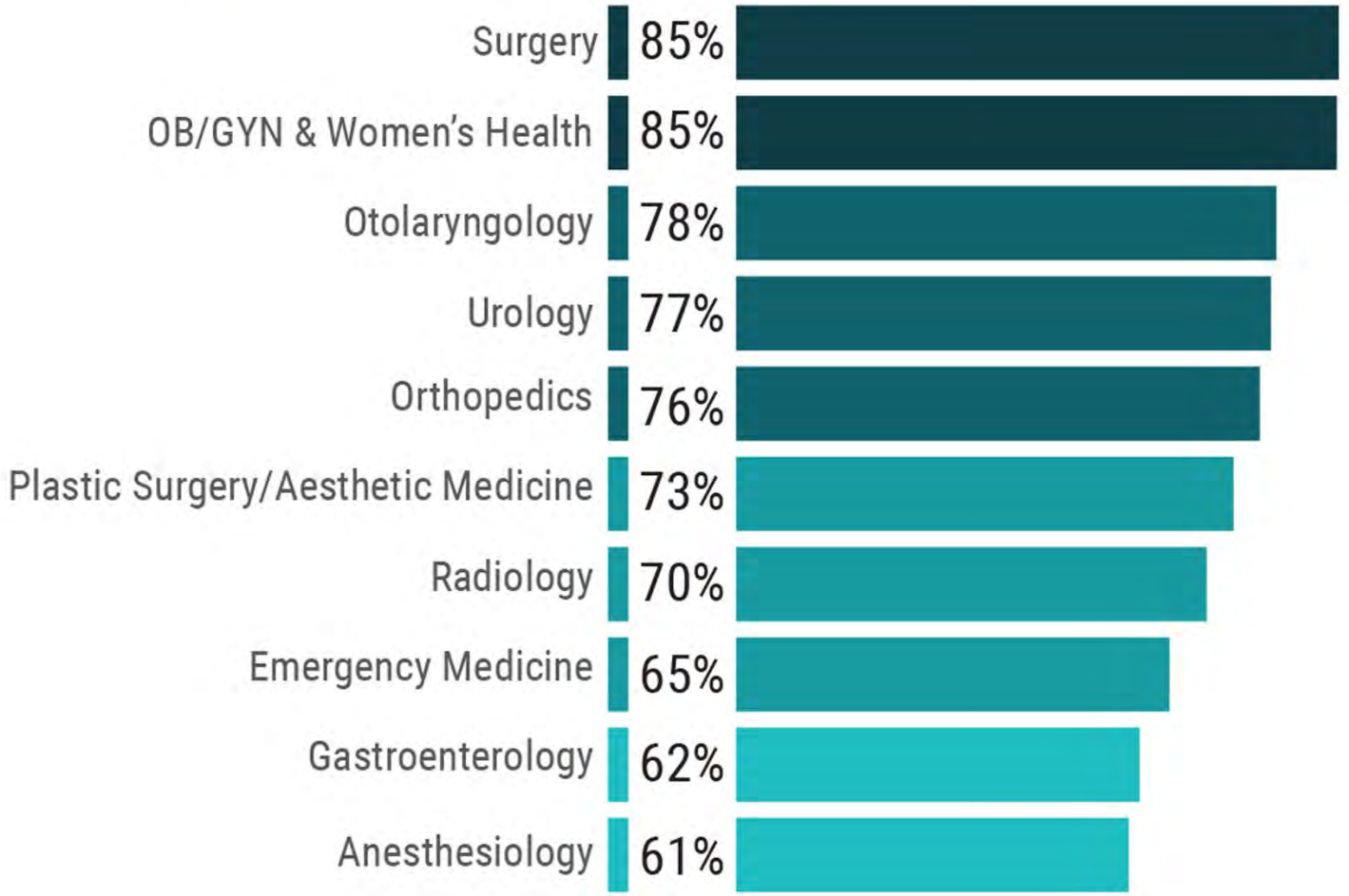
Was the Lawsuit Warranted?



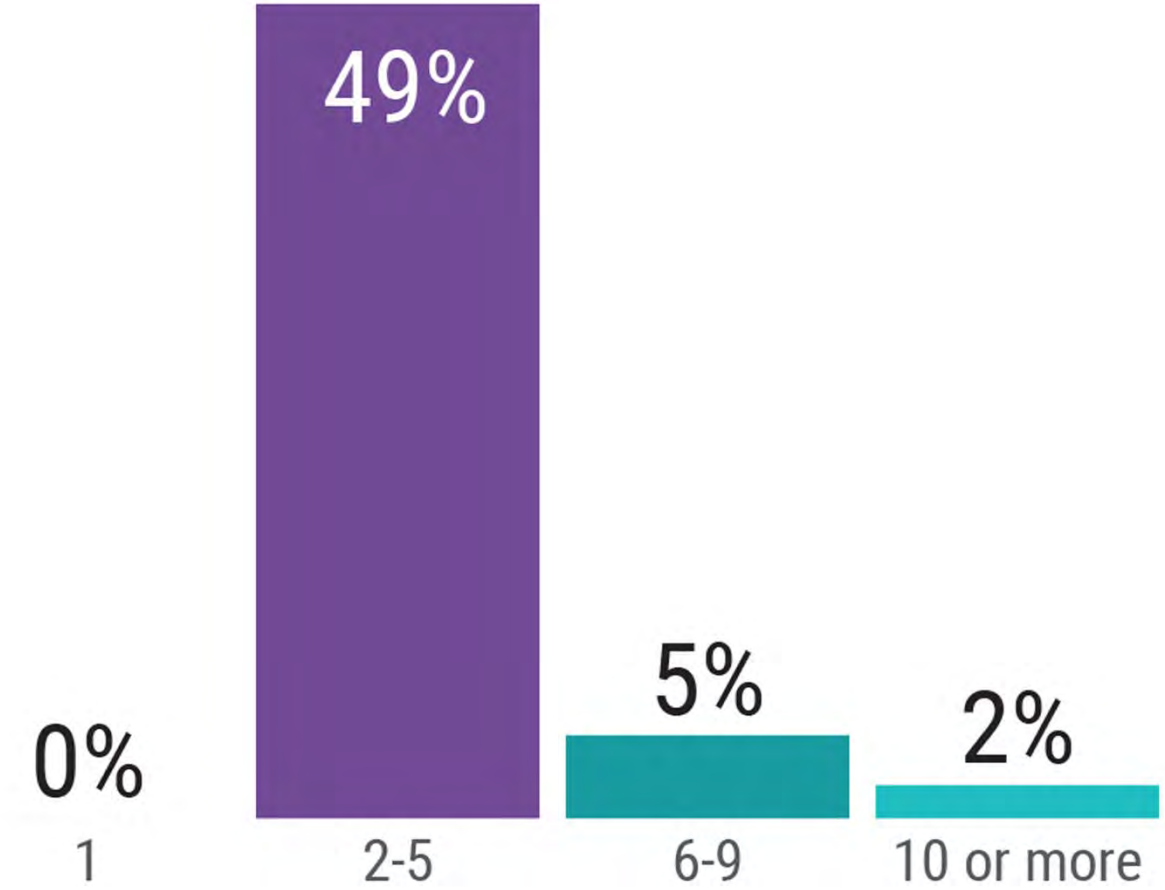
Have You Ever Been Named in a Malpractice Lawsuit?



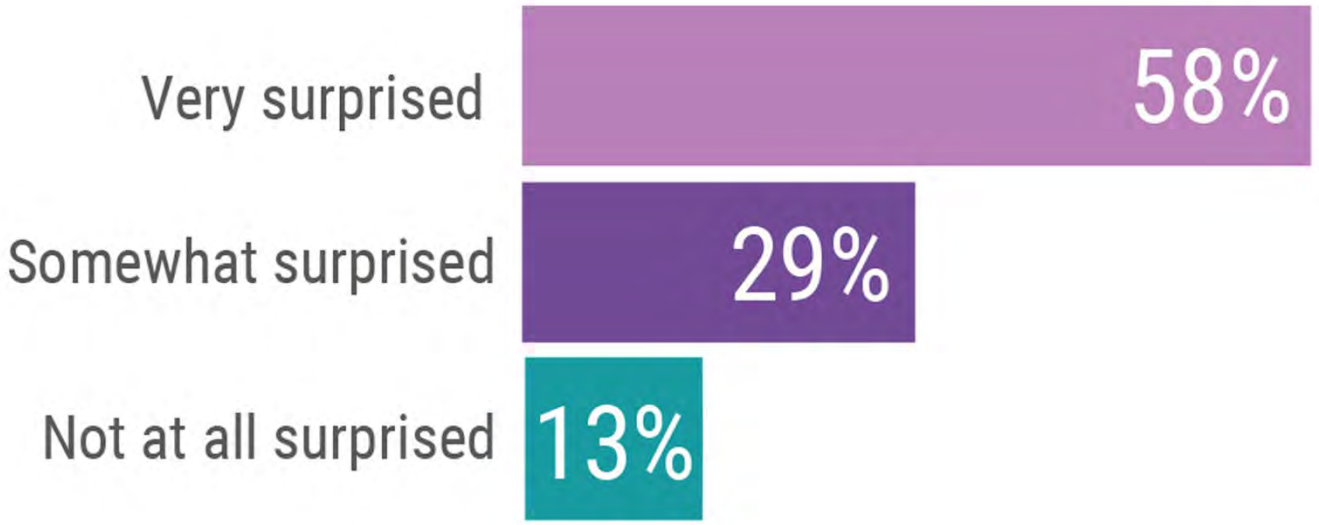
Top 10 Specialties for Lawsuits



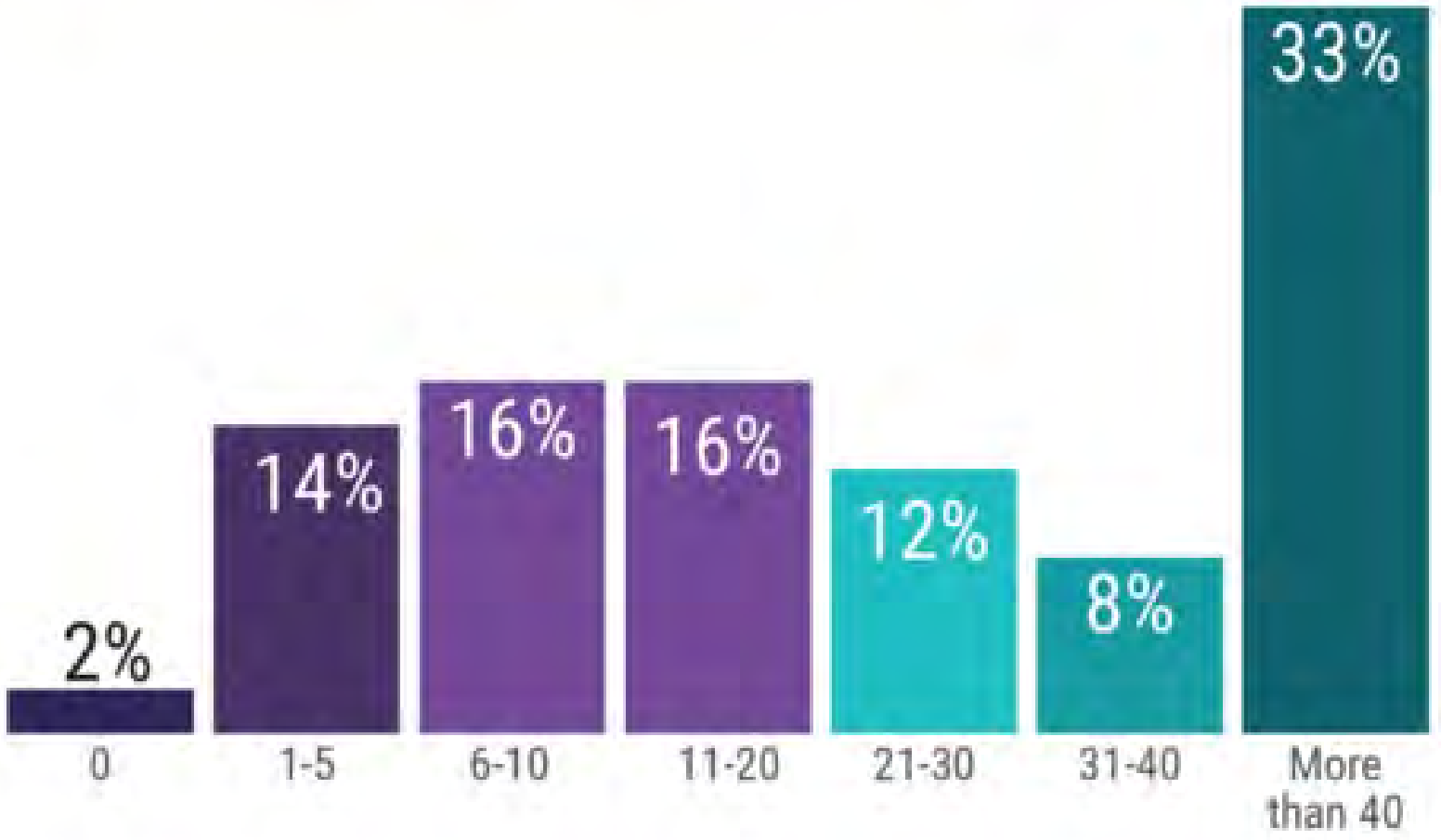
How Many Malpractice Lawsuits Have Physicians Been Named In?



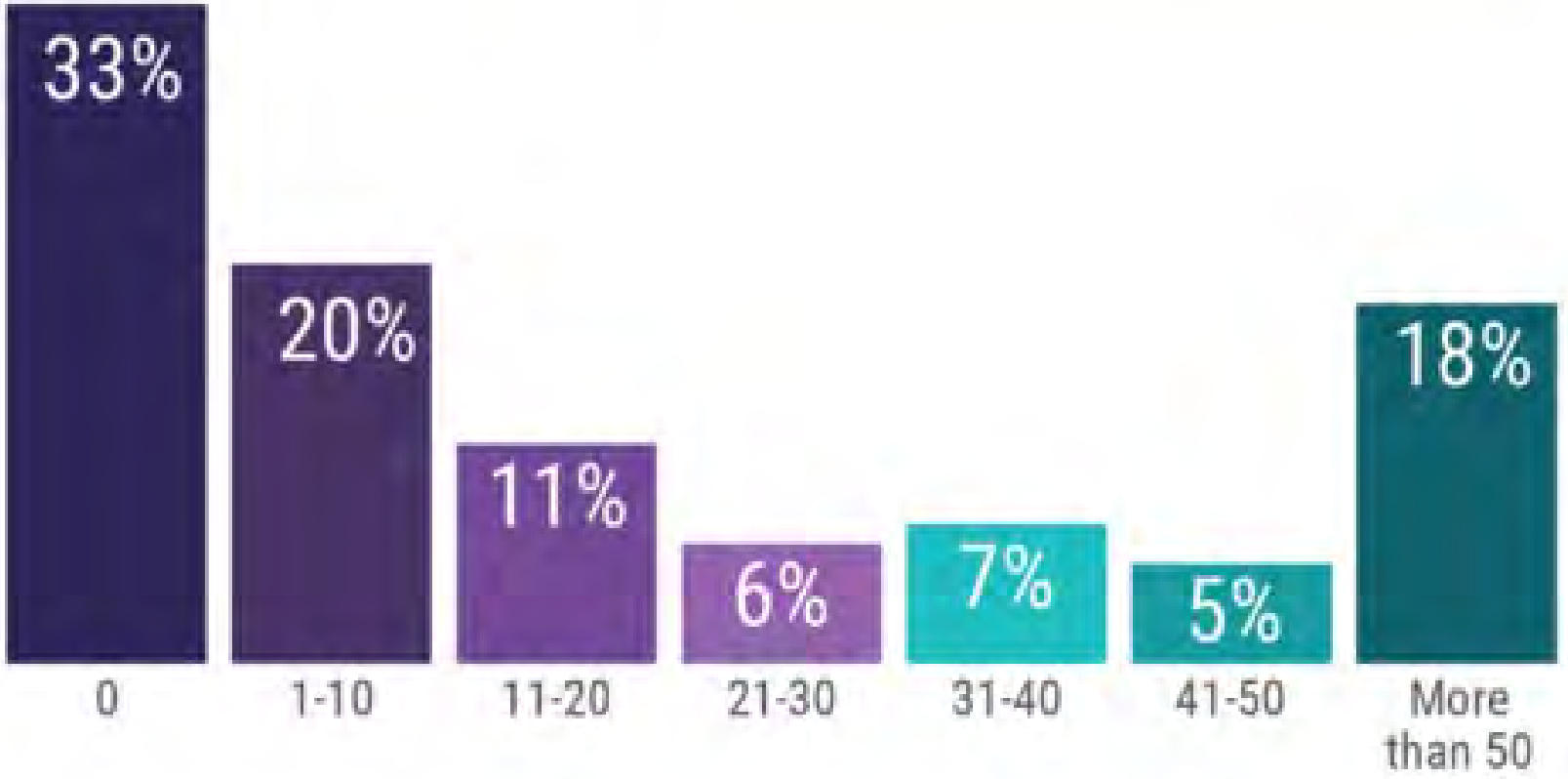
Were Physicians Surprised by the Lawsuit?



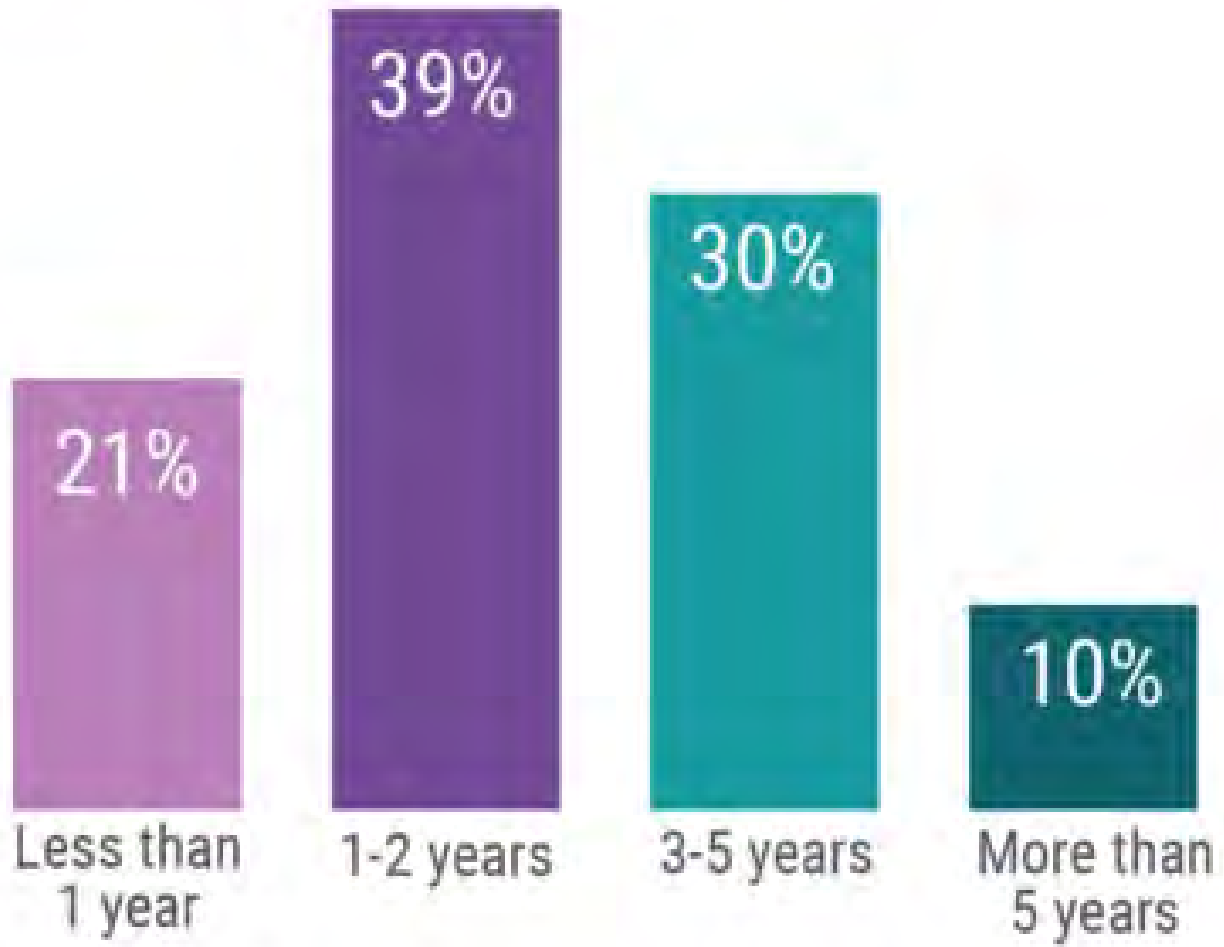
How Many Hours Did Physicians Spend on Their Defense?



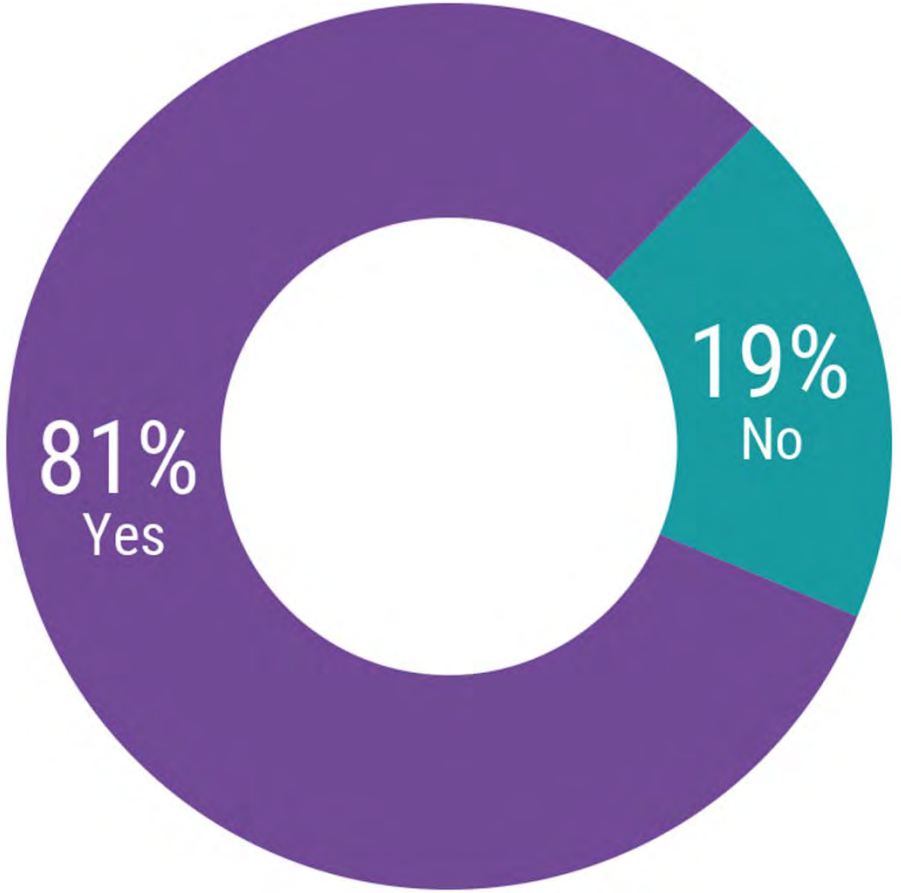
How Many Hours Did Physicians Spend in Court and In Trial-Related Meetings?



How Long Did the Lawsuit Process Take?



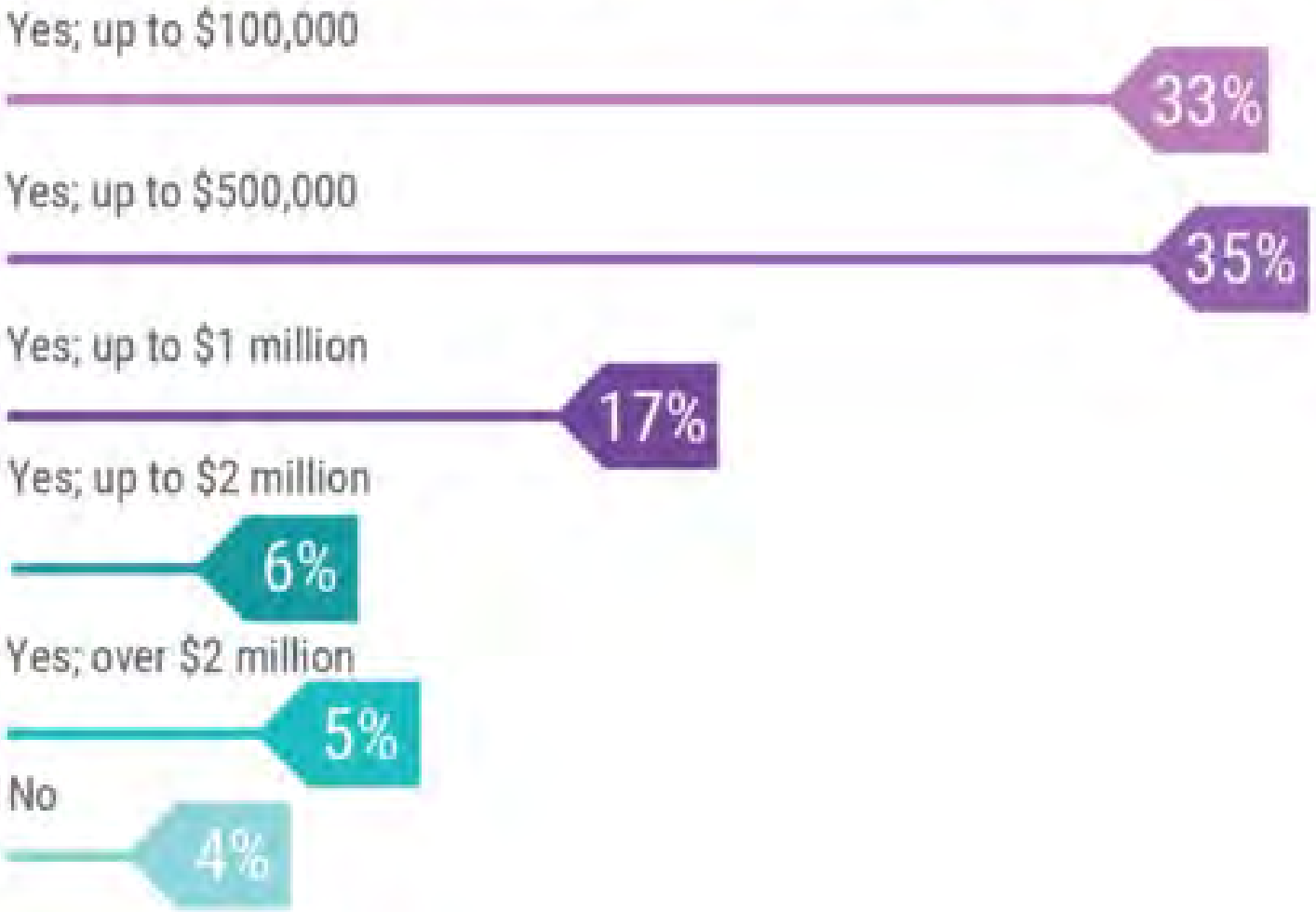
Did Physicians Give Depositions?



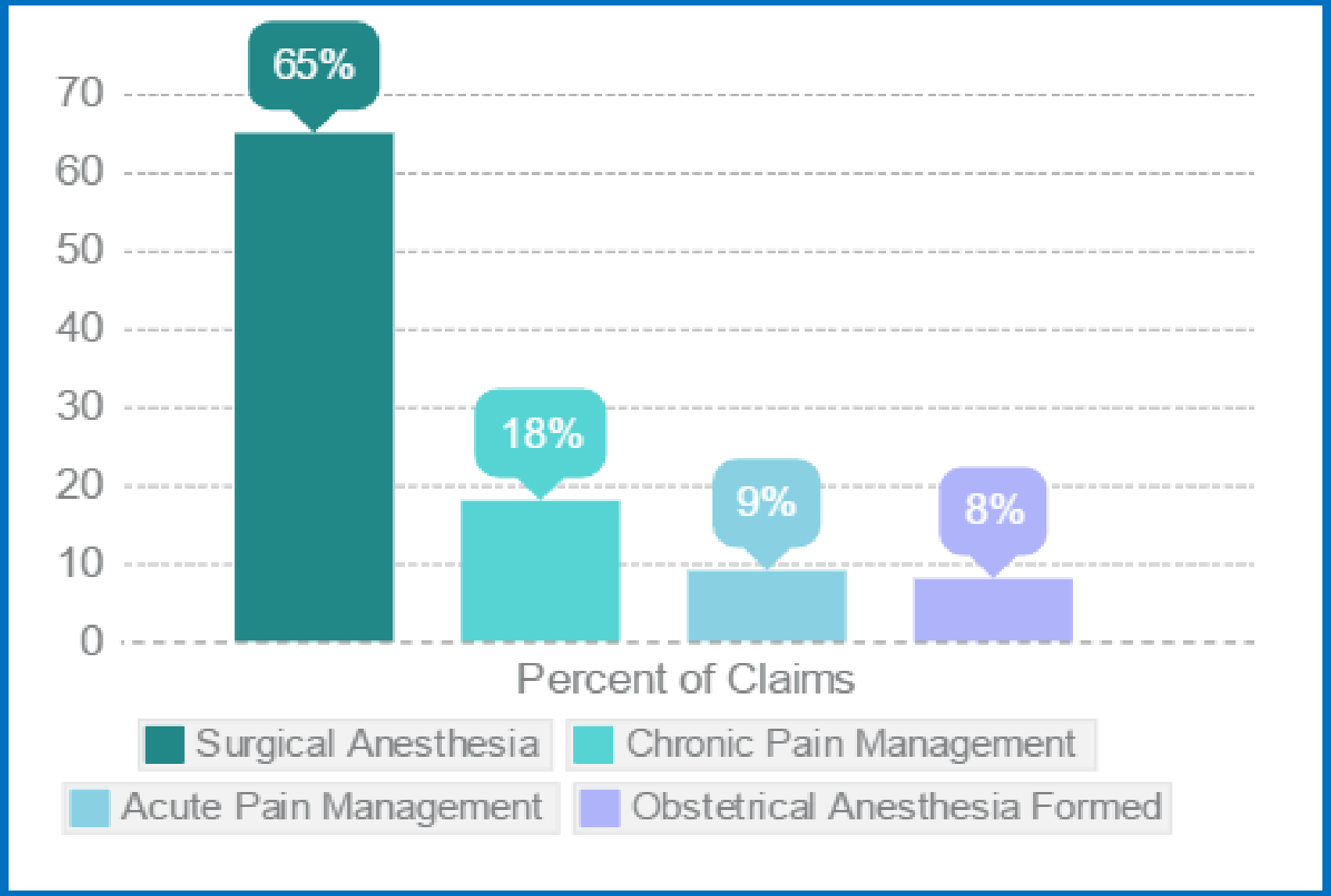
Physicians' Advice About Deposition and Trial

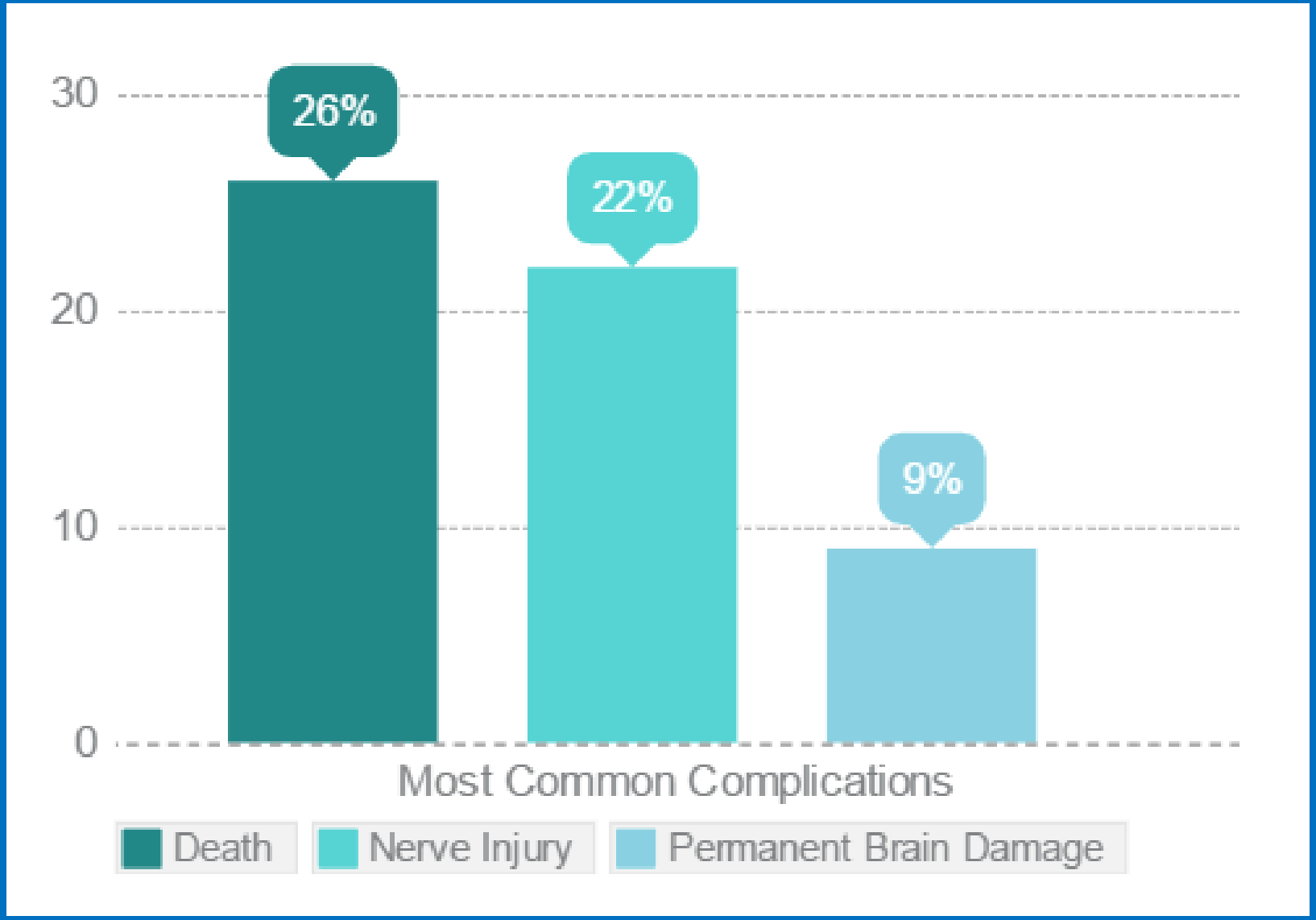
What Ultimately Happened With the Lawsuit?

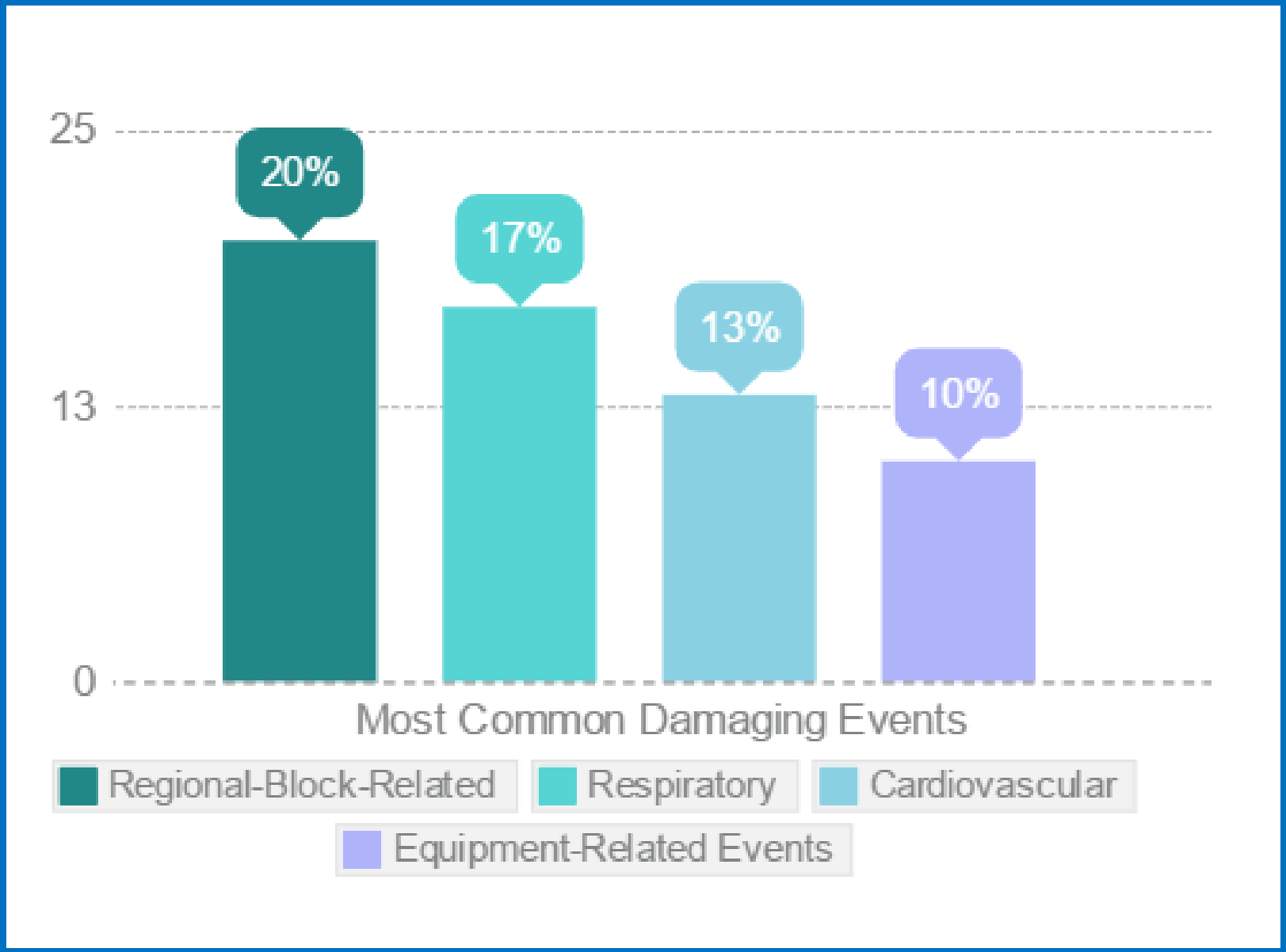
Did the Plaintiff Receive a Monetary Award?

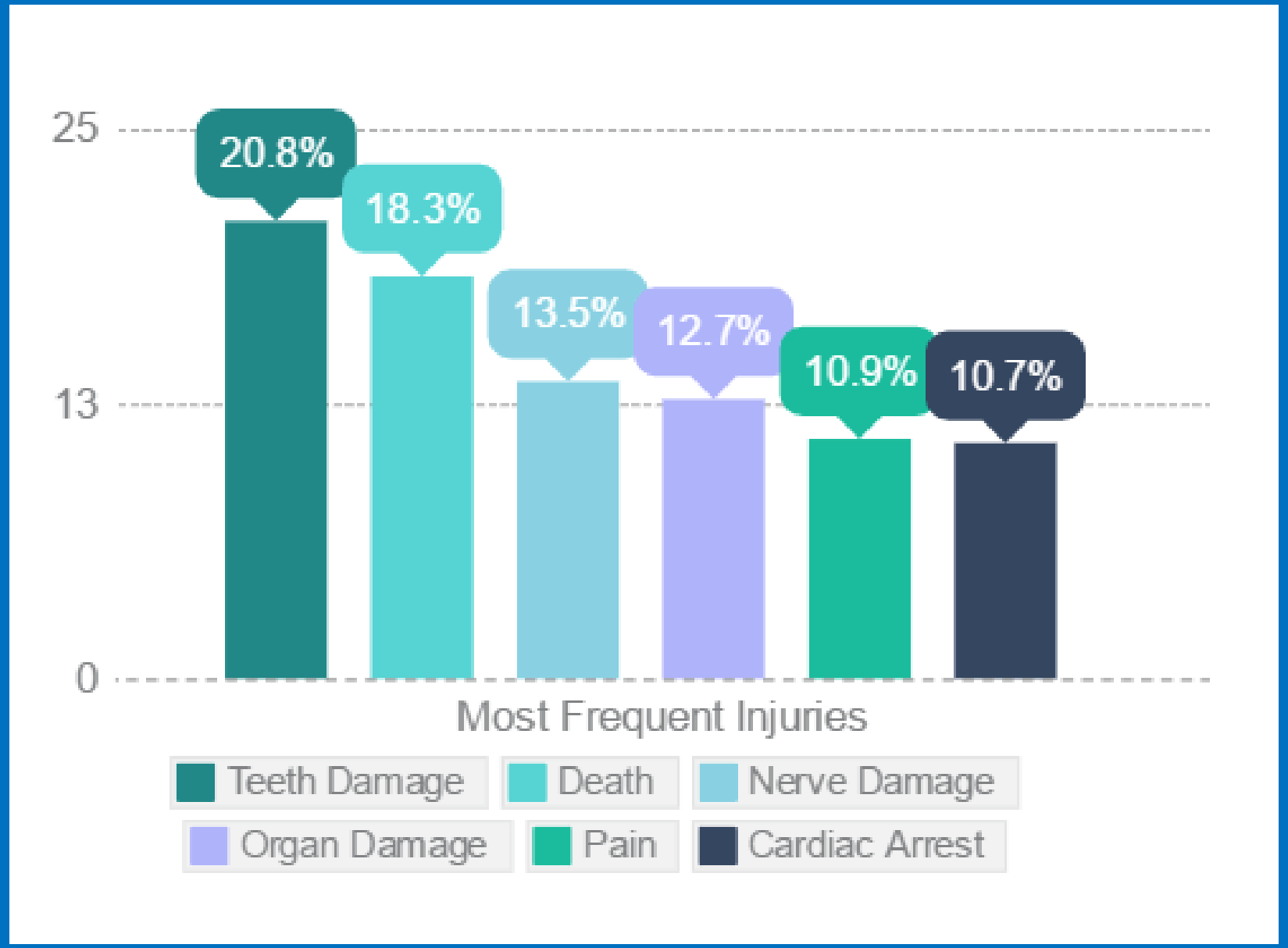


ASA Closed Claim Database


65%
18%
9%
8%
70
60
50
40
30
20
10
0
Percent of Claims
Surgical Anesthesia
Chronic Pain Management
Acute Pain Management
Obstetrical Anesthesia Formed


30
20
10
0
26%
22%
9%
Most Common Complications
Death
Nerve Injury
Permanent Brain Damage


25
13
0
20%
17%
13%
10%
Most Common Damaging Events
Regional-Block-Related
Respiratory
Cardiovascular
Equipment-Related Events


25
13
0
20.8%
18.3%
13.5%
12.7%
10.9%
10.7%
Most Frequent Injuries
Teeth Damage
Death
Nerve Damage
Organ Damage
Pain
Cardiac Arrest

When It Becomes Your Turn

In the District Court of Oklahoma County

State of Oklahoma

CJ-2017-1955

Just Another Day in the OR on Call

- Ordinary call day assigned to a long case.

- Completed my “normal” preoperative assessment and discussion with family.

Nothing Unusual

Typical progression of case

Discuss ongoing issues with surgeon

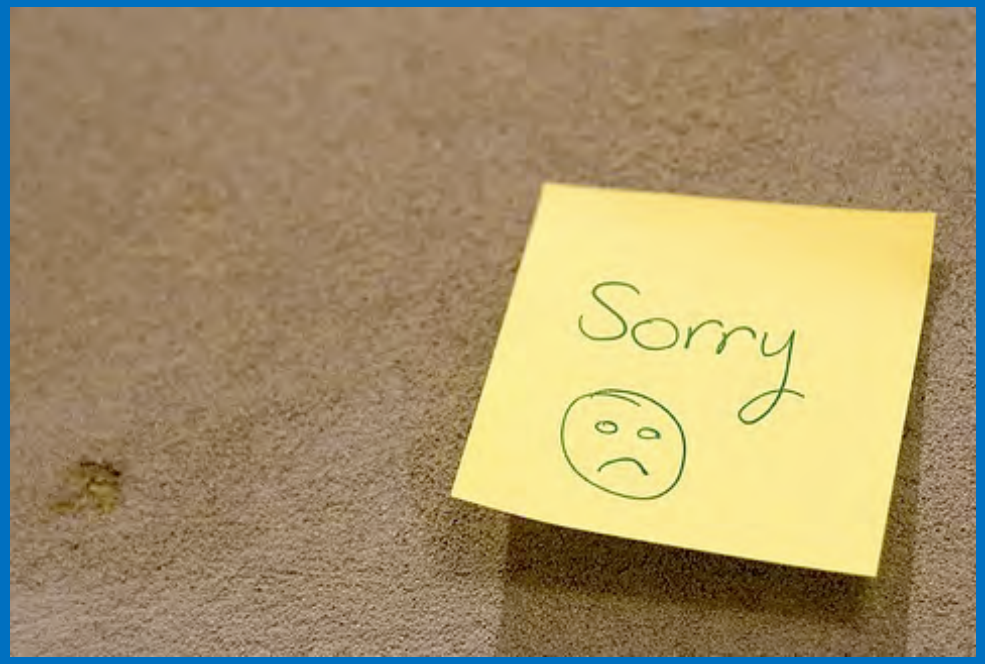
End of Case

Risk Management IS Your friend

- Called in the morning to discuss events and status of the case.
  - Advise on how to approach family
  - Over the next 2 days spent a number of hours

Saying Your Sorry

- I’m sorry laws
  - Differ by state
  - Georgia protects all admissions of fault



Documentation

- The chart needs to be accurate and complete.
- Late entries are allowed
  - Timely, facts with no blame
- Electronic records
  - Forensic log can be requested
  - Technology fails

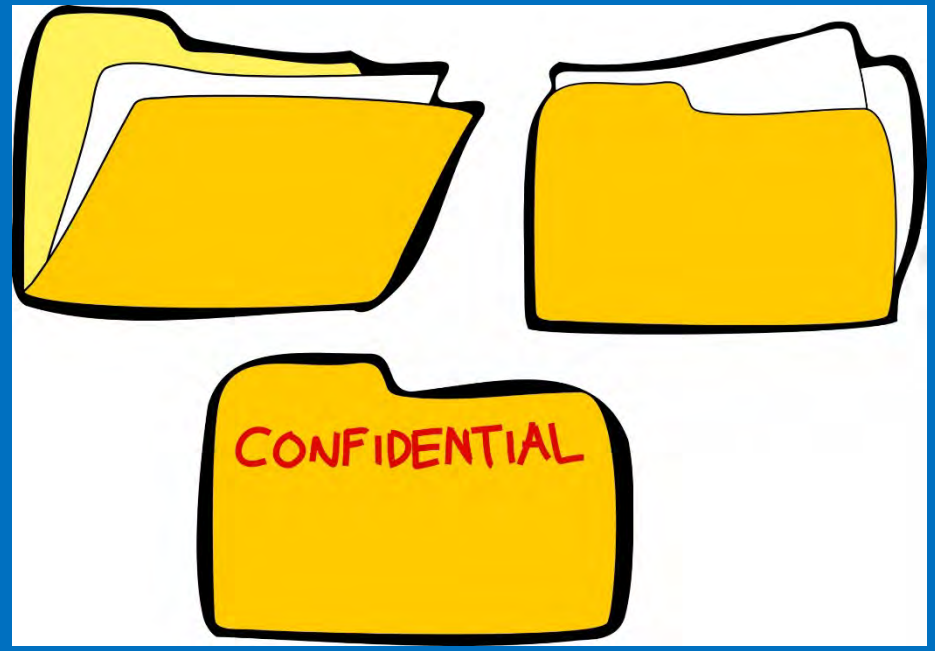
Emotional Time

- The OR environment after a case with an unexpected outcome occurs.
- You can’t talk to anyone.
- Discoverable


allsports
HOHENFELS
3516
allsports
7108

The Next Steps

- Received notice that a request for medical records had been received.
- Don’t destroy, alter existing medical records



Legal Proceedings

In the District Court of Oklahoma County

State of Oklahoma

CJ-2017-1955

April 4th, 2017

Your Attorneys

- APIC
- Great law firms on retainer
- Met with the attorneys over the summer

Your Life Story

- Interrogatory: a written question which is formally put to one party in a case by another party and which must be answered.

Meet with Attorney

- Typed up your responses
  - Review closely, accuracy matters

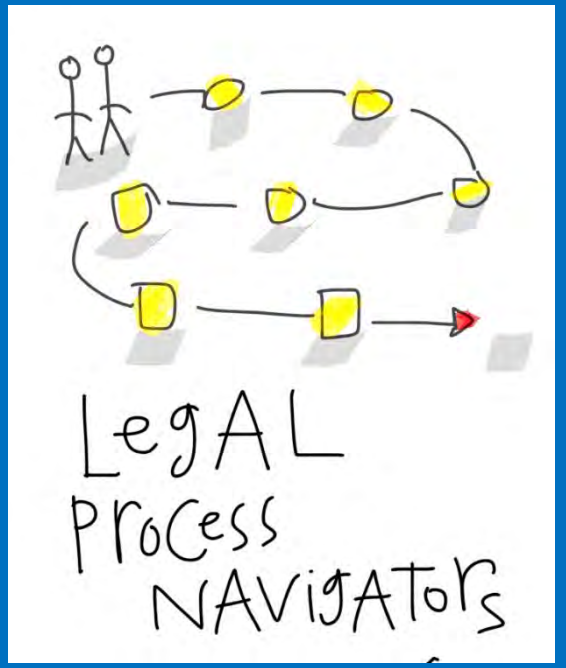
- Likely will review the record
  - Client Attorney privilege

Legal Process

- Players in the Game

  Plaintiff and attorney(s)

  Defendant(s) and attorney

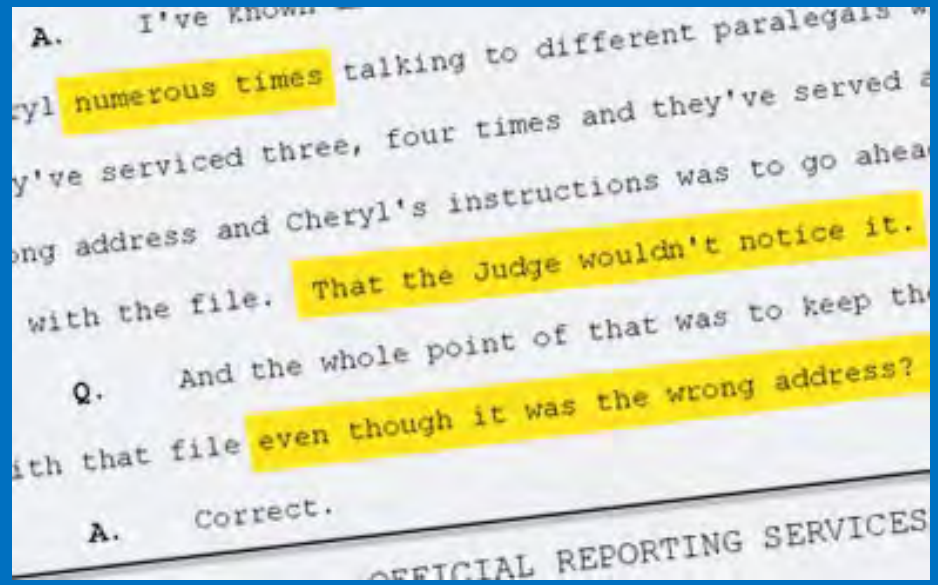


More Legal Stuff

- Discovery
- Plaintiff’s attorney will likely be consulting expert witness
  - Laws regarding expert witnesses
- Be in communication

Deposition

- As depositions are given and released
- Review them with your attorney
- Prepare for your deposition



Preparation is KEY

- Many preparation sessions
- Some attorneys may videotape
- It is their job to get you ready
  - It’s often unpleasant
  - Emotional

Make No Mistake

- Plaintiff’s attorney IS not your friend
- This is a battle
- Again: Prepare

My Approach

- Off work for the couple of days before.

- Eliminated stress and distractions
  - Stayed at hotel
  - Pickup up by attorney

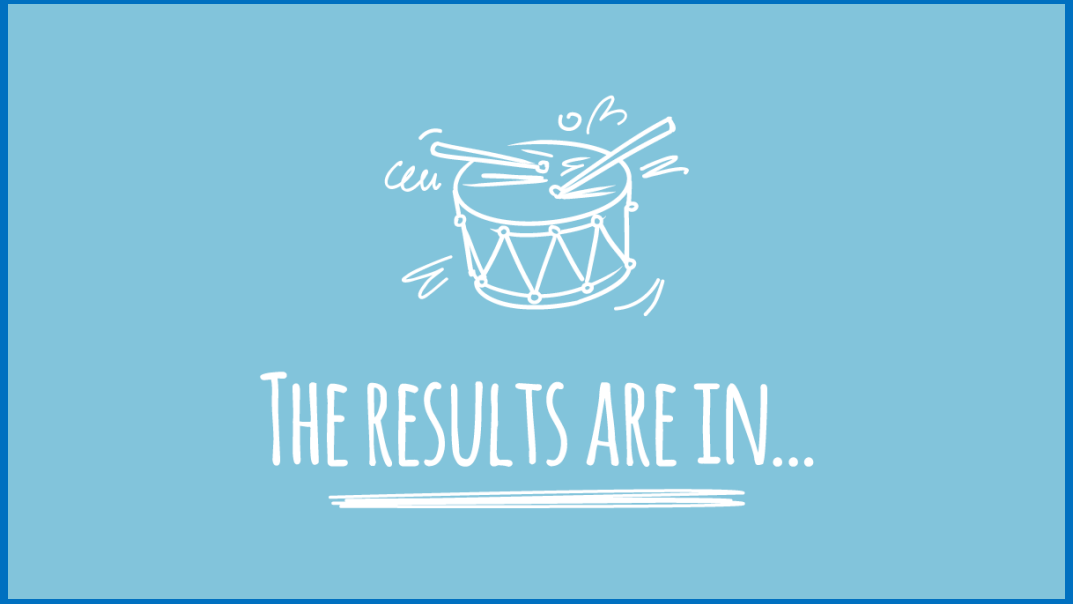
Star of the Show

Deposition

- Court will type your responses
  - Review it CAREFULLY
  - Be nit picky
  - Basis for questioning if it goes to trial

Possible Outcomes

- Dismissed
- Settlement
- Trial



Dismissed

- The plaintiff hereby dismisses this action without prejudice as to the defendant

- Judith L.P. Handley, M.D. only

Final Points

- It does not mean you are a bad clinician
- Reach out to available support systems

References

- Medscape Medical Malpractice Report 2017
- Diederich Healthcare 2017 Medical Malpractice Payout Analysis
- Oklahoma Court Filing CJ-2017-1955
- Brenner, IR. “How to Survive a Medical Malpractice Lawsuit: the physician’s road map for success.”2010.

THANK YOU

Burden Reduction Myths and Opportunities: An Assessment of Recent Regulatory Actions Affecting Anesthesiologists

Matthew T. Popovich, Ph.D. | January 11, 2020

Disclosures

Matthew T. Popovich works for the

American Society of Anesthesiologists® (ASA).

Learning Objectives

Describe	Describe the goals of federal regulatory policy on burden reduction as it relates to healthcare and patient safety.
Identify	Identify three federal policy decisions related to burden reduction on the Quality Payment Program and the Conditions of Participation.
Explain	Explain the impact that standard setting organizations and medical society guidelines and standards have on facility accreditation, physician workflow and regulatory burden.

ASA Quality and Regulatory Affairs

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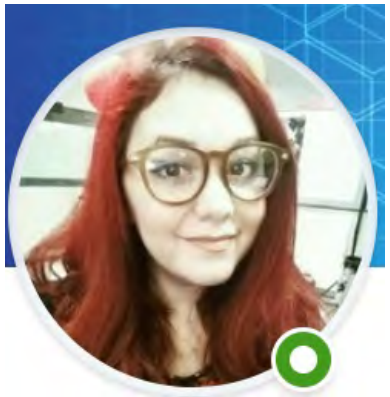

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Schaumburg, IL

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Regulatory Affairs Specialist
Washington, DC

Claire Ostarello
Quality Associate
Schaumburg, IL

ASA Quality and Regulatory Affairs

QRA Expertise

- Accreditation organizations
- Conditions of Participation
- Advocate on non-payment federal regulatory issues
- Facilitate review of external standards and practice parameters
- Quality measure development
- Quality Payment Program
- Support registry reporting

ASA DC Office Expertise

- Payment policy (Payment and Practice Management)
- Alternative Payment Models (Payment and Practice Mgmt)
- Scope of Practice (Advocacy and State Affairs)
- Surprise Medical Billing (Advocacy and State Affairs)
- Federal opioid policy (Advocacy)

Section 1: Burden Reduction

Trump Administration implemented long-standing policy goals to “reduce regulation” and “eliminate costs” associated with regulation.

- Any new regulation must be accompanied by eliminating two other regulations.
- Agencies must implement methods for identifying cost reductions.
- Agencies must be focused on burden reduction.


EXECUTIVE ORDERS

Presidential Executive Order on Reducing Regulation and Controlling Regulatory Costs

BUDGET & SPENDING | Issued on: January 30, 2017

Section 1: Burden Reduction

ASA priorities for burden reduction in 2017 included:

1. Address disparities in Medicare payments for anesthesiologists.
2. Eliminate the negative adjustment to the value-based modifier (defunct after payment year 2018).
3. Reduce number of measures required for the Physician Quality Reporting System (defunct after payment year 2018).
4. Eliminate burdensome surgical attire requirements that were not based on evidence; emphasis on accreditation standards based on evidence.
5. Eliminate of burdensome personal protective equipment requirements for drugs that are rarely, if ever, hazardous (USP <800>) to healthcare workers.
6. Address rural pass through payments.

Section 1: Burden Reduction

Administrations often use a simple framework or motto to guide their regulatory decision making.

Obama Administration

Trump Administration

Section 1: Burden Reduction

Centers for Medicare & Medicaid Services (CMS) Goals Include:

1. Reduce unnecessary burden and cost
2. Increase efficiencies
3. Improve the beneficiary experience

Dr. Seema Verma, CMS Administrator: Patients over paperwork is aimed at reducing "*Regulations that are not contributing to patient safety, quality or program integrity but instead are only increasing our healthcare costs.*"

Section 1: Burden Reduction

ASA successes in reducing burden have included:

1. Continue Hardship Exemptions for QPP Promoting Interoperability (2017-)
2. Eliminated of the negative Value-based Payment Modifier (2018)
3. Removed of subjective pain-related CAHPS questions (2018)
4. Placed more anesthesiologists on opioid-related panels (2018-)
5. Supported unified infection prevention programs across health systems (2019)
6. Supported the unified Quality Assurance and Performance Improvement (QAPI) processes across health systems (2019)

Section 1: Burden Reduction

CMS policy implications have been broad:

1. Increased minimum threshold for participation in MIPS
2. Revisions to Evaluation and Management Codes
3. Proposed revisions to the Stark Law and Anti-Kickback Regulations
4. Multiple requests for information (HIPAA, Supervision)
5. Changes to the H&P evaluations for inpatient and outpatient procedures (September 2019)
6. Preanesthesia evaluation in ambulatory settings (November 2019)

Section 1: Burden Reduction

Burden Reduction for some does not mean burden reduction for all. ASA is increasingly concerned that “burden reduction” in many cases means burden transfer to anesthesiologists.

- **2019 Hospital and Ambulatory Conditions of Participation Changes**
  - Transfer of care agreements between ASC and hospital is optional
  - H&P completion for ambulatory / outpatient settings can be set by local policy
  - Emergency Preparedness training can be set by local policy
  - Can set unified Infection Prevention policies and procedures across a health system
  - Can set unified Quality Assessment and Performance Improvement procedures
  - Decreased repetitive documentation for hospice healthcare workers

Section 1: Burden Reduction

January 2020 *ASA Monitor* article includes further discussion on changes within the 2019 Hospital and Ambulatory Conditions of Participation Final Rule

Quality and Regulatory Affairs

CMS Finalizes the Conditions of Participation Burden Reduction Rule

Grant C. Lynde, M.D., M.B.A.
Chair, Committee on Quality Management & Departmental Administration
Vacheria Tutson, J.D.
Matthew T. Popovich, Ph.D.

Just days after his inauguration, President Trump signed an executive order directing federal agencies to review and eliminate regulations identified as unnecessary, obsolete or excessively burdensome. Since then, the administration and individual agencies within the U.S. Department of Health and Human Services (HHS) have pursued such policies. Programs like Patients Over Paperwork, the Meaningful Measures Initiative and an overall drive toward "burden reduction" have significantly refocused health care regulation.

The CMS Conditions of Participation (CoPs), including those for hospital, ambulatory and other settings, ensure that common health and safety standards are provided to patients receiving surgical, diagnostic and procedural care.

ASA members have become well acquainted with these CoPs for Anesthesia Services, including those governing the Director of Anesthesia Services (DAS), which have encouraged the highest standard of patient safety in anesthesia. The CoPs have also set expectations for physician responsibilities, shared decision-making and in the establishment of local policies and procedures. Over time, it has seemed that CoPs for Anesthesia Services are well-balanced and offer appropriate flexibility for states, local facilities and physicians.

But just because regulations may seem balanced and appropriate to some does not mean they are immune from regulatory tinkering in other regulatory areas. In September 2018, CMS published the Regulatory Provisions to Promote Program Efficiency, Transparency, and Burden Reduction ("Omnibus Burden Reduction") proposed rule for comment. The proposed rule contained several proposed changes to the CoPs that, while not altering the CoPs for anesthesia services, focused on other features of hospital and ambulatory surgery center (ASC) administration that do affect anesthesiologists. ASA submitted comments in November of last year requesting that CMS reconsider aspects of these provisions that impact both physician anesthesiologists and overall patient safety. Of particular concern were the significant altering of requirements like Comprehensive Medical History and Physical Assessments (H&Ps) in hospitals and ASCs, written transfer agreements between hospitals and ASCs, and facilities documenting

Grant C. Lynde, M.D., M.B.A., is Associate Professor and Vice Chair, Quality, Emory University Department of Anesthesiology, Atlanta.

Vacheria Tutson, J.D., is ASA Regulatory Affairs Specialist.

Matthew T. Popovich, Ph.D., is ASA Director of Quality and Regulatory Affairs.

Section 1: Burden Reduction

But CMS and Health and Human Services have several positions that have not been resolved or are on the horizon that will impact anesthesiologists:

1. Electronic Health Records
2. Price Transparency
3. HIPAA Regulations
4. Stark and Anti-Kickback Updates
5. Presidential Order #13890: Protecting and Improving Medicare for Our Nation's Seniors

Section 1: Burden Reduction

In 2020, ASA is focused on protecting physician-led care and the anesthesia care team model that protects patient safety and delivers quality care to patients.

Executive Order 13890 of October 3, 2019

Protecting and Improving Medicare for Our Nation's Seniors

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1. *Purpose*. The proposed Medicare for All Act of 2019, as introduced in the Senate ("Medicare for All") would destroy our current Medicare program, which enables our Nation's seniors and other vulnerable Americans to receive affordable, high-quality care from providers of their choice. Rather than upend Medicare as we know it, my Administration will protect and improve it.

Sec. 5. *Enabling Providers to Spend More Time with Patients*. Within 1 year of the date of this order, the Secretary shall propose reforms to the Medicare program to enable providers to spend more time with patients by:

(a) proposing a regulation that would eliminate burdensome regulatory billing requirements conditions of participation, supervision requirements, benefit definitions, and all other licensure requirements of the Medicare program that are more stringent than applicable Federal or State laws require and that limit professionals from practicing at the top of their profession;

(b) proposing a regulation that would ensure appropriate reimbursement by Medicare for time spent with patients by both primary and specialist health providers practicing in all types of health professions; and

(c) conducting a comprehensive review of regulatory policies that create disparities in reimbursement between physicians and non-physician practitioners and proposing a regulation that would, to the extent allowed by law, ensure that items and services provided by clinicians, including physicians, physician assistants, and nurse practitioners, are appropriately reimbursed in accordance with the work performed rather than the clinician's occupation.

Action Request: Feedback to HHS/CMS

CMS recently requested information on scope of practice:

- "Medicare regulations that require more stringent supervision than existing state scope of practice laws, or that limit health professionals from practicing at the top of their license."
- Concerned about the patient safety implications of any proposal that would remove physician supervision from the anesthesia care.
- Submit comments to CMS on the importance of safe, high-quality physician-led anesthesia care by **JANUARY 17, 2020.**
  - Visit: **asahq.org/grassroots** or text "**CMSRequest**" to **855-465-8659**.

Section 1: Burden Reduction

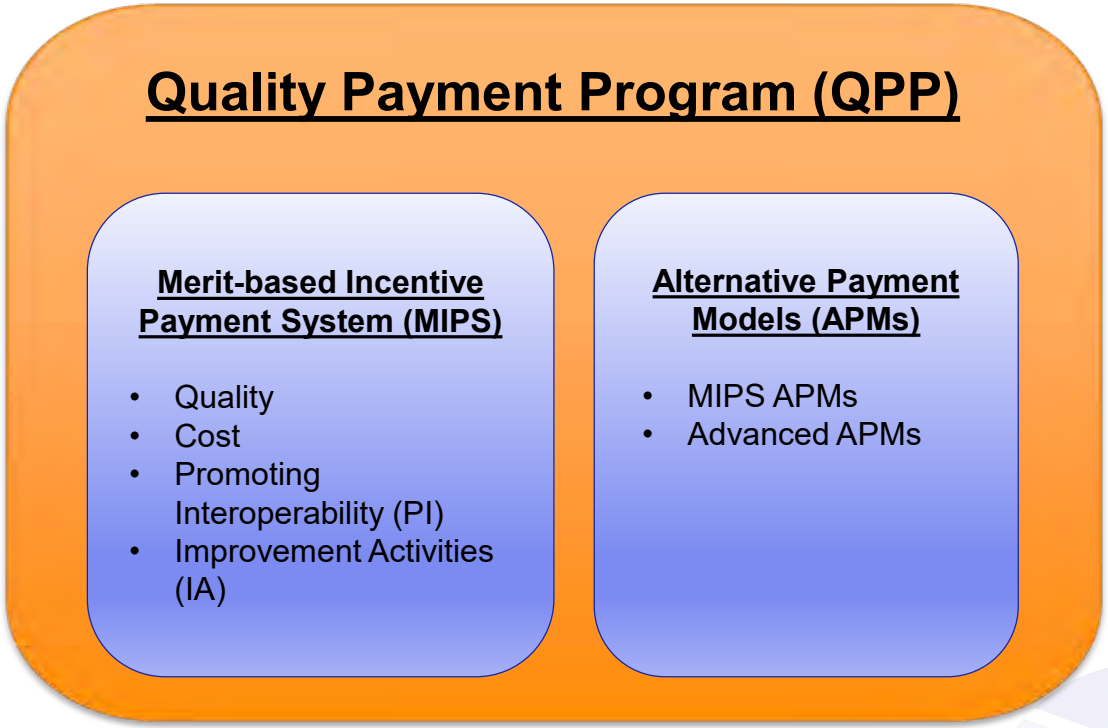
The general themes of burden reduction in the past three years has been:

- CMS and other agencies are making and implementing decisions that may alter your daily workflows and practice administration.
- Patients Over Paperwork is another term CMS uses for removing unnecessary or duplicative regulatory and billing requirements.
- Anyone can suggest a regulatory change to CMS.
- CMS has used the term “burden reduction” as a catchphrase for any change in regulation, regardless of whether burden is actually “reduced.”

Section 2: Quality Payment Program (CY 2020)

Quality Payment Program (QPP) pathways:

- Merit-based Incentive Payment System (MIPS)
  - Eligible clinicians and groups receive positive, neutral or negative payment adjustments
- Advanced Alternative Payment Models (Advanced APM)
  - Potential for 5% bonus for up to 6 years, depending on thresholds and definition



Section 2: Quality Payment Program (CY 2020)

		MIPS	Advanced APM	Partially Qualifying APM
Payment Update	July 2015-Dec. 2019	~~0.5%~~		
	2020 - 2025	**0%**		
	2026 & Beyond	0.25%	0.75%	0.25%
Bonuses and Penalties	2019	~~+4/-4 %~~	5% lump sum (2024 last year of bonus)	Not subject to any penalties and not eligible for any bonus payments
	2020	~~+5/-5%~~		
	2021	~~+7/-7%~~		
	2022	+9/-9% (2022 and beyond)		
	2023			
	2024			

Section 2: Quality Payment Program (CY 2020)

For the 2020 QPP, CMS focused on:

- “Reducing clinician burden”
- Stabilizing MIPS scoring features
- Increasing data completeness for quality measures
- Requiring more documentation and physician involvement for receiving credit in the improvement activities component
- Encouraging ECs and Groups to join APMs

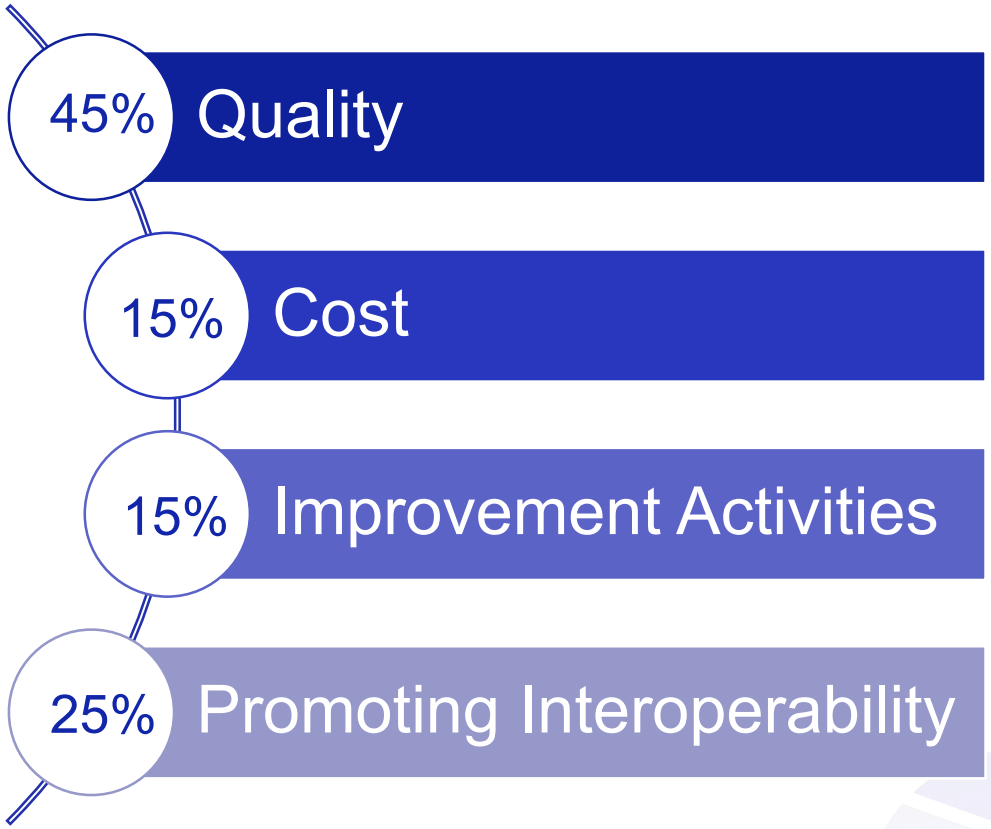
Section 2: Quality Payment Program (CY 2020)

In general, the MIPS components are weighted the same in 2020 as they were in 2019.

Cost component must be 30% by reporting year 2022.

2022 Payment adjustment based on 2020 performance and participation = **+ / - 9%**.

Component weights may change based on clinician special status.



Section 2: Quality Payment Program (CY 2020)

Two examples about burden reduction and the Quality Payment Program.

1. Quality measures available for reporting (Meaningful Measures Initiative)
2. Improvement Activities attestation requirements (Burden Reduction)

Section 2: Quality Payment Program (CY 2020)

Case Study #1: Meaningful Measures Initiative

CMS Goals Include:

1. Promote alignment across quality initiatives and programs to minimize burden.
2. Promote focused quality measure development toward outcomes that are meaningful to patients, families and providers
3. Identify highest priorities in improving healthcare
4. Assess how CMS delivers value – better care, smarter spending, healthier communities.

Section 2: Quality Payment Program (CY 2020)

Objectives for the meaningful measures initiative include a focus on measures that:

- Address areas that safeguard public health (think opioids)
- Are Patient-centered and meaningful to patients
- Are Outcome-based where possible
- Fulfill each program's statutory requirements
- Minimize documentation burdens
- Show significant opportunity for improvement
- Address population-based payment through alternative payment models
- Align across quality programs

Section 2: Quality Payment Program (CY 2020)

Meaningful Measures Initiative Challenges

1. More than three dozen MIPS measures removed since 2017; dozens of Qualified Clinical Data Registry (QCDR) measures removed.
2. CMS removed MIPS 426 and MIPS 427 anesthesiology transfer of care measures
3. Greater challenge for CMS to view anesthesia measures as meaningful to patients (few outcome measures, harder to attribute)
4. CMS reluctant to approve new quality measures for MIPS (not unique to anesthesiology)

Section 2: Quality Payment Program (CY 2020)

Meaningful Measures Initiative Opportunities

1. Approved MIPS 477: Multimodal Pain Management measure
2. Increased data completeness threshold from 60% to 70% of all cases
    a. May demonstrate greater gap in performance
    b. CMS sees this as a “burden reduction”
3. Implemented facility-based scoring for groups to have better opportunities to score higher in the quality and cost components

Section 2: Quality Payment Program (CY 2020)

***Anesthesiology Specialty Measure Set (2020)* is:**

1. MIPS #44: CABG: Preoperative Beta-Blocker in Patients with Isolated CABG Surgery
2. MIPS #76: Prevention of CVC-Related Bloodstream Infections*
3. MIPS #404: Anesthesiology Smoking Abstinence* (Intermediate Outcome)
4. MIPS #424: Perioperative Temperature Management* (Outcome)
5. MIPS #430: Prevention of PONV - Combination Therapy*
6. MIPS #463: Prevention of Post-Operative Vomiting (POV) – Combination Therapy (Pediatrics)*
7. **MIPS #477: Multimodal Pain Management***

* designates a "high priority" measure

Section 2: Quality Payment Program (CY 2020)

Case Study #2: MIPS Improvement Activities

- IA component has consistently been 15% of the total MIPS score
- Activities must be performed for a 90-day period
- Group must maintain documentation for six years
- Yes/No attestation ***through AQI***
- Before 2020, only one person in a group had to complete the activity

Changes for 2020:

- 15 IAs were removed; seven were modified and two were added
- 50% of ECs in a practice must participate and report the same IAs

Section 2: Quality Payment Program (CY 2020)

Improvement Activities there will be added in 2020:

- Drug Cost Transparency (Counseling to patients about cost of drugs)
- Tracking of clinician's relationship to and responsibility for a patient by reporting MACRA patient relationship codes

Improvement Activities that were modified or retired for 2020:

- Most changes reflected a consolidation of Qualified Clinical Data Registry-related and other improvement activities that were duplicative of other available improvement activities.

Section 2: Quality Payment Program (CY 2020)

In 2020, CMS requires that at least 50 percent of a group's National Provider Identifiers (NPIs) must perform the same activity for any continuous 90 days in the performance period.

- CMS recommends large groups and multispecialty groups participate in "general improvement activities."

ASA and AQI, along with other specialty societies opposed this regulatory change noting that it is a burden increase.

- We are concerned that CMS will increase this threshold in the future
- We are concerned that CMS is infringing on the business objectives and individual goals of groups participating in MIPS

Section 2: Quality Payment Program (CY 2020)

The top 5 Improvement Activities reported to AQI in 2018 were:

Activity ID	Improvement Activity
BE_13	Regularly assess the patient experience of care through surveys, advisory councils and/or other mechanisms.
PSPA_19	Implementation of formal quality improvement methods, practice changes or other practice improvement processes
BE_6	Collection and follow-up on patient experience and satisfaction data on beneficiary engagement
PSPA_7	Use of QCDR data for ongoing practice assessment and improvements
BE_1	Use of certified EHR to capture patient reported outcomes

Section 2: Quality Payment Program (CY 2020)

Beneficiary Engagement – 13 ("BE_13") Improvement Activity

- **2019 Description:** Regularly assess the patient experience of care through surveys, advisory councils and/or other mechanisms.
- **2019 Validation/Documentation:** Documentation (e.g. survey results, advisory council notes and/or other methods) showing regular assessments of the patient care experience to improve the experience, taking into account specific populations served and including them in this assessment, such as identified vulnerable populations. Surveys should be administered independently to the best extent possible.

Yes, CMS may audit on this criteria alone!

Section 2: Quality Payment Program (CY 2020)

But wait!

That doesn't sound like burden reduction!

That sounds like a burden increase on my group!

We believe that by Year 4 (2020 performance year) of the Quality Payment Program, clinicians should be familiar with the improvement activities performance category. We believe that increasing the minimum threshold for a group to receive credit for the improvement activities performance category will not present additional complexity and burden for a group. With over 100 improvement activities available for eligible clinicians to choose from in the improvement activities Inventory, which may be found at the Quality Payment Program website https://qpp.cms.gov/, that provide a range of options for clinicians seeking to improve clinical practice that are not specific to practice size, specialty, or practice setting. We believe that a group should be able to find applicable and meaningful improvement activities to complete that would apply to at least 50 percent of individual MIPS eligible clinicians in a group.

Section 2: Quality Payment Program (CY 2020)

Common Questions that a Group should ask about 2020 Improvement Activities choices:

1. What IAs reflect your current group initiatives and/or workflows?
2. Can more than 50% of your NPIs complete the task?
3. Can you document that the IA was completed?
4. Did you choose a minimum amount of IAs to complete to earn the 15% MIPS points?

Section 2: Quality Payment Program (CY 2020)

The general themes of burden reduction and the Quality Payment Program in 2020 is:

- Stability in QPP program scoring
- Emphasis on opioid-related measures and improvement activities that reflect general public health needs
- Future opportunities to link quality with improvement activities
- Increased data completeness threshold for quality measures
- Increased emphasis on improvement activity data collection, implementation and documentation

Section 3: Guidelines and Regulatory Burden

Burden reduction can also occur regardless of government intervention – what can be done with standard setting bodies, infection control and non-government organizations?

Where are the challenges to and opportunities for anesthesiologist leadership?

- Director of Anesthesia Services (DAS) responsibilities in hospitals
- Surgical attire and “dangling” masks
- Disposable equipment and Infection Prevention
- The “one-hour rule” and US Pharmacopeia (USP) <797>
- Spiked IV bags
- Personal Protective Equipment and USP <800>
- History and Physical Assessments (H&Ps)
- Many other issues affecting anesthesiologists and their groups

Section 3: Guidelines and Regulatory Bodies

CMS Conditions of Participation grant significant authority to Directors of Anesthesia Services (DAS).

> **§482.52 Condition of Participation: Anesthesia Services**
>
> **If the hospital furnishes anesthesia services, they must be provided in a well-organized manner under the direction of a qualified doctor of medicine or osteopathy. The service is responsible for all anesthesia administered in the hospital.**

Areas where anesthesia services may be furnished: operating room (inpatient and outpatient), obstetrical suite, radiology, clinics, emergency departments, psychiatry department, outpatient surgery areas, "special procedure areas" (e.g. endoscopy, pain management).

Section 3: Guidelines and Regulatory Bodies

Features of the DAS routinely include:

- Authority and responsibility for directing the administration of all anesthesia services, including anesthesia and analgesia, throughout the hospital (including all departments in all campuses and off-site locations where anesthesia services are provided)
- Protecting patient safety
- Ensuring compliance with federal and state laws governing anesthesia services
- Understanding hospital administration priorities and goals
- Engaging different departments in developing policy
- Identifying evidence-based resources and practice parameters to support policy positions
- Evaluating appropriateness of quality assessment and performance improvement

Section 3: Guidelines and Regulatory Burden

Recent guidelines, training, practice parameters and other decision points that ASA members have faced as Directors of Anesthesia Services.

1. Practice Parameters from other medical societies
    a. Surgical Attire (Association of periOperative Regsitered Nurses – AORN)
    b. Procedural Sedation (Emergency Medicine)
2. Training requirements
    a. Advanced Care Life Support training
    b. Completion of educational training
3. Opportunities for common interests
    a. Drug concentration standardization

Section 3: Guidelines and Regulatory Bodies

ASA has been successful in reducing burden in several areas:

Engagement with external stakeholders:

- AORN on Surgical Attire revisions
- Society for Healthcare Epidemiology in America on Infection Control
- Joint Commission FAQs / Future Accrediting Organization FAQs

Member Resources:

- “Principles for Hospital-based Moderate Sedation, Analgesia and Anesthesia”
- ASA Practice Parameter on Surgical Attire
- Guide for Anesthesia Department Administration

Section 3: Guidelines and Regulatory Bodies

But more work needs to be done:

1. Appropriate interpretation of surgical attire locally
2. Appropriate interpretation of USP <797> (Joint Commission)
3. Appropriate understanding of spiked IV bags (Joint Commission)
4. Removal of certain drugs for NIOSH Hazardous Drug list
5. Changes to the Conditions of Participation regarding History and Physical Examinations (H&Ps)
6. Collaborating with medical society stakeholders on burden reduction

Section 3: Guidelines and Regulatory Bodies

In general, guideline development by external stakeholders affect anesthesiologist workflows each day.

- Director of Anesthesia Services is a position within hospitals and other settings that can and should set the tone for patient safety and use of evidence-based guidelines.
- ASA provides guidance documents and practice parameters that groups should use to develop policy.
- Contact Quality and Regulatory Affairs (QRA) at qra@asahq.org for additional areas where you believe we can reduce anesthesiologist burden

Learning Objectives

1. Describe the goals of federal regulatory policy on burden reduction as it relates to healthcare and patient safety.
2. Identify three federal policy decisions related to burden reduction on the Quality Payment Program and the Conditions of Participation.
3. Explain the impact that standard setting organizations and medical society guidelines and standards have on facility accreditation, physician workflow and regulatory burden.

QRA Contact Information / Questions

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Twitter: @profmattp

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ASA Website ("Quality Improvement"):
https://www.asahq.org/quality-and-practice-management/quality-improvement

*****

Department E-mail Address: qra@asahq.org

EMORY UNIVERSITY SCHOOL OF MEDICINE | Department of Anesthesiology

Rethinking Penicillin Allergies in the Perioperative Period: An Opportunity for Stewardship

Francis A. Wolf, MD
Assistant Professor, Department of Anesthesiology
Emory University School of Medicine

Disclosures: No conflicts of interest

Learning Objectives

- Describe how a penicillin allergy listing impacts surgical patients
- Cite the basis of cefazolin's lack of cross-reactivity with other beta-lactam agents
- Describe a focused allergy assessment to determine the presence of a severe delayed reaction
- Describe the importance of a multi-disciplinary approach in perioperative antibiotic stewardship

Stewardship / ˈstu ərd ʃɪp, ˈstyu- /

(n) the responsible overseeing and protection of something considered worth caring for and preserving

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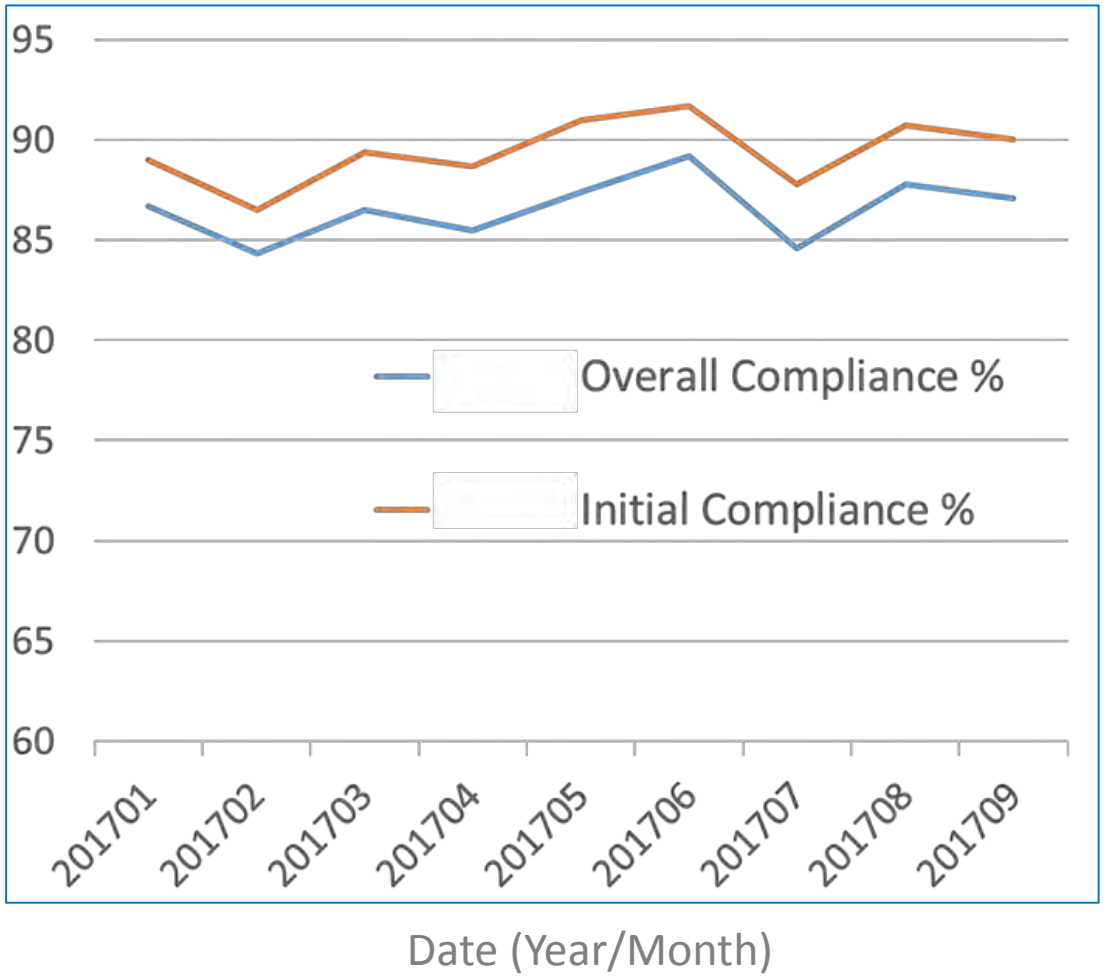
a coordinated program that promotes the appropriate use of antimicrobials (including antibiotics), improves patient outcomes, reduces microbial resistance, and decreases the spread of infections caused by multidrug-resistant organisms. https://apic.org/

Perioperative Antibiotics and SSI: Room for Improvement

- Inconsistencies:
  - Selection
  - Timing of the initial dose and subsequent doses
- Failed compliance linked to:
  - Increased risk of surgical site infection and post-operative sepsis

EUH Antibiotic compliance: overall and initial dosing



Major Changes in Our Approach to Perioperative Antibiotics

1. Primary responsibility for antibiotic selection transferred to Anesthesiology
2. **Antibiotic standardization** (recommendations from ID and pharmacy)
   - **Cefazolin** for most cases, cefuroxime in cardiothoracic cases
     - Active against common skin flora, bactericidal, rapid concentrations in tissues
   - Metronidazole added to cover gut flora
   - Vancomycin added if increased MRSA risk
   - Vancomycin or clindamycin as alternative agent
3. Most common agents made available in OR
4. **Personalized feedback** on compliance

Antibiotics Standardized by Surgical Case

Ordered Item DESC	Primary Antibiotic	Secondary Antibiotic
Abdominal Aortic Aneurysm By/Endo Stent	Cefazolin	Vancomycin. Add Gent if abdominal aorta or groin incision
Abdominal Aortic Aneurysm Bypass Graft	Cefazolin	Vancomycin. Add Gent if abdominal aorta or groin incision
Abdominal Biopsy	Ask Proceduralist if Necessary	
Abdominal Exploration/Revision	Cefazolin + Flagyl	Clindamycin + Aztreonam
Abdominal Fistula Tractotomy	Cefazolin + Flagyl	Clindamycin + Aztreonam
Abdominal Fistula Tractotomy Lap	Cefazolin + Flagyl	Clindamycin + Aztreonam
Abdominal I&D	Cefazolin + Flagyl	Clindamycin + Aztreonam
Abdominal I&D w/Wound Vac	Cefazolin + Flagyl	Clindamycin + Aztreonam
Abdominal Mass/Soft Tissue Excision	Ask Proceduralist if Necessary	
Abdominal Mesh Removal	Cefazolin + Flagyl	Vancomycin + Aztreonam
Abdominal Perineal Resection	Cefazolin + Flagyl	Vancomycin + Aztreonam
Abdominal Wall Reconstruction	Cefazolin + Flagyl	Clindamycin + Aztreonam
Abdominal Wall Resection	Cefazolin	Vancomycin

Dear Francis,

We are pleased to be providing your individualized monthly feedback on perioperative antibiotic prophylaxis. We appreciate your hard work and willingness to improve care to our patients.

Your overall compliance across sites (if applicable) for 11/01/2019 to 11/30/2019

Total # of Cases	Total Attributed Cases	Overall Compliance	Compliant with Initial Dose	Compliant with Redose
32	30	96.7 (29/30)	96.7 (29/30)	100.0 (8/8)

Dear Francis,

The Emory Healthcare Quality Committee changed how we define and monitor successful surgical antibiotic prophylaxis.

In our ongoing automated reviews, we identified a discrepancy in the antibiotic prophylaxis for one or more cases. We are providing the information below for your review:

MRN:
Patient Name:
Procedure: Arm Lesion Excision/Destruction

Anesthesia Start	2019-10-14 12:24:17
Surgery Start	2019-10-14 12:43:00
Surgery Stop	2019-10-14 13:46:00
Anesthesia Stop	2019-10-14 14:04:00

Reason: Failed Antibiotic Compliance On Initial Dose

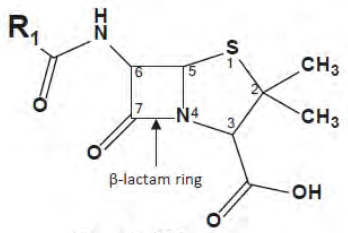
Explanation: CEFAZOLIN initial dose administered at 10-14-2019 12:54. This was outside of the compliance window 10-14-2019 11:43 to 10-14-2019 12:43.

What About Patients with a Penicillin Allergy?

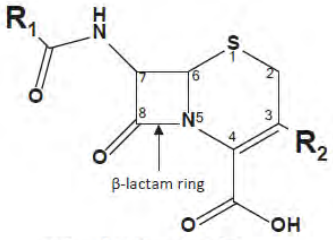
- About 10% of the US population reports a penicillin allergy (Zhou 2016, Lee 2000, Shenoy 2019)

  The exact reaction is rarely documented in the medical record

- Providers may avoid cephalosporins due to concerns about cross-reactivity (Epstein 2016)



Penicillin



Cephalosporin

Cephalosporins

First-Generation	Second-Generation	Third-Generation	Fourth-Generation	Fifth-Generation
• Cephalothin • Cefazolin • Cephalexin • Cephradine	• Cefamandole • Cefaclor • Cefuroxime • Cefonicid • Cefoxitin • Cefotetan	• Cefotaxime • Ceftazidime • Cefoperazone • Ceftizoxime • Ceftriaxone • Cefixime	• Cefepime	• Ceftaroline

10% cross-reactivity?

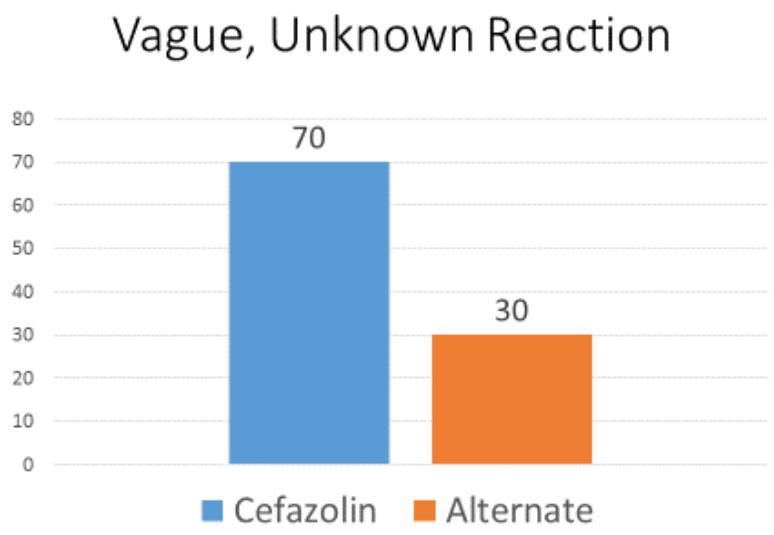
Institutional guidelines:
Use secondary antibiotic in cases of “severe” reactions

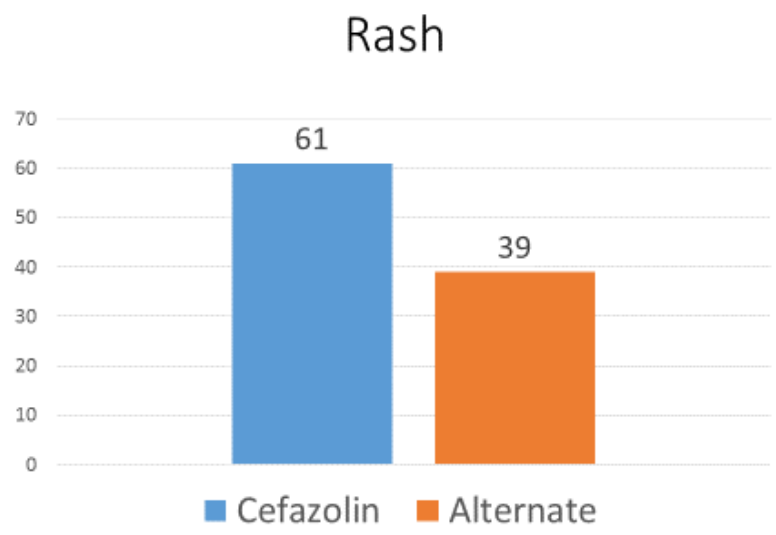
Types of Reactions

- Unknown
- Not a true allergy
  - Family history, GI symptoms
- Benign rash
- IgE mediated reaction
- Severe delayed reactions
  - Severe cutaneous adverse reaction (SJS, TEN, DRESS)
  - Serum sickness, drug fever
  - Organ specific injury (nephritis, hepatitis, hemolytic anemia)

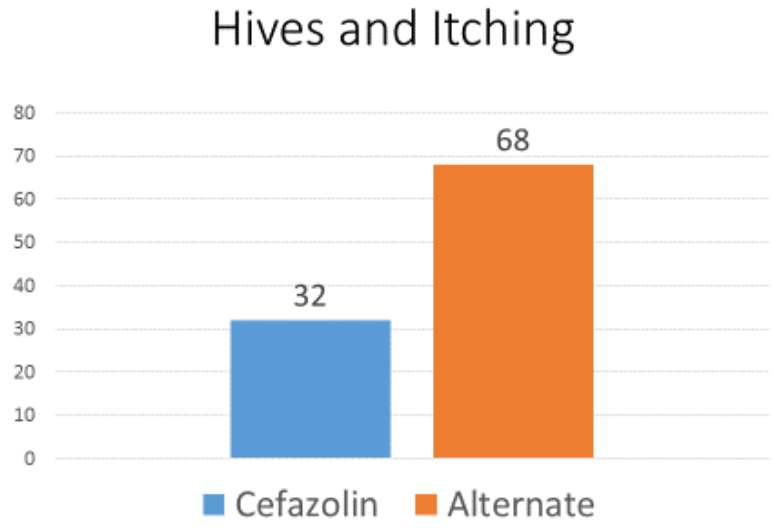
Shenoy, Macy, Rowe. JAMA 2019.

Antibiotic Selection in Patients with PCN allergy

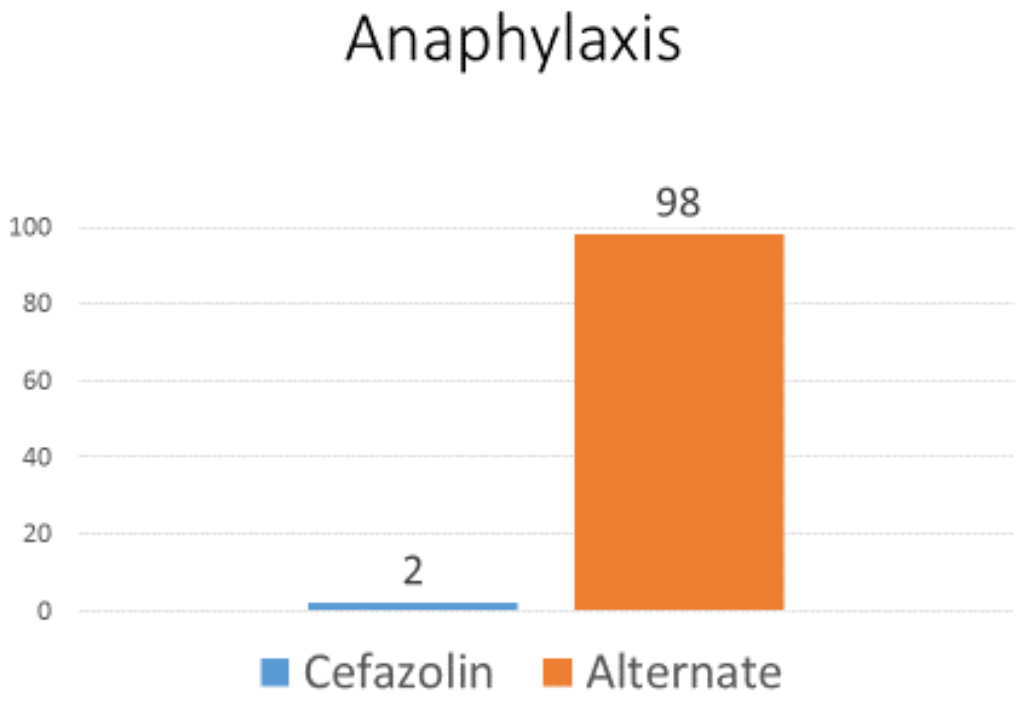


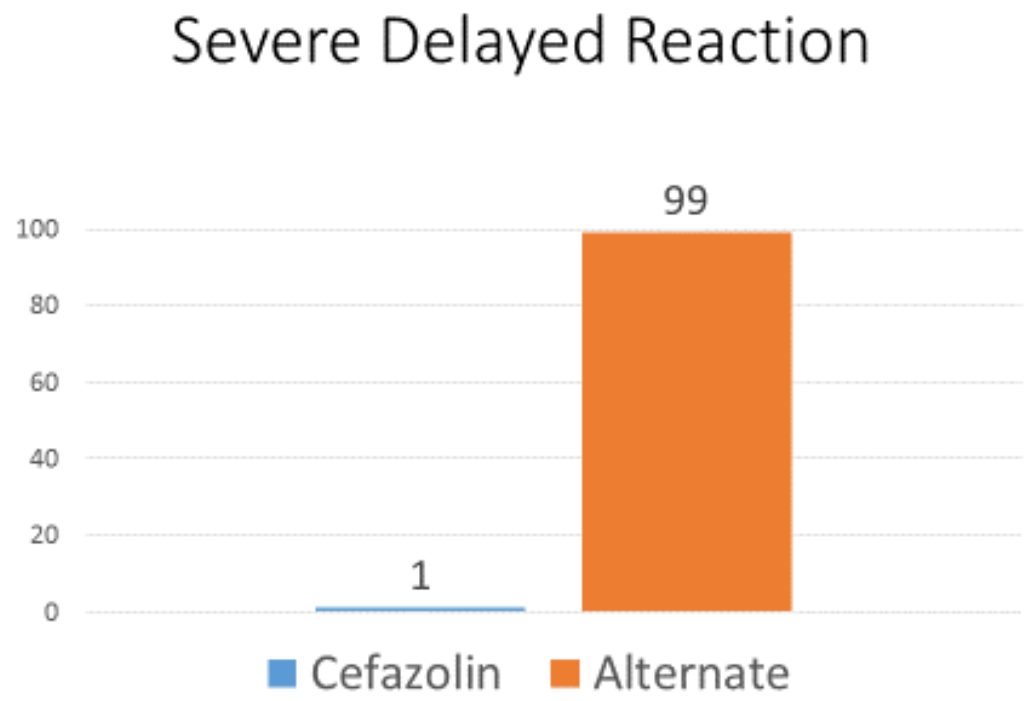


Survey of Emory anesthesia providers 2018 (n = 93)



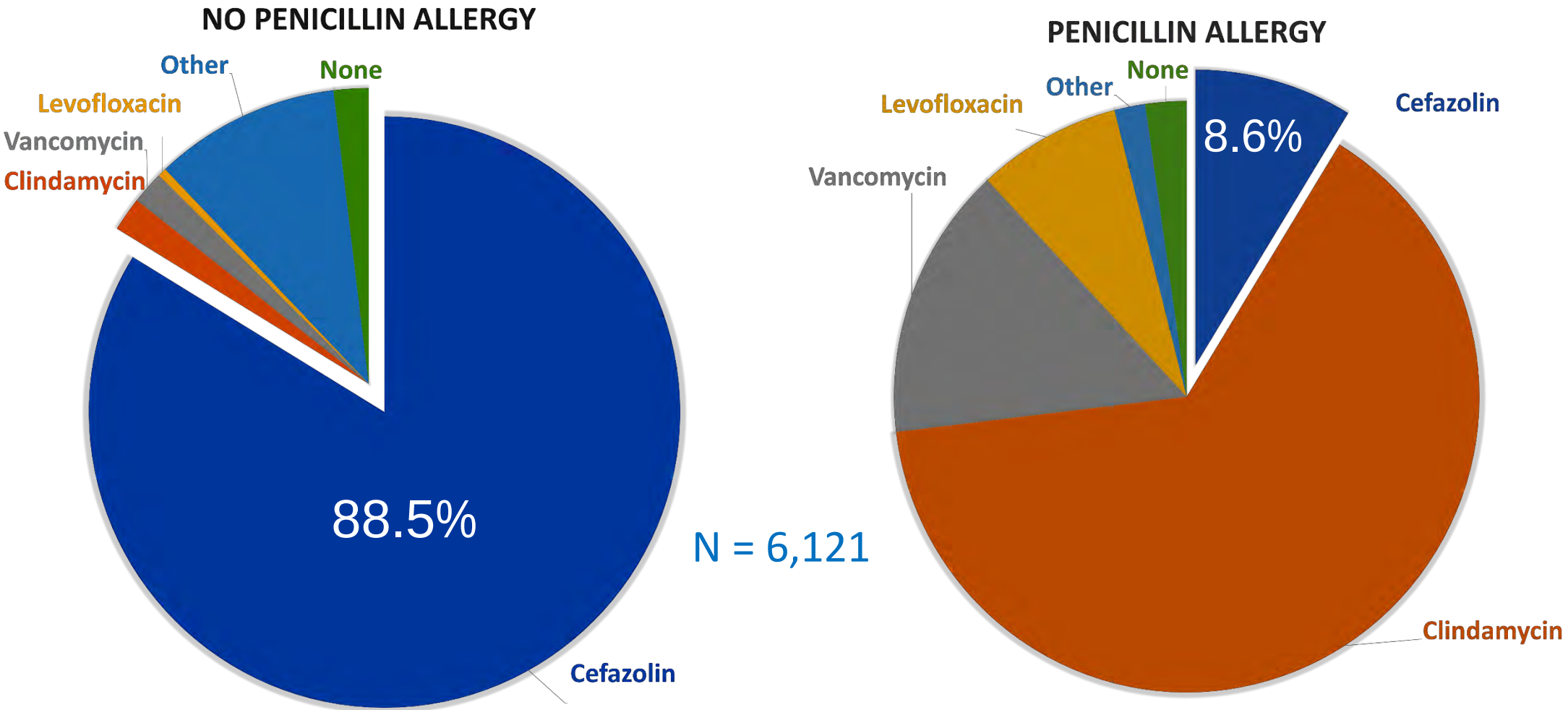
Antibiotic Selection in Patients with PCN allergy





Prophylactic Antibiotic Selection: EUH Case Review

2013-2017



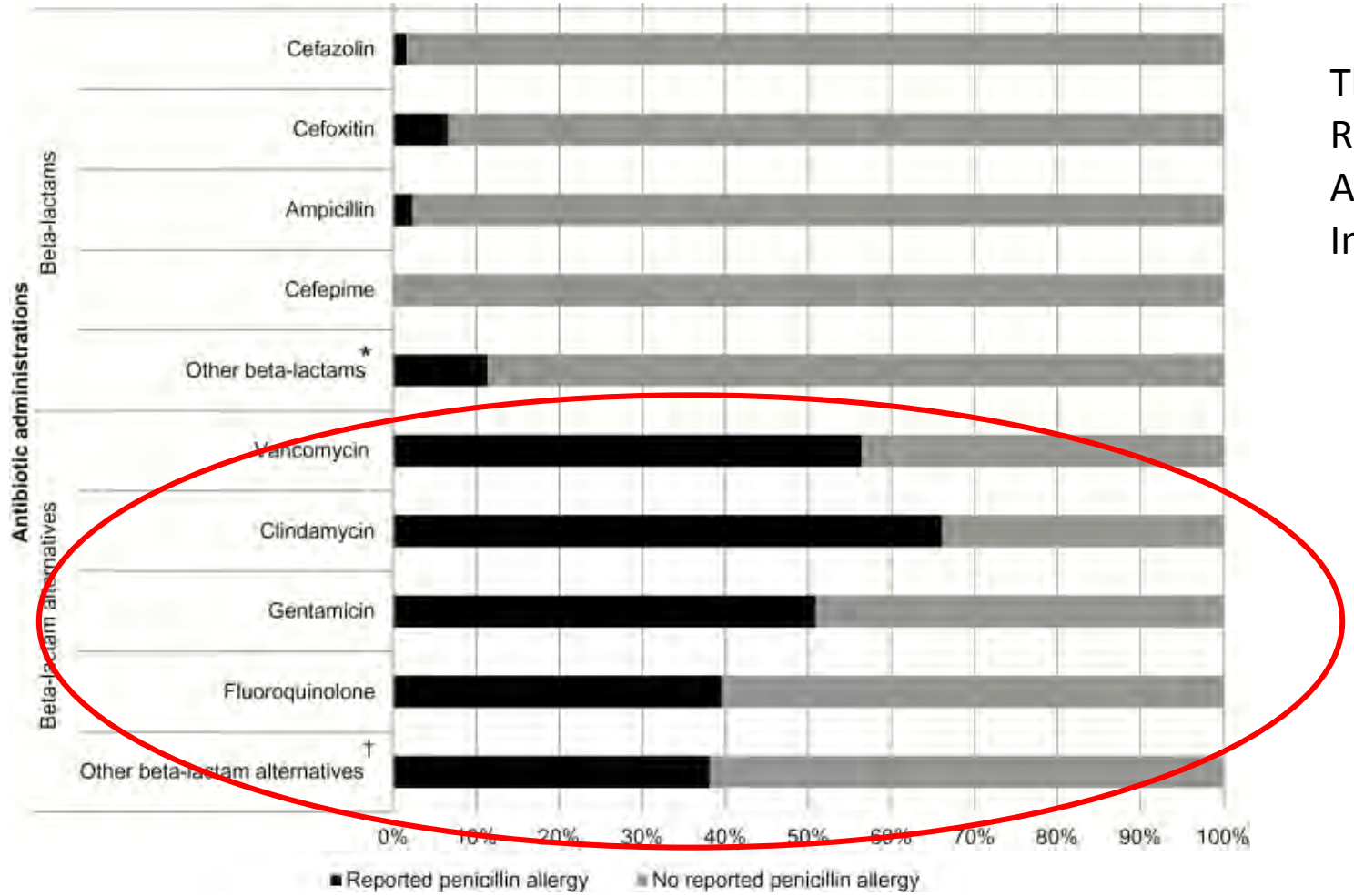
Langfitt, Mudda, Iorianni, Yao, Bowman, Lee, Amoateng, O'Reily-Shah, Lynde, Wolf. Compliance and Complications Associated with Penicillin Allergies in Surgical Patients. Presented at the ASA Annual Meeting, 2018 (Abstract presentation)

Patients with PCN Allergy Listing Receive Second-Line Antibiotics

	PCN ALLERGY (%)	NO PCN ALLERGY (%)	P-value
CEFAZOLIN	12.2	92.%	<0.001
CLINDAMYCIN	48.8	3.1	<0.001
VANCOMYCIN	34.7	3.3	<0.001
GENTAMYCIN	24.0	2.8	<0.001
FLOUROQUINALONES	6.8	1.3	<0.001

Blumenthal et al. The Impact of a Reported Penicillin Allergy on Surgical Site Infection Risk Clin Infect Dis. 2018 Feb 1; 66(3): 329–336.

Most Alternative Antibiotic Use is in Penicillin Allergic Patients



The Impact of a Reported Penicillin Allergy on Surgical Site Infection Risk

Clin Infect Dis. 2018 Feb 1; 66(3): 329–336.

N=9004

Key Fact 1

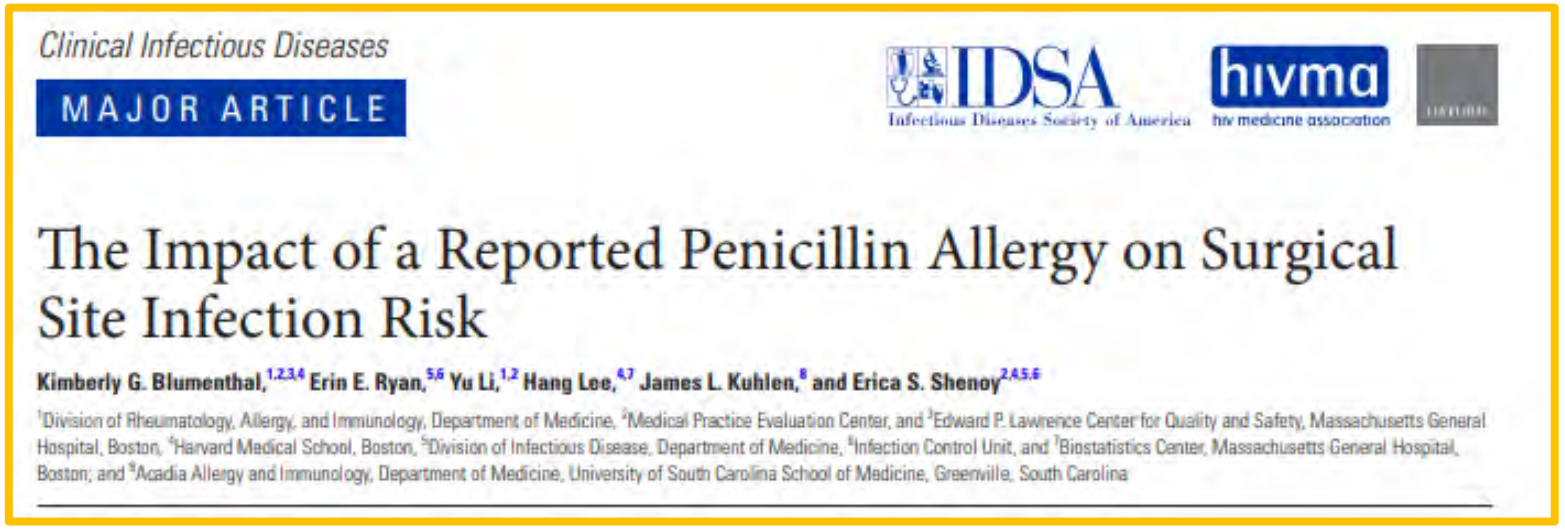
- Patients with a penicillin allergy listing are more likely to get second line agents

Due to concerns for cross-reactivity with cephalosporins

1. What are the consequences of second line agents?
2. Are the cross-reactivity concerns justified?

Reported Penicillin Allergy is Associated with Increased SSI

- Patients reporting a penicillin allergy had increased odds (adjusted odds ratio, 1.51; 95% confidence interval, 1.02–2.22) of SSI.
- Entirely mediated by receipt of alternative perioperative antibiotic
- NNT = 112-124 to prevent 1 SSI.



Blumenthal et. al. Clin Infect Dis. 2018 Feb 1; 66(3): 329–336.

Failed Compliance and SSI Associated with PCN Allergy Label

Failed compliance with first dose:

- 8.8% without a penicillin allergy
- 16.2% with a penicillin allergy (p = <.001)

	No PCN Allergy n=8503	PCN Allergy n=1445	P– Value
Superficial SSI, wound disruption	247 (2.9%)	62 (4.3%)	0.007
Deep or organ space infection, sepsis or septic shock	543 (6.4%)	114 (7.9%)	0.04
Any SSI or sepsis	725 (8.5%)	161 (11.1%)	0.002

Langfitt, Mudda, Iorianni MD et al. ASA 2018 (Abstract presentation)

Drawbacks to Common Second-Line Alternatives

Vancomycin:

- Not ideal coverage for:
  - MSSA, Strep species: SSIs 3.7% vs 1.3% of patients receiving cefazolin
- No gram negative coverage
- Prolonged infusion time, can cause delays or inappropriate timing
- Renal toxicity; need for drug levels
- “Red man syndrome”
- Often overly broad-spectrum

Clindamycin:

- Theoretically has MRSA coverage but:
  - Only 60% of isolates within the Emory system are susceptible
- Also increasing resistance for:
  - MSSA (75% susceptible)
  - Coag-negative staph (57% susceptible)
  - Strep species (70% susceptible)
- Increased *C. difficile* risk
- Microbiome disruption

Other Complications Associated with PCN Allergy

- C. Difficile risks: 23% increased odds
- MRSA colonization or infection: 14% increased odds
- VRE colonization or infection: 30% increased odds

Patients with PCN “allergy” spent more days in the hospital compared to matched controls (n=51,582)

PCN “allergy” associated with increased healthcare costs

Macy E, Contreras R. Health care use and serious infection prevalence associated with penicillin “allergy” in hospitalized patients: a cohort study. J Allergy Clin Immunol 2014; 133:790–6.

J Allergy Clin Immunol Pract. 2018 Sep - Oct;6(5):1649-1654.e4. doi: 10.1016/j.jaip.2017.12.033. Epub 2018 Jan 31. The Cost of Self-Reported Penicillin Allergy: A Systematic Review.

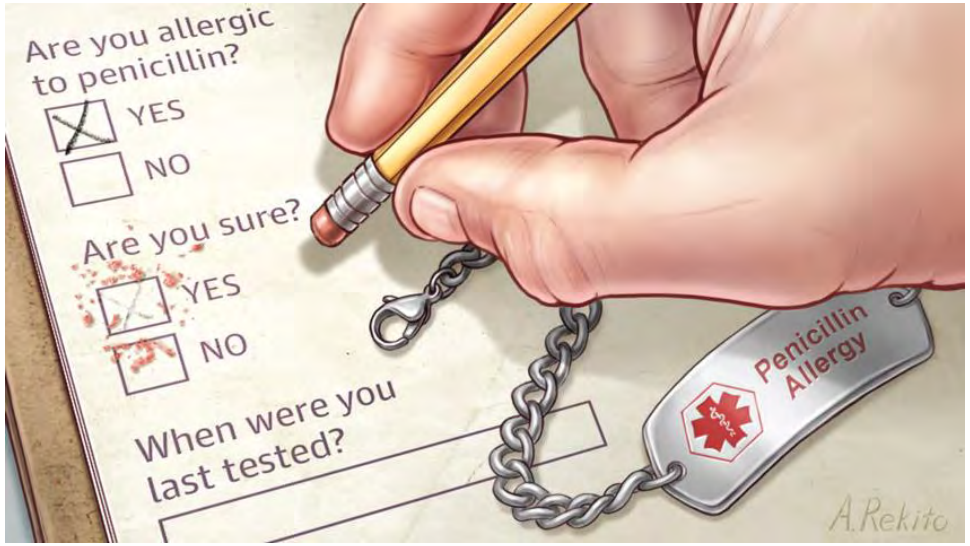
Key Fact 2

- Second line antibiotics are associated with negative outcomes

Can we safely reduce our use of second line agents?

PCN Allergy is Less Common Than Thought

- 90% to 99% of patients reporting being allergic to penicillin can tolerate penicillins
  - misclassification of reaction: side effects, intolerances, preference, rash related to viral illness
  - natural waning of type I (IgE) allergy: 80% of patients become tolerant after a decade



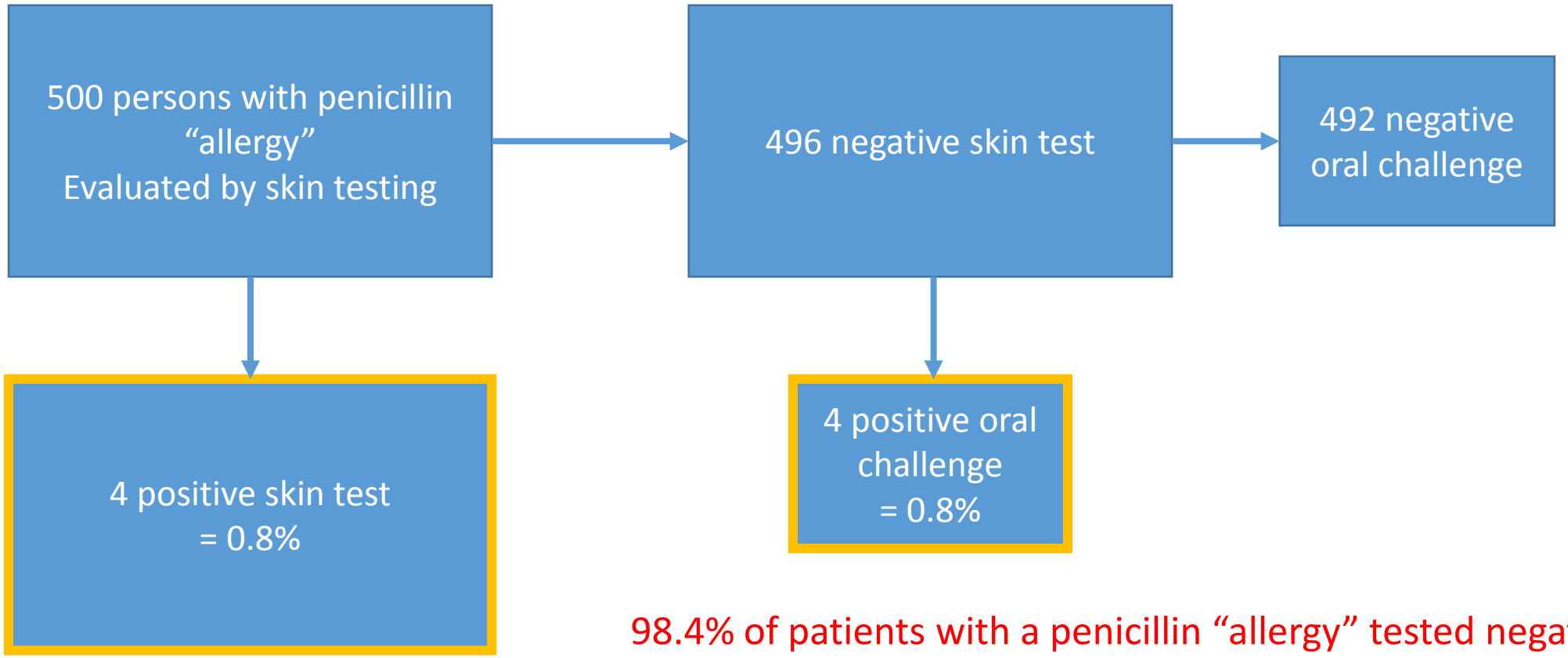
JAMA Network

Blumenthal KG, Shenoy ES, Varughese CA, Hurwitz S, Hooper DC, Banerji A. Impact of a clinical guideline for prescribing antibiotics to inpatients reporting penicillin or cephalosporin allergy. Ann Allergy Asthma Immunol 2015;115: 294-300.e2

Original Article

Safely Diagnosing Clinically Significant Penicillin Allergy Using Only Penicilloyl-Poly-Lysine, Penicillin, and Oral Amoxicillin

Eric Macy, MS, MD[a], and Eunis W. Ngor, MS[b] *San Diego and Pasadena, Calif*



98.4% of patients with a penicillin "allergy" tested negative to skin test and oral challenge

Macy E, Ngor EW. J Allergy Clin Immunol. 2013; 1:258-63.

Are You Sure You're Allergic?

Allergy & Immunology > Allergy

Patients Who Say They're Allergic to Penicillin Are Usually Wrong

— All "allergic" patients should be evaluated, review concludes

U.S.News & World Report | CIVIC » | Best Countries | Best States | Healthiest Communities

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Penicillin Allergy Less Common Than Thought: Study

Nov. 25, 2019, at 4:00 p.m.

an estimated 30 million Americans think they're allergic to this lifesaving drug when they are not.

Think You're Allergic to Penicillin? You're Probably Not

NEWS | Oct 30, 2019 | Original story from University of Georgia

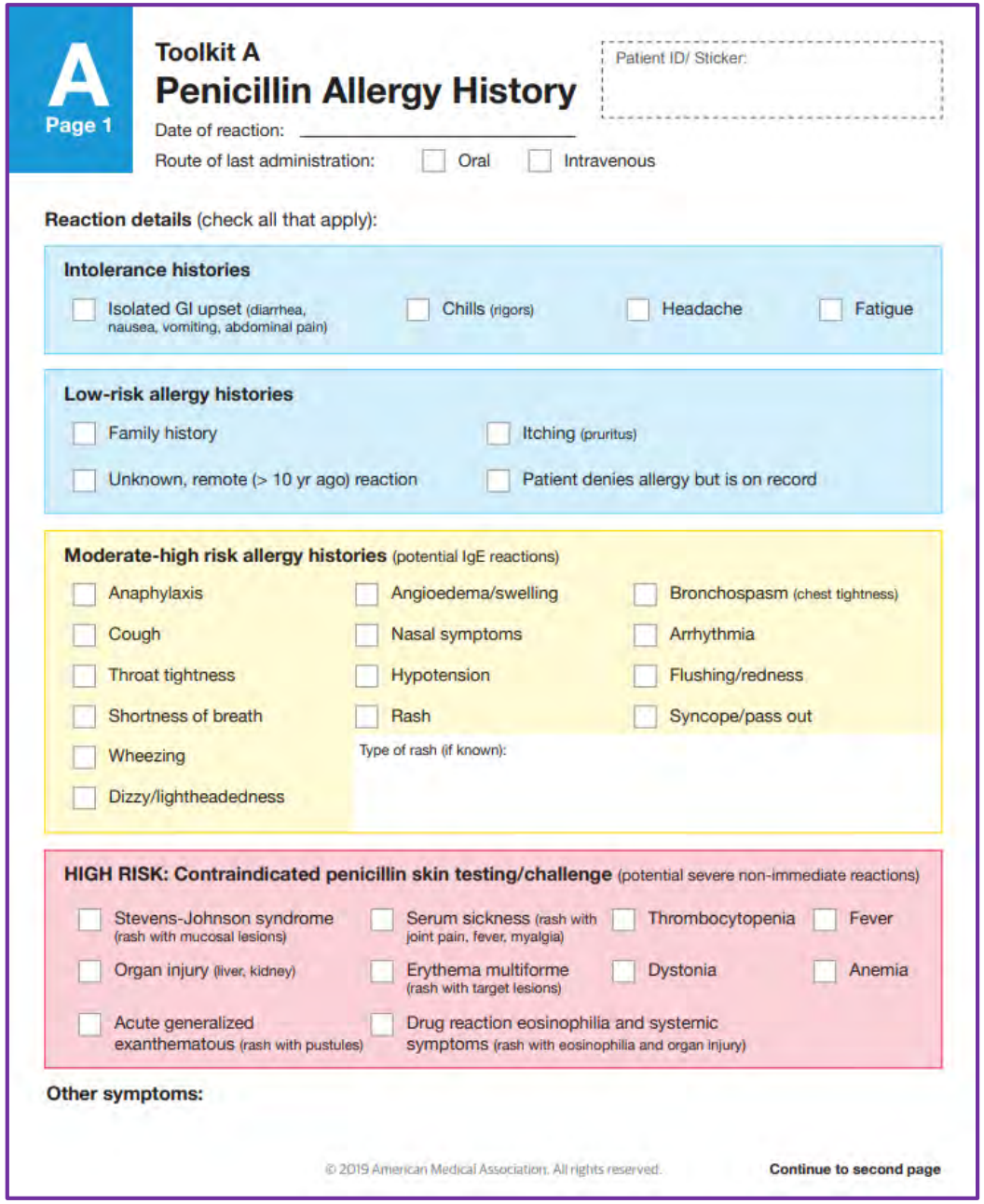
Key Fact 3

- Most patients with a penicillin allergy label do not have a penicillin allergy

Should we try to identify patients with "real" allergies?

Allergy History

- Unknown
- Not a true allergy
  - Headache, isolated GI symptoms
- Benign rash?
- IgE mediated reaction
- Severe delayed reactions
  - Severe cutaneous adverse reaction (SJS, TEN, DRESS)
  - Serum sickness, drug fever
  - Organ specific injury (nephritis, hepatitis, hemolytic anemia)



A
Page 1

Toolkit A
Penicillin Allergy History

Patient ID/ Sticker:

Date of reaction: _____

Route of last administration: ☐ Oral ☐ Intravenous

Reaction details (check all that apply):

Intolerance histories

☐ Isolated GI upset (diarrhea, nausea, vomiting, abdominal pain) ☐ Chills (rigors) ☐ Headache ☐ Fatigue

Low-risk allergy histories

☐ Family history ☐ Itching (pruritus)

☐ Unknown, remote (> 10 yr ago) reaction ☐ Patient denies allergy but is on record

Moderate-high risk allergy histories (potential IgE reactions)

☐ Anaphylaxis ☐ Angioedema/swelling ☐ Bronchospasm (chest tightness)

☐ Cough ☐ Nasal symptoms ☐ Arrhythmia

☐ Throat tightness ☐ Hypotension ☐ Flushing/redness

☐ Shortness of breath ☐ Rash ☐ Syncope/pass out

☐ Wheezing Type of rash (if known):

☐ Dizzy/lightheadedness

HIGH RISK: Contraindicated penicillin skin testing/challenge (potential severe non-immediate reactions)

☐ Stevens-Johnson syndrome (rash with mucosal lesions) ☐ Serum sickness (rash with joint pain, fever, myalgia) ☐ Thrombocytopenia ☐ Fever

☐ Organ injury (liver, kidney) ☐ Erythema multiforme (rash with target lesions) ☐ Dystonia ☐ Anemia

☐ Acute generalized exanthematous (rash with pustules) ☐ Drug reaction eosinophilia and systemic symptoms (rash with eosinophilia and organ injury)

Other symptoms:

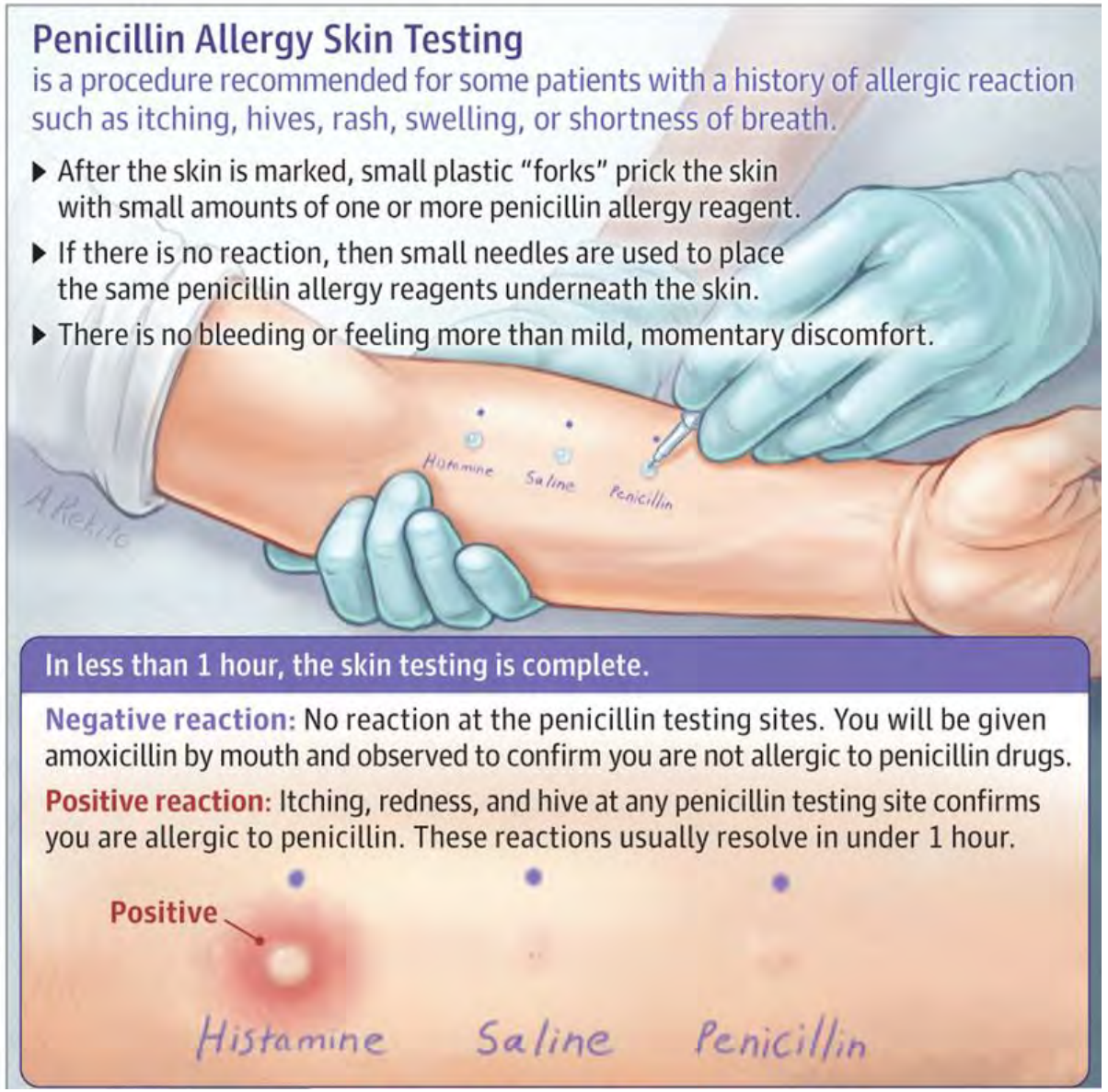
Continue to second page

Shenoy, Macy, Rowe. JAMA 2019.

What About Skin Testing?

- Fairly simple
- Effective
- Available
- Allows for de-listing

Testing for penicillin allergy is recommended by the CDC and multiple professional societies



Shenoy ES, Macy E, Rowe T, Blumenthal KG. Evaluation and management of penicillin allergy: a review [published January 15, 2019]. JAMA. doi:10.1001/jama.2018.19283

The effect of preoperative penicillin allergy testing on perioperative non-beta-lactam antibiotic use: A systematic review and meta-analysis

"preoperative testing protocols significantly decreased the rates of prescribing non-beta-lactam antibiotics compared with usual care (odds ratio 3.64 [95% confidence interval, 2.67-4.98]; p < 0.0001)."

Reilly, Clifford A.; Backer, Grant; Basta, Danielle; Riblet, Natalie B. V.; Hofley, Pamela M.; Gallagher, Megan C. Allergy and Asthma Proceedings, Volume 39, Number 6, November/December 2018, pp. 420-

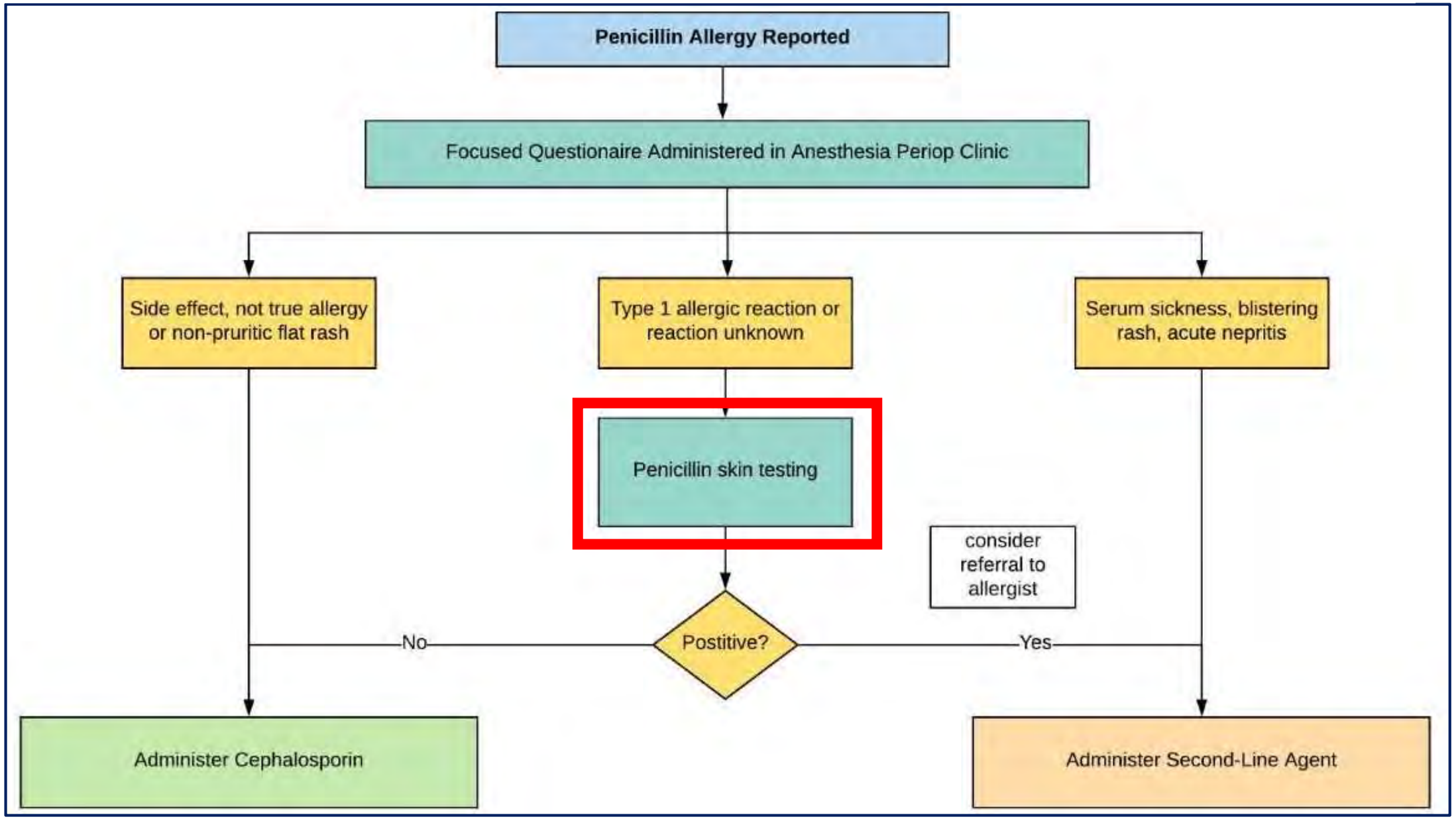
Safety and effectiveness of a preoperative allergy clinic in decreasing vancomycin use in patients with a history of penicillin allergy

Miguel Park, MD; Patricia Markus, RN; Damir Matesic, MD; and James T. C. Li, MD

Annals of Allergy, Asthma & Immunology 97(5) 681-687. 2006.

1,111 patients, 1,030 (93%) underwent skin testing for penicillin allergy. Forty-three (4%) had a positive skin test result to penicillin. 75% of patients received cefazolin, and only 149 (16%) received vancomycin compared with 30% historical controls (P < .01).

Proposal for New Approach



Barriers to Preoperative Skin Testing

- Logistics
- Time
- Training
- Materials
- Consent
- Documentation, communication
- Not all patients come through the Preop Clinic

Oral challenge is needed to confirm negative skin test (1 hour, can be harder to interpret)

Expert Consult…

What medications are you giving in the OR?

Mostly cefazolin, some cefuroxime

I don’t think you need to bother with the skin testing

Why not?

Cefazolin is safe *even in patients with severe IgE reactions to penicillin, including anaphylaxis*

What?

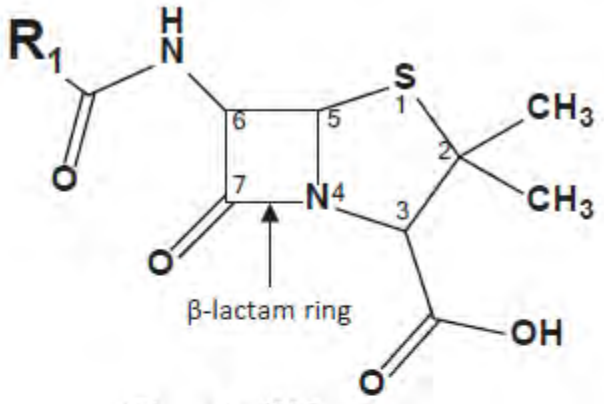
SPECIAL ARTICLE

Misconceptions Surrounding Penicillin Allergy: Implications for Anesthesiologists

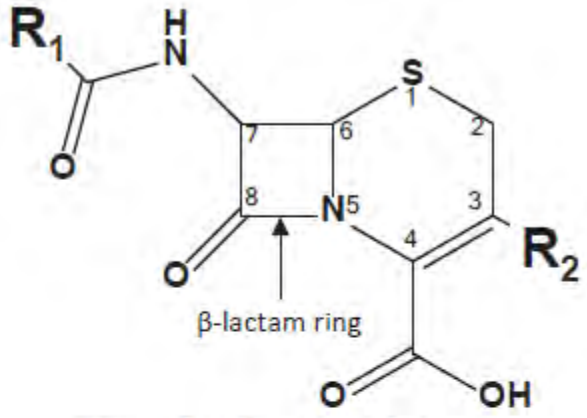
Leon Vorobeichik, MD,* Elizabeth A. Weber, MD, FRCPC,†‡ and Jordan Tarshis, MD, FRCPC*§

Anesth Analg. 2018 Sep;127(3):642-649.

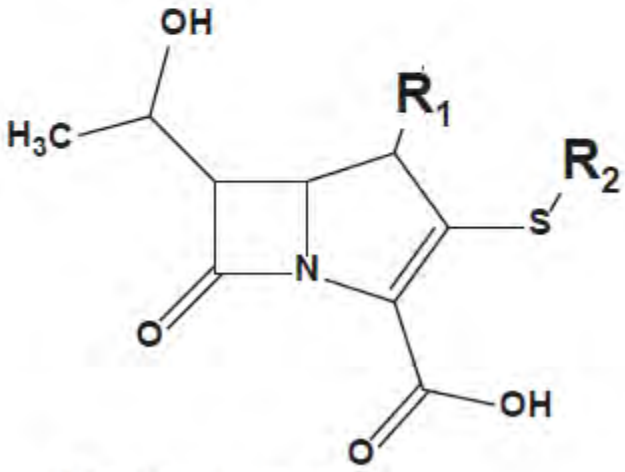
Beta Lactam Antibiotics



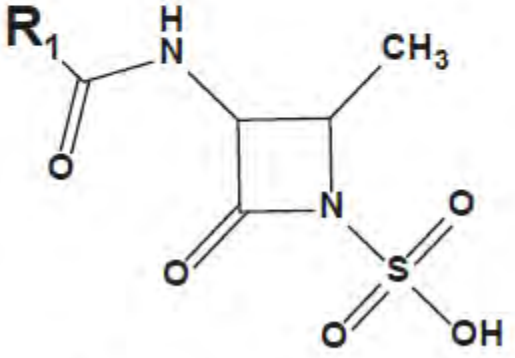
Penicillin



Cephalosporin



Carbapenem



Monobactam

J Allergy Clin Immunol Pract Vol 6 (1) Zagursky

The Beta Lactam Ring is Not the Major Determinant of Allergies

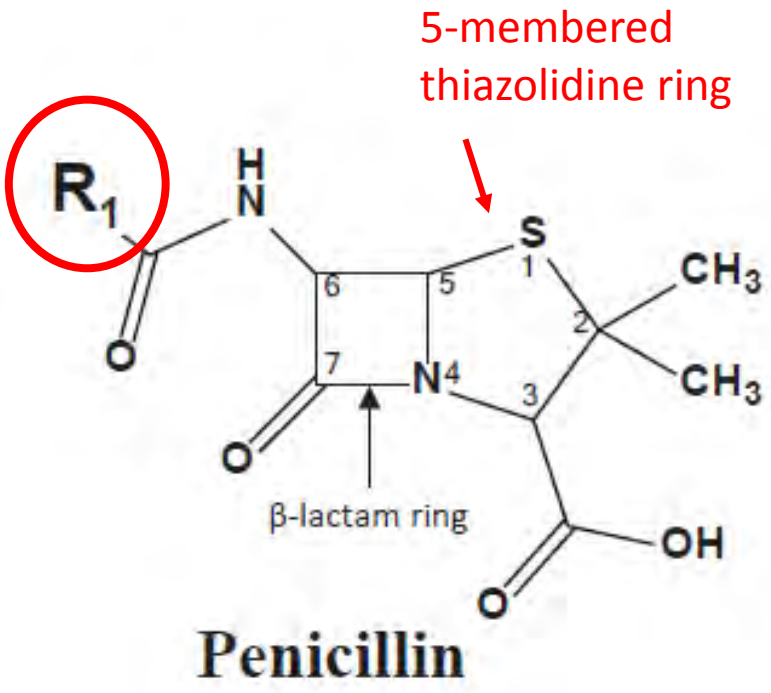
Among patients with a positive PCN skin test who are exposed to carbapenem, the reaction rate was 0.8-1%

= Consistent with unique (separate) sensitivity

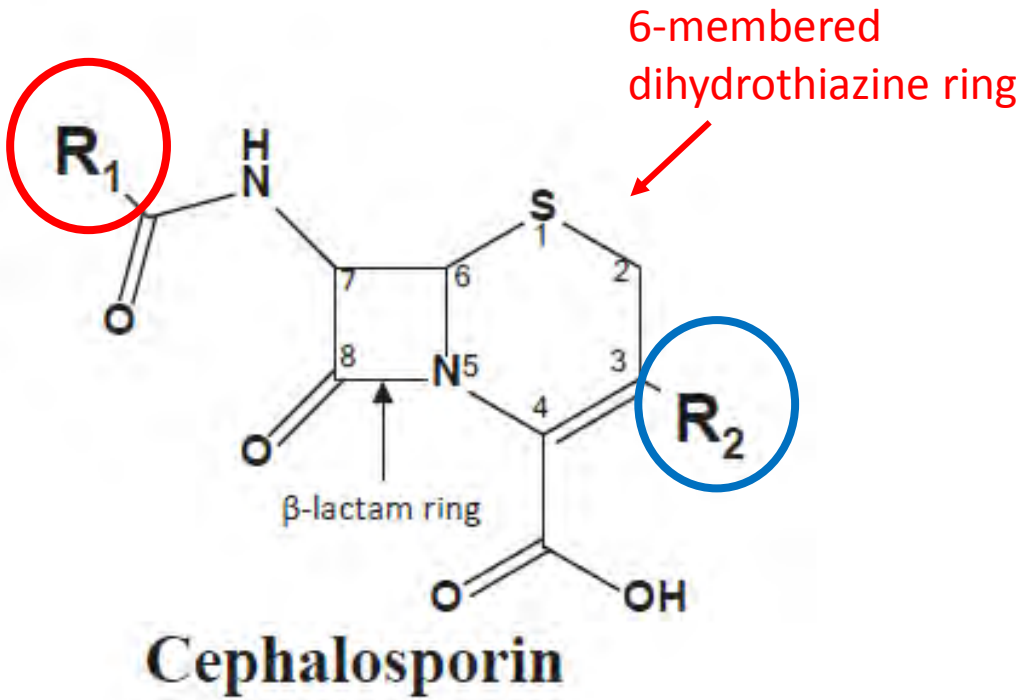
Skin and *in vitro* tests have established IgE response is directed towards the R1 side chain

Zagursky. J Allergy Clin Immunol Pract 2018

Penicillin *vs.* Cephalosporin: Structure



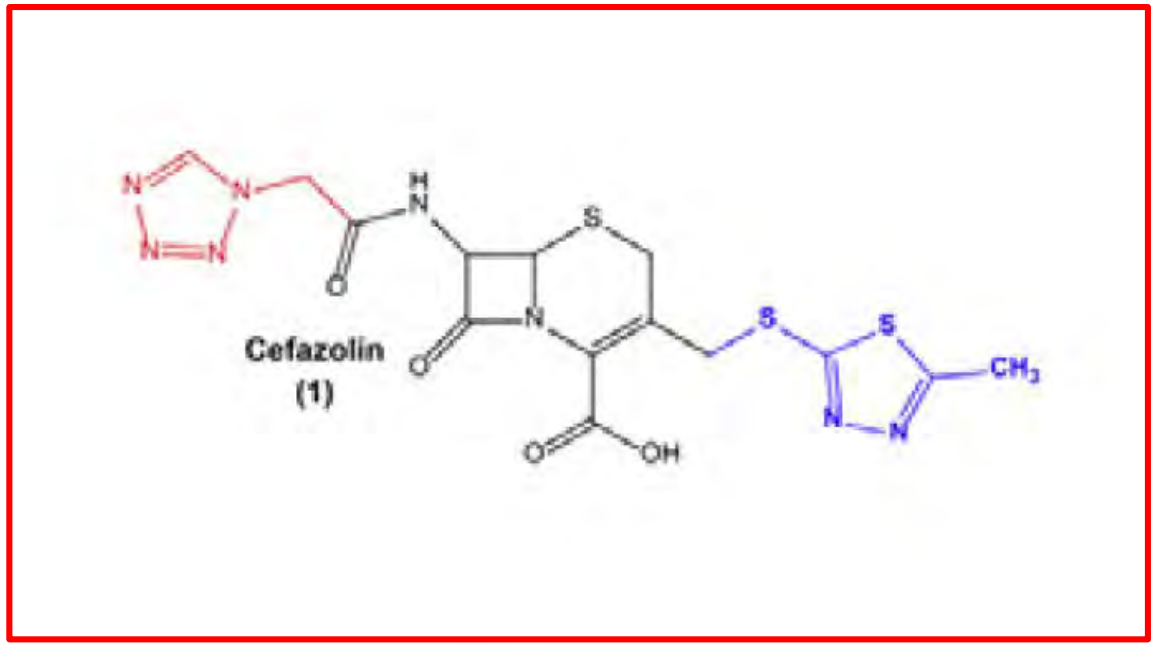
Penicillin

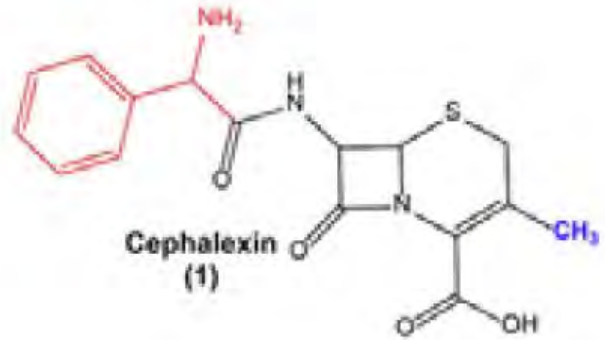


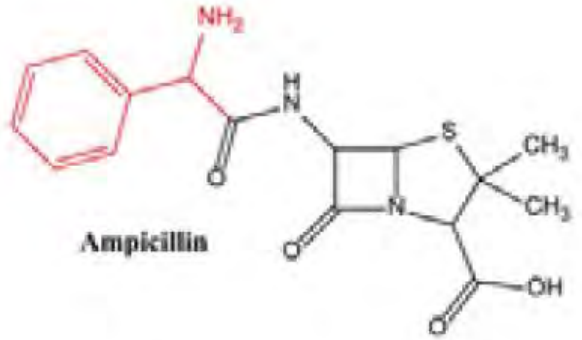
Cephalosporin

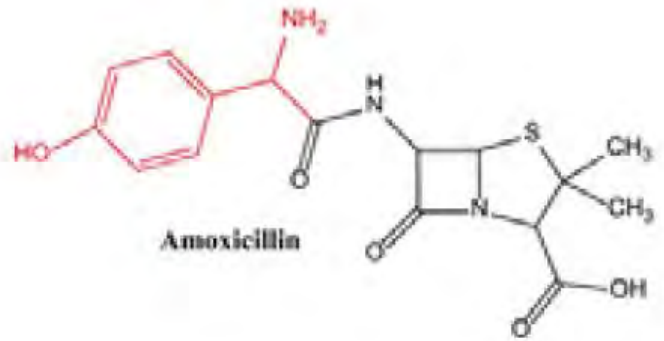
the R1 side-chain is the major factor for cross-reactivity between cephalosporins and penicillins.

Zaugrusky. J Allergy Clin Immunol Pract Vol 6 (1)









J Allergy Clin Immunol Pract Vol 6 (1) Zagursky 2018

Key Fact 4:

- Cross-reactivity among the beta lactams is based R side-chain similarity, not on the beta lactam ring.

Side Chain Cross-Reactivity Chart

		Penicillins							1st							2nd							3rd									4th		5th			Mono
		Nafcillin	Oxacillin	Dicloxacillin	Penicillin G / V	Piperacillin	Ampicillin	Amoxicillin	Cefadroxil	Cefatrizine	Cephalexin	Cefazolin	Ceftezole	Cephalothin	Cephapirin	Cefoxitin	Cefuroxime	Cefotetan	Cefprozil	Cefaclor	Cefonicid	Cefamandole	Cefoperazone	Ceftibuten	Cefdinir	Cefixime	Ceftriaxone	Cefditoren	Cefodizime	Cefotaxime	Cefpodoxime	Ceftazidime	Cefepime	Cefpirome	Ceftaroline fosamil	Ceftolozane	Cefiderocol	Aztreonam
PCN	Nafcillin																																				
	Oxacillin			r1																																
	Dicloxacillin		r1																																	
	Penicillin G / V					r1'	r1'	r1'	r1	r1	r1								r1	r1	r1	r1	r1'													
	Piperacillin				r1'		R1'	r1'	r1'	r1'	R1'								r1'	R1'	r1'	r1'	R1"													
	Ampicillin				r1'	R1'		r1'	r1	r1	**R1**								r1	**R1**	r1	r1	r1'													
	Amoxicillin				r1'	r1'	r1'		**R1**	**R1**	r1'								**R1**	r1	r1	r1	R1'													
1st	Cefadroxil				r1	r1	r1	**R1**		**R1**	r1								**R1**	r1	r1	r1	R1'													
	Cefatrizine				r1	r1'	r1	**R1**	**R1**		r1								**R1**	r1	r1	r1	R1'													
	Cephalexin				r1	R1'	**R1**	r1	r1	r1									r1	**R1**	r1	r1	r1'													
	Cefazolin												**R1**r2																								
	Ceftezole											**R1**r2																									
	Cephalothin														**R2**	**R1**r2	r1'r2												**R2**								
	Cephapirin													**R2**		r2	r2												**R2**								
2nd	Cefoxitin													**R1**r2	r2		r1'**R2**												r2								
	Cefuroxime													r1'r2	r2	r1'**R2**									r1"	R1"	R1"	R1"	R1"r2	R1"		R1"	R1"	r1"			
	Cefotetan																				r2	**R2**	**R2**														
	Cefprozil				r1	r1	r1	**R1**	**R1**	**R1**	r1									r1	r1	r1	R1'														
	Cefaclor				r1	R1'	**R1**	r1	r1	r1	**R1**								r1		r1	r1	r1'														
	Cefonicid				r1	r1	r1	r1	r1	r1	r1							r2	r1	r1		**R1**r2	r1'r2														
	Cefamandole				r1	r1	r1	r1	r1	r1	r1							**R2**	r1	r1	**R1**r2		r1'**R2**														
3rd	Cefoperazone				r1'	R1"	r1'	R1'	R1'	R1'	r1'							**R2**	R1'	r1'	r1'r2	r1'**R2**															
	Ceftibuten																								R1'	R1'	R1'	R1'	R1'	R1'	R1'	R1'	R1'	r1'	r1'	R1'	R1'
	Cefdinir																						R1'		R1'**R2**	R1'	R1'	R1'	R1'	R1'	R1'	R1'	R1'	r1'	r1'	R1'	R1'
	Cefixime																r1"						R1'	R1'**R2**		R1'	R1'	R1'	R1'	R1'	R1'	R1'	R1'	r1	r1	R1'	R1'
	Ceftriaxone																R1"						R1'	R1'	R1'		**R1**	**R1**	**R1**	**R1**	R1'	**R1**	**R1**	r1	r1	R1'	R1'
	Cefditoren																R1"						R1'	R1'	R1'	**R1**		**R1**	**R1**	**R1**	R1'	**R1**	**R1**	r1	r1	R1'	R1'
	Cefodizime																R1"						R1'	R1'	R1'	**R1**	**R1**		**R1**	**R1**	R1'	**R1**	**R1**	r1	r1	R1'	R1'
	Cefotaxime													**R2**	**R2**	r2	R1"r2						R1'	R1'	R1'	**R1**	**R1**	**R1**		**R1**	R1'	**R1**	**R1**	r1	r1	R1'	R1'
	Cefpodoxime																R1"						R1'	R1'	R1'	**R1**	**R1**	**R1**	**R1**		R1'	**R1**	**R1**	r1	r1	R1'	R1'
	Ceftazidime																						R1'	R1'	R1'	R1'	R1'	R1'	R1'	R1'		R1'	R1'r2	r1	R1'	**R1**	**R1**
4th	Cefepime																R1"						R1'	R1'	R1'	**R1**	**R1**	**R1**	**R1**	**R1**	R1'		**R1**	r1	r1	R1'r2	R1'
	Cefpirome																R1"						R1'	R1'	R1'	**R1**	**R1**	**R1**	**R1**	**R1**	R1'r2	**R1**		r1	r1'	R1'	R1'
5th	Ceftaroline fosamil																r1"						r1'	r1'	r1'	r1	r1	r1	r1	r1	r1	r1	r1		R1'	r1	r1'
	Ceftolozane																						r1'	r1'	r1'	r1'	r1'	r1'	r1'	r1'	R1'	r1'	r1'	R1'		R1'	R1'
	Cefiderocol																						R1'	R1'	R1'	R1'	R1'	R1'	R1'	R1'	**R1**	R1'r2	R1'	r1	R1'		**R1**
Mono	Aztreonam																						R1'	R1'	R1'	R1'	R1'	R1'	R1'	R1'	**R1**	R1'	R1'	r1'	R1'	**R1**	

Zagursky RJ and Pichichero ME. *J Allergy Clin Immunol Pract* 2018; 6(10): 72-81.

		Penicillins						
		Nafcillin	Oxacillin	Dicloxacillin	Penicillin G / V	Piperacillin	Ampicillin	Amoxicillin
PCN	Nafcillin							
	Oxacillin			r1				
	Dicloxacillin		r1					
	Penicillin G / V					r1'	r1'	r1'
	Piperacillin				r1'		R1'	r1'
	Ampicillin				r1'	R1'		r1'
	Amoxicillin				r1'	r1'	r1'	
1st	Cefadroxil				r1	r1	r1	R1
	Cefatrizine				r1	r1'	r1	R1
	Cephalexin				r1	R1'	R1	r1
	Cefazolin							
	Ceftezole							
	Cephalothin							
	Cephapirin							
2nd	Cefoxitin							
	Cefuroxime							
	Cefotetan							
	Cefprozil				r1	r1	r1	R1
	Cefaclor				r1	R1'	R1	r1
	Cefonicid				r1	r1	r1	r1
	Cefamandole				r1	r1	r1	r1

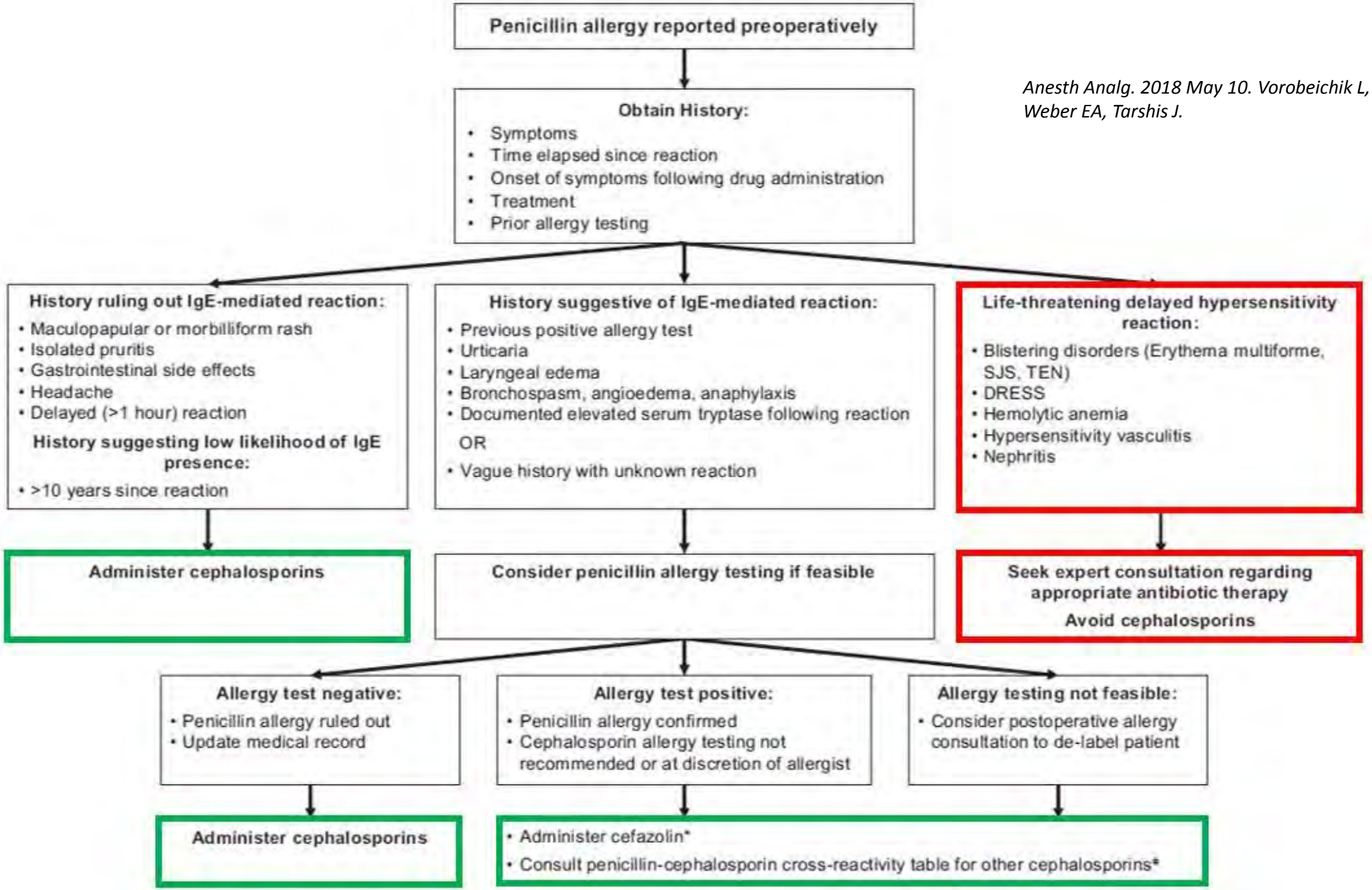
J Allergy Clin Immunol Pract. 2018 Jan - Feb;6(1):72-81.e1. Cross-reactivity in β-Lactam Allergy. Zagursky RJ, Pichichero ME.

SPECIAL ARTICLE

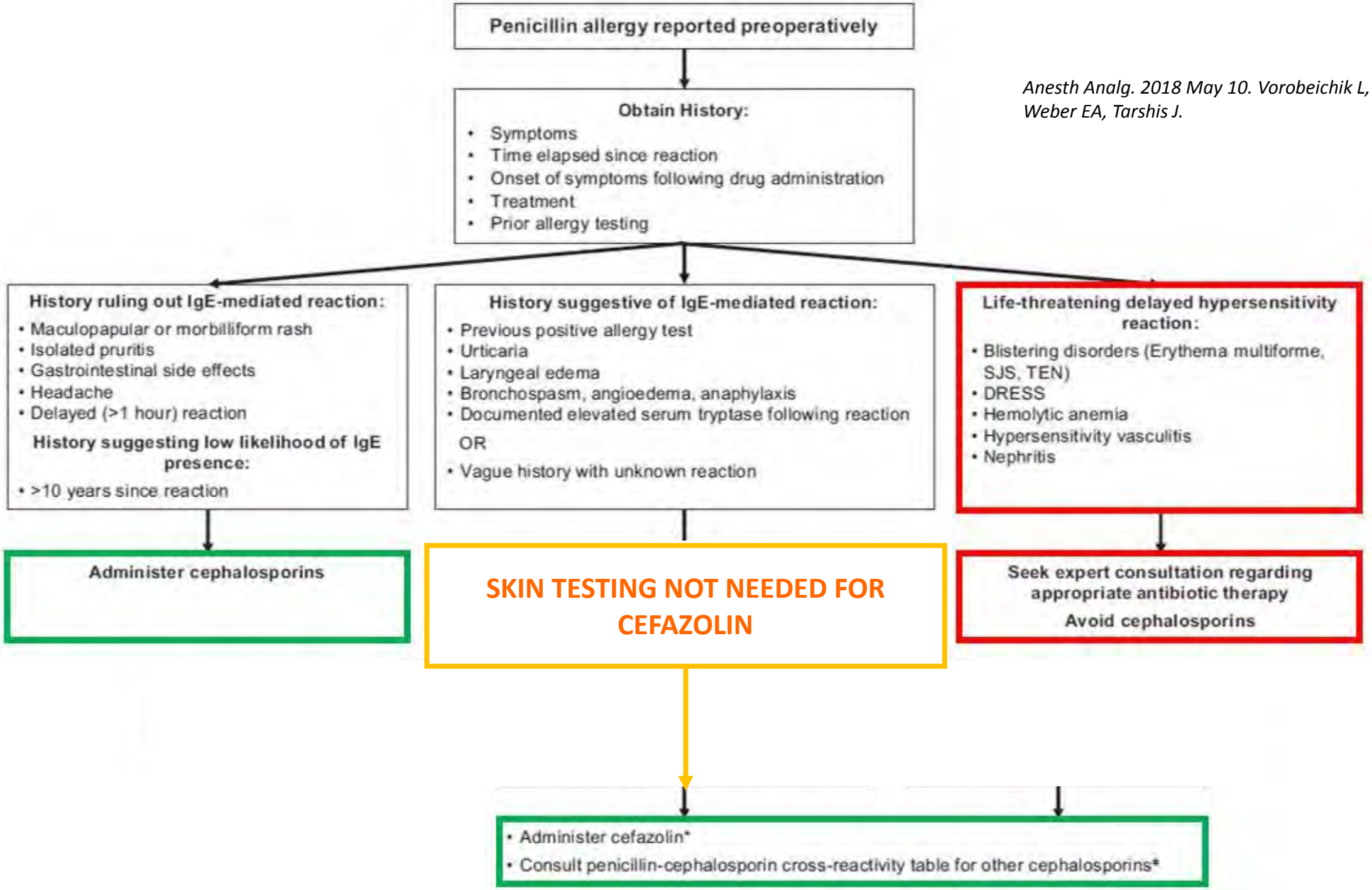
Misconceptions Surrounding Penicillin Allergy: Implications for Anesthesiologists

Leon Vorobeichik, MD,* Elizabeth A. Weber, MD, FRCPC,†‡ and Jordan Tarshis, MD, FRCPC*§

*"It is noted that **cefazolin** in particular demonstrates a **lack of cross-reactivity** with penicillins and other cephalosporins"*



Anesth Analg. 2018 May 10. Vorobeichik L, Weber EA, Tarshis J.



Anesth Analg. 2018 May 10. Vorobeichik L, Weber EA, Tarshis J.

Safety Data: Macy et al

- Kaiser Permanente retrospective study of cephalosporin utilization over 2 years:
  - 949,323 received a cephalosporin
  - 13 had an anaphylactic reaction

    = 0.001%

  - 65,915 patients had a penicillin allergy
  - 3 of these patients had anaphylaxis to a cephalosporin

    = 0.0046%

Macy E and Conteraras R. *J Allergy Clin Immunol* 2015: 745-752.

Safety Data: Beltran et al

Cohort of 513 penicillin allergic surgical patients (624 cases)

Antibiotics Received (Courses)	Adverse Reactions	Rate
Cephalosporin* n=153	1 (hives, erythema)	0.6%
Clindamycin n=387	8 (rash or other effects	2%
Ciprofloxacin n=19	3 (rash or other side effects)	15.8%

*Cefazolin, Cefoxitin

Beltran RJ et al. J Pdiatr Surg. 2015 May;50(5):856-9.

Anaphylaxis to Cephalosporins in Patients with Anaphylactic Reactions from Penicillins

- Cephalexin, cefamandol and cefaclor all have R-side chain similarities with penicillins
- Cephalothin preparations were contaminated with benzylpenicillin

Year, Reference	Age (years)	Sex	Reaction to penicillin	Anaphylaxis to penicillin (yes/no)	Cephalosporin	Reaction to cephalosporin
1965, Kabins et al (4)	47	F	Pruritis and angioneurotic edema	Yes	Cephalothin	Hypotensive, wheezing and unresponsive within 2 min
1966, Rothschild and Doty (23)	56	M	Pruritis and urticaria	No	Cephalothin	Apnea and hypotension within minutes
1966, Drug Letter (24)	40	F	Rash*	No	Cephalothin	Pruritis, dyspnea and angioneurotic edema
1968, Scholand et al (5)	65	M	Urticaria, angio-neurotic edema and dyspnea	Yes	Cephalothin	Wheezing and hypotension within 30 s
1968, Girard (6)	1 patient†		Anaphylaxis*	Yes	Cephaloridine	Mild anaphylactic shock*
1971, Petz (25)	2 patients†		Unknown*	No	Cephalothin	Anaphylaxis*
1974, Spruill et al (10)	59	M	Unknown*	Unknown	Cephalothin	Cardiac arrest within 5 min
1980, Zeok and Tsueda (26)	1 patient†		Urticaria	No	Cephalothin	Hypotension, bradycardia, diminished respiratory excursions and wheezing, generalized edema, urticaria
1989, Blanca et al (7)	22	F	Angioedema of the mouth and eyes	No	Cefamandole	Hypotension
1989, Blanca et al (7)	50	F	Hypotension, pruritis of the lips, breathing difficulties	Yes	Cefamandole	Hypotension, dysphonia, generalized pruritis, and upper airway obstruction
1989, Macnab (27)	35	F	Unknown*	No	Cephalexin and cephalothin	Urticaria, dyspnea, nausea and severe headaches
1999, Pumphrey and Davis (8)	76	F	Anaphylaxis to amoxicillin*	Yes	Cefaclor	Fatal anaphylaxis*
1999, Pumphrey and Davis (8)	3 patients†		Two allergic to amoxicillin and 1 allergic to penicillin*	Unknown	Unknown	Fatal anaphylaxis*
1999, Nordt et al (28)	32	F	Unknown*	Unknown	Cephalexin	Rapid onset of throat tightness and urticaria

*No further details of the reactions were given; †Ages unknown. F Female; M Male

Key Fact 5:

- Cefazolin is predicted to be safe even in cases of IgE-mediated reactions to penicillin

Exception: Severe, Delayed Reactions

Severe T-cell-mediated reactions or severe cutaneous adverse reactions

Onset days to weeks into treatment course

Blistering and/or skin desquamation

Mucosal and/or organ involvement

Usually requires hospitalization

JAMA
January 15, 2019

<u>SCARS (Severe cutaneous adverse reactions)</u>

- DRESS

<u>Blistering skin rashes</u>

- Stevens-Johns Syndrome (SJS)
- Toxic endodermal necrolysis (TEN)

<u>Organ-Specific Injury</u>

- Hepatitis, nephritis
- Hemolytic anemia
- Serum sickness (joint pains)
- Drug fever

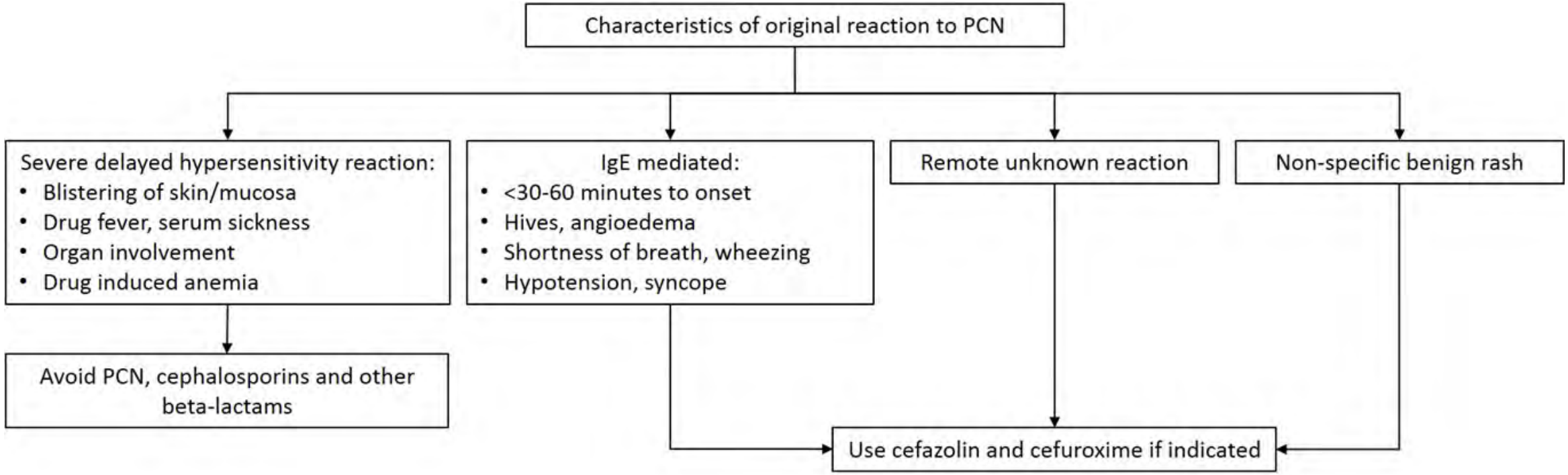
Mechanism for these reactions is unknown. Suggest <u>avoiding all beta lactam agents</u>

Key Fact 6

- In presence of severe delayed reaction, the mechanism is unknown and therefore many recommend avoiding all beta lactam agents.

- In the absence of a severe, delayed reaction, patients with a penicillin allergy can receive cefazolin and cefuroxime

Antibiotics for PCN Allergy, Approach 3.0



Emory's institutional algorithm for cefazolin/cefuroxime use in perioperative patients with reported allergy to penicillin.

Kuruvilla, et al. Journal of Allergy and Clinical Immunology: In Practice. In Press

Screening Tool for Severe, Delayed Reaction

YES	NO	
☐	☐	Did you have a severe skin reaction involving blisters on your skin and shedding or detachment of your skin? (SJS/TEN)
☐	☐	Were you told you had Stevens-Johnson Syndrome or TEN?
☐	☐	Did you have liver injury or hepatitis caused by the medication?
☐	☐	Did you have kidney injury, nephritis or acute renal failure caused by the medication (acute interstitial nephritis)?
☐	☐	Were you told you had hemolytic anemia caused by the medication? (Low hemoglobin or hematocrit or "blood counts" counts caused by penicillin)
☐	☐	Did you have painful swollen joints caused by the medication (serum sickness)?
☐	☐	Were you diagnosed with "drug fever"? (A fever caused by the antibiotic that developed about a week after starting the medication and then went away when you stopped the antibiotic?)
☐	☐	Did you have a severe reaction involving the inside of your mouth, eye, or genital ulcers?

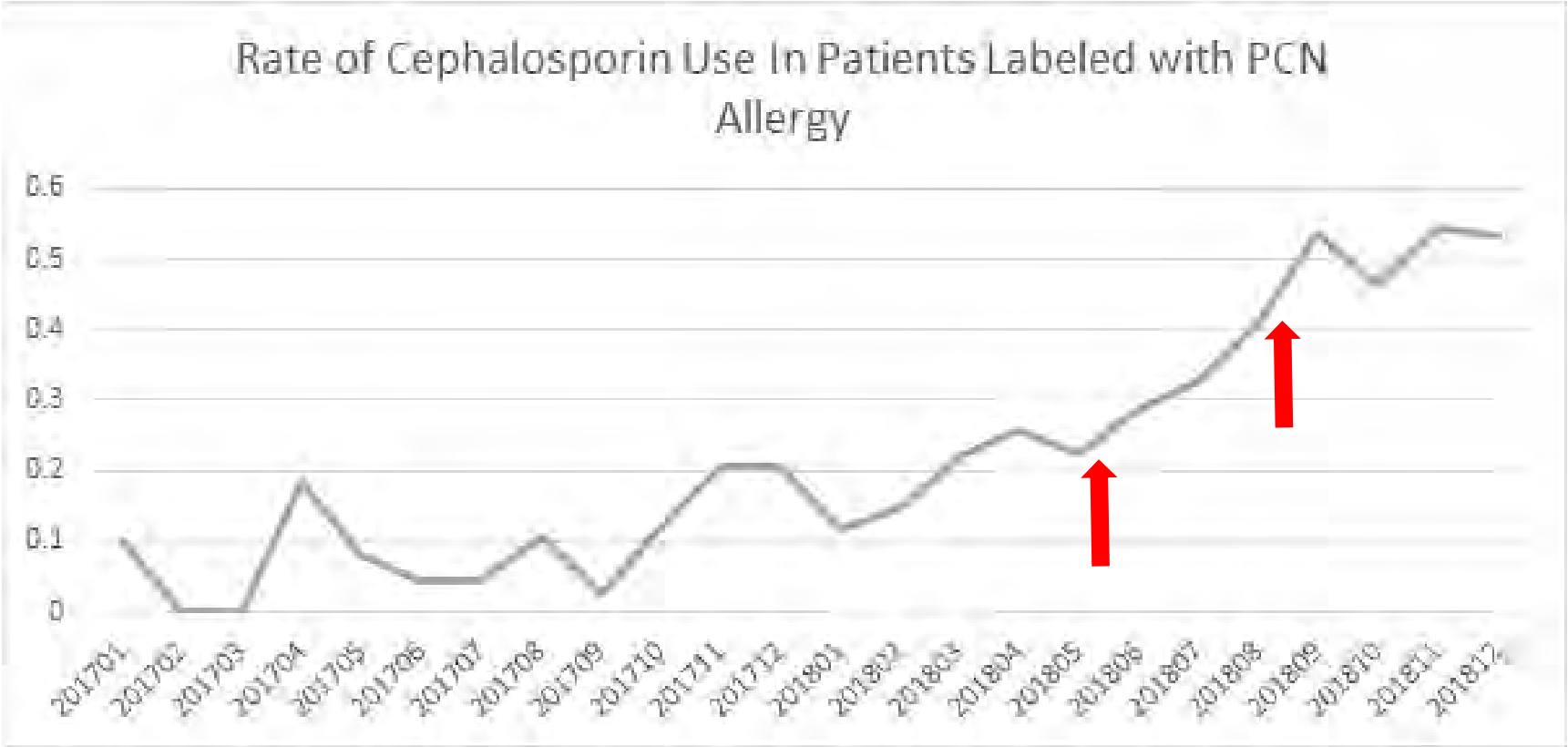
Figure 2. Questionnaire to assess for a history of a severe delayed hypersensitivity reaction to penicillin. If the patient answers yes to any of the above: avoid beta-lactam medications. If none of the above are checked: cefazolin and cefuroxime are expected to be safe.

Kuruvilla, et al. Journal of Allergy and Clinical Immunology: In Practice. In Press

New Protocol Implementation:

- Baseline survey with educational component
- Multidisciplinary group presentations including:
  - **Anesthesia**: Baseline data and knowledge survey results
  - **Infectious Disease**: Advantages to first-line antibiotic use
  - **Allergy**: Safety data for cefazolin use and the new protocol
- Electronic communications, updated guidelines
- Dept of surgery morning meetings
- Pharmacy meetings
- Ongoing informal education

Change in Practice at EUH



(cefazolin, cefuroxime)

Increased Use of First Line Antibiotics

Study Time Period	Mean Percentage of Penicillin-Allergic Patients Receiving Cefazolin/Cefuroxime
Baseline (1/2017 – 9/2017)	6.5%
Anesthesia managing antibiotics Survey of their allergy practice performed (10/2017 – 7/2018)	21.2%
Following educational session (9/2018 – 12/2018)	51.9%
Following Grand Rounds (1/2019-3/2019)	87.8%

- ANOVA utilized to compare the percentage of patients receiving a cephalosporin at baseline, after anesthesia control of antibiotics, and after both educational interventions, $p<0.0001$

New Process Review

Reviewed 24,629 cases before and after implementation of the new algorithm

PCN allergy 2296 = 9.3%

Chart review of all surgical patients with PCN allergy (n = 551) who was given a cephalosporin and received diphenhydramine or epinephrine (n=32)

- No immediate allergic reactions requiring epinephrine were identified.
- One case of delayed rash that did not require cephalosporin discontinuation
- Three patients received diphenhydramine for itching without rash

A streamlined approach to optimize perioperative antibiotic prophylaxis in the setting of penicillin allergy labels. Kuruvilla, Sexton, Wiley, Langfitt, Lynde, Wolf. Journal of Allergy and Clinical Immunology: In Practice. In Press *https://doi.org/10.1016/j.jaip.2019.12.016*

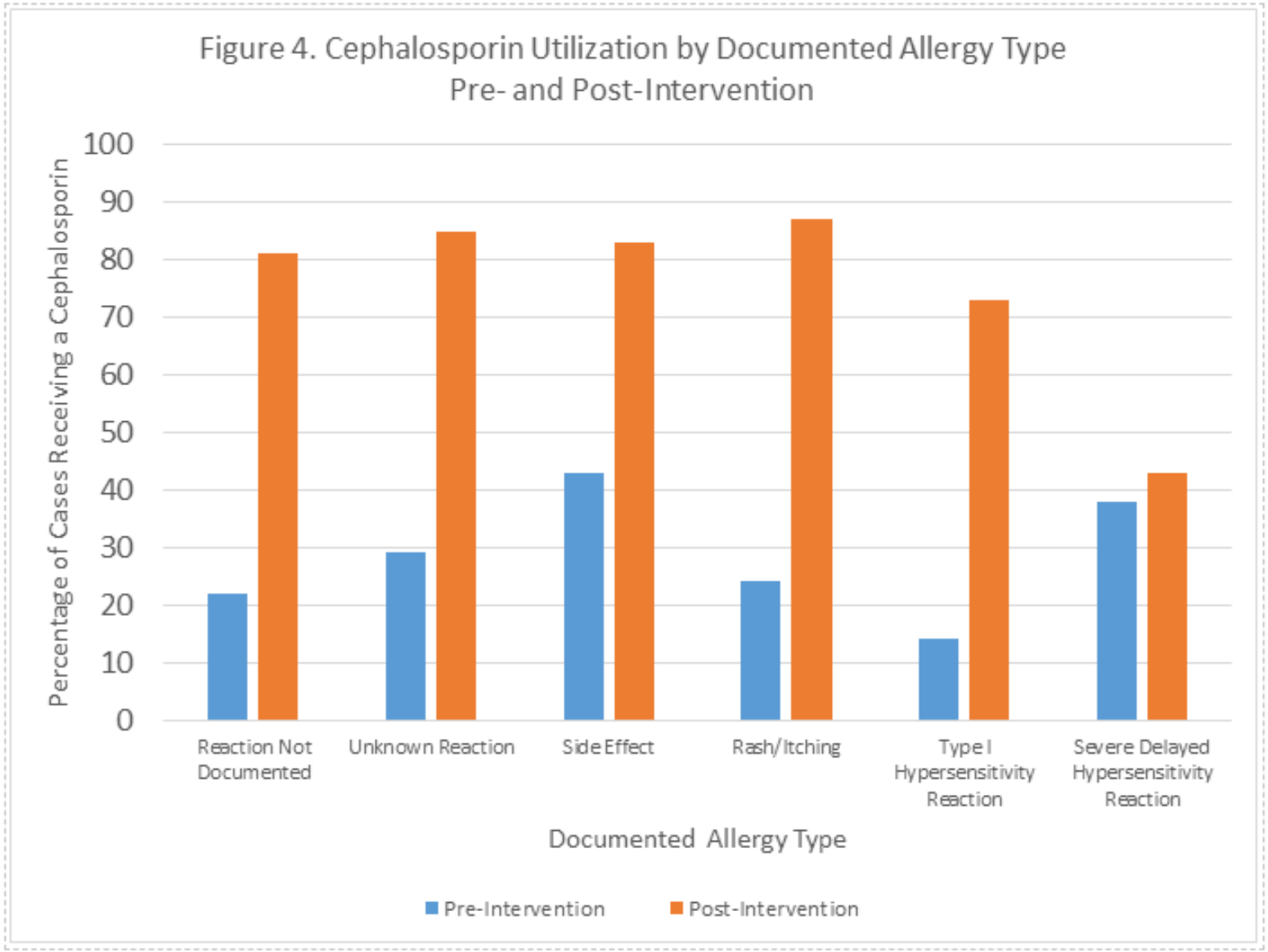


Figure 4. The percentage of penicillin-allergic surgical cases receiving a cephalosporin before and after algorithm implementation is shown, stratified by the type of allergic reaction documented in the patient's medical record.

Kuruvilla et al. Journal of Allergy and Clinical Immunology: In Practice. *In Press*

Next Steps

- Assess impact on outcomes: SSI, *C. Diff*, cost
- Continue safety monitoring

Six Key Facts That Changed My Practice

1. Patients with listed penicillin allergy are more likely to get second line antibiotics
2. Second line agents are associated with negative outcomes
3. Most patients with a penicillin allergy label do not have a penicillin allergy

Six Key Facts That Changed My Practice

1. Patients with listed penicillin allergy are more likely to get second line antibiotics
2. Second line agents are associated with negative outcomes
3. Most patients with a penicillin allergy label do not have a penicillin allergy
4. Cross-reactivity among the beta lactams is based on side chain similarity
5. Cefazolin is safe even in cases of severe Ig-E reactions to penicillin
6. In presence of a severe delayed reaction, experts recommend avoiding all beta lactam agents.

In the absence of a severe delayed reaction, cefazolin can be used in patients with a penicillin allergy

Summary

Major Societies Agree – A New Approach to Penicillin Allergy Is Needed

- Patients with a penicillin allergy often get second line antibiotics due to concerns about cross-reactivity
- As a result, they may be at increased risk for SSIs and other complications
- A streamlined approach to that relies on ruling out a history of severe delayed reaction to PCN can allow for safe administration of first-line agents cefazolin or cefuroxime, without the need for skin testing.
- A multi-disciplinary team proved valuable in supporting this change in practice.
- The anesthesia team can take a leadership role in antibiotic stewardship

The Team

- Marybeth Sexton MD, MSc – Infectious Diseases
- Zanthia Wiley, MD – Infectious Diseases
- Merin Kurivilla, MD – Allergy and Immunology
- Grant Lynde MD, MBA – Anesthesiology, Practice Improvement
- Terry Langfitt MD – Anesthesiology (Resident)
- Joe Sharma MD – Surgery
- Tony Ottaviano RPh – Pharmacy




Thank you

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Systematic review of professional liability when prescribing β-lactams for patients with a known penicillin allergy

Meghan N. Jeffres, PharmD [*]; Elizabeth A. Hall-Lipsy, JD, MPH [†]; S. Travis King, PharmD, BCPS (AQ-ID) [‡]; John D. Cleary, PharmD, FCCP, BCPS (AQ-ID) [§]

Key Messages

- Patients labeled as penicillin-allergic are more likely to receive second line non-β-lactam antibiotics, experience higher rates of treatment failure, and incur higher antibiotic costs.
- Fear of litigation has been identified as a potential reason clinicians avoid using β-lactams in a patient with a penicillin allergy.
- Since 1959, 27 medical malpractice or negligence cases have been published in which a patient with a penicillin allergy received a β-lactam and experienced an adverse reaction.
- Defendants (providers) were found liable in 3 of 7 cases in which a penicillin-based antibiotic was prescribed to a patient with a known penicillin allergy.
- Defendants were not found liable in any cases in which a cephalosporin or carbapenem was prescribed excluding 1 case in which physicians settled out of court.
- Judges have cited a lack of scientific evidence demonstrating cephalosporins or carbapenems are contraindicated for patients with a penicillin allergy.

Ann Allergy Asthma Immunol 121 (2018) 530–536

Residual Neuromuscular Blockade
Is Our Silent Epidemic of Weakness Finally Over?

Strychnos toxifera (Curare) from Koehler's Medicinal-Plants 1887

Francis Wolf, MD
Assistant Professor, Department of Anesthesiology, Emory University School of Medicine

Disclosures: No conflicts of interest

Objectives

1. Provide the definition of residual neuromuscular blockade (rNMB)
2. Cite some of the main causes of rNMB
3. Compare qualitative and quantitative nerve monitoring
4. Describe advantages and limitations of sugammadex as a reversal agent

A STUDY OF THE DEATHS ASSOCIATED WITH ANESTHESIA AND SURGERY*

BASED ON A STUDY OF 599,548 ANESTHESIAS IN TEN INSTITUTIONS 1948–1952, INCLUSIVE

HENRY K. BEECHER, M.D., AND DONALD P. TODD, M.D.

FROM THE ANESTHESIA DEPARTMENT OF THE HARVARD MEDICAL SCHOOL AT THE MASSACHUSETTS GENERAL HOSPITAL, BOSTON

TABLE XIII. *Total Incidence of "Curare" Use and Associated Death.*

Total Number Anesthesias	599,500
Number Anesthesias in which "Curare" Used (1 : 14)	44,100
Frequency of Death Related to Anesthesia	
Anesthesias Which Did Not Include "Curare" (266)	1 : 2100
Anesthesias Which Included "Curare" (118)	1 : 370

Most patients were not intubated and were breathing spontaneously

1954: Annals of Surgery

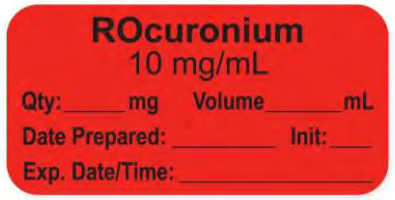
A 61 Year-Old, 80-kg Patient for Ventral Hernia Repair

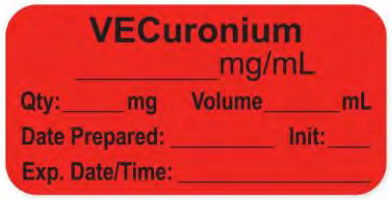
- Rocuronium: 100 mg for case
- Reversal: 2 mg neostigmine from 2 twitches
- Extubated 10 minutes later
- On arrival in PACU was motionless and apneic
- Upper airway obstruction, low O_2 saturation
- Quantitative TOF reveals TOF ratio = 0.61

Residual neuromuscular blockade is the single biggest thing we do to harm our patients

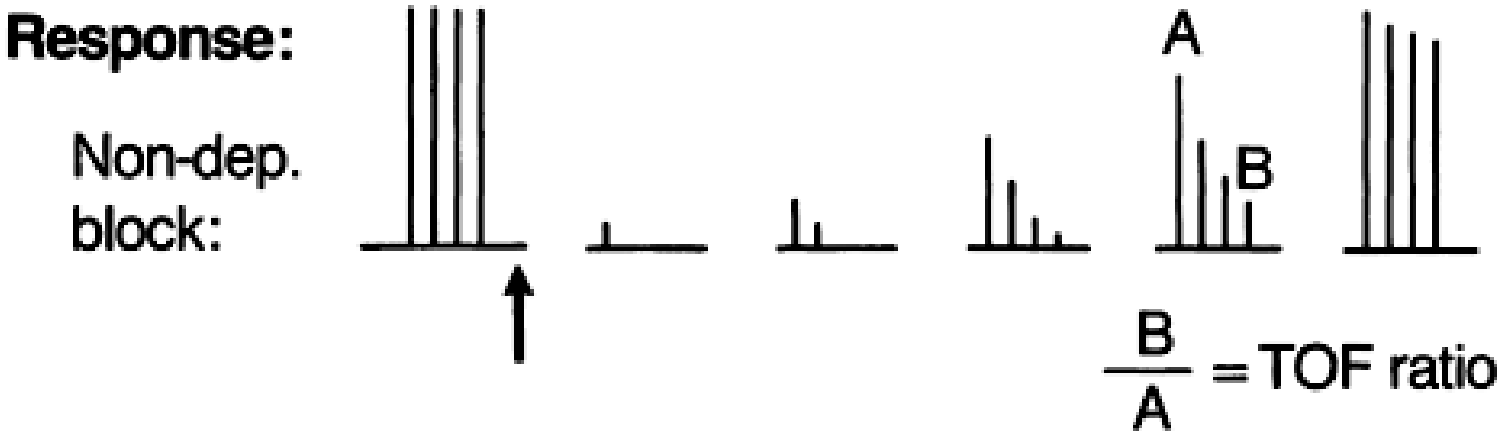
-Glenn Murphy MD

Neuromuscular Blocking Drugs are (Still) Dangerous





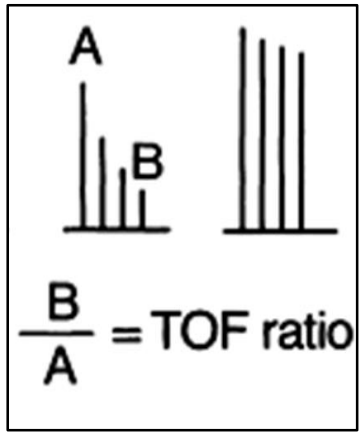
Train of Four Ratio



Non-depolarizing NMBD

$$\frac{T4}{T1} = \text{TOF ratio}$$

Train of Four Ratio: Defining Weakness



1.0 or 100% = baseline

0.9 or 90% = full recovery

<0.9 = residual weakness

<0.7 = residual weakness (older definition)

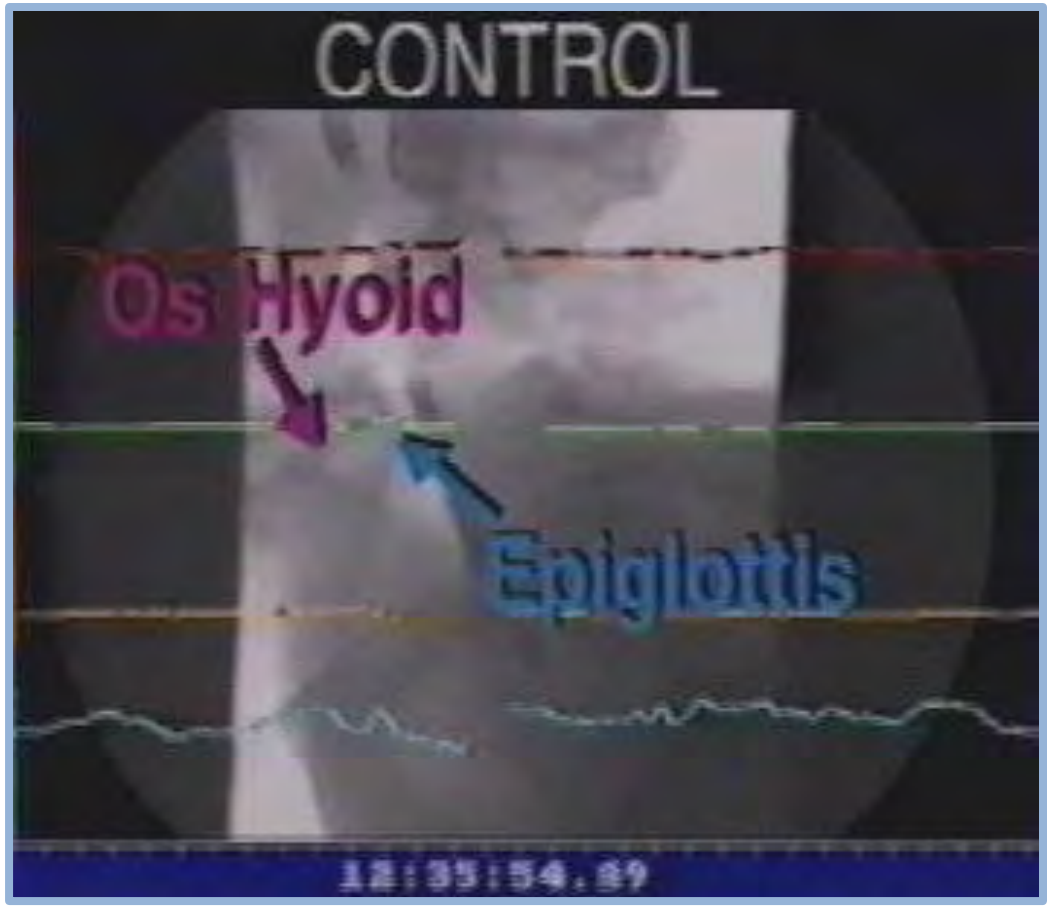
Train of four ratio <0.9 = residual weakness

"residual paralysis"

"residual (neuromuscular) blockade"

"residual curarization"

TOF-R	Results of Weakness
≥0.9	No/little impairment
<0.9	Pharyngeal dysfunction Increased risk for aspiration Feelings of distress Diplopia Decreased upper esoph tone
<0.8	Impaired air flow Partial airway obstruction Decreased jaw clench Decreased FEV1
<0.7	Impact on • cough • tongue protrusion • sustained head lift • lung volumes, inspiratory force, peak flows • grip strength Impaired ventilatory response to hypoxia



Functional assessment of the pharynx at rest and during swallowing in partially paralyzed humans: simultaneous videomanometry and mechanomyography of awake human volunteers. Anesthesiology. 1997 Nov;87(5):1035-43.

Incidence of residual paralysis after extubation and in the PACU: 15-88%

Table 1. Incidence of Residual Neuromuscular Blockade (2000–2008)

Author	Year	Number of patients	NMBD used	NM monitoring used (%)	Reversal used (%)	Site/time RNMB measured	Definition RNMB	Incidence RNMB	Type of anesthesia
Baillard et al.[27]	2000	568	Vecuronium	2	0	PACU	<0.7	42% (AMG)	Inhalational
Bissinger et al.[20]	2000	83	Pancuronium	NS	100	PACU	<0.7	20% (AMG)	Inhalational and TIVA
			Vecuronium	NS	100	PACU	<0.7	7%	
Hayes et al.[22]	2001	148	Vecuronium	41	68	PACU	<0.8	64% (AMG)	Primarily inhalational
			Atracurium	41	68	PACU	<0.8	52%	
			Rocuronium	41	68	PACU	<0.8	39%	
McCaul et al.[28]	2002	40	Atracurium	50	100	Extubation	<0.7	65% (MMG)	NS
Kim									nal
Gatk									
Baill									nal
									nal
Debaene et al.[3]	2003	526	Vecuronium	NS	0	PACU	<0.7	16% (AMG)	Inhalational
			Rocuronium	NS	0	PACU	<0.9	45%	Inhalational
			Atracurium	NS	0	PACU			
Baillard et al.[21]	2005	218	Vecuronium	60	42	PACU	<0.9	3.5% (AMG)	Inhalational
			Atracurium	60	42	PACU	<0.9	3.5%	Inhalational
Kopman et al.[24]	2004	60	Cisatracurium	100	100	Transfer to	<0.9	36.7% (MMG)	Inhalational
			Rocuronium	100	100	PACU	<0.9	50.0%	Inhalational
Murphy et al.[26]	2004	70	Pancuronium	100	100	PACU	<0.9	83% (AMG)	Inhalational
			Rocuronium	100	100	PACU	<0.9	29%	Inhalational
Murphy et al.[25]	2005	120	Rocuronium	100	100	Extubation	<0.9	88% (AMG)	Inhalational
Cammu et al.[4]	2006	640	Atracurium	11–12	25–26	PACU	<0.9	38–47% (AMG)	NS
			Mivacurium	11–12	25–26	PACU	<0.9	38–47%	NS
			Rocuronium	11–12	25–26	PACU	<0.9	38–47%	NS
Maybauer et al.[29]	2007	338	Cisatracurium	100	0	Extubation	<0.9	57% (AMG)	TIVA
			Rocuronium	100	0	Extubation	<0.9	44%	TIVA
Murphy et al.[6]	2008	90	Rocuronium	100	100	PACU	<0.9	30% (AMG) (TOF group)	Inhalational

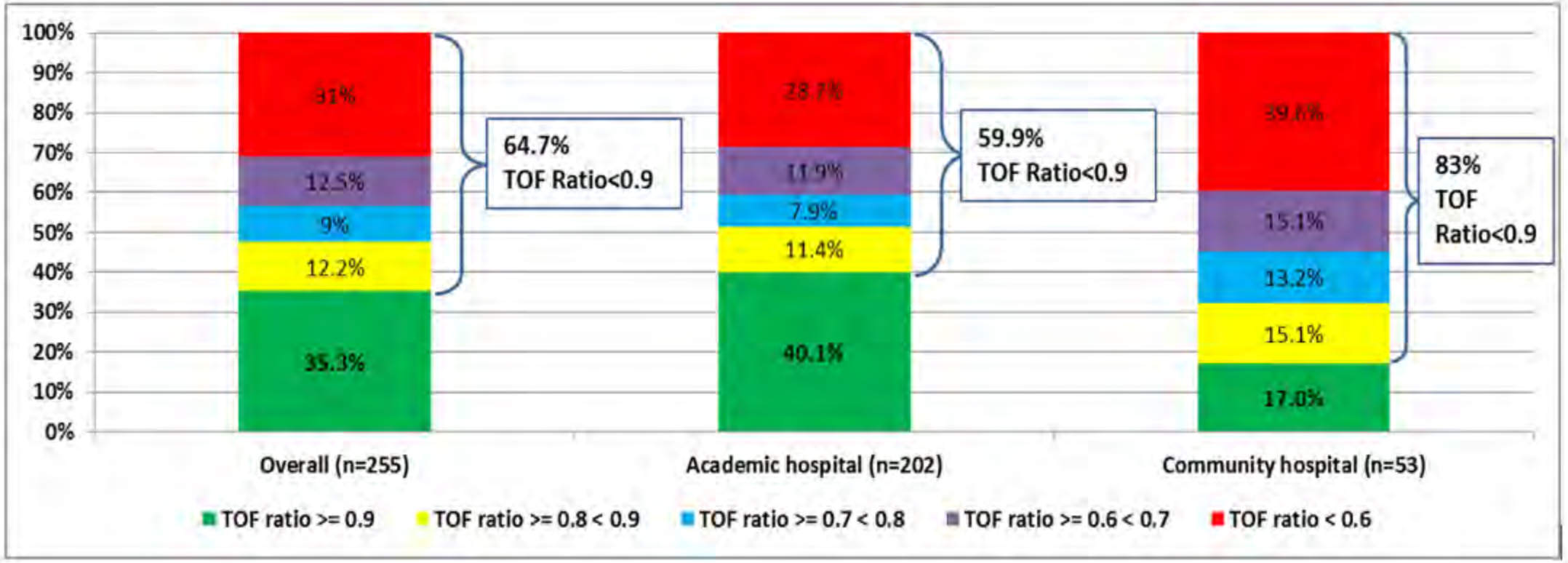
NMBD = neuromuscular blocking drugs; NM monitoring= neuromuscular monitoring; RNMB = residual neuromuscular blockade; TIVA = total intravenous anesthesia; NS = not stated.

Typical rate of rNMB on arrival in PACU: 40%

Residual Neuromuscular Block: Lessons Unlearned. Part I: Definitions, Incidence, and Adverse Physiologic Effects of Residual Neuromuscular Block .
Murphy, Glenn; Brull, Sorin Anesthesia & Analgesia. 111(1):120-128, July 2010. DOI: 10.1213/ANE.0b013e3181da832d

Residual Curarization and its Incidence at Tracheal Extubation (RECITE)

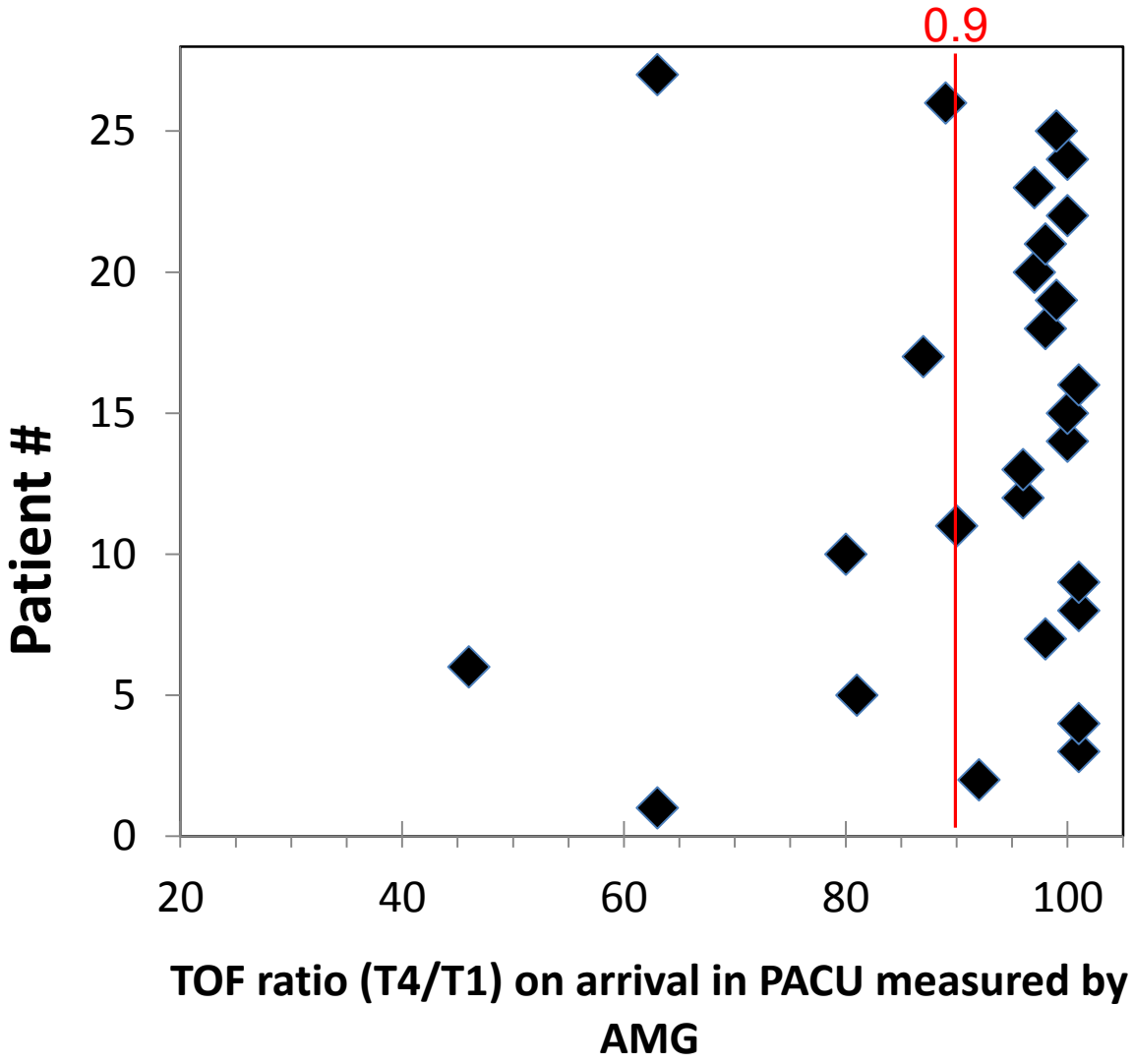
rNMB at extubation: 64.7%



J Clin Anesth. 2019 Aug: 55:33-41. Saager L et al.

Residual Paralysis in the EUH PACU (2014)

TOF <0.9
7/27 = 26%



Residual Paralysis is Associated with Critical Respiratory Events

- Airway Obstruction, Hypoxemia (Murphy 2004, 2008, Norton 2013)
- Aspiration, Respiratory Distress, Reintubation
- Longer PACU stays, diplopia, feelings of distress, inability to breathe deeply (Murphy 2004)

Anesthesia & Analgesia. 111(1):120-128, July 2010.

Murphy GS, Szokol JW, Marymont JH, Greenberg SB, Avram MJ, Vender JS. Anesth Analg. 2008;107:130–7

Butterly A, Bittner EA, George E, Sandberg WS, Eikermann M, Schmidt U. Br J Anaesth. 2010;105:304–9

Stewart PA. Anesth Analg 2016;123:859-68

Residual Paralysis and Critical Respiratory Events

- 202 PACU patients
- 30% had TOF <0.9

	TOF <0.9	TOF ≥0.9	P-Value
Airway obstruction	10%	2%	0.03
Mild-mod hypoxemia	23%	4%	<0.001
Severe hypoxemia	7%	1%	0.03
Inability to breathe deeply	38%	12%	<0.001

Norton. Rev Esp Anestesiol Reanim. 2013 Apr;60(4):190-6.

Critical Respiratory Events in the PACU

Table 4. Simple Logistic Regression Models Analyzing the Relationship Between Various Measures of Residual Neuromuscular Blockade and the Presence or Absence of Upper Airway Obstruction or Hypoxemia

Outcome	Variable	Regression coefficient	Standard error	Wald statistic	*P*	Odds ratio	95% CI
Upper airway obstruction	Intercept	1.220	0.910	—	—	—	—
	Train-of-four ratio	−0.037	0.013	−2.963	0.003	0.96	0.94 to 0.99
Upper airway obstruction	Intercept	−3.831	0.939	—	—	—	—
	Degree of NM blockade*	1.745	0.517	3.371	0.001	5.73	2.08 to 15.80
Severe hypoxemia	Intercept	2.509	0.939	—	—	—	—
	Train-of-four ratio	−0.047	0.012	−3.768	0.0002	0.95	0.93 to 0.98
Severe hypoxemia	Intercept	−2.487	0.539	—	—	—	—
	Degree of NM blockade*	1.290	0.335	3.855	0.0001	3.63	1.88 to 7.00
Any hypoxemia	Intercept	4.431	1.129	—	—	—	—
	Train-of-four ratio	−0.062	0.014	−4.463	<0.0001	0.94	0.91 to 0.97
Any hypoxemia	Intercept	−2.265	0.491	—	—	—	—
	Degree of NM blockade*	1.744	0.339	5.151	<0.0001	5.72	2.95 to 11.11

* Degree of residual NM blockade classified as acceptable neuromuscular recovery = 0 (TOF ratio >0.90), mild-to-moderate = 1 (0.70 ≤ TOF ratio ≤ 0.90), or severe = 2 (TOF ratio <0.70).

Murphy, Anesth Analg 2008; 107:130 –7)

	Critical respiratory event group	Control group	Difference (95% CI)	*P*
Degree of NM blockade[b]				
Acceptable	4 (9.5%)	38 (90.5%)	−81.0% (−90 to −66)	<0.0001*
Mild-to-moderate	7 (16.7%)	4 (9.5%)	7.1% (−9 to 24)	0.366*
Severe	31 (73.8%)	0 (0%)	73.8% (59 to 85)	<0.0001*

Why Are Patients Weak?

- Limitations of nerve monitoring
- Limited effectiveness of neostigmine
- Timing and dose of reversal and extubation
- Deep paralysis/repeated dosing

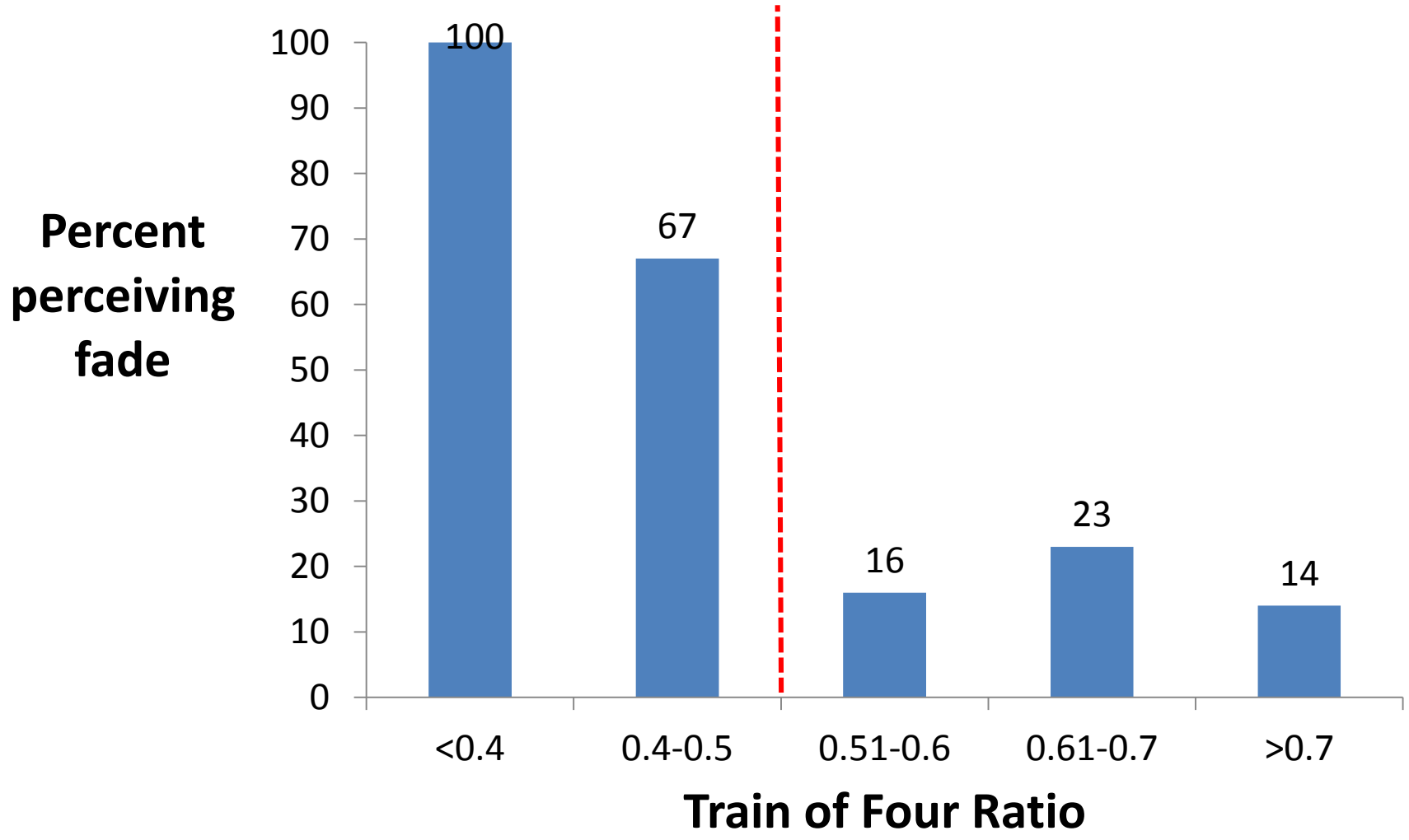
Traditional (Qualitative) Monitor

- No sensing function
- Clinician evaluates for fade
- Subjective

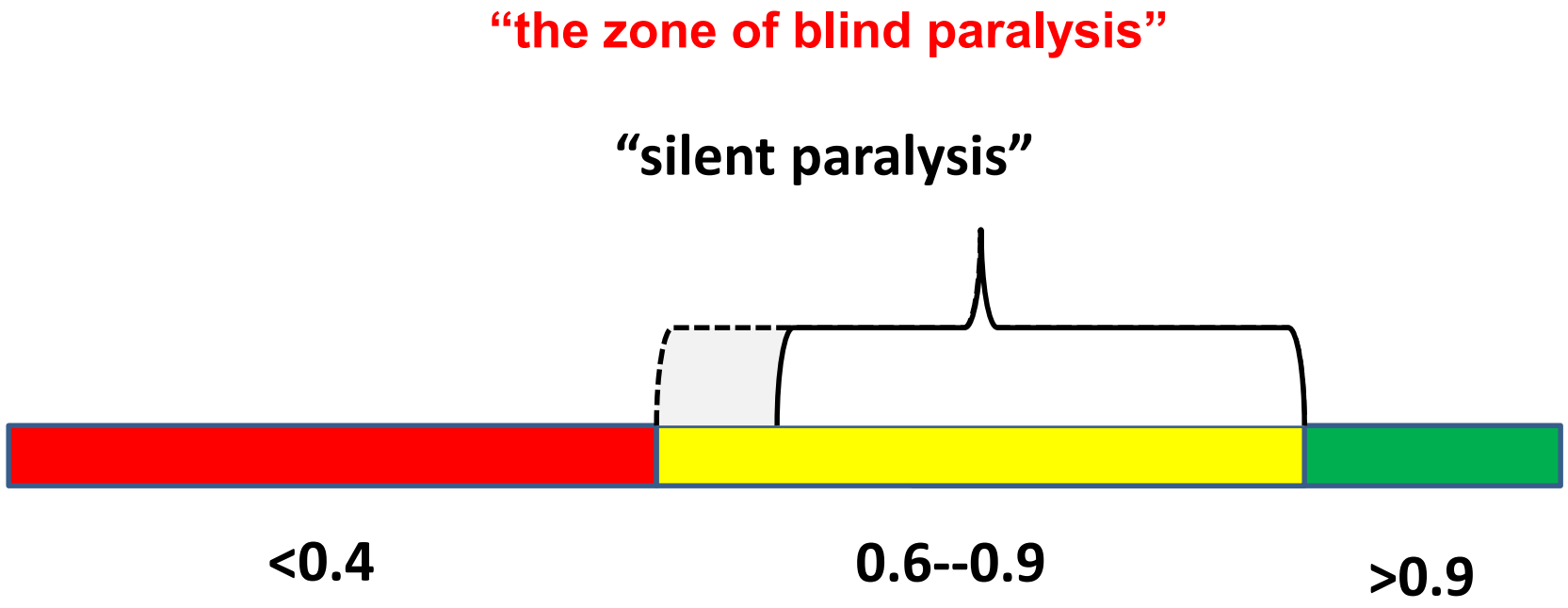
Quantitative Monitor:

- Additional sensor of acceleration, force, or EMG
- Provides numeric (objective) measure of fade

Experienced Anesthesiologists' (In)ability to Detect Fade on TOF



Residual Paralysis is Often Unrecognized

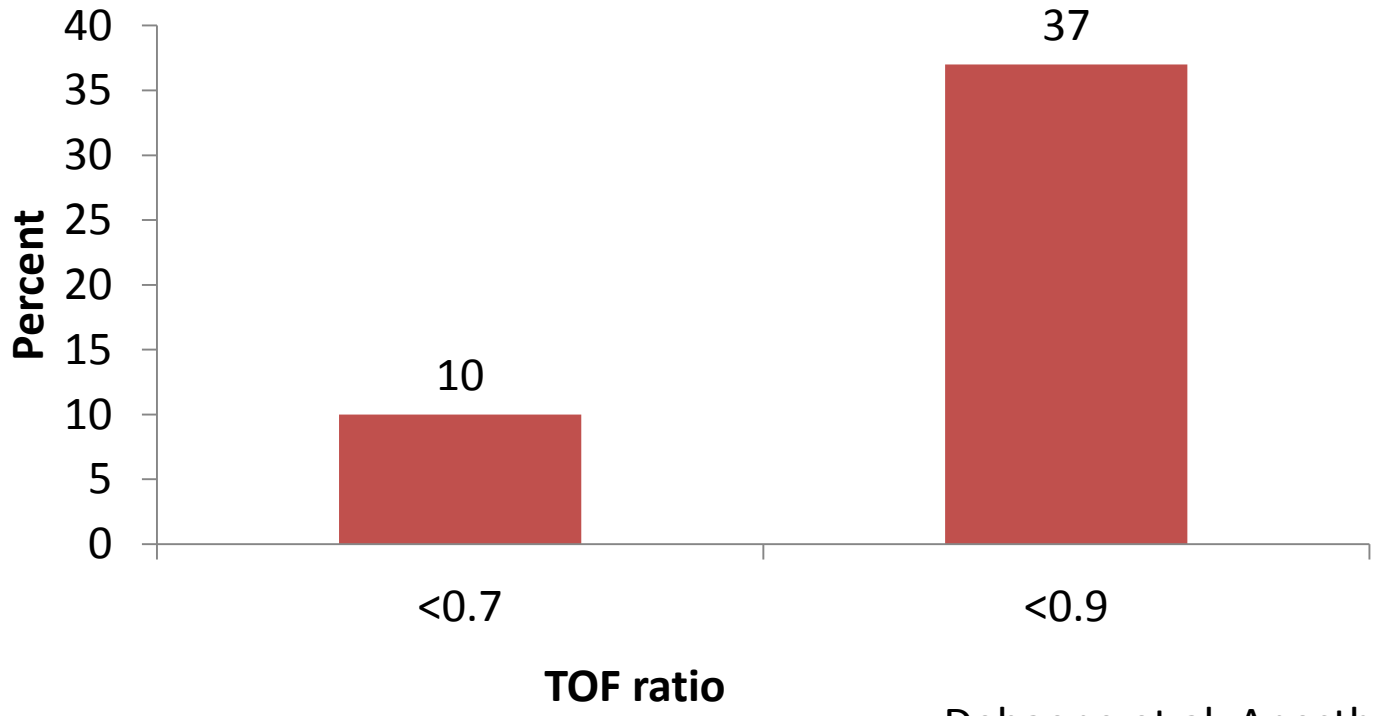


Six Pitfalls on the Way to Reversal with Neostigmine

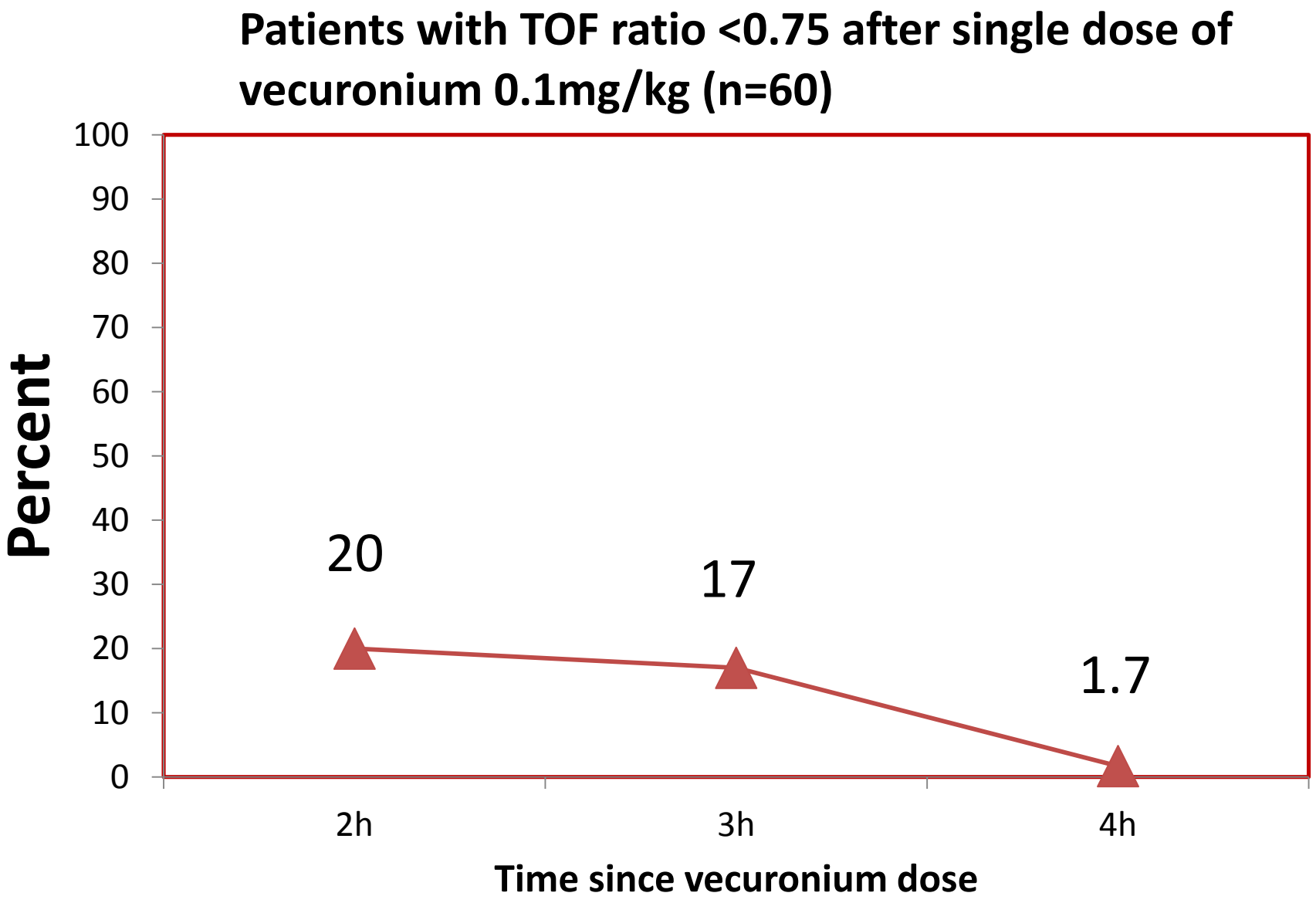
1. Relying on time alone
2. Relying on clinical tests
3. Using the facial nerve
4. Under-dosing
5. Allowing too little time
6. Use of qualitative monitors

Time Since Relaxation Does Not Reliably Exclude Weakness

Residual paralysis 2 hours after single intubating dose of intermediate acting neuromuscular blocking drug. N=239



Debaene et al. Anesthesiology 2003. 98 1042-8



Caldwell 1995 (adapted)

Clinical Tests Do Not Exclude Weakness

- Sustained head lift
  - 80-90% of healthy volunteers are able to maintain **5-second head lift with TOF 0.5** (Eikermann 2003, Pedersen 1990)
- Hand grip, leg lift, eye opening also possible with significant degree of **residual paralysis**
- (Masseter strength may indicate TOF ≥ 0.85)

Capron F, Fortier LP, Racine S, Donati F. Tactile fade detection with hand or wrist stimulation using train-of-four, double-burst stimulation, 50-hertz tetanus, 100-hertz tetanus, and acceleromyography. Anesth Analg. 2006;102:1578–84

Clinical Tests of Weakness

Table 2. Diagnostic Attributes of the Clinical Tests: Sensitivity, Specificity, Positive and Negative Predictive Values of an Individual Clinical Test for a Train-of-Four <90%

	Sensitivity	Specificity	Positive predictive value	Negative predictive value
Inability to smile	0.29	0.80	0.47	0.64
Inability to swallow	0.21	0.85	0.47	0.63
Inability to speak	0.29	0.80	0.47	0.64
General weakness	0.35	0.78	0.51	0.66
Inability to lift head for 5 s	0.19	0.88	0.51	0.64
Inability to lift leg for 5 s	0.25	0.84	0.50	0.64
Inability to sustained hand grip for 5 s	0.18	0.89	0.51	0.63
Inability to perform sustained tongue depressor test	0.22	0.88	0.52	0.64

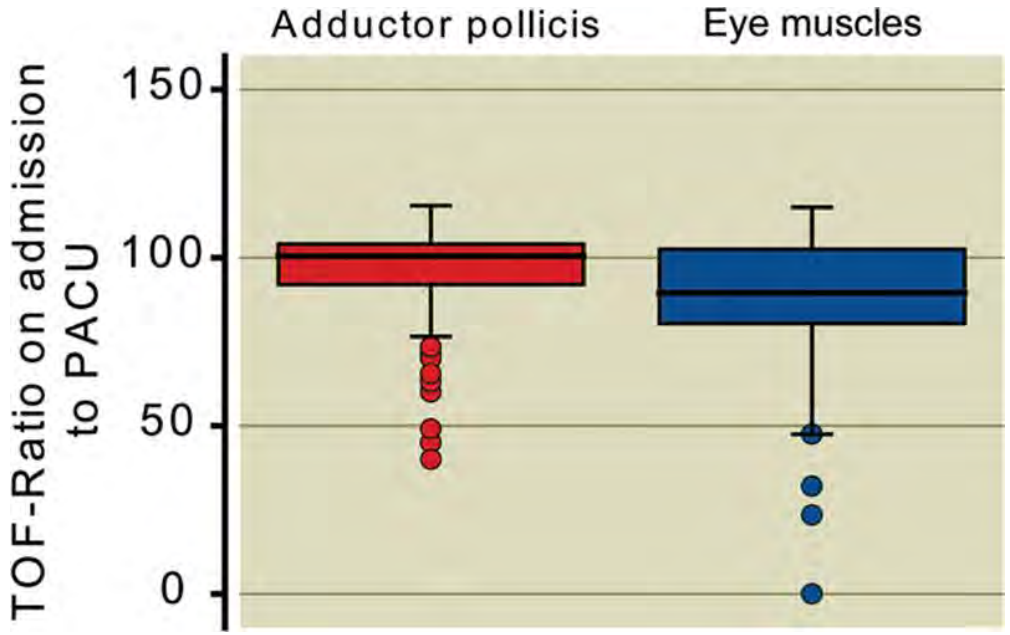
Residual Neuromuscular Block: Lessons Unlearned. Part II: Methods to Reduce the Risk of Residual Weakness

Sorin J. Brull, MD,* and Glenn S. Murphy, MD†

Anesth Analg 2010;111:129 –40

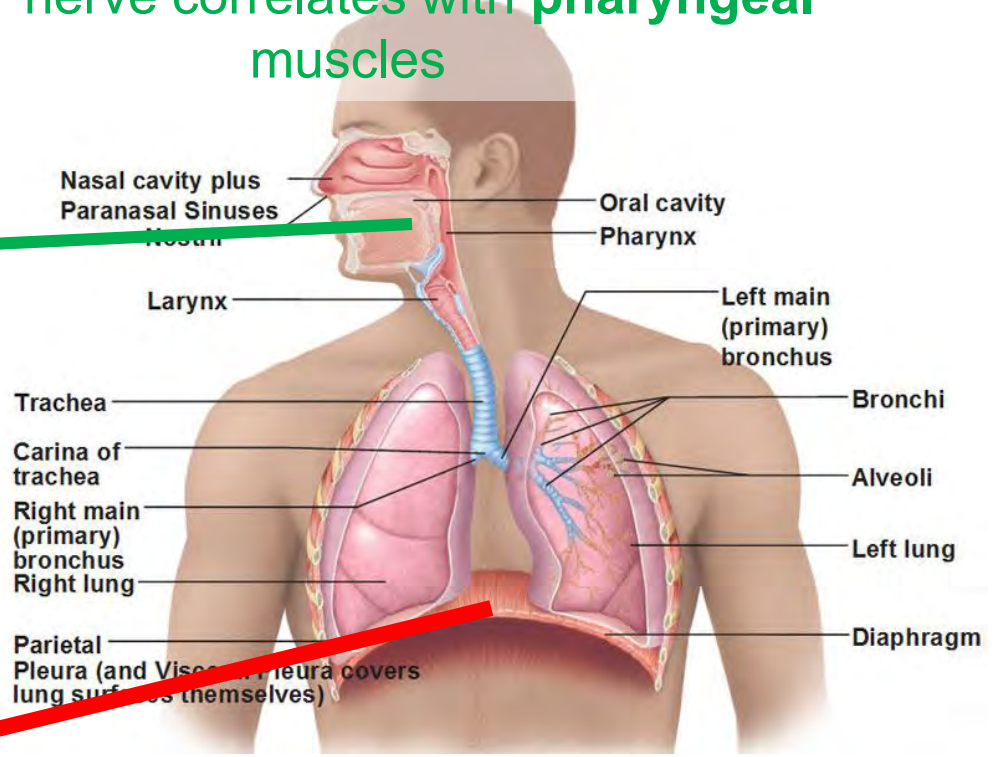
Ulnar vs Facial

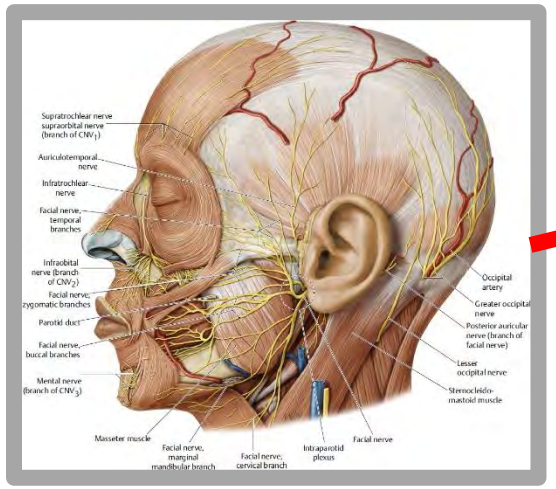
- Twitches return earlier at facial nerve compared to ulnar nerve
- Monitoring facial nerve results in higher incidence of residual paralysis (52% vs 22%, Thilen 2012):



Diaphragm *vs*. Pharynx

Ulnar nerve correlates with **pharyngeal** muscles





Facial nerve correlates with **diaphragm** (and larynx)

Dosing Neostigmine Reversal

- Full dose reversal = 50-70 mcg/kg
- Low dose reversal* = 20 mcg/kg

*Appropriate when TOF=4 with no fade, or TOFR ≥0.4

Time to Recovery Following Reversal

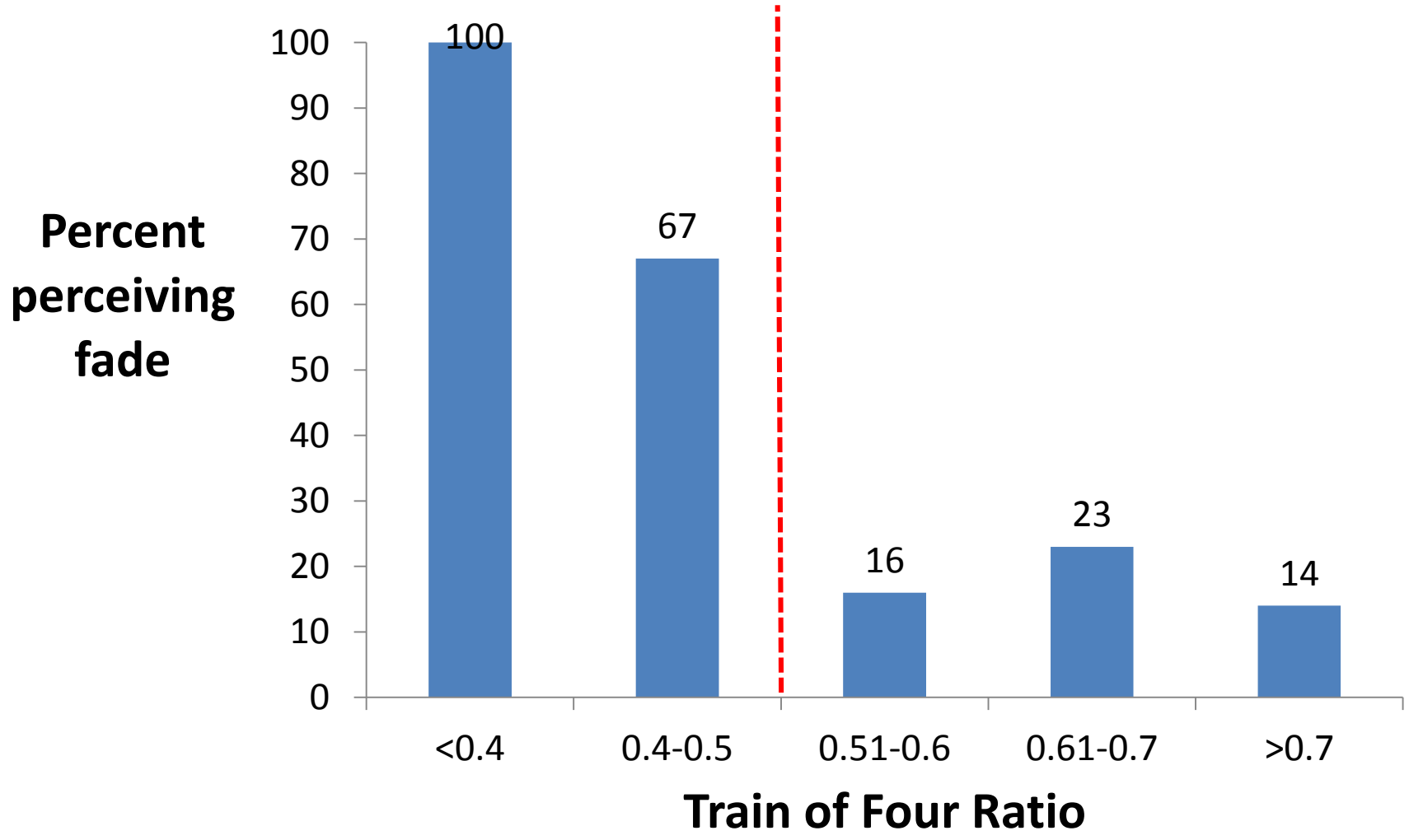
Number of twitches at time of reversal	Time to TOF ≥0.9 (minutes)
1	?
2	?
3	?
4	?

Kim et. al

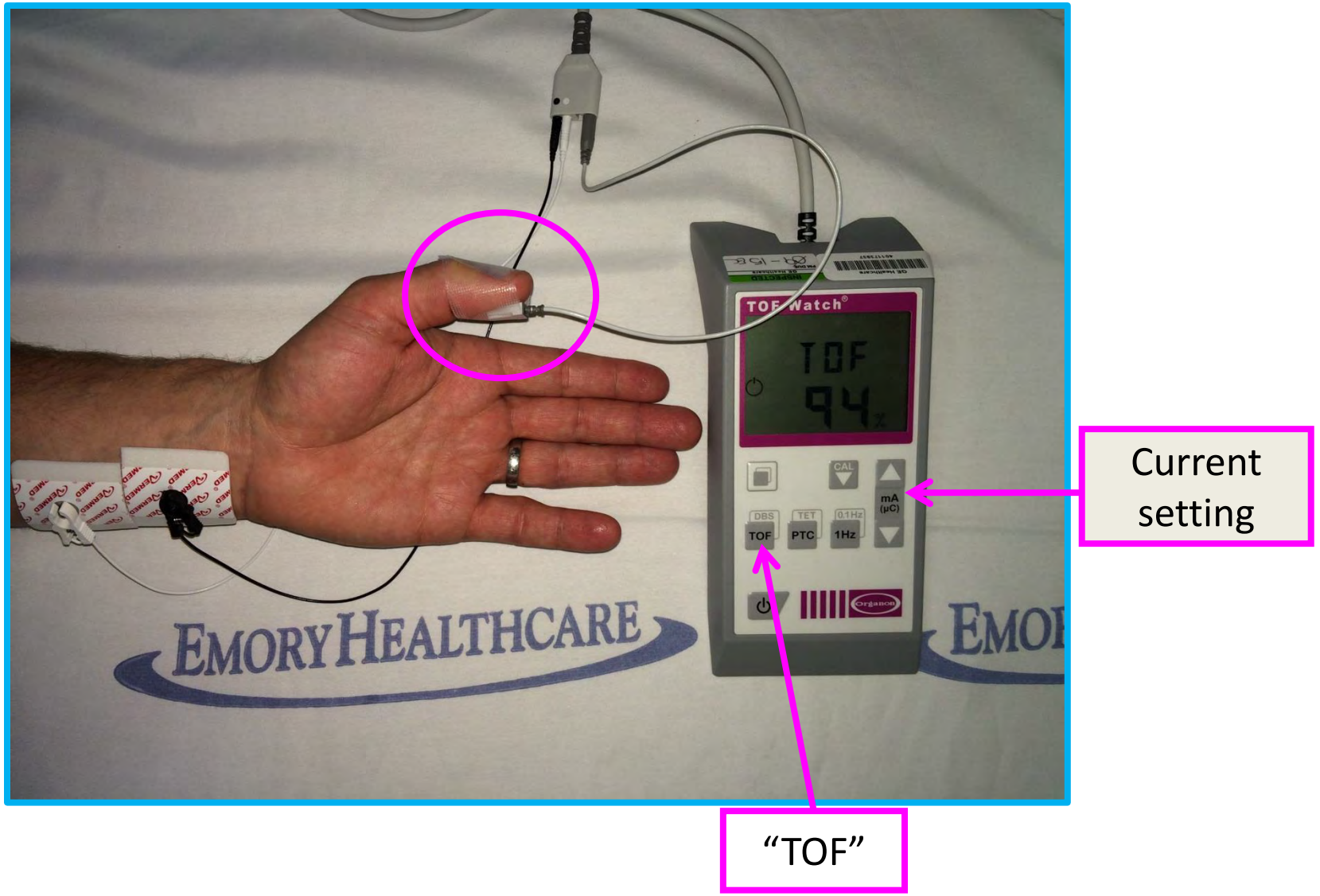
Time to Recovery Following Reversal

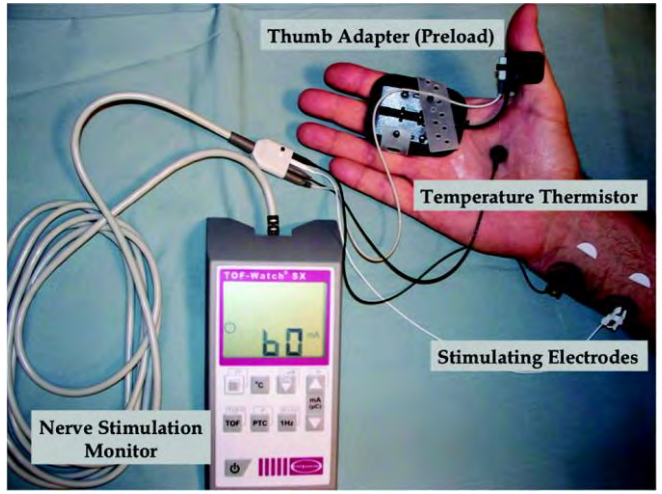
- Reversal from two twitches requires **at least 15 minutes** (Kopman 2004)
- Some patients reversed from two twitches will still have TOF <0.9 more than 30 minutes following reversal
- Unless you are using a quantitative monitor, you **cannot** reliably exclude residual paralysis using nerve stimulator and clinical assessment

Experienced Anesthesiologists' (In)ability to Detect Fade on TOF

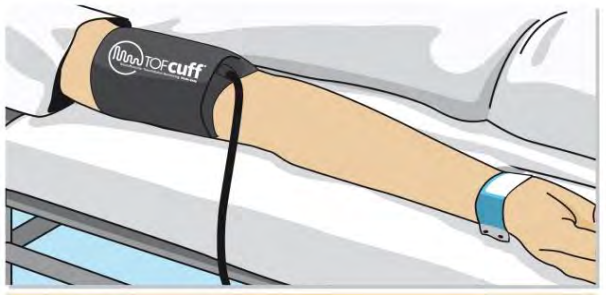


TOF Assessment with Accelerometer





Quantitative (objective) neuromuscular devices must be used to reliably detect TOF >0.4 to 0.6



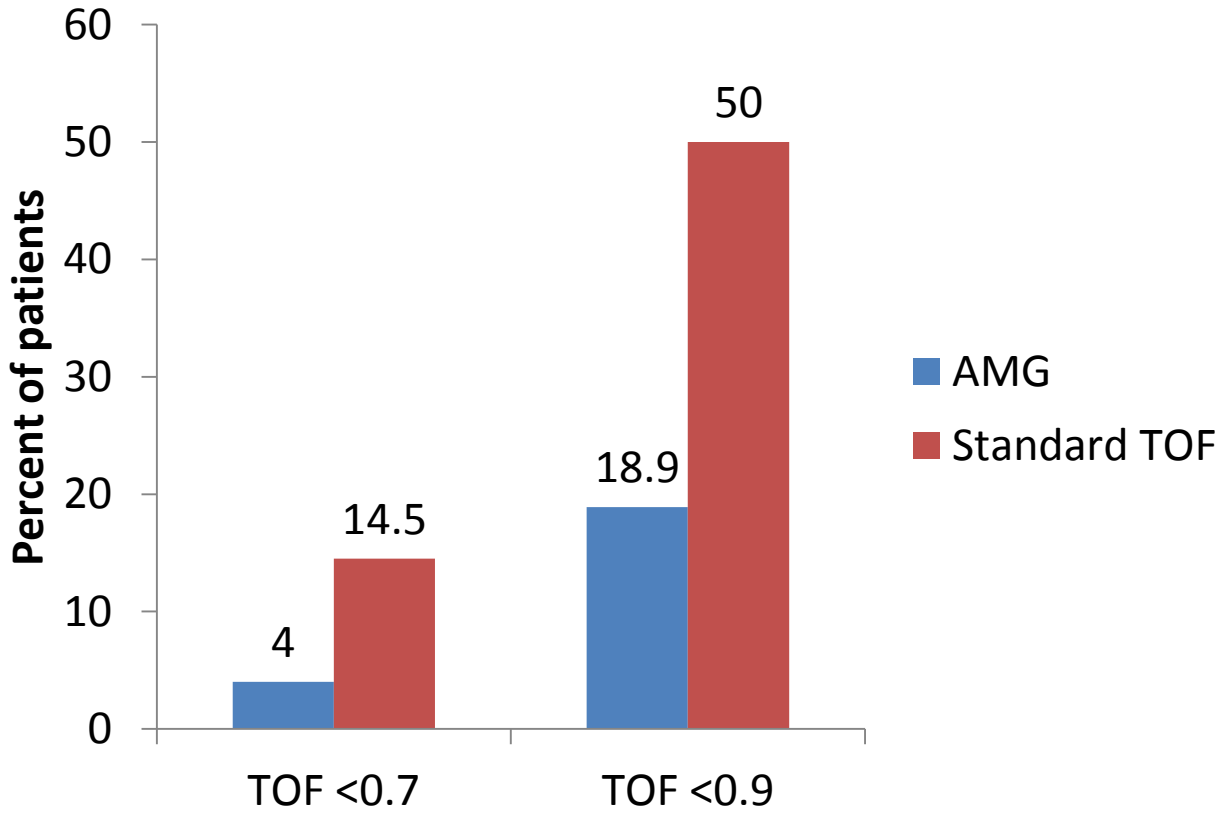
Measuring Train of Four Ratio

Monitor Type	Features
Mechanomyography (MMG)	"Gold Standard" Research applications only
Accelerometry (AMG)	Baseline TOF-R may be >100% (requires normalization) Requires unrestricted movement of thumb (or toe)
Electromyography (EMG)	Correlates well with MMG Can be used with arms tucked Disposable electrode (increased cost)
Cuff Device	Measures response in upper arm Overestimated recovery compared to EMG/AMG at ulnar nerve

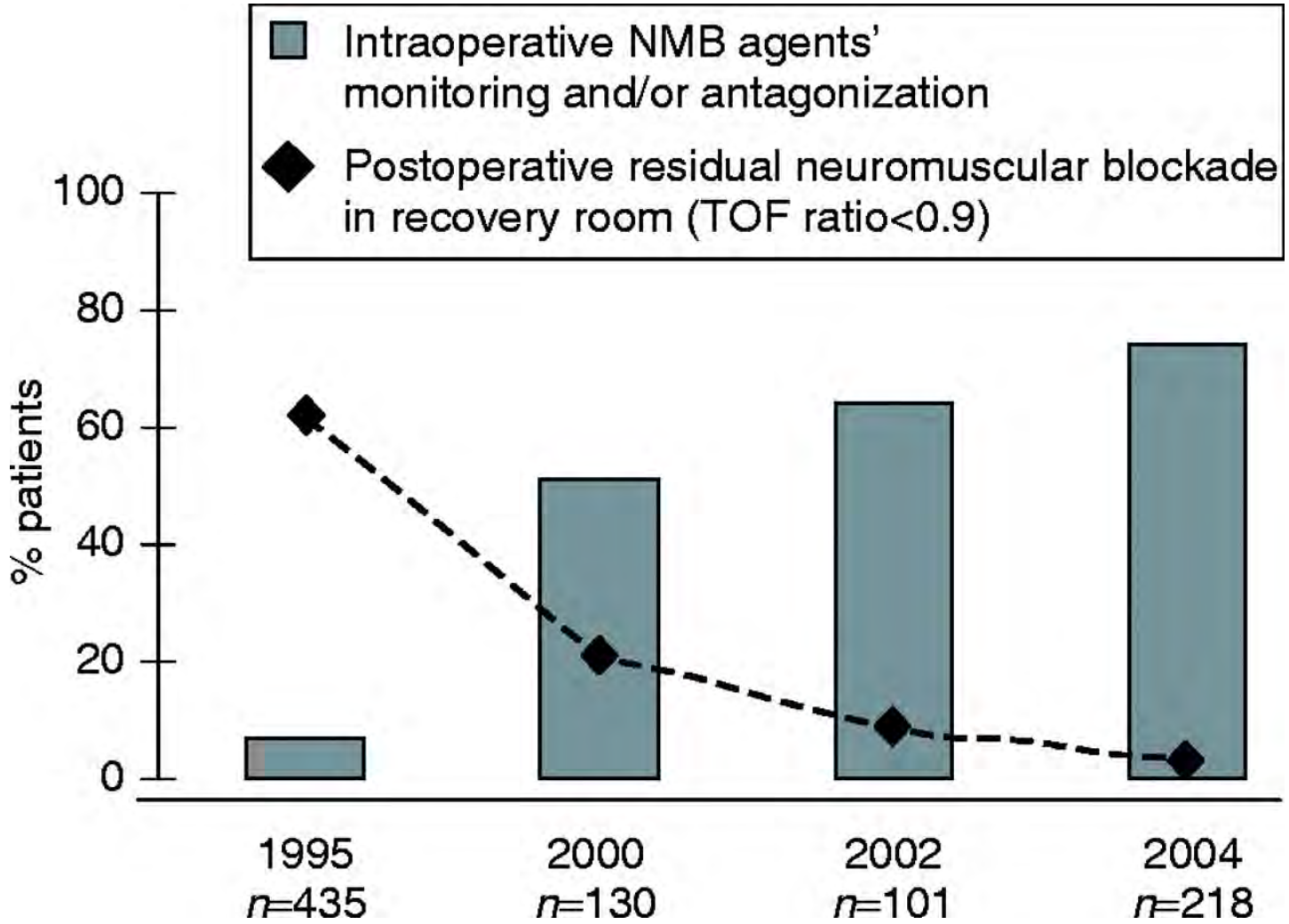
Quantitative monitoring can reduce residual paralysis

Intraoperative Acceleromyography Monitoring Reduces Symptoms of Muscle Weakness and Improves Quality of Recovery in the Early Postoperative Period

Glenn S. Murphy, M.D.,* Joseph W. Szokol, M.D.,* Michael J. Avram, Ph.D.,†
Steven B. Greenberg, M.D.,‡ Jesse H. Marymont, M.D.,* Jeffery S. Vender, M.D.,§ Jayla Gray, B.A.,‖
Elizabeth Landry, B.A.,‖ Dhanesh K. Gupta, M.D.#



Evolution of intraoperative NMB agents' management and postoperative residual neuromuscular block defined as a TOF ratio less than 0.9.



Baillard C et al. Br. J. Anaesth. 2005;95:622-626

ASA Guidelines on NMB Monitoring and Reversal:

Recommendations: Monitoring

- Quantitative TOF monitoring should be routine when we reverse with **neostigmine**

(Anesth Analg 2010;111:129 –40)

Recommendations For Safer **Neostigmine** Reversal

- **Monitor** depth of blockade
- Use **ulnar nerve** rather than facial (for recovery)
- Reverse from **at least two twitches (preferably 4)**
- (Wait **at least 15 minutes** before extubating)
- Use a **quantitative** twitch monitor
- Use full dose reversal (50-70 mcg/kg) unless patient has 4/4 twitches with no detectable fade
- Withhold reversal only if normalized TOFR 90% or higher

Based on: Anesth Analg 2010;111:129 –40

Anesthesiology 2005; 103:695–703

First Human Exposure of Org 25969, a Novel Agent to Reverse the Action of Rocuronium Bromide

Francois Gijsenbergh, M.D., Steven Ramael, M.D.,† Natalie Houwing, M.Sc.,‡ Thijs van Iersel, M.D.§*

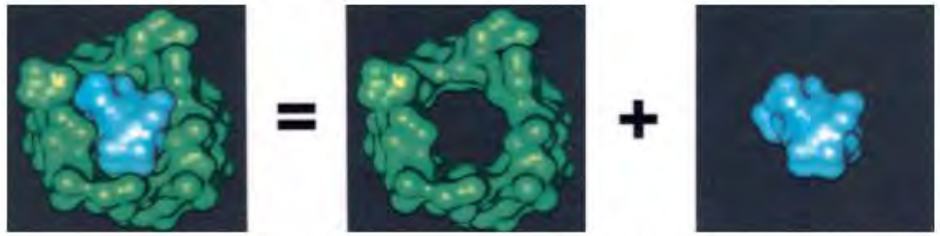
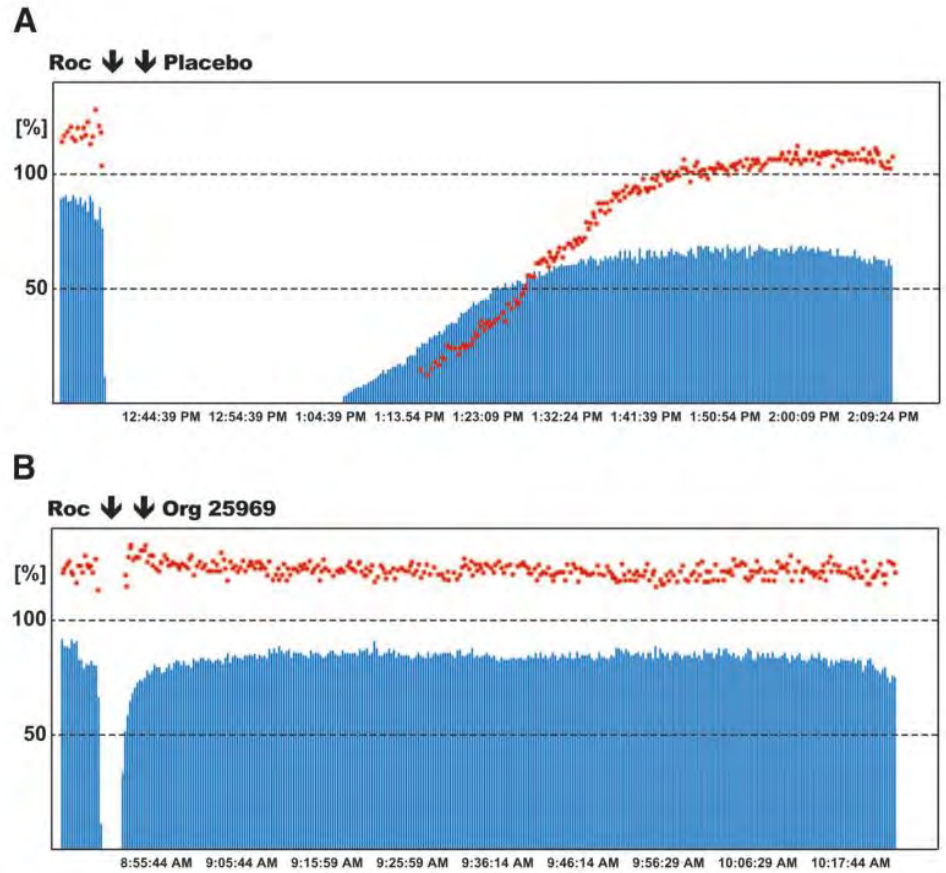


Fig. 1. X-ray crystal structures of Org 25969 (*green*) and rocuronium (*blue*) with filled van der Waals surface, showing that the two structures have many close contacts and are highly complementary to each other.



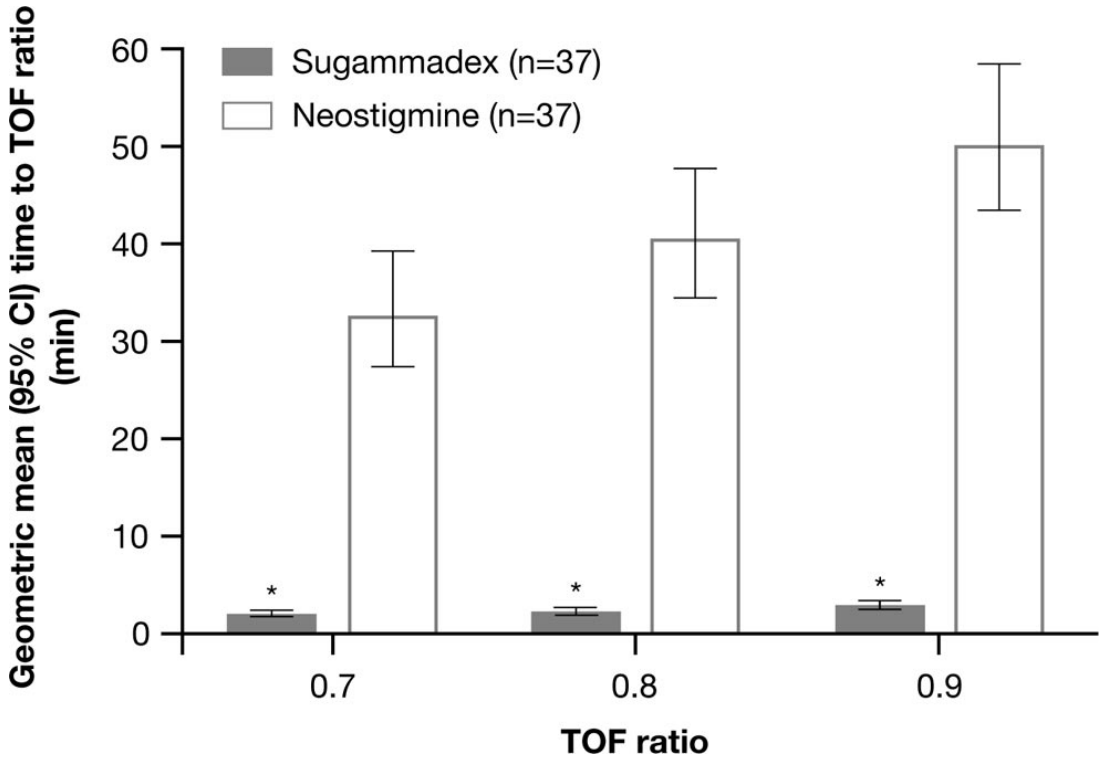
Sugammadex Dosing

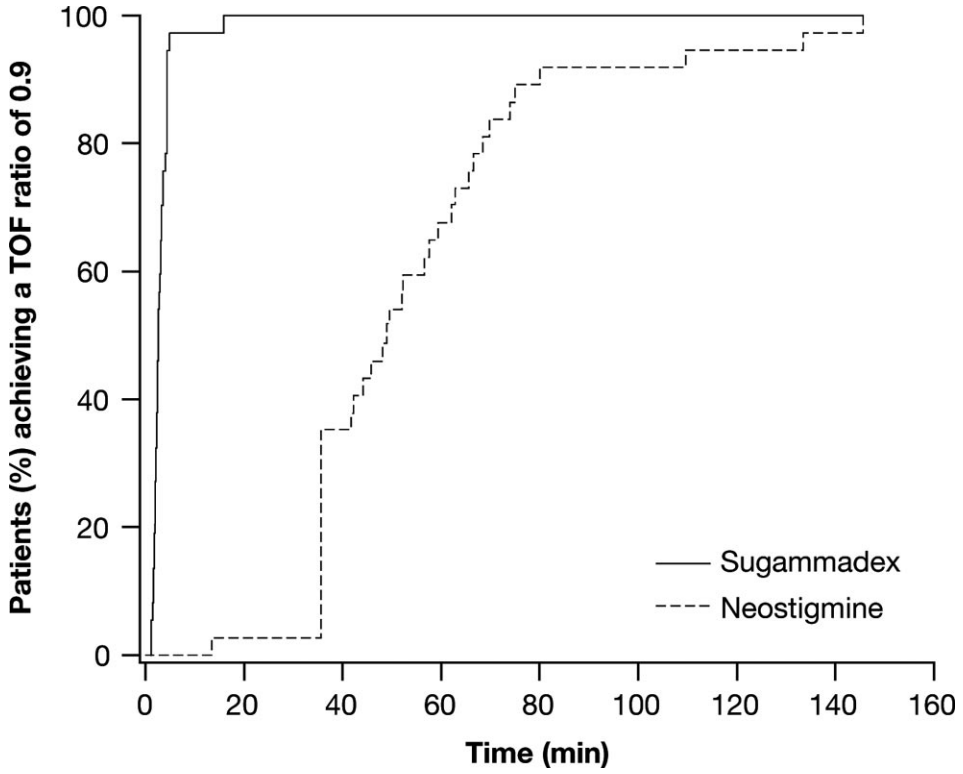
Depth of Block	Dose	Time to TOFR >0.9 Minutes (range)
TOF = 2	2mg/kg	2 (0.9-5.4)
PTC = 1-2	4 mg/kg	3 (1.2-16.1)
2 min after RSI dose	16mg/kg	3 (1.2-10.6)

SIGNAL Study: PTC 1-2

- **Median time to recovery** TOF Ratio 0.9:

Sugammadex **2.7 min** (1.2-16 min) v neostigmine 49.0 min (13.3-145.7 min), p < 0.0001



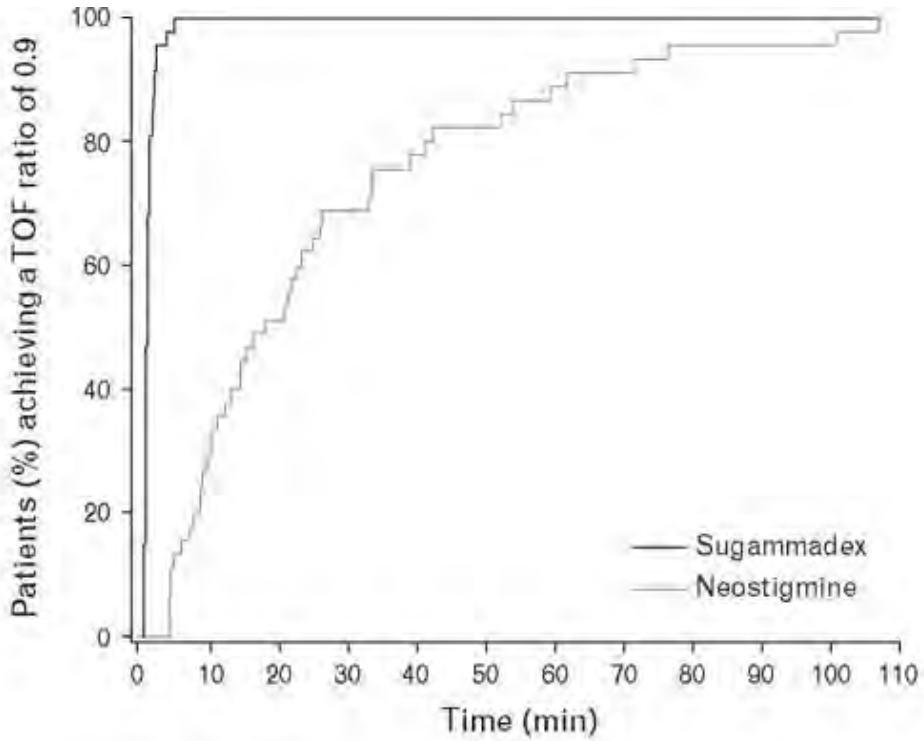


Jones. Anesthesiology 2008;105(5):816-824

AURORA Study: TOF =2/4

- **Median time to recovery**
  - TOF Ratio 0.9: Sugammadex **1.5 min** v neostigmine 18.6 min, p < 0.0001
  - TOF Ratio 0.8: Sugammadex **1.2 min** v neostigmine 10.8 min, p < 0.0001
  - TOF Ratio 0.7: Sugammadex **1.1 min** v neostigmine 7.2 min, p < 0.0001

	Sugammadex ($N=48$)	Neostigmine ($N=48$)	P
Recovery of T_4/T_1 ratio to 0.9			
n	47[a]	45[b]	
Geometric mean (min)	1.5	18.6	<0.0001
95% CI[c]	1.3–1.6	14.2–24.4	
Median (min)	1.4	18.5	
Range (min)	0.9–5.4	3.7–106.9	
Recovery of T_4/T_1 ratio to 0.8			
n	47[a]	48	
Geometric mean (min)	1.2	10.8	<0.0001
95% CI[c]	1.1–1.3	8.5–13.7	
Median (min)	1.2	9.8	
Range (min)	0.9–3.4	2.7–67.9	
Recovery of T_4/T_1 ratio to 0.7			
n	47[a]	48	
Geometric mean (min)	1.1	7.2	<0.0001
95% CI[c]	1.0–1.2	5.8–8.9	
Median (min)	1.0	6.2	
Range (min)	0.7–2.7	2.4–41.1	



Blobner. European J of Anaesthes 27(10):874-881

SPECTRUM Study: Emergency Reversal

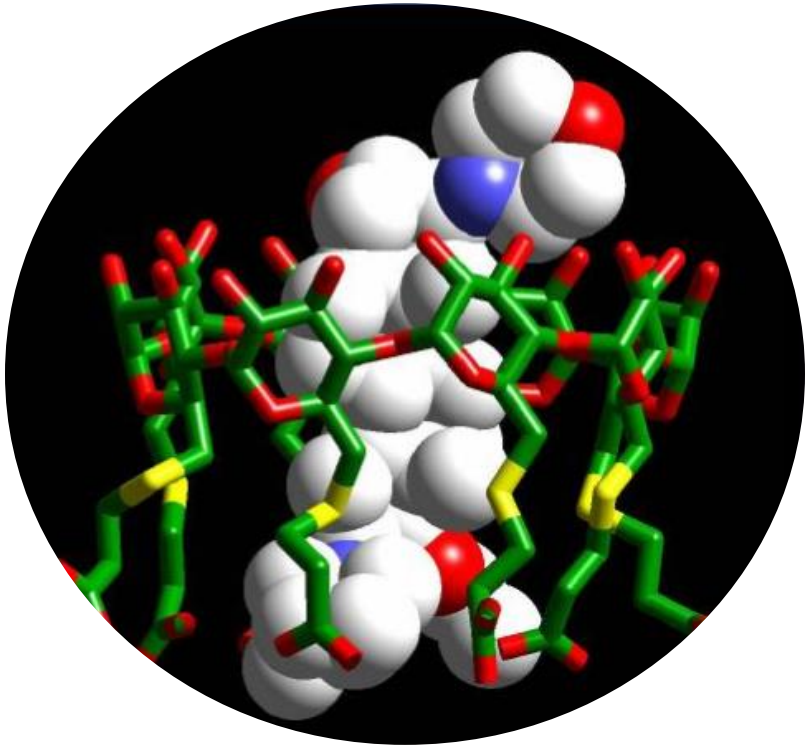
- **Mean time to recovery**
  - Time to recovery of T1 to 10% of the baseline value
    - **4.4 min** rocuronium/sugammadex vs **7.1 min** succinylcholine, p < 0.001
  - Time to recovery of T1 to 90% of the baseline value
    - **6.2 min** rocuronium/sugammadex vs **10.9 min** succinylcholine, p < 0.001

Table 1. Time (min) from Start of Administration of Neuromuscular Blocking Agent to Recovery of T_1 to 10% and T_1 to 90%

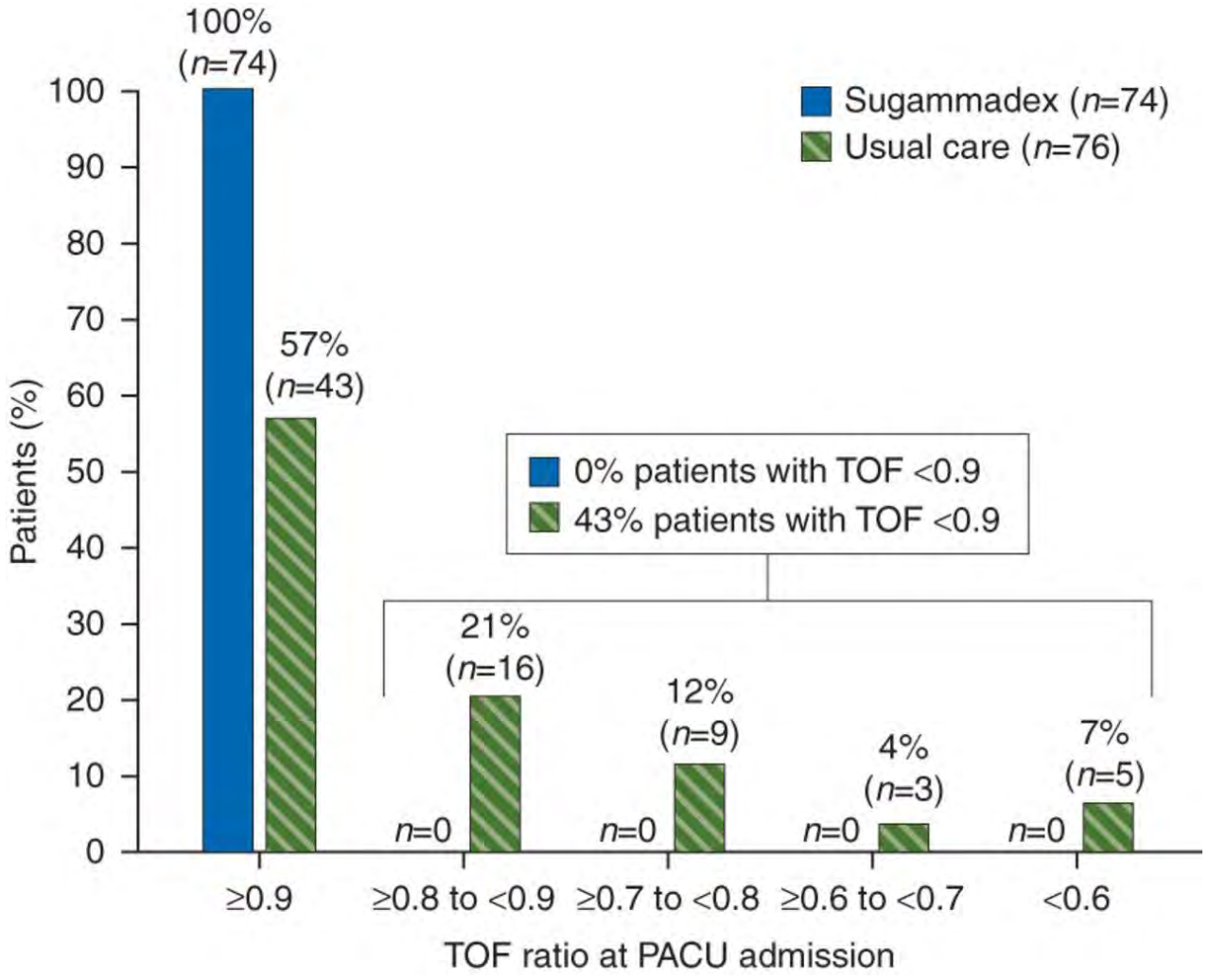
	Treatment Group	
	Rocuronium + Sugammadex* (n = 55)	Succinylcholine Only (n = 55)
Recovery to T_1 10% (primary endpoint)		
Mean (SD)	4.4 (0.7)	7.1 (1.6)†
Median	4.2	7.1
Min–max	3.5–7.7	3.8–10.5
Recovery to T_1 90%		
Mean (SD)	6.2 (1.8)	10.9 (2.4)†
Median	5.7	10.7
Min–max	4.2–13.6	5.0–16.2

* Protocol-specified sugammadex administration at 3 min after the start of rocuronium administration (mean [SD] 3.1 [0.2]; range 2.7 to 4.2 min). † $P <$ 0.001 between treatment groups.

Can Sugammadex Eliminate rNMB?



Residual paralysis **43%** with usual care *vs* **0%** with sugammadex



B. Brueckmann et al. Br. J. Anaesth. 2015;115:743-751

BJA British Journal of Anaesthesia

Reversal	**TOFR < 0.9**	
None	13.0%	(2.8%-33.6%)
Neostigmine	23.9%	(16.2%-33.0%)
Sugammadex	4.3%	(1.7%-9.4%)

Domenech et al. BMC Anesthesiology (2019) 19:143
https://doi.org/10.1186/s12871-019-0817-4

BMC Anesthesiology

RESEARCH ARTICLE Open Access

Usefulness of intra-operative neuromuscular blockade monitoring and reversal agents for postoperative residual neuromuscular blockade: a retrospective observational study

Gonzalo Domenech[1*], Matías A. Kampel[1], María E. García Guzzo[1], Delfina Sánchez Novas[1], Sergio A. Terrasa[2] and Gustavo García Fornari[1]

RNMB was present in 1.6% patients who received intra-operative quantitative NMB monitoring and 32% patients whose NMB was not monitored ($P < 0.01$).

Facial vs Ulnar Nerve

"Avoid Disgrace: Don't Use the Face!"
For dosing reversal

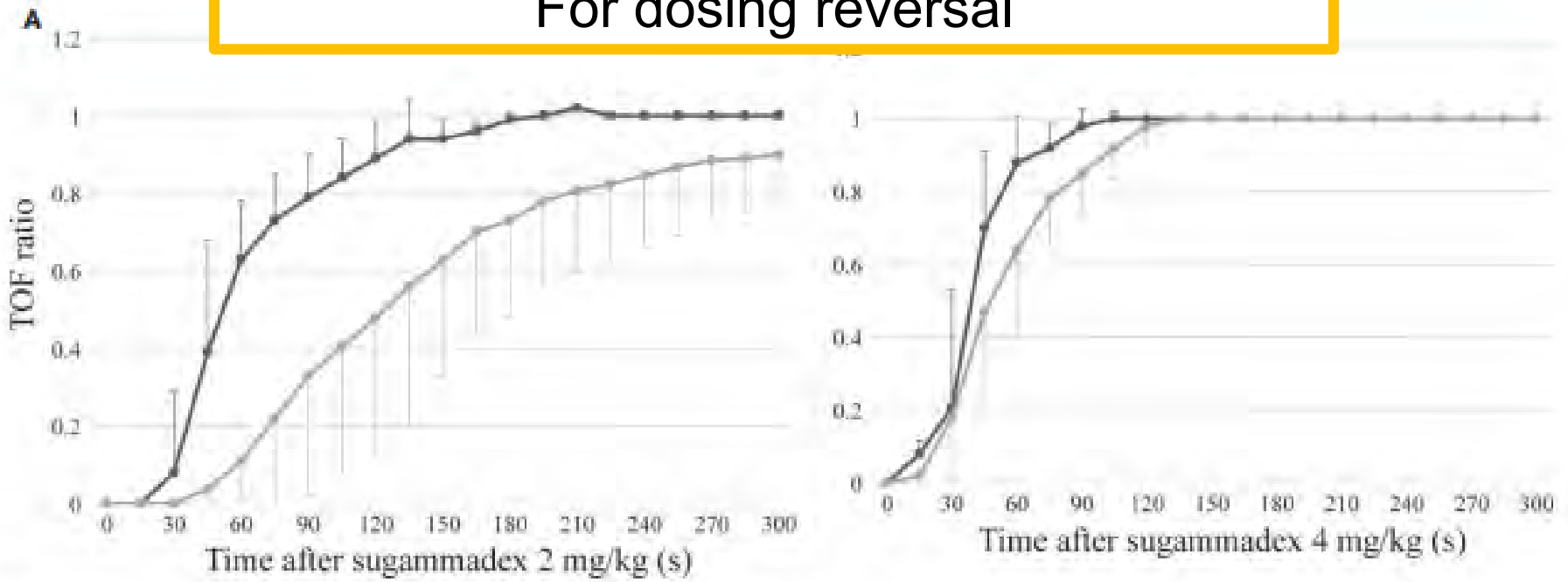
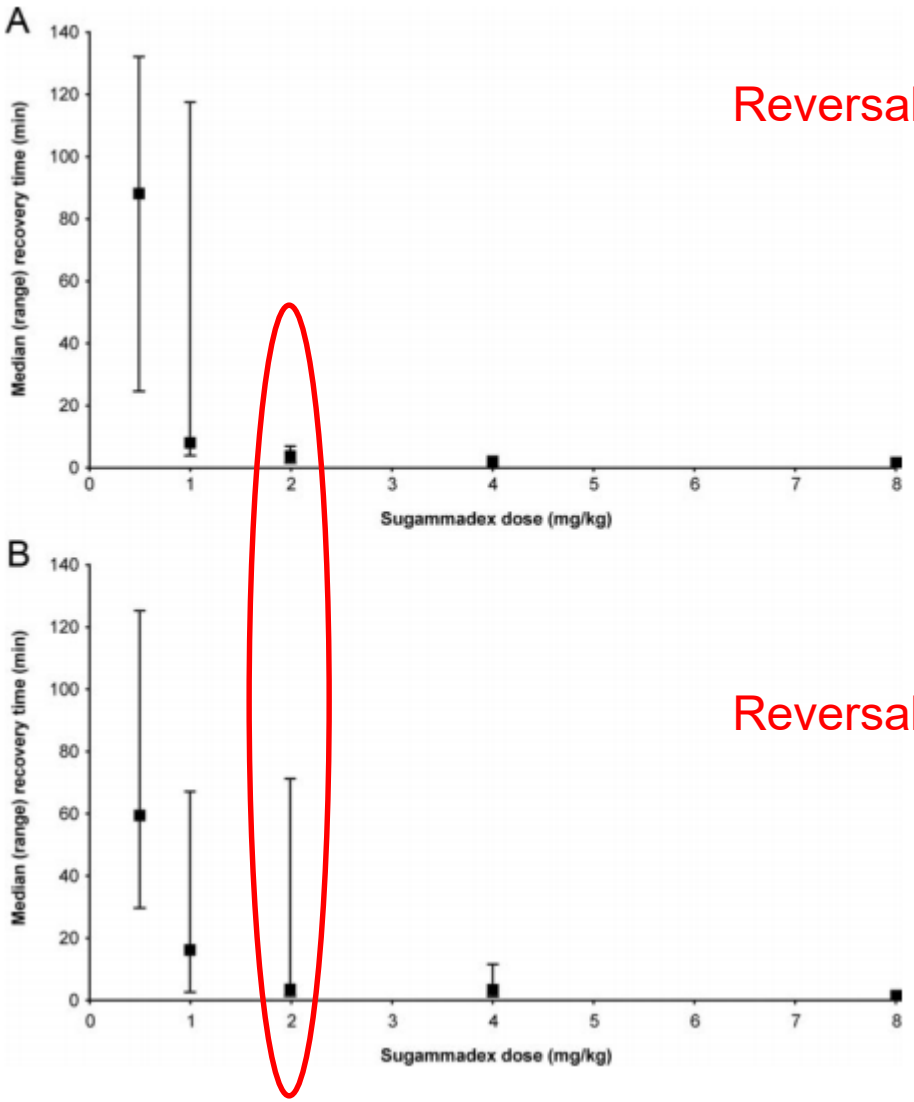


Fig. 2. Time course of facilitated recovery after a bolus of 2 mg/kg (A) and 4 mg/kg (B) sugammadex in the 20–60 y age group. A black line and a gray line show the response of the corrugator supercilii muscle and adductor pollicis muscle, respectively. Data are shown as mean and SD.

Acta Anaesthesiologica Scandinavica 59 (2015) 892–901

Rocuronium vs Vecuronium



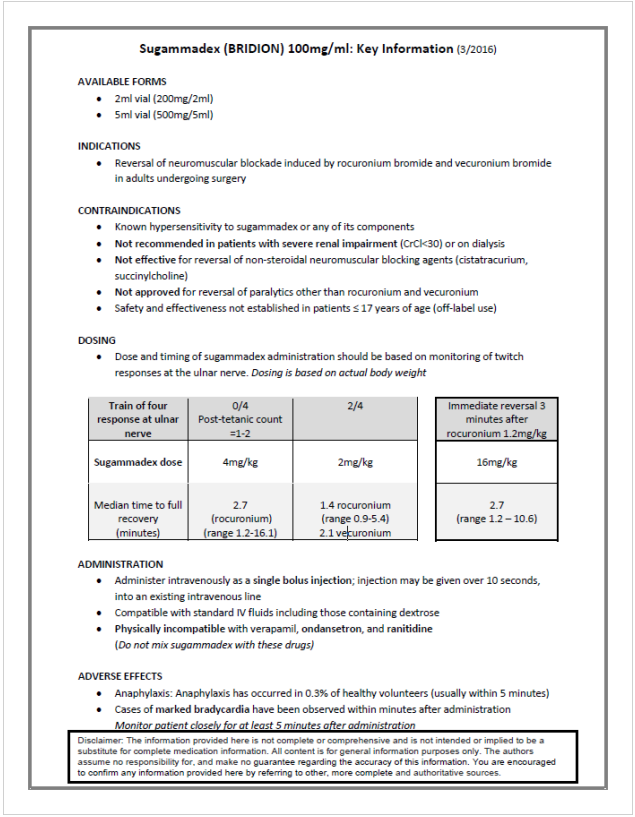
Reversal of rocuronium

Reversal of vecuronium

Duvaldestin. Anesth Analg 2010;110:74-82

Sugammadex at EUH

- Added to formulary
- Established provider and patient education



Sugammadex (BRIDION) 100mg/ml: Key Information (3/2016)

AVAILABLE FORMS
- 2ml vial (200mg/2ml)
- 5ml vial (500mg/5ml)

INDICATIONS
- Reversal of neuromuscular blockade induced by rocuronium bromide and vecuronium bromide in adults undergoing surgery

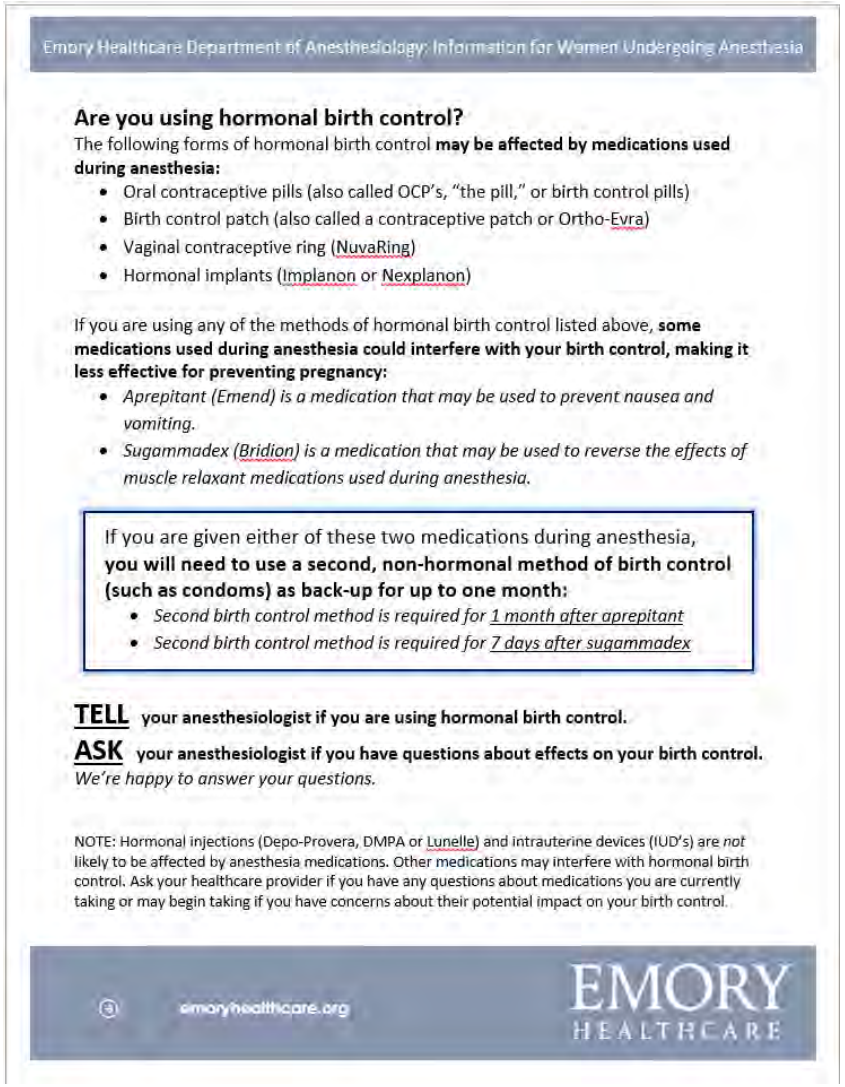
CONTRAINDICATIONS
- Known hypersensitivity to sugammadex or any of its components
- **Not recommended in patients with severe renal impairment** (CrCl<30) or on dialysis
- **Not effective** for reversal of non-steroidal neuromuscular blocking agents (cistatracurium, succinylcholine)
- **Not approved** for reversal of paralytics other than rocuronium and vecuronium
- Safety and effectiveness not established in patients ≤ 17 years of age (off-label use)

DOSING
- Dose and timing of sugammadex administration should be based on monitoring of twitch responses at the ulnar nerve. *Dosing is based on actual body weight*

Train of four response at ulnar nerve	0/4 Post-tetanic count =1-2	2/4	Immediate reversal 3 minutes after rocuronium 1.2mg/kg
Sugammadex dose	4mg/kg	2mg/kg	16mg/kg
Median time to full recovery (minutes)	2.7 (rocuronium) (range 1.2-16.1)	1.4 rocuronium (range 0.9-5.4) 2.1 vecuronium	2.7 (range 1.2 – 10.6)

ADMINISTRATION
- Administer intravenously as a **single bolus injection**; injection may be given over 10 seconds, into an existing intravenous line
- Compatible with standard IV fluids including those containing dextrose
- **Physically incompatible** with verapamil, **ondansetron**, and **ranitidine** (*Do not mix sugammadex with these drugs*)

ADVERSE EFFECTS
- Anaphylaxis: Anaphylaxis has occurred in 0.3% of healthy volunteers (usually within 5 minutes)
- Cases of **marked bradycardia** have been observed within minutes after administration *Monitor patient closely for at least 5 minutes after administration*



Emory Healthcare Department of Anesthesiology: Information for Women Undergoing Anesthesia

Are you using hormonal birth control?

The following forms of hormonal birth control **may be affected by medications used during anesthesia:**
- Oral contraceptive pills (also called OCP's, "the pill," or birth control pills)
- Birth control patch (also called a contraceptive patch or Ortho-Evra)
- Vaginal contraceptive ring (NuvaRing)
- Hormonal implants (Implanon or Nexplanon)

If you are using any of the methods of hormonal birth control listed above, **some medications used during anesthesia could interfere with your birth control, making it less effective for preventing pregnancy:**
- *Aprepitant (Emend) is a medication that may be used to prevent nausea and vomiting.*
- *Sugammadex (Bridion) is a medication that may be used to reverse the effects of muscle relaxant medications used during anesthesia.*

If you are given either of these two medications during anesthesia, **you will need to use a second, non-hormonal method of birth control (such as condoms) as back-up for up to one month:**
- *Second birth control method is required for 1 month after aprepitant*
- *Second birth control method is required for 7 days after sugammadex*

TELL your anesthesiologist if you are using hormonal birth control.

ASK your anesthesiologist if you have questions about effects on your birth control.

We're happy to answer your questions.

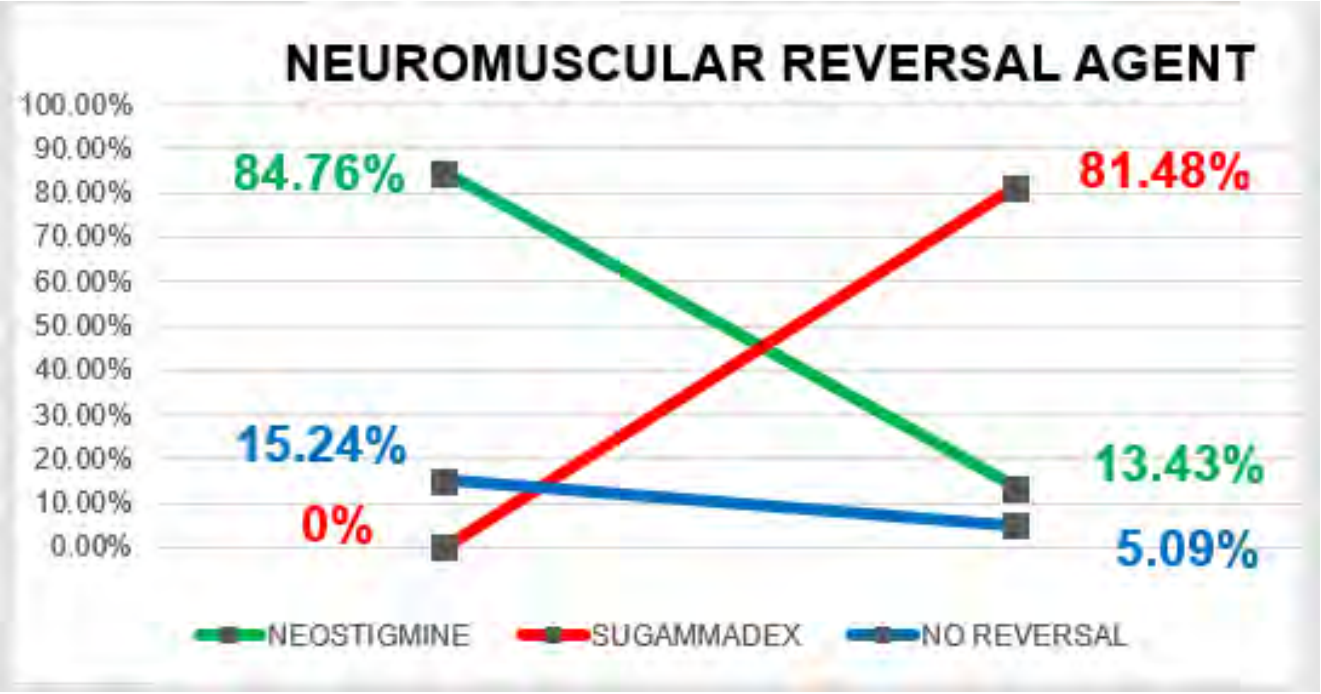
NOTE: Hormonal injections (Depo-Provera, DMPA or Lunelle) and intrauterine devices (IUD's) are *not* likely to be affected by anesthesia medications. Other medications may interfere with hormonal birth control. Ask your healthcare provider if you have any questions about medications you are currently taking or may begin taking if you have concerns about their potential impact on your birth control.

emoryhealthcare.org

EMORY HEALTHCARE

Sugammadex at EUH

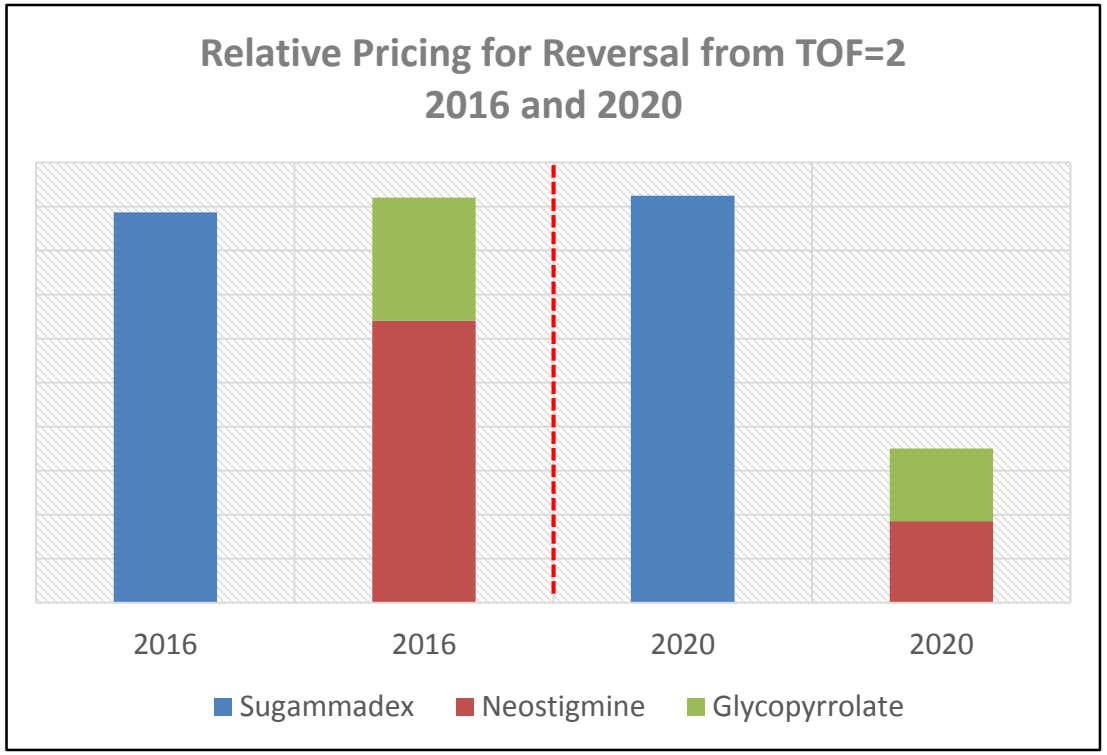
- Available without restriction
- Reversal agent of choice



Blaufuss, Wolf. ASA 2018 (Poster)

Sugammadex at EUH

- Available without restriction
- Reversal agent of choice
- Cost concerns



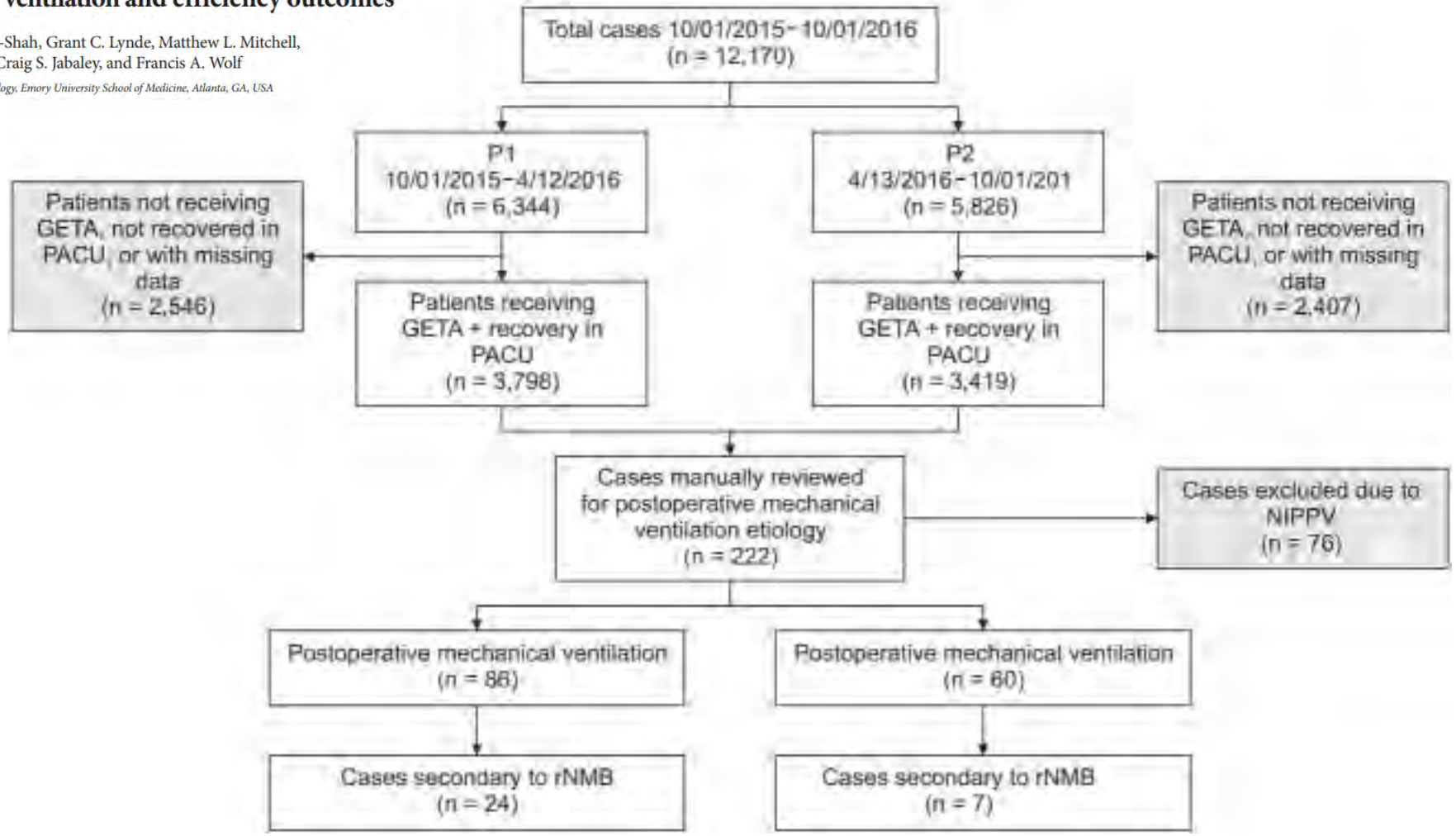
KJA
Korean Journal of Anesthesiology

Clinical Research Article
pISSN 2005-6419 · eISSN 2005-7563

Initial experience with the unrestricted introduction of sugammadex at a large academic medical center: a retrospective observational study examining postoperative mechanical ventilation and efficiency outcomes

Vikas N. O'Reilly-Shah, Grant C. Lynde, Matthew L. Mitchell, Carla L. Maffeo, Craig S. Jabaley, and Francis A. Wolf

Department of Anesthesiology, Emory University School of Medicine, Atlanta, GA, USA



Early Signs of Reduced Mechanical Ventilation in the PACU

Table 2. Rates and Causes of Post-anesthesia Care Unit Mechanical Ventilation before (P1) and after (P2) the Introduction of Sugammadex into Clinical Care

Cause of PACU mechanical ventilation	Total	Pre (P1)	Post (P2)	Odds ratio of PACU mechanical ventilation in the post-introduction era versus the pre-introduction era (95% CI)	P value
Did not plan to extubate	32 (21.9%)	19 (22.1%)	13 (21.7%)	0.772 (0.373–1.551)	0.469
Hemodynamic	18 (12.3%)	6 (7.0%)	12 (20.0%)	2.030 (0.807–5.616)	0.134
Iatrogenic	16 (11.0%)	11 (12.8%)	5 (8.3%)	0.546 (0.182–1.451)	0.230
Neurological	18 (12.3%)	11 (12.8%)	7 (11.7%)	0.792 (0.297–1.992)	0.622
Respiratory	31 (21.2%)	15 (17.4%)	16 (26.7%)	1.124 (0.557–2.282)	0.108
rNMB	31 (21.2%)	24 (27.9%)	7 (11.7%)	0.339 (0.139–0.736)	0.005
All except rNMB	115 (78.8%)	62 (72.1%)	53 (88.3%)	0.938 (0.645–1.358)	0.733
All causes	146	86	60	0.767 (0.547–1.069)	0.118

Values are expressed as number (%). PACU: post-anesthesia care unit, rNMB: residual neuromuscular blockade. P values were derived by performing multiple variable logistic regression as described.

Korean J Anesthesiol. 2018 Oct; 71(5): 374–385.

Sugammadex – Potential Benefits

- Reversal from deep and even profound blockade
- Faster, more reliable reversal
- Low rates of rNMB (~1-2%)
- Shorter PACU LOS
- Shorter time to extubation

Sugammadex Limitations

Areas of potential concern:

- Cases of bradycardia
- Only for use with rocuronium>vecuronium
- **“Not recommended”** in renal impairment (CrCl<30 or on dialysis)
- Prolongation of PTT/PT (effect on the lab assay)
- Decreased effectiveness of hormonal contraception?
  - Provide Preop Information and Discharge Instructions
- Hypersensitivity risks
- Cost

What is the Role of *Quantitative* Monitoring if We Have Sugammadex?

- Withhold reversal if spontaneous recovery is complete
- **Increase use of neostigmine (e.g. patients with TOF3 or more)**
- Reversal from very deep block (PTC=0)
- Assess suspected rNMB in OR and PACU
- Adjust dosing in obese patients?
- Precision dosing for rocuronium vs vecuronium at different levels of block

Summary

- Residual NMB is common after extubation when neostigmine is used for reversal
- Residual NMB can cause patient harm
- Use of quantitative monitoring can reduce rNMB
  - ➢ We should routinely use quantitative monitors of NMB when relying on neostigmine
- Sugammadex can reduce rNMB
  - – When dosed correctly based on twitch assessment at the ulnar nerve
- If we employ quantitative monitoring combined with our available reversal agents we should be able to fully eliminate rNMB

Thank you

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Board-Certified Physician Anesthesiologist and professional writer. Fifteen years of front-line clinical experience and a strong interest in public health. Looking to expand my career into including more writing and public service, applying my deep knowledge and experience of the field into new challenges in narrative non-fiction, healthcare communication, and health policy.

PROFESSIONAL EXPERIENCE

PHYSICIAN SPECIALISTS IN ANESTHESIA, Emory-St. Joseph's Hospital, Atlanta, GA
Attending Anesthesiologist, August 2008 – Present

- Diplomate of the American Board of Anesthesiology (2010)
- Direct management of patient care and supervision of a team of 75+ midlevel providers in the perioperative environment at a high-acuity tertiary care community affiliate of Emory University Hospital.
- Clinical Day Director in charge of OR scheduling, personnel and management, surgeon and nursing outreach, and daily hospital operations.
- Work environment included clinical management the operating rooms, intensive care units, endoscopy suites, radiology suites, the emergency department, and the preoperative testing clinic.
- 50-60 clinical hours a week while full-time, 30-40 hours a week part-time (since 2014)
- Expertise in major vascular and regional anesthesia, with expertise in ultrasound-guided peripheral nerve blockade
- Lead physician, physician mentorship team, charged with mentoring colleagues about interpersonal communication, teamwork skills, and effective group management technique
- Deep academic knowledge of the history and biologic effects of pharmacologic agents, with an interest in pain management and strategies for attenuating the national opioid epidemic

Professional memberships: American Society of Anesthesiology, Georgia Society of Anesthesiology, Medical Association of Georgia (Georgia Physicians Leadership Academy Class XII)

EDUCATION

COLUMBIA UNIVERSITY MAILMAN SCHOOL OF PUBLIC HEALTH
New York, NY
Master of Public Health with focus in Healthcare Administration, August 2017-August 2019

- Graduation class speaker
- Led team to help build a community health center in rural Humacao, Puerto Rico at the Centro de Transformación Comunitaria in the aftermath of Hurricane Maria. Solicited donations, performed home health visits to assess community needs.

COLUMBIA UNIVERSITY MEDICAL CENTER, DEPARTMENT OF ANESTHESIOLOGY
New York, NY
Post-Doctoral Residency Fellow, July 2005-June 2008

- Resident Education Committee
- Medical Student Curriculum Committee

COLUMBIA UNIVERSITY MEDICAL CENTER, DEPARTMENT OF PEDIATRICS
New York, NY
Post-Doctoral Residency Fellow, July 2003-June 2005

COLUMBIA UNIVERSITY COLLEGE OF PHYSICIANS AND SURGEONS
New York, NY
Doctor of Medicine, August 1999-May 2003

- **Awards:** Fellow of the Gold Humanism Honor Society, inducted May 2003, *"In recognition of demonstrated clinical excellence, integrity, exemplary devotion to the service of others, and compassionate and respectful relationships with patients, families, and colleagues."*
- **Clerkship Honors:** Pediatrics, Medicine, Neurology, Neurosurgery, Psychiatry
- **Preclinical Honors:** Psychiatric Medicine I and II, Endocrinology, Neuropathology
- Licensed to practice medicine in New York and Georgia

WELLESLEY COLLEGE
Wellesley, MA
BA Psychobiology, August 1995-May 1999

- *Magna cum laude*
- **Sherman Fairchild Foundation Research Grant** for work in Behavioral Neuroscience with Joanne Berger-Sweeney, Ph.D., studying the effect of neonatal monoaminergic depletion on the performance of learning and memory tasks in adult mice (1998-1999)
- **Beth Israel Deaconess Medical Center, Boston, MA,** Research Assistant, Institute for the Prevention of Cardiac Disease (1996)

L E A D E R S H I P

MEDICAL ASSOCIATION OF GEORGIA - GEORGIA PHYSICIANS LEADERSHIP ACADEMY

- Nominated by the Georgia Society of Anesthesiologists
- Focus on opioid epidemic risk mitigation in perioperative pain management

P U B L I C A T I O N S

THIS WON'T HURT A BIT (AND OTHER WHITE LIES), Grand Central Publishing, 2011

- *"An account of medicine, marriage and motherhood, executed with style and enough humor to offset the not-always-happy endings for patients...An upbeat memoir by a woman still imbued with the idealism to serve, but also to be there for her husband and two sons."* (Kirkus Reviews)
- Editor: Grand Central Publishing, Hachette Book Group
- Agent: Sharon Bowers, The Miller Agency, NY

"One Flew Over,"
Wellesley Magazine, Endnote *[publication date pending]*

"Your Smartwatch: High-tech Health Tracker or Talisman?"
Emory Medicine Magazine, Spring 2019

"There's a Proven Public Health Strategy We Could Use to Encourage Vaccination"
Slate, March 8, 2019

"Smartwatches Are Changing the Purpose of the EKG"
The Atlantic, February 7, 2019

"Humanely Told Stories of Lives Saved and Lost"
The Boston Globe, March 21, 2018

Arnold P. Gold Foundation, "The Big Picture"
Featured essay, July 11, 2001

PUBLIC SPEAKING

- Keynote speaker, Resident House of Delegates, American Society of Anesthesiology Annual Meeting (2019)
- Graduation speaker, Columbia University Mailman School of Public Health (2019)
- Visiting Professorship University of Florida, Jacksonville, Grand Rounds featured speaker (2017)
- Commencement address, Louisiana State University at Shreveport Health Sciences Center (2016)
- Commencement address, Wright State Boonshoft School of Medicine (2013)
- 2012: UC Davis School of Medicine, Wellesley College Hippocratic Society Annual Lecture (keynote speaker), 36th Annual Conference of the American Academy of Anesthesiologist Assistants (AAAA), South Carolina Medical Association annual meeting (keynote speaker)
- 2011: Iowa Writer's Workshop, Prairie Lights Bookstore, Atlanta History Center, Harvard Coop, Penn Book Center, Columbia University, Georgia Society of the American College of Surgeons Annual Meeting, Johns Hopkins University AMSA "Empowering Future Physicians" Conference, AJC Decatur Book Festival

RESEARCH

INWOOD HOUSE, New York, NY

- Development and implementation of a health education program assessing the effect of a smoking cessation initiative at a residential home for pregnant teenagers.
- Presented at the **Soros Service Program for Community Health (SSPCH) Research Symposium** on August 3, 2000

PERSONAL

Married to Joseph Walrath M.D., an oculoplastic surgeon in Atlanta GA. Mother of three. Strong medical Spanish, fluent in Cantonese.

Curriculum Vitae
Of

Matthew T. Popovich, Ph.D.

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https://www.linkedin.com/in/matthewpopovich/

Work Experience

Director of Quality and Regulatory Affairs, American Society of Anesthesiologists
November 2014 – Present
Washington, DC

Quality Specialist, American Society of Anesthesiologists
May 2013 – November 2014
Washington, DC

Accreditation Consultant, National Association of Boards of Pharmacy
January 2012 – May 2013
Mt Prospect, IL

Pharmacy Quality and Safety Accreditation Manager, National Association of Boards of Pharmacy
June 2010 – August 2011
Mt Prospect, IL

Research Consultant, National Association of Boards of Pharmacy
February 2010 – June 2010
Mt Prospect, IL

Teaching Assistant and PhD Candidate, University of Illinois at Chicago – Department of History
August 2002 – August 2009
Chicago, IL

Graduate Archivist, University of Illinois at Chicago - Daley Library/Special Collections
January 2009 – August 2009, May 2005 - August 2005, February 2004 - August 2004
Chicago, IL

Education

Doctor of Philosophy (August 2009)
University of Illinois at Chicago – Department of History (Chicago, IL)

Dissertation:	Boundaries of Progress: The Politics of Urban Annexation and Anti-Annexation, 1870-1930 (Defended July 2009)
Committee:	Perry Duis, Ann Keating, Richard John, Leon Fink, Robert Johnston

Master of Arts (August 2004)
University of Illinois at Chicago – Department of History (Chicago, IL)

Bachelor of Arts (December 2001)
Purdue University, West Lafayette – Political Science and History

Non-Peer Reviewed Publications

1. Goldman, JM; Killoran, PV; Popovich, MT. "Federal initiatives to Improve Patient Safety through the Interoperability of Medical Devices, Data and Platforms Taking Shape." *ASA Monitor*. 11 2019; Vol.83, 54-56.

2. Rebello, E; Connolly, L; Hein, HAT; Popovich, MT. "Long-awaited United States Pharmacopeia (USP) General Chapter <797> Revisions Explained: The One-Hour Rule will No Longer be in Effect." *ASA Monitor*. 9 2019; Vol. 83, 70-71.

3. Dietrich, CC; Cammarata, BJ; Giordano, CR; Popovich, MT. "ASA Engagement with AORN Results in Surgical Attire Burden Reduction." *ASA Monitor*. 5 2019; Vol.83, 44-46.

4. Rebello, E; Connolly, LA; Popovich, MT. "Do No Harm: Finding Consensus on Medication Concentration Standardization." *ASA Monitor*. 03 2019; Vol.83, 18-19.

5. Connolly, LA; Popovich, MT; Quill, E. "Supporting ASA Members with Quality Management & Departmental Administration Initiatives." *ASA Monitor*. 03 2019; Vol.83, 12-13.

Book Chapters

Schmitz, D; Popovich, MT. "Quality Reporting: Understanding National Priorities, Identifying Local Applicability" in *Practice Management: Successfully Guiding Your Group into the Future.* Editors Stead, Stanley and Abouleish, Amr. *Anesthesiology Clin* 36 (2018) 201–216.

Presentations

1. Popovich, Matthew T. *Lifecycle of a Performance Measure.* ANESTHESIOLOGY 2019. Orlando. 22 October 2019.

2. Popovich, Matthew T. and Sharon K. Merrick. *MACRA & Regulatory Update* American Society of Anesthesiologists Practice Management 2019. Las Vegas. 19 January 2019.

3. Popovich, Matthew T. *Measuring Quality Data & Reporting.* American Society of Anesthesiologists Practice Management 2019. Las Vegas. 18 January 2019.

Expert Panels

1. National Quality Forum. Acute Pain Management Strategy Session. Washington, DC. 2 February 2017.

2. National Quality Forum. Measure Incubator™ Strategy Session: Appropriate Pain Management. Washington, DC. 28 February – 1 March, 2018.

Professional Workshops

1. Quality Reporting and Registries: Building Anesthesiology's Future. American Society of Anesthesiologists Anesthesiology Quality Meeting Pre-Conference. Schaumburg, IL. 15 November 2019.

Honors and Awards

March 2002 *Phi Beta Kappa*
Purdue University

Last Updated: December 28, 2019

GSA 2020
SUMMER MEETING

JULY 17-19

The Ritz Carlton Lodge at Lake Oconee

Greensboro, GA