2025 GSA Summer Meeting

Legacy Lodge at Lake Lanier Islands

August 22-24

Syllabus

Activity Directors:
Ana Mavarez, MD
Sri Varsha Pulijal, MBBS

Jointly Provided by... Georgia Society of Anesthesiologists | American Society of Anesthesiologists™

ASA: Working for You

Jeffrey T. Mueller, MD, FASA | First Vice President

August 23, 2025

American Society of Anesthesiologists®

asahq.org

Disclosures & Objectives

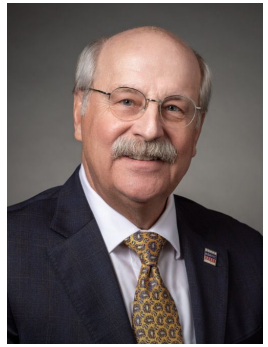
- Nothing to disclose
- Objectives: Participants will learn

  - ASA's focus on delivering value for members
  - How ASA is implementing our Strategic Plan to address current challenges
  - Key trends facing the specialty in the marketplace, legislative, and regulatory arenas – selected advocacy topics

Special "Thank you" to...

ASA Director & Alternate Director

William R. Lane Jr., MD, MBA, FASA
Director, Georgia Society of Anesthesiologists



Steven L. Sween, MD, FASA
Alternate Director, Georgia Society of Anesthesiologists

ASA Past Presidents

- 1965 – Perry P. Volpitto, MD
- 1970 – John E. Steinhaus, MD, FACA
- 1999 – John B. Neeld Jr., MD, FACA

Anesthesiologists of Note

- Michelle Au, MD, Georgia House of Representatives (District 50)

Special "Thank you" to...

State Component Officers

- Rachel Steckelberg, MD, President
- Stephen Anderson, MD, President-Elect
- William Hallowes Jr., MD, Vice President
- Joanna Schindler, MD, FASA, Secretary/Treasurer
- Korrin Ford, MD, FASA, Immediate Past President

ASA Committee Chairs

- Matthew A. Klopman, MD, FASA, Chair, Committee on Occupational Health
- Sona S. Arora, MD, FASA, Chair, Abstract Review Subcommittee on Geriatric Anesthesia
- Julius Hamilton, MD, FASA, Chair, COE Payment Litigation Workgroup

the ANESTHESIOLOGY® annual meeting

American Society of **Anesthesiologists®**

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ASA Strategic Plan

American Society of Anesthesiologists®

asahq.org

We are ASA: Leaders in Patient Safety

Mission: Advancing the practice and securing the future

Vision: A world leader improving health through innovation in quality and safety

Values: Patient safety, physician-led care and scientific discovery

Strategic Pillars

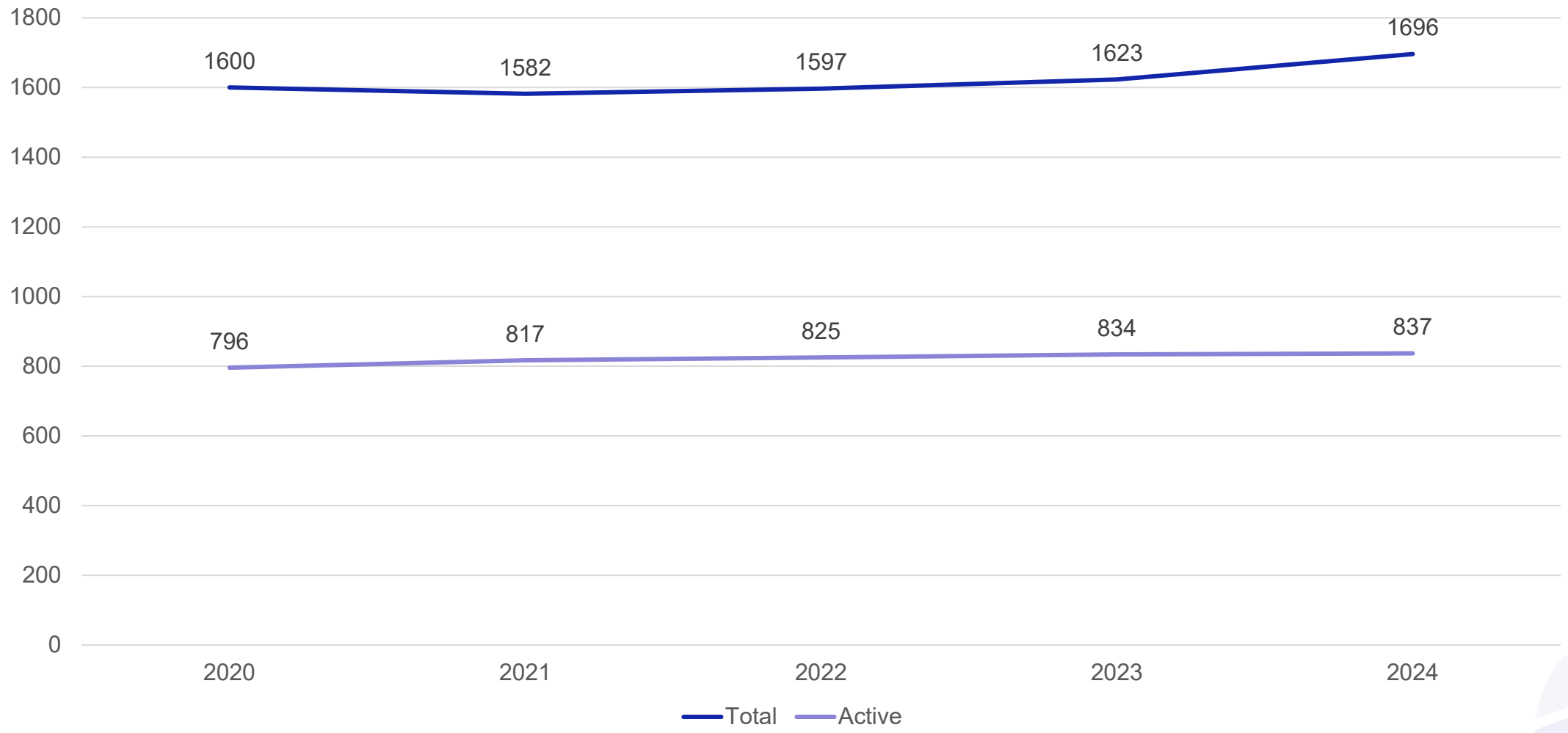
1. Advocacy
2. Patient Safety, Quality & Practice Advancement
3. Educational Resources
4. Member Engagement
5. Leadership & Professional Development
6. Research & Scientific Discovery
7. Stewardship of the Society & Specialty

Membership

American Society of Anesthesiologists®

asahq.org

Georgia Society 5-Year Member Count



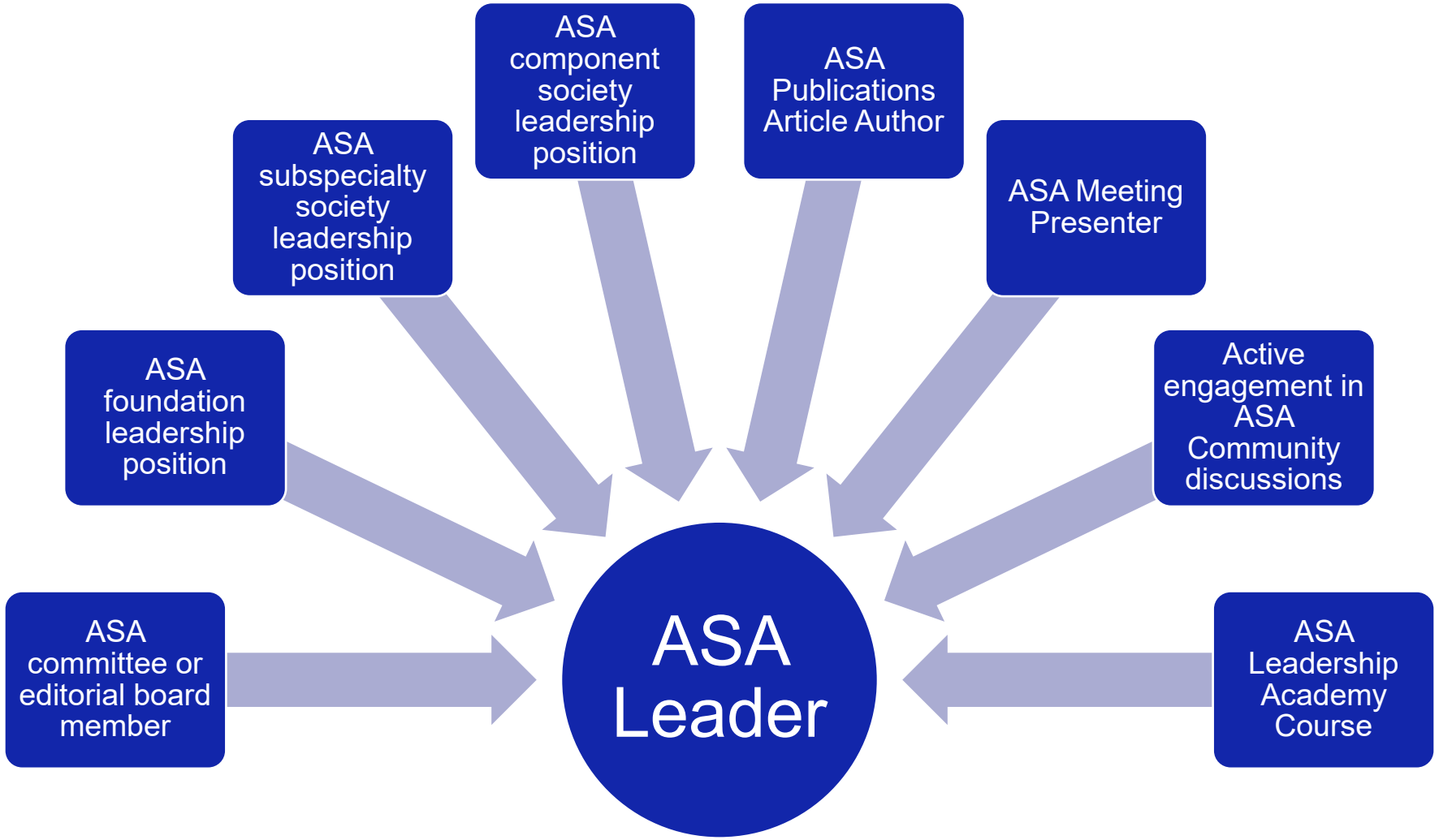
ASA Focus:
Strengthen State Component Collaboration

- Focused attention to help components implement best practices and provide member value:
  - Improved data collection, data sharing and access
  - Toolkit and resource library for components
  - Executive Director Summit held in Schaumburg every year

- Open Forums for component leadership and staff on relevant topics such as:
  - Membership renewal and recruitment
  - Resident and early-career engagement, including the ECMP
  - Diversity, equity and inclusion
  - Leadership development

- 51 state components participate in Unified Dues Billing Program

Become an ASA Leader: Helpful Service Opportunities to Build Engagement and Mentoring



ASAPAC Update

American Society of Anesthesiologists®

asahq.org

Why Contribute? Our Dollars Make a Real Difference

- Patient safety and quality of care
- Economic strength and sustainability of our practices
- Promote and protect anesthesiologist-led team-based care
- Advocating for scientific discovery, the cornerstone of what we are
- Assuring support and advocacy for education and training the next generation of anesthesiologists
- Advocacy is a two-sided coin: Political (candidate) & Official (legislator)
- **ASAPAC is the power multiplier of anesthesiology's unity and combined resources!**

Thank You Georgia ASAPAC Contributors!

Nearly 145 contributors in 2025 to date!

ASAPAC
American Society of Anesthesiologists®

asapac.asahq.org/honorroll

Special "Thank you" to...

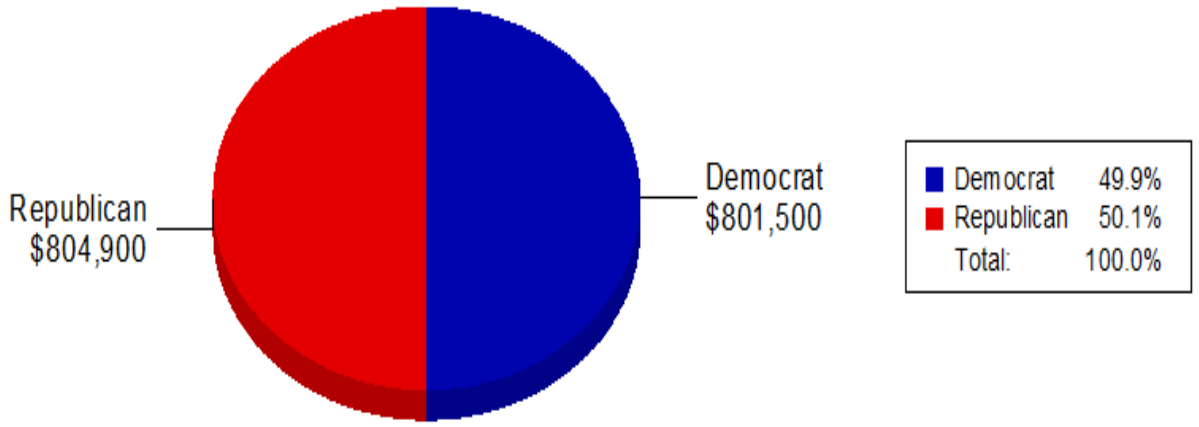
Georgia 2025 YTD ASAPAC Contributors: Council Chair Level

- David Apatov
- Carolyn Bannister
- Kurt Briesacher
- Amanda Brown
- Andrea Corujo Rodriguez
- Danika Curley
- Heather Dozier
- William Hallowes Jr
- Julius Hamilton
- Judith Handley
- Anne Hartney-Baucom
- Keith Johnson
- Michael Kissel
- Matthew Klopman
- William Lane Jr
- Nanhi Mitter
- John Moss
- Oluwatosin Oladipupo
- Gaurav Patel
- Jose Rivera-Melendez
- Devendra Shantha
- John Stephenson
- Steven Sween

ASAPAC's Balanced Giving: 2022 Election Cycle vs. 2024 Election Cycle

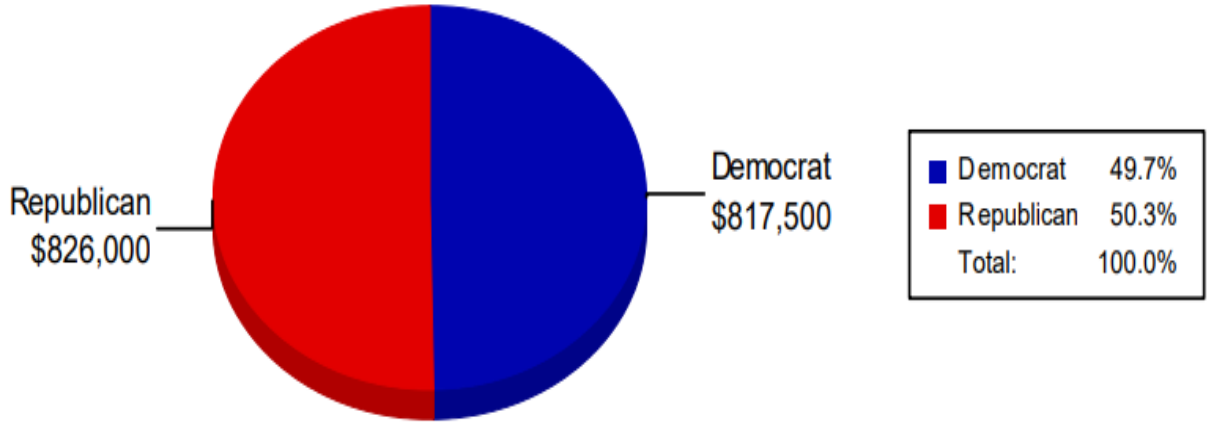
2022 Election Cycle

Total Expenditures by Party

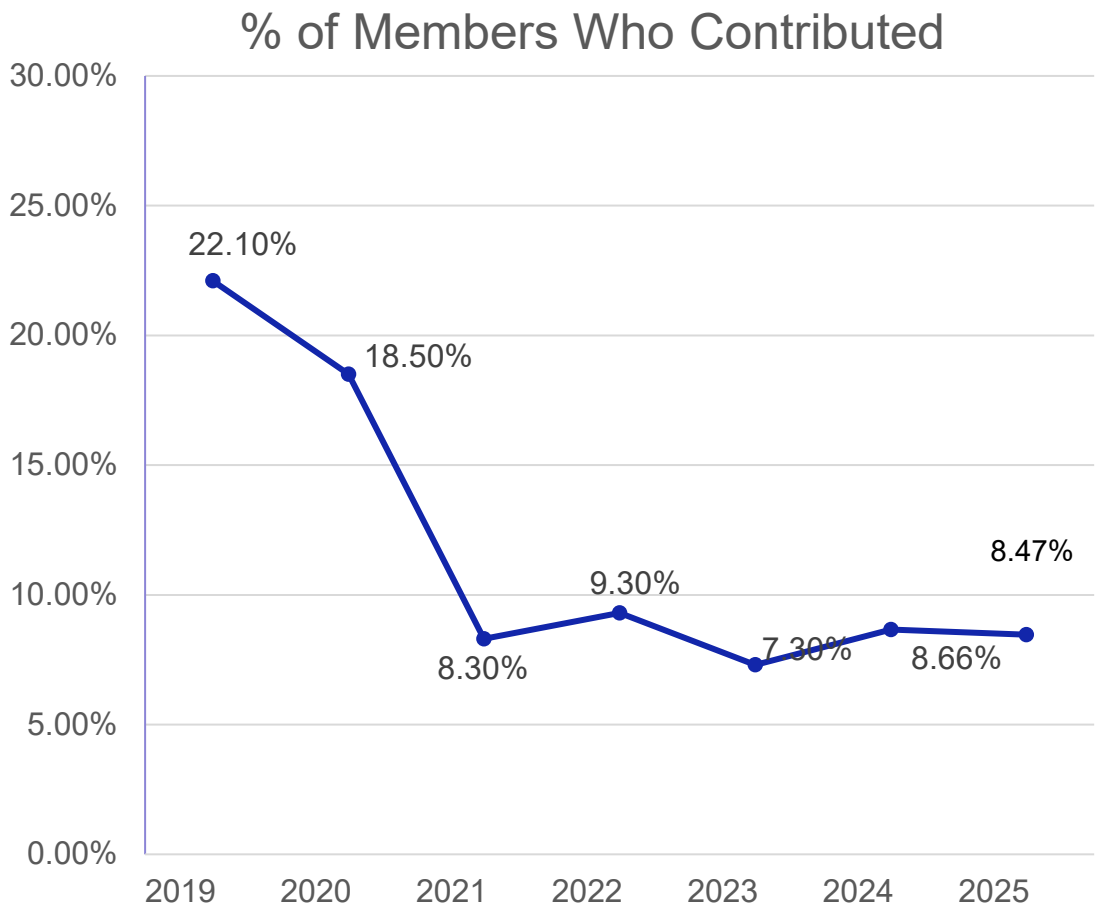


2024 Election Cycle

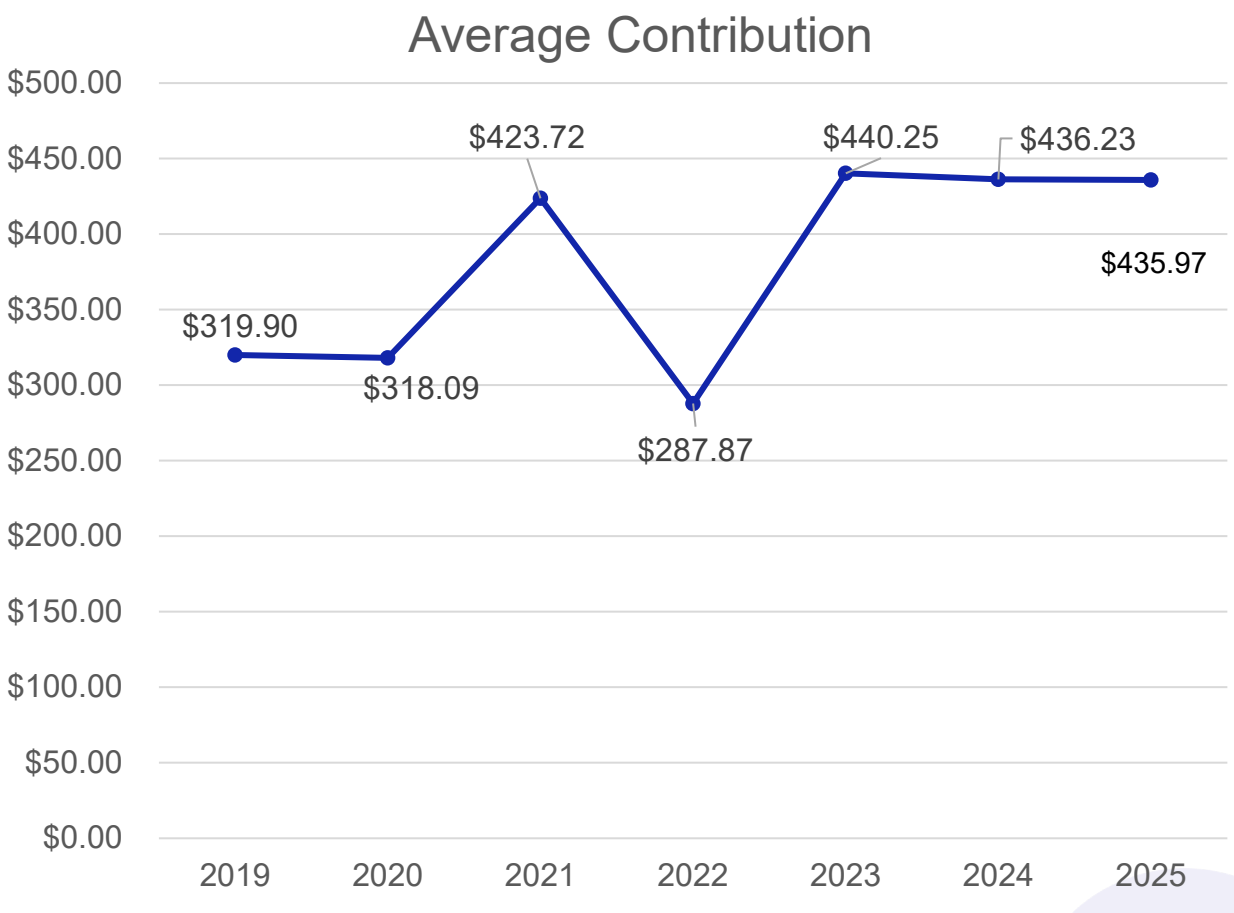
Total Expenditures by Party



ASAPAC Activity by Georgia Members

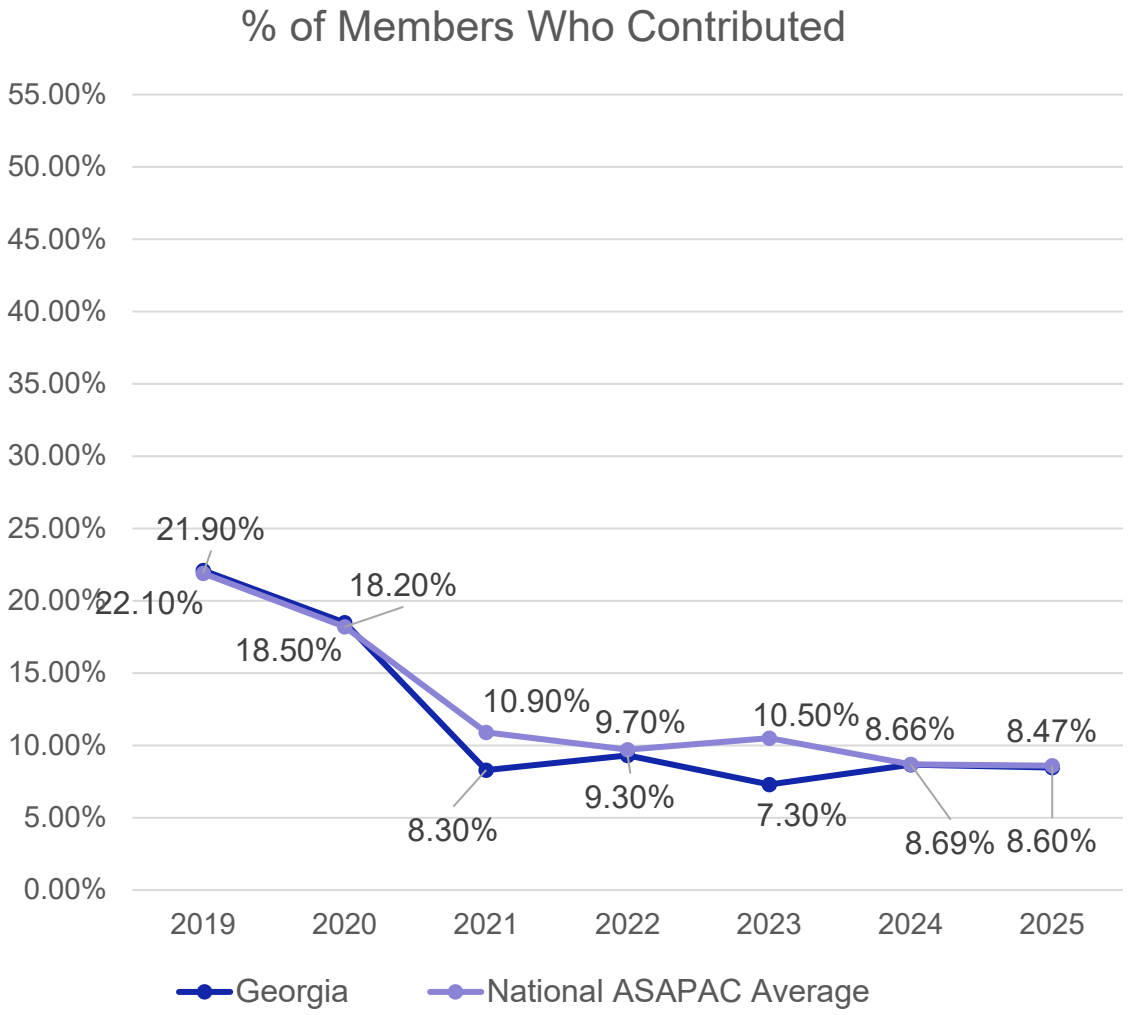


ASAPAC's Fiscal Year 2025 national average participation rate is 8.6%, as of June 30. (Fiscal Year 2025 is October 1, 2024 – September 30, 2025)



ASAPAC's Fiscal Year 2025 national average contribution is $376.24, as of June 30. (Fiscal Year 2025 is October 1, 2024 – September 30, 2025)

Georgia ASAPAC Member Averages vs. National ASAPAC Averages



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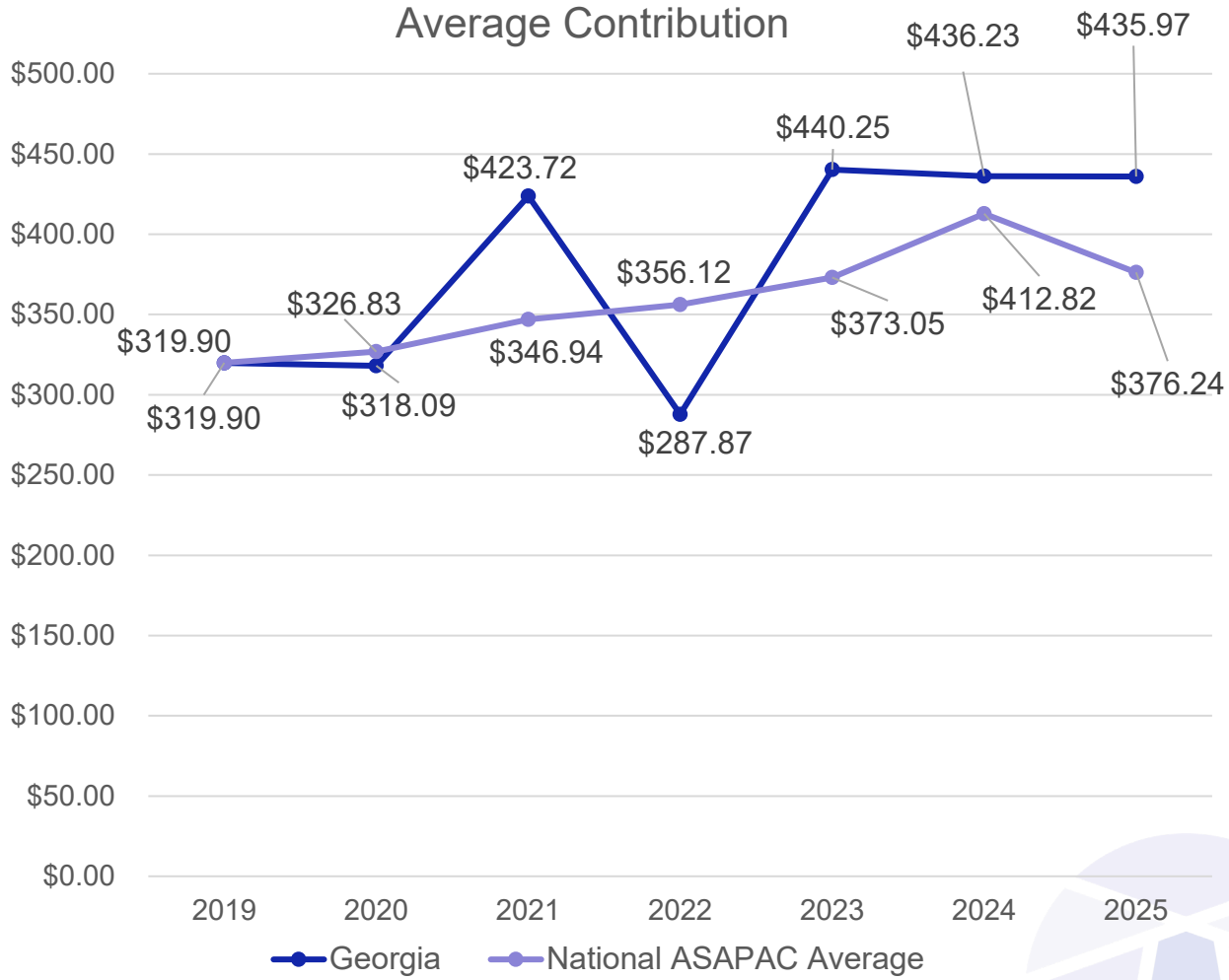

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(Fiscal Year 2025 is October 1, 2024 – September 30, 2025)

2024 Election Cycle Total Contributions

Organization	Dollar Amount
American Society of Anesthesiologists PAC	$3,882,491
American Dental Association PAC	$2,228,047
American Academy of Dermatology Association PAC	$2,046,801
American Association of Orthopaedic Surgeons PAC	$1,957,954
American College of Radiology PAC	$1,653,916
American College of Emergency Physicians PAC	$1,613,599
American Academy of Ophthalmology	$904,559
American College of Ob-Gyns	$798,388
American Osteopathic Information Association	$753,495
American College of Cardiology PAC	$670,778
American College of Surgeons	$662,453
American Academy of Neurology	$539,868

American Medical Association $2,096,338

2024 Election Cycle Contributions, according to Federal Election Committee (FEC) two-year financial summary as of December 31, 2024

Advocacy Update

ASA Grassroots Network

American Society of Anesthesiologists®

asahq.org

ASA Advocacy Priorities for 2025

- Navigating the New Administration
- Economic Advocacy
  - H.R. 1, the One Big Beautiful Bill
  - Taking on “big insurance”
    - Harmful payer policies – PS Modifier, Qualifying Circumstances, Anesthesia Time
    - No Surprises Act reform: Legal, Legislative, Regulatory
- Protecting Our Patients
- Other
  - Workforce (Anesthesiology residency and CAA licensure growth)
  - Physician Health and Well-Being
  - Funding for Anesthesia Research
  - Leadership in Pain Medicine

Key ASA/State Component Accomplishments

- VA anesthesia standard – no change
- 2.5% *Traditional* Medicare Payment Update for 2026?
- Prohibition on insurers limiting payment for anesthesia time – Four (4) new state laws (OK, MD, CT, IL)
- Scope of practice – Defeated fifteen (15) CRNA-backed bills and five (5) APRN Compact bills
- CAA – Three (3) state laws (VA, TN, SC – ratio expansion)
- Medical title - WV

Key Advocacy Activities Since January 20, 2025

Washington Alerts referencing sign-on letters/coalition engagement:

- ASA Urges Congressional Leadership to Advance “Doc Fix” Bill
- ASA Urges Reconsideration of NIH 15% Cap on Indirect Cost Payments
- ASA Joins Over 500 Groups In Raising Concerns about Federal Research and Public Health Funding Cuts
- ASA Joins National Medical Organizations in Raising Concerns about Medicaid Changes
- ASA Urges Congress to Protect Student Loan Programs
- ASA Works with Coalition Urging Congressional Leaders to Reject NIH Funding Cuts
- ASA Congressional Allies Lead Strong Bipartisan Letter to VA
- ASA Joins National Effort to Support Vaccination Against Respiratory Viruses

Key Advocacy Activities Since January 20, 2025

Advocacy news releases:

- January 1, 2025 **Commercial Health Insurance Companies: Time to Put Patients Before Profits**
- February 24, 2025 **American Society of Anesthesiologists Submits Request to Court Seeking Dismissal of AANA's Nondiscrimination Suit**
- March 10, 2025 **American Society of Anesthesiologists Extremely Disappointed with Absence of 'Doc Fix' in Funding Package**
- March 24, 2025 **American Society of Anesthesiologists Strongly Opposes Legislation to Replace Anesthesiologists with Nurses for Veterans' Care**
- March 25, 2025 **Certified Anesthesiologist Assistants Now Authorized to Practice in Virginia**

Key Advocacy Activities Since January 20, 2025

Advocacy news releases (continued):

- May 5, 2025 American Society of Anesthesiologists LEGCON 2025
- May 22, 2025 Certified Anesthesiologist Assistants Authorized to Practice in Tennessee
- May 27, 2025 New York State Bill Amendment Imposes Time Limit on Anesthesia Care and Puts Patients' Lives at Risk
- June 13, 2025 American Society of Anesthesiologists Applauds Congressional Leadership in Demanding VA Maintain Safe Anesthesia Care for Veterans
- June 24, 2025 Massive Coalition of 75 Health Care Organizations Support Including House-Passed Medicare Payment Provisions in Senate Package
- July 7, 2025 American Society of Anesthesiologists Requests Court Deny Bid by UnitedHealth Group Subsidiary Change Healthcare to Dismiss Negligence Claims
- July 9, 2025 Insurer to Cut Payments Supporting Care for Sicker, More Complex Patients Starting October 1

2025
New Administration
New Congress

American Society of Anesthesiologists®

asahq.org

Navigating the New Administration

- **Trump Approach to Government**
  - WHO: “The Art of the Deal”
    - Think Big – Leverage – Maximize Options – Loyalty – Get the Word Out
  - Deregulation – Smaller Government – Less Spending = “more efficient and effective”
  - Policy Orientation
    - **Agencies = Voice of Policy – White House & Domestic Policy Council = Policy Decision-making**
  - President = Sole Point of Executive Branch Power – Enforced by OMB
- **Advisors**
  - Paragon Health Institute: https://paragoninstitute.org
  - Medicare – Medicaid – Private Health – Public Health
- **Executive Orders – New Health Care Policies**
  - Freeze on Federal Grants (rescinded)
  - Changes to National Institutes of Health grants (indirect costs)
  - Reductions in Force (CMS, HHS) > Blocked > Additional cuts: FDA, NIH, CDC > Blocked Supreme Court July 8 > approves resumption of federal reorganization/layoffs

Regulatory Relief: Risks and Opportunities

POLITICO

WHITE HOUSE

Trump executive order requires sweeping review of federal regulations

President Donald Trump signed yet another sweeping executive order late Wednesday that stands to dramatically curb the power of federal agencies by ordering a thorough review of all government regulations to decide which should be on the chopping block.

Physicians in the New 119th Congress

U.S. Senate (4: all GOP)

- John Barrasso (GOP), orthopedic surgery, Wyoming
- Bill Cassidy (GOP), GI, Louisiana
- Roger Marshall (GOP), ob-gyn, Kansas
- Rand Paul (GOP), ophthalmologist, Kentucky

U.S. House (11: 8 GOP, 3 Dem)

- Ami Bera (Dem), internal medicine, California
- Scott DesJarlais (GOP), primary care, Tennessee
- Neal Dunn (GOP), urology, Florida
- Mark Green (GOP), emergency medicine, Tennessee
- Andy Harris (GOP), anesthesiology, Maryland
- Ronny Jackson (GOP), emergency medicine, Texas
- John Joyce (GOP), dermatology, Pennsylvania
- Rich McCormick (GOP), emergency medicine, Georgia
- Greg Murphy (GOP), urology, North Carolina
- Raul Ruiz (Dem), emergency medicine, California
- Kim Schrier (Dem), pediatrics, Washington

Newcomers (5: 2 GOP, 3 Dem)

- Herb Conaway (Dem), primary care, New Jersey
- Maxine Dexter (Dem), pulmonology, Oregon
- Mike Kennedy (GOP), family medicine, Utah
- Kelly Morrison (Dem), obstetrics-gynecology, Minnesota
- Bob Onder (GOP), allergy and asthma, Missouri

Physician Influence Under GOP Control

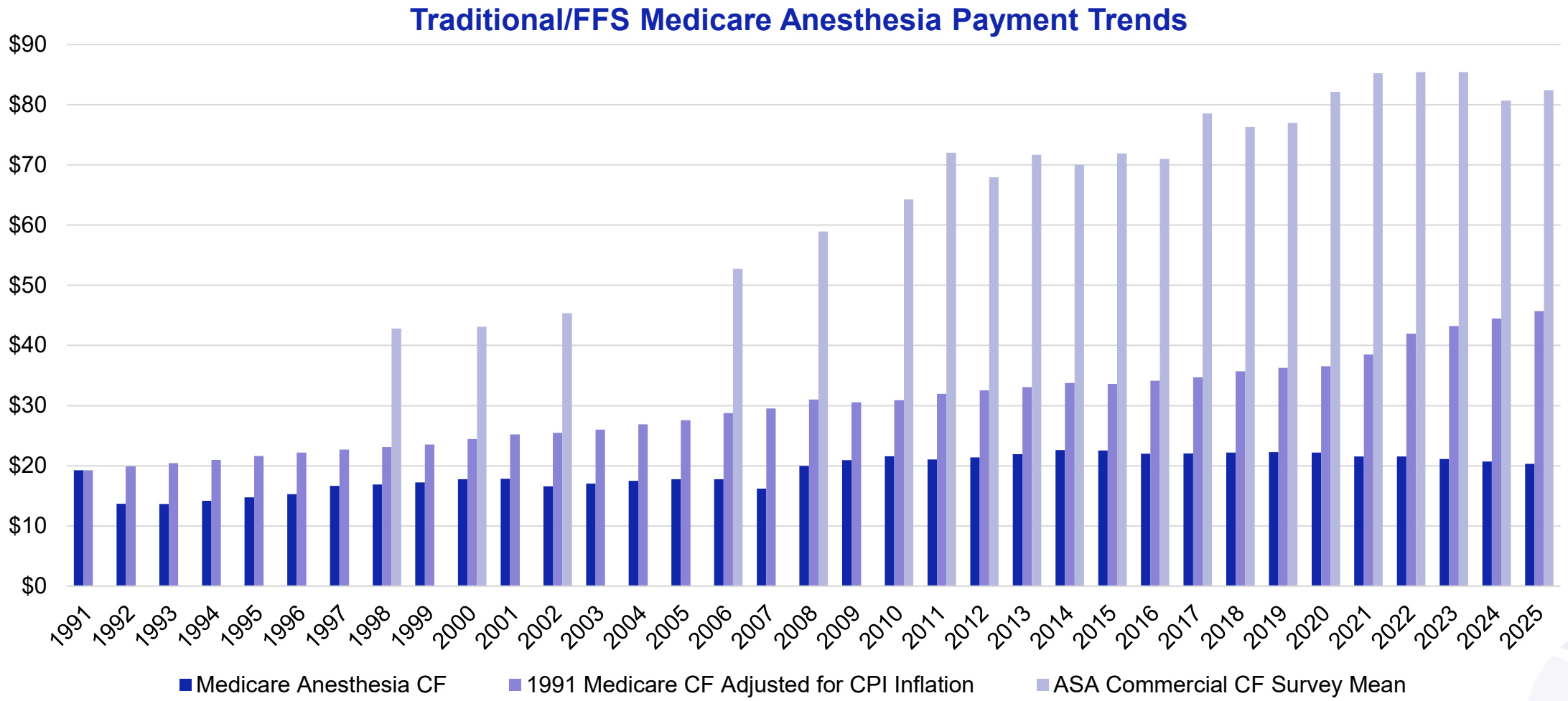
- **Bill Cassidy, MD (GOP)** - New Chairman, Senate Health Education Labor and Pensions (HELP) Committee and existing member of the Senate Finance Committee
- **Roger Marshall, MD (GOP)** - New Member, Senate Finance Committee and Existing Member of the Senate HELP Committee
- **Neal Dunn, MD (GOP)** - New Vice Chair, House Energy and Commerce, Subcommittee on Health
- **Andy Harris, MD (GOP)** - Chair, House Freedom Caucus

Economic Advocacy

American Society of Anesthesiologists®

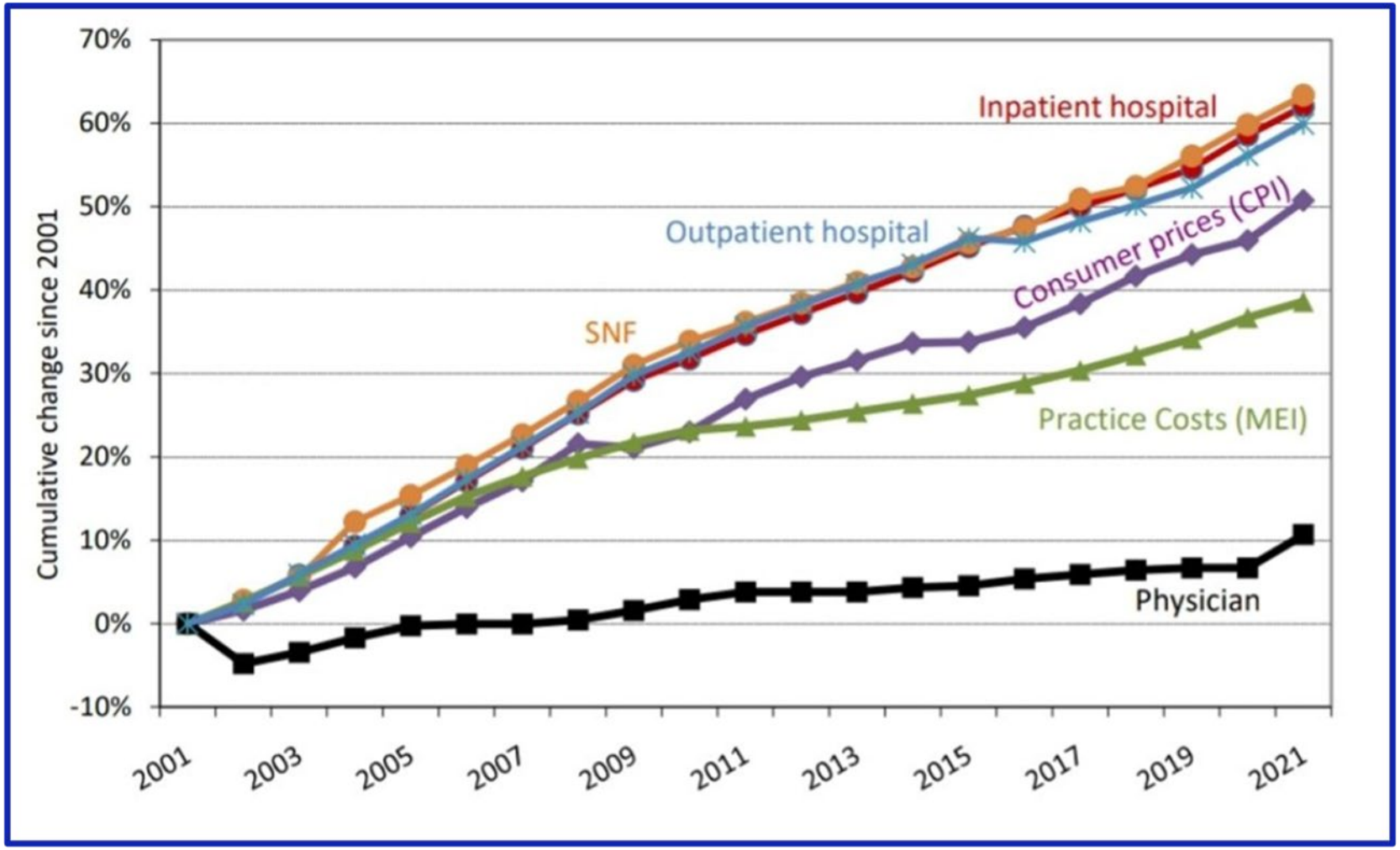
asahq.org

Payment Advocacy: Medicare Payment Reform



2015 and 2024 had two distinct Medicare CFs due to rate updates during the year. Data for those years reflects blended rates based on the duration each conversion factor was in effect.

Payment Advocacy: Medicare Payment Reform



Proposed 2026 Medicare Physician Fee Schedule (MPFS) Rule

	2025 Final CF	2026 Proposed CF	Percent Change
Anesthesia (Qualified APM Participants)	$20.3178	$20.6754	1.8%
Anesthesia (Non-Qualified APM Participants)	$20.3178	$20.5728	1.3%
RBRVS APM Participants	$32.3465	$33.5875	3.84%
RBRVS – Non-APM Participants	$32.3465	$33.4209	3.32%

Proposed 2026 MPFS Rule (2 Conversion Factors)

	Qualifying APM CF	Non-Qualifying APM CF
CY 2025 National Average Anesthesia CF	20.3178	20.3178
CY 2026 Qualifying APM Update Factor	0.75 percent	NA
CY 2026 Non-Qualifying APM Update Factor	NA	0.25 percent
CY 2026 RVU Budget Neutrality Adjustment	0.55 percent	0.55 percent
CY 2026 2.50 Percent Increase (OBBB)	2.50 percent	2.50 percent
CY 2026 Anesthesia Fee Schedule Practice Expense and Malpractice Adjustment	-2.00 percent	-2.00 percent
CY [PROPOSED] 2026 Conversion Factor	20.6754	20.5728

Proposed 2026 MPFS Rule

The 2026 Proposed Medicare Physician Fee Schedule misses the mark on payments

X – Proposed conversion factor is small

X – Changes to the Practice Expense methodology is clunky and unfair to anesthesiologists

X – Proposed efficiency reductions (-2.5% for RBRVS) are arbitrary

Proposed 2026 Quality Payment Program Rule

Federal Policies have Undermined Merit-based Incentive Payment System (MIPS) Operations

- Anesthesiologists are at a disadvantage
  - Limited measure choice
  - Few financial incentives to participate
  - 80% of anesthesiologists received a payment bonus in 2025 (based on 2023 data)

Table 33. 2025 Payment Adjustments Overall

Payment Adjustment Type	Max Negative	Negative	Neutral	Positive	
Payment Adjustment Range	-9%	-6.75% – 0%	0%	0% – 1.28%	1.28% – 2.15%
Associated Final Score Range	0 – 18.75 points	18.76 – 74.99 points	75 points	75.01 – 88.99 points	89 – 100 points
Percentage of MIPS Eligible Clinicians in Payment Adjustment/Final Score Range (All)	2.26%	12.13%	4.75%	38.86%	42.00%
Percentage of MIPS Eligible Clinicians in Payment Adjustment/Final Score Range (Non-Reporting[52])	33.44%	11.00%	54.04%	1.39%	0.13%

The One Big Beautiful Bill Act (OBBBA)

- Purpose -
  - Extend Trump 2017 tax cuts/prevent tax rate increases
  - Increase defense spending
  - Increase border protection spending
- How?
  - Address “waste, fraud and abuse”

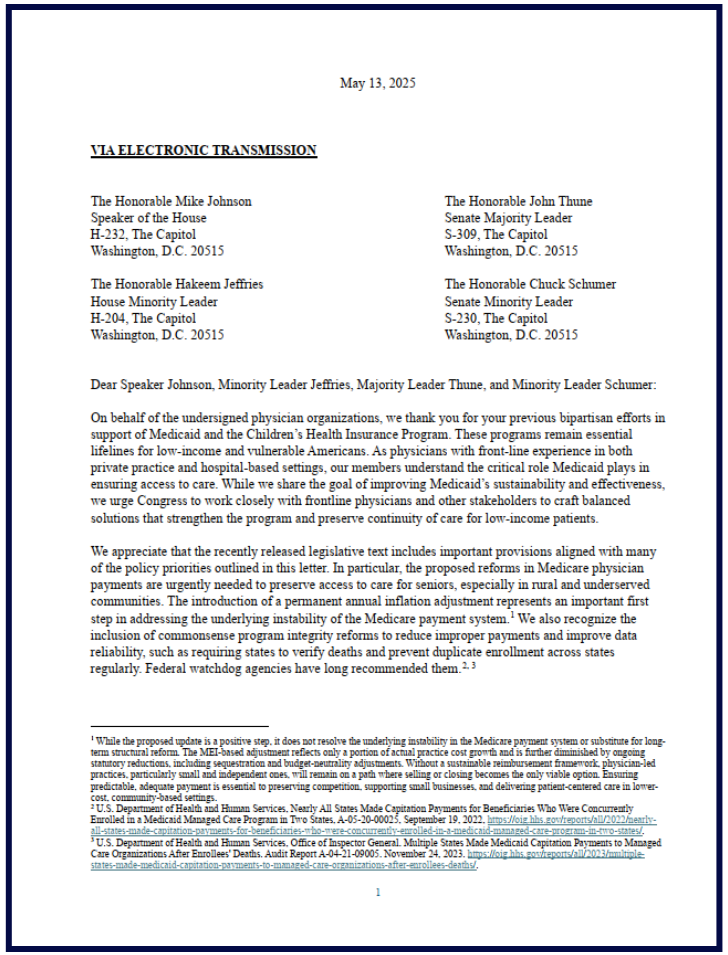
Key Provisions: One Big Beautiful Bill Act (OBBBA)

Issue	ASA engagement	Impact
Medicaid reforms	Coalition	• Loss of coverage for 10m • Increase in uncompensated care • Hospital finances stressed
Changes to federal student loan programs	Coalition	• Changes to subsidized federal loans programs • Changes borrowing limits • Changes eligibility for Public Service Loan Forgiveness (PSLF) program
“Doc Fix”	ASA co-led coalition statement to House and Senate Leadership. Work with House GOP Doc Caucus.	• Final package - 2.5% update for CY ’26 • Senate rejected House Doc Caucus language of permanent modest inflation adjustment
Tax provisions	Coalition	• Preserved Pass-Through Entity Tax (PTET) used by some practices (LLC, partnerships, S corps) in SALT states

ASA Concerns with Medicaid Changes

"…we remain concerned that several Medicaid proposals could disrupt coverage for vulnerable populations by shifting significant costs to states without a clear, evidence-based path to maintaining continuity of care."

Medical Specialty Coalition Communication to House and Senate Leadership, May 13, 2025



May 13, 2025

VIA ELECTRONIC TRANSMISSION

The Honorable Mike Johnson
Speaker of the House
H-232, The Capitol
Washington, D.C. 20515

The Honorable John Thune
Senate Majority Leader
S-309, The Capitol
Washington, D.C. 20515

The Honorable Hakeem Jeffries
House Minority Leader
H-204, The Capitol
Washington, D.C. 20515

The Honorable Chuck Schumer
Senate Minority Leader
S-230, The Capitol
Washington, D.C. 20515

Dear Speaker Johnson, Minority Leader Jeffries, Majority Leader Thune, and Minority Leader Schumer:

On behalf of the undersigned physician organizations, we thank you for your previous bipartisan efforts in support of Medicaid and the Children's Health Insurance Program. These programs remain essential lifelines for low-income and vulnerable Americans. As physicians with front-line experience in both private practice and hospital-based settings, our members understand the critical role Medicaid plays in ensuring access to care. While we share the goal of improving Medicaid's sustainability and effectiveness, we urge Congress to work closely with frontline physicians and other stakeholders to craft balanced solutions that strengthen the program and preserve continuity of care for low-income patients.

We appreciate that the recently released legislative text includes important provisions aligned with many of the policy priorities outlined in this letter. In particular, the proposed reforms in Medicare physician payments are urgently needed to preserve access to care for seniors, especially in rural and underserved communities. The introduction of a permanent annual inflation adjustment represents an important first step in addressing the underlying instability of the Medicare payment system.[1] We also recognize the inclusion of commonsense program integrity reforms to reduce improper payments and improve data reliability, such as requiring states to verify deaths and prevent duplicate enrollment across states regularly. Federal watchdog agencies have long recommended them.[2, 3]

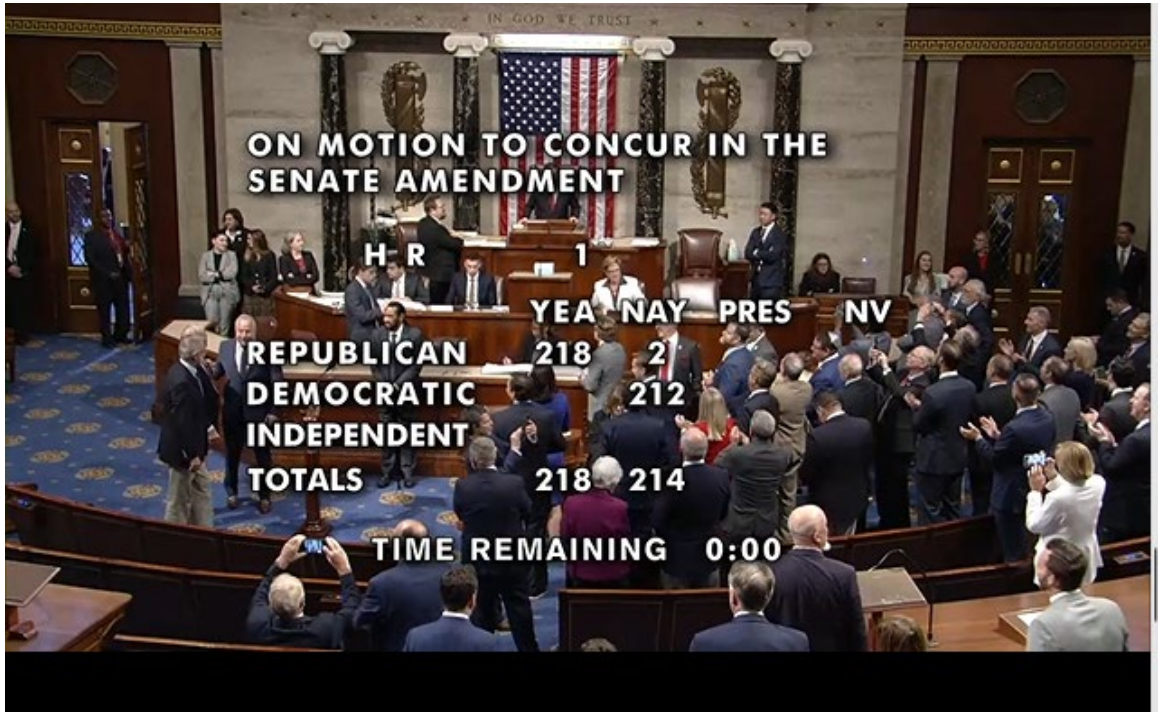
[1] While the proposed update is a positive step, it does not resolve the underlying instability in the Medicare payment system or substitute for long-term structural reform. The MEI-based adjustment reflects only a portion of actual practice cost growth and is further diminished by ongoing statutory reductions, including sequestration and budget-neutrality adjustments. Without a sustainable reimbursement framework, physician-led practices, particularly small and independent ones, will remain on a path where selling or closing becomes the only viable option. Ensuring predictable, adequate payment is essential to preserving competition, supporting small businesses, and delivering patient-centered care in lower-cost, community-based settings.
[2] U.S. Department of Health and Human Services. Nearly All States Made Capitation Payments for Beneficiaries Who Were Concurrently Enrolled in a Medicaid Managed Care Program in Two States, A-05-20-00025, September 19, 2022. https://oig.hhs.gov/reports/all/2022/nearly-all-states-made-capitation-payments-for-beneficiaries-who-were-concurrently-enrolled-in-a-medicaid-managed-care-program-in-two-states/.
[3] U.S. Department of Health and Human Services. Office of Inspector General. Multiple States Made Medicaid Capitation Payments to Managed Care Organizations After Enrollees' Deaths. Audit Report A-04-21-09005. November 24, 2023. https://oig.hhs.gov/reports/all/2023/multiple-states-made-medicaid-capitation-payments-to-managed-care-organizations-after-enrollees-deaths/.

1

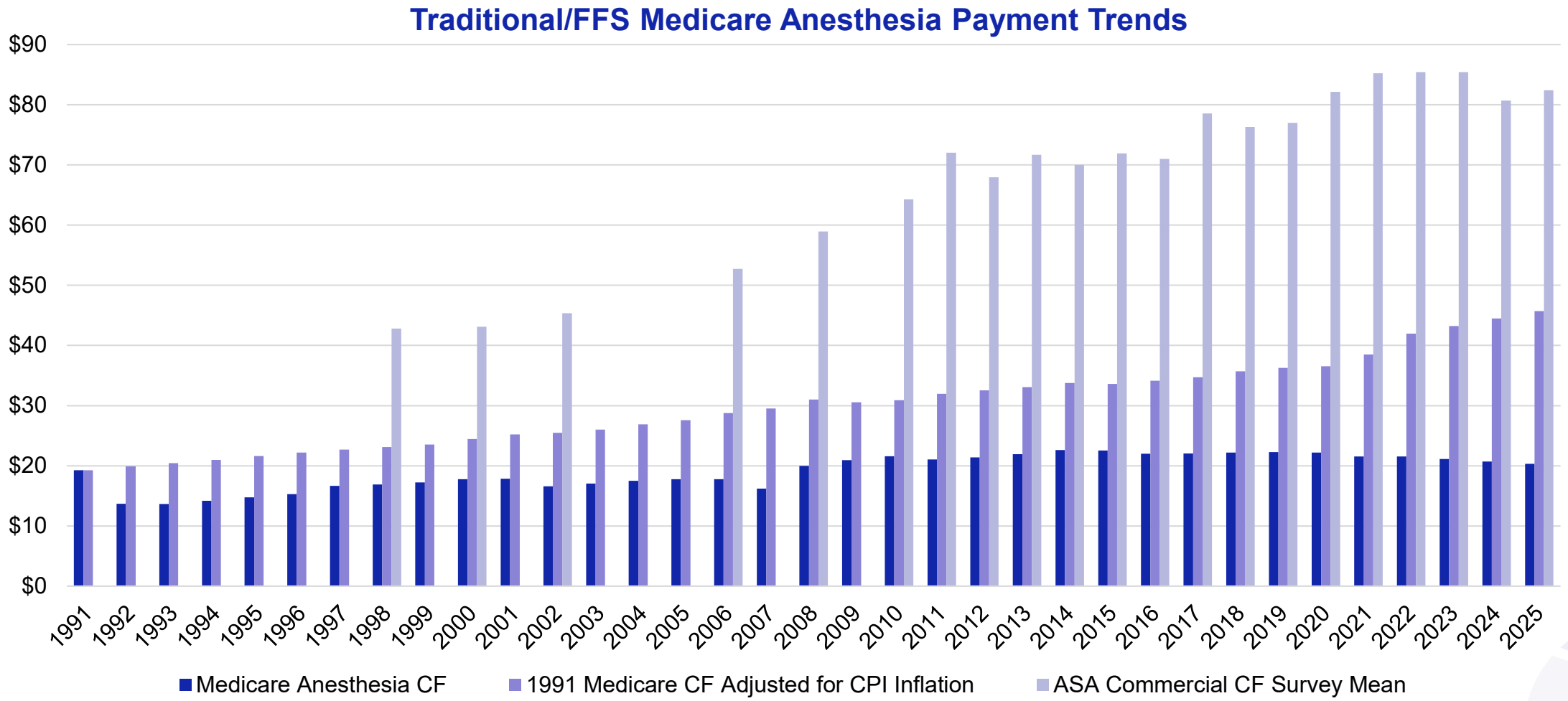
Another "Patch“ (No Doc Fix)

Senate and Final Version of H.R. 1, the "One Big Beautiful Bill"

- Rejected Congressional GOP "Doc Caucus" provisions
- No fix for 2025
- 2.4% update for 2026
- No provisions for 2027



Payment Advocacy: Medicare Payment Reform



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Fighting "Big Insurance"

American Society of
Anesthesiologists®

asahq.org

Payment Advocacy: Taking on “Big Insurance”

A MESSAGE FROM
the President

DONALD E. ARNOLD
MD,FACHE, FASA

November 15. 2024

Good afternoon,

As many of you read in my November 11 Monday Morning Outreach, Anthem has proposed a policy change for its plans in Connecticut, Missouri, and New York to withhold payments for documented anesthesia time that exceed a new, arbitrary Anthem-mandated time for anesthesia services. Not only are they proposing to use an unreliable and unvalidated Centers for Medicare & Medicaid Services Physician Work Time Value data set, Anthem (also known as Elevance) erroneously announced that the policy will “not change industry standard coding requirements or the American Society of Anesthesiologists’ (ASA) anesthesia formula” in their announcements.

That is flat out ridiculous.

Unfortunately, Anthem’s latest attack on anesthesia payments—and the patients who hold Anthem policies—demonstrate its lack of concern for our health care system and the greater good. The proposed Anthem policy reflects a significant disconnect between Anthem, its patients, and their needs.

On Tuesday, I sent a letter to the President of Anthem as well as their Chief Health Officer requesting an urgent meeting. The letter detailed multiple issues with such a policy change, including how the policy will cut off anesthesia payments when a patient may need anesthesia services the most—for necessary care that exceeds Anthem’s arbitrary anesthesia time limits, when complications arise, or when other surgical and patient circumstances demand continued vigilance and action by an anesthesiologist.

ASA Washington Alert

November 15, 2024

ASA Fights New Anthem Blue Cross Blue Shield Policy that Caps Payments for Anesthesia Time

In an unprecedented move, Anthem Blue Cross Blue Shield plans representing Connecticut, New York and Missouri have unilaterally declared it will no longer pay for anesthesia care if the surgery or procedure goes beyond an arbitrary time limit, regardless of how long the surgical procedure takes. The American Society of Anesthesiologists strongly opposes this policy and is taking action to address this concerning policy. Read the full press release here.

ASA Press Release

November 14, 2024

Anthem Blue Cross Blue Shield Won’t Pay for the Complete Duration of Anesthesia for Patients’ Surgical Procedures

Another Example of Insurers Putting Profits Over Patients

CHICAGO – In an unprecedented move, Anthem Blue Cross Blue Shield plans representing Connecticut, New York and Missouri have unilaterally declared it will no longer pay for anesthesia care if the surgery or procedure goes beyond an arbitrary time limit, regardless of how long the surgical procedure takes. The American Society of Anesthesiologists calls on Anthem to reverse this proposal immediately.

Social Media Coverage

- ASA posts Nov. 14 statement on Anthem to social media
- Doctor and comedian William E. Flanary, MD, aka Dr. Glaucomflecken, posted a video to YouTube about the policy

Payment Advocacy: Taking on “Big Insurance”

Anthem Rescinds Payment Policy Proposal on Capping Anesthesia Time

Good afternoon,

As many of you heard, ASA was successful in pushing Anthem Blue Cross Blue Shield to cancel its proposed policy change to deny payments to anesthesiologists for cases that exceeded an arbitrary threshold set by Anthem. Not only was the policy absurd to anesthesiologists, it clearly demonstrated to patients, our medical colleagues, and state and federal regulators that Anthem was looking to reduce payments for what the insurance giant might describe as “medically necessary anesthesia.”

ASA Press Release

December 06, 2024

American Society of Anesthesiologists’ Statement Regarding Anthem’s Policy Reversal on Anesthesia Care Payment

Hundreds of media inquiries and interviews:
Drs. Donald Arnold, Jonathan Gal, Gordon Morewood, and Kenneth Stone

AP · The New York Times · Becker’s ASC Review · abc NEWS · The Hill · NBC News · CNN Health

ASA Partners with States to Build on Momentum...

New state **laws** prohibiting payers from limiting coverage/payment for anesthesia time

- Oklahoma
- Maryland
- Connecticut
- Illinois

“But wait…there’s more”

ASA Press Release

New York State Bill Amendment Imposes Time Limit on Anesthesia Care and Puts Patients’ Lives at Risk

May 27, 2025

“This added ‘hidden clause’ is designed to mislead rank and file legislators to continue thinking they are banning this nefarious arbitrary practice, but it actually does the complete opposite. It allows insurers to predetermine the time allowed for anesthesia care during surgery or a procedure, which is ridiculous,” said ASA President Donald E. Arnold, M.D., FACHE, FASA.

More "Big Insurance" Bad Behavior

- One-size-fits-all policies that cannot address unique health care needs and significantly lower payment rates:
  - **Physical Status Modifiers**
    - Payers halting payments physical status modifiers.
  - **Qualifying Circumstances Add-on Codes**
    - Payer halting payments for qualifying circumstances codes (99100, 99116, 99135, and 99140)

New UnitedHealthcare Group Shenanigans

"I am writing to express our strongest concern with UnitedHealthcare (UHC) payment policy changes for billing anesthesia services and to request an immediate meeting with you and the initiators of this ill-advised policy. Under this new policy, slated to take effect October 1, 2025, UHC will stop payment for the use of physical status modifiers P3, P4, P5 and qualifying circumstances add-on codes 99100, 99116, 99135 and 99140."

…

"We request UHC rescind these policy changes immediately."

ASA President Donald Arnold, MD, FACHE, FASA
to UnitedHealthcare Group (UHG), July 3, 2025

American Society of Anesthesiologists®

July 3, 2025

Gigi Ferrando
Program Manager, National Advocacy, Business Strategy & Public Affairs
UHC Clinical Leadership and Accountability
UnitedHealthcare Group
9700 Health Care Lane,
Hopkins, Minnesota 55343

Sent Via E-mail: gigi_ferrando@uhc.com

Dear Ms. Ferrando:

On behalf of the more than 59,000 members of the American Society of Anesthesiologists® (ASA) and the patients we serve, I am writing to express our strongest concern with UnitedHealthcare (UHC) payment policy changes for billing anesthesia services and to request an immediate meeting with you and the initiators of this ill-advised policy. Under this new policy, slated to take effect October 1, 2025, UHC will stop payment for the use of physical status modifiers P3, P4, P5 and qualifying circumstances add-on codes 99100, 99116, 99135 and 99140.

The proposal to stop appropriate payments based on physical status modifiers and qualifying circumstances conveys a lack of UHC understanding of individual patient needs during periods of high-risk care. These changes will undermine appropriate payments to anesthesiologists and their practices and shift health care costs from insurance companies to hospitals, physicians, and patients themselves. We urge UHC to consider the impact these policy changes will have on patients with multiple co-morbidities. UHC must ensure their customers continue to have access to anesthesia care that is safe, effective, efficient, and meets their individual patient needs. Anesthesia care that is individually focused on patients, including opportunities to improve care coordination and recovery times, not only benefits UHC's bottom line but also the well-being of its customers.

These policy proposals are short-sighted and anti-patient, shifting cost burdens to a range of stakeholders beyond anesthesia groups. We expect hospitals, ambulatory surgery centers, patients, and local community health care professionals will need to make difficult financial decisions about a patient's access to a range of anesthesia services brought upon by these policy changes.

UHC should maintain payment for physical status modifiers.

Mission: Advancing the Practice and Securing the Future asahq.org

Big Insurance: Growing Role of Medicare Advantage (MA)

- More than half (54%) of Medicare beneficiaries are enrolled in MA plans in 2025
- Medicare payments to MA plans is 20% higher than for similar beneficiaries in traditional fee-for-service (FFS)
- MA plans received $84 billion in additional Medicare spending over projected traditional FFS
- Highly concentrated payer participation – UHC and Humana account for 46% of all enrollees.

- LEG CON 2025 – “Hill Ask” to use MA “upcoding” overpayments to fix Medicare physician payments
- ASA endorsed Congressional MA prompt pay legislation
- ASA endorsed Congressional MA payment floor legislation
- *Maybe: Network adequacy legislation*

Reining in MA Prior Authorization

Regulations

- **New Medicare Advantage (MA) prior authorization (PA) requirements issued on January 17, 2024**

  Payers required to:

  - Provide a reason for all denied PA requests
  - Publicly report PA metrics
  - Develop and provide access to multiple applications for EHR-to-payer PA
  - Shortened the PA response timeline from the payers
  - Effective on January 1, 2026

Legislation

- ***Improving Seniors' Timely Access to Care Act (bipartisan and bicameral)***
  - Authored by Roger Marshall, MD
  - Mandates standardized MA electronic PA process
  - Mandates PA reporting requirements
    - Number and percentage of denials and appeals
  - Government authority to enforce timely responses to PA requests

Medicare Advantage "Upcoding"

THE WALL STREET JOURNAL.

How Health Insurers Racked Up Billions in Extra Payments From Medicare Advantage

January 2025

"Medicare Advantage insurers diagnosed patients with conditions that triggered extra payments of $50 billion from 2019 to 2021, even though no doctor ever treated the diseases."

Senate Finance Committee Hearing: Confirmation Hearing of Dr. Mehmet Oz, Centers for Medicare and Medicaid Services (CMS) Administrator

March 2025

"We're actually apparently paying more for Medicare Advantage than we're paying for regular Medicare…I think there are ways for us to look, for example, at the upcoding that's going on, that's happening systemically in many systems, in many programs."

More $$ for Medicare "Doc Fix?"

MedPAC Report to Congress: The Medicare Advantage program: Status report

March 2025

"The two largest factors responsible for higher payments to plans in recent years are favorable selection and coding intensity… 'Coding intensity' refers to the tendency for more diagnosis codes to be recorded for MA enrollees, which causes risk scores—and payments—for the same beneficiaries to be higher when they are enrolled in MA than they would be if they were in FFS Medicare. **Both favorable selection and coding intensity lead to pricing errors that cause CMS's risk-adjustment system to set the payment rate too high for a given MA enrollee."**

ASA Advocacy on No Surprises Act (NSA)

- **Regulatory Changes**
  - Pushing regulators to ease NSA process
  - New independent dispute resolution (IDR) operations rule due for release in 2025
    - Improved regulatory process
- **Legislative Changes**
  - Legislation to add penalties to insurers who failed to make timely payments to physicians who prevail in the IDR – **The No Surprises Enforcement Act of 2025 (week of June 23, 2025)**
- **Other Issues**
  - Exploring new law to permit legal challenge (private right of action) to payers who do not pay on time.

No Surprises Act Bill Reintroduced

July 24, 2025

Anesthesiologist, Emergency Physician and Radiologist Groups Strongly Support New Legislation that Penalizes Insurers for Delayed Payments

WASHINGTON, D.C. – The American College of Radiology® (ACR®), American College of Emergency Physicians (ACEP) and the American Society of Anesthesiologists (ASA) strongly support H.R. 4710 / S. 2420, the No Surprises Enforcement Act, introduced yesterday that will fine health insurance companies that fail to pay physicians within 30 days after losing the independent dispute resolution (IDR) process laid out in the No Surprises Act (NSA).

No Surprises Act *(continued)*

- **ASA engagement in litigation**
  - Five formal amicus briefs filed in support of Texas Medical Association lawsuits (TMA I-IV) challenging the federal regulatory agencies flawed implementation of the law
  - Victorious in four and one case still pending
  - *New: Texas Medical Association (TMA) III ruling accepted for review (5/30/2025)*
    - *OK for payer calculation of QPA to include services the physician does not provide?*
    - *OK for payer calculation of QPA to exclude bonuses and incentives?*
    - *ASA, ACEP, ACR will submit joint amicus brief*

Protecting Our Patients

American Society of
Anesthesiologists®

asahq.org

State Scope of Practice by the Numbers in 2025

- 0 (zero) - Opt-Out
- 15 - AANA state practice expansion bills defeated
- 4 - APRN Compact bills to expand APRN practice defeated
- 2 - New CAA practice laws (TN and VA)
- 1 - New CAA expanded supervision ratio law (SC)
- 1 - New medical title protection law (WV)
- 1 - New truth in advertising law (CO)

Scope of Practice: The Modesto Experiment

American Society of Anesthesiologists®

asahq.org

The Modesto Bee Exposé

ay's Edition

The Modesto Bee

NEWS SPORTS OPINION CALIFORNIA BUSINESS OBITUARIES FINANCE CLASSIFIEDS MODESTO'S BEST

HEALTH & FITNESS

Stanislaus hospital faces closure after Medicare decision. County, federal support sought

BY KEN CARLSON
APRIL 23, 2024 8:00 AM

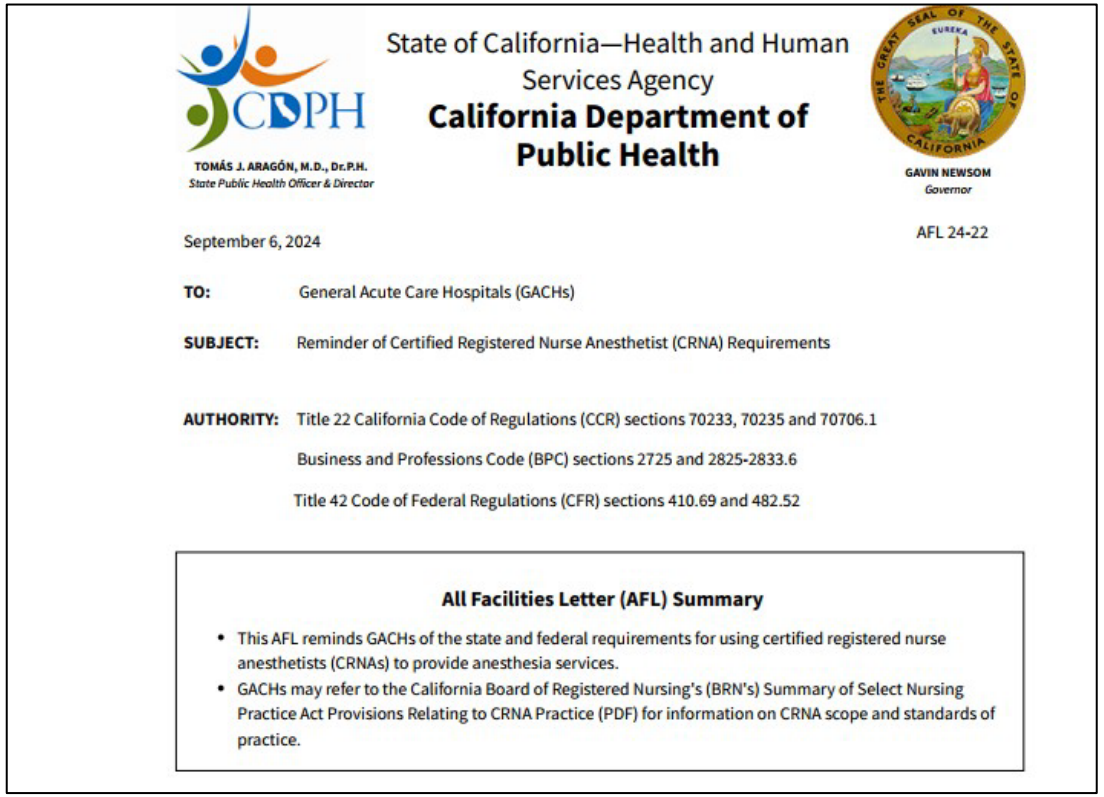
California agency investigates complaints at Modesto hospital | Modesto Bee

California Department of Public Health (CDPH) Summary of Deficiencies

- "…20 patients had surgery and anesthesia care (medical intervention that prevents patients from feeling pain during procedures and surgery) and were transferred from the post operative unit or inpatient floor unit to an outside facility after undergoing surgery and receiving anesthesia."
- "These failures resulted in the potential to allow unsafe practices to go unnoticed and uncorrected and to increase the risk of negative patient outcomes such as harm and injury."
- "CRNA 1 stated there was no difference between a CRNA and an Anesthesiologist at the hospital and could order and administer "anything" in the perioperative environment."

CDPH “All Facilities Letter” Sets Record Straight

- “A CRNA may only administer anesthesia and anesthesia related medications ordered by a physician, dentist, podiatrist, or clinical psychologist. (BPC section 2725)”
- “Except as provided in BPC section 2725, a CRNA is not authorized to practice medicine or surgery. (BPC section 2833.5)”
- “Use of CRNAs to provide anesthesia services in an acute care facility must be approved by the hospital administration and the appropriate committee and must be at the discretion of the physician, dentist, or podiatrist. (BPC section 2827)”



CDPH

TOMÁS J. ARAGÓN, M.D., Dr.P.H.
State Public Health Officer & Director

State of California—Health and Human Services Agency
California Department of Public Health

GAVIN NEWSOM
Governor

September 6, 2024

AFL 24-22

TO: General Acute Care Hospitals (GACHs)

SUBJECT: Reminder of Certified Registered Nurse Anesthetist (CRNA) Requirements

AUTHORITY: Title 22 California Code of Regulations (CCR) sections 70233, 70235 and 70706.1
Business and Professions Code (BPC) sections 2725 and 2825-2833.6
Title 42 Code of Federal Regulations (CFR) sections 410.69 and 482.52

All Facilities Letter (AFL) Summary

- This AFL reminds GACHs of the state and federal requirements for using certified registered nurse anesthetists (CRNAs) to provide anesthesia services.
- GACHs may refer to the California Board of Registered Nursing's (BRN's) Summary of Select Nursing Practice Act Provisions Relating to CRNA Practice (PDF) for information on CRNA scope and standards of practice.

Late Breaking - Minneapolis VA

- August 14th vote for bylaws change - CRNAs designated as licensed independent practitioners and granted privileges
- ASA, MSA, AVAA and NAVAPD engaged with MVAMC leadership, VA Central Office leadership and Congressional allies
- VA “Stop the Line” program invoked
  - Initial letter sent with 250 signatories
  - Updated letter will be sent with over 400 signatories

Minneapolis VA

We are not giving up - continuing the fight…

- Consulting with AVAA insiders and others on next steps
  - Congressional allies
  - VA leadership
- ASA Position
  - Compromise quality of care
  - Not consistent with MN licensure and practice laws
  - Not consistent with existing VA Directives

Support for Advocacy

American Society of Anesthesiologists®

asahq.org

Help Make a Difference!

ASAPAC

ASA Grassroots Network

Questions?

Thank You!

Workforce

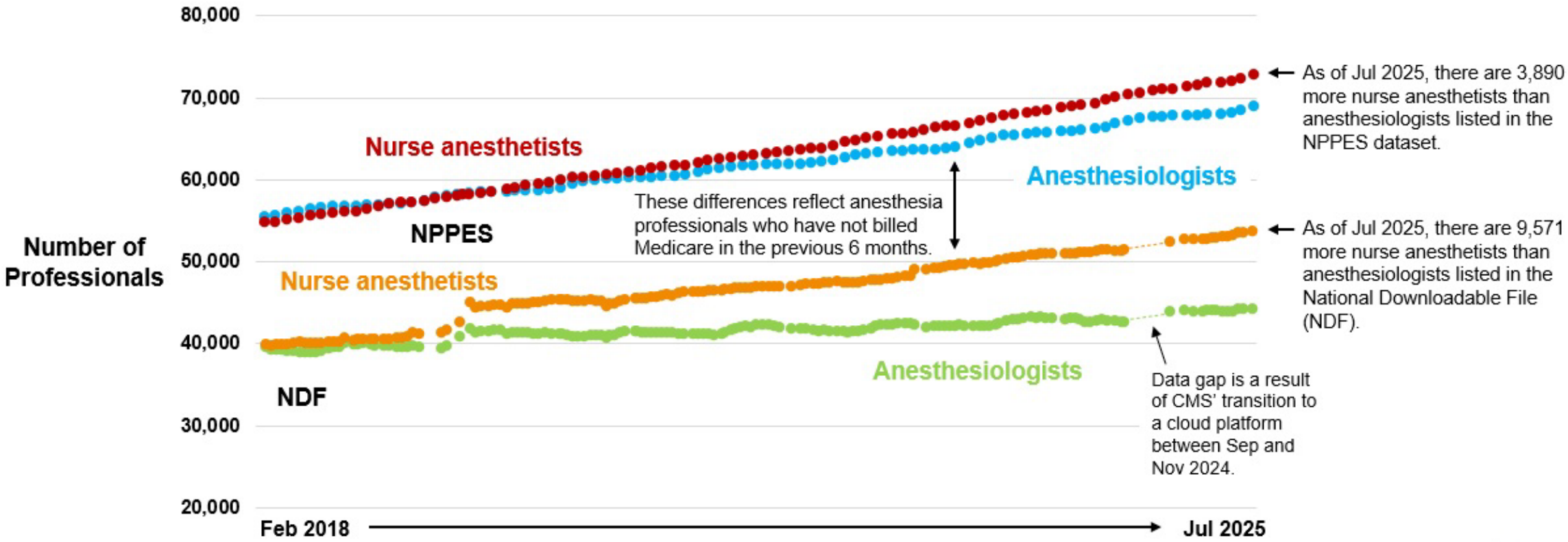
American Society of Anesthesiologists®

asahq.org

ASA Workforce Initiatives

- **ASA Workforce Summits – June 2022 and November 2023**
- **Endorsements and Support**
  - **H.R. 2028, the Resident Education Deferred Interest (REDI) Act**
    - Permits residents to qualify for interest-free deferment on their student loans while serving in a medical or dental internship or residency program
  - **S. 2439/ H.R. 4731, the Resident Physician Shortage Reduction Act**
    - Funding for 14,000 additional residency positions
  - **S. 1380, the Specialty Physicians Advancing Rural Care (SPARC) Act**
    - Authorizes a loan repayment program to encourage specialty medicine physicians to serve in rural communities experiencing a shortage of specialty medicine physicians

How Many Anesthesiologists and Nurse Anesthetists Are There? Feb 2018–Jul 2025



Source: NPPES/NPI Datasets, 2/15/2018–07/13/2025 and CMS Provider Data: Doctors and Clinicians, National Downloadable File (NDF). Updated 07/08/2025. Available at https://data.cms.gov/provider-data/dataset/mj5m-pzi6

ASA Anesthesia Workforce Summit II

- ASA convened a second Anesthesia Workforce Summit November 2023
- **Purpose:** Build upon the work from the first Summit and obtain additional perspectives and priorities to help guide ASA initiatives concerning:
  - Advocacy to expand residency programs and facilitate use of internationally-trained physicians
  - Anesthesiology "ownership" of NORA and procedural sedation services
  - Involvement of anesthesiologists in health system leadership and communication of the anesthesiology value proposition

ASA Anesthesia Workforce Summit II *(continued)*

- Workforce data, communications, and education regarding workforce issues and potential solutions
- Development of toolkits and case examples to assist practices and hospitals
- Collaboration with other organizations with aligned interests

Supply and Demand

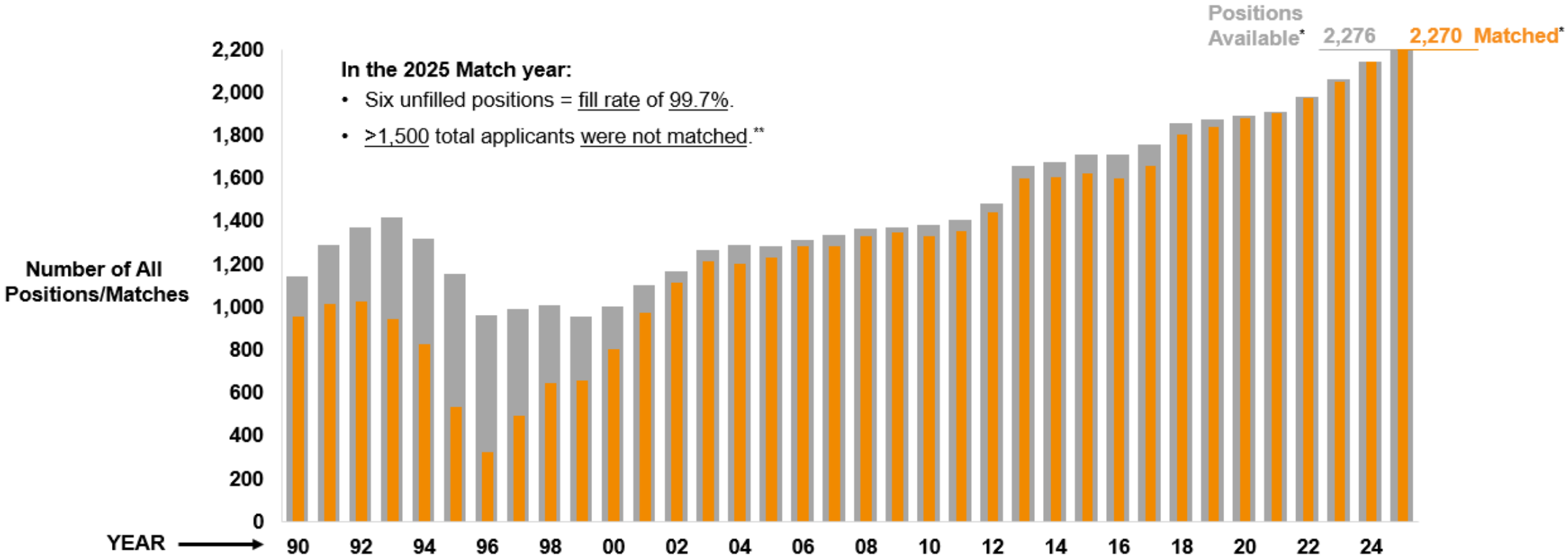
Supply

1) Increase pipeline for anesthesiologists
2) Decrease attrition

Demand

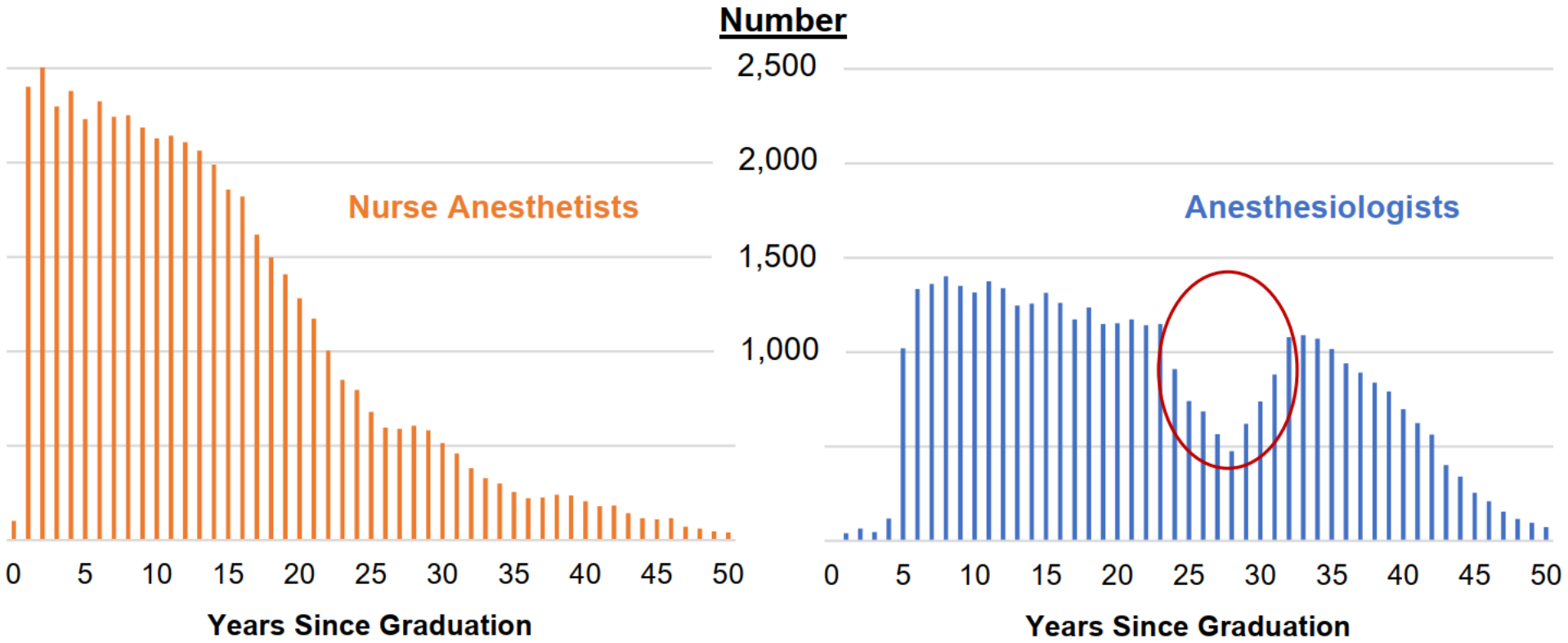
3) Create better OR/NORA efficiencies
4) Consider what can be done by other professionals under the guidance of the anesthesia department to decrease demand for anesthesia professionals

Anesthesiology Positions Available Compared to Total Anesthesiology Candidates Matched*, 1990–2025



Sources: 35 years of reports (1990 to 2024): National Resident Matching Program, Results and Data: Main Residency Match®. National Resident Matching Program, Washington, DC. 2025 data: Advanced Data Tables: 2025 Main Residency Match®. National Resident Matching Program, Washington, D.C.
Represents NRMP specialty programs in: Anesthesiology, Emergency Medicine (EM)-Anesthesiology, Medicine-Anesthesiology and Pediatrics-Anesthesiology.
*PGY-1 plus CA-1, and from 2014-2024, includes Physician (R) programs.**2024 applicants: AAMC ERAS® Statistics Preliminary Data for Anesthesiology, EM-Anesthesiology, Internal Medicine (IM)-Anesthesiology and Pediatrics-Anesthesiology. See “Definitions” slide for candidate description. Note, a small portion of applicants can match into PGY-1 and CA-1 positions in tandem. You may access further reading on positions and the Match .

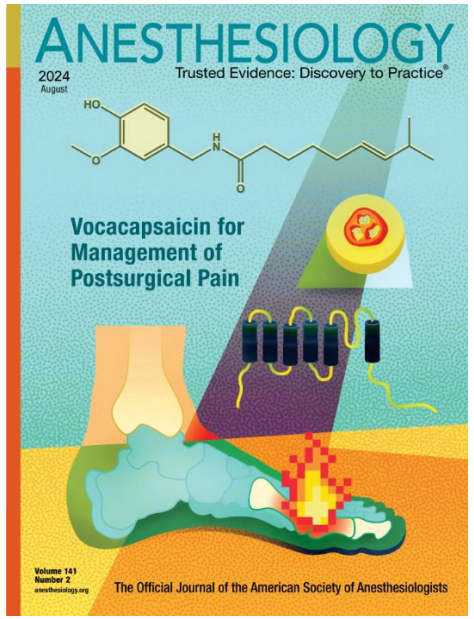
Age (proxy) Distributions of Nurse Anesthetists and Anesthesiologists, 2024



Source: Miller T.R. (2025). One for the ages. *ASA Monitor*. 89(2): 1,6,8

Anesthesiology Workforce Article

- *Anesthesiology* posted an article in June titled, **"Closing the Chasm: Understanding and Addressing the Anesthesia Workforce Supply and Demand Imbalance"**
  - Included in August 2024, *Anesthesiology*
  - Result of ASA workforce summits, June 2022 and November 2023
  - News release garnered articles in medical trade press
  - The authors will speak during a session at annual meeting in Philadelphia



PAIN NEWS NETWORK

AMBULATORY SURGERY CENTER NEWS

OR Manager

healthleaders

Can We Meet Demand? YES, but….

- **It will take time.**
- ASA will advocate for increased CMS GME funding and additional residency programs
- ASA's Center for Anesthesia Workforce Studies (CAWS) will continue to track and communicate trends related to the supply and demand of anesthesia professionals
- ASA will provide case examples and recommendations around:
    - Strategies to reduce burnout, help enhance physicians' work-life integration, and enhance the professional work environment
    - Best practices for efficient and effective staffing and scheduling in the operating room and non-operating room services requiring anesthesia

Reimagining Perioperative Care: How Large Language Models Can Shape Modern Anesthesia

Sesh Mudumbai M.D.,M.S.

Associate Professor, Department of Anesthesiology, Perioperative, and Pain Medicine, Stanford University School of Medicine

Staff Anesthesiologist

Medical Director for Clinical Informatics Systems and Perioperative Analytics

mudumbai@stanford.edu

Disclosures

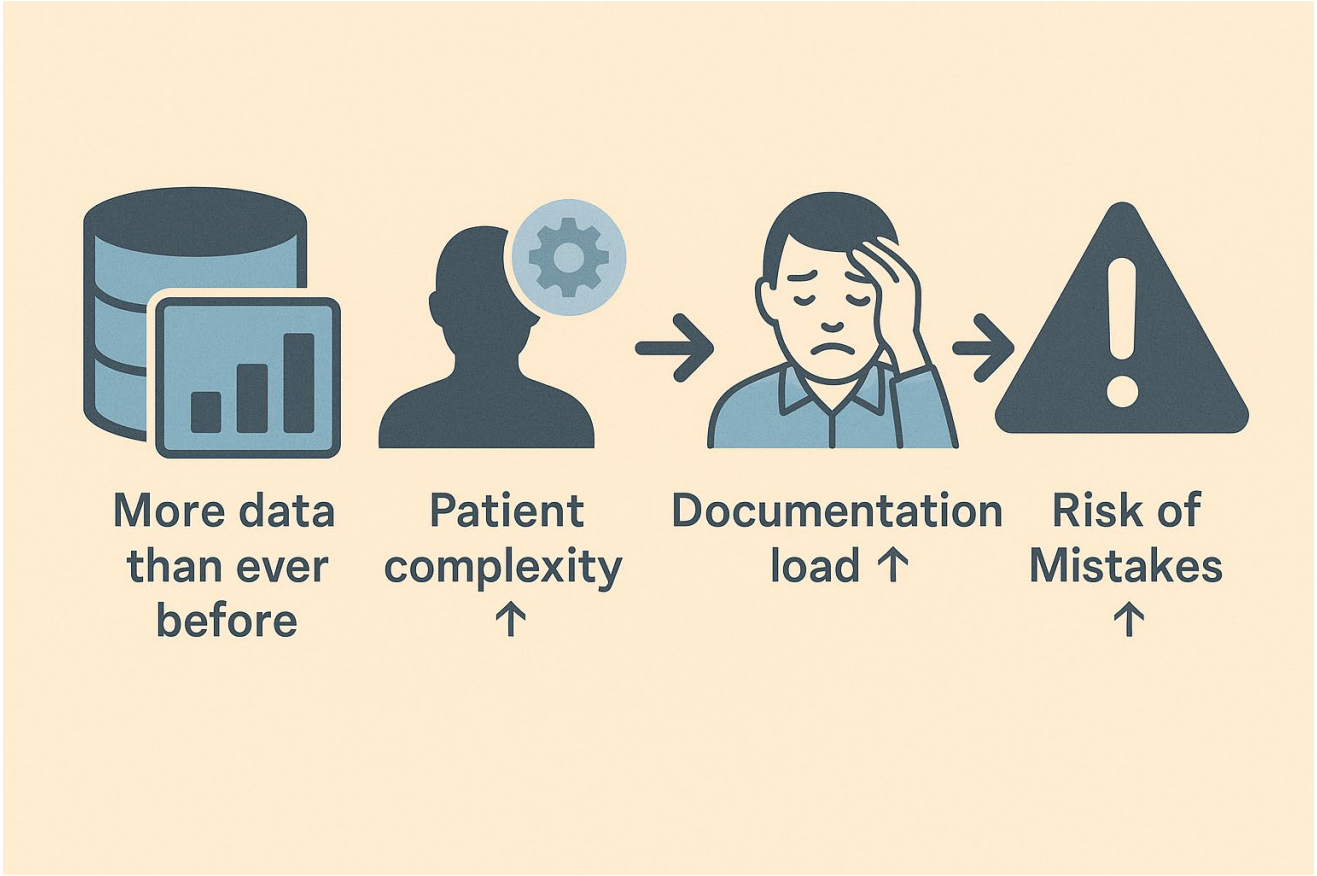
- **I have no conflicts of interest that could affect the content of my presentation. The views expressed here are not necessarily those of the Veterans Health Administration or Stanford University.**
- **Funded research:**
  - **Wellcome Leap Foundation**: "Leveraging Artificial Intelligence and Multi-Omic Data to Predict Opioid Addiction"
  - **National Cancer Institute:** "Cancer and Mortality Associated with Long-Term Opioid Use Among the Population Using Veterans Health Administrations Services"
  - **Food & Drug Administration PMR Study 3033-1A:** "A prospective investigation of the risks of opioid misuse, abuse, and addiction among patients treated with extended-release/long acting (ER/LA) opioids for the treatment of chronic pain"

The 1 AM Decision

Sound familiar?

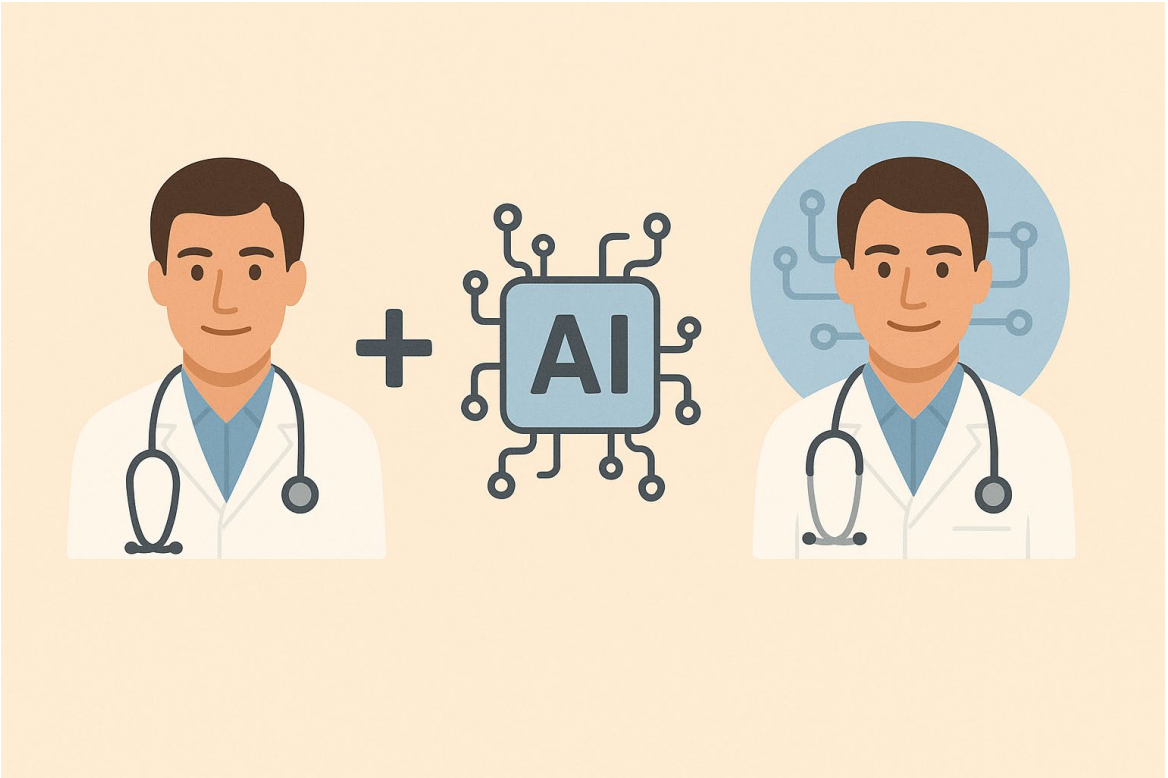
We're Drowning in Data

The Problem is Clear



THE BIG IDEA

AI should reduce cognitive load in the OR, not add to it

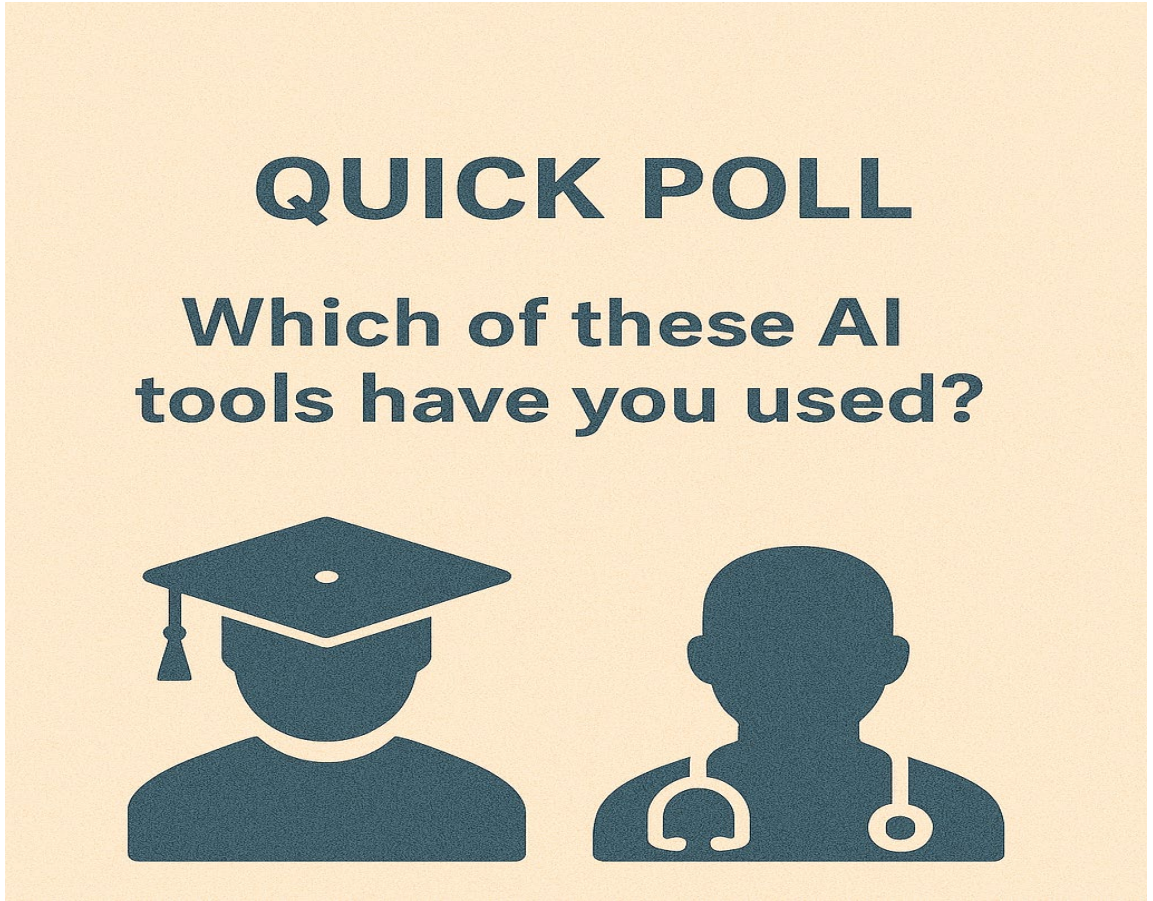


QUICK POLL

Raise your hand if you are:

🎓 Trainee

👨‍⚕️ Practitioner



What Patients Are Already Doing

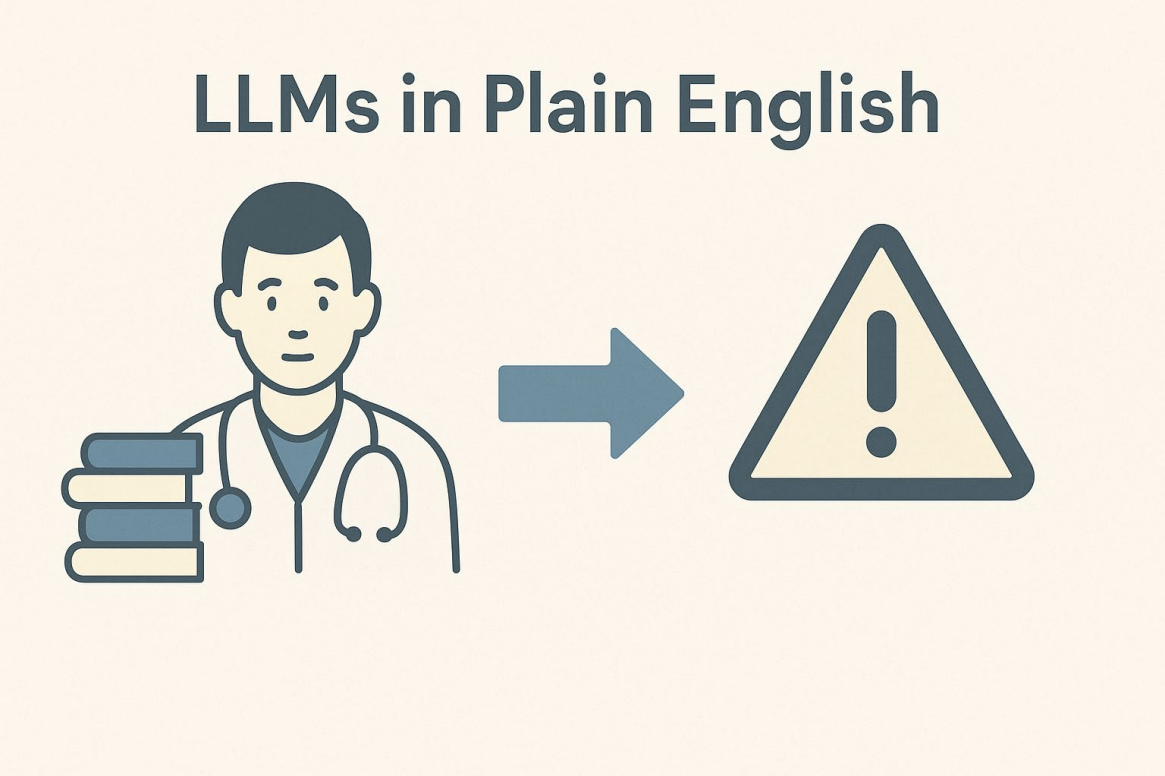
r/blueprint_
u/VariousWar1537 • 5h

I Stopped Asking Doctors for Help. ChatGPT Is My First Responder Now.

I've completely stopped asking conventional doctors for help. Every time I walk in with symptoms and full lab work, they look at me with dead eyes and say: "So... what do you want me to do?"

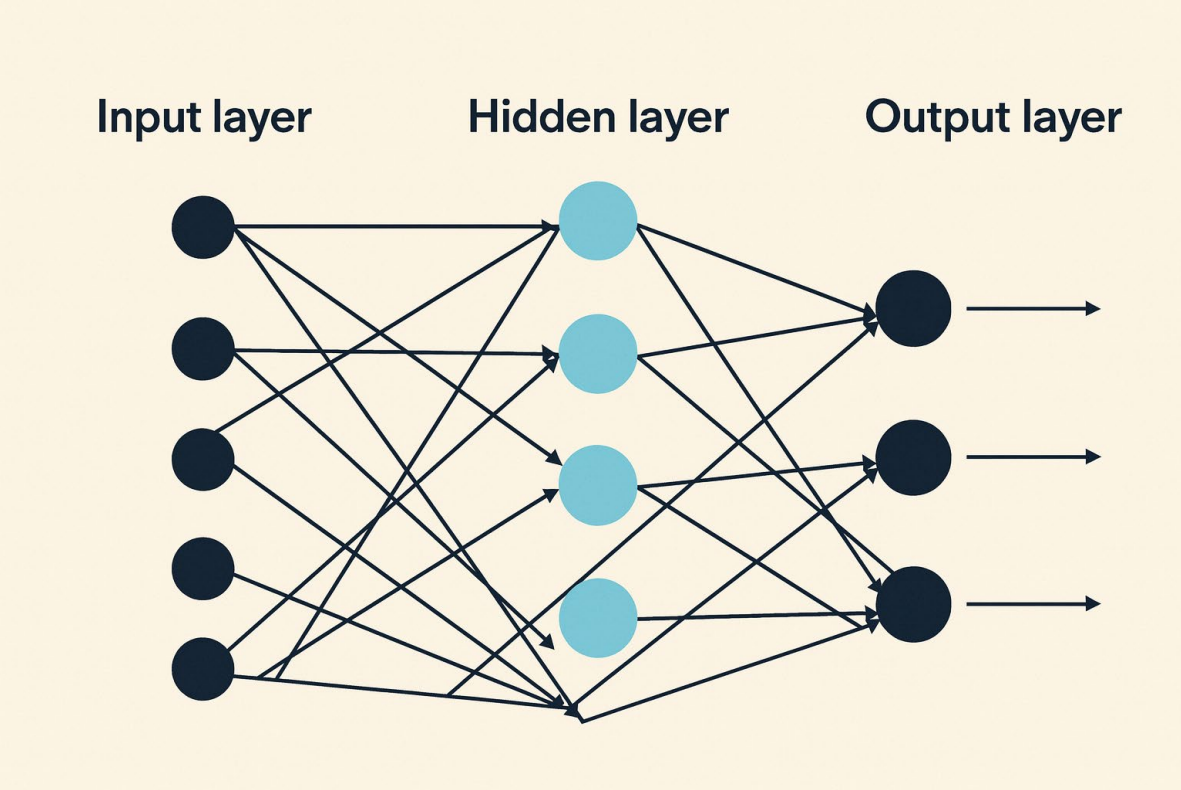
I'm done.

LLMs in Plain English

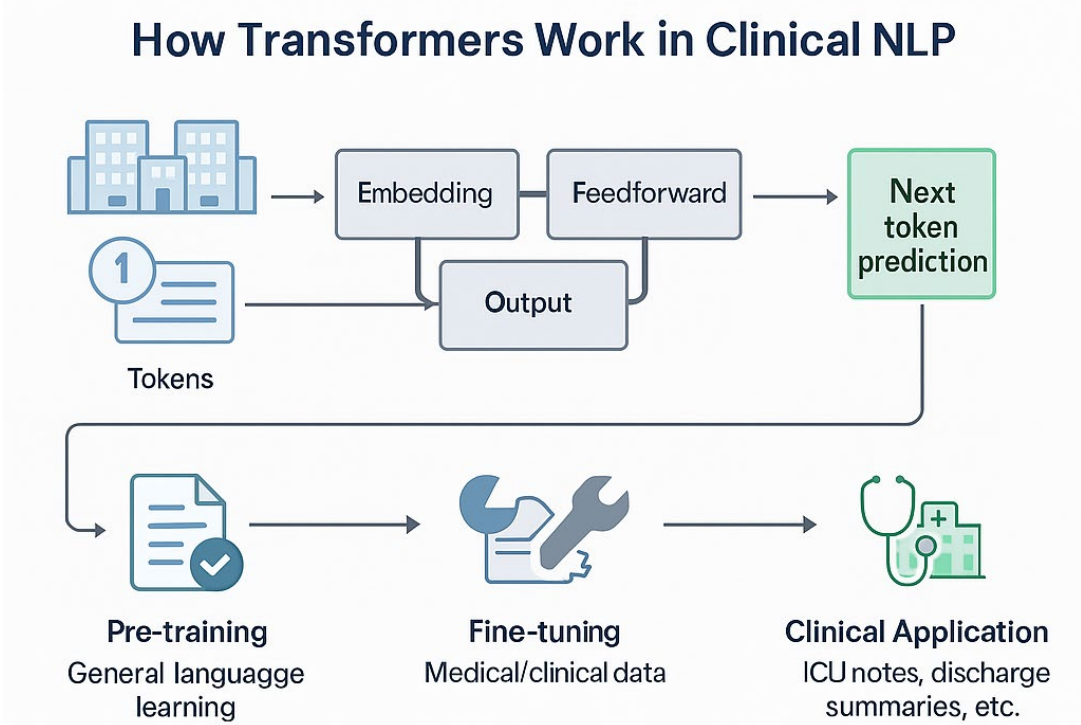


Like a trainee who's read *everything* but needs supervision

HOW LLMs WORK

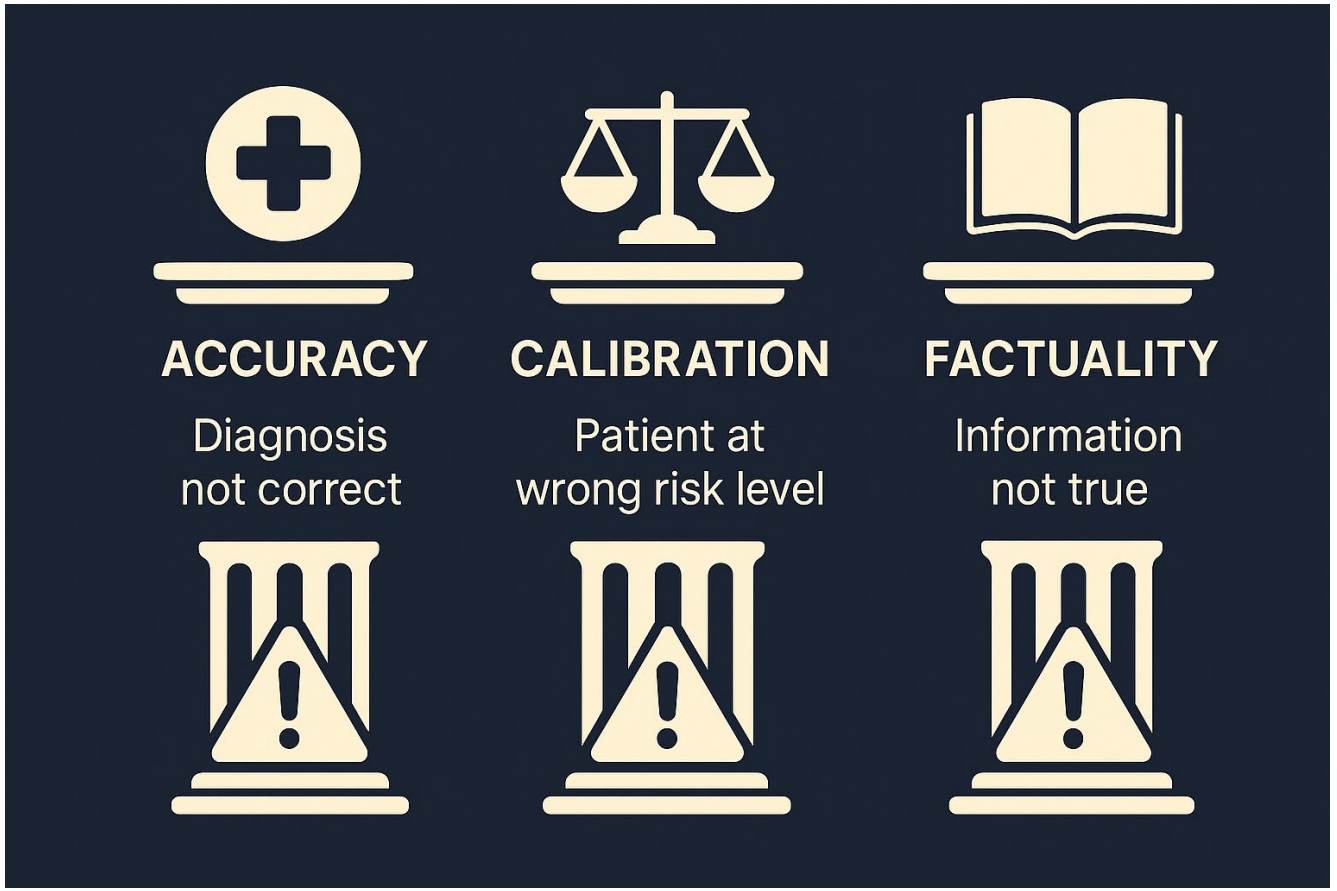


Neural Network



Transformer

THREE EVALUATION PILLARS THAT MATTER



EXAMPLE 1: THE KNOWLEDGE FOUNDATION

LLMS CAN PASS THE ABA WRITTEN EXAM

Clinical Knowledge and Reasoning Abilities of AI Large Language Models in Anesthesiology: A Comparative Study on the American Board of Anesthesiology Examination

Mirana C. Angel, MSc,*† Joseph B. Rinehart, MD,‡ Maxime P. Canneson, MD, PhD,§ and Pierre Baldi, PhD*†

ANESTHESIA & ANALGESIA®

HOW DID THE AUTHORS ASSESS

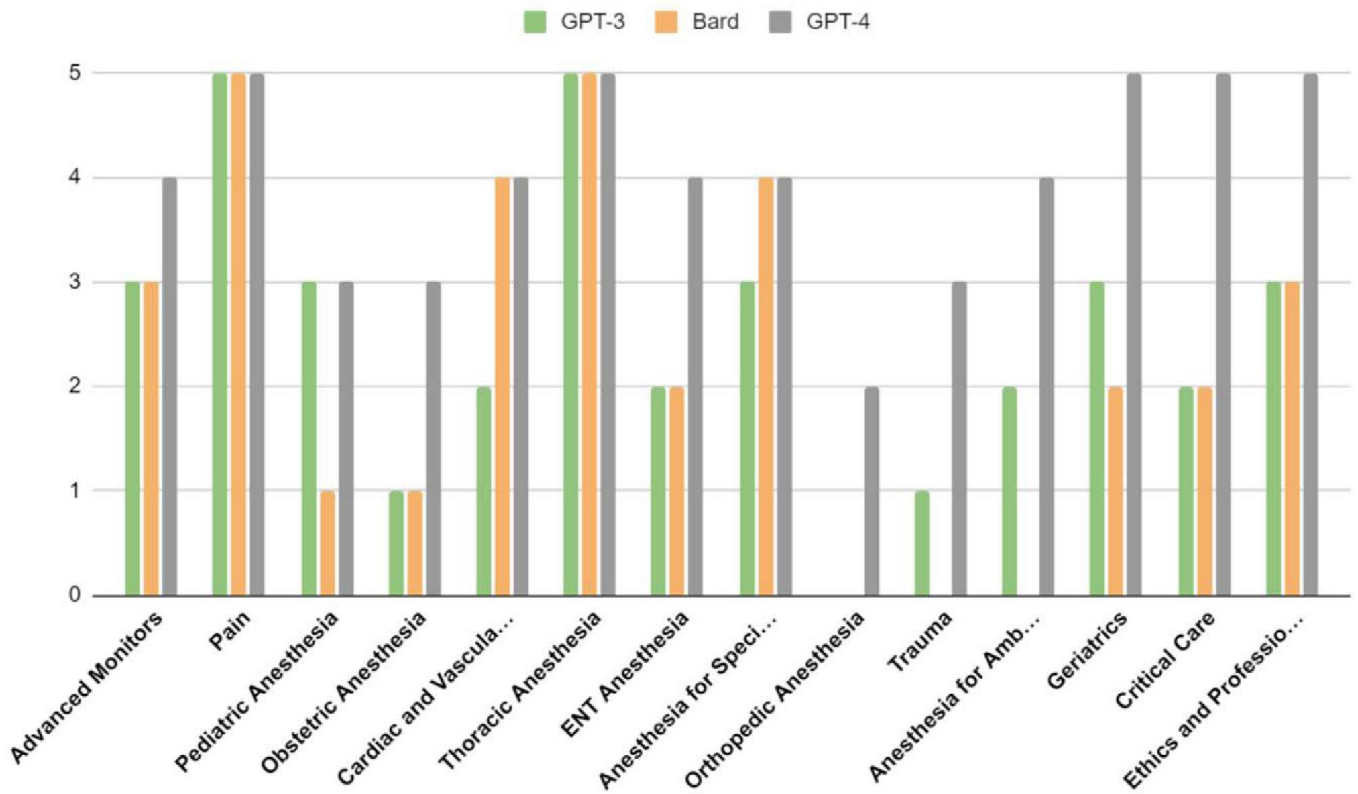
ABA BOARD EXAMINATION

WRITTEN + ORAL PORTIONS TESTED
3 LLMs COMPARED

GPT-3	Bard	GPT-4
GPT-4 78%/80% PASSED	58%50% FAILED	47%46% FAILED

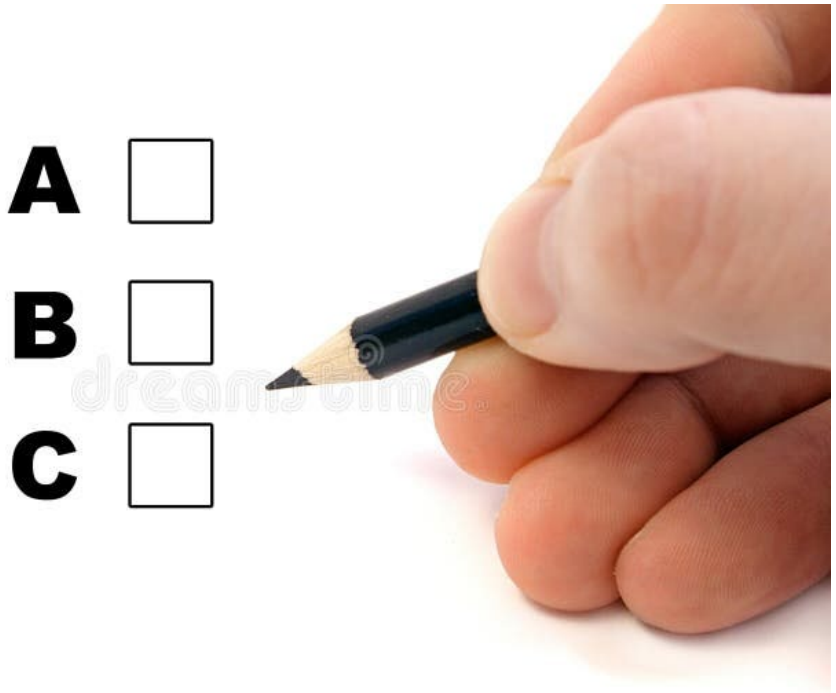
GPT-4: “Reasonable possibility of passing oral exam”

BOARD EXAMINERS’ ASSESSMENT



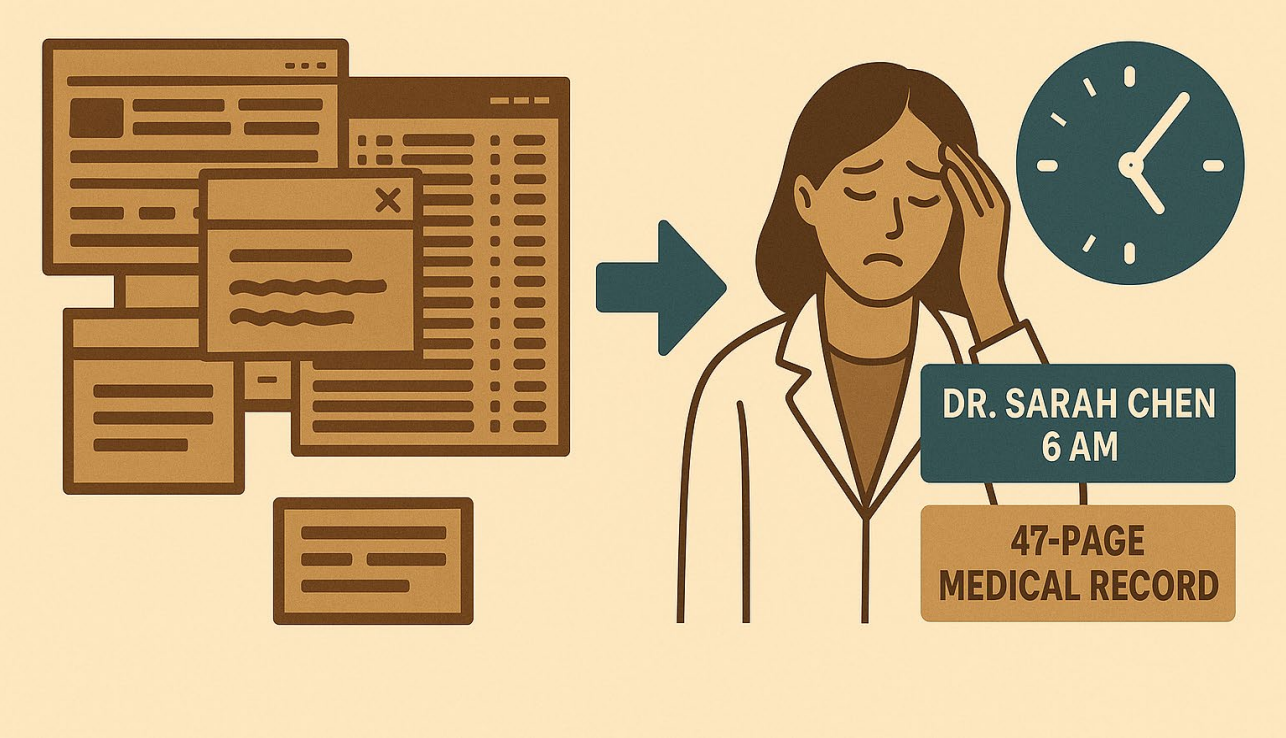
“using these AI systems to help us avoid some of the more common cognitive errors that may occur during critical events”

BUT CAN LLMS BE USEFUL CLINICALLY?

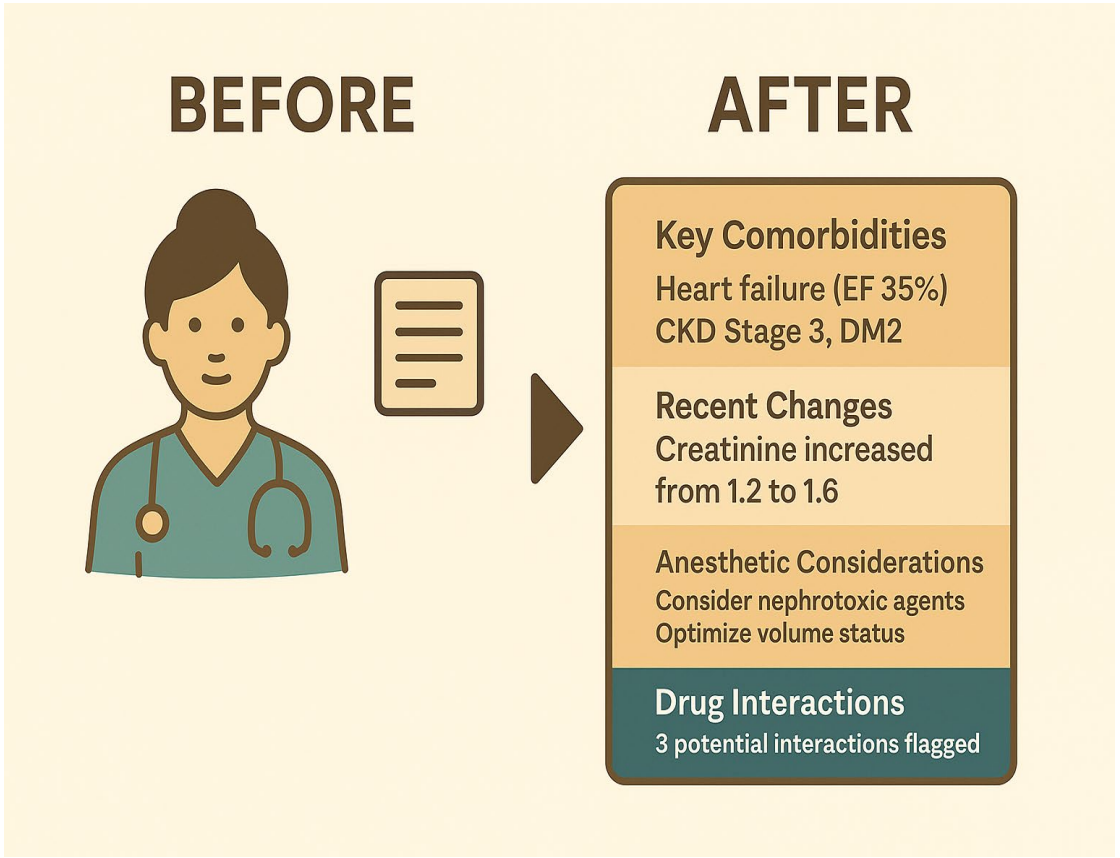


EXAMPLE 2: THE CHART REVIEW REVOLUTION

BEFORE - THE CHART REVIEW CHALLENGE



AFTER: AI-ASSISTED SUMMARIES



20 minutes

2 minu

PREFERRED BY CLINICIANS
IN HEAD-TO-HEAD COMPARISON

MORE COMPREHENSIVE AND ORGANIZED

REQUIRES HUMAN OVERSIGHT

ANY EVIDENCE?

nature medicine

Article

https://doi.org/10.1038/s41591-024-02855-5

Adapted large language models can outperform medical experts in clinical text summarization

Received: 23 October 2023

Accepted: 2 February 2024

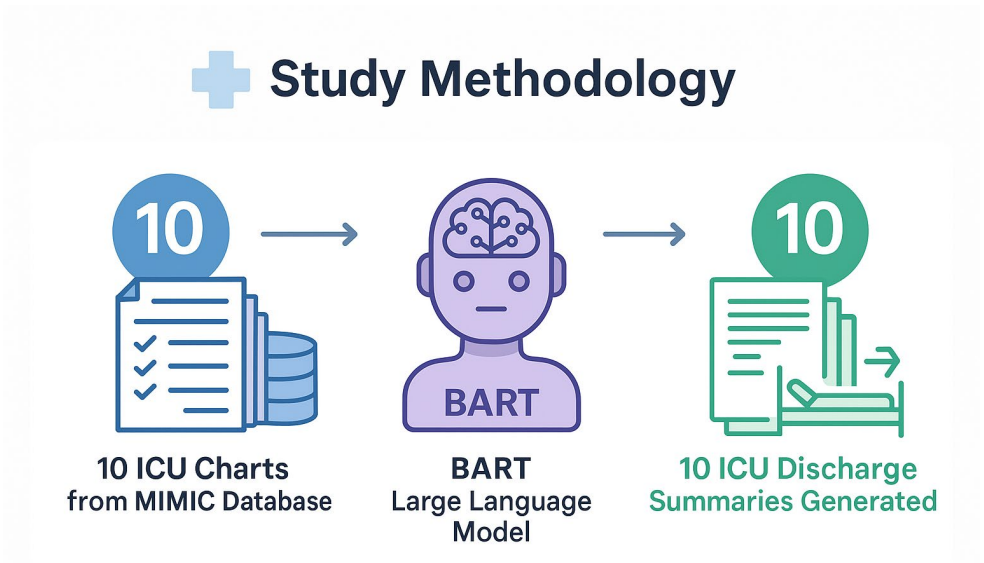
Published online: 27 February 2024

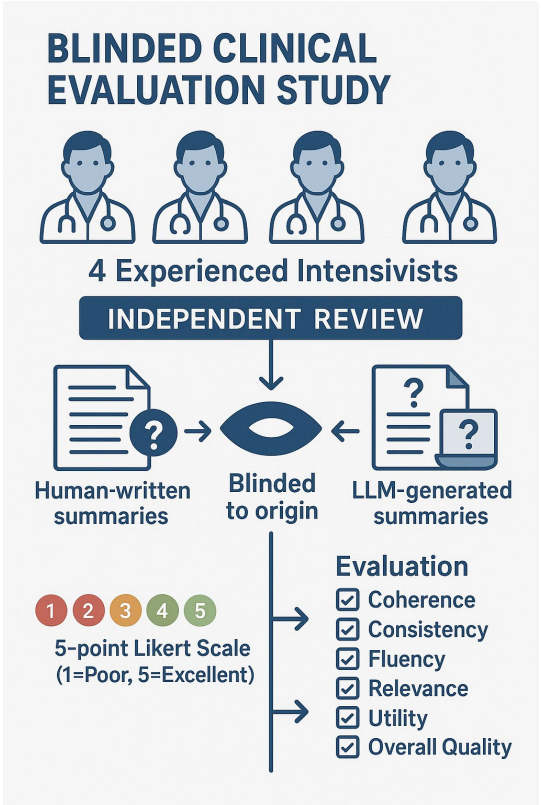
Check for updates

Dave Van Veen[1,2] ✉, Cara Van Uden[2,3], Louis Blankemeier[1,2], Jean-Benoit Delbrouck[2], Asad Aali[4], Christian Bluethgen[2,5], Anuj Pareek[2,6], Malgorzata Polacin[5], Eduardo Pontes Reis[2,7], Anna Seehofnerová[8,9], Nidhi Rohatgi[8,10], Poonam Hosamani[8], William Collins[8], Neera Ahuja[8], Curtis P. Langlotz[2,8,9,11], Jason Hom[8], Sergios Gatidis[2,9], John Pauly[1] & Akshay S. Chaudhari[2,9,11,12]

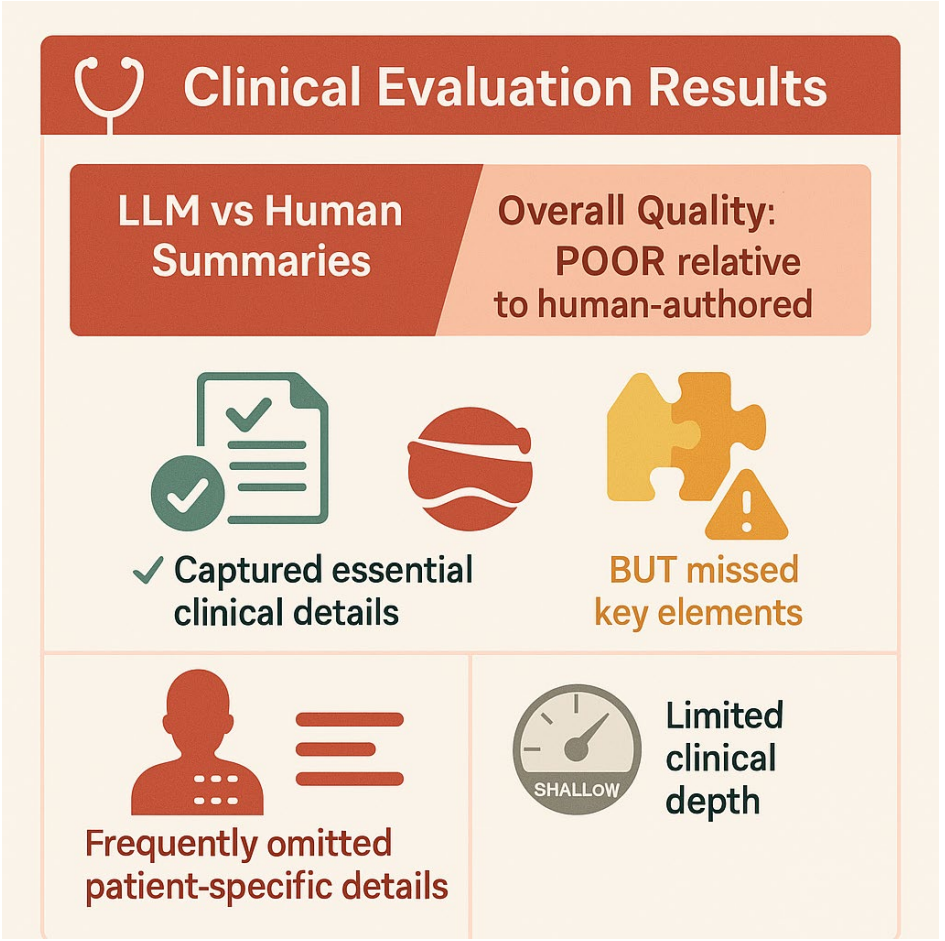
ANY EVIDENCE?

ANY EVIDENCE?



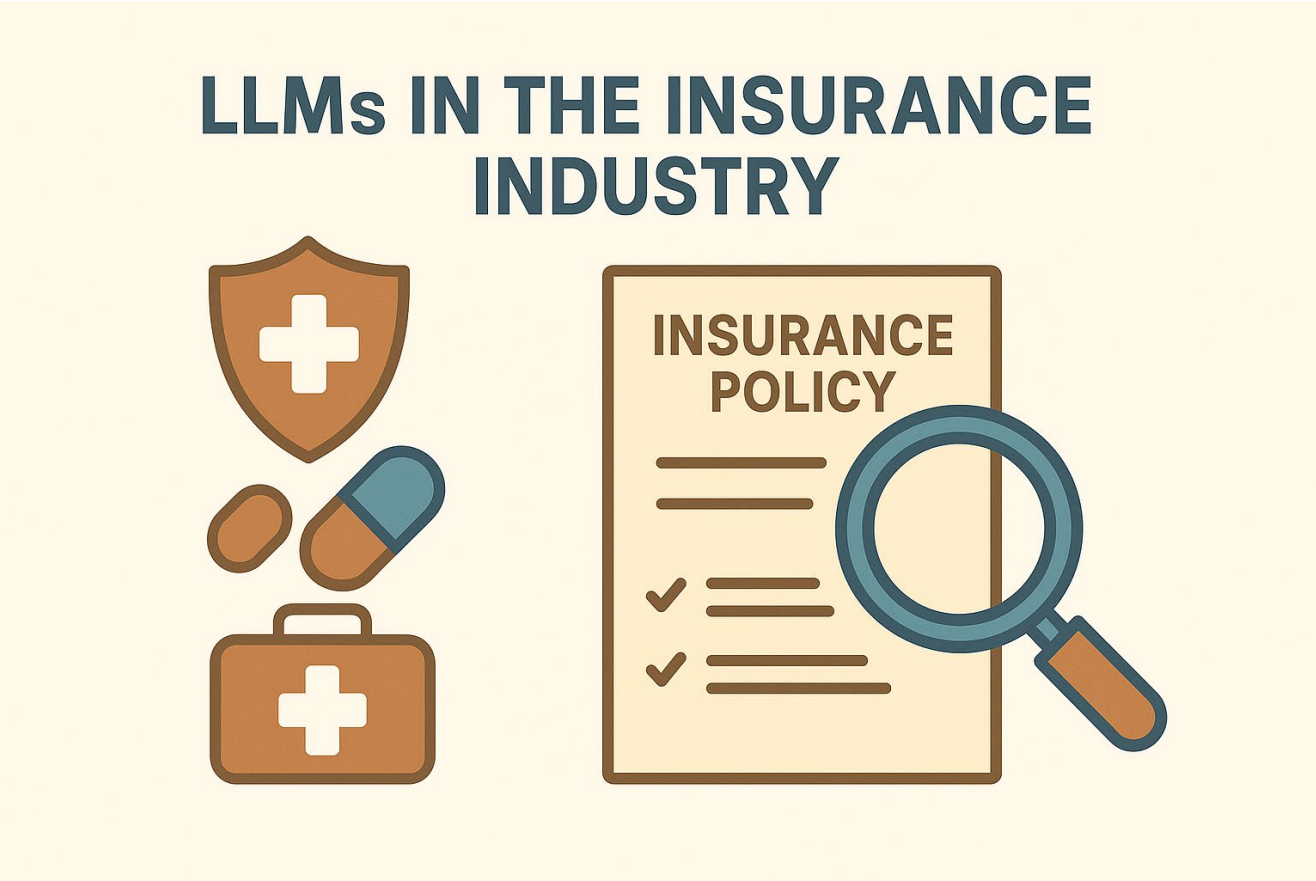


WHAT DID WE ASSESS?



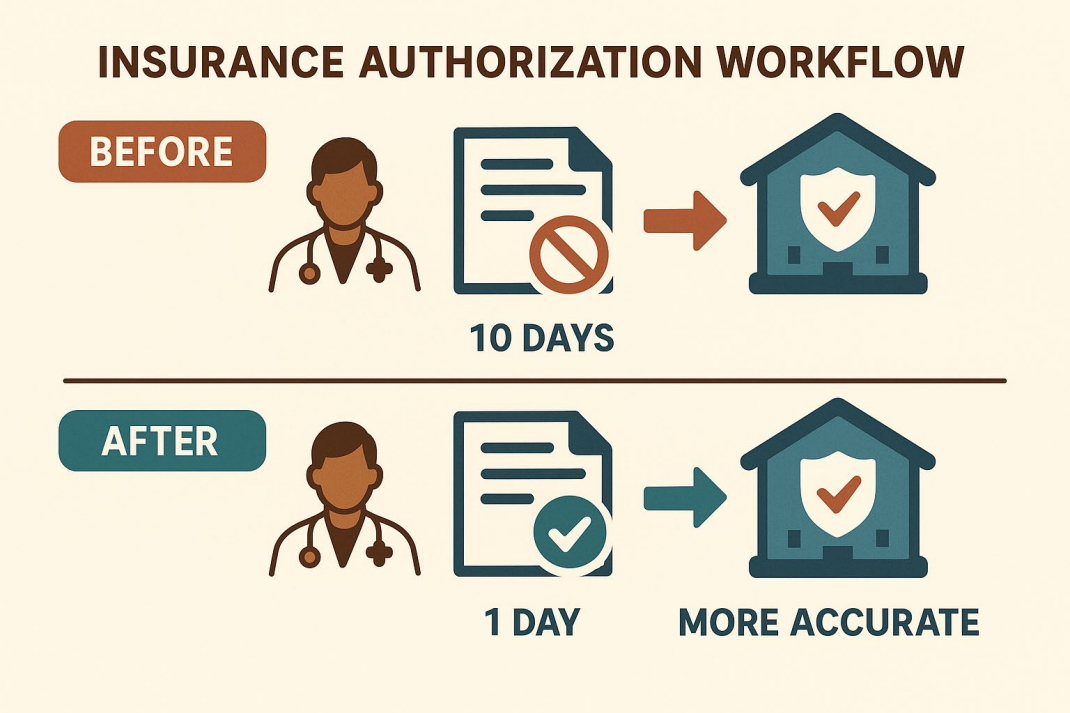
EXAMPLE 3: REAL-WORLD ADOPTION

HEALTHCARE INSURANCE'S USES FOR LLMs



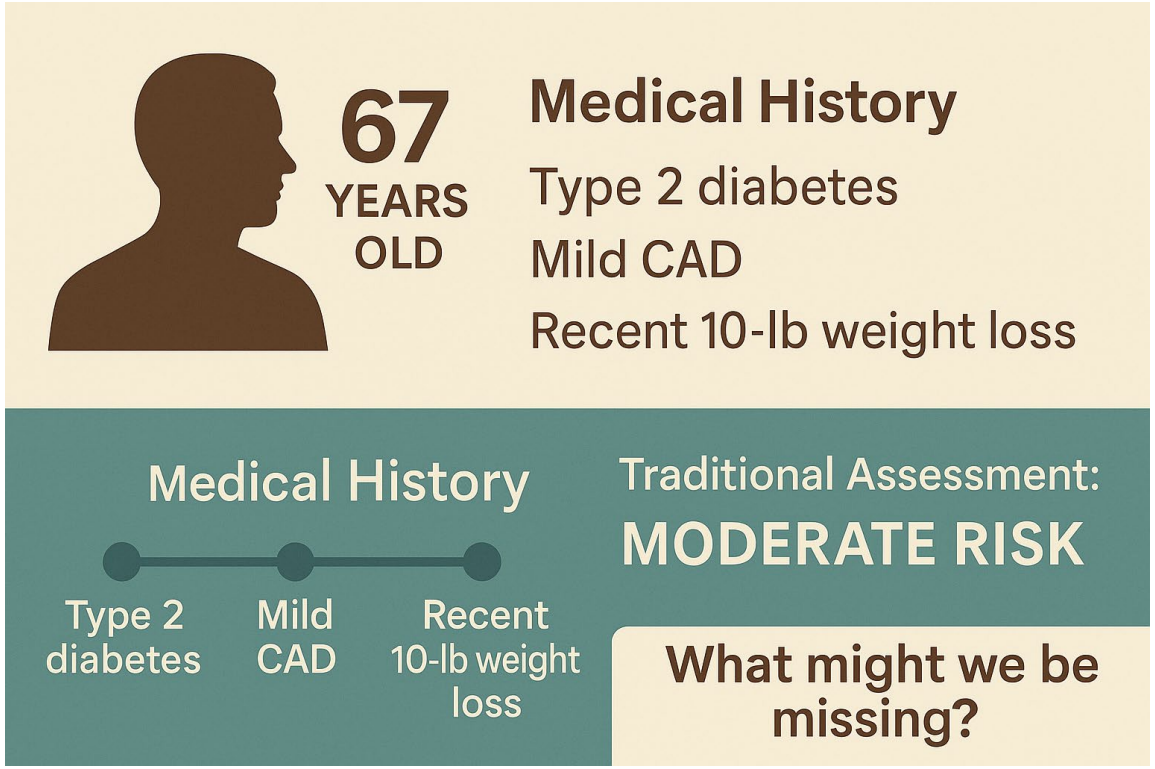
- Claims handling
- Fraud detection
- Customer service chatbots

LLMS TO COMMUNICATE WITH HEALTHCARE INSURANCE

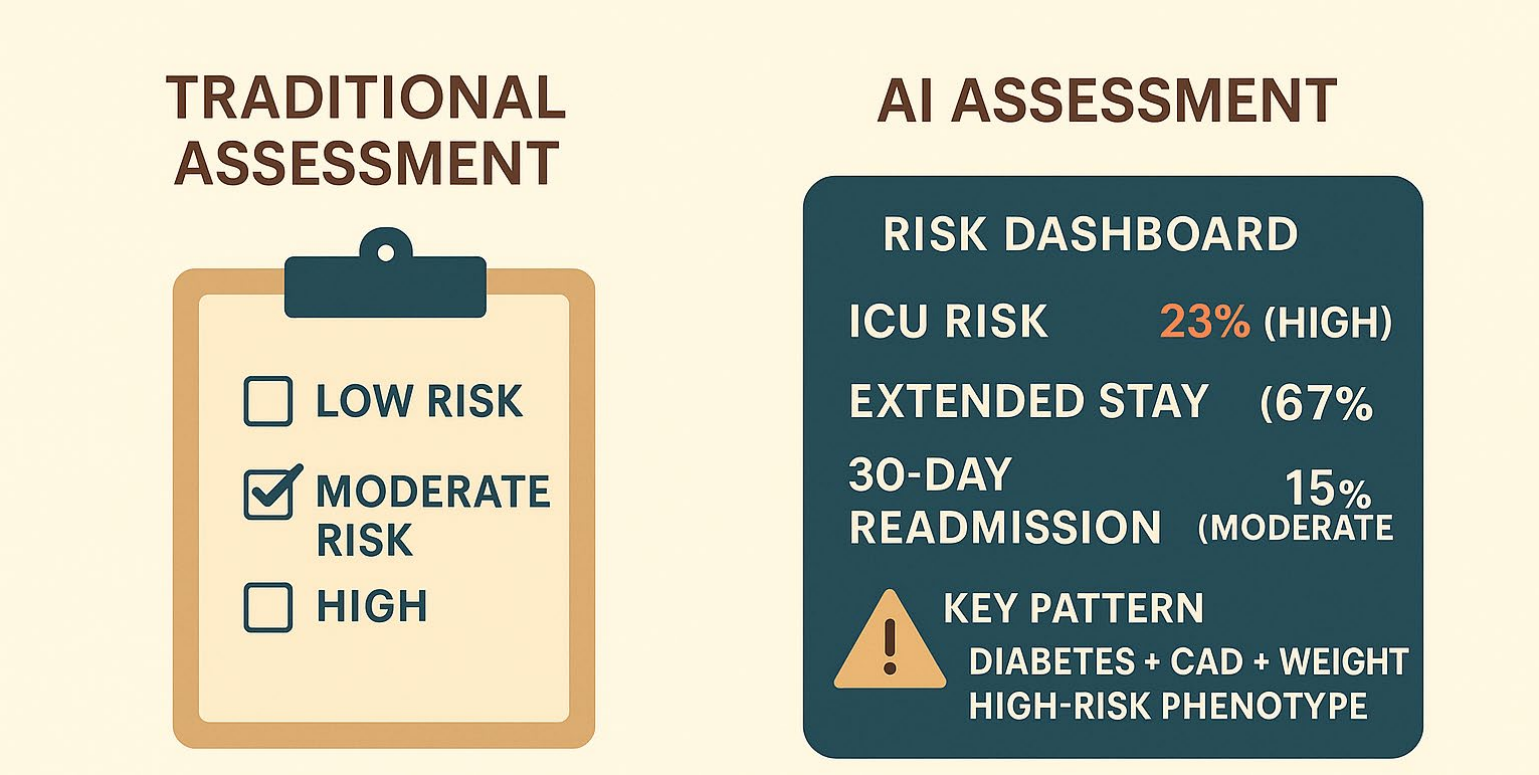


EXAMPLE 4: PERIOPERATIVE RISK PREDICTION

MEET MR. JOHNSON



AI RISK PREDICTION

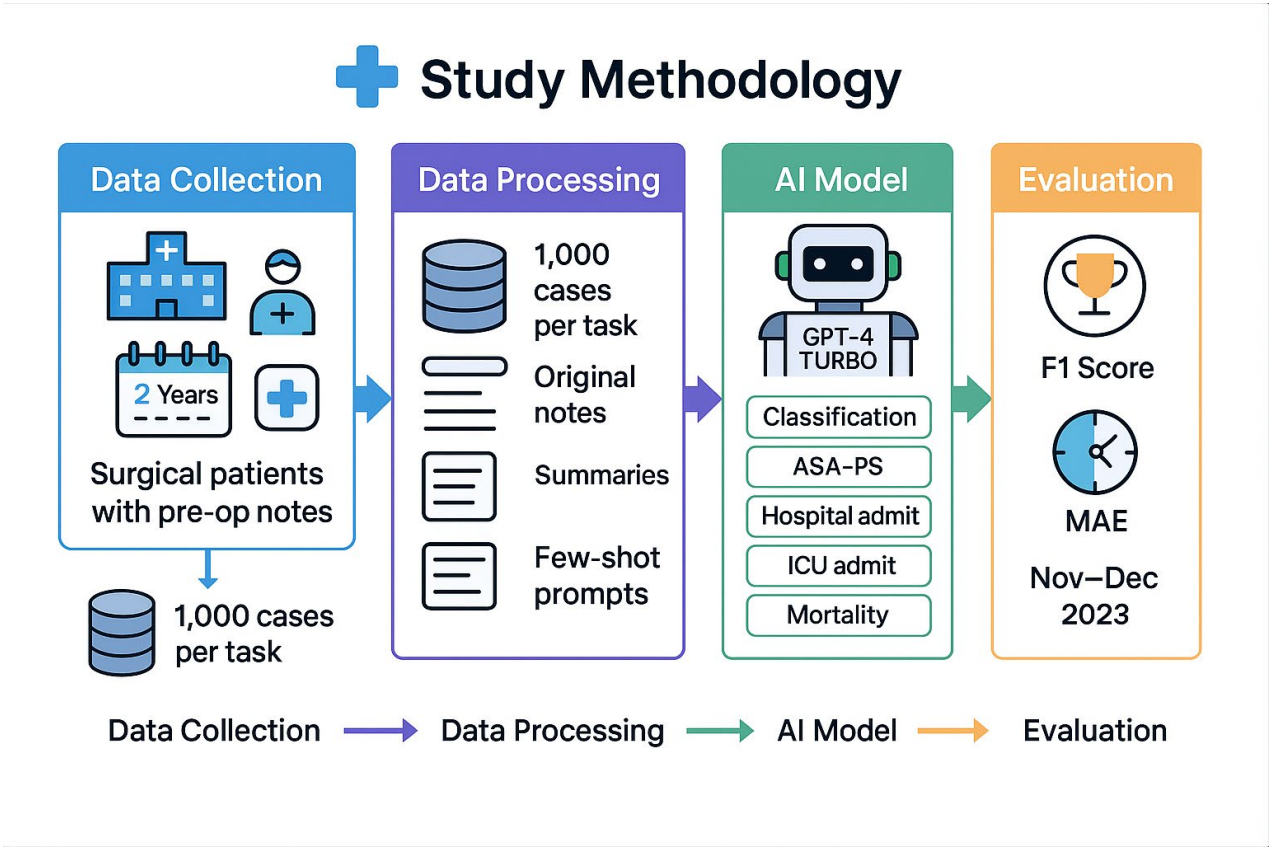


PROOF OF CONCEPT?

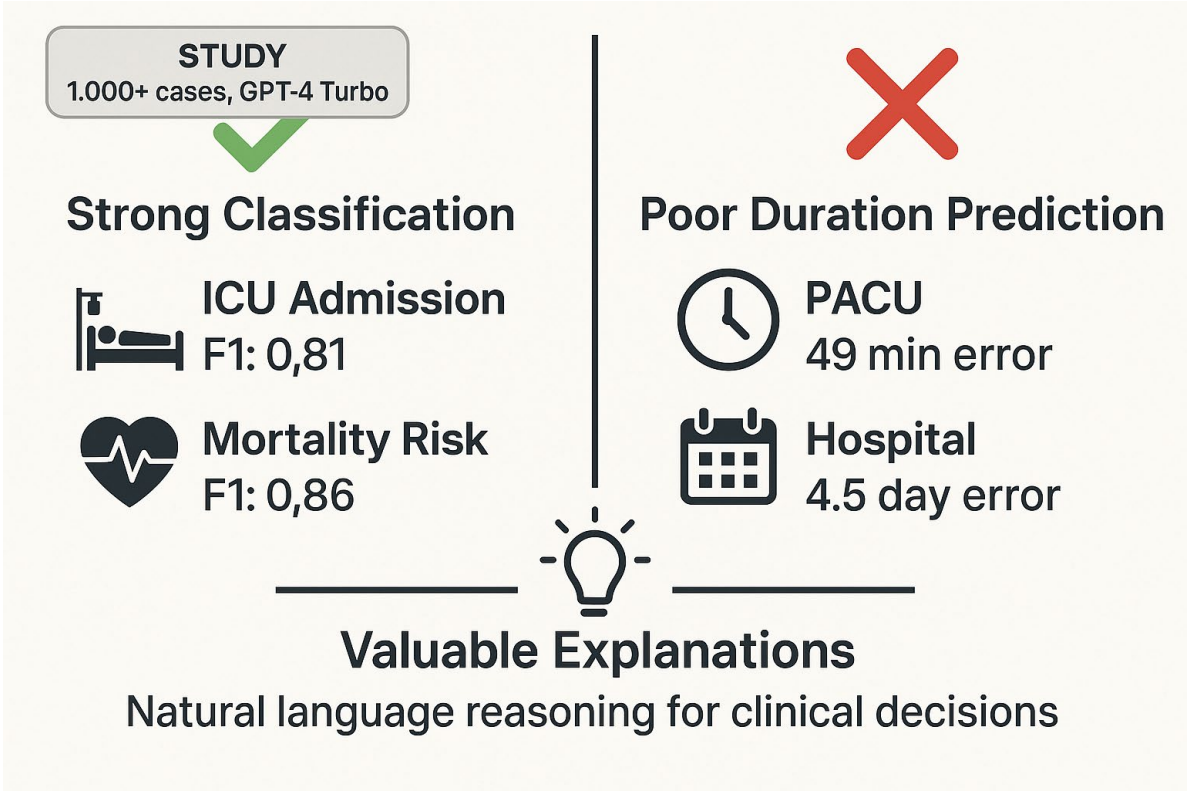
JAMA Surgery | Original Investigation

Large Language Model Capabilities in Perioperative Risk Prediction and Prognostication

Philip Chung, MD, MS; Christine T. Fong, MS; Andrew M. Walters, MD; Nima Aghaeepour, PhD; Meliha Yetisgen, PhD; Vikas N. O'Reilly-Shah, MD, PhD



RESULTS

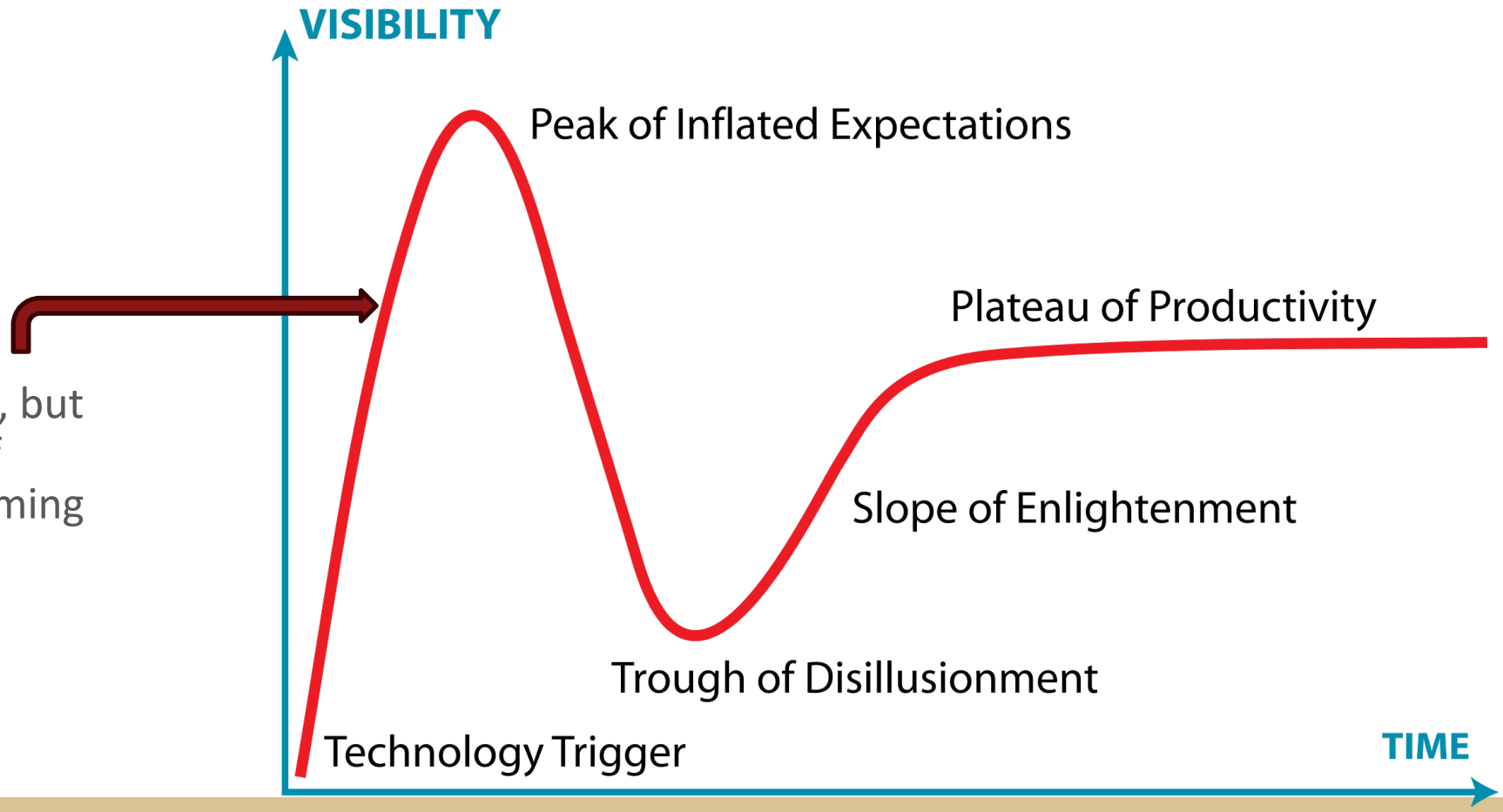

STUDY
1.000+ cases, GPT-4 Turbo
Strong Classification
ICU Admission
F1: 0,81
Mortality Risk
F1: 0,86
Poor Duration Prediction
PACU
49 min error
Hospital
4.5 day error
Valuable Explanations
Natural language reasoning for clinical decisions

GUARDRAILS & IMPLEMENTATION

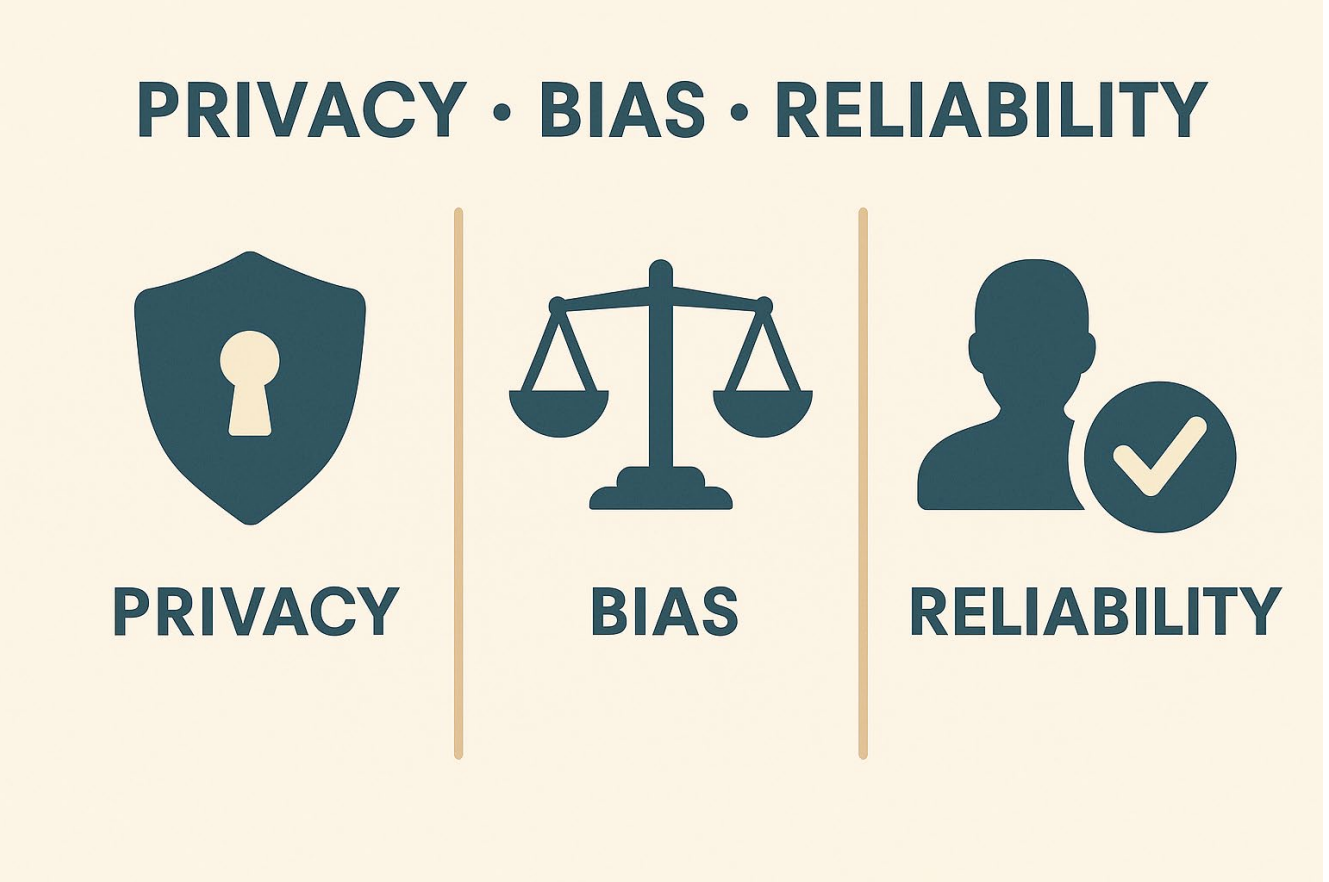
REALITY CHECK: GARTNER HYPE CYCLE

LLMs for medicine

They are promising, but there will be lots of disappointment coming soon.



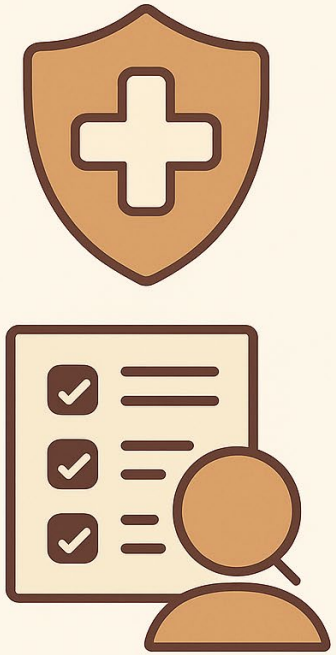
THREE ESSENTIAL GUARDRAILS



THE RELIABILITY CHECKLIST

NON-NEGOTIABLE REQUIREMENTS

- ☑ ALWAYS HUMAN-IN-THE-LOOP
- ☑ START WITH LOW-RISK APPLICATIONS
- ☑ VALIDATE ON YOUR PATIENT POPULATION
- ☑ MONITOR FOR DRIFT AND ERRORS
- ☑ CLEAR ESCALATION PROTOCOLS

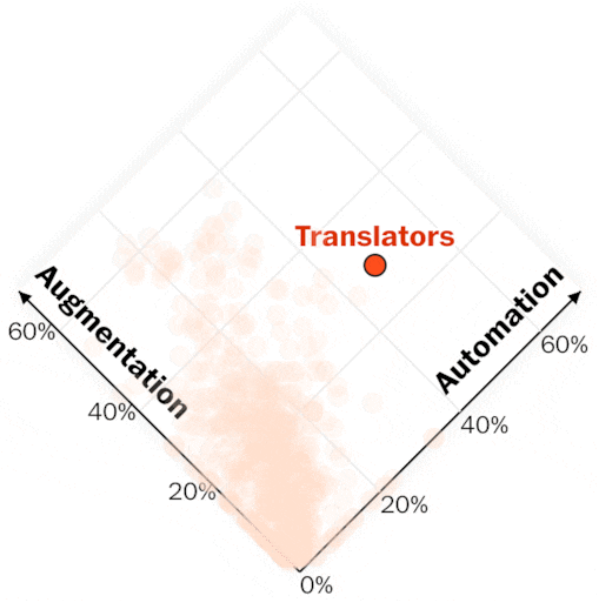


PUTTING IT TOGETHER

AUGMENTATION VS. AUTOMATION

Automation: when a LLM system can independently carry out a task without human input.

Augmentation: when a LLM system needs human supervision to complete a task, complementing the human worker



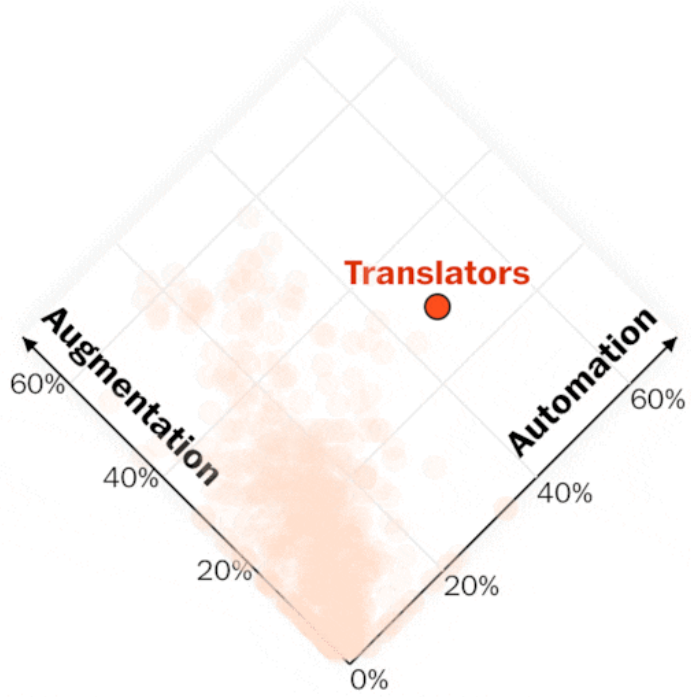
AUGMENTATION VS. AUTOMATION

Automation:

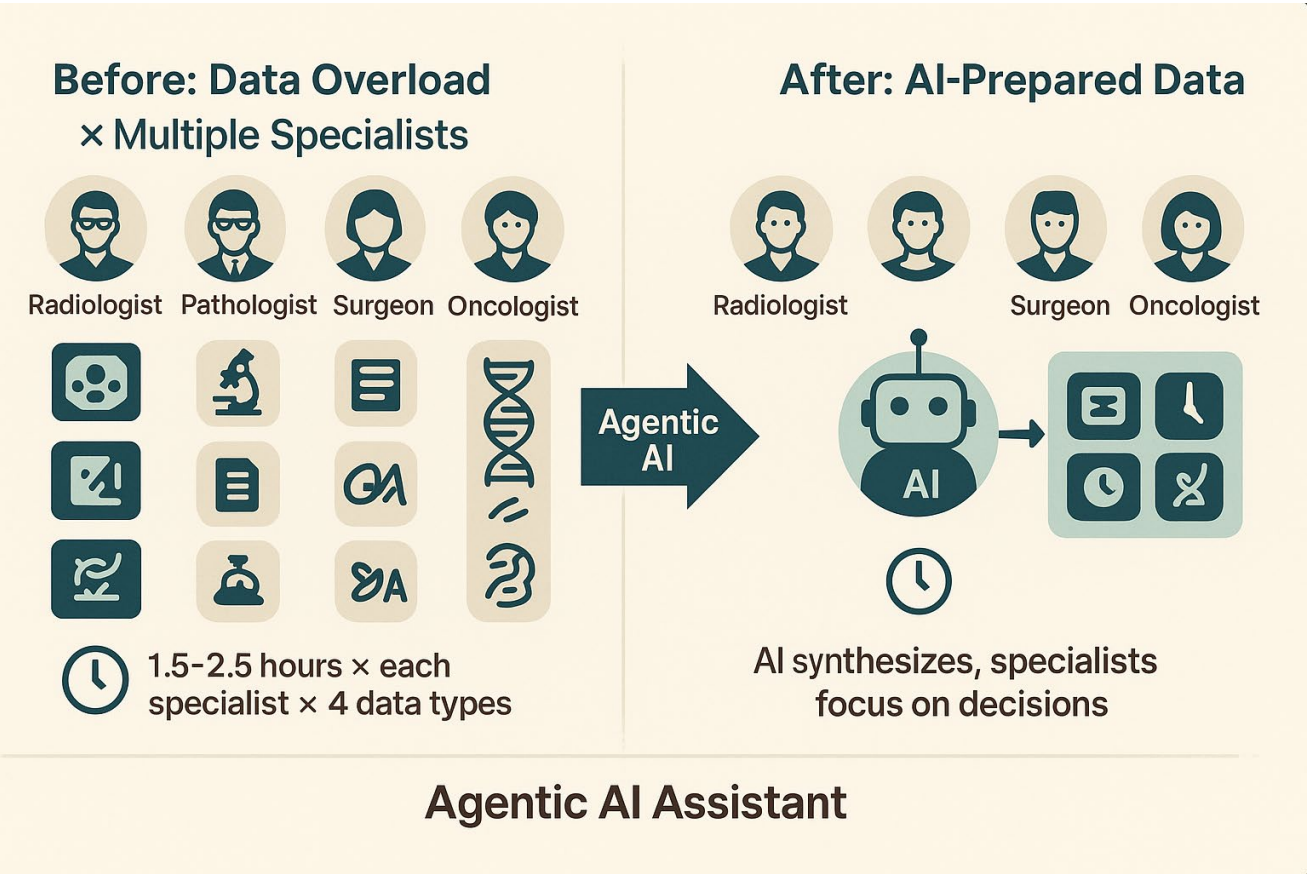
- Pre-filled procedure codes based on surgical schedule
- Medication reconciliation alerts
- Anesthesia machine alarm threshold adjustments

Augmentation:

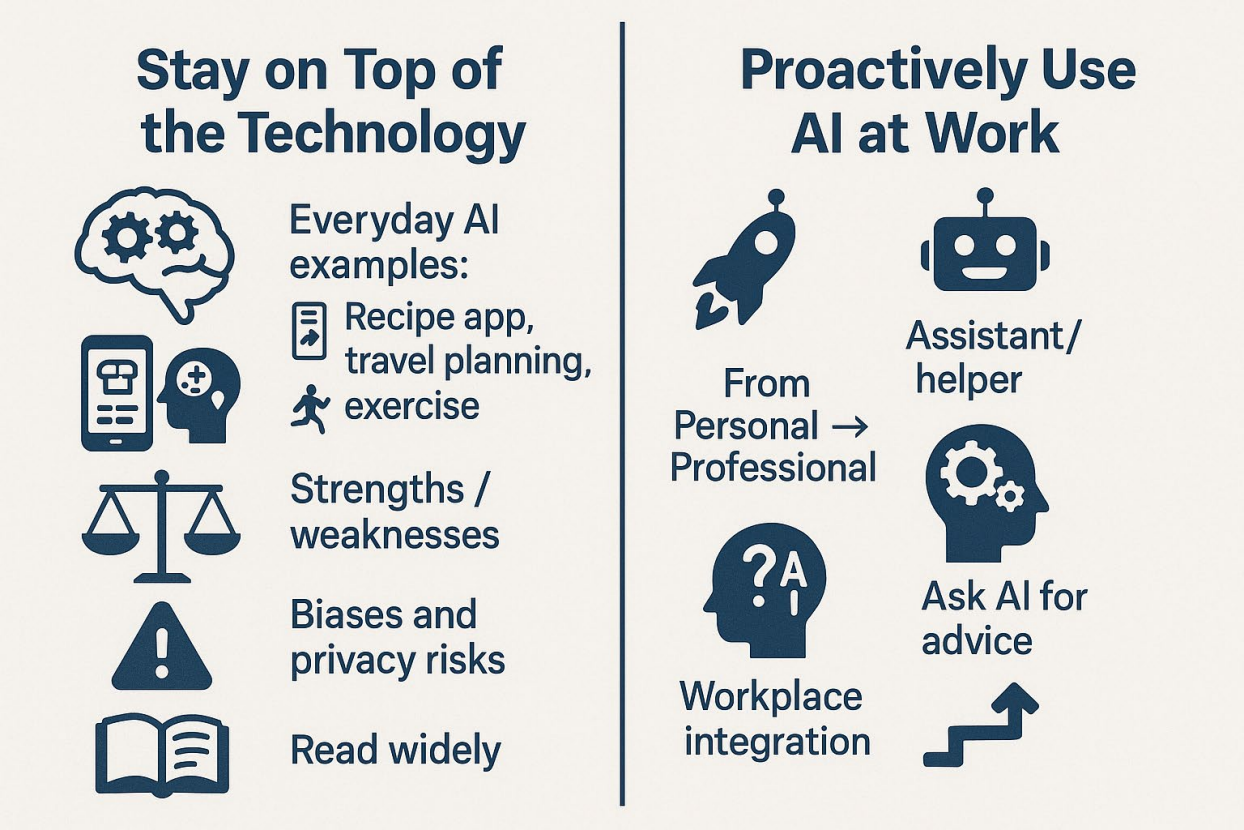
- AI-assisted summaries (human reviews)
- Perioperative risk prediction (clinician decides)
- Consult requests (physician approves)



INITIAL EXAMPLE: STANFORD'S AI-AUGMENTED TUMOR BOARDS



NEXT STEPS



ASA AI Certificate Course

-> Spring 2026!

The 1 AM Decision-What Success Looks Like

THANK YOU!

Factors Affecting Care of Minority Populations in the Intensive Care Unit

Nicholas Flores-Conner

Assistant Professor of Anesthesiology and Critical Care Medicine

Divisions of Critical Care Medicine and Cardiothoracic Anesthesiology

Disclosures

- No conflicts of interest or financial interests.
- Liverpool FC
- Quito-Ecuador

Objectives

- Understand the legal requirement to use an interpreter for individuals with limited English proficiency.
- Identify the importance of appropriate language and cultural competence in the care of the critically ill.
- Recognize the role of implicit bias and systemic factors in ICU outcomes.
- Explore the role of stigmatizing language in healthcare.

Initial Presentation

35-year-old male patient.

Was found confused and on the ground by family.

Initial visit to ER found a cerebellar hemorrhage with signs of herniation.

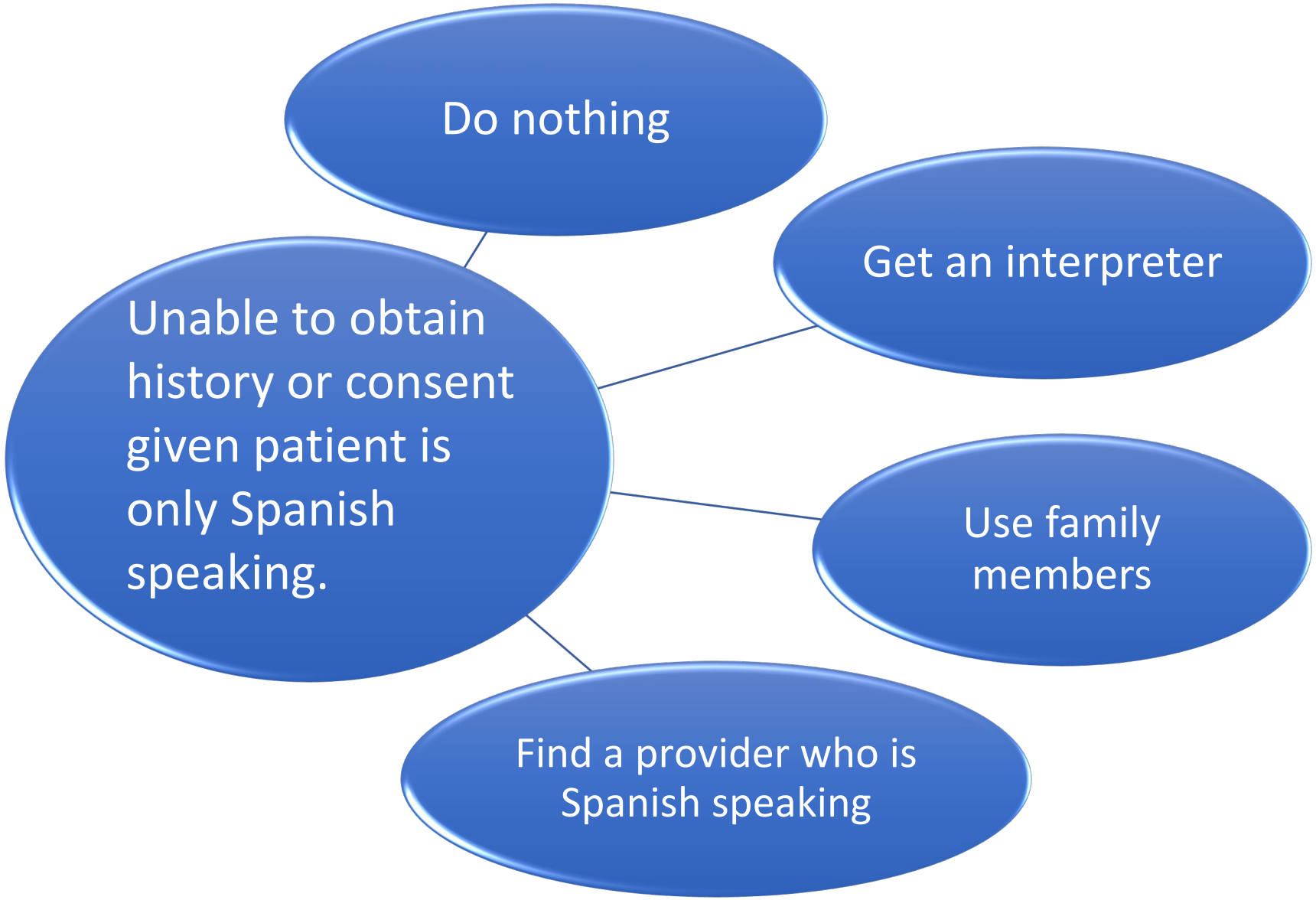
Transferred to a higher level of care.

Initial Presentation

First GCS was 7: E1, V1, M5

Shortly after, GCS was 13: E3, V4, M6

Neurosurgery Was Consulted



Title III of the ADA

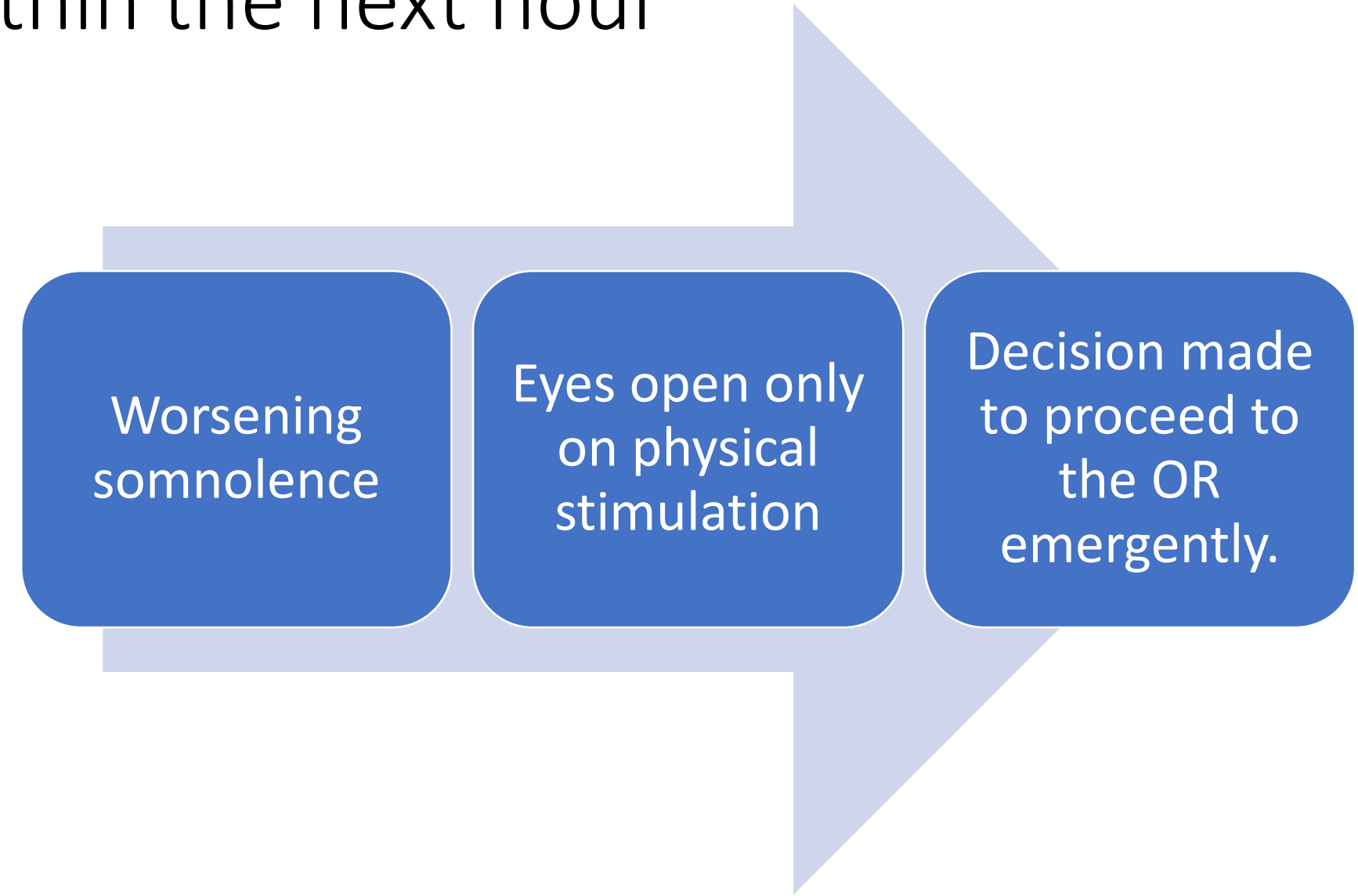
§ 36.303 Auxiliary aids and services.

(a) *General*. A public accommodation shall take those steps that may be necessary to ensure that no individual with a disability is excluded, denied services, segregated or otherwise treated differently than other individuals because of the absence of auxiliary aids and services, unless the public accommodation can demonstrate that taking those steps would fundamentally alter the nature of the goods, services, facilities, privileges, advantages, or accommodations being offered

(1) Qualified interpreters on-site or through video remote interpreting (VRI) services; notetakers; real-time computer-aided transcription services; written materials; exchange of written notes; telephone handset amplifiers; assistive listening devices; assistive listening systems; telephones compatible with hearing aids; closed caption decoders; open and closed captioning, including real-time captioning; voice, text, and video-based telecommunications products and systems, including text telephones (TTYs), videophones, and captioned telephones, or equally effective telecommunications devices; videotext displays; accessible electronic and information technology;

deaf or hard of hearing; (2) Qualified readers; taped texts; audio recordings; Brailled materials and displays; screen reader software; magnification software; optical readers; secondary auditory programs (SAP); large print materials; accessible electronic and information technology; or other effective methods of making visually delivered materials available to individuals who are blind or have low vision; (3) Acquisition or modification of equipment or devices; and (4) Other similar services and actions.

Within the next hour



Perioperative Nurse attempted to contact family

No phone number listed.

No family in waiting room.

No family in ER or transported with the patient.

Is the patient at a higher risk of ICU complications compared to an English-speaking patient with the same disease process?

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Long-Term Cognitive Impairment after Critical Illness

P.P. Pandharipande, T.D. Girard, J.C. Jackson, A. Morandi, J.L. Thompson, B.T. Pun, N.E. Brummel, C.G. Hughes, E.E. Vasilevskis, A.K. Shintani, K.G. Moons, S.K. Geevarghese, A. Canonico, R.O. Hopkins, G.R. Bernard, R.S. Dittus, and E.W. Ely, for the BRAIN-ICU Study Investigators*

- 826 patients were enrolled.
- 606 (74%) had delirium with a median duration of 4 days.

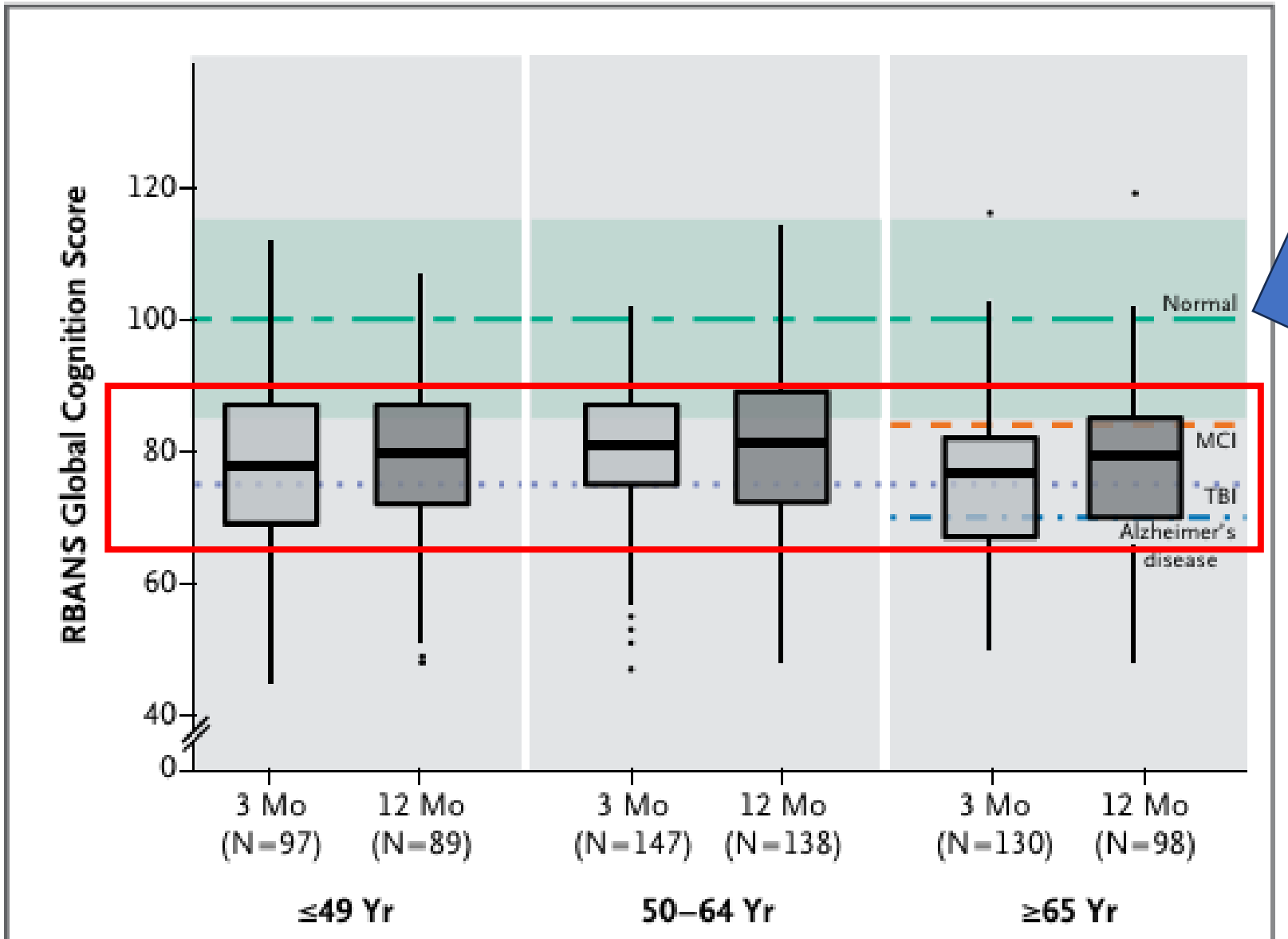


Figure 1. Global Cognition Scores in Survivors of Critical Illness.

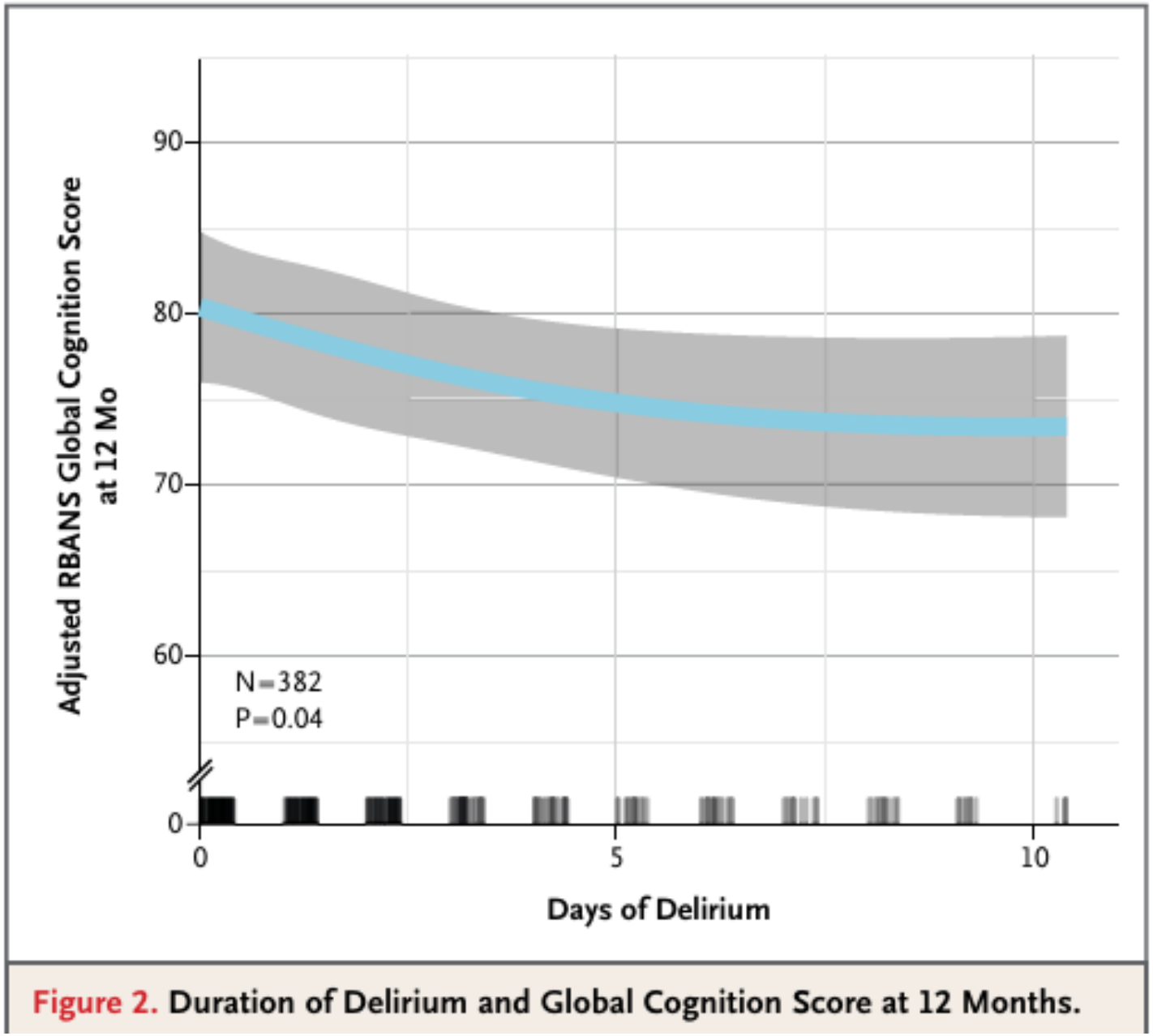


Figure 2. Duration of Delirium and Global Cognition Score at 12 Months.

Table 1. Demographic and Clinical Characteristics of the Patients.*

Characteristic	In-Hospital Cohort (N = 821)	Follow-up Cohort (N = 467)
Age — yr		
Median	61	59
Interquartile range	51–71	49–69
White race — no. (%)†	740 (90)	413 (88)
Male sex — no. (%)	420 (51)	234 (50)
Mechanical ventilation		
No. of patients — %	746 (91)	421 (90)
No. of days		
Median	3	2
Interquartile range	1–8	1–6
Delirium		
No. of patients — %	606 (74)	352 (75)
No. of days		
Median	4	3
Interquartile range	2–7	2–7

ORIGINAL ARTICLE

Patricia Mesa[1], Ignacio José Previgliano[2], Sonia Altez[1], Silvina Favretto[1], María Orellano[1], Cinthya Lecor[3], Ana Soca[1], Ely Wesley[4,5]

Delirium in a Latin American intensive care unit. A prospective cohort study of mechanically ventilated patients

- 230 patients from a general ICU
- Pasteur Hospital in Montevideo, Uruguay
- 184 (80%) of patients had delirium, lasting a median of 4 days.

Table 1 - Baseline characteristics and clinical outcomes by *delirium* status

Variable	All patients (N = 230)	No *delirium* (N = 46)	*Delirium* (N = 184)
Age	60.6 (17.7)	55.91 (17.88)	61.77 (17.57)
> 65	115 (50.0)	19 (41.3)	104 (56.5)
Sex			
Male	140 (60.9)	23 (50.0)	117 (63.6)
Medical history			
Alcohol consumption	64 (28.6)	7 (16.3)	57 (31.5)
Tobacco use	116 (53.7)	19 (45.2)	97 (55.7)
Drug abuse	24 (10.4)	6 (13)	18 (9.8)
HIV	5 (2.2)	0 (0)	5 (2.7)
Psychiatric disorder	43 (18.7)	5 (10.9)	38 (20.7)
Stroke	29 (12.6)	5 (10.9)	24 (13)
Disease severity			
APACHE II score	24.21 (9.07)	22.39 (8.38)	24.66 (9.20)
Disease stratification			
Medical	172 (74.8)	34 (73.9)	138 (75)
In-hospital length of stay	21.11 (19.11)	17.26 (15.65)	22.56 (20.84)
Mechanical ventilation (days)	6 (3 - 11)	3.5	7
Analgesia (days)	2 (1 - 3)	1	2
Mortality			
In ICU	46 (20)	5 (10.9)	41 (22.3)
In hospital	106 (46)	15 (32)	95 (51)

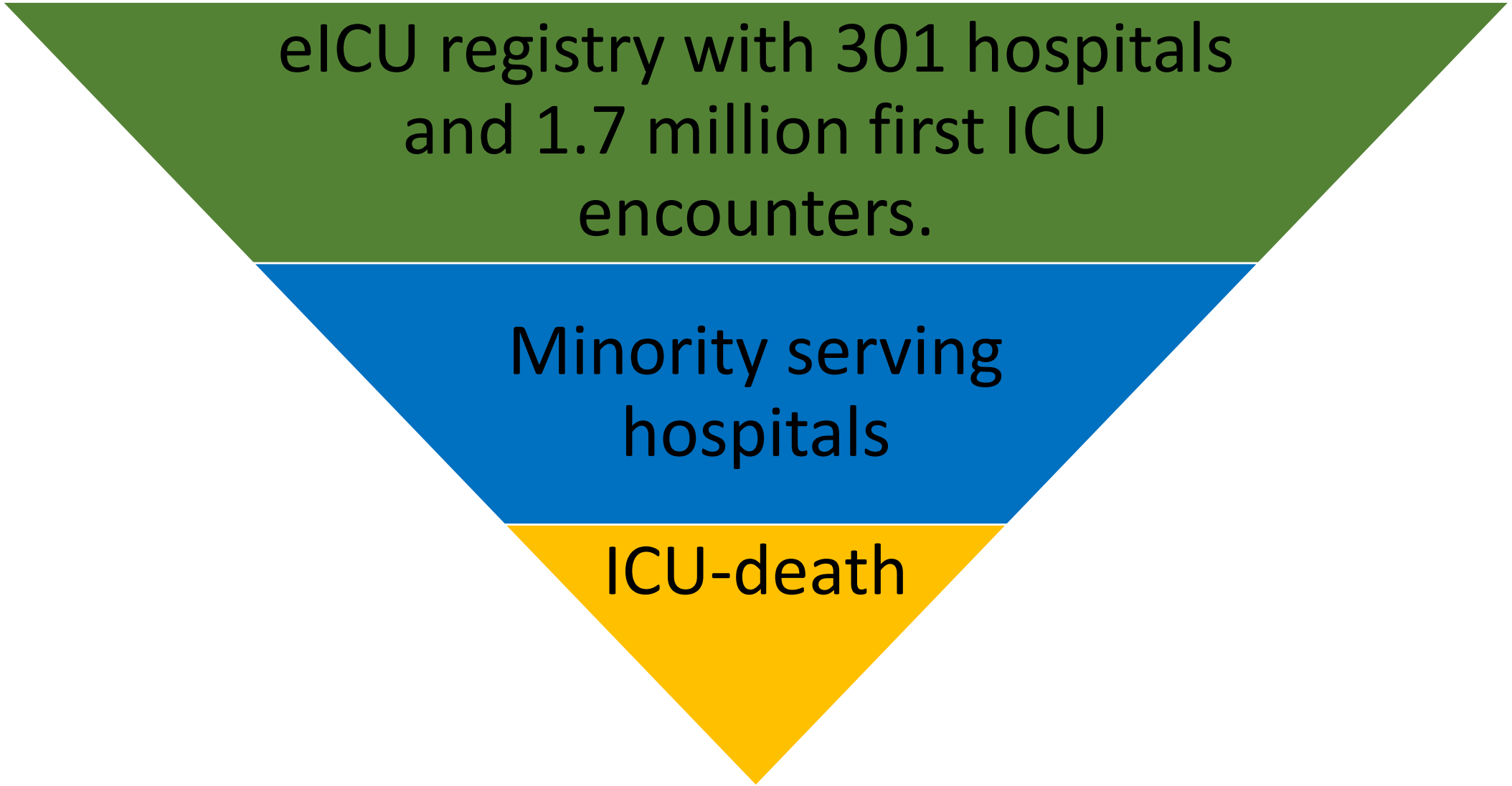
Racial Disparities in ICU Outcomes: A Systematic Review*

Samuel K. McGowan, MD[1]
Kalli A. Sarigiannis, MD[1]
Samuel C. Fox, MD[1]
Michael A. Gottlieb, MD[2]
Elaine Chen, MD[3]

- Non-white patients had **higher mortality rates**.
- Black and Hispanic patients have **higher mortality** with ALI requiring mechanical ventilation. Hispanic patients remain having a higher mortality if adjusting for illness severity.
- Black and Hispanic patients requiring mechanical ventilation were **less likely to be transferred to a higher level of care**.

Temporal Trends in Critical Care Outcomes in U.S. Minority-Serving Hospitals

John Danziger[1], Miguel Ángel Armengol de la Hoz[2,3,4], Wenyuan Li[5], Matthieu Komorowski[6,7,8], Rodrigo Octávio Deliberato[3,7,8], Barret N. M. Rush[9], Kenneth J. Mukamal[1], Leo Celi[1,3], and Omar Badawi[10,11]



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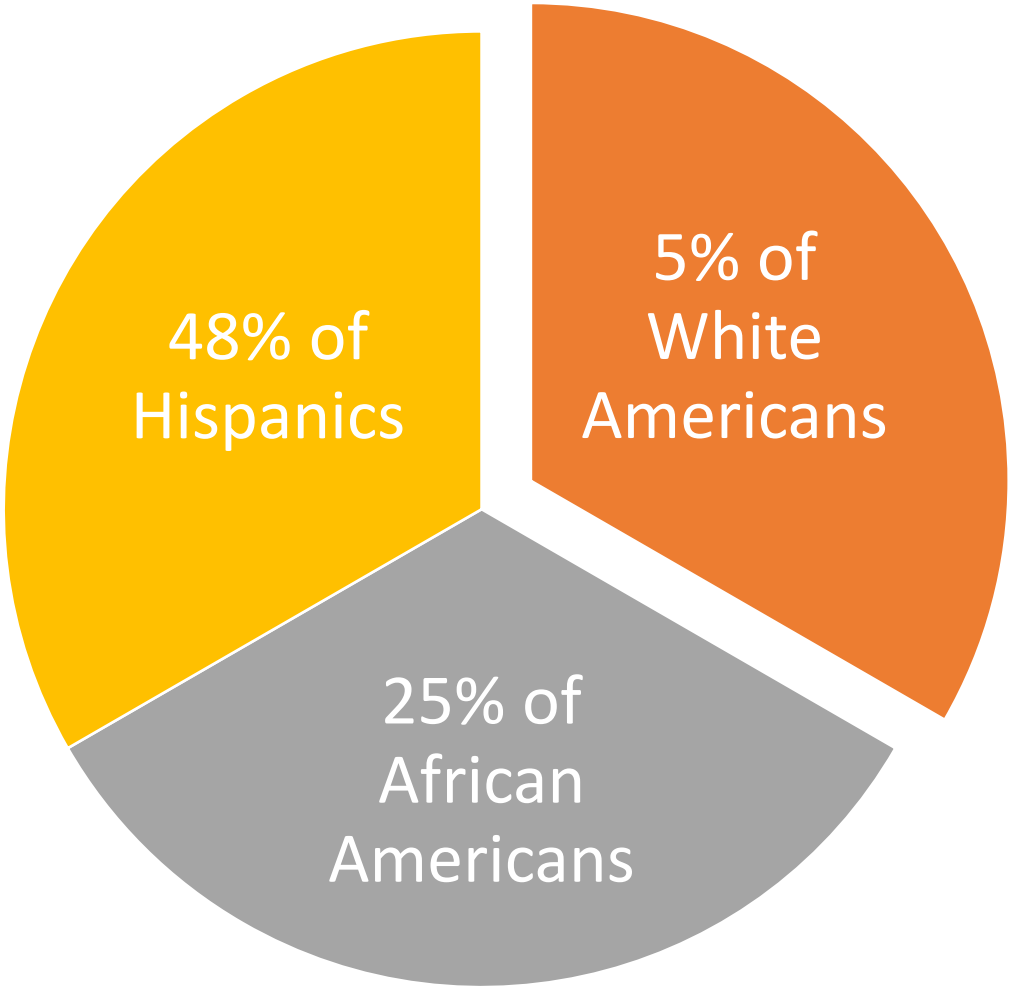

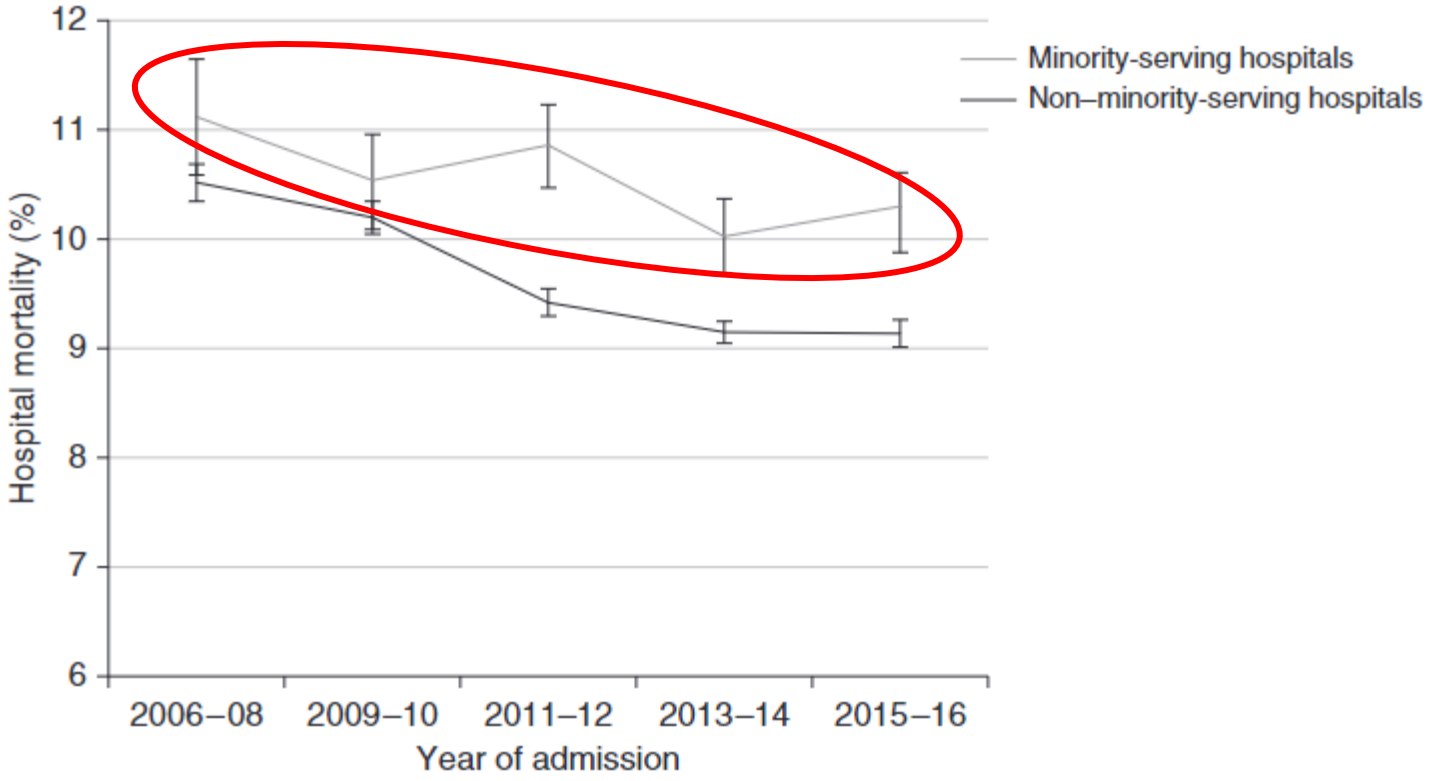

Figure 1. Critical illness mortality (95% confidence interval) in minority and non–minority-serving hospitals from 2006 to 2016 in the United States ($n = 1{,}088{,}109$). Trend P values for minority-serving and non–minority-serving hospitals were 0.002 and <0.001, respectively.

Temporal Trends in Critical Care Outcomes in U.S. Minority-Serving Hospitals

John Danziger[1], Miguel Ángel Armengol de la Hoz[2,3,4], Wenyuan Li[5], Matthieu Komorowski[6,7,8], Rodrigo Octávio Deliberato[3,7,8], Barret N. M. Rush[9], Kenneth J. Mukamal[1], Leo Celi[1,3], and Omar Badawi[10,11]

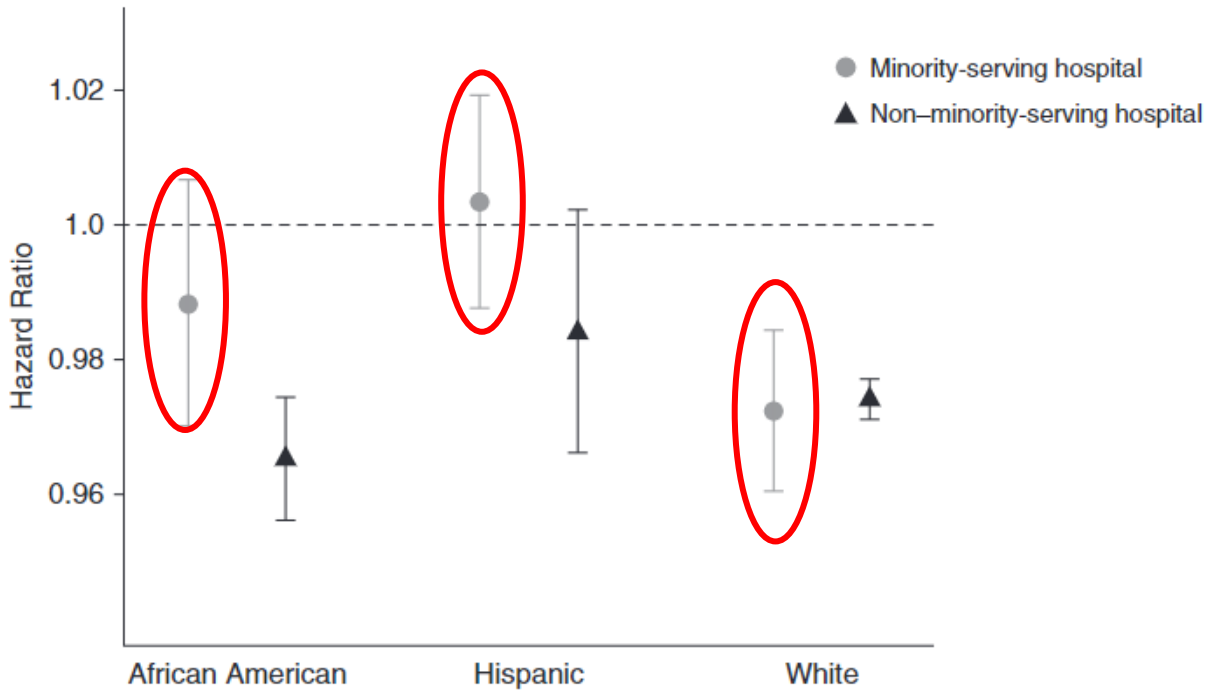

Figure 2. The adjusted hazard ratio (95% confidence interval) of hospital mortality per additional calendar year of admission between 2006 and 2016, stratified by ethnicity. The hazard ratios were adjusted for age, sex, unit type, admission diagnosis, Charlson comorbidity score, illness severity, and year of admission (defined continuously). The *P* values for the multiplicative interaction between calendar year and minority-serving hospital were 0.02, 0.07, and 0.04 among African American, Hispanic, and white patients, respectively. *N* = 1,039,595 patients in 208 hospitals.

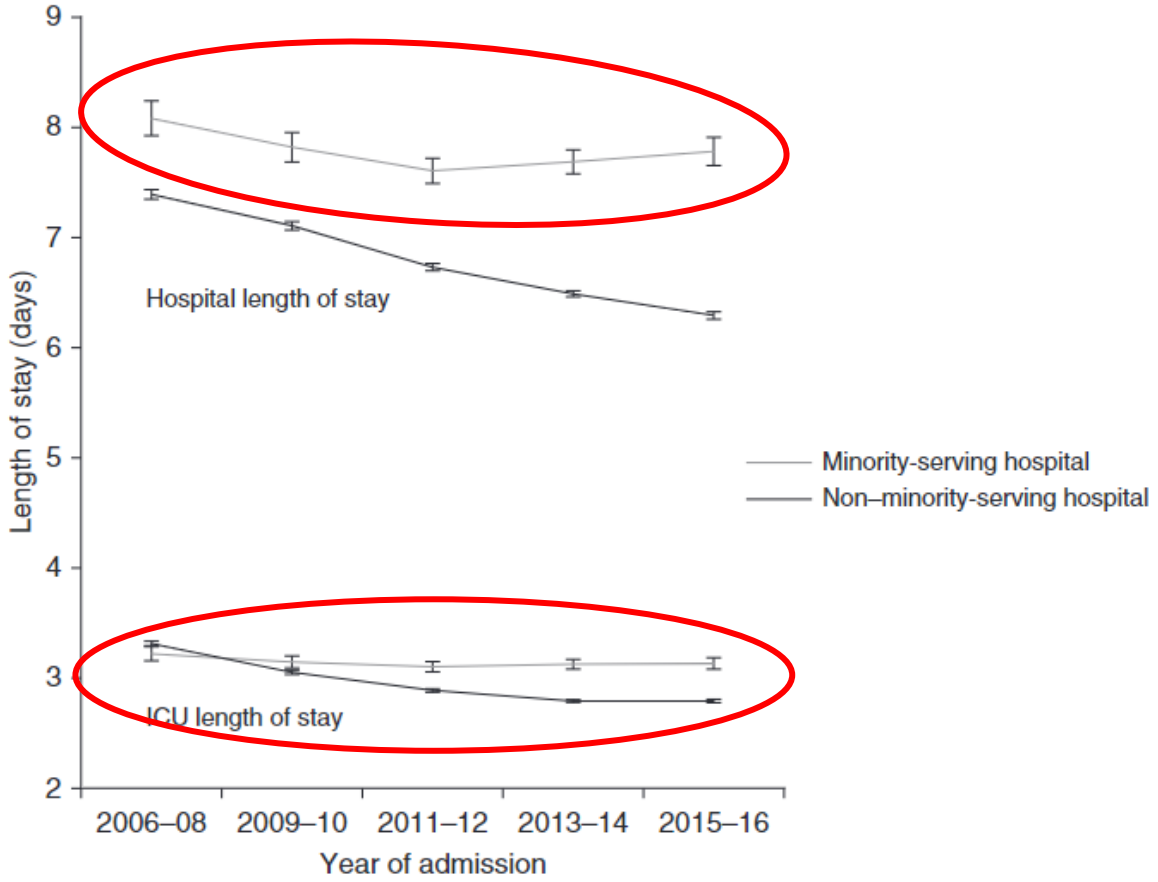

Figure 3. Temporal trends in hospital and ICU length of stay in minority- and non–minority-serving hospitals. Mean (95% confidence interval) lengths of stay according to year of admission are provided. Trend *P* values were all less than 0.001, except for ICU length of stay in minority-serving hospitals (*P* = 0.06).

Is the patient at a higher risk of ICU complications compared to an English-speaking patient with the same disease process?

POD 0: CIWA protocol was started.

POD 1: Agitation and self-extubation.

POD 2: COVID treatment was initiated.

POD 3: Enrolled in research study.

POD 4: 4-point restraints started.

POD 5: Expedited Limited Health Fiduciary.

POD 6: Intubated prior to IVC filter.

POD 7: Worsening O2 requirements and secretions.

POD 8: SW contacted neighbor who reports no family in the US.

How did this patient's language proficiency and ethnicity affect his care?

The association between primary language spoken and all-cause mortality in critically ill patients☆,☆☆

Mallika L. Mendu, MD, MBA [a], Sam Zager, MD, MPhil [b], Takuhiro Moromizato, MD [c], Caitlin K. McKane, BS, RN [d], Fiona K. Gibbons, MD [e], Kenneth B. Christopher, MD [c,*]

[a] Renal Division, Brigham and Women's Hospital, Boston, MA 02115, USA
[b] Department of Family Medicine, Maine Medical Center, Portland, ME 04102, USA
[c] The Nathan E. Hellman Memorial Laboratory, Renal Division, Brigham and Women's Hospital, Boston, MA 02115, USA
[d] Department of Nursing, Brigham and Women's Hospital, Boston, MA 02115, USA
[e] Pulmonary and Critical Care, Massachusetts General Hospital, Boston, MA 02114, USA

Table 2
Stratified patient characteristics of the study population

	Primary language spoken		
	English	Non-English	*P*
n	45 620	2961	
Age (y), mean (SD)	62.0 (18.2)	58.7 (19.0)	<.001
Sex, no. (%)			.006
Male	26 587 (58.3)	1650 (55.7)	
Female	19 033 (41.7)	1311 (44.3)	
Race, no. (%)			<.001
White	38 591 (84.6)	725 (24.5)	
Nonwhite[a]	7029 (15.4)	2236 (75.5)	
Hispanic	949 (2.1)	1397 (47.2)	
African American	3008 (6.6)	142 (4.8)	
Asian	473 (1.0)	347 (11.7)	
Other	2599 (5.7)	350 (11.8)	
Patient type, no. (%)			<.001
Medical	22 882 (50.2)	1667 (56.3)	
Surgical	22 738 (49.8)	1294 (43.7)	
Deyo-Charlson Index (%)			<.001
0	4758 (10.4)	504 (17.0)	
1	7077 (15.5)	450 (15.2)	
2	8900 (19.5)	539 (18.2)	
3	8213 (18.0)	467 (15.8)	
4	6632 (14.5)	353 (11.9)	
5	4406 (9.7)	260 (8.8)	
6	2605 (5.7)	173 (5.8)	
7	1583 (3.5)	114 (3.9)	
≥8	1446 (3.2)	101 (3.4)	

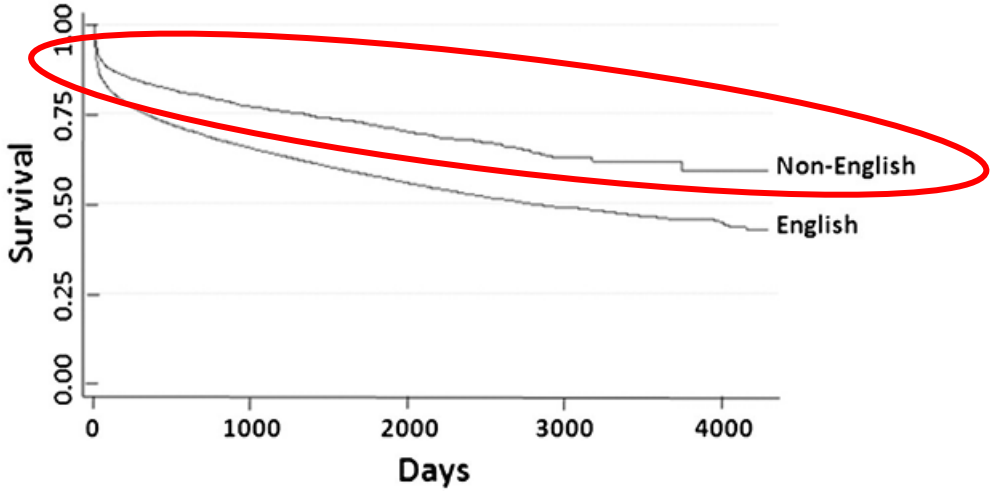

Fig. 1. Time-to-event curves for the primary end point. Note: unadjusted event rates were calculated with the use of the Kaplan-Meier methods and compared with the use of the log-rank test. Categorization of language is per the primary analyses. The global comparison log-rank *P* value is less than .001.

37% reduction in odds of 30-day mortality for patients who do not speak English as their primary language.

The association between primary language spoken and all-cause mortality in critically ill patients☆,☆☆

Mallika L. Mendu, MD, MBA [a], Sam Zager, MD, MPhil [b], Takuhiro Moromizato, MD [c], Caitlin K. McKane, BS, RN [d], Fiona K. Gibbons, MD [e], Kenneth B. Christopher, MD [c,*]

[a] Renal Division, Brigham and Women's Hospital, Boston, MA 02115, USA
[b] Department of Family Medicine, Maine Medical Center, Portland, ME 04102, USA
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[d] Department of Nursing, Brigham and Women's Hospital, Boston, MA 02115, USA
[e] Pulmonary and Critical Care, Massachusetts General Hospital, Boston, MA 02114, USA

Table 1
Patient characteristics of the study population

n	48 581
Age (y), mean (SD)	61.8 (18.3)
Sex, no. (%)	
Male	28 237 (58.12)
Female	20 344 (41.88)
Race, no. (%)	
White	39 316 (80.93)
Nonwhite	9265 (19.07)
Primary language spoken, no. (%)	
English	46 723 (93.9)
Spanish	1504 (3.0)
Portuguese	357 (0.7)
Italian	239 (0.5)
Cantonese	137 (0.3)
Russian	131 (0.3)
Arabic	93 (0.2)
Creole	90 (0.2)
Cambodian	78 (0.2)
Vietnamese	76 (0.2)
Greek	65 (0.1)
Mandarin	43 (0.1)
French	31 (0.1)

Boston's population is 52% White according to the last ACS.

This difference disappears when you perform a sub analysis for neighborhood poverty.

Association of Healthcare Access With Intensive Care Unit Utilization and Mortality in Patients of Hispanic Ethnicity Hospitalized With COVID-19

Ferdinand Velasco, MD[1#], Donghan M Yang, PhD[2#], Minzhe Zhang, PhD[2], Tanna Nelson, RN[1], Thomas Sheffield, PhD[2], Tony Keller[1], Yiqing Wang, MA[2], Clark Walker[1], Chaitanya Katterapalli[1], Kelli Zimmerman[1], Andrew Masica, MD[1], Christoph U Lehmann, MD[3], Yang Xie, PhD[2*], John W Hollingsworth, MD[4,5*]

TABLE 1. **Cohort Characteristics and Comorbidity**

		Patients			
	Total	**Non-Hispanic**	**Hispanic, English speaking**	**Hispanic, non-English speaking**	***P* value**
Total	6097	4139	1203	755	
Age, y					<.001
18–49	1989 (32.6)	1089 (26.3)	671 (55.8)	229 (30.3)	
50–64	1633 (26.8)	1093 (26.4)	288 (23.9)	252 (33.4)	
65–79	1623 (26.6)	1237 (29.9)	184 (15.3)	202 (26.8)	
≥80	852 (14.0)	720 (17.4)	60 (5.0)	72 (9.5)	
Sex					.004
Male	2916 (47.8)	1972 (47.6)	544 (45.2)	400 (53.0)	
Female	3181 (52.2)	2167 (52.4)	659 (54.8)	355 (47.0)	
Comorbidity					
Diabetes[a]	2324 (38.1)	1479 (35.7)	477 (39.7)	368 (48.7)	<.001
HbA1c > 9%	512 (8.4)	251 (6.1)	142 (11.8)	119 (15.8)	<.001
Hypertension	3688 (60.5)	2702 (65.3)	563 (46.8)	423 (56.0)	<.001
Obesity	3109 (51.0)	2005 (48.4)	755 (62.8)	349 (46.2)	<.001
COPD	563 (9.2)	514 (12.4)	29 (2.4)	20 (2.7)	<.001
Other lung disease	301 (4.9)	263 (6.4)	24 (2.0)	14 (1.9)	<.001
Asthma	564 (9.3)	431 (10.4)	108 (9.0)	25 (3.3)	<.001
Heart failure	541 (8.9)	449 (10.9)	60 (5.0)	32 (4.2)	<.001
Cancer	566 (9.3)	469 (11.3)	66 (5.5)	31 (4.1)	<.001
Kidney disease without ESRD	1921 (31.5)	1492 (36.1)	236 (19.6)	193 (25.6)	<.001
ESRD	242 (4.0)	141 (3.4)	63 (5.2)	38 (5.0)	.005
Liver disease	367 (6.0)	241 (5.8)	82 (6.8)	44 (5.8)	.4
Smoker	1681 (27.6)	1280 (30.9)	267 (22.2)	134 (17.8)	<.001

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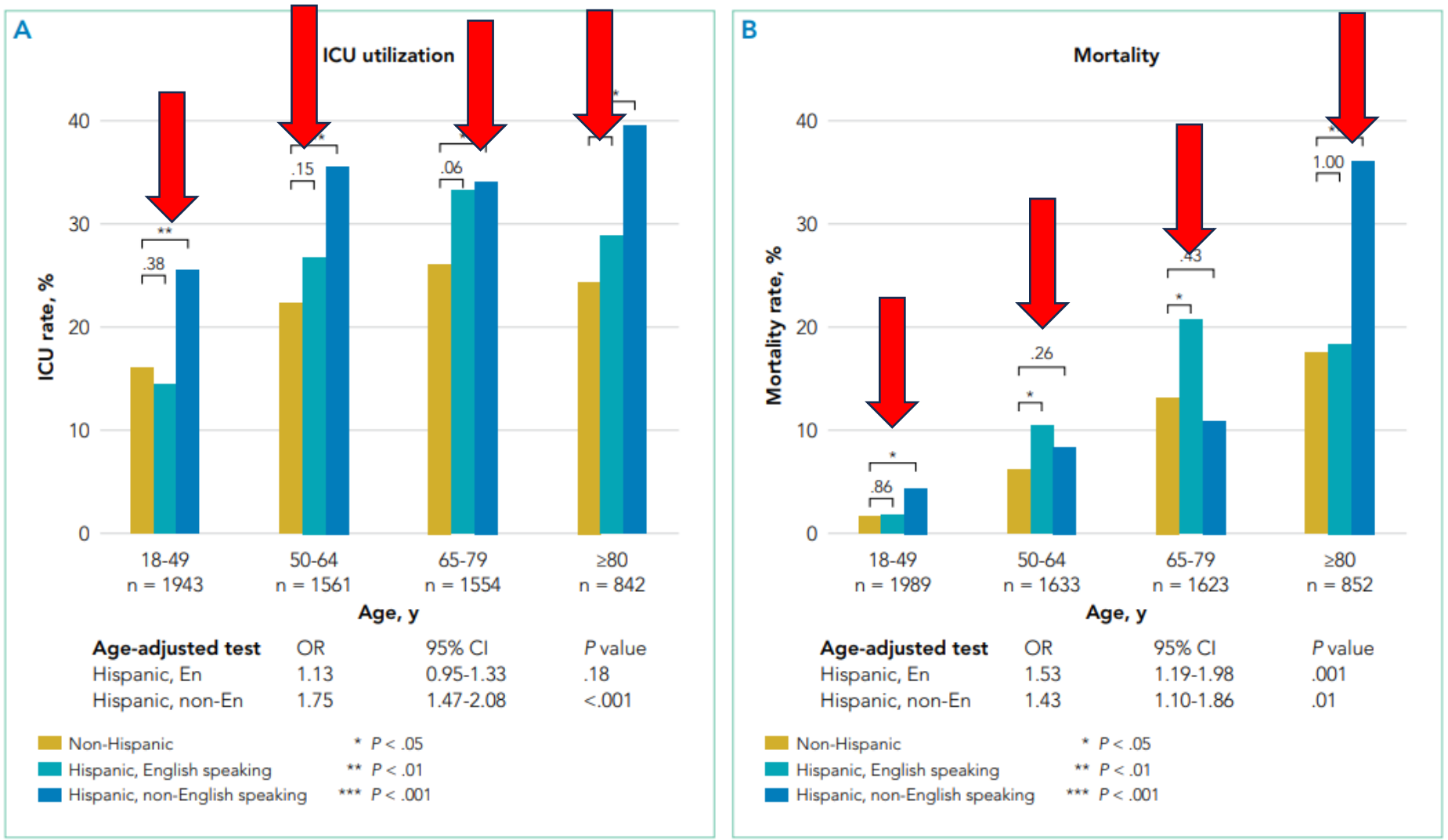
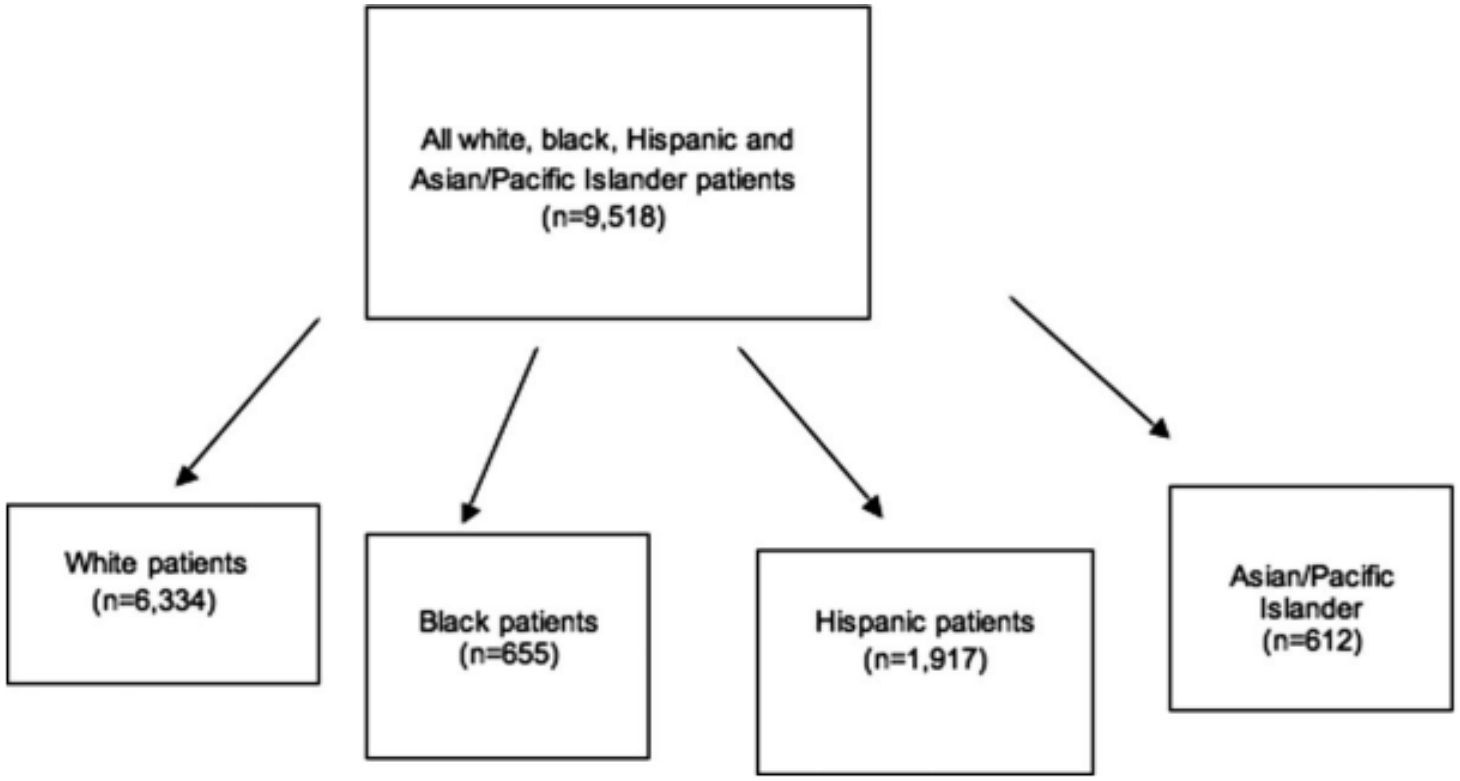


FIG 1. Intensive Care Unit Admission Rate and Mortality Rate Among Ethnic-Language Groups. *P* values are shown above the brackets.

The effect of race and ethnicity on outcomes among patients in the intensive care unit: A comprehensive study involving socioeconomic status and resuscitation preferences*

Sara E. Erickson, MD; Eduard E. Vasilevskis, MD; Michael W. Kuzniewicz, MD, MPH; Brian A. Cason, MD; Rondall K. Lane, MD, MPH; Mitzi L. Dean, MS, MHA; Deborah J. Rennie, BA; R. Adams Dudley, MD, MBA



35 hospitals

SES obtained through zip code.

Zip code was linked to US census block.

The effect of race and ethnicity on outcomes among patients in the intensive care unit: A comprehensive study involving socioeconomic status and resuscitation preferences*

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White Patients

- Older
- Medicare or private insurance
- Highest SES
- More likely to be admitted after elective surgery

Hispanic Patients

- Lowest SES
- Most likely to have comorbidities
- Higher median ICU LOS

Black Patients

- More frequent medical admission
- Higher median ICU LOS

POD 10: Stopped CIWA protocol.

POD 11: Mother of children at bedside.

POD 13: Extubated successfully.

POD 18: Posey vest for agitation

POD 19: Physical altercation with nurse.

Assessment:

35 yo unfunded, undocumented male with history of htn, presented by ems after being found down, now s/p suboccipital craniectomy and EVD placement for right cerebellar hematoma with brainstem compression and hydrocephalus. COVID+ on screening at admission. Extubated 9/1. Pt has been recommended for IPR by PT/OT

Summary:

SW continued to pt/family support. SW was contacted by pt former Significant other (Dominic) that pt work prior to admission as a temporary employee at Teeter farm and Seed company at 18 Tylertown Road, Clarksville, TN 37040. Pt former SO stated pt makes $9.00 an hr and averages around 30 hours a week, sometimes less.

Does the terminology used in electronic medical records affect the way the patient is perceived, and the care they receive?

Does it matter how we refer to individuals with substance-related conditions? A randomized study of two commonly used terms☆

John F. Kelly*, Cassandra M. Westerhoff

Center for Addiction Medicine, Department of Psychiatry, Massachusetts General Hospital, 60 Staniford Street, Boston, MA 02114, United States

728 mental health providers

Addiction focused conferences

71% survey completion

Agreement with statements

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"Substance Abuser"

Mr. Williams is a substance abuser and is attending a treatment program through the court. As part of the program Mr. Williams is required to remain abstinent from alcohol and other drugs. He has been compliant with program requirements, until one month ago, when he was found to have two positive urine toxicology screens which revealed drug use and a breathalyzer reading which revealed alcohol consumption. Within the past month there was a further urine toxicology screen revealing drug use. Mr. Williams has been a substance abuser for the past few years. He now awaits his appointment with the judge to determine his status.

"Substance Use Disorder"

Mr. Williams has a substance use disorder and is attending a treatment program through the court. As part of the program Mr. Williams is required to remain abstinent from alcohol and other drugs. He has been compliant with program requirements, until one month ago, when he was found to have two positive urine toxicology screens which revealed drug use and a breathalyzer reading which revealed alcohol consumption. Within the past month there was a further urine toxicology screen revealing drug use. Mr. Williams has had a substance use disorder for the past few years. He now awaits his appointment with the judge to determine his status.

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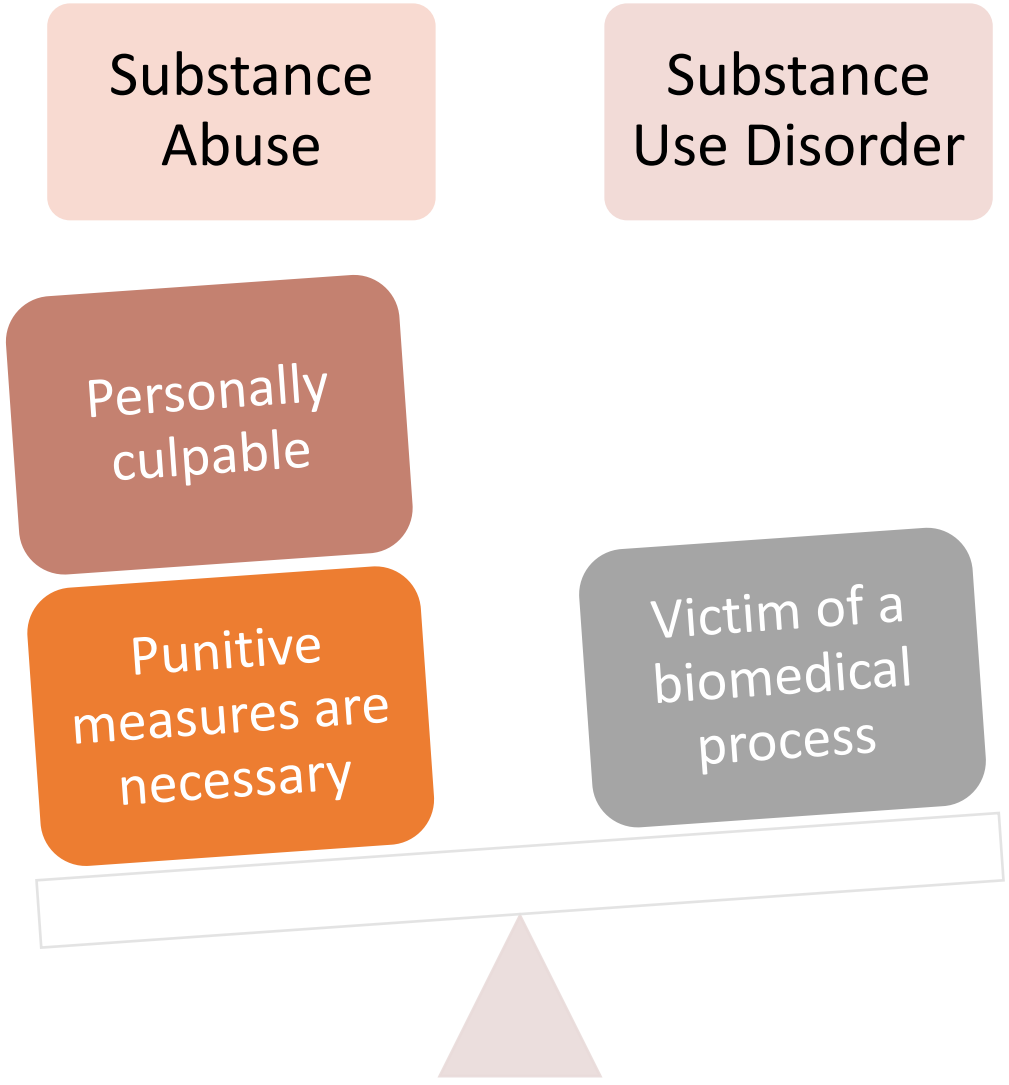

Do Words Matter? Stigmatizing Language and the Transmission of Bias in the Medical Record

Anna P. Goddu, MSc[1], Katie J. O'Conor, BA[1], Sophie Lanzkron, MD, MHS[2], Mustapha O. Saheed, MD[3], Somnath Saha, MD, MPH[4,5], Monica E. Peek, MD, MPH, MSc[6], Carlton Haywood, Jr., PhD, MA[2], and Mary Catherine Beach, MD, MPH[1]

Table 1 Text Employed in the Vignettes

Neutral language chart note	Stigmatizing language chart note
Section 1 Mr. R is a 28-year old man with sickle cell disease and chronic left hip osteomyelitis who comes to the ED with 10/10 pain in his arms and legs. He has about 8–10 pain crises per year, for which he typically requires opioid pain medication in the ED. At home, he takes 100 mg OxyContin BID and oxycodone 5 mg for breakthrough pain. Over the past few days, he has taken 2 tabs every 4–6 hours. About 3 months ago, he moved to a new apartment and now has to wheel himself in a manual wheelchair up 3 blocks from the bus stop.	Mr. R is a 28-year old sickle cell patient with chronic left hip osteomyelitis who comes to the ED stating he has 10/10 pain "all up in my arms and legs." He is narcotic dependent and in our ED frequently. At home he reportedly takes 100 mg OxyContin BID and oxycodone 5 mg for breakthrough pain. Over the past few days, he says that he has taken 2 tabs every 4–6 hours. About 3 months ago, patient states that the housing authority moved him to a new neighborhood and he now has to wheel himself in a manual wheelchair up 3 blocks from the bus stop.

He spent yesterday afternoon with friends and wheeled himself around more than usual, which caused dehydration due to the heat. He believes that this, along with recent stress, precipitated his current crisis. The pain is aching in quality, severe (10/10), and not alleviated by his home pain medication regimen.	Yesterday afternoon, he was hanging out with friends outside McDonald's where he wheeled himself around more than usual and got dehydrated due to the heat. He believes that this, along with some "stressful situations," has precipitated his current crisis. Pain is aching in quality, severe (10/10), and has not been helped by any of the narcotic medications he says he has already taken.
On physical exam, he is in obvious distress. He has no fever and his pulse ox is 96% on RA. The rest of the physical exam is normal other than tenderness to palpation on the left hip.	On physical exam, he appears to be in distress. He has no fever and his pulse ox is 96% on RA. The rest of the physical exam is normal although he reports tenderness to palpation on the left hip.
Section 2	
After 1 hour, the nurse documents:	
Mr. R is sleeping but easily arousable and seems distressed. He is not tolerating the oxygen mask and still has 10/10 pain. His girlfriend is by his side but will need to go home soon.	Mr. R is sleeping but easily arousable and has been cussing at nurse. He refuses to wear his oxygen mask and is insisting that his pain is "still a 10." His girlfriend is lying on the bed with shoes on and requests a bus token to go home.

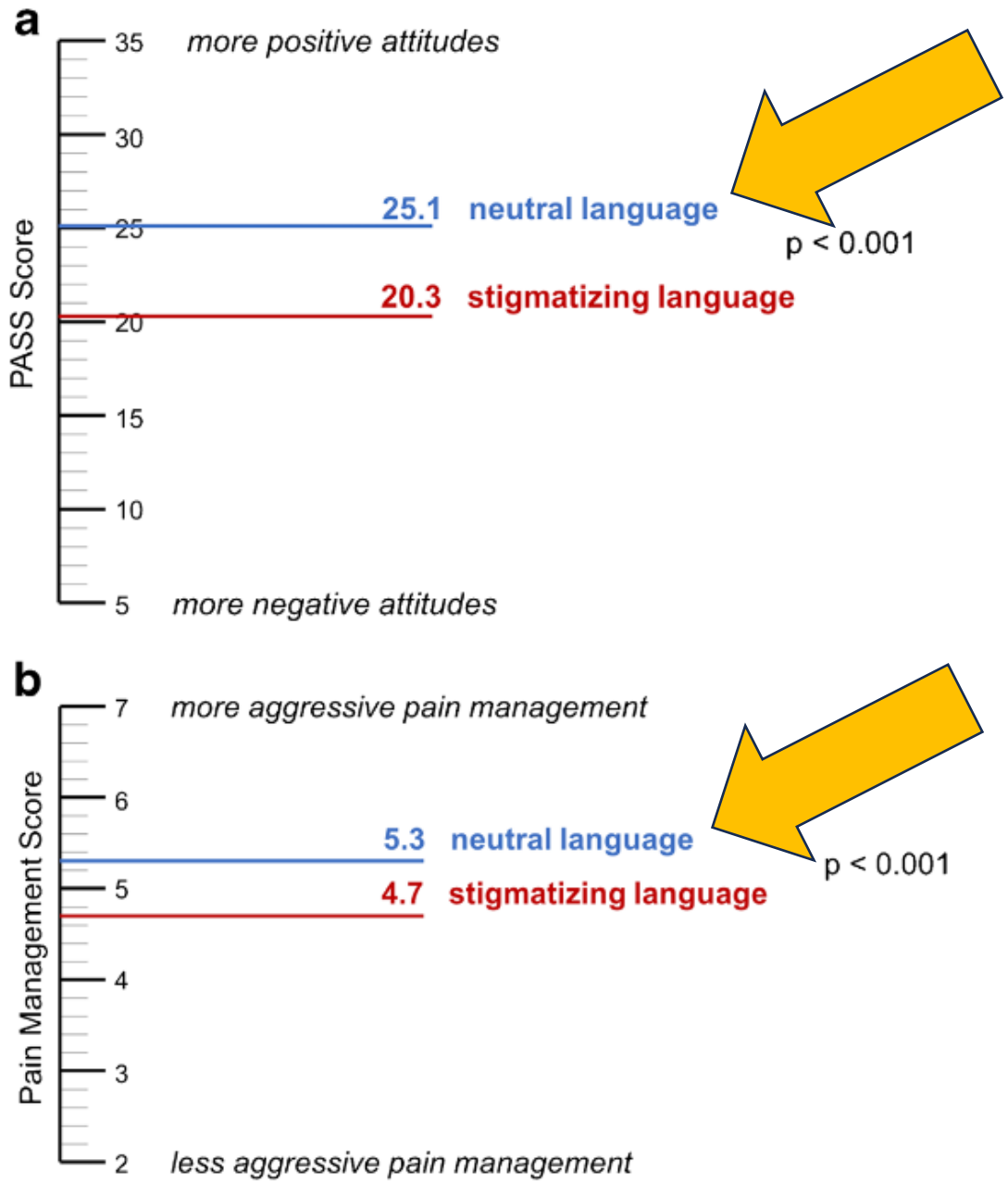

Figure 1 Effect of stigmatizing language on attitudes (Panel A) and on pain management (Panel B).

By Michael Sun, Tomasz Oliwa, Monica E. Peek, and Elizabeth L. Tung

Negative Patient Descriptors: Documenting Racial Bias In The Electronic Health Record

18459 patients with COVID

ED, inpatient and outpatient settings

Machine learning model

30% white

60% black

6% Hispanic

By Michael Sun, Tomasz Oliwa, Monica E. Peek, and Elizabeth L. Tung

Negative Patient Descriptors: Documenting Racial Bias In The Electronic Health Record

EXHIBIT 1

Use of negative patient descriptors in electronic health records (EHRs), by characteristics of patients from a large urban academic medical center in Chicago, Illinois, January 2019–October 2020

			Negative patient descriptors in EHRs			
	Patients (*N* = 18,459)		None (*n* = 16,938)		One or more (*n* = 1,521)	
Patient characteristics	%	No.	%	No.	%	No.
Age, years						
0–17	11.9	2,197	12.0	2,028	10.7	169
18–29	13.4	2,464	13.5	2,276	11.9	188
30–44	16.8	3,101	17.0	2,862	15.1	239
45–64	30.3	5,591	30.0	5,057	33.7	534
65+	27.7	5,106	27.6	4,649	28.8	457
Sex						
Female	56.0	10,327	56.4	9,514	51.2	813
Race and ethnicity						
Non-Hispanic White	29.7	5,479	31.2	5,263	13.6	216
Non-Hispanic Black	60.6	11,192	58.8	9,928	79.7	1,264
Hispanic or Latino	6.2	1,152	6.3	1,070	5.2	82
Other	3.5	636	3.6	611	1.5	25
Marital status						
Not married	67.8	12,517	66.5	11,224	81.5	1,293
Primary language						
Not English	2.2	399	2.2	369	1.9	30
Insurance						
Medicaid	32.2	5,950	31.0	5,232	45.2	718
Medicare	32.7	6,026	32.0	5,404	39.2	622
Employer-based/private	35.1	6,483	37.0	6,236	15.6	247
COVID-19 test result						
Positive	8.2	1,521	8.1	1,363	10.0	158

By Michael Sun, Tomasz Oliwa, Monica E. Peek, and Elizabeth L. Tung

Negative Patient Descriptors: Documenting Racial Bias In The Electronic Health Record

EXHIBIT 3

Association of negative patient descriptor use in electronic health records with patient and encounter characteristics at a large urban academic medical center in Chicago, Illinois, odds ratios, January 2019–October 2020

Characteristics	Unadjusted odds ratio	Adjusted odds ratio
Race and ethnicity (ref: non-Hispanic White)		
Non-Hispanic Black	2.84****	2.54****
Hispanic or Latino	1.34***	1.51*
Other	0.89	1.07
Age, years (ref: 65+)		
0–17	0.99	0.81
18–29	1.23***	0.87
30–44	1.19**	1.12
45–64	1.23****	1.40****
Sex (ref: male)		
Female	0.93*	0.76****
Marital status (ref: married)		
Not married	2.30****	2.12****
Language (ref: English)		
Not English	0.61***	0.77
Insurance provider (ref: employer-based/private)		
Medicaid	3.00****	2.66****
Medicare	2.15****	2.08****
Encounter location (ref: inpatient)		
Outpatient	0.26****	0.37****
Emergency department	0.85	0.70
Charlson Comorbidity Index	1.08****	1.11****
Encounter length (days)	1.01*	1.00
Positive COVID-19 test	1.16*	0.88
Timing of encounter (ref: before March 1, 2020)[a]		
On or after March 1, 2020	0.77****	0.82**

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More Than RYR:

Genetic Testing for Malignant Hyperthermia

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AUGUSTA UNIVERSITY

CME Disclaimer

- I have no conflicts of interest to report
- No off-label uses of drugs or devices will be discussed

Learning Objectives

1: Name the genes implicated in causing malignant hyperthermia

2: List the strengths and weaknesses of genetic testing for malignant hyperthermia versus muscle biopsy testing

3: Be able to discuss genetic testing for malignant hyperthermia with patients and families who may be affected

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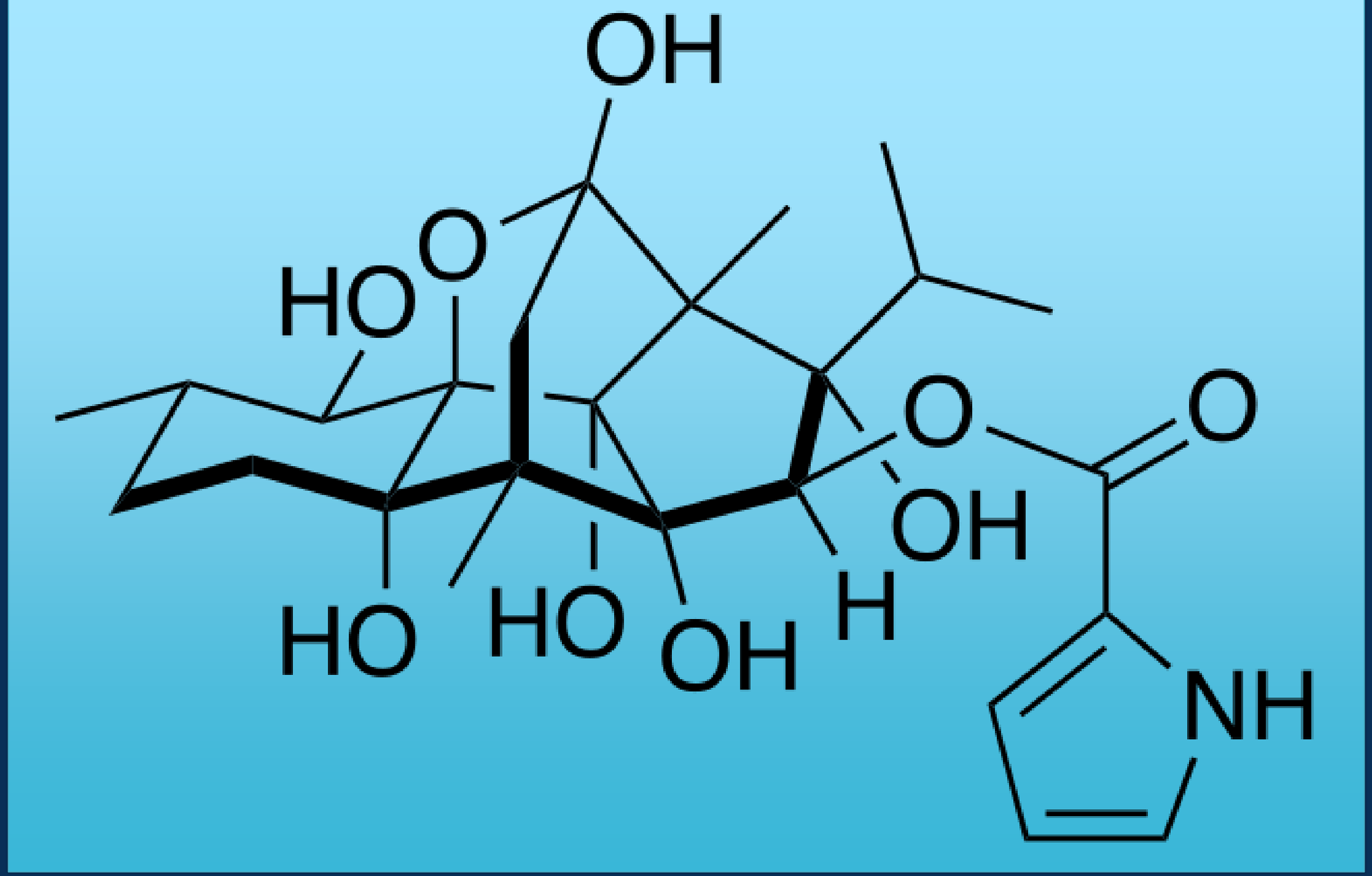

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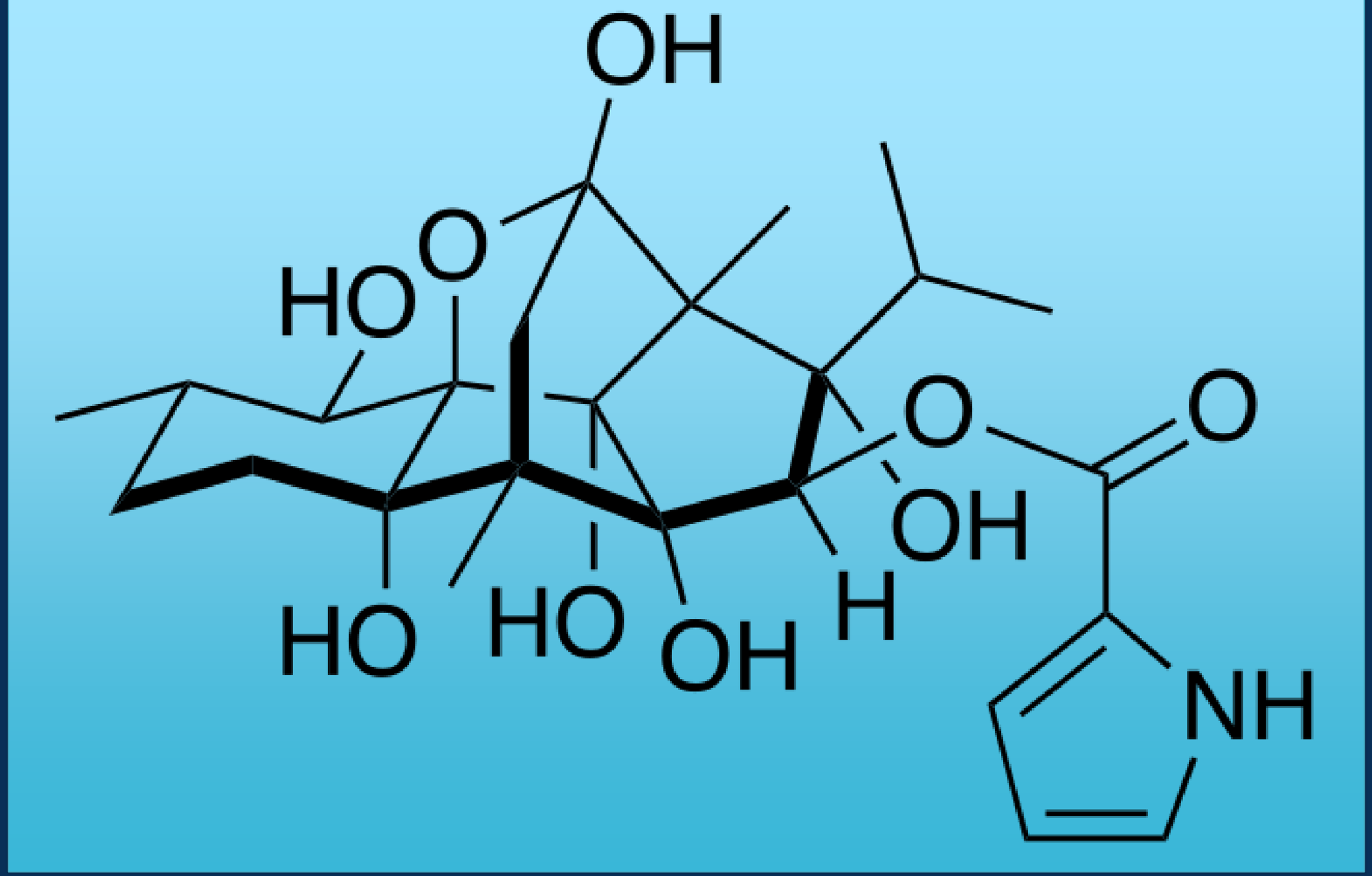
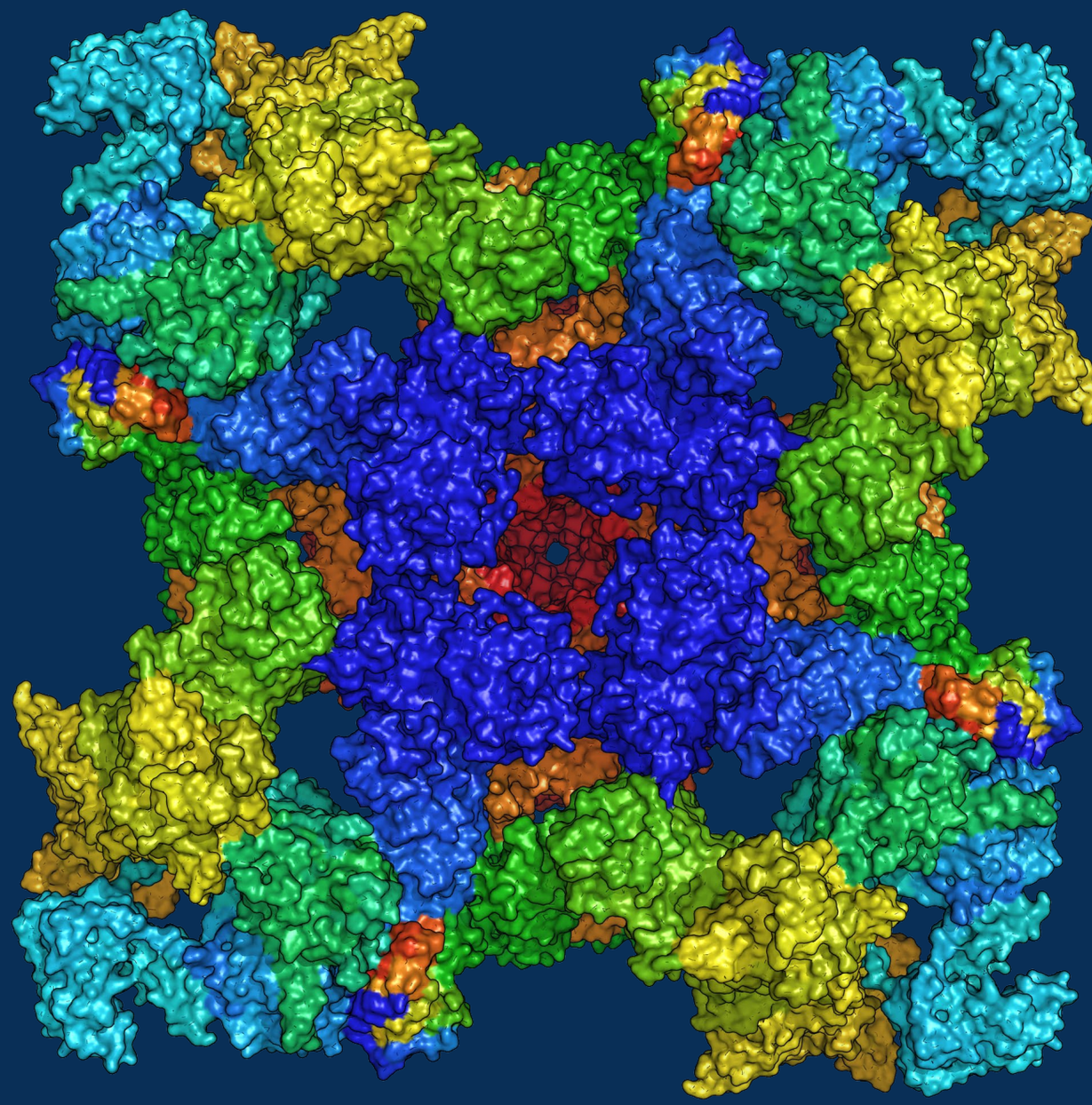


RYANODINE



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Malignant Hyperthermia

- May have been described as early as 1900
- Report of mother and son who died following chloroform anesthesia reported in 1919 and published in 1992
- Muscle deterioration in stressed swine reported in 1950s and 1960s
- First widely accepted report of MH in a family in 1960
- RYR identified and localized in 1980s
- In vitro contracture test developed and standardized in the early 1980s
- RYR (and other genes) linked genetically to MH and other myopathies in late 1980s and 1990s

The Ryanodine Receptor (RYR)

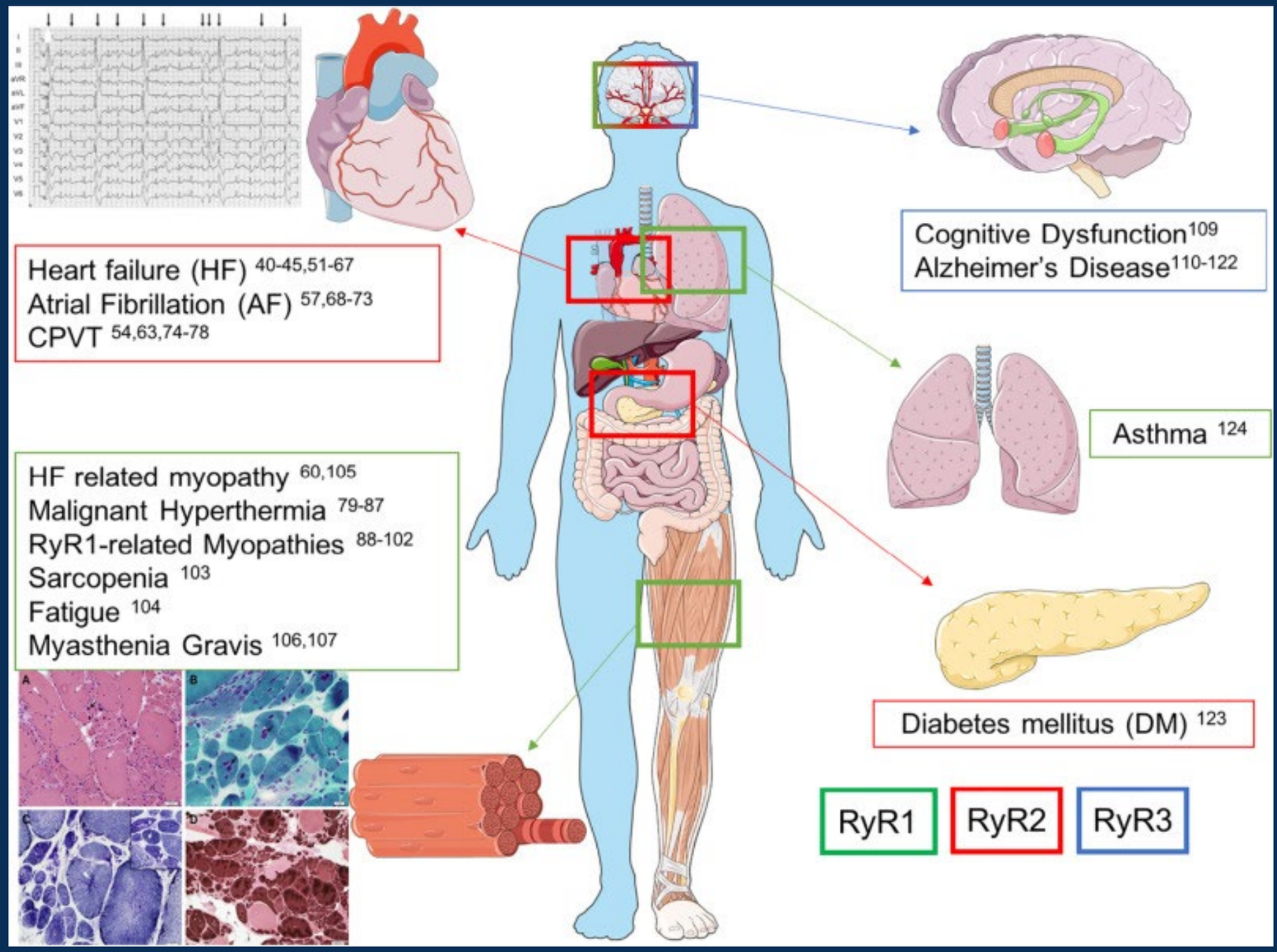
- Calcium ion channel
- Largest known ion channel; weight exceeding 2 Mdaltons
- 4 identical subunits
- 3 isoenzymes:
  - RYR1-mainly muscle
  - RYR2-mainly heart
  - RYR3-mainly brain

The Ryanodine Receptor (RYR)

- Are closed normally but spontaneously open randomly
- Opening is modulated by a large number of molecules, including:
  - Ca^{2+} and Mg^{2+}
  - Protein Kinase A
  - Calmodulin
  - Calsequestrin
  - FK binding proteins
  - Junctin and triadin
  - Catecholamines (indirectly)

The Ryanodine Receptor (RYR)

- Also modulated by a number of exogenous compounds
  - Ryanodine (obviously)
  - Dantrolene
  - Caffeine
  - Volatile anesthetics
    - Cyclopropane(?)
    - Ether (?)
  - Succinylcholine (?)
  - Suramin
  - 4-chloro-m-cresol



A. Kushinir et al., Ryanodine receptor dysfunction in human disorders, BBA-Molecular Cell Research, 1865 (2018) 1687-1697

RYR3

- Encoded on chromosome 15
- Widely expressed, but especially found in the cortex and hippocampus of the brain
- Interacts with presenilin
- May be involved in disorders of learning and memory, including Alzheimer’s disease
- Also expressed in the diaphragm and extraocular muscles where it likely plays a role in development

RYR2

- Encoded on chromosome 1
- Highly expressed in cardiac muscle
- Most common RYR in the brain; may play a role in PTSD
- Mutations have been found in patients with seizure disorders
- Implicated in catecholaminergic polymorphic ventricular tachycardia and arrhythmogenic right ventricular dysplasia
- May also play a role in diabetes mellitus

RYR1

- Encoded on chromosome 19
- First identified in skeletal muscle
- Bound to dihydropyridine receptor
- Found throughout the body, including lungs and brain
- May play a role in asthma
- Most studied for its role in myopathies
  - Myasthenia gravis: a small subset of patients have RYR1 antibodies
  - Chronic fatigue and heart failure related myopathy
  - RYR1-related myopathies
  - Malignant hyperthermia

RYR1-Related Myopathies

- Most common type of congenital myopathies
- Historically named for their histopathological appearance
  - Central core disease
  - Multiminicore disease
  - Centronuclear myopathy
  - Core-rod myopathy
  - Congenital fiber type disproportion
  - Others as well; no standardization in naming
- Group has expanded as gene sequencing has improved

RYR1-Related Myopathies

- Dominant inheritance linked to central core disease and MH
- Other myopathies likely to be recessively inherited
- Clinical features are common to many of these disorders
  - Symmetric proximal muscle weakness
  - Oculomotor involvement
  - Respiratory involvement
  - Hypotonia
  - Orthopedic abnormalities

RYR1-Related Myopathies

- Histopathological diagnosis being augmented with genetic analysis
- Imaging can play a role in diagnosis, but can be non-specific
- Current treatment is primarily supportive; no FDA approved treatments exist
- Several drugs under investigation, including:
  - Dantrolene
  - N-acetylcysteine
  - Albuterol/salbutamol
  - Carvedilol
  - Pyridostigmine

Dihydropyridine Receptor

- CACNA1S
- Encoded on chromosome 1
- Voltage regulated calcium channel that is bound to and regulates RYR1
- 2 Mutations thought to cause MH
- 11 mutations associated with hypokalemic periodic paralysis

STAC3 Disorder

- Involves a gene on chromosome 12
- Functional relationship to RYR1 and CACNAS1S poorly understood
- First identified in Lumbee Tribe of North Carolina
- Subsequently found in other populations, especially Southern Africa
- Autosomal recessive myopathy
- Considered susceptible to MH

STAC3-Clinical Features

- Congenital myopathy
- Abnormal facies
- Kyphoscoliosis
- Cleft palate
- MH susceptibility?
  - MH-like reactions to anesthesia have been reported
  - Clinical features quite variable
  - No reports of confirmatory IVCT
  - EMHG does not consider STAC3 mutations to be definitely associated with MH, but patients should be treated as MH susceptible

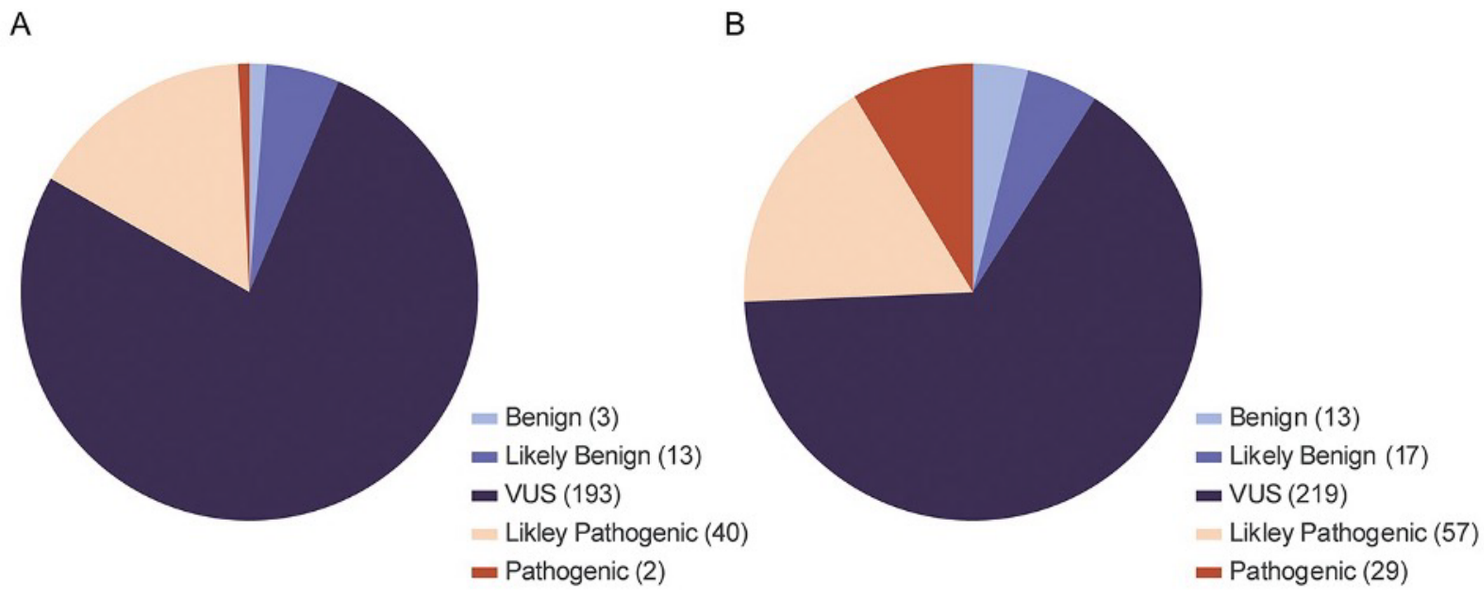
Muscle Biopsy Testing

- Only validated for patients older than 4 years of age; most centers only test patients older than 10
- Requires several grams of muscle
- Must be done within 5 hours of obtaining specimen
- Only 3 places in North America perform the test
  - University of Minnesota
  - Toronto General Hospital
  - Uniformed Services University of Health Sciences
- Can cost up to $30,000.00 when all costs are tabulated
- Remains the gold standard for diagnosis

Genetic Testing

- List of diagnostic mutations maintained by European Malignant Hyperthermia Group
- Mutations described as benign, likely benign, likely pathogenic, or pathogenic based on a scoring matrix with defined criteria
- Currently 72 RYR1 mutations and 2 DHPR mutations are classified as pathogenic or likely pathogenic
- Hundreds of mutations are not linked to MH but may cause other diseases
- It is very likely that other pathogenic mutations are waiting to be discovered
- Approximately 40% of patients with positive IVCT do not have a known pathogenic mutation

Figure 1 (A) Variant pathogenicity classification distribution for the 251 variants classified in this study. (B) ...



Hum Mol Genet, Volume 31, Issue 23, 1 December 2022, Pages 4087–4093, https://doi.org/10.1093/hmg/ddac145

EMHG Criteria

- Likely Benign
  - Greater than 1:1000 population frequency
  - 2 unrelated carriers with negative IVCT
  - Has a loss of function effect

EMHG Criteria

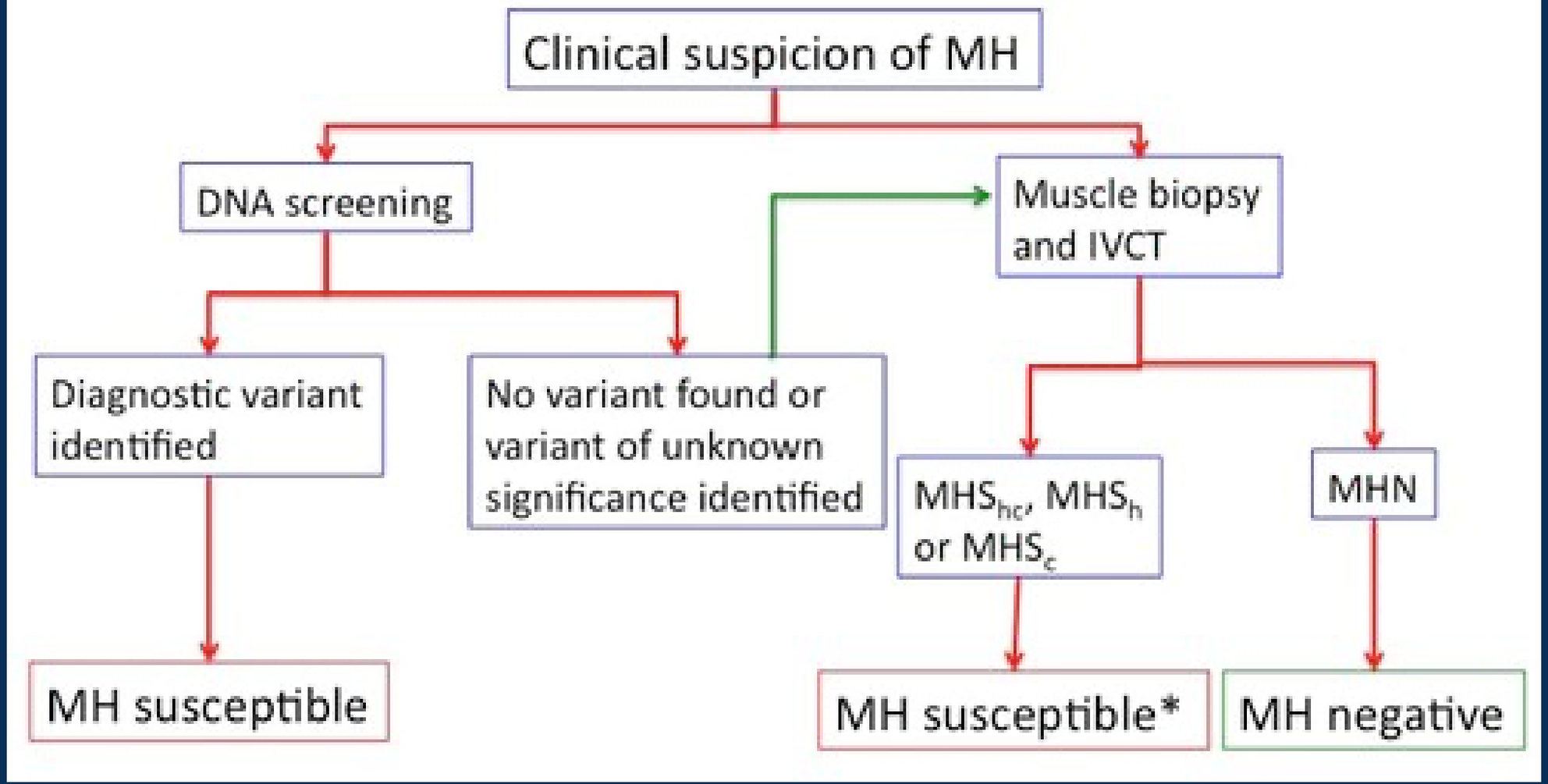
- Likely Pathogenic
  - Strong criteria (PS)
    - Same amino acid change as previously described pathogenic variant
    - *In vitro* gain of function shown
  - Moderate criteria (PM)
    - *Ex vivo* gain of function shown from 2 independent families
    - More common at $P < 10^7$ in affected populations
  - Supporting criteria (PP)
    - Segregation with 4 family members with positive IVCT in relevant gene
    - Computational evidence consistent with deleterious effect on gene
    - Association with clinical MH confirmed by IVCT

Scoring

- Pathogenic defined by meeting 1 PS and 2 PP criteria
- Likely pathogenic defined by meeting 1 PM and 2 PP criteria
- Similar definitions for benign variants
- https://www.emhg.org/genetic-scoring-matrix

Updates

- New mutations still being discovered
- Most new mutations are of unknown significance for MH
- List of pathogenic and likely pathogenic mutations updated regularly
- Latest update May 2025
  - 7 mutations added
  - 1 mutation downgraded from pathogenic to likely pathogenic



Conclusion

Genetic testing is a useful part of our diagnostic armamentarium, but due to the large number of RYR1 and other mutations and variable presentation of the disease, it is unlikely to replace muscle biopsy as the gold standard of diagnosis in the near future. Further work is also needed to clarify the role of STAC3 (and possibly other proteins) in MH and MH-like conditions

Useful Links

- Malignant Hyperthemia Association of the United States
  - https://www.mhaus.org
- European Malignant Hyperthermia group
  - https://www.emhg.org
- RYR1 Foundation
  - https://ryr1.org

Further Reading:

- Van Petegem, F., Ryanodine Receptors, Structure and Function, Journal of Biological Chemistry, 287 (2012), 31624-31632
- Betzenhauser, M., and Marks, A., Ryanodine receptor channelopathies, European Journal of Physiology, 460 (2010), 467-480
- Kushnir, A., Wajsberg, B., and Marks, A., Ryanodine receptor dysfunction in human disorders, BBA-Molecular Cell Research, 1865 (2018) 1687-1697
- Szentandrássy, N., Magyar, Z., Hevesi, J., Bányász, T., Nánási, P., and Almássy', J., Therapeutic Approaches of Ryanodine Receptor-Associated Heart Diseases, International Journal of Molecular Sciences, 23 (2022) 4435-4451
- Lawal, T., *et al.*, Ryanodine receptor 1-related disorders: an historical perspective and proposal for a unified nomenclature, Skeletal Muscle, 10 (2020) 32-48
- Lawal, T., Todd, J., Meilleur, K., Ryanodine Receptor 1-Related Myopathies: Diagnostic and Therapeutic Approaches, Neurotherapeutics, 15 (2018) 885-899
- Carpenter, D., *et al.*, Genetic variation in *RYR1* and malignant hyperthermia phenotypes, British Journal of Anesthesia, 103 (2009) 538-48
- Brandom, B., Genetics of Malignant Hyperthermia, The Scientific World Journal, 6 (2006) 1722-1730

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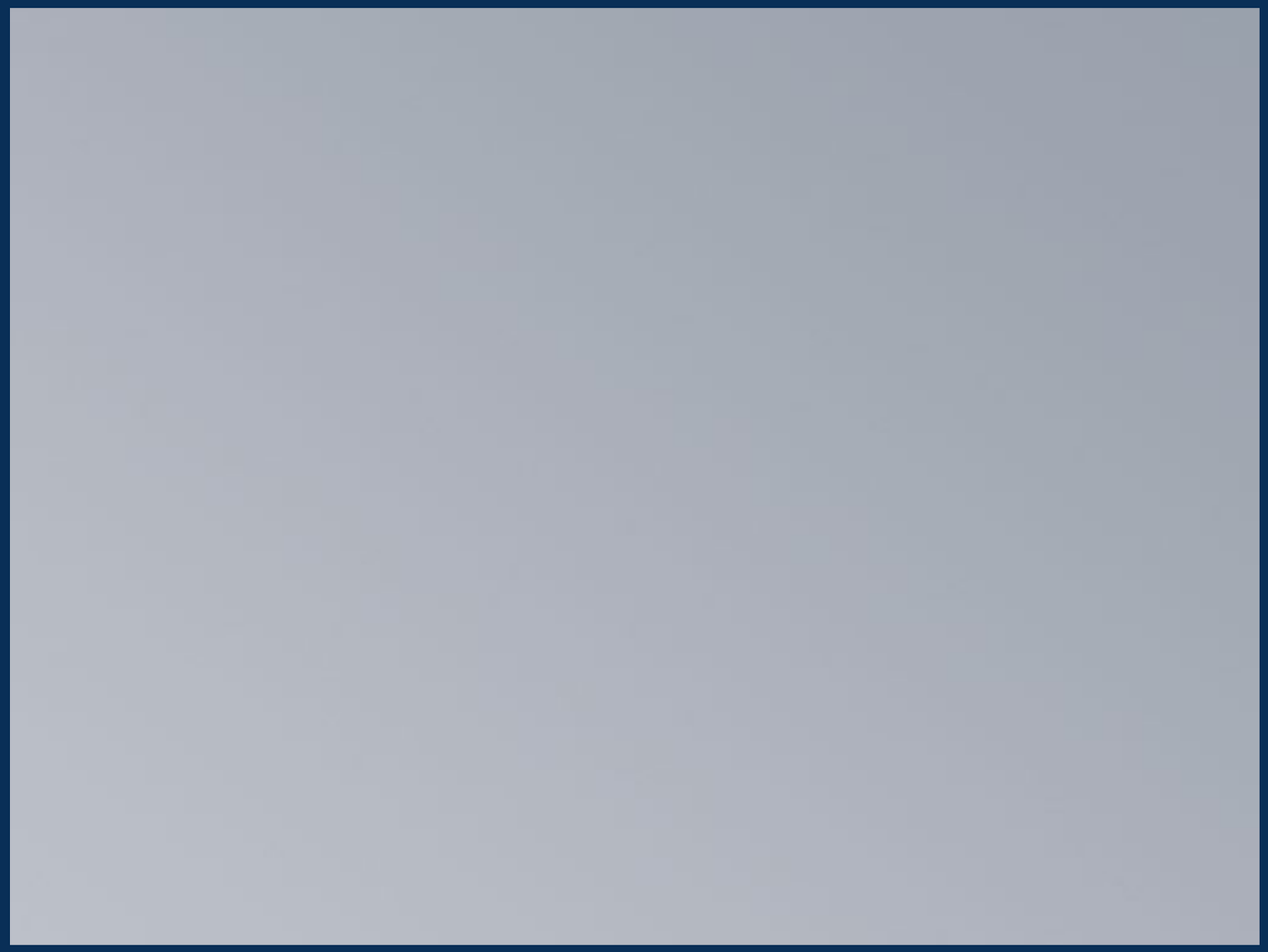

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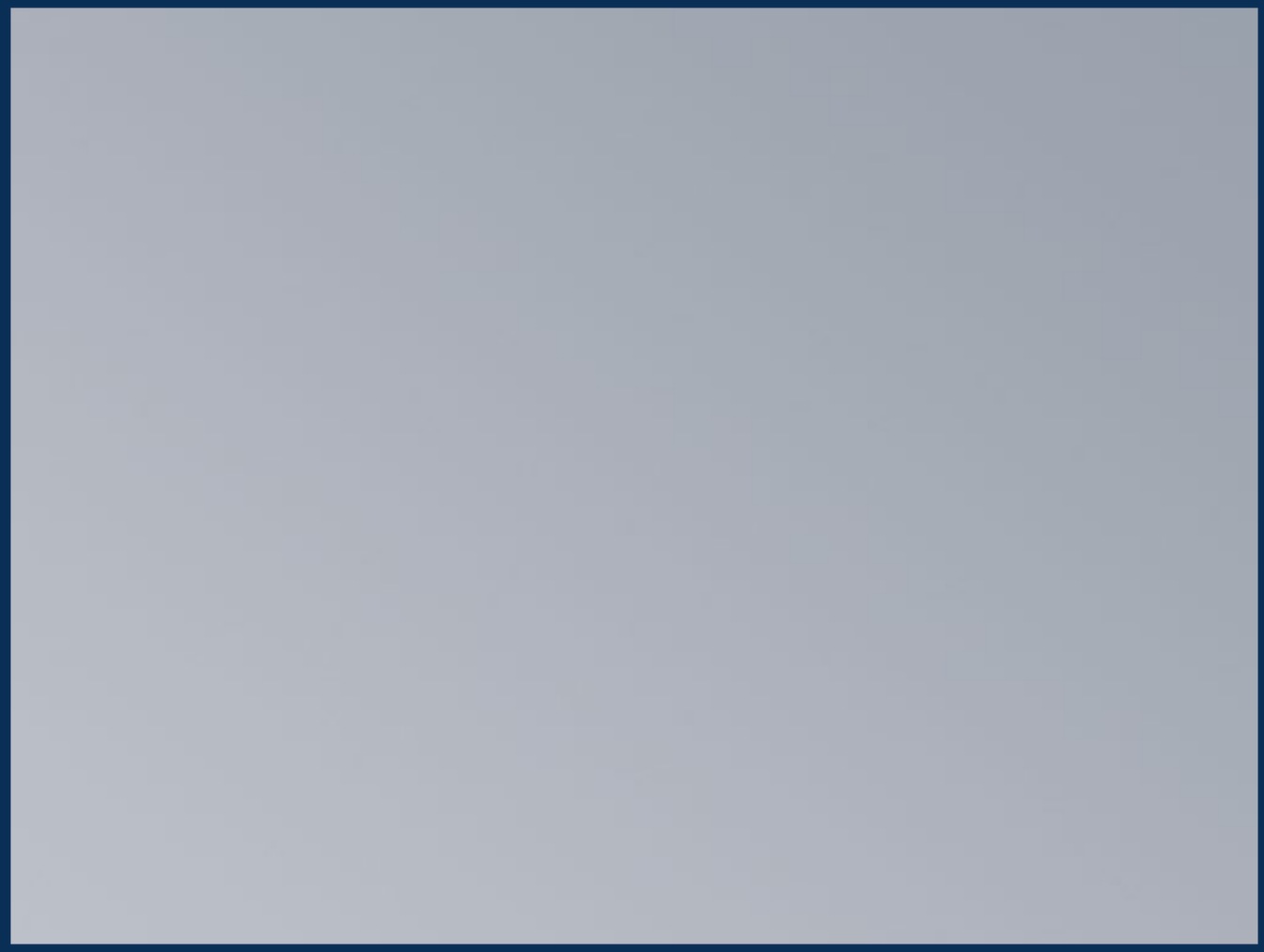

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Perspectives and Updates on Perioperative Cardiac Arrest

Craig Jabaley

8/24/2025

Disclosures

- I helped to developed ASA's Perioperative Resuscitation and Life Support (PeRLS) curriculum. (Uncompensated)
- Otherwise, I have no relevant disclosures or conflicts of interest.
- We **will** discuss off-label use of medications and medical devices.

Objectives

- Contrast cardiac arrest in the OR with that in other settings.
- Extrapolate lessons from intraoperative cardiac arrest to other settings.
- Identify evidence-based practices for cardiac arrest management that improve long-term outcomes.

Important Notes

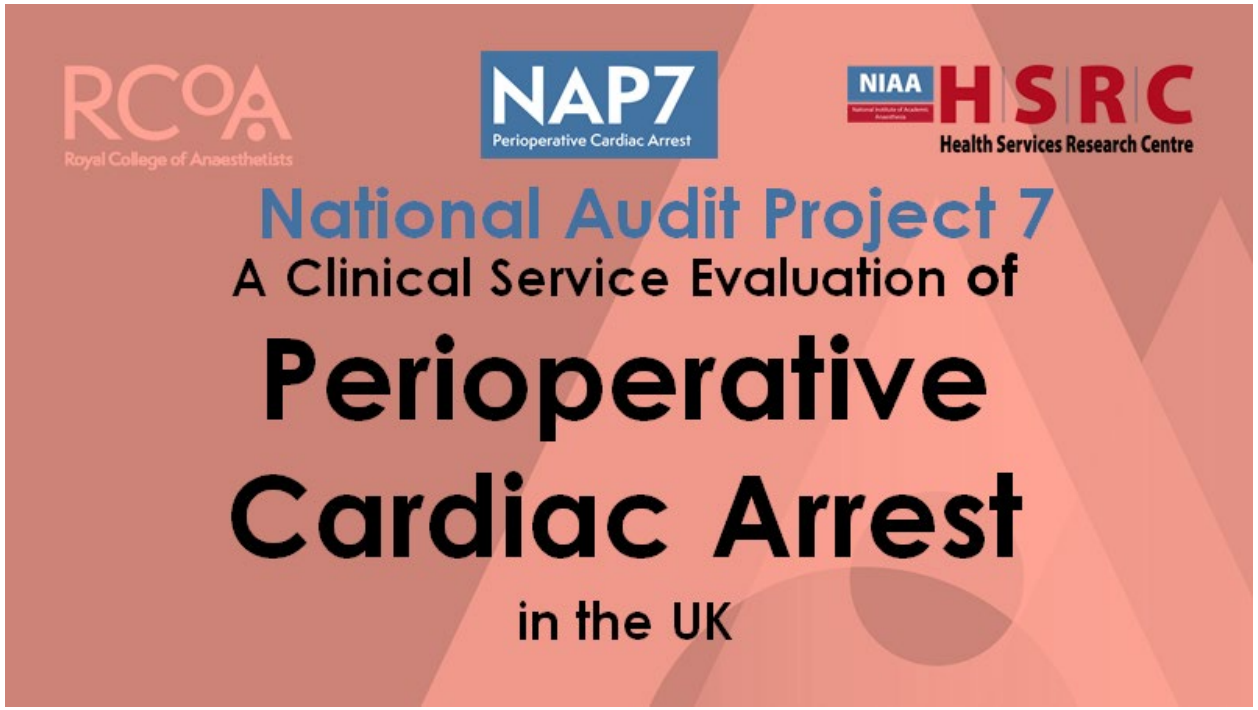
- We will primarily discuss intraoperative cardiac arrest; general principles apply to perioperative arrest
- The accepted community standard of care for management of cardiac arrest is AHA's ACLS
- However, cardiac arrest in the OR is different than arrest in other settings
  - Out-of-hospital
  - In-hospital
- However, there is not yet a *widely* accepted modification of this approach for use in the OR

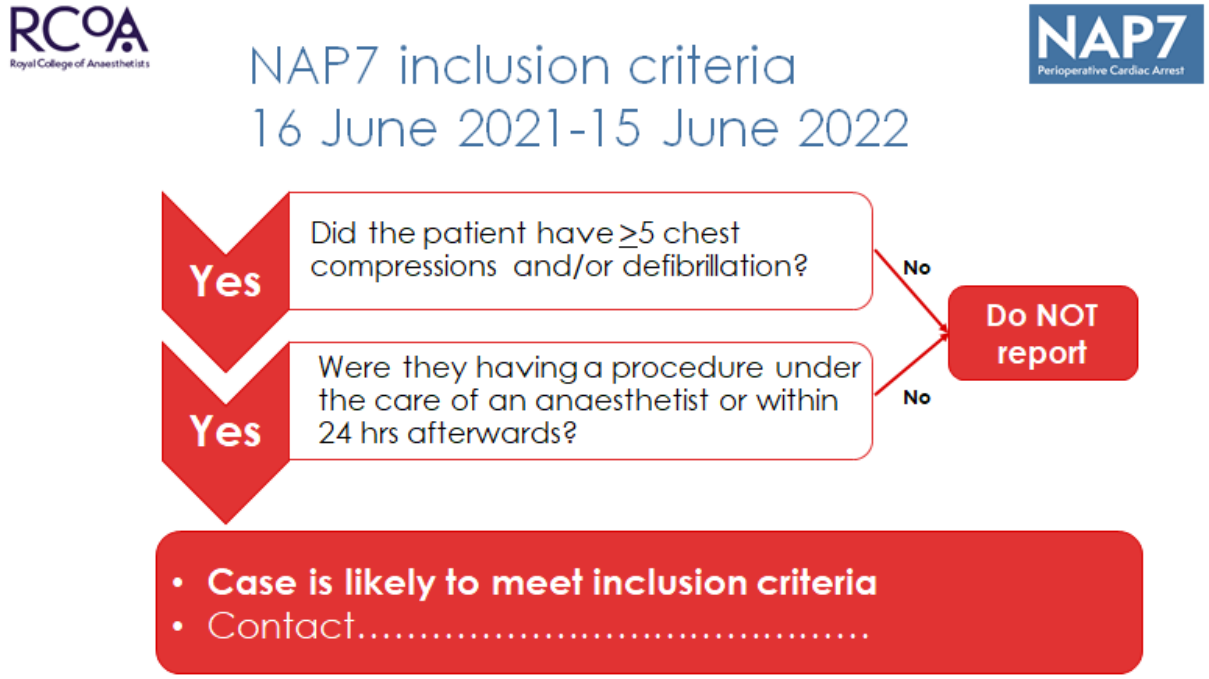
Epidemiology and Outcomes

Good News

- The incidence of perioperative cardiac arrest has declined with time
  - Estimated at **0.2 to 1.1 arrests per 10,000 non-cardiac adult cases**
    - National Inpatient Sample: 5.7 arrests per 10,000 adult cases (Fielding-Singh 2020)
    - NSQIP data: 3 intraoperative arrests per 10,000 adult cases (Kaiser 2020)
      (33 arrests per 10,000 cases w/in 28 days postoperatively)

Update: NAP7 on Perioperative Arrest





https://twitter.com/NAPs_RCoA/status/1390957229742960646

Cook TM, et al. *Anaesthesia*. 2024;79(4):368-379. PMID: 38031494

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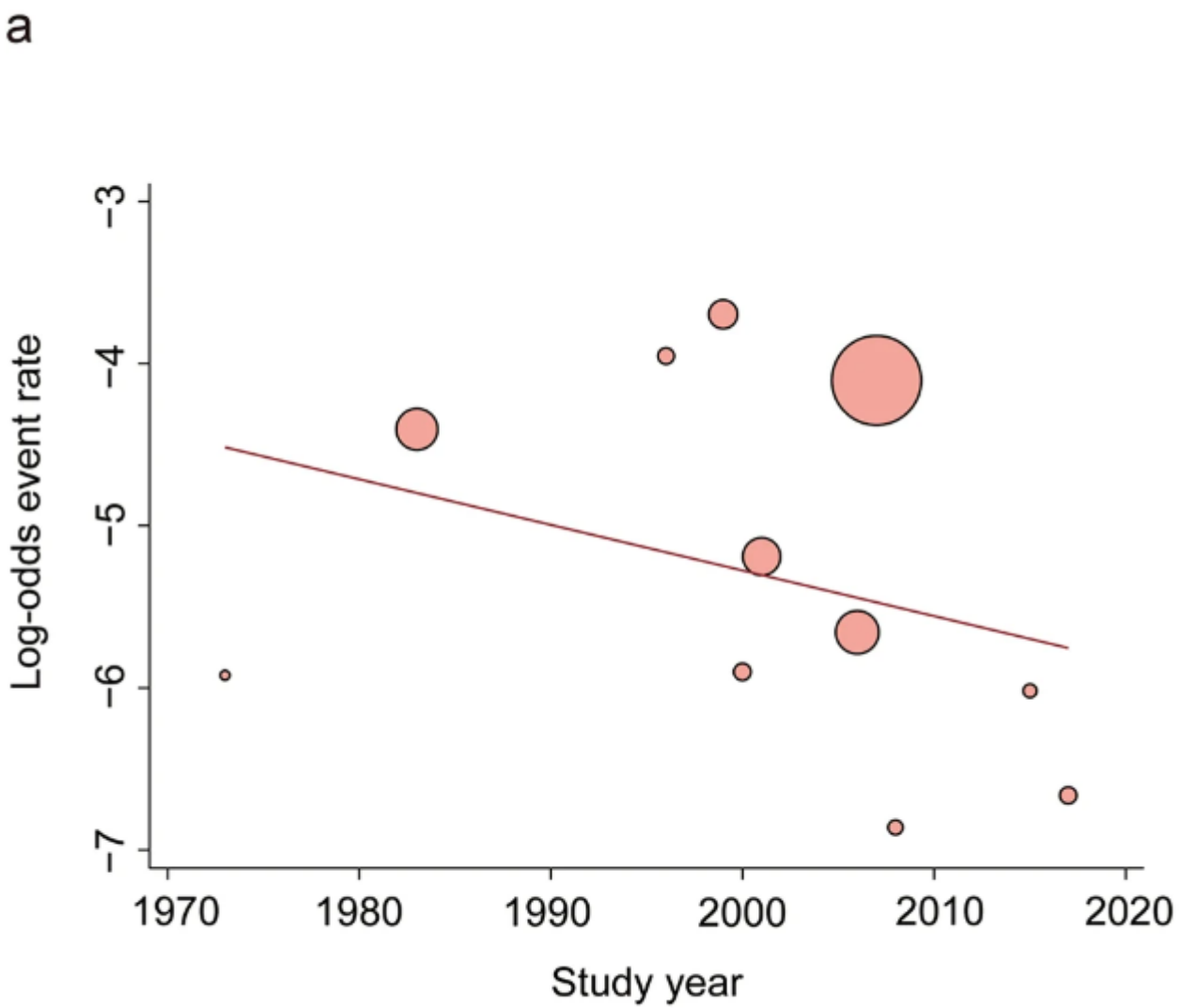
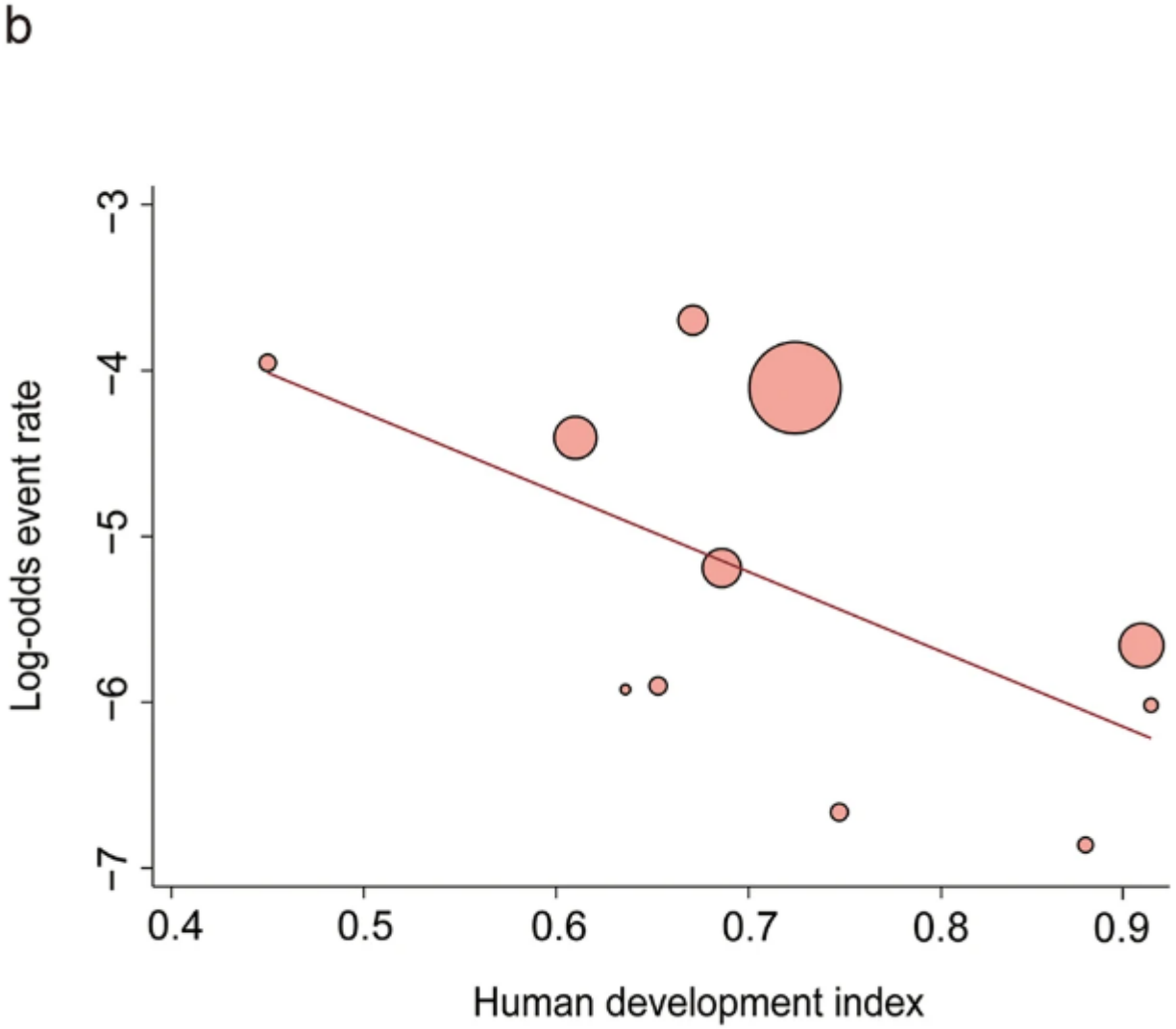
      (33 arrests per 10,000 cases w/in 28 days postoperatively)
    - **NAP-7: 3.3 arrets per 10,000 adult anesthetics**

From: Mortality and cardiac arrest rates of emergency surgery in developed and developing countries: a systematic review and meta-analysis





Meta-regression of perioperative cardiac arrest (a, b) rates outcomes by decades (**a**) and country's Human Development Index status (**b**). Every circle represents a study; the circle size is representative of the weight of that study in the analysis

Guo K, et al. *BMC Anesthesiol*. 2024;24(1):178. PMID: 38769493

Good News

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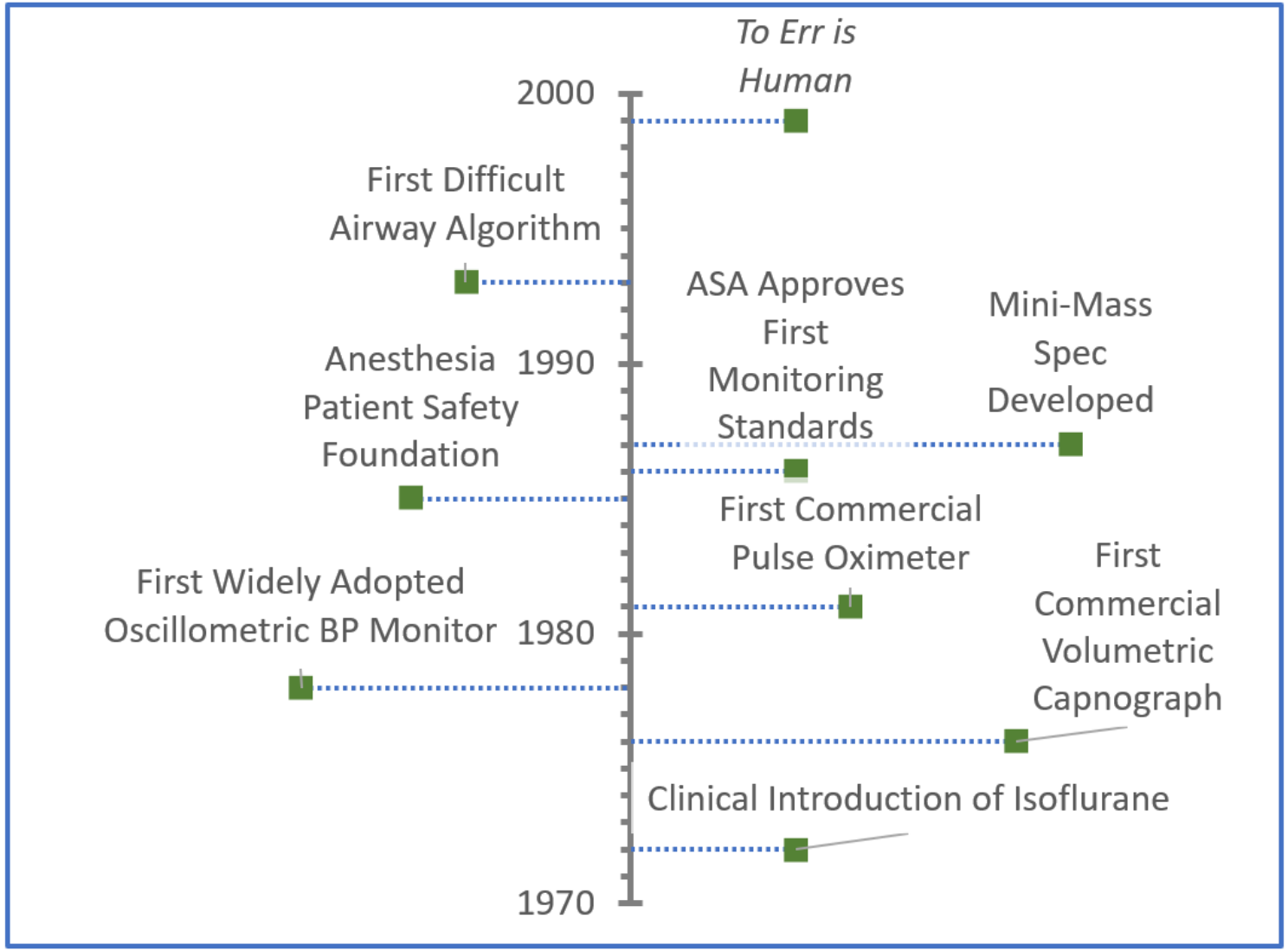
  - Estimated at **0.2 to 1.1 arrests per 10,000 non-cardiac adult cases**
    - National Inpatient Sample: 5.7 arrests per 10,000 adult cases (Fielding-Singh 2020)
    - NSQIP data: 3 intraoperative arrests per 10,000 adult cases (Kaiser 2020)
      (33 arrests per 10,000 cases w/in 28 days postoperatively)
    - **NAP-7: 3.3 arrets per 10,000 adult anesthetics**
  - In the US, there has been a **10-fold reduction** from the 1970s
    - Why?

What Changed Since the 70s



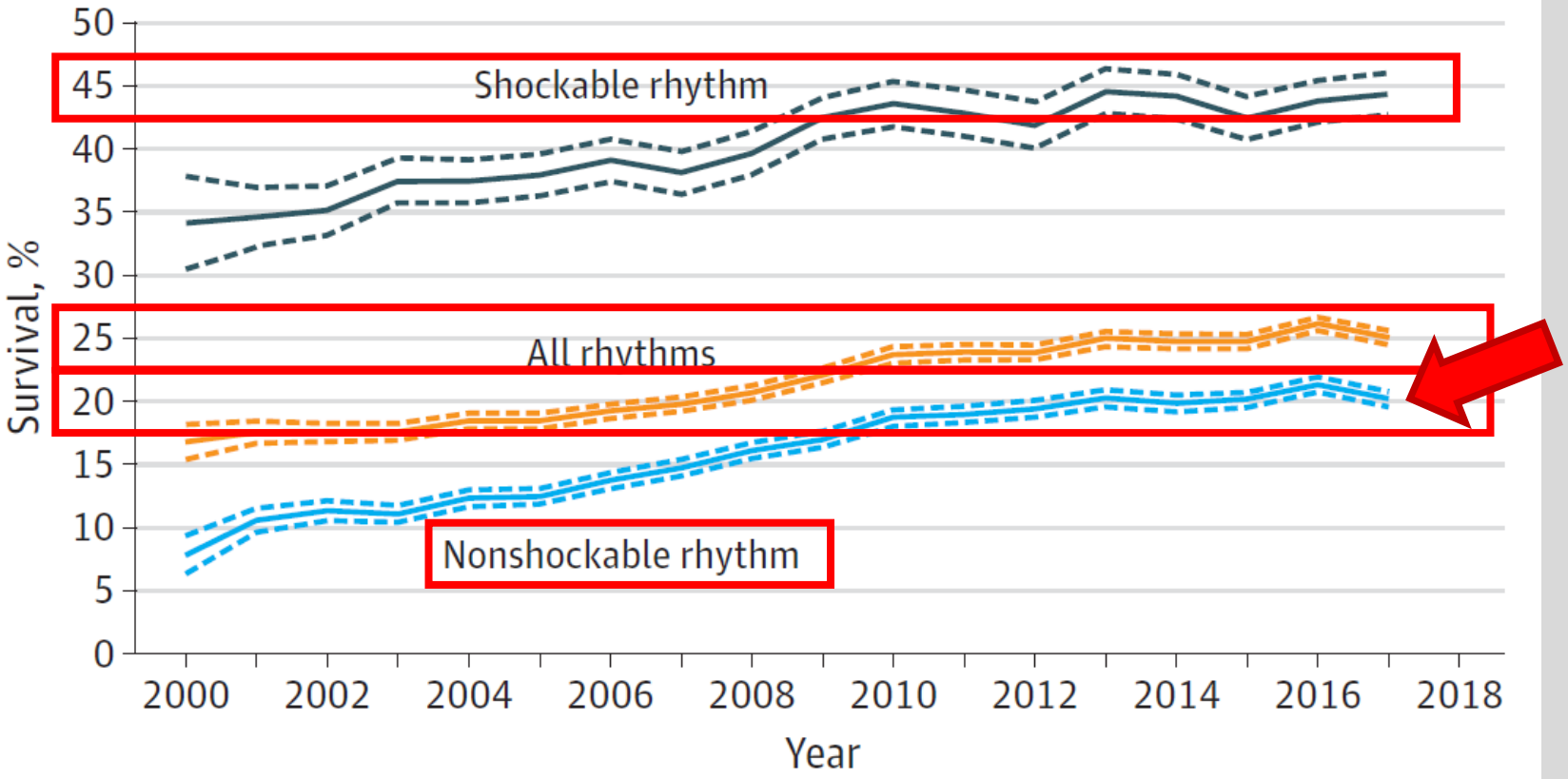
Good News, Continued

- The incidence of perioperative cardiac arrest has declined with time
  - Estimated at **0.2 to 1.1 arrests per 10,000 non-cardiac adult cases**
  - This is a **10-fold reduction** from the 1970s
- **Vulnerable populations remain (in descending order)**
  - Emergency surgery: 163 arrests per 10,000 cases
  - Elderly: 54.4 arrests per 10,000 cases
  - Neonates undergoing cardiac surgery: 127 arrests per 10,000 cases
  - General pediatrics: 1.4 to 4.6 arrests per 10,000 cases

In-Hospital Cardiac Arrest Outcomes

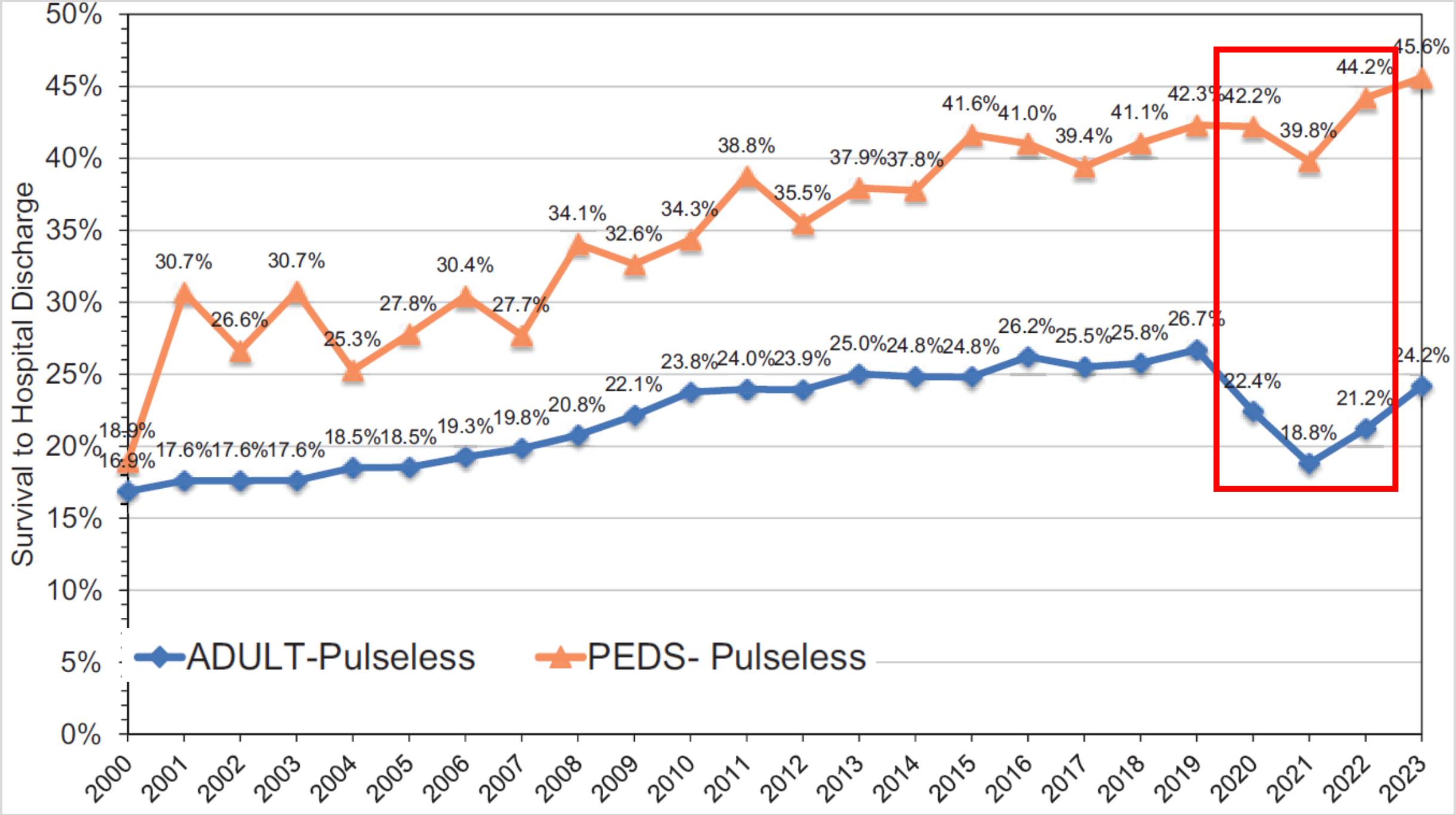
- How many people survive in-hospital cardiac arrest?

Figure 1. Survival After In-Hospital Cardiac Arrest, 2000 to 2017



Based on data from the Get With The Guidelines-Resuscitation registry on all adult in-hospital cardiac arrests from 2000 to 2017. The dotted lines represent 95% CIs. Shockable rhythms include ventricular fibrillation and pulseless ventricular tachycardia. Nonshockable rhythms include asystole and pulseless electrical activity. Adapted from Benjamin et al.[2]

Andersen LW, et al. *JAMA*. 2019;321(12):1200-1210. PMID: 30912843

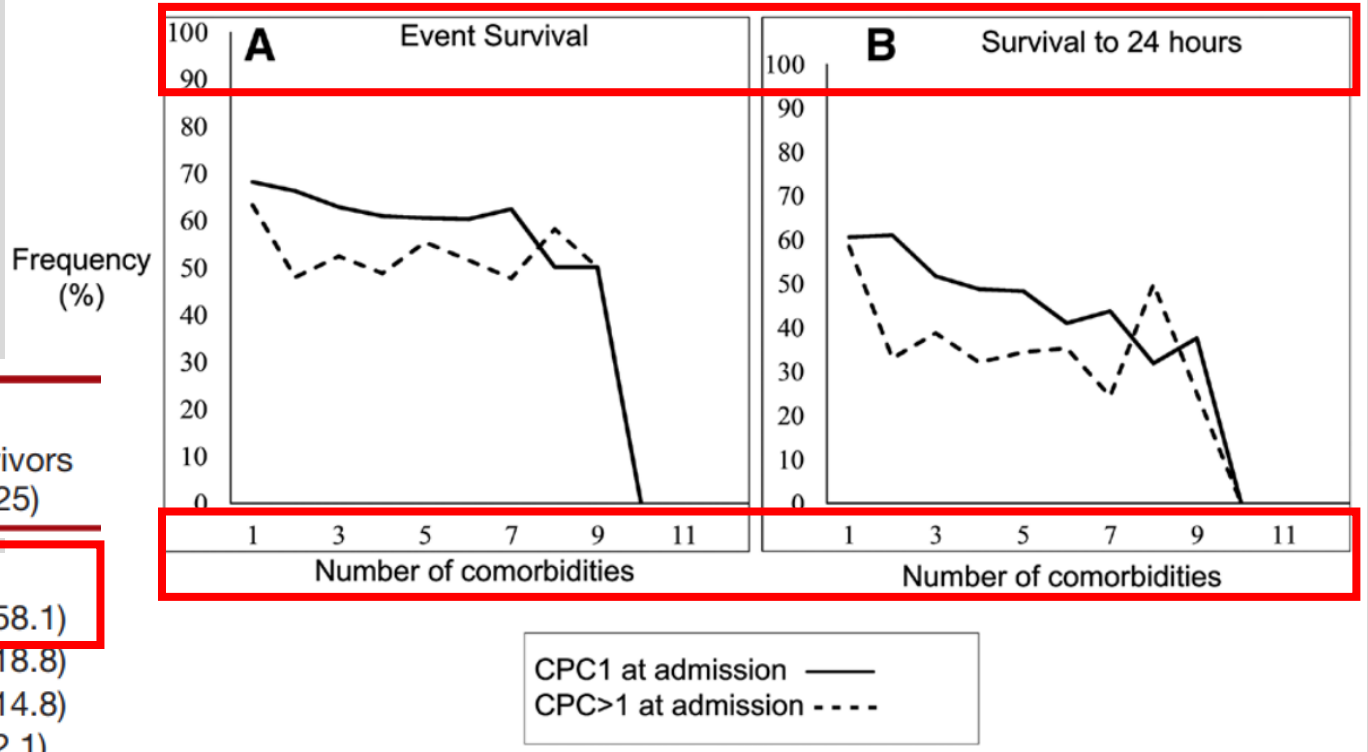


Martin SS, et al. *Circulation*. 2025;151(8):e41-e660. PMID: 39866113

In-Hospital Cardiac Arrest Outcomes

- In-hospital cardiac arrest survival (was) getting better but is still not impressive
  - ~25% survival to discharge in all-comers
  - **~20% survival to discharge in non-shockable rhythms**
    - (Most arrests in the OR are associated with non-shockable rhythms)
- What about in the OR?

Characteristic	Survivors (n=799)	Nonsurvivors (n=1725)
Event location		
Operating room	455 (56.9)	1,003 (58.1)
Postanesthesia care unit	214 (26.8)	32 (18.8)
Intensive care area	76 (9.5)	256 (14.8)
Telemetry/step-down	20 (2.5)	38 (2.1)
General in-patient area	34 (4.3)	106 (6.1)



Intraoperative Cardiac Arrest Survival = 455/1458 = 31.2%

Ramachandran SK, et al. *Anesthesiology*. 2013;119(6):1322-39. PMID: 23838723

869 425 patients receiving anesthesia for a surgical procedure in 11 community and university hospitals over a 13-year study period

98 patients excluded because of death occurring in the operating room after intraoperative cardiac arrest

~60% survival to ICU

140 patients with successfully resuscitated intraoperative cardiac arrest included in the study

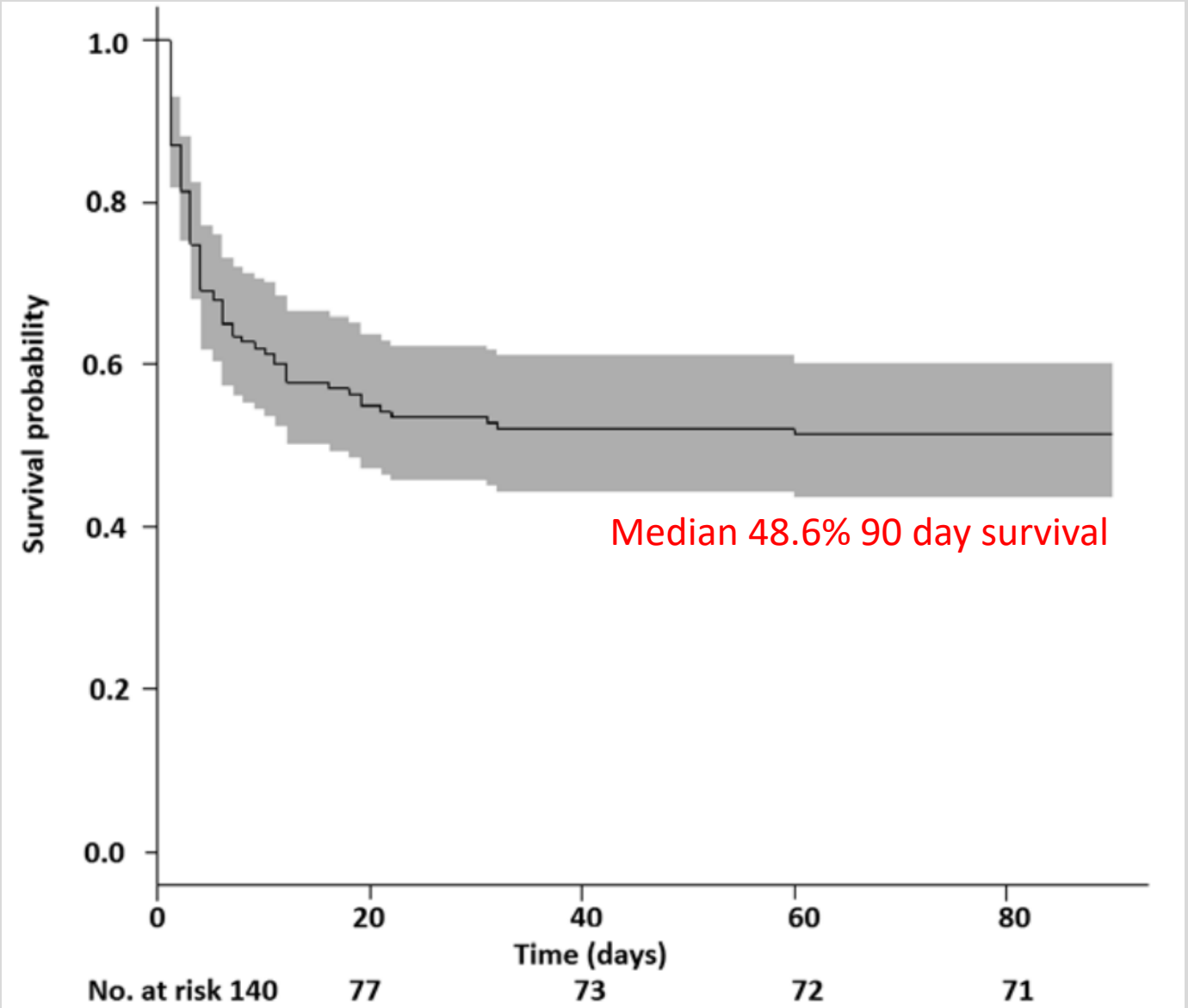
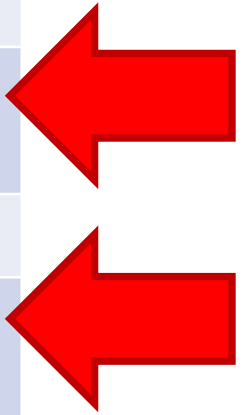


Fig. 2. Kaplan–Meir estimates of 90-day survival in 140 patients with successfully resuscitated intraoperative cardiac arrest.

Constant AL et al. *Anesthesiology*. 2014;121(3):482-91. PMID: 24841698

These and Other Studies

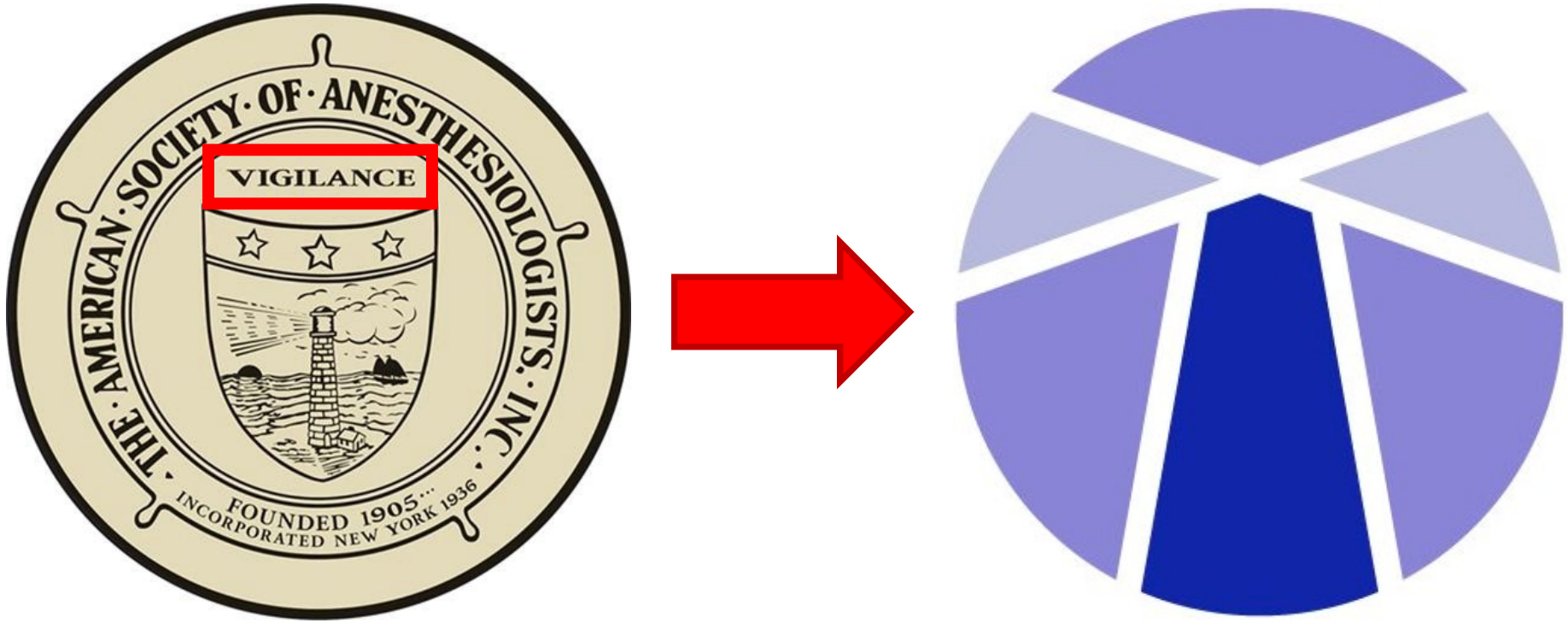
	Ramachandran et al. 2013	Constant et al. 2014	Hur et al. 2017	Fuchs et al. 2023	NAP 7 2023
Design	Registry	Single-center	Single-center	Single-Center	UK-wide
Survival	31% (discharge)	29% (90-day)	38% (90-day)	55% (90-day)	44% (discharge)
Common Causes	Asystole (37%) PEA (31%)	Asystole (52%) PEA (31%)	Asystole (24%) PEA (40%)	Asystole (13%) PEA (46%)	Asystole (15%) PEA (52%)
Arrest to CPR	0 minutes	0 minutes	NR	NR	NR
Median time to ROSC	Not reported	10 minutes (IQR 5-20)	3 minutes (IQR 1-14)	5 minutes (IQR 2-14)	<10 minutes in 67% patients



In-Hospital Cardiac Arrest Outcomes

- In-hospital cardiac arrest survival is getting better but not impressive
  - ~25% survival to discharge in all-comers
  - ~20% survival to discharge in non-shockable rhythms
    - (Most arrests in the OR are associated with non-shockable rhythms)
- What about in the OR?
  - **~30+% survival to discharge (44% in NAP-7)**
    - Why is this 65% better than in-hospital cardiac arrest?

Intraoperative Arrest is Unique


THE · AMERICAN · SOCIETY · OF · ANESTHESIOLOGISTS · INC ·
VIGILANCE
FOUNDED 1905 ...
INCORPORATED NEW YORK 1936

Key Differences About Intraoperative Arrest

- Patients are continuously monitored by people and devices
  - Arrests are (almost) always witnessed
  - Precipitating causes are typically known
  - Responses are timelier and more focused
- The airway may already be secure
- Many causes of arrest may be (rapidly) reversible

Box. Potential Reversible Causes of Cardiac Arrest

h's

Yes Hypokalemia/hyperkalemia[a]

Yes Hypothermia

Yes Hypovolemia

Yes Hypoxia

t's

Tamponade

Tension pneumothorax

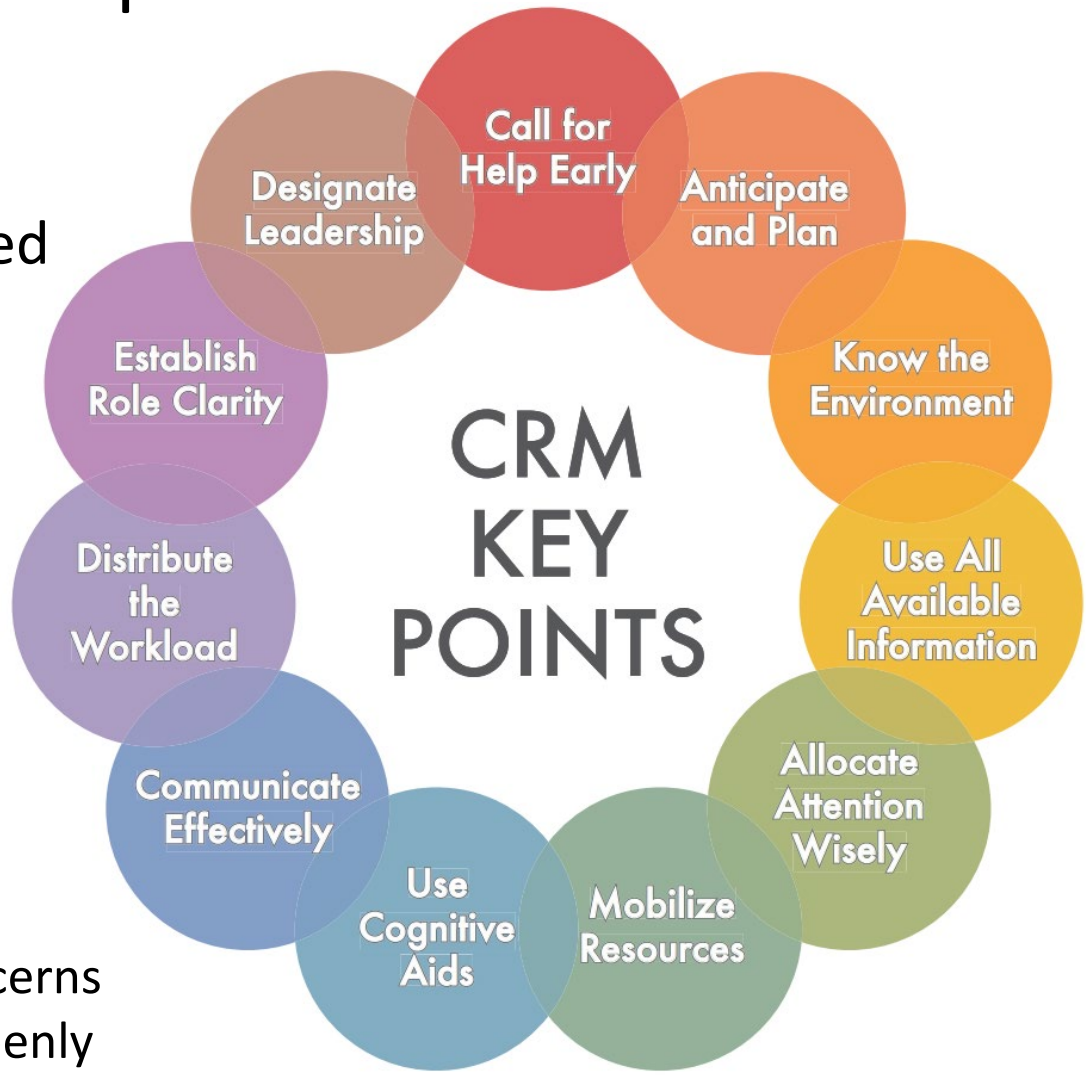
Thrombosis (coronary or pulmonary)

Yes Toxins

[a] Can include other metabolic alterations such as severe acidosis.

An Ounce of Prevention: Prepare and Plan

- Human factors (i.e., medical errors)
  - Frequently implicated in anesthesia-related perioperative cardiac arrest
  - Calling for help
  - Role clarity and assignment
  - Communication
- Potential solutions…
  - Cognitive aids & simulation
    - Emergency manuals
    - Checklists
  - Culture
    - Encourage/normalize reporting of safety concerns
    - Empower team members to communicate openly



4: Cardiac Arrest – Asystole/PEA

Condition: Non-shockable pulseless cardiac arrest.

Objective: Restore pulse, hemodynamic stability.

4

- **Call for help.**
- **CPR** (100 chest compressions/min and 8 breaths per minute)*
  - Ensure full chest recoil with minimal interruptions.
- **Epinephrine (or Vasopressin).**
- **Check pulse & rhythm** (after every 2 minutes of CPR):
  - If **no pulse and shockable** (VF/VT): **GO TO**: **Cardiac Arrest - VF/VT Checklist**
  - If **no pulse and NOT shockable** (asystole/PEA):
    - Resume CPR.
    - Read out potential causes (H&Ts).
    - Restart checklist.
  - If **pulse:**
    - Begin post-resuscitation care.
    - Read out potential causes (H &Ts).

Potential Causes (H&Ts):

- **Hypovolemia**
- **Hypoxia**
- **Hydrogen ion** (acidosis)
- **Hypo-/hyperkalemia**
- **Hypothermia**
- **Tension Pneumothorax**
- **Tamponade** (Cardiac)
- **Toxins** (narcotic, local anesthetic, beta blocker, channel blocker)
- **Thrombosis** (Pulmonary)
- **Thrombosis** (Coronary)

During CPR:

- **Airway** ([bag mask ventilation]).
- **Breathing** (100% FiO_2).
- **Circulation** (confirm adequate IV or IO access) .
  - Consider IV fluids wide open.
- **Assign roles for:** Chest compressions, airway, vascular access, documentation, code cart, time keeping. Orders should be explicitly acknowledged and repeated.

Drug Doses and Treatments:

Epinephrine dosing: 1mg IV, repeats every 3-5 minutes

Vasopressin 40 Units IV can be given to replace the first or second dose of epinephrine.

Hyperkalemia treatment:

- Calcium gluconate (10mg/kg) or Calcium chloride (10mg/kg) IV;
- Sodium bicarbonate 1-2mEq/kg, slow IV push
- Insulin 10 Units regular IV with 1-2 amps D50W (Dextrose 50% in Water)

Toxin Treatments:

Narcotic Overdose:

- Naloxone 0.04 to 0.4 mg IV, may repeat dosing if response inadequate.

Local Anesthetic overdose:

Intralipid administration:

- 1.5mL/kg IV bolus
- Repeat 1-2 times for persistent asystole
- Start infusion 0.25 to 0.5 mL/kg/min for 30-60 minutes for refractory hypotension

Beta-blocker overdose:

- Glucagon (2-4mg IV push)

Calcium channel blocker overdose:

- Calcium chloride (1g IV).

Modified by MGH

EMERGENCY:	Number:	Anes Workroom:	Number:	Teams:	Number:
Anes Staff Administrator	617-726-0202	Gray Anes Workroom	617-726-8997	Rescue **TEE** (Echo Team)	PAGE #21400
MGH Operator for Emergency	617-726-3333	**Pharmacy:**		Emergency/**Surgical Airway**	617-726-3333
Vocera Access Number	617-643-1811	Main OR	617-726-8947	*(Request "Surgical Airway")*	
MOR Anes Attending Call Rm.	617-726-1879	Off-Hours	617-726-2503	Acute MI Team (**STEMI** Team)	617-726-8282
Control Desk:		**Blood Bank:**		*(Request "STEMI Team")*	
Gray Desk - Anes	617-726-8995	Main OR	617-726-3623	Acute **Stroke** Team	PAGE #34282
Gray Desk - Nursing	617-726-8910	Lunder	857-238-5280	Blood Bank Fellow	PAGE #24346

ACLS (for perioperative setting)
Asystole 1
Bradycardia – Unstable 2
PEA 3
SVT Unstable – Tachycardia 4
SVT Stable – Tachycardia 5
VF/VT 6

BROAD DIFFERENTIAL DIAGNOSES
Hypotension 15
Hypoxemia 16

SPECIFIC CRITICAL EVENTS
Amniotic Fluid Embolism 7
Anaphylaxis 8
Bronchospasm 9
Delayed Emergence 10
Difficult airway – Unanticipated 11
Fire – Airway 12
Fire – Patient 13
Hemorrhage – MTG 14
Hypotension 15
Hypoxemia 16
Local Anesthetic Toxicity 17
Malignant Hyperthermia 18
Myocardial Ischemia 19
Oxygen Failure 20
Pneumothorax 21
Power Failure 22
SVT Stable – Tachycardia 5
Total Spinal Anesthesia 23
Transfusion Reaction 24
Venous Air Embolus 25

CRISIS RESOURCE MANAGEMENT 26

EMERGENCY MANUAL

COGNITIVE AIDS FOR PERIOPERATIVE CRITICAL EVENTS 2014, V2.2

STANFORD ANESTHESIA COGNITIVE AID GROUP

CLINICAL CONCEPTS AND COMMENTARY

Jerrold H. Levy, M.D., F.A.H.A., F.C.C.M., Editor

Operating Room Crisis Checklists and Emergency Manuals

David L. Hepner, M.D., M.P.H., Alexander F. Arriaga, M.D., M.P.H., Sc.D., Jeffrey B. Cooper, Ph.D., Sara N. Goldhaber-Fiebert, M.D., David M. Gaba, M.D., William R. Berry, M.D., M.P.H., M.P.A., Daniel J. Boorman, B.S., Angela M. Bader, M.D., M.P.H.

Anesthesiology, V 127 • No 2 384 August 2017

Table 2. Failure to Adhere to Critical Steps in Management, According to the Presence or Absence of Checklists and the Scenario Type.

Scenario Type*	Failure Rate†		P Value‡
	With Checklists	Without Checklists	
	no./total no. (%)		
ACLS scenario	7/100 (7)	15/89 (17)	.005
ACLS scenario preceded by hemodynamically unstable condition	14/154 (9)	46/172 (27)	<0.001
Other crisis scenario	3/117 (3)	28/118 (24)	0.002

Arriaga AF et al. N Engl J Med. 2013;368(3):246-53.

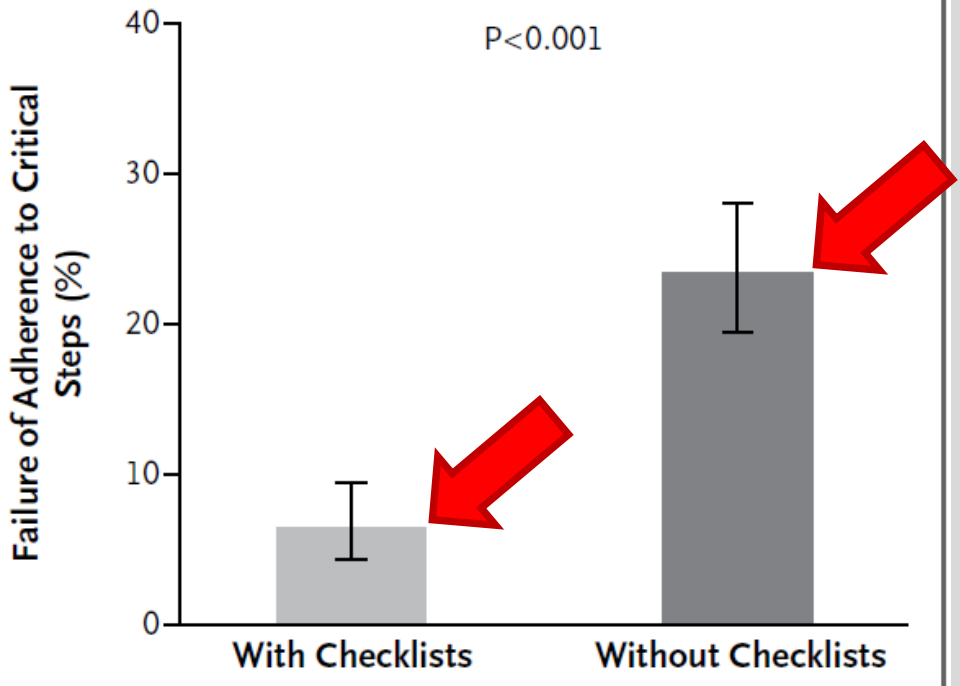


Figure 1. Association between Use or Nonuse of Operating-Room Crisis Checklists and Failure to Adhere to Critical Steps in Management.

The use of checklists during operating-room crises resulted in nearly a 75% reduction in failure to adhere to critical steps in management. Of 371 critical steps in the management of surgical crises, 24 (6%) were missed when the checklists were available, as compared with 89 of 379 steps (23%) missed when the checklists were not available. I bars indicate 95% confidence intervals.

CRISIS RESOURCE MANAGEMENT

Call for Help Early

- Call for help early enough to make a difference
- Err on the side of getting more help
- Mobilize early personnel with special skills if they may be needed

Designate Leadership

- Establish clear leadership
- Inform team members who is in charge
- 'Followers' should be active in asking who is leading

Establish Role Clarity

- Determine who will do what
- Assign areas of responsibility appropriate to knowledge, skills, and training
- Active followers may offer specific roles

Anticipate and Plan

- Plan & prepare for high work-load periods during low work-load periods
- Know where you are likely headed during the crisis and make backup plans early

Know the Environment

- Maintain situational awareness
- Know how things work and where things are
- Be aware of strengths and vulnerabilities of environment

Use All Available Information

- Monitor multiple streams of data and information
- Check and cross check information

Distribute the Workload

- Assign specific tasks to team members according to their abilities
- Revise the distribution if there is task overload or failure

Communicate Effectively

- Command and request clearly
- Seek confirmation of request (close the loop)
- Avoid "thin air" statements
- Foster input and atmosphere of open information exchange among all personnel

Allocate Attention Wisely

- Eliminate or reduce distractions
- Monitor for task saturation & data overload
- Avoid getting fixated
- Recruit others to help w/ monitoring

Mobilize Resources

- Activate all helpful resources including equipment and additional personnel

Use Cognitive Aids

- Be familiar with content, format, and location
- Support the effective use of cognitive aids

Management Pearls

A Brief Synopsis

HIGHLIGHTS

of the **2023 American Heart Association Focused Update on Adult Advanced Cardiovascular Life Support**: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

2023 Highlights

ECPR is “reasonable in selected patients” within an appropriate system of care
Emergent coronary angiography not recommended over delayed/selective *unless* STEMI, shock, ongoing issues
Select and maintain temperature 32 to 37.5 degrees Celsius
Trial a non-sedating antiseizure medication in survivors with EEG patters on the ictal-interictal continuum

Circulation

AHA FOCUSED UPDATE

2023 American Heart Association Focused Update on Adult Advanced Cardiovascular Life Support: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

AHA 2023

Perman SM, et al. *Circulation*. 2024;149(5):e254-e273. PMID: 38108133

VASOPRESSOR MEDICATIONS DURING CARDIAC ARREST

Vasopressor Management in Cardiac Arrest		
COR	**LOE**	**Recommendations**
1	B-R	1. We recommend that epinephrine be administered for patients in cardiac arrest.
2a	B-R	2. It is reasonable to administer epinephrine 1 mg every 3 to 5 minutes for cardiac arrest.
2a	C-LD	3. With respect to timing, for cardiac arrest with a nonshockable rhythm, it is reasonable to administer epinephrine as soon as feasible.
2b	B-R	4. Vasopressin alone or vasopressin+ methylprednisolone in combination with epinephrine may be considered in cardiac arrest but offers no advantage as a substitute for epinephrine.
2b	C-LD	5. With respect to timing, for cardiac arrest with a shockable rhythm, it may be reasonable to administer epinephrine after initial defibrillation attempts have failed.
3: No Benefit	B-R	6. High-dose epinephrine is not recommended for routine use in cardiac arrest.

NONVASOPRESSOR MEDICATIONS DURING CARDIAC ARREST

Nonvasopressor Medications		
COR	**LOE**	**Recommendations**
2b	B-R	1. Amiodarone or lidocaine may be considered for ventricular fibrillation/pulseless ventricular tachycardia that is unresponsive to defibrillation.
2b	C-LD	2. For patients with OHCA, use of steroids during CPR is of uncertain benefit.
3: No Benefit	B-R	3. Routine administration of calcium for treatment of cardiac arrest is not recommended.
3: No Benefit	B-R	4. Routine use of sodium bicarbonate is not recommended for patients in cardiac arrest.
3: No Benefit	B-R	5. Routine use of magnesium for cardiac arrest is not recommended.

AHA 2023

Perman SM, et al. *Circulation*. 2024;149(5):e254-e273. PMID: 38108133

Cardiac Arrest in the Operating Room: Resuscitation and Management for the Anesthesiologist: Part 1

Vivek K. Moitra, MD,* Sharon Einav, MD,† Karl-Christian Thies, MD,‡ Mark E. Nunnally, MD,§ Andrea Gabrielli, MD,‖ Gerald A. Maccioli, MD,¶ Guy Weinberg, MD,# Arna Banerjee, MD,** Kurt Ruetzler, MD,†† Gregory Dobson, MD,‡‡ Matthew D. McEvoy, MD,** and Michael F. O'Connor, MD, FCCM§§

Cardiac Arrest in the Operating Room: Part 2—Special Situations in the Perioperative Period

Matthew D. McEvoy, MD,* Karl-Christian Thies, MD, FRCA, FERC, DEAA,† Sharon Einav, MD,‡ Kurt Ruetzler, MD,§‖ Vivek K. Moitra, MD, FCCM,¶ Mark E. Nunnally, MD, FCCM,# Arna Banerjee, MD,* Guy Weinberg, MD,** Andrea Gabrielli, MD, FCCM,†† Gerald A. Maccioli, MD, FCCM,‡‡ Gregory Dobson, MD,§§ and Michael F. O'Connor, MD, FCCM‖‖

A Brief Comment on Progressive Shock

Comprehensive Algorithm

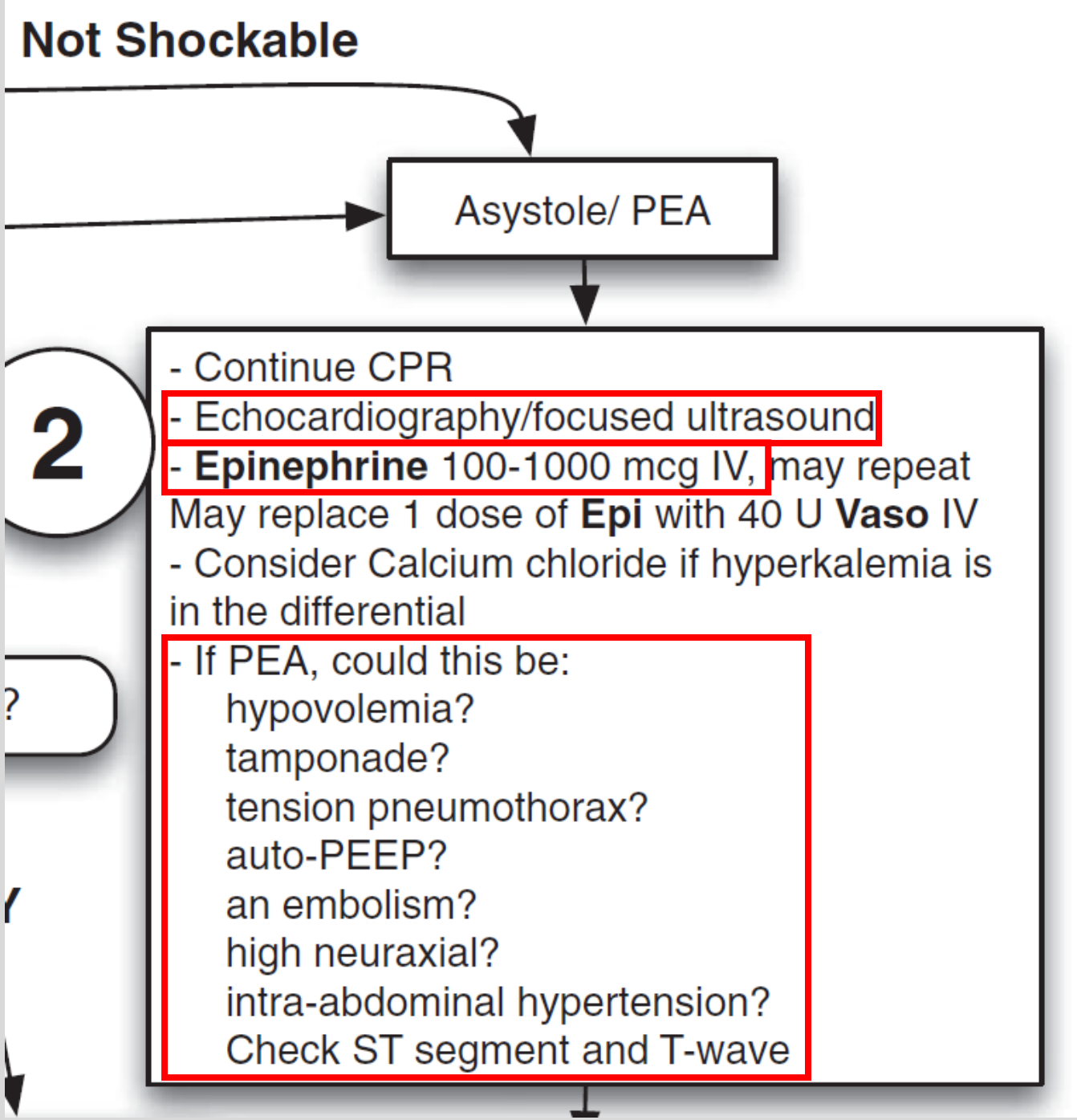
- Communicate change in status with surgeon/proceduralist. **Call for Help!**
- Check ECG, oximeter, capnometry, skin and field blood color, quick-check circuit
- Confirm ECG cardiac arrest: A-line tracing, pulse, plethysmograph, capnometer
- Call for help, defibrillator
- Hold surgery, discontinue anesthesia, ventilate with 100% O2, IVs wide open
- Start CPR at rate 100-120/min. Titrate to ET CO2 of > 20mm Hg, Diastolic BP > 40mm Hg
- Establish airway. **Avoid Hyperventilation!**

↓

- Could this be:
  - hypervagal vs hypovolemia?
  - gas/air embolism? thrombo/fat embolism?
  - local anesthetic toxicity?
  - hyperkalemia?

↓

Moitra VK, et al. *Anesth Analg*. 2018;126(3):876-888. PMID: 29135598



Moitra VK, et al. *Anesth Analg*. 2018;126(3):876-888. PMID: 29135598

Specific Circumstances

OR-Specific Circumstances and Questions

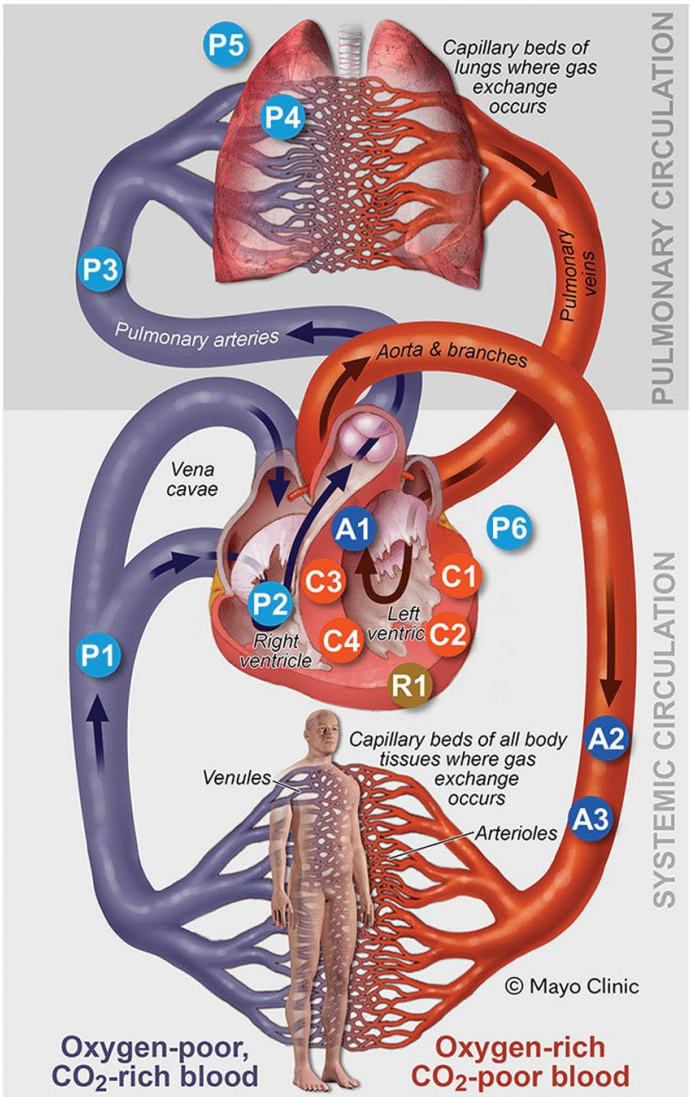
- I was asked by the meeting planners to touch on a few specific areas
- Each of these could be its own one-hour talk
- I’ll give you some QR codes for additional reading

Invasive Blood Pressure Monitoring

There are no high-quality human studies to determine optimal approaches guided by IABP monitoring.

- Having said that …
  - Do not stop for pulse checks if you have an arterial line
    - Clinicians are bad at feeling the carotid pulse (evidence-based statement)
  - The higher the diastolic blood pressure, the better
    - *At least* 15-20 mmHg, ideally ≥ 35 mmHg
  - "Ideal" systolic pressure, if any, is unclear. Perhaps ≥ 90 mmHg.
- **It has been *suggested* that CPR should be started for an arterial SBP of ≤ 50 mmHg**
  - NIBP *over-estimates* the blood pressure by 10 mmHg at aSBP of 60 mmHg (PMID 23269127)

Echocardiography: Narrowing the Differential



P =Preload crisis C =Contractility crisis A =Afterload crisis R =Rate & rhythm crisis

PRELOAD CRISIS

1. Hypovolemia (trauma, massive bleeding, anaphylaxis, major vein occlusion)
2. Right heart failure (myocardial ischemia, pulmonary hypertension, pulmonary embolism)
3. Pulmonary embolism (blood clot, gas [air, O_2, CO_2], surgical cement, fatty tissue, amniotic fluid)
4. Exaggerated PEEP
5. Tension pneumothorax
6. Cardiac tamponade

CONTRACTILITY CRISIS

1. Myocardial ischemia (low perfusion pressure, thrombosis, embolism [air, O_2, CO_2], spasm)
2. Myocardial hypoxia (desaturation, acute anemia)
3. Hydrogen ions (acidosis)
4. Takotsubo cardiomyopathy

AFTERLOAD CRISIS

1. LVOT obstruction (systolic anterior motion of the mitral leaflet)
2. Severe vasodilation (anaphylaxis, vasodilator overdose)
3. Severe vasoconstriction (vasoconstrictor overdose, pheochromocytoma)

RATE & RHYTHM CRISIS

1. Severe bradycardia
   Atrioventricular block
   Supraventricular tachycardia
   Atrial fibrillation
   Ventricular tachycardia & fibrillation

Potential causes

- Myocardial ischemia & hypoxia
- Hypokalemia & hyperkalemia
- Toxins & drugs
- Local anesthetic systemic toxicity
- Procedure-related stimulation
- Vasovagal response
- Hypoglycemia
- Hypothermia

bitly

Meng L, et al. *Anesth Analg*. 2024;138(6):1215-1232. PMID: 37788395

Local Anesthetic Systemic Toxicity Checklist

- Call for help
- Get LAST rescue kit
- Consider cardiopulmonary bypass team

\+ Consider administering LIPID EMULSION early

LIPID EMULSION 20%
The order of administration (bolus or infusion) and method of infusion (manually, iv roller clamp, or pump) are not critical

over 70 kg
- Bolus ~100 mL over 2-3 min
- Infuse ~250 mL over 15-20 min

IF PATIENT REMAINS UNSTABLE:
- Repeat bolus
- Double infusion

under 70 kg
- Bolus ~1.5 mL/kg over 2-3 min
- Infuse ~0.25 mL/kg/min (consider using a pump if <40 kg)

IF PATIENT REMAINS UNSTABLE:
- Repeat bolus
- Double infusion

Seizure?

- Ensure adequate airway
- Benzodiazepine preferred
- If only propofol available, use low dose, e.g., 20 mg increments

Arrhythmia or Hypotension?

BEWARE
LAST Resuscitation is DIFFERENT from Standard ACLS

EPINEPHRINE
- Smaller than normal dose preferred
- Start with ≤1 mcg/kg

AVOID
- Local anesthetics
- Beta-blockers
- Calcium channel blockers
- Vasopressin

Stable?

- Continue lipid emulsion ≥15 min once hemodynamically stable
- Maximum lipid dose: 12 mL/kg

Once Stable, OBSERVE
- 2 hrs after seizure
- 4-6 hrs after cardiovascular instability
- As appropriate after cardiac arrest

Neal JM, et al. *Reg Anesth Pain Med*. 2021;46(1):81-82. PMID: 33148630

MH

Eliminate the Trigger

- Hyperventilate
- Carbon filters
- Flush circuit

Dantrolene 2.5 mg/kg

- Conventional: 9 vials (70 kg)
- Ryanodex: single vial

Treat Hyperkalemia

- Calcium
- Bicarb 1-2 mEq/kg
- Insulin and dextrose

Arrythmias

- Standard ACLS
- Avoid CCBs

Peri-operative anaphylaxis

For anaesthetists/intensivists

A = Airway **B** = Breathing **C** = Circulation **D** = Disability **E** = Exposure

Diagnosis – look for:

- Unexplained hypotension, tachycardia, bradycardia, bronchospasm (wheeze may be absent if severe)
- Unexpected cardiorespiratory arrest where other causes are excluded
- Skin signs are often absent in severe reactions

Call for HELP

Stop/remove non-essential surgery. Call for cardiac arrest trolley

Stop/remove suspected triggers if possible

e.g. Antibiotics, NMBAs, dyes, colloids, chlorhexidine coated lines/catheters, lubricants , latex

Give initial IV bolus of adrenaline

Adult and child > 12 years: 50 micrograms IV (0.5 mL IV of 1 mg/10 mL [1:10,000])

Child < 12 years: 1 microgram/kg, needs careful dilution, titrate to effect

If no IV access: 10 micrograms/kg IM, (max 500 micrograms IM) of 1 mg/mL (1:1,000), and secure IV/IO access

If in doubt, give adrenaline

&

Give rapid IV fluid bolus

Adult and child > 12 years: 500–1000 mL

Child < 12 years: 20 mL/kg

- Multiple fluid boluses may be needed (e.g. up to 3-5 L in adults, 60-100 mL/kg in children)
- Avoid colloid

If poor response to adrenaline boluses, start IV infusion*

Involve ICU team early

If systolic BP < 50 mmHg or cardiac arrest, start CPR

A B = Airway/Breathing

Give 100% oxygen Ensure sustained $ETCO_2$ trace. Change to inhalational anaesthetic if appropriate.

Severe/persistent bronchospasm:

- Exclude oesophageal intubation
- Check patent airway and anaesthetic circuit
- Nebulised salbutamol and ipratropium
- Consider IV bronchodilator

C = Circulation

Hypotension may be resistant, requiring prolonged treatment with large volume resuscitation

- Give further fluid boluses, titrate to response
- Consider head-down table-tilt or elevating legs
- Establish invasive monitoring as soon as practical

IF REFRACTORY TO ADRENALINE INFUSION:

- Add a second vasopressor (noradrenaline or vasopressin) **in addition** to adrenaline
- Consider glucagon 1 mg IV in adults on beta-blockers
- Consider steroids for refractory reactions or shock
- Consider extracorporeal life support

Immediate follow-up

- Take blood (clotted) for serum tryptase once stable
- Request further samples 1–4 hours after onset of symptoms, and at least 24 hours later
- Complete allergy referral form: **bit.ly/NAP6referral**
- If surgery is urgent or time-critical and patient is stable, proceed with surgery but avoid suspected triggers
- Refer fatal cases to **bit.ly/UKFAR**

***Use local protocol for adrenaline infusion**

(Peripheral infusion recommended if no central venous access)

OR

Peripheral low-dose IV adrenaline infusion (if no local protocol):

0.5 mg (0.5 mL of 1 mg/mL [1:1000]) in 50 mL

- In both adults and children, start at 0.5–1.0 mL/kg/hour, and **titrate according to clinical response**
- Continuous monitoring and observation is mandatory

Resuscitation Council UK

Association of Anaesthetists

BSACI Improving Allergy Care through education, training and research

British Society for Immunology CIPN Clinical Immunology Professional Network

RCoA Royal College of Anaesthetists

Perioperative Allergy Network

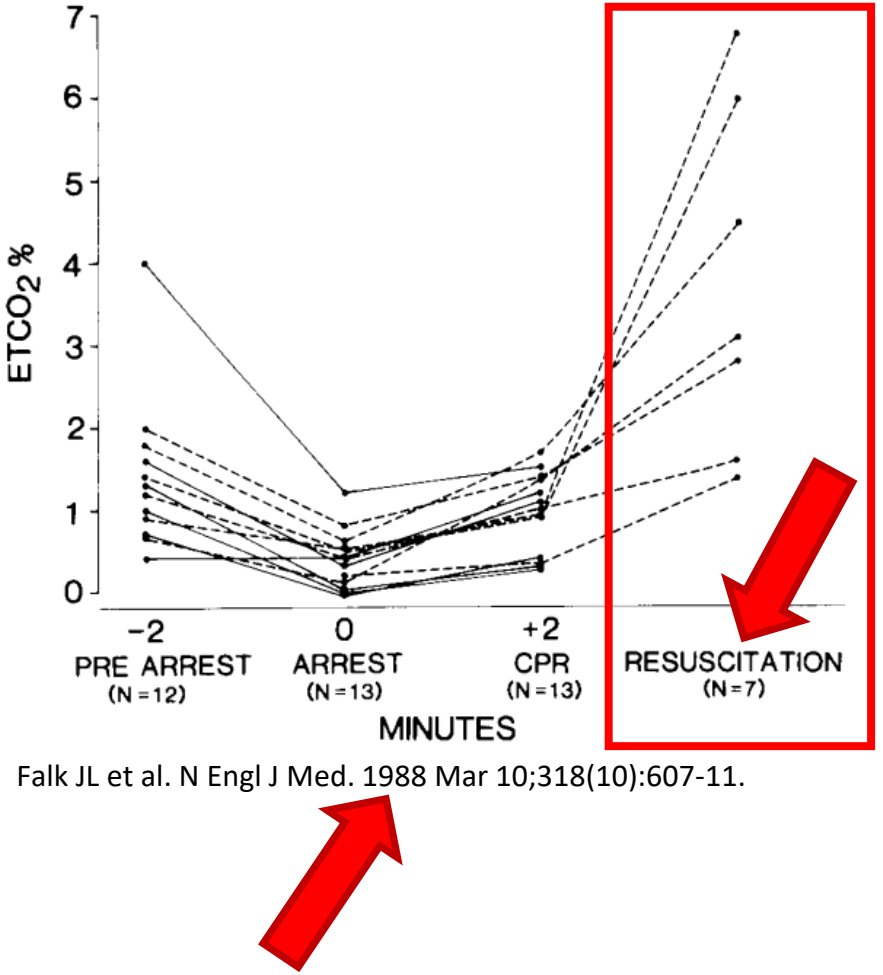
bitly

Dodd A, et al. *Anaesthesia*. 2024;79(5):535-541. PMID: 38205901

Back to Our Regular Programming

Best Practices During Resuscitation: $EtCO_2$

- End-tidal carbon dioxide
  - ROSC
    - Can precede meaningful BP or palpable pulse
  - Adequacy of chest compressions
    - 10 mm chest compression depth → ↑EtCO2 by 1.4 mmHg
  - Prognosis
    - $EtCO_2$ > 10 mmHg generally associated with ROSC
    - Immediate $EtCO_2$ or 20 min $EtCO_2$ > 20 more strongly associated
    - **$EtCO_2$ < 10 mmHg after 20 min = 0.5% likelihood of ROSC (Paiva 2018)**



Falk JL et al. N Engl J Med. 1988 Mar 10;318(10):607-11.

JAMA | Original Investigation

Effect of Vasopressin and Methylprednisolone vs Placebo on Return of Spontaneous Circulation in Patients With In-Hospital Cardiac Arrest
A Randomized Clinical Trial

Lars W. Andersen, MD, MPH, PhD, DMSc; Dan Isbye, MD, PhD; Jesper Kjærgaard, MD, PhD, DMSc;

Exploratory

Figure 2. Subgroups Results for Return of Spontaneous Circulation

	No./total (%)					
	Vasopressin and methylprednisolone	Placebo	Risk difference, % (95% CI)	Favors placebo / Favors intervention	Risk ratio (95% CI)	Favors placebo / Favors intervention
Overall	100/237 (42)	86/264 (33)	9.6 (1.1 to 18)		1.30 (1.03 to 1.63)	
Initial rhythm						
Shockable	15/21 (71)	15/31 (48)	23 (-4.7 to 47)		1.48 (0.92 to 2.38)	
Nonshockable	85/216 (39)	71/233 (30)	8.9 (0 to 18)		1.29 (1.00 to 1.67)	
Witnessed						
Yes	79/168 (47)	75/202 (37)	9.9 (-0.2 to 20)		1.27 (1.00 to 1.61)	
No	21/69 (30)	11/62 (18)	13 (-2 to 27)		1.72 (0.92 to 3.28)	
Age, y						
>72	45/127 (35)	33/122 (27)	8.4 (-3 to 20)		1.31 (0.90 to 1.91)	
≤72	55/110 (50)	53/142 (37)	13 (0.3 to 25)		1.34 (1.01 to 1.78)	
Time from arrest to trial drug, min						
>8	38/115 (33)	41/135 (30)	2.7 (-8.8 to 14)		1.09 (0.75 to 1.56)	
≤8	62/122 (51)	45/129 (35)	16 (3.7 to 28)		1.46 (1.09 to 1.96)	

Andersen LW, et al. *JAMA*. 2021;326(16):1586-1594. PMID: 34587236

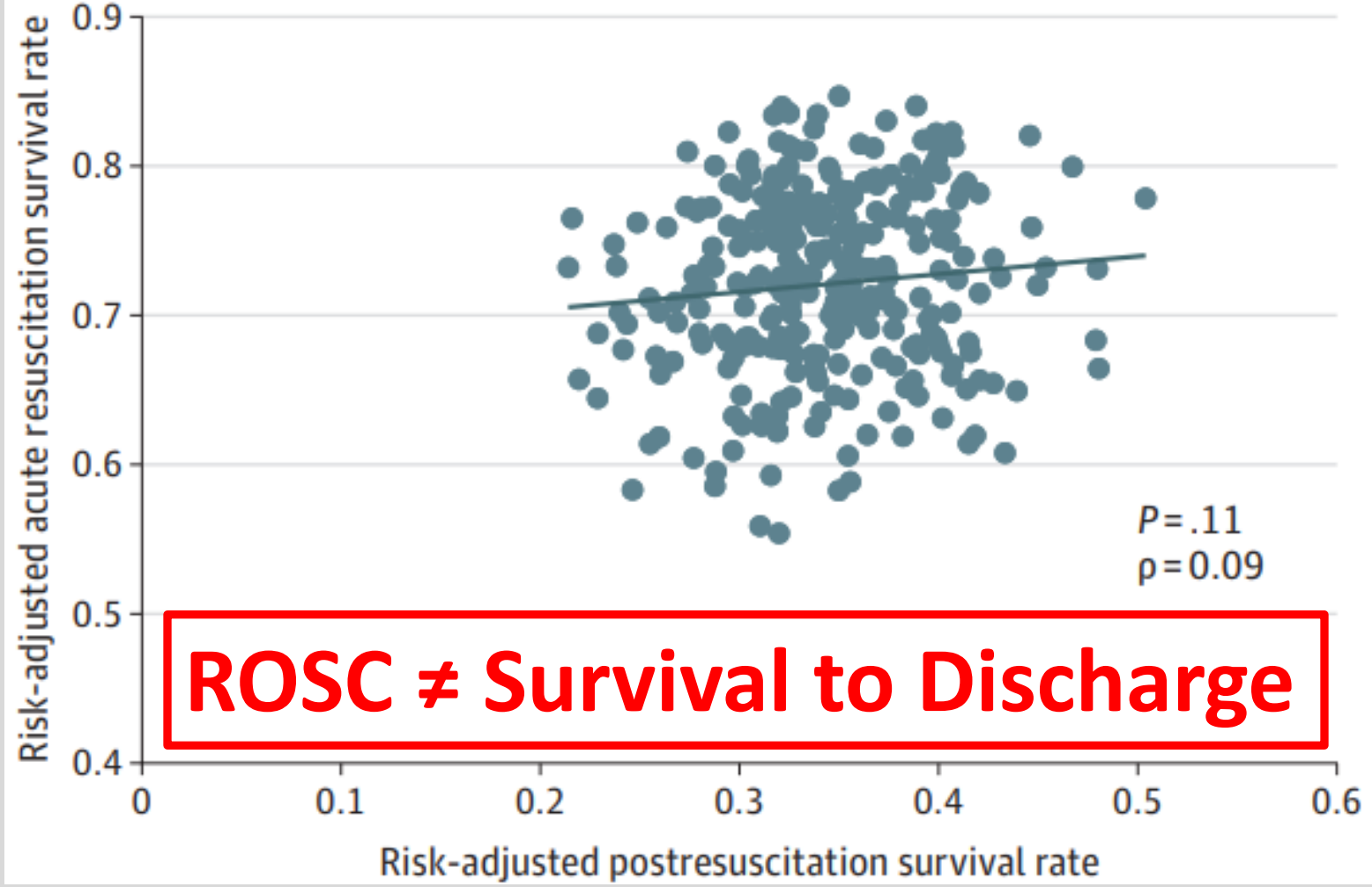
Post-Arrest Management

Improving Long-Term Outcomes

Original Investigation | Cardiology

Association of Hospital-Level Acute Resuscitation and Postresuscitation Survival With Overall Risk-Standardized Survival to Discharge for In-Hospital Cardiac Arrest

C Acute resuscitation survival vs postresuscitation survival



ROSC ≠ Survival to Discharge

Girotra S, et al. *JAMA Netw Open*. 2020;3(7):e2010403. PMID: 32648925

Neurologic injury is the main cause of mortality and eventual morbidity and functional limitation in survivors

Neurologic Considerations

- **Neurologic injury is the main cause of mortality and eventual morbidity/functional limitations in survivors**
- **Hyperthermia must be avoided**: each 1°C over 37°C confers a 2-fold increased risk of death (Zeiner 2001)
- **What about hypothermia?**

Is Cooling Still Hot?

Lascarrou 2019 (HYPERION)

- Non-shockable OHCA
- Randomized to 33°C vs 37°C
- 584 patients
- Comparable mortality (80%)
- Better functional outcomes at 90d (with a small sample size)
- Comparable adverse events

Dankiewicz 2021 (TTM2)

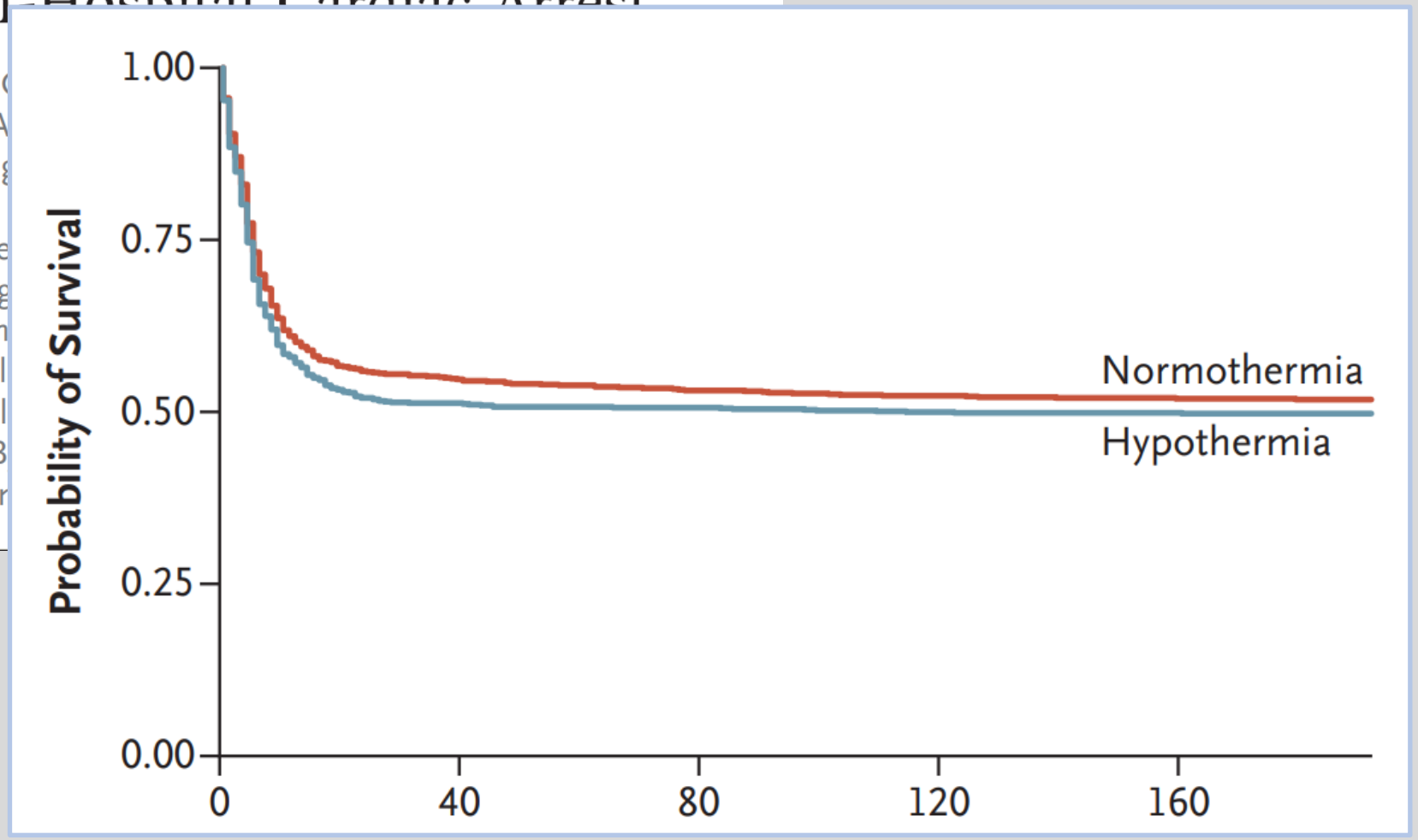
- All OHCA (75% shockable)
- Randomized to 33°C vs. “37°C”
- 1900 patients
- Comparable mortality (50%)
- Comparable functional outcomes
- Hypothermia → arrhythmia (24% vs. 17%)

ORIGINAL ARTICLE

Hypothermia versus Normothermia after Out-of-Hospital Cardiac Arrest

J. Dankiewicz, T. Cronberg, [illegible]
M.P. Wise, M. Oddo, A[illegible]
H. Kirkegaard, P.J. Young
C. Callaway, G.M. Eastwood, [illegible]
M.S. Chew, J. Hollenbe[illegible]
S. Christensen, M. Haeng[illegible]
T.R. Keeble, G.V. Karam[illegible]
M. Maggiorini, P.D. Wendel[illegible]
C. Leithner, S. Abed-Maill[illegible]
A. Awad, P. McGuigan, R. B[illegible]
T. Lange, H. Friberg, ar[illegible]

- 1850 patients
- 33°C vs. ≤37.7°C



Dankiewicz J, et al. *N Engl J Med*. 2021;384(24):2283-2294. PMID: 34133859

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Bottom line: TTM2 raises the question of efficacy in all survivors
However, TTM is (currently) recommended

ICM RAPID PRACTICE GUIDELINE

ERC-ESICM guidelines on temperature control after cardiac arrest in adults

Claudio Sandroni[1,2*], Jerry P. Nolan[3,4], Lars W. Andersen[5,6,7], Bernd W. Böttiger[8], Alain Cariou[9], Tobias Cronberg[10], Hans Friberg[11], Cornelia Genbrugge[12,13], Gisela Lilja[10], Peter T. Morley[14], Nikolaos Nikolaou[15], Theresa M. Olasveengen[16], Markus B. Skrifvars[17], Fabio S. Taccone[18] and Jasmeet Soar[19]

LOW

We **recommend** actively preventing fever (defined as a temperature > 37.7°C) in post-cardiac arrest patients who remain comatose.

GOOD PRACTICE

There is currently insufficient evidence to recommend for or against temperature control at 32-36°C in sub-populations of cardiac arrest patients or using early cooling, and future research may help elucidate this. We **recommend not** actively rewarming comatose patients with mild hypothermia after ROSC to achieve normothermia.

Sandroni C, et al. *Intensive Care Med*. 2022;48(3):261-269. PMID: 35089409

Performance of Temperature Control		
COR	LOE	Recommendations
1	B-R	1. We recommend selecting and maintaining a constant temperature between 32°C and 37.5°C during postarrest temperature control.
1	B-NR	2. We recommend hospitals develop protocols for postarrest temperature control.
2a	B-NR	3. It is reasonable that temperature control be maintained for at least 24 h after achieving target temperature.
2b	B-NR	4. There is insufficient evidence to recommend a specific therapeutic temperature for different subgroups of cardiac arrest patients.
2b	C-LD	5. It may be reasonable to actively prevent fever in patients unresponsive to verbal commands after initial temperature control.
2b	C-EO	6. Patients with spontaneous hypothermia after ROSC unresponsive to verbal commands should not routinely be actively or passively rewarmed faster than 0.5°C per hour.

AHA 2023

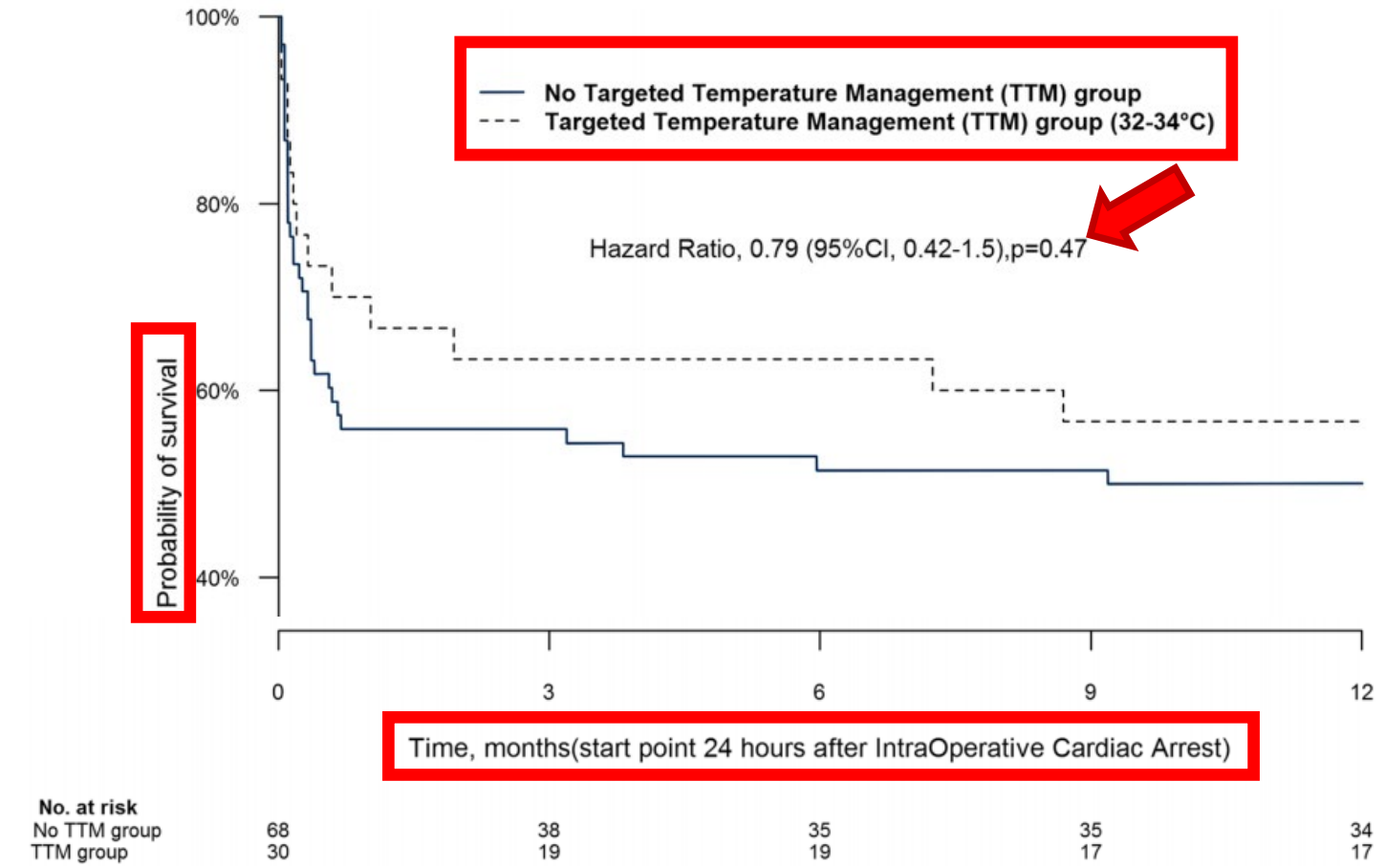
Perman SM, et al. *Circulation*. 2024;149(5):e254-e273. PMID: 38108133

Perioperative Hypothermia: Practical?

- Coagulopathy
  - Incidence ≤ 20% (Jarrah 2011)
  - Worse below 35°C; can rewarm
- Infection
- Insulin resistance
- Hyperglycemia

Constant 2017

- Only 30% of 101 IOCAs underwent TTM
- 2x infection rate



Constant AL, et al. Intensive Care Med. 2017 Apr;43(4):485-495

Neurologic Considerations

- **Neurologic injury is the main cause of mortality and eventual morbidity/functional limitations in survivors**
- Always avoid temperatures > 37.5°C, and…
  - If deep coma (i.e. no motor response or brainstem reflexes), evidence of cerebral edema, malignant EEG
    - 33°C x24 hours → re-warm 0.25 to 0.5°C/hour
  - In less practiced centers and/or none of the above (i.e. some motor response)
    - ≤ 36-37.5°C x24 hours → re-warm 0.25 to 0.5°C/hour
- EEG should be performed in comatose patients
- Trial of antiepileptics when EEG c/w ictal-interictal continuum
- Early (non-contrast) CT imaging of the head

Cardiovascular Considerations

- **Circulatory failure is the 2nd leading cause of death after ROSC**
- 12-lead EKG
  - Evidence of ischemia (to include new LBBB)
- Echocardiography
- PCI and early consultation with an interventional cardiologist
  - **Emergent** if EKG evidence of STEMI, *potentially emergent* when…
  - Continued hemodynamic instability
  - Focal wall motion abnormalities by echo
  - Consider if no obvious non-cardiac etiology
- Temporize hemodynamics (SBP > 90 – 100 mmHg; **MAP > 65 – 70 mmHg**)
  - Restore euvolemia
  - Norepinephrine is the vasopressor of choice
  - Consider inotropes based on echocardiography
  - Antiarrhythmics as needed

Coronary Angiography

- Lemkes et al. 2019
  - Multicenter RCT
  - 552 patients with out-of-hospital non-STEMI cardiac arrest
  - Immediate (2 hrs) vs. delayed coronary angiography (122 hrs)
  - Equivalent clinical outcomes
  - Interesting findings:
    - No disease: ~35%
    - Acute lesions: ~20% patients
    - CTO: ~35% patients

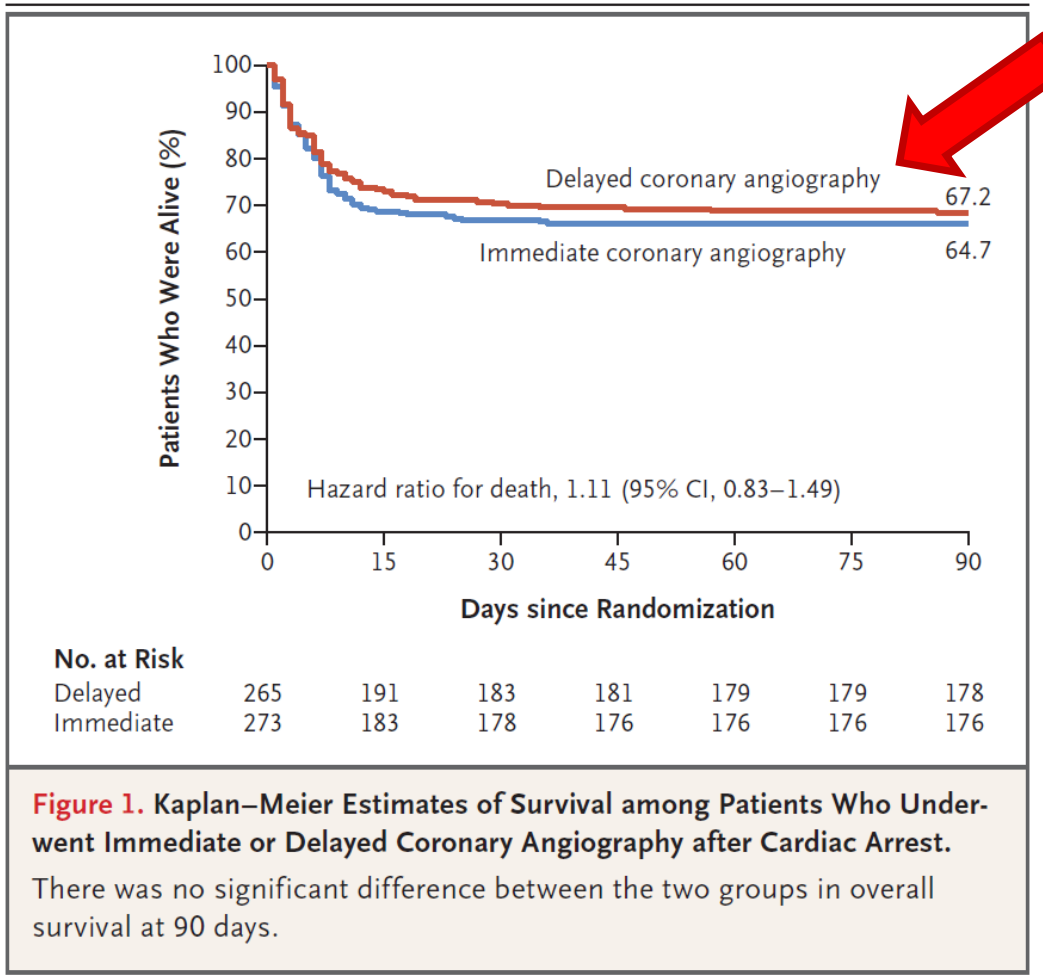


Figure 1. Kaplan–Meier Estimates of Survival among Patients Who Underwent Immediate or Delayed Coronary Angiography after Cardiac Arrest.

There was no significant difference between the two groups in overall survival at 90 days.

Lemkes JS et al. N Engl J Med. 2019 Apr 11;380(15):1397-1407

PERCUTANEOUS CORONARY INTERVENTION AFTER CARDIAC ARREST

Percutaneous Coronary Intervention After Cardiac Arrest		
COR	**LOE**	**Recommendation**
1	B-NR	1. Coronary angiography should be performed emergently for all cardiac arrest patients with suspected cardiac cause of arrest and ST-segment elevation on electrocardiogram.
2a	B-NR	2. Emergent coronary angiography is reasonable for selected adult patients without ST-elevation on electrocardiogram but with elevated risk of significant coronary artery disease where revascularization may provide benefit, such as those with shock, electrical instability, signs of significant ongoing myocardial damage, or ongoing ischemia.
2a	C-LD	3. Independent of a patient's neurologic status, coronary angiography is reasonable in all post–cardiac arrest patients for whom coronary angiography is otherwise indicated.
3: No Benefit	B-R	4. Emergent coronary angiography is not recommended over a delayed or selective strategy in patients with ROSC after cardiac arrest in the absence of ST-segment elevation, shock, electrical instability, signs of significant myocardial damage, and ongoing ischemia.

AHA 2023

Perman SM, et al. *Circulation*. 2024;149(5):e254-e273. PMID: 38108133

Pulmonary Considerations

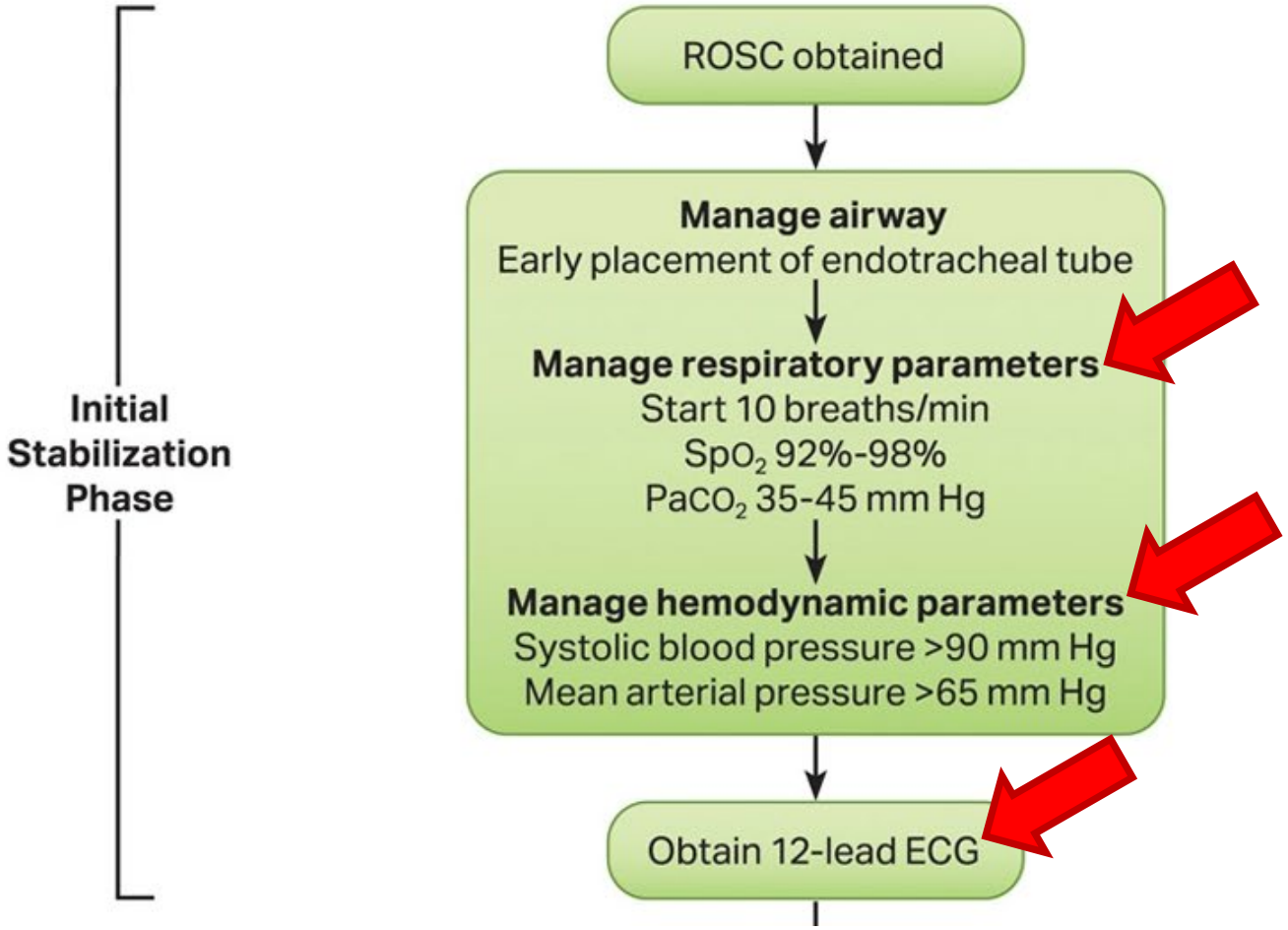
- Lung protective ventilation
  - 6 ml/kg PBW
  - Limit plateau pressures < 30 cmH2O
  - Avoidance of over-zealous PEEP
- Normocapnia (McKenzie 2017)
- *Consider* avoiding hyperoxia (PaO2 > 300 mmHg)
- Confirm location of tubes and lines with radiography
  - Rule-out pneumothorax

Metabolic and Other Considerations

- Glycemic control: 140 to 180 mg/dL (Longstreth 1986, Skrifvars 2003)
- Immediate hyperkalemia is common
  - This typically self-corrects through endogenous catecholamines and acid/base normalization
- Raise the head of the bed to 30°
- Consider empiric antibiotics (François 2019)
- VTE and stress ulcer prophylaxis where appropriate

2020 ACC/AHA Guidelines: Initial Management

Adult Post–Cardiac Arrest Care Algorithm



Panchal AR et al. Circulation. 2020 Oct 21;142(16S2):S366-S468

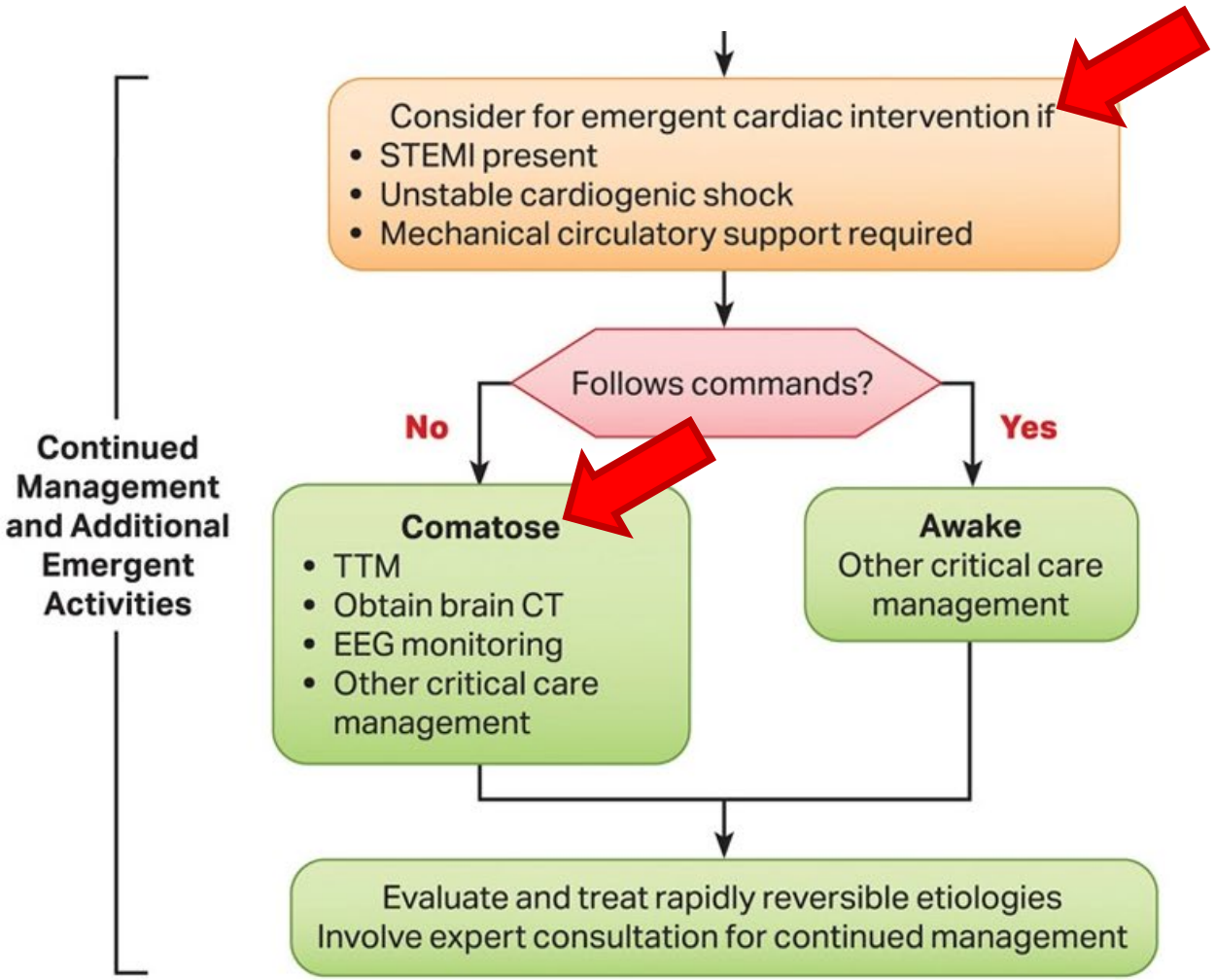
Initial Stabilization Phase

Resuscitation is ongoing during the post-ROSC phase, and many of these activities can occur concurrently. However, if prioritization is necessary, follow these steps:

- Airway management: Waveform capnography or capnometry to confirm and monitor endotracheal tube placement
- Manage respiratory parameters: Titrate FIO_2 for SpO_2 92%-98%; start at 10 breaths/min; titrate to $PaCO_2$ of 35-45 mm Hg
- Manage hemodynamic parameters: Administer crystalloid and/or vasopressor or inotrope for goal systolic blood pressure >90 mm Hg or mean arterial pressure >65 mm Hg

2020 ACC/AHA Guidelines: Initial Management

Panchal AR et al. Circulation. 2020 Oct 21;142(16S2):S366-S468



Continued Management and Additional Emergent Activities

These evaluations should be done concurrently so that decisions on targeted temperature management (TTM) receive high priority as cardiac interventions.

- Emergent cardiac intervention: Early evaluation of 12-lead electrocardiogram (ECG); consider hemodynamics for decision on cardiac intervention
- TTM: If patient is not following commands, start TTM as soon as possible; begin at 32-36°C for 24 hours by using a cooling device with feedback loop
- Other critical care management
  - Continuously monitor core temperature (esophageal, rectal, bladder)
  - Maintain normoxia, normocapnia, euglycemia
  - Provide continuous or intermittent electroencephalogram (EEG) monitoring
  - Provide lung-protective ventilation

RESUSCITATION 161 (2021) 152 –219

Available online at www.sciencedirect.com

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

European Resuscitation Council Guidelines 2021: Cardiac arrest in special circumstances

Carsten Lott[a,], Anatolij Truhlář[b,c], Annette Alfonzo[d], Alessandro Barelli[e], Violeta González-Salvado[f], Jochen Hinkelbein[g], Jerry P. Nolan[h,i], Peter Paal[j], Gavin D. Perkins[k,l], Karl-Christian Thies[m], Joyce Yeung[k,l], David A. Zideman[n], Jasmeet Soar[o], the ERC Special Circumstances Writing Group Collaborators[1]*

- Recognise cardiac arrest by continuous monitoring.
- Inform the surgeon and the theatre team. Call for help and the defibrillator.
- Initiate high-quality chest compressions and effective ventilation.
- Follow the ALS algorithm with a strong focus on reversible causes, especially hypovolaemia (anaphylaxis, bleeding), hypoxia, tension-pneumothorax, thrombosis (pulmonary embolism).
- Use ultrasound to guide resuscitation.
- Adjust the height of the OR table to enable high-quality CPR.
- Check the airway and review the EtCO2 tracing.
- Administer oxygen with a FiO2 1.0.
- Open cardiac compression should be considered as an effective alternative to closed chest compression.
- Consider ECPR as a rescue therapy for selected patients with cardiac arrest when conventional CPR is failing.

Lott C, et al. *Resuscitation*. 2021;161:152-219. PMID: 33773826

Concluding Thoughts on Optimizing Outcomes

- Determine and treat the cause of the arrest
  - An ounce of prevention is worth a pound of cure
  - Don’t neglect capnography
  - Consider the cath lab when indicated
- Minimize injury to the brain
  - Targeted temperature management
- Manage cardiovascular dysfunction and the sequelae of ischemia and reperfusion

Thank You

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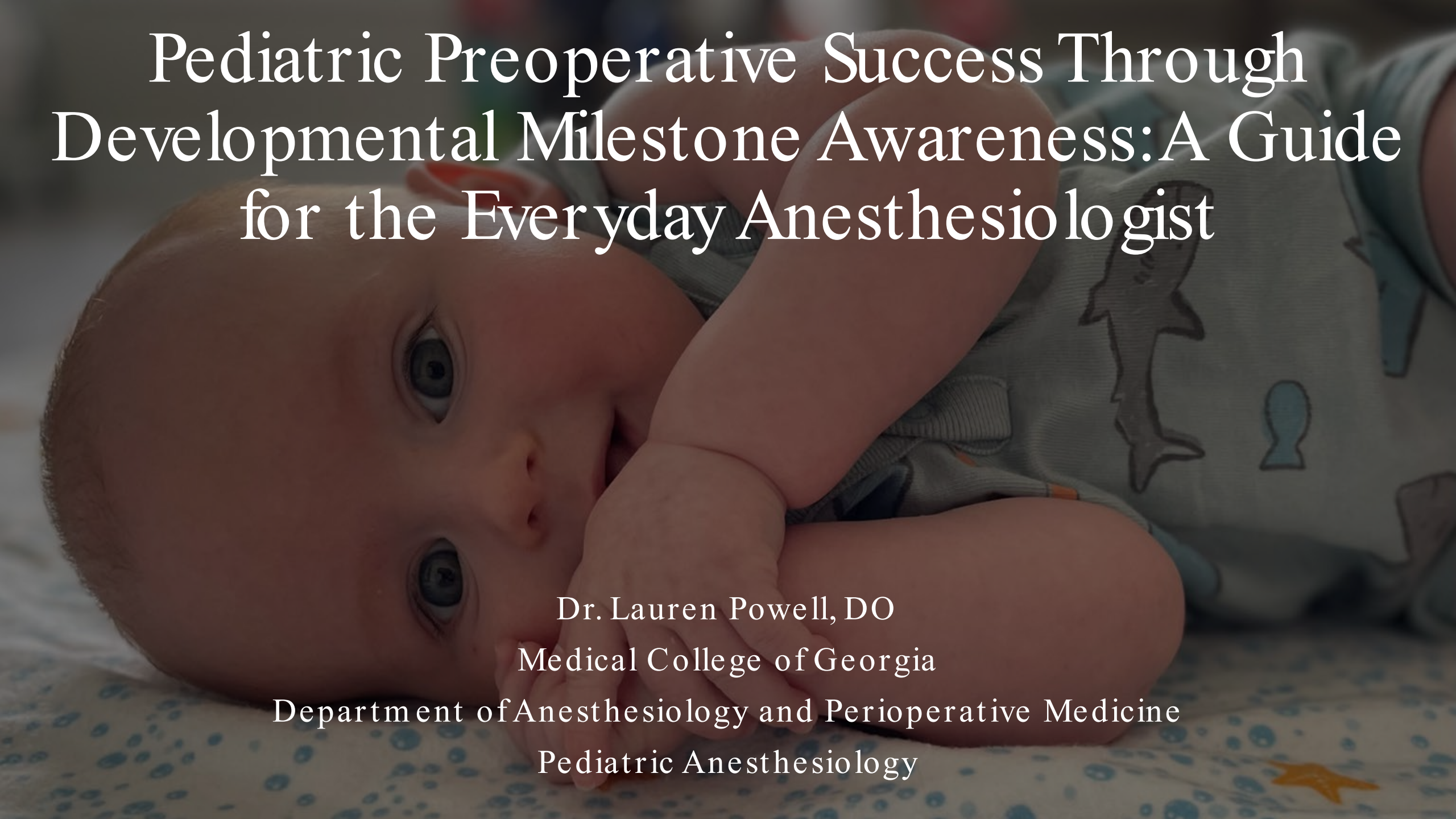
MORE VIDEOS

Pediatric Preoperative Success Through Developmental Milestone Awareness: A Guide for the Everyday Anesthesiologist



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Medical College of Georgia
Department of Anesthesiology and Perioperative Medicine
Pediatric Anesthesiology

I have no disclosures

Goals & Objectives

- Why is developmental awareness important
- Identify key stages of pediatric cognitive and psychosocial development from infancy through adolescence
- Explain how cognitive and psychosocial development influences pediatric patients' understanding of medical procedures
- Adapt preanesthetic communication strategies based on patient's developmental stage
- Design and implement age-appropriate preanesthetic assessment techniques for pediatric patients


W
H
Y

40-60% of children report perioperative anxiety

Misinterpretation of Medical Lingo

Volume 155, Issue 1
1 January 2025

PEDIATRICS PERSPECTIVES | DECEMBER 11 2024

Children's Understanding of Commonly Used Medical Terminology

Rheanne Maravelas, MD; Zachary Linneman, MD; Jordan Marmet, MD; Marissa A. Hendrickson, MD; Scott Lunos, MS; Emily Hause, MD, MPH; Alexis Quade, MD; Katherine Allen, MD; Michelle M. Kelly, MD, PhD; Sage Marmet; Brett Norling, MD; Aarabhi S. Rajagopal, MD; Madeline Suk, BS; Michael Pitt, MD

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Pediatrics (2025) 155 (1): e2024067871.
https://doi.org/10.1542/peds.2024-067871 **Article history**

Methods

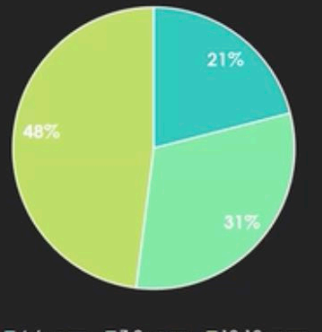
Setting	Population	Instruments	Consent
• Minnesota State Fair 	• Children aged 4-12 years old • English-speaking	• 11-question survey • Parents provided demographic information	• Children gave verbal assent • Parents provided consent

Photograph taken by an author, used with permission

PEDIATRICS

Respondents

Age Group



100 Survey respondents

13% Previously hospitalized

58% Girls

24% Live with a medical professional

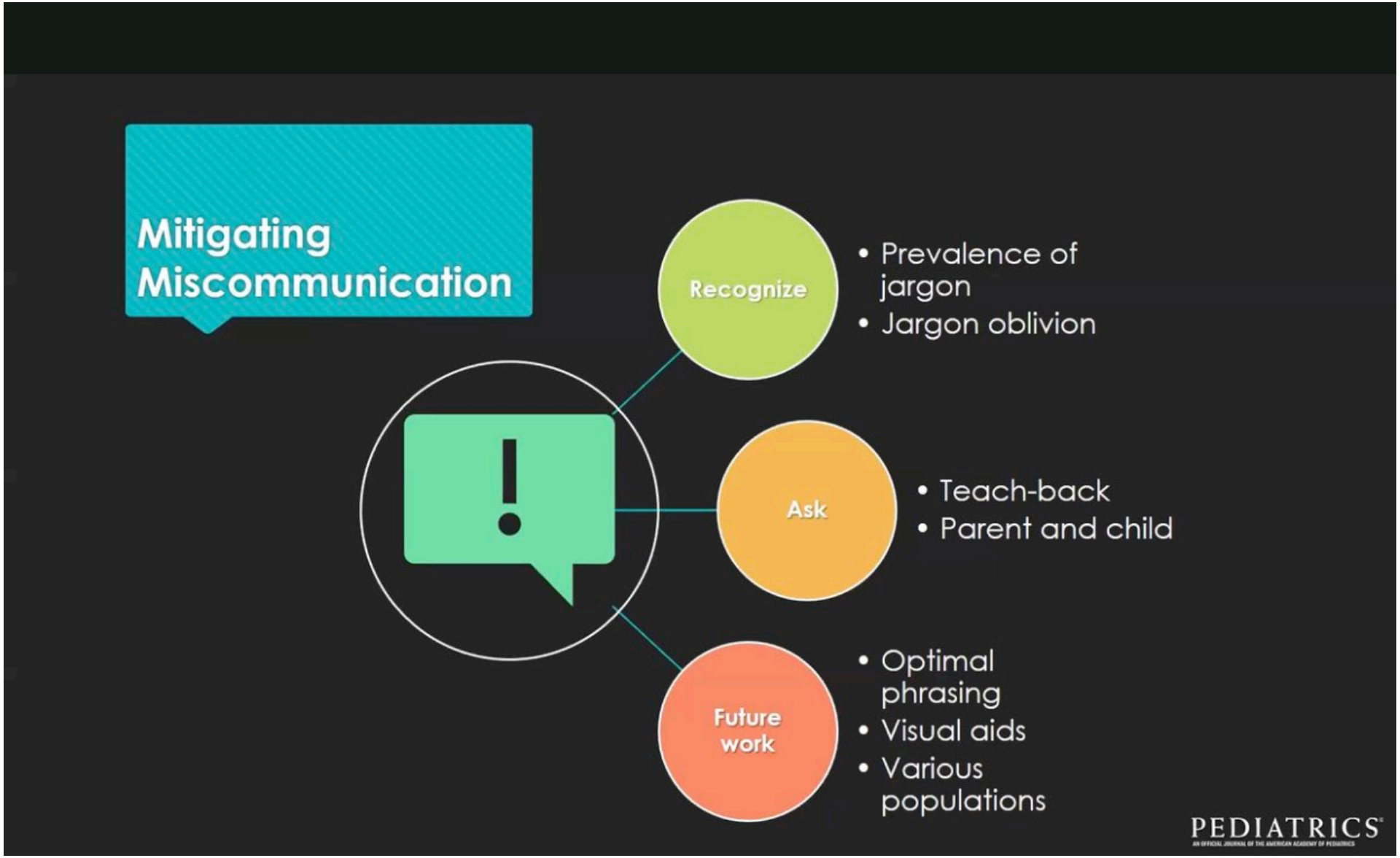
PEDIATRICS

Question Stem – "If the doctor said… What do you think they mean?"	Correct	Partially Correct	Incorrect
"[Your COVID test] results were negative."	86%	0%	14%
"We ran the test for strep throat, and it was negative"	83%	0%	17%
"We are going to draw some blood now"	69%	8%	23%
"We will need to put you to sleep"	63%	24%	13%
"We are going to get a CAT scan to look in your brain"	54%	10%	36%
"We don't have any beds in the hospital right now"	33%	13%	54%
"We are going to put in an IV now"	23%	16%	61%
"We are going to do a test"	22%	48%	29%
"We will transfer you to the floor soon"	17%	14%	69%
You asked if you could eat, and the nurse said "The doctor needs to put in a diet for you"	14%	43%	43%
"We are going to have surgery come see you today"	8%	6%	86%

PEDIATRICS

Key Jargon Phrase	Examples of Incorrect Answers
COVID test "negative"	"You have COVID." "You have it."
Strep test "negative"	"Do have strep throat." "Have it."
"We are going to draw some blood"	"Color blood." "They are going to take my blood to give to people who lost blood."
"We will need to put you to sleep"	"It means you need to go to bed so you can rest." "I'll be put down like I'm going to die."
"We are going to get a CAT scan to look in your brain"	"That I have brain cancer maybe. Or maybe if I'm really old I have Alzheimer's." "Cats have good smell and vision so maybe testing that."
"We don't have any beds in the hospital right now"	"I would have to stay the night but they don't have any beds so Dad would go home and get our cot." "You have to sleep on the floor."
"We are going to put in an IV now"	"Have to get scanned." "International vaccine."
"We are going to do a test"	"Like a test at school." "Take out all the blood."
"We will transfer you to the floor soon"	"Sleep on the floor." "They are going to give you a sleeping bag."
"The doctor needs to put in a diet for you"	"Give me something healthy or bad tasting." "They want me to lose weight."
"We are going to have surgery come see you today"	"I'm going to get surgery." "They are opening up your body because there is something wrong inside and then they will sew it back."

PEDIATRICS


Mitigating Miscommunication
Recognize
• Prevalence of jargon
• Jargon oblivion
Ask
• Teach-back
• Parent and child
Future work
• Optimal phrasing
• Visual aids
• Various populations
PEDIATRICS

Developmental and chronological age are often very different

Developmental Milestones

Gross Motor	Fine Motor	Language	Personal-social	Cognitive

Jean Piaget

Aug 9, 1896 – Sep 16, 1980

Jean Piaget: Stages of Cognitive Development

Sensorimotor

Birth to 2 years

Preoperational

2 - 7 years

Concrete Operational

7 - 11 years

Formal Operational

Adolescence to adulthood

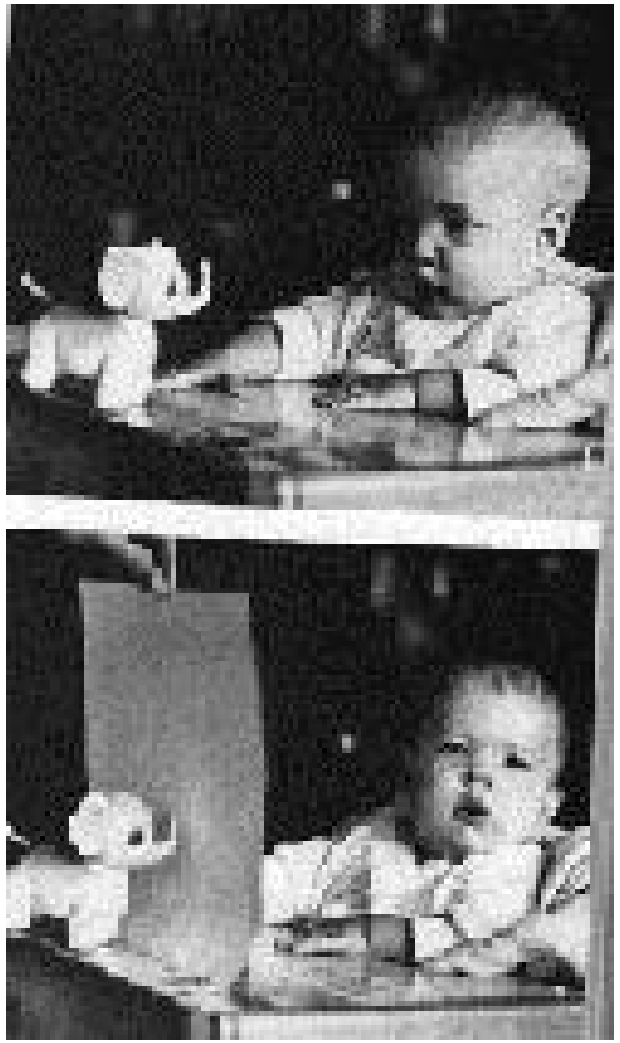
Erik Erikson

Jun 15, 1902 – May 12, 1994

Erikson: Stages of Psychosocial Development

Stage	Period	Personality Attributes	Age
1	Early Infancy	Trust vs. Mistrust	1–2
2	Toddler	Autonomy vs. Shame and Doubt	2–4
3	Early Childhood	Initiative vs. Guilt	4–7
4	Middle Childhood	Industry vs. Inferiority	7–11
5	Adolescence	Identity vs. Identity Confusion	11–18
6	Young Adulthood	Intimacy vs. Isolation	18–29
7	Middle Adulthood	Generativity vs. Stagnation	29–48
8	Older Adulthood	Integrity vs. Despair	48–78+

P



Sensorimotor Stage

Goal: Object Permanence

Birth to 2 years

E

Stage 1: Infancy

Trust vs. Mistrust

Separation anxiety & Caregiver Preparation

Anesthetic Implications

Sensory Distractions

Key Points for Infants

1. Caregiver preparation
2. Encourage caregiver involvement
3. Sensory distraction techniques and items
4. Help the infant feel safe
5. Security item

P

Preoperational Stage

Pretend Play & Egocentrism

2 – 7 years

E

Stage 2:Toddler

Autonomy vs.
Shame and Doubt

E

Stage 3: Early Childhood

Initiative vs. Guilt

Appearance over Logic

Promoting Autonomy

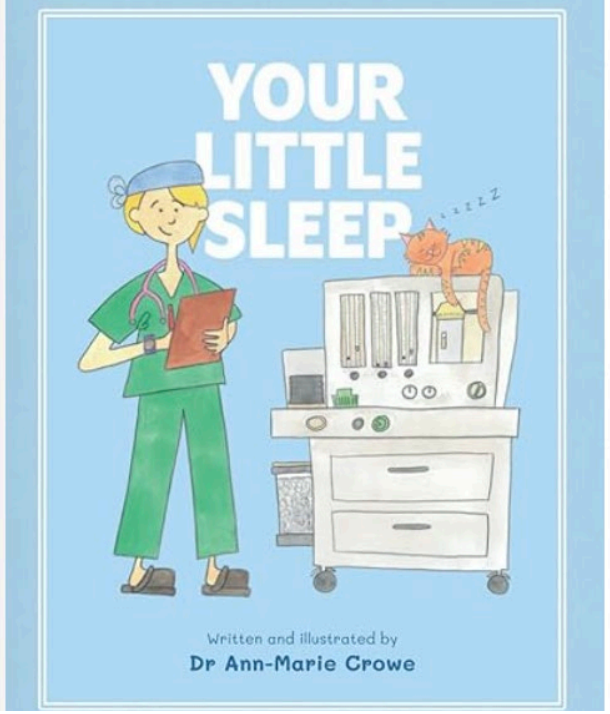
Imitation

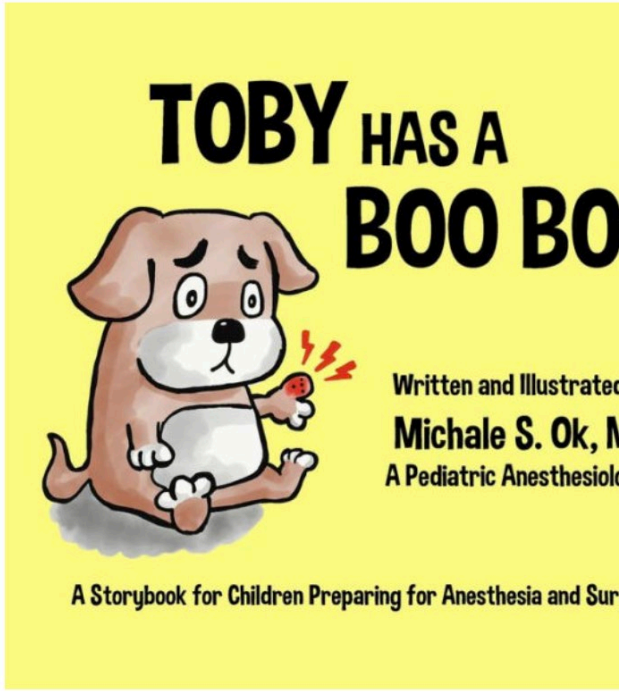
Symbolic-play

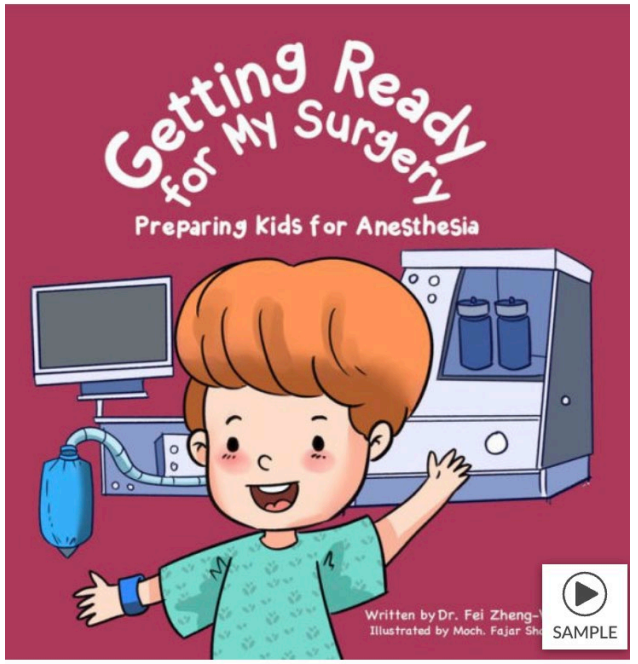
Drawing

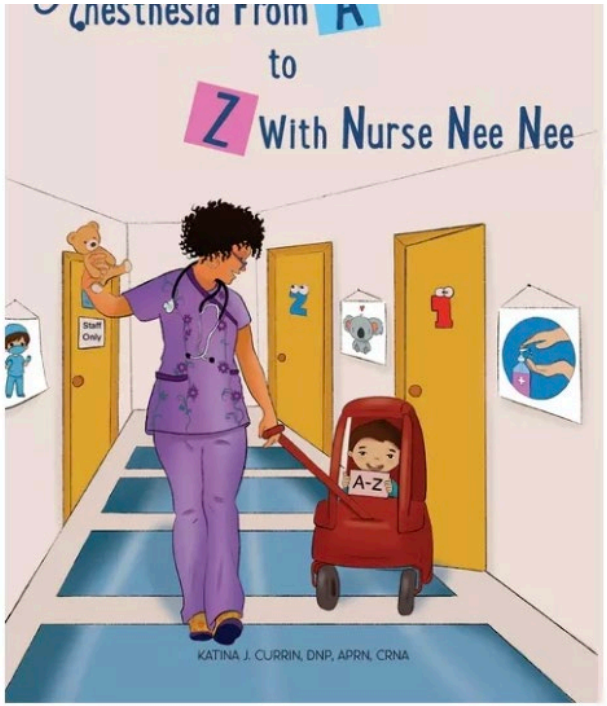
Mental Imagery

Verbal evocation









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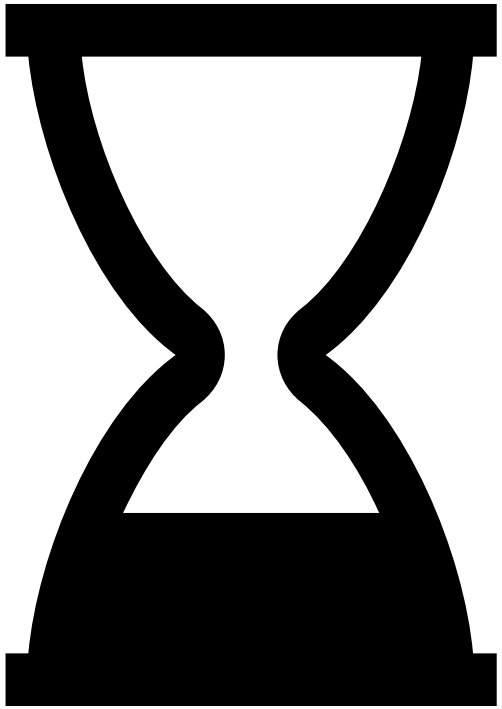
Timing of Preparation



Key Points for Toddlers and Young Children

1. Simple explanations
2. Encourage caregiver involvement
3. Importance of magical thinking, pretend play, and imitation
4. Encourage exploration (when safe!)
5. Allow opportunities for control

P

Concrete Operational Stage

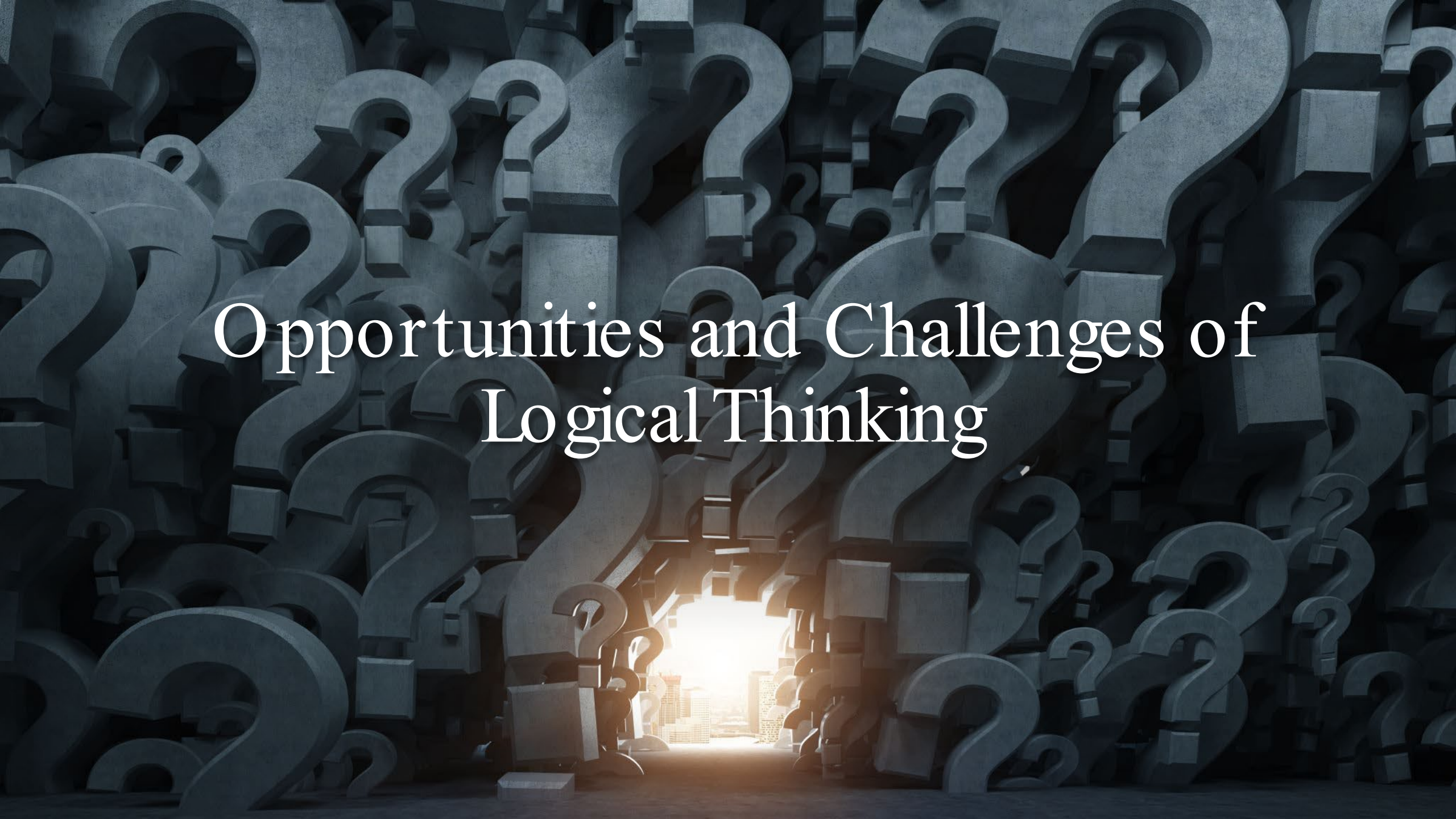
Logical thinking with concrete materials

7 – 11 years

E

Stage 4: Middle Childhood

Industry vs. Inferiority



Opportunities and Challenges of Logical Thinking

RALPHINTHEROCKIES
Posts

ralphintherockies
Children's Hospital Colorado

Building Competence and Control

Key Points for Elementary School-Aged

1. Basic discussion with visual aids
2. Ask to verify understanding
3. Encourage participation

P

Formal Operational Stage

Abstract sophisticated thought

12 years and older

E

Stage 5: Adolescence

Identity vs. Role Confusion

FIDELITY

A sense of loyalty and acceptance of others even when there may be underlying differences

Identity Experimentation

Hypothetical Concerns

Misinformation

Key Points for Adolescents

1. Maintain privacy
2. Correct misinformation
3. Emphasize safety
4. Expectations for pain
5. Allow for a sense of control

Conclusions

Use your new-found knowledge regarding the stages of pediatric cognitive development and apply them to your preanesthetic interview

Understand that individualized interactions may improve patient outcomes

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