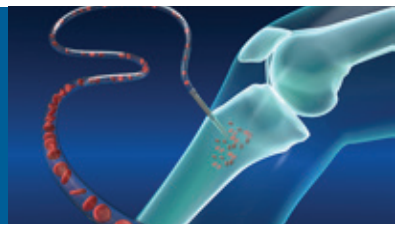
IO ACCESS
Intraosseous Myths
SEE PAGE 12



ADVOCACY
ACEP Delivers on Out-Of-Network Billing
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EM CASES
Hepatic Encephalopathy
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FORENSIC FACTS

Child Sex Trafficking

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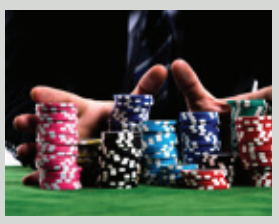

MEDICOLEGAL MIND

Know When to Fold 'Em

SEE PAGE 21

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For more clinical stories and practice trends, plus commentary and opinion pieces, go to:
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THE EQUITY EQUATION

Emergency physician Lauren Westafer, DO, MPH, MS, holding her children during an ACEP20 presentation.

LAUREN WESTAFER

"SEE YOU ON ZOOM"

Are virtual conferences a blessing for women?

by JORDANA HABER, MD, MACM, FACEP

Since the pandemic began, virtual meetings have become the new normal. As a mother of two children under five years of age (and one on the way), I have been reflecting on changes to both department meetings and national conferences.

Attending conferences is an important part of professional development. Conferences offer opportunities to speak in public, present research, chair committees, and network.[1]

Being away from home to attend a multiday conference has always been a challenge. Women have unique responsibilities to their families, especially when their children are young. It can be even tougher if you are the primary caretaker and perhaps also the nutritional source for your child if you are nursing. Research specifically identifies barriers to conference attendance as a factor that contributes to gender promotion gap.[2] In the article

CONTINUED *on page 22*

Coronavirus Vaccinations Begin Among Frontline Workers

We answer common questions about the Pfizer-BioNTech and Moderna vaccines

by JOSHUA D. NIFORATOS, MD, MTS

Editors' Note: This article was accepted on Dec. 28, 2020, and was accurate at that time. Because information about SARS-CoV-2 and COVID-19 is evolving rapidly, please verify these recommendations and information.

After witnessing more than 300,000 patients perish from COVID-19, including thousands of our health care colleagues, and despite record-setting hospitalizations in December, 2020 ended with a glimmer of hope: On Dec. 11, 2020, the Food and Drug Administration (FDA) granted emergency use authorization (EUA) for the Pfizer-BioNTech mRNA coronavirus vaccine, followed one week later by an EUA for Moderna's version of the vaccine. At the time of this writing (Dec. 28), the Oxford-

CONTINUED *on page 17*

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NEWS FROM THE COLLEGE

UPDATES AND ALERTS FROM ACEP

Seeking *ACEP Now* Resident Fellow

ACEP Now has a new opportunity for a resident on its editorial team! Open to any PGY2–4 EM resident physician in an ACGME-accredited program, the Resident Fellow would coordinate magazine content, including full oversight of content for the Resident Voice column, and promote *ACEP Now*'s published articles on social media. The position includes a $1,000 stipend. Find a full job description at www.acepnow.com/resident-fellow. Applications are due Feb. 16, 2021, for a year-long term that would formally begin July 1. To apply, send your résumé and a letter of interest to acepnow@acep.org.

COVID-19 Vaccine Resources and More

The COVID-19 Center (www.acep.org/covid-19) has a new section dedicated to relevant COVID-19 vaccine resources, toolkits, and more. Find the latest at www.acep.org/covid-19-alert.

Nominations Open for ACEP Board, Council

The ACEP Nominating Committee is accepting individual and component body recommendations for Board of Directors, Council Speaker, and Council Vice Speaker candidates. Nominations are due March 22, 2021, and qualifications and application details are available at www.acep.org/board-nominations. Elections for the Board of Directors and Council officers will be held Oct. 24, 2021, during the ACEP Council meeting.

New Online Resource: Conversations with Industry

ACEP's Conversations with Industry initiative is a new way for ACEP members to learn about industry products, services, and treatments in this socially distant era. While you may not be able to see products or treatments in person, you can still connect with companies to learn about solutions that may assist your daily practice. View three new packages of micro-education content at www.acep.org/CWI.

- "Guidelines and Use of Nasal High Flow for COVID-19" by Fisher & Paykel Healthcare
- "Brain Injury Assessment" with BrainScope
- "Mitigating Hematoma Expansion: HCP Insights" by Alexion Pharmaceuticals

Virtual Grand Rounds Scheduled Through May

ACEP's monthly Virtual Grand Rounds, one of our most popular new education resources during the pandemic, has more topics coming up:

- Jan. 27, 2021: Vulnerable Populations/Social Determinants of Health
- Feb. 24, 2021: Simulation: OB Emergencies with EMRA
- March 24, 2021: Injury Prevention
- April 28, 2021: Communication: Difficult Conversations
- May 19, 2021: ENT Emergencies

Past sessions are available for viewing, including COVID-19, Wellness, Airway, Ultrasound, Pediatrics, Neurology, and Cardiology. Learn more or sign up at www.acep.org/virtual grandrounds.

ACEP Nowcast
The Official Voice of Emergency Medicine

Check Out *ACEP Now* Podcasts

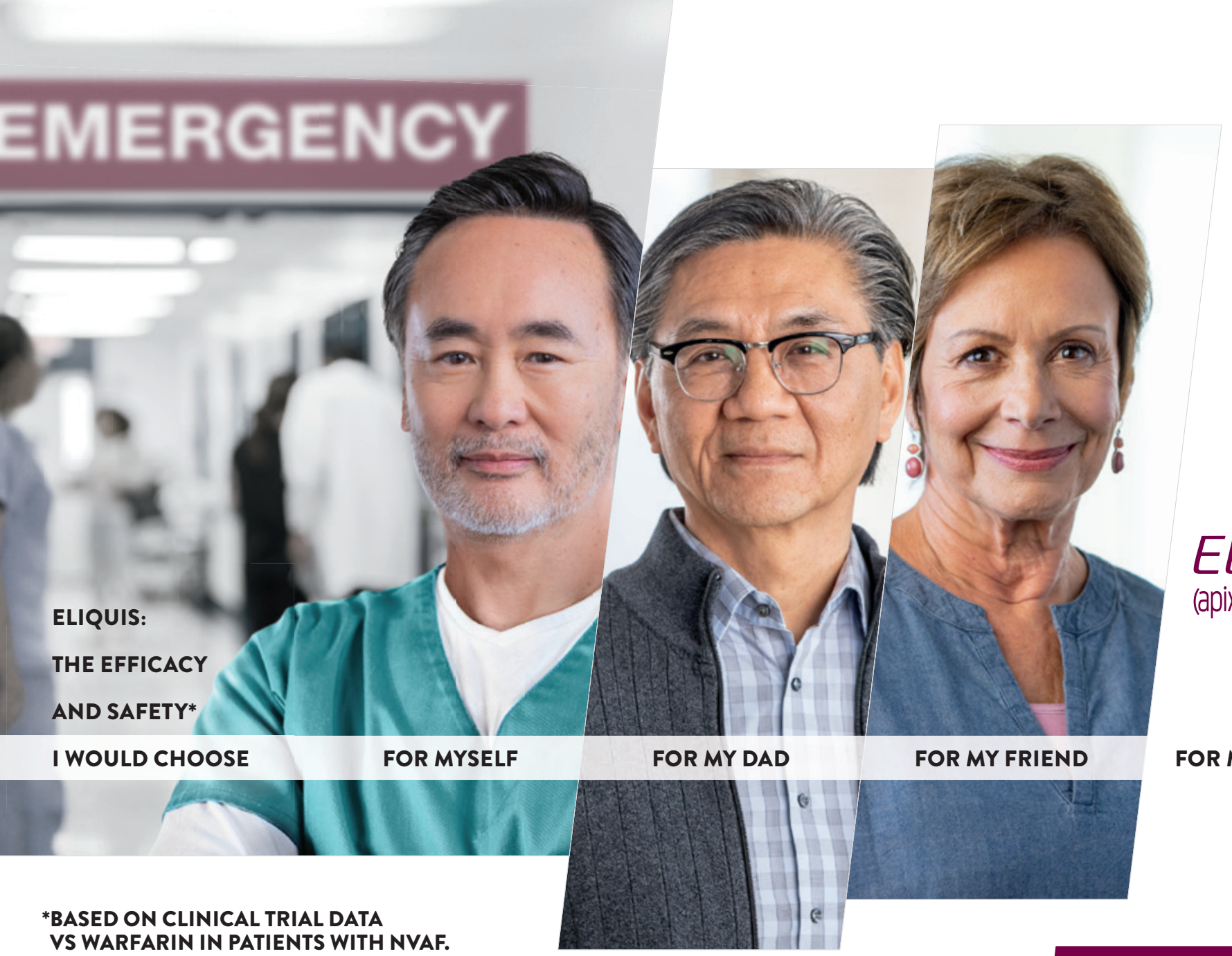
Did you know that *ACEP Now* has a monthly podcast? In *ACEP Nowcast*, Medical Editor in Chief Dr. Jeremy Faust highlights can't-miss articles from the latest issues of *ACEP Now*. Listen to the current installment and past podcasts at www.acepnow.com/podcast or subscribe through your favorite podcast service.

E-QUAL 2021 Enrollment Open for Opioid, Stroke Collaboratives

E-QUAL 2021 enrollment is open. Emergency departments can enroll for free. This year's Opioid Wave IV, with enrollment closing on Feb. 14, is focused on helping emergency departments develop programs to treat addiction for patients with opioid use disorder or nonfatal opioid overdose. The 2021 Stroke Wave II collaborative, with enrollment closing March 14, is expanding its focus to both hemorrhagic and ischemic stroke. Learn more at www.acep.org/equal and read more about this and other quality initiatives on page 15.

Visit ACEPNow.com for These Online-Only Articles

- COVID-19 Hospitalization in Heart Failure Patients Linked to Poor Outcomes, Death
- Vitamin D Fails to Help in Severe COVID-19
- Range of COVID-19 Neurological Complications Seen in Kids
- Few Patients Recall Gun Safety Discussions with Clinicians
- U.S. Clinicians Spend More Time with EHR Than Counterparts in Other Countries
- Pediatric Emergency-Medicine Workers Can Discuss Child Trafficking with Patients
- Glycemia in Early COVID-19 Hospitalization Linked to Mortality
- First-in-human Study Has Good News for Universal Flu Vaccine
- Early Tracheostomy May Be Beneficial in Ventilated COVID-19 Patients
- Cancer Patients Often Excluded in U.S. State Crisis-standards-of-care Guidelines
- Early Administration of Tranexamic Acid Potentially Harmful in Isolated Severe TBI
- Nonfatal Stimulant Overdoses Increasing Among U.S. Youth
- Interval Likelihood Ratios of Urinalysis Results Can Help Predict UTI More Accurately in Kids
- Surge in U.S. Overdose-related Cardiac Arrests During COVID-19 Pandemic
- Racial Disparities in Atrial Cardiopathy Among Ischemic Stroke Patients



Eliquis® (apixaban) tablets 5mg 2.5mg

*BASED ON CLINICAL TRIAL DATA VS WARFARIN IN PATIENTS WITH NVAF.

Visit EliquisData.com

INDICATION

ELIQUIS is indicated to reduce the risk of stroke and systemic embolism in patients with nonvalvular atrial fibrillation (NVAF).

SELECTED IMPORTANT SAFETY INFORMATION

WARNING: (A) PREMATURE DISCONTINUATION OF ELIQUIS INCREASES THE RISK OF THROMBOTIC EVENTS, (B) SPINAL/EPIDURAL HEMATOMA

(A) Premature discontinuation of any oral anticoagulant, including ELIQUIS, increases the risk of thrombotic events. If anticoagulation with ELIQUIS is discontinued for a reason other than pathological bleeding or completion of a course of therapy, consider coverage with another anticoagulant.

(B) Epidural or spinal hematomas may occur in patients treated with ELIQUIS who are receiving neuraxial anesthesia or undergoing spinal puncture. These hematomas may result in long-term or permanent paralysis. Consider these risks when scheduling patients for spinal procedures. Factors that can increase the risk of developing epidural or spinal hematomas in these patients include:

- **use of indwelling epidural catheters**
- **concomitant use of other drugs that affect hemostasis, such as nonsteroidal anti-inflammatory drugs (NSAIDs), platelet inhibitors, other anticoagulants**
- **a history of traumatic or repeated epidural or spinal punctures**
- **a history of spinal deformity or spinal surgery**
- **optimal timing between the administration of ELIQUIS and neuraxial procedures is not known**

Monitor patients frequently for signs and symptoms of neurological impairment. If neurological compromise is noted, urgent treatment is necessary.

Consider the benefits and risks before neuraxial intervention in patients anticoagulated or to be anticoagulated.

CONTRAINDICATIONS

- Active pathological bleeding
- Severe hypersensitivity reaction to ELIQUIS (e.g., anaphylactic reactions)

Please see additional Important Safety Information and accompanying Brief Summary of Full Prescribing Information, including **Boxed WARNINGS,** on the adjacent pages.

ARISTOTLE study design[1,2]

A phase III, double-blind, randomized trial designed to compare the effects of ELIQUIS 5 mg twice daily* (n=9120) and warfarin (n=9081) (target INR range: 2.0-3.0) in reducing the risk of stroke and systemic embolism in 18,201 patients with NVAF and ≥1 additional risk factor for stroke: prior stroke or transient ischemic attack (TIA); prior systemic embolism; age ≥75 years; arterial hypertension requiring treatment; diabetes mellitus; heart failure ≥New York Heart Association (NYHA) Class 2; or left ventricular ejection fraction (LVEF) ≤40%. Patients were followed for a median of ≈1.7 years. The 2 treatment groups were well balanced with respect to baseline characteristics, including age, stroke risk at entry as measured by $CHADS_2$ score,† and prior vitamin K antagonist (VKA) experience. The primary efficacy endpoint was stroke/systemic embolism, and the primary safety endpoint was major bleeding. Patients who needed aspirin >165 mg/day or needed aspirin plus a thienopyridine (eg, clopidogrel) were excluded from ARISTOTLE.

AVERROES study design[1,3]

AVERROES was a phase III, double-blind, randomized trial designed to compare the effects of ELIQUIS 5 mg twice daily* (n=2807) and aspirin (81 mg–324 mg once daily) (n=2791) in reducing the risk of stroke and systemic embolism in 5598 patients with NVAF thought not to be candidates for warfarin therapy, and with ≥1 additional risk factor for stroke: prior stroke or TIA; age ≥75 years of age; arterial hypertension (receiving treatment); diabetes mellitus (receiving treatment); heart failure (≥NYHA Class 2 at the time of enrollment); LVEF ≤35%, or documented peripheral artery disease. Patients could not be receiving VKA therapy (eg, warfarin), either because it had already been demonstrated to be or was expected to be unsuitable for them. The 2 treatment groups were well balanced with respect to baseline characteristics, including age, stroke risk at entry as measured by $CHADS_2$ score,† and prior use of a VKA within 30 days before screening. The mean follow-up period was approximately 1.1 years. The primary efficacy endpoint was stroke/systemic embolism, and the primary safety endpoint was major bleeding.

*A dose of 2.5 mg twice daily was assigned to patients with at least 2 of the following characteristics: age ≥80 years, body weight ≤60 kg, or serum creatinine ≥1.5 mg/dL.[1]
†Scale from 0 to 6 to estimate stroke risk; higher scores predict greater risk.[1]

SELECTED IMPORTANT SAFETY INFORMATION

WARNINGS AND PRECAUTIONS

- **Increased Risk of Thrombotic Events after Premature Discontinuation:** Premature discontinuation of any oral anticoagulant, including ELIQUIS, in the absence of adequate alternative anticoagulation increases the risk of thrombotic events. An increased rate of stroke was observed during the transition from ELIQUIS to warfarin in clinical trials in atrial fibrillation patients. If ELIQUIS is discontinued for a reason other than pathological bleeding or completion of a course of therapy, consider coverage with another anticoagulant.
- **Bleeding Risk:** ELIQUIS increases the risk of bleeding and can cause serious, potentially fatal, bleeding.
  - Concomitant use of drugs affecting hemostasis increases the risk of bleeding, including aspirin and other antiplatelet agents, other anticoagulants, heparin, thrombolytic agents, SSRIs, SNRIs, and NSAIDs.
  - Advise patients of signs and symptoms of blood loss and to report them immediately or go to an emergency room. Discontinue ELIQUIS in patients with active pathological hemorrhage.
  - The anticoagulant effect of apixaban can be expected to persist for at least 24 hours after the last dose (i.e., about two half-lives). An agent to reverse the anti-factor Xa activity of apixaban is available. Please visit www.andexxa.com for more information on availability of a reversal agent.
- **Spinal/Epidural Anesthesia or Puncture:** Patients treated with ELIQUIS undergoing spinal/epidural anesthesia or puncture may develop an epidural or spinal hematoma which can result in long-term or permanent paralysis.

  The risk of these events may be increased by the postoperative use of indwelling epidural catheters or the concomitant use of medicinal products affecting hemostasis. Indwelling epidural or intrathecal catheters should not be removed earlier than 24 hours after the last administration of ELIQUIS. The next dose of ELIQUIS should not be administered earlier than 5 hours after the removal of the catheter. The risk may also be increased by traumatic or repeated epidural or spinal puncture. If traumatic puncture occurs, delay the administration of ELIQUIS for 48 hours.

  Monitor patients frequently and if neurological compromise is noted, urgent diagnosis and treatment is necessary. Physicians should consider the potential benefit versus the risk of neuraxial intervention in ELIQUIS patients.
- **Prosthetic Heart Valves:** The safety and efficacy of ELIQUIS have not been studied in patients with prosthetic heart valves and is not recommended in these patients.
- **Acute PE in Hemodynamically Unstable Patients or Patients who Require Thrombolysis or Pulmonary Embolectomy:** Initiation of ELIQUIS is not recommended as an alternative to unfractionated heparin for the initial treatment of patients with PE who present with hemodynamic instability or who may receive thrombolysis or pulmonary embolectomy.
- **Increased Risk of Thrombosis in Patients with Triple Positive Antiphospholipid Syndrome (APS):** Direct-acting oral anticoagulants (DOACs), including ELIQUIS, are not recommended for use in patients with triple-positive APS. For patients with APS (especially those who are triple positive [positive for lupus anticoagulant, anticardiolipin, and anti–beta 2-glycoprotein I antibodies]), treatment with DOACs has been associated with increased rates of recurrent thrombotic events compared with vitamin K antagonist therapy.

ADVERSE REACTIONS

- The most common and most serious adverse reactions reported with ELIQUIS were related to bleeding.

TEMPORARY INTERRUPTION FOR SURGERY AND OTHER INTERVENTIONS

- ELIQUIS should be discontinued at least 48 hours prior to elective surgery or invasive procedures with a moderate or high risk of unacceptable or clinically significant bleeding. ELIQUIS should be discontinued at least 24 hours prior to elective surgery or invasive procedures with a low risk of bleeding or where the bleeding would be noncritical in location and easily controlled. Bridging anticoagulation during the 24 to 48 hours after stopping ELIQUIS and prior to the intervention is not generally required. ELIQUIS should be restarted after the surgical or other procedures as soon as adequate hemostasis has been established.

DRUG INTERACTIONS

- **Combined P-gp and Strong CYP3A4 Inhibitors:** Inhibitors of P-glycoprotein (P-gp) and cytochrome P450 3A4 (CYP3A4) increase exposure to apixaban and increase the risk of bleeding. For patients receiving ELIQUIS doses of 5 mg or 10 mg twice daily, reduce the dose of ELIQUIS by 50% when ELIQUIS is coadministered with drugs that are combined P-gp and strong CYP3A4 inhibitors (e.g., ketoconazole, itraconazole, or ritonavir). In patients already taking 2.5 mg twice daily, avoid coadministration of ELIQUIS with combined P-gp and strong CYP3A4 inhibitors.

  Clarithromycin

  Although clarithromycin is a combined P-gp and strong CYP3A4 inhibitor, pharmacokinetic data suggest that no dose adjustment is necessary with concomitant administration with ELIQUIS.

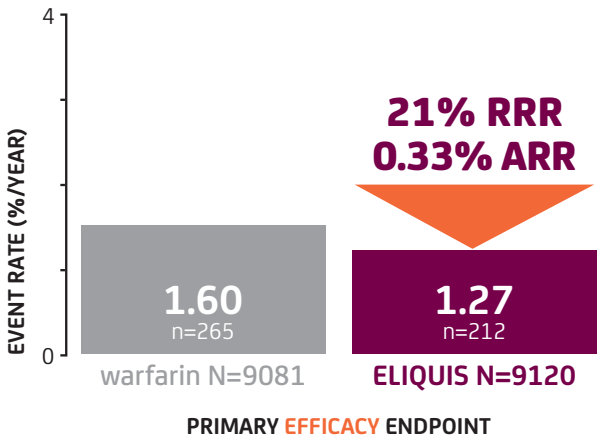
FOR PATIENTS WITH NVAF

ARISTOTLE: ONLY ELIQUIS demonstrated superiority in BOTH stroke/systemic embolism and major bleeding vs warfarin[1]

SUPERIOR

Risk reduction in stroke/systemic embolism

HR=0.79 (95% CI: 0.66–0.95); *P*=0.01

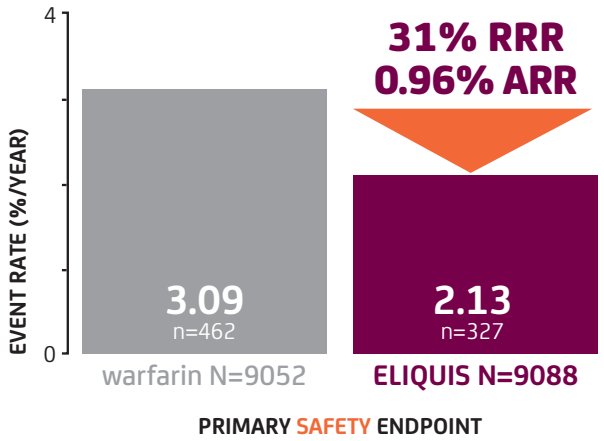


PRIMARY EFFICACY ENDPOINT

SUPERIOR

Based on fewer major bleeding events‡

HR=0.69 (95% CI: 0.60–0.80); *P*<0.0001



PRIMARY SAFETY ENDPOINT

ELIQUIS increases the risk of bleeding and can cause serious, potentially fatal, bleeding[1]

- Superiority to warfarin was primarily attributable to a reduction in hemorrhagic stroke and ischemic strokes with hemorrhagic conversion compared to warfarin. Purely ischemic strokes occurred with similar rates on both drugs[1]
- In another clinical trial (AVERROES), ELIQUIS was associated with an increase in major bleeding compared with aspirin that was not statistically significant (1.41%/yr vs 0.92%/yr, HR=1.54 [95% CI: 0.96–2.45]; *P*=0.07)[1]
- The most common reason for treatment discontinuation in both ARISTOTLE and AVERROES was bleeding-related adverse reactions; in ARISTOTLE, this occurred in 1.7% and 2.5% of patients treated with ELIQUIS and warfarin, respectively, and in AVERROES, in 1.5% and 1.3% on ELIQUIS and aspirin, respectively[1]

Major bleeding was defined as clinically overt bleeding accompanied by ≥1 of the following[1]:

A decrease in hemoglobin of ≥2 g/dL§ over 24 hours; transfusion of 2 or more units of packed red blood cells; bleeding that occurred in at least one of the following critical sites: intracranial,¶ intraspinal, intraocular, pericardial, intra-articular, intramuscular with compartment syndrome, retroperitoneal; and fatal bleeding.

‡Bleeding events were counted during treatment or within 2 days of stopping study treatment (on-treatment period). Bleeding events within each subcategory were counted once per subject, but subjects may have contributed events to multiple endpoints.[1]

§In AVERROES, a decrease in hemoglobin of 2 g/dL or more over a 24-hour period.[3]

¶In ARISTOTLE, intracranial bleeding included intracerebral, intraventricular, subdural, and subarachnoid bleeding. Any type of hemorrhagic stroke was adjudicated and counted as intracranial major bleeding.[1]

ARR=absolute risk reduction; CI=confidence interval; HR=hazard ratio; INR=international normalized ratio; RRR=relative risk reduction.

SELECTED IMPORTANT SAFETY INFORMATION

DRUG INTERACTIONS (cont'd)

- **Combined P-gp and Strong CYP3A4 Inducers:** Avoid concomitant use of ELIQUIS with combined P-gp and strong CYP3A4 inducers (e.g., rifampin, carbamazepine, phenytoin, St. John's wort) because such drugs will decrease exposure to apixaban.
- **Anticoagulants and Antiplatelet Agents:** Coadministration of antiplatelet agents, fibrinolytics, heparin, aspirin, and chronic NSAID use increases the risk of bleeding. APPRAISE-2, a placebo-controlled clinical trial of apixaban in high-risk post-acute coronary syndrome patients treated with aspirin or the combination of aspirin and clopidogrel, was terminated early due to a higher rate of bleeding with apixaban compared to placebo.

PREGNANCY

- The limited available data on ELIQUIS use in pregnant women are insufficient to inform drug-associated risks of major birth defects, miscarriage, or adverse developmental outcomes.

  Treatment may increase the risk of bleeding during pregnancy and delivery, and in the fetus and neonate.
  - *Labor or delivery*: ELIQUIS use during labor or delivery in women who are receiving neuraxial anesthesia may result in epidural or spinal hematomas. Consider use of a shorter acting anticoagulant as delivery approaches.

LACTATION

- Breastfeeding is not recommended during treatment with ELIQUIS.

References: 1. Eliquis [package insert]. Bristol-Myers Squibb Company, Princeton, NJ, and Pfizer Inc, New York, NY. **2.** Granger CB, Alexander JH, McMurray JJV, et al; for ARISTOTLE Committees and Investigators. Apixaban versus warfarin in patients with atrial fibrillation. *N Engl J Med.* 2011;365(11):981-992. **3.** Connolly SJ, Eikelboom J, Joyner C, et al; for AVERROES Steering Committee and Investigators. Apixaban in patients with atrial fibrillation. *N Engl J Med.* 2011;364(9):806-817.

Please see accompanying Brief Summary of Full Prescribing Information, including **Boxed WARNINGS,** on the adjacent pages.

Eliquis® (apixaban) tablets 5mg 2.5mg

Bristol Myers Squibb™ Pfizer

ELIQUIS® (apixaban) tablets, for oral use

℞ ONLY

Brief Summary of Prescribing Information. For complete prescribing information consult official package insert.

WARNING: (A) PREMATURE DISCONTINUATION OF ELIQUIS INCREASES THE RISK OF THROMBOTIC EVENTS

(B) SPINAL/EPIDURAL HEMATOMA

(A) PREMATURE DISCONTINUATION OF ELIQUIS INCREASES THE RISK OF THROMBOTIC EVENTS

Premature discontinuation of any oral anticoagulant, including ELIQUIS, increases the risk of thrombotic events. If anticoagulation with ELIQUIS is discontinued for a reason other than pathological bleeding or completion of a course of therapy, consider coverage with another anticoagulant *[see Dosage and Administration, Warnings and Precautions, and Clinical Studies (14.1) in full Prescribing Information]*.

(B) SPINAL/EPIDURAL HEMATOMA

Epidural or spinal hematomas may occur in patients treated with ELIQUIS who are receiving neuraxial anesthesia or undergoing spinal puncture. These hematomas may result in long-term or permanent paralysis. Consider these risks when scheduling patients for spinal procedures. Factors that can increase the risk of developing epidural or spinal hematomas in these patients include:

- **use of indwelling epidural catheters**
- **concomitant use of other drugs that affect hemostasis, such as nonsteroidal anti-inflammatory drugs (NSAIDs), platelet inhibitors, other anticoagulants**
- **a history of traumatic or repeated epidural or spinal punctures**
- **a history of spinal deformity or spinal surgery**
- **optimal timing between the administration of ELIQUIS and neuraxial procedures is not known**

[see Warnings and Precautions]

Monitor patients frequently for signs and symptoms of neurological impairment. If neurological compromise is noted, urgent treatment is necessary *[see Warnings and Precautions]*.

Consider the benefits and risks before neuraxial intervention in patients anticoagulated or to be anticoagulated *[see Warnings and Precautions]*.

INDICATIONS AND USAGE

Reduction of Risk of Stroke and Systemic Embolism in Nonvalvular Atrial Fibrillation— ELIQUIS is indicated to reduce the risk of stroke and systemic embolism in patients with nonvalvular atrial fibrillation.

Prophylaxis of Deep Vein Thrombosis Following Hip or Knee Replacement Surgery— ELIQUIS is indicated for the prophylaxis of deep vein thrombosis (DVT), which may lead to pulmonary embolism (PE), in patients who have undergone hip or knee replacement surgery.

Treatment of Deep Vein Thrombosis—ELIQUIS is indicated for the treatment of DVT.

Treatment of Pulmonary Embolism—ELIQUIS is indicated for the treatment of PE.

Reduction in the Risk of Recurrence of DVT and PE—ELIQUIS is indicated to reduce the risk of recurrent DVT and PE following initial therapy.

DOSAGE AND ADMINISTRATION (Selected information)

Temporary Interruption for Surgery and Other Interventions

ELIQUIS should be discontinued at least 48 hours prior to elective surgery or invasive procedures with a moderate or high risk of unacceptable or clinically significant bleeding *[see Warnings and Precautions]*. ELIQUIS should be discontinued at least 24 hours prior to elective surgery or invasive procedures with a low risk of bleeding or where the bleeding would be non-critical in location and easily controlled. Bridging anticoagulation during the 24 to 48 hours after stopping ELIQUIS and prior to the intervention is not generally required. ELIQUIS should be restarted after the surgical or other procedures as soon as adequate hemostasis has been established. (For complete *Dosage and Administration* section, see full Prescribing Information.)

CONTRAINDICATIONS

ELIQUIS is contraindicated in patients with the following conditions:

- Active pathological bleeding *[see Warnings and Precautions and Adverse Reactions]*
- Severe hypersensitivity reaction to ELIQUIS (e.g., anaphylactic reactions) *[see Adverse Reactions]*

WARNINGS AND PRECAUTIONS

Increased Risk of Thrombotic Events after Premature Discontinuation

Premature discontinuation of any oral anticoagulant, including ELIQUIS, in the absence of adequate alternative anticoagulation increases the risk of thrombotic events. An increased rate of stroke was observed during the transition from ELIQUIS to warfarin in clinical trials in atrial fibrillation patients. If ELIQUIS is discontinued for a reason other than pathological bleeding or completion of a course of therapy, consider coverage with another anticoagulant *[see Dosage and Administration (2.4) and Clinical Studies (14.1) in full Prescribing Information]*.

Bleeding

ELIQUIS increases the risk of bleeding and can cause serious, potentially fatal, bleeding *[see Dosage and Administration (2.1) in full Prescribing Information and Adverse Reactions]*.

Concomitant use of drugs affecting hemostasis increases the risk of bleeding. These include aspirin and other antiplatelet agents, other anticoagulants, heparin, thrombolytic agents, selective serotonin reuptake inhibitors, serotonin norepinephrine reuptake inhibitors, and nonsteroidal anti-inflammatory drugs (NSAIDs) *[see Drug Interactions]*.

Advise patients of signs and symptoms of blood loss and to report them immediately or go to an emergency room. Discontinue ELIQUIS in patients with active pathological hemorrhage.

Reversal of Anticoagulant Effect

An agent to reverse the anti-factor Xa activity of apixaban is available. The pharmacodynamic effect of ELIQUIS can be expected to persist for at least 24 hours after the last dose, i.e., for about two drug half-lives. Prothrombin complex concentrate (PCC), activated prothrombin complex concentrate or recombinant factor VIIa may be considered, but have not been evaluated in clinical studies *[see Clinical Pharmacology (12.2) in full Prescribing Information]*. When PCCs are used, monitoring for the anticoagulation effect of apixaban using a clotting test (PT, INR, or aPTT) or anti-factor Xa (FXa) activity is not useful and is not recommended. Activated oral charcoal reduces absorption of apixaban, thereby lowering apixaban plasma concentration *[see Overdosage]*.

Hemodialysis does not appear to have a substantial impact on apixaban exposure *[see Clinical Pharmacology (12.3) in full Prescribing Information]*. Protamine sulfate and vitamin K are not expected to affect the anticoagulant activity of apixaban. There is no experience with antifibrinolytic agents (tranexamic acid, aminocaproic acid) in individuals receiving apixaban. There is no experience with systemic hemostatics (desmopressin) in individuals receiving ELIQUIS, and they are not expected to be effective as a reversal agent.

Spinal/Epidural Anesthesia or Puncture

When neuraxial anesthesia (spinal/epidural anesthesia) or spinal/epidural puncture is employed, patients treated with antithrombotic agents for prevention of thromboembolic complications are at risk of developing an epidural or spinal hematoma which can result in long-term or permanent paralysis.

The risk of these events may be increased by the postoperative use of indwelling epidural catheters or the concomitant use of medicinal products affecting hemostasis. Indwelling epidural or intrathecal catheters should not be removed earlier than 24 hours after the last administration of ELIQUIS. The next dose of ELIQUIS should not be administered earlier than 5 hours after the removal of the catheter. The risk may also be increased by traumatic or repeated epidural or spinal puncture. If traumatic puncture occurs, delay the administration of ELIQUIS for 48 hours.

Monitor patients frequently for signs and symptoms of neurological impairment (e.g., numbness or weakness of the legs, or bowel or bladder dysfunction). If neurological compromise is noted, urgent diagnosis and treatment is necessary. Prior to neuraxial intervention the physician should consider the potential benefit versus the risk in anticoagulated patients or in patients to be anticoagulated for thromboprophylaxis.

Patients with Prosthetic Heart Valves

The safety and efficacy of ELIQUIS have not been studied in patients with prosthetic heart valves. Therefore, use of ELIQUIS is not recommended in these patients.

Acute PE in Hemodynamically Unstable Patients or Patients who Require Thrombolysis or Pulmonary Embolectomy

Initiation of ELIQUIS (apixaban) is not recommended as an alternative to unfractionated heparin for the initial treatment of patients with PE who present with hemodynamic instability or who may receive thrombolysis or pulmonary embolectomy.

Increased Risk of Thrombosis in Patients with Triple Positive Antiphospholipid Syndrome

Direct-acting oral anticoagulants (DOACs), including ELIQUIS, are not recommended for use in patients with triple-positive antiphospholipid syndrome (APS). For patients with APS (especially those who are triple positive [positive for lupus anticoagulant, anticardiolipin, and anti–beta 2-glycoprotein I antibodies]), treatment with DOACs has been associated with increased rates of recurrent thrombotic events compared with vitamin K antagonist therapy.

ADVERSE REACTIONS

The following clinically significant adverse reactions are discussed in greater detail in other sections of the prescribing information.

- Increased Risk of Thrombotic Events After Premature Discontinuation *[see Warnings and Precautions]*
- Bleeding *[see Warnings and Precautions]*
- Spinal/Epidural Anesthesia or Puncture *[see Warnings and Precautions]*

Clinical Trials Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

Reduction of Risk of Stroke and Systemic Embolism in Patients with Nonvalvular Atrial Fibrillation

The safety of ELIQUIS was evaluated in the ARISTOTLE and AVERROES studies *[see Clinical Studies (14) in full Prescribing Information]*, including 11,284 patients exposed to ELIQUIS 5 mg twice daily and 602 patients exposed to ELIQUIS 2.5 mg twice daily. The duration of ELIQUIS exposure was ≥12 months for 9375 patients and ≥24 months for 3369 patients in the two studies. In ARISTOTLE, the mean duration of exposure was 89 weeks (>15,000 patient-years). In AVERROES, the mean duration of exposure was approximately 59 weeks (>3000 patient-years).

The most common reason for treatment discontinuation in both studies was for bleeding-related adverse reactions; in ARISTOTLE this occurred in 1.7% and 2.5% of patients treated with ELIQUIS and warfarin, respectively, and in AVERROES, in 1.5% and 1.3% on ELIQUIS and aspirin, respectively.

Bleeding in Patients with Nonvalvular Atrial Fibrillation in ARISTOTLE and AVERROES

Tables 1 and 2 show the number of patients experiencing major bleeding during the treatment period and the bleeding rate (percentage of subjects with at least one bleeding event per 100 patient-years) in ARISTOTLE and AVERROES.

Table 1: Bleeding Events in Patients with Nonvalvular Atrial Fibrillation in ARISTOTLE*

	ELIQUIS N=9088 n (per 100 pt-year)	Warfarin N=9052 n (per 100 pt-year)	Hazard Ratio (95% CI)	P-value
Major†	327 (2.13)	462 (3.09)	0.69 (0.60, 0.80)	<0.0001
Intracranial (ICH)‡	52 (0.33)	125 (0.82)	0.41 (0.30, 0.57)	-
Hemorrhagic stroke§	38 (0.24)	74 (0.49)	0.51 (0.34, 0.75)	-
Other ICH	15 (0.10)	51 (0.34)	0.29 (0.16, 0.51)	-
Gastrointestinal (GI)¶	128 (0.83)	141 (0.93)	0.89 (0.70, 1.14)	-
Fatal**	10 (0.06)	37 (0.24)	0.27 (0.13, 0.53)	-
Intracranial	4 (0.03)	30 (0.20)	0.13 (0.05, 0.37)	-
Non-intracranial	6 (0.04)	7 (0.05)	0.84 (0.28, 2.15)	-

* Bleeding events within each subcategory were counted once per subject, but subjects may have contributed events to multiple endpoints. Bleeding events were counted during treatment or within 2 days of stopping study treatment (on-treatment period).
† Defined as clinically overt bleeding accompanied by one or more of the following: a decrease in hemoglobin of ≥2 g/dL, a transfusion of 2 or more units of packed red blood cells, bleeding at a critical site: intracranial, intraspinal, intraocular, pericardial, intra-articular, intramuscular with compartment syndrome, retroperitoneal or with fatal outcome.
‡ Intracranial bleed includes intracerebral, intraventricular, subdural, and subarachnoid bleeding. Any type of hemorrhagic stroke was adjudicated and counted as an intracranial major bleed.
§ On-treatment analysis based on the safety population, compared to ITT analysis presented in Section 14 in the full Prescribing Information.
¶ GI bleed includes upper GI, lower GI, and rectal bleeding.
** Fatal bleeding is an adjudicated death with the primary cause of death as intracranial bleeding or non-intracranial bleeding during the on-treatment period.

In ARISTOTLE, the results for major bleeding were generally consistent across most major subgroups including age, weight, $CHADS_2$ score (a scale from 0 to 6 used to estimate risk of stroke, with higher scores predicting greater risk), prior warfarin use, geographic region, and aspirin use at randomization (Figure 1). Subjects treated with ELIQUIS with diabetes bled more (3% per year) than did subjects without diabetes (1.9% per year).

Table 2: Bleeding Events in Patients with Nonvalvular Atrial Fibrillation in AVERROES

	ELIQUIS (apixaban) N=2798 n (%/year)	Aspirin N=2780 n (%/year)	Hazard Ratio (95% CI)	P-value
Major	45 (1.41)	29 (0.92)	1.54 (0.96, 2.45)	0.07
Fatal	5 (0.16)	5 (0.16)	0.99 (0.23, 4.29)	-
Intracranial	11 (0.34)	11 (0.35)	0.99 (0.39, 2.51)	-

Events associated with each endpoint were counted once per subject, but subjects may have contributed events to multiple endpoints.

Other Adverse Reactions

Hypersensitivity reactions (including drug hypersensitivity, such as skin rash, and anaphylactic reactions, such as allergic edema) and syncope were reported in <1% of patients receiving ELIQUIS.

Prophylaxis of Deep Vein Thrombosis Following Hip or Knee Replacement Surgery

The safety of ELIQUIS has been evaluated in 1 Phase II and 3 Phase III studies including 5924 patients exposed to ELIQUIS 2.5 mg twice daily undergoing major orthopedic surgery of the lower limbs (elective hip replacement or elective knee replacement) treated for up to 38 days.

In total, 11% of the patients treated with ELIQUIS 2.5 mg twice daily experienced adverse reactions.

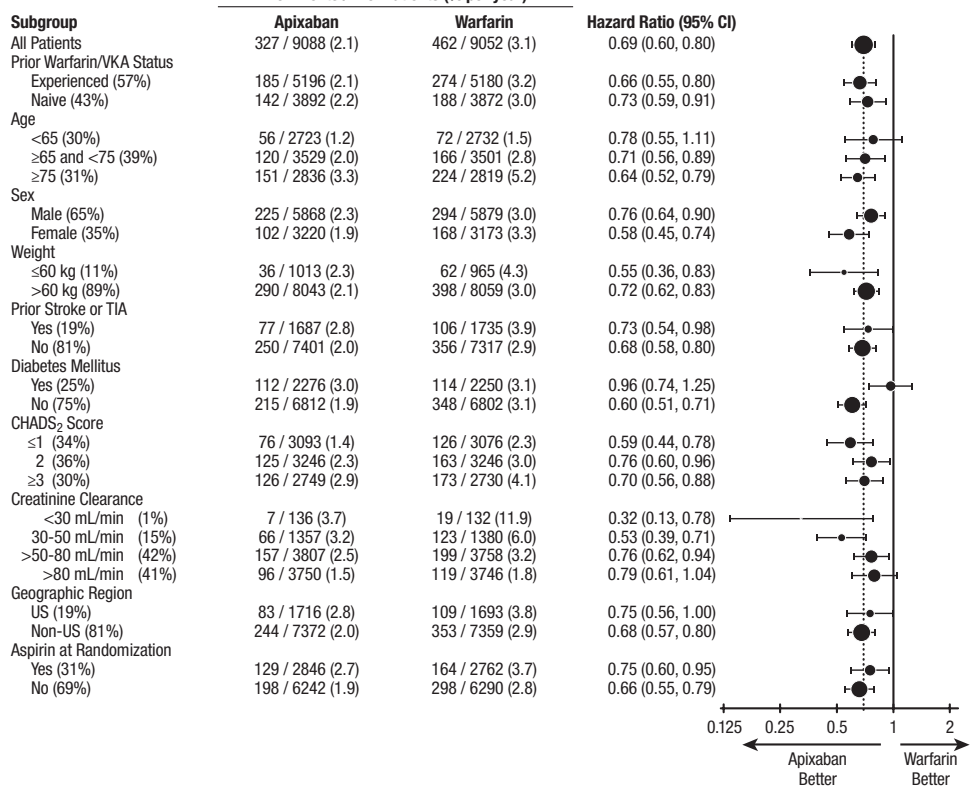
Bleeding results during the treatment period in the Phase III studies are shown in Table 3. Bleeding was assessed in each study beginning with the first dose of double-blind study drug.

Table 3: Bleeding During the Treatment Period in Patients Undergoing Elective Hip or Knee Replacement Surgery

Bleeding Endpoint*	ADVANCE-3 Hip Replacement Surgery		ADVANCE-2 Knee Replacement Surgery		ADVANCE-1 Knee Replacement Surgery	
	ELIQUIS 2.5 mg po bid 35±3 days	Enoxaparin 40 mg sc qd 35±3 days	ELIQUIS 2.5 mg po bid 12±2 days	Enoxaparin 40 mg sc qd 12±2 days	ELIQUIS 2.5 mg po bid 12±2 days	Enoxaparin 30 mg sc q12h 12±2 days
	First dose 12 to 24 hours post surgery	First dose 9 to 15 hours prior to surgery	First dose 12 to 24 hours post surgery	First dose 9 to 15 hours prior to surgery	First dose 12 to 24 hours post surgery	First dose 12 to 24 hours post surgery
All treated	N=2673	N=2659	N=1501	N=1508	N=1596	N=1588
Major (including surgical site)	22 (0.82%)†	18 (0.68%)	9 (0.60%)‡	14 (0.93%)	11 (0.69%)	22 (1.39%)
Fatal	0	0	0	0	0	1 (0.06%)
Hgb decrease ≥2 g/dL	13 (0.49%)	10 (0.38%)	8 (0.53%)	9 (0.60%)	10 (0.63%)	16 (1.01%)
Transfusion of ≥2 units RBC	16 (0.60%)	14 (0.53%)	5 (0.33%)	9 (0.60%)	9 (0.56%)	18 (1.13%)
Bleed at critical site§	1 (0.04%)	1 (0.04%)	1 (0.07%)	2 (0.13%)	1 (0.06%)	4 (0.25%)
Major + CRNM¶	129 (4.83%)	134 (5.04%)	53 (3.53%)	72 (4.77%)	46 (2.88%)	68 (4.28%)
All	313 (11.71%)	334 (12.56%)	104 (6.93%)	126 (8.36%)	85 (5.33%)	108 (6.80%)

* All bleeding criteria included surgical site bleeding.
† Includes 13 subjects with major bleeding events that occurred before the first dose of ELIQUIS (administered 12 to 24 hours post-surgery).
‡ Includes 5 subjects with major bleeding events that occurred before the first dose of ELIQUIS (administered 12 to 24 hours post-surgery).
§ Intracranial, intraspinal, intraocular, pericardial, an operated joint requiring re-operation or intervention, intramuscular with compartment syndrome, or retroperitoneal. Bleeding into an operated joint requiring re-operation or intervention was present in all patients with this category of bleeding. Events and event rates include one enoxaparin-treated patient in ADVANCE-1 who also had intracranial hemorrhage.
¶ CRNM = clinically relevant nonmajor.

Figure 1: Major Bleeding Hazard Ratios by Baseline Characteristics – ARISTOTLE Study



Note: The figure above presents effects in various subgroups, all of which are baseline characteristics and all of which were prespecified, if not the groupings. The 95% confidence limits that are shown do not take into account how many comparisons were made, nor do they reflect the effect of a particular factor after adjustment for all other factors. Apparent homogeneity or heterogeneity among groups should not be over-interpreted.

Adverse reactions occurring in ≥1% of patients undergoing hip or knee replacement surgery in the 1 Phase II study and the 3 Phase III studies are listed in Table 4.

Table 4: Adverse Reactions Occurring in ≥1% of Patients in Either Group Undergoing Hip or Knee Replacement Surgery

	ELIQUIS (apixaban), n (%) 2.5 mg po bid N=5924	Enoxaparin, n (%) 40 mg sc qd or 30 mg sc q12h N=5904
Nausea	153 (2.6)	159 (2.7)
Anemia (including postoperative and hemorrhagic anemia, and respective laboratory parameters)	153 (2.6)	178 (3.0)
Contusion	83 (1.4)	115 (1.9)
Hemorrhage (including hematoma, and vaginal and urethral hemorrhage)	67 (1.1)	81 (1.4)
Postprocedural hemorrhage (including postprocedural hematoma, wound hemorrhage, vessel puncture-site hematoma and catheter-site hemorrhage)	54 (0.9)	60 (1.0)
Transaminases increased (including alanine aminotransferase increased and alanine aminotransferase abnormal)	50 (0.8)	71 (1.2)
Aspartate aminotransferase increased	47 (0.8)	69 (1.2)
Gamma-glutamyltransferase increased	38 (0.6)	65 (1.1)

Less common adverse reactions in ELIQUIS-treated patients undergoing hip or knee replacement surgery occurring at a frequency of ≥0.1% to <1%:

Blood and lymphatic system disorders: thrombocytopenia (including platelet count decreases)

Vascular disorders: hypotension (including procedural hypotension)

Respiratory, thoracic, and mediastinal disorders: epistaxis

Gastrointestinal disorders: gastrointestinal hemorrhage (including hematemesis and melena), hematochezia

Hepatobiliary disorders: liver function test abnormal, blood alkaline phosphatase increased, blood bilirubin increased

Renal and urinary disorders: hematuria (including respective laboratory parameters)

Injury, poisoning, and procedural complications: wound secretion, incision-site hemorrhage (including incision-site hematoma), operative hemorrhage

Less common adverse reactions in ELIQUIS-treated patients undergoing hip or knee replacement surgery occurring at a frequency of <0.1%:

Gingival bleeding, hemoptysis, hypersensitivity, muscle hemorrhage, ocular hemorrhage (including conjunctival hemorrhage), rectal hemorrhage

Treatment of DVT and PE and Reduction in the Risk of Recurrence of DVT or PE

The safety of ELIQUIS has been evaluated in the AMPLIFY and AMPLIFY-EXT studies, including 2676 patients exposed to ELIQUIS 10 mg twice daily, 3359 patients exposed to ELIQUIS 5 mg twice daily, and 840 patients exposed to ELIQUIS 2.5 mg twice daily.

Common adverse reactions (≥1%) were gingival bleeding, epistaxis, contusion, hematuria, rectal hemorrhage, hematoma, menorrhagia, and hemoptysis.

AMPLIFY Study

The mean duration of exposure to ELIQUIS was 154 days and to enoxaparin/warfarin was 152 days in the AMPLIFY study. Adverse reactions related to bleeding occurred in 417 (15.6%) ELIQUIS-treated patients compared to 661 (24.6%) enoxaparin/warfarin-treated patients. The discontinuation rate due to bleeding events was 0.7% in the ELIQUIS-treated patients compared to 1.7% in enoxaparin/warfarin-treated patients in the AMPLIFY study.

In the AMPLIFY study, ELIQUIS was statistically superior to enoxaparin/warfarin in the primary safety endpoint of major bleeding (relative risk 0.31, 95% CI [0.17, 0.55], P-value <0.0001).

Bleeding results from the AMPLIFY study are summarized in Table 5.

Table 5: Bleeding Results in the AMPLIFY Study

	ELIQUIS N=2676 n (%)	Enoxaparin/Warfarin N=2689 n (%)	Relative Risk (95% CI)
Major	15 (0.6)	49 (1.8)	0.31 (0.17, 0.55) p<0.0001
CRNM*	103 (3.9)	215 (8.0)	
Major + CRNM	115 (4.3)	261 (9.7)	
Minor	313 (11.7)	505 (18.8)	
All	402 (15.0)	676 (25.1)	

* CRNM = clinically relevant nonmajor bleeding.
Events associated with each endpoint were counted once per subject, but subjects may have contributed events to multiple endpoints.

Adverse reactions occurring in ≥1% of patients in the AMPLIFY study are listed in Table 6.

Table 6: Adverse Reactions Occurring in ≥1% of Patients Treated for DVT and PE in the AMPLIFY Study

	ELIQUIS N=2676 n (%)	Enoxaparin/Warfarin N=2689 n (%)
Epistaxis	77 (2.9)	146 (5.4)
Contusion	49 (1.8)	97 (3.6)
Hematuria	46 (1.7)	102 (3.8)
Menorrhagia	38 (1.4)	30 (1.1)
Hematoma	35 (1.3)	76 (2.8)
Hemoptysis	32 (1.2)	31 (1.2)
Rectal hemorrhage	26 (1.0)	39 (1.5)
Gingival bleeding	26 (1.0)	50 (1.9)

AMPLIFY-EXT Study

The mean duration of exposure to ELIQUIS was approximately 330 days and to placebo was 312 days in the AMPLIFY-EXT study. Adverse reactions related to bleeding occurred in 219 (13.3%) ELIQUIS-treated patients compared to 72 (8.7%) placebo-treated patients. The discontinuation rate due to bleeding events was approximately 1% in the ELIQUIS-treated patients compared to 0.4% in those patients in the placebo group in the AMPLIFY-EXT study.

Bleeding results from the AMPLIFY-EXT study are summarized in Table 7.

Table 7: Bleeding Results in the AMPLIFY-EXT Study

	ELIQUIS 2.5 mg bid N=840 n (%)	ELIQUIS 5 mg bid N=811 n (%)	Placebo N=826 n (%)
Major	2 (0.2)	1 (0.1)	4 (0.5)
CRNM*	25 (3.0)	34 (4.2)	19 (2.3)
Major + CRNM	27 (3.2)	35 (4.3)	22 (2.7)
Minor	75 (8.9)	98 (12.1)	58 (7.0)
All	94 (11.2)	121 (14.9)	74 (9.0)

* CRNM = clinically relevant nonmajor bleeding.
Events associated with each endpoint were counted once per subject, but subjects may have contributed events to multiple endpoints.

Adverse reactions occurring in ≥1% of patients in the AMPLIFY-EXT study are listed in Table 8.

Table 8: Adverse Reactions Occurring in ≥1% of Patients Undergoing Extended Treatment for DVT and PE in the AMPLIFY-EXT Study

	ELIQUIS (apixaban) 2.5 mg bid N=840 n (%)	ELIQUIS 5 mg bid N=811 n (%)	Placebo N=826 n (%)
Epistaxis	13 (1.5)	29 (3.6)	9 (1.1)
Hematuria	12 (1.4)	17 (2.1)	9 (1.1)
Hematoma	13 (1.5)	16 (2.0)	10 (1.2)
Contusion	18 (2.1)	18 (2.2)	18 (2.2)
Gingival bleeding	12 (1.4)	9 (1.1)	3 (0.4)

Other Adverse Reactions

Less common adverse reactions in ELIQUIS-treated patients in the AMPLIFY or AMPLIFY-EXT studies occurring at a frequency of ≥0.1% to <1%:

Blood and lymphatic system disorders: hemorrhagic anemia

Gastrointestinal disorders: hematochezia, hemorrhoidal hemorrhage, gastrointestinal hemorrhage, hematemesis, melena, anal hemorrhage

Injury, poisoning, and procedural complications: wound hemorrhage, postprocedural hemorrhage, traumatic hematoma, periorbital hematoma

Musculoskeletal and connective tissue disorders: muscle hemorrhage

Reproductive system and breast disorders: vaginal hemorrhage, metrorrhagia, menometrorrhagia, genital hemorrhage

Vascular disorders: hemorrhage

Skin and subcutaneous tissue disorders: ecchymosis, skin hemorrhage, petechiae

Eye disorders: conjunctival hemorrhage, retinal hemorrhage, eye hemorrhage

Investigations: blood urine present, occult blood positive, occult blood, red blood cells urine positive

General disorders and administration-site conditions: injection-site hematoma, vessel puncture-site hematoma

DRUG INTERACTIONS

Apixaban is a substrate of both CYP3A4 and P-gp. Inhibitors of CYP3A4 and P-gp increase exposure to apixaban and increase the risk of bleeding. Inducers of CYP3A4 and P-gp decrease exposure to apixaban and increase the risk of stroke and other thromboembolic events.

Combined P-gp and Strong CYP3A4 Inhibitors

For patients receiving ELIQUIS 5 mg or 10 mg twice daily, the dose of ELIQUIS should be decreased by 50% when coadministered with drugs that are combined P-gp and strong CYP3A4 inhibitors (e.g., ketoconazole, itraconazole, ritonavir) *[see Dosage and Administration (2.5) and Clinical Pharmacology (12.3) in full Prescribing Information]*.

For patients receiving ELIQUIS at a dose of 2.5 mg twice daily, avoid coadministration with combined P-gp and strong CYP3A4 inhibitors *[see Dosage and Administration (2.5) and Clinical Pharmacology (12.3) in full Prescribing Information]*.

Clarithromycin

Although clarithromycin is a combined P-gp and strong CYP3A4 inhibitor, pharmacokinetic data suggest that no dose adjustment is necessary with concomitant administration with ELIQUIS *[see Clinical Pharmacology (12.3) in full Prescribing Information]*.

Combined P-gp and Strong CYP3A4 Inducers

Avoid concomitant use of ELIQUIS with combined P-gp and strong CYP3A4 inducers (e.g., rifampin, carbamazepine, phenytoin, St. John's wort) because such drugs will decrease exposure to apixaban *[see Clinical Pharmacology (12.3) in full Prescribing Information]*.

Anticoagulants and Antiplatelet Agents

Coadministration of antiplatelet agents, fibrinolytics, heparin, aspirin, and chronic NSAID use increases the risk of bleeding.

APPRAISE-2, a placebo-controlled clinical trial of ELIQUIS in high-risk, post-acute coronary syndrome patients treated with aspirin or the combination of aspirin and clopidogrel, was terminated early due to a higher rate of bleeding with ELIQUIS compared to placebo. The rate of ISTH major bleeding was 2.8% per year with ELIQUIS versus 0.6% per year with placebo in patients receiving single antiplatelet therapy and was 5.9% per year with ELIQUIS versus 2.5% per year with placebo in those receiving dual antiplatelet therapy.

In ARISTOTLE, concomitant use of aspirin increased the bleeding risk on ELIQUIS from 1.8% per year to 3.4% per year and concomitant use of aspirin and warfarin increased the bleeding risk from 2.7% per year to 4.6% per year. In this clinical trial, there was limited (2.3%) use of dual antiplatelet therapy with ELIQUIS.

USE IN SPECIFIC POPULATIONS

Pregnancy

Risk Summary

The limited available data on ELIQUIS use in pregnant women are insufficient to inform drug-associated risks of major birth defects, miscarriage, or adverse developmental outcomes. Treatment may increase the risk of bleeding during pregnancy and delivery. In animal reproduction studies, no adverse developmental effects were seen when apixaban was administered to rats (orally), rabbits (intravenously) and mice (orally) during organogenesis at unbound apixaban exposure levels up to 4, 1 and 19 times, respectively, the human exposure based on area under plasma-concentration time curve (AUC) at the Maximum Recommended Human Dose (MRHD) of 5 mg twice daily.

The estimated background risk of major birth defects and miscarriage for the indicated populations is unknown. All pregnancies have a background risk of birth defect, loss, or other adverse outcomes. In the U.S. general population, the estimated background risk of major birth defects and miscarriage in clinically recognized pregnancies is 2% to 4% and 15% to 20%, respectively.

Clinical Considerations

Disease-associated maternal and/or embryo/fetal risk

Pregnancy confers an increased risk of thromboembolism that is higher for women with underlying thromboembolic disease and certain high-risk pregnancy conditions. Published data describe that women with a previous history of venous thrombosis are at high risk for recurrence during pregnancy.

Fetal/Neonatal adverse reactions

Use of anticoagulants, including ELIQUIS, may increase the risk of bleeding in the fetus and neonate.

Labor or delivery

All patients receiving anticoagulants, including pregnant women, are at risk for bleeding. ELIQUIS use during labor or delivery in women who are receiving neuraxial anesthesia may result in epidural or spinal hematomas. Consider use of a shorter acting anticoagulant as delivery approaches *[see Warnings and Precautions]*.

Data

Animal Data

No developmental toxicities were observed when apixaban was administered during organogenesis to rats (orally), rabbits (intravenously) and mice (orally) at unbound apixaban exposure levels 4, 1, and 19 times, respectively, the human exposures at the MRHD. There was no evidence of fetal bleeding, although conceptus exposure was confirmed in rats and rabbits. Oral administration of apixaban to rat dams from gestation day 6 through lactation day 21 at maternal unbound apixaban exposures ranging from 1.4 to 5 times the human exposures at the MRHD was not associated with reduced maternal mortality or reduced conceptus/neonatal viability, although increased incidences of peri-vaginal bleeding were observed in dams at all doses. There was no evidence of neonatal bleeding.

Lactation

Risk Summary

There are no data on the presence of apixaban or its metabolites in human milk, the effects on the breastfed child, or the effects on milk production. Apixaban and/or its metabolites were present in the milk of rats (see Data). Because human exposure through milk is unknown, breastfeeding is not recommended during treatment with ELIQUIS (apixaban).

Data

Animal Data

Maximal plasma concentrations were observed after 30 minutes following a single oral administration of a 5 mg dose to lactating rats. Maximal milk concentrations were observed 6 hours after dosing. The milk to plasma AUC (0-24) ratio is 30:1 indicating that apixaban can accumulate in milk. The concentrations of apixaban in animal milk does not necessarily predict the concentration of drug in human milk.

Pediatric Use

Safety and effectiveness in pediatric patients have not been established.

Geriatric Use

Of the total subjects in the ARISTOTLE and AVERROES clinical studies, >69% were 65 years of age and older, and >31% were 75 years of age and older. In the ADVANCE-1, ADVANCE-2, and ADVANCE-3 clinical studies, 50% of subjects were 65 years of age and older, while 16% were 75 years of age and older. In the AMPLIFY and AMPLIFY-EXT clinical studies, >32% of subjects were 65 years of age and older and >13% were 75 years of age and older. No clinically significant differences in safety or effectiveness were observed when comparing subjects in different age groups.

Renal Impairment

Reduction of Risk of Stroke and Systemic Embolism in Patients with Nonvalvular Atrial Fibrillation

The recommended dose is 2.5 mg twice daily in patients with at least two of the following characteristics *[see Dosage and Administration (2.1) in full Prescribing Information]*:

- age greater than or equal to 80 years
- body weight less than or equal to 60 kg
- serum creatinine greater than or equal to 1.5 mg/dL

Patients with End-Stage Renal Disease on Dialysis

Clinical efficacy and safety studies with ELIQUIS did not enroll patients with end-stage renal disease (ESRD) on dialysis. In patients with ESRD maintained on intermittent hemodialysis, administration of ELIQUIS at the usually recommended dose *[see Dosage and Administration (2.1) in full Prescribing Information]* will result in concentrations of apixaban and pharmacodynamic activity similar to those observed in the ARISTOTLE study *[see Clinical Pharmacology (12.3) in full Prescribing Information]*. It is not known whether these concentrations will lead to similar stroke reduction and bleeding risk in patients with ESRD on dialysis as was seen in ARISTOTLE.

Prophylaxis of Deep Vein Thrombosis Following Hip or Knee Replacement Surgery, and Treatment of DVT and PE and Reduction in the Risk of Recurrence of DVT and PE

No dose adjustment is recommended for patients with renal impairment, including those with ESRD on dialysis *[see Dosage and Administration (2.1) in full Prescribing Information]*. Clinical efficacy and safety studies with ELIQUIS did not enroll patients with ESRD on dialysis or patients with a CrCl <15 mL/min; therefore, dosing recommendations are based on pharmacokinetic and pharmacodynamic (anti-FXa activity) data in subjects with ESRD maintained on dialysis *[see Clinical Pharmacology (12.3) in full Prescribing Information]*.

Hepatic Impairment

No dose adjustment is required in patients with mild hepatic impairment (Child-Pugh class A). Because patients with moderate hepatic impairment (Child-Pugh class B) may have intrinsic coagulation abnormalities and there is limited clinical experience with ELIQUIS in these patients, dosing recommendations cannot be provided *[see Clinical Pharmacology (12.2) in full Prescribing Information]*. ELIQUIS is not recommended in patients with severe hepatic impairment (Child-Pugh class C) *[see Clinical Pharmacology (12.2) in full Prescribing Information]*.

OVERDOSAGE

Overdose of ELIQUIS increases the risk of bleeding *[see Warnings and Precautions]*.

In controlled clinical trials, orally administered apixaban in healthy subjects at doses up to 50 mg daily for 3 to 7 days (25 mg twice daily for 7 days or 50 mg once daily for 3 days) had no clinically relevant adverse effects.

In healthy subjects, administration of activated charcoal 2 and 6 hours after ingestion of a 20-mg dose of apixaban reduced mean apixaban AUC by 50% and 27%, respectively. Thus, administration of activated charcoal may be useful in the management of ELIQUIS overdose or accidental ingestion. An agent to reverse the anti-factor Xa activity of apixaban is available.

PATIENT COUNSELING INFORMATION

Advise patients to read the FDA-approved patient labeling (Medication Guide).

Advise patients of the following:

- Not to discontinue ELIQUIS without talking to their physician first.
- That it might take longer than usual for bleeding to stop, and they may bruise or bleed more easily when treated with ELIQUIS. Advise patients about how to recognize bleeding or symptoms of hypovolemia and of the urgent need to report any unusual bleeding to their physician.
- To tell their physicians and dentists they are taking ELIQUIS, and/or any other product known to affect bleeding (including nonprescription products, such as aspirin or NSAIDs), before any surgery or medical or dental procedure is scheduled and before any new drug is taken.
- If the patient is having neuraxial anesthesia or spinal puncture, inform the patient to watch for signs and symptoms of spinal or epidural hematomas *[see Warnings and Precautions]*. If any of these symptoms occur, advise the patient to seek emergent medical attention.
- To tell their physicians if they are pregnant or plan to become pregnant or are breastfeeding or intend to breastfeed during treatment with ELIQUIS *[see Use in Specific Populations]*.
- How to take ELIQUIS if they cannot swallow, or require a nasogastric tube *[see Dosage and Administration (2.6) in full Prescribing Information]*.
- What to do if a dose is missed *[see Dosage and Administration (2.2) in full Prescribing Information]*.

Marketed by:
Bristol-Myers Squibb Company
Princeton, New Jersey 08543 USA
and
Pfizer Inc
New York, New York 10017 USA

Rev November 2019

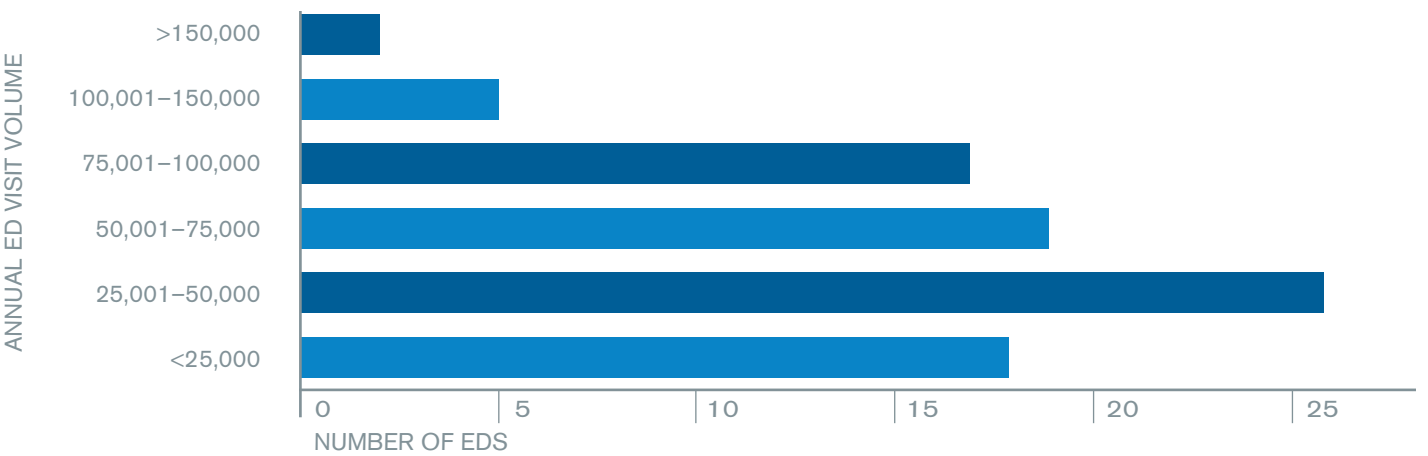
432US1904143-11-01

By the Numbers

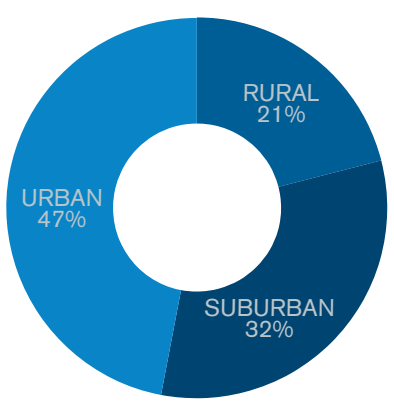
ED Medical Directors on COVID-19

ACEP surveyed emergency department medical directors in early November 2020 about the challenges they're facing due to the pandemic. Here are some highlights from their responses.

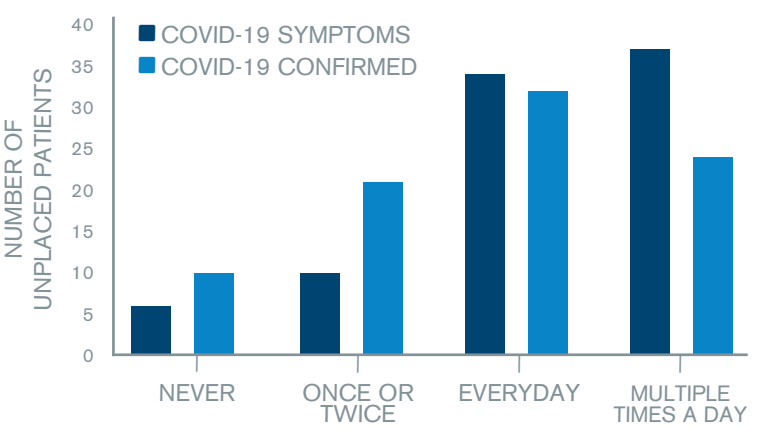
ANNUAL ED VISIT VOLUMES



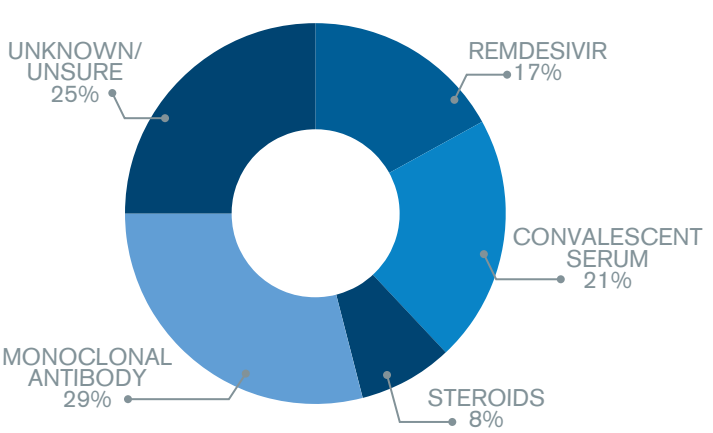
ED LOCATION



PATIENTS UNABLE TO BE PLACED IN ISOLATION



ED COVID-19 MEDICINE SHORTAGES



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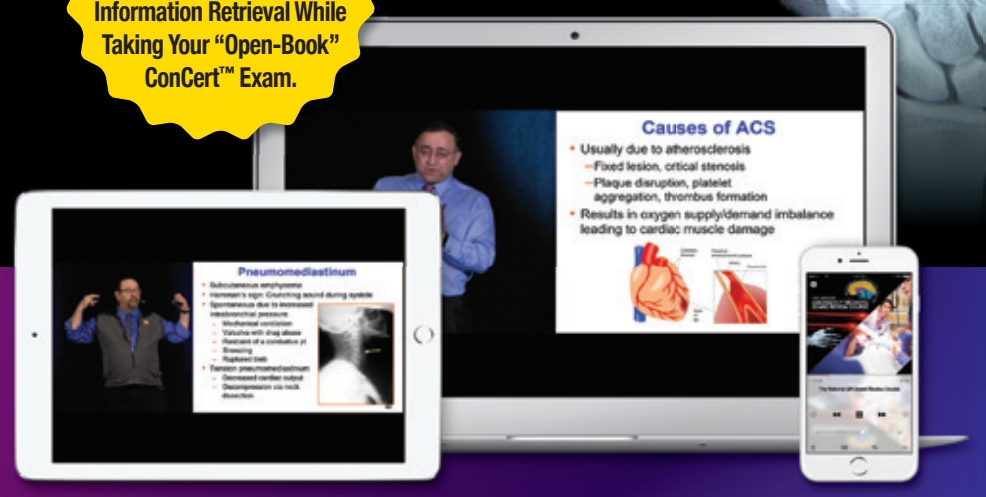

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ACEP Delivers on Out-of-Network Billing

Recently enacted law also substantially reduces painful fee cuts

by L. ANTHONY CIRILLO, MD, FACEP

Amid a global pandemic, out-of-network billing and cuts to fee schedules were probably the last things on the minds of most working emergency physicians. We've got enough of a crisis on our hands every time we go to work. But ACEP never lost focus on these issues, as any legislation related to these issues always carries the potential to pose existential threats to our specialty as we know it.

While most of us have been focusing our attention on battling COVID-19 on the front lines, ACEP was deeply engaged in successfully brokering a series of compromises on Capitol Hill in December. The news is excellent.

On Dec. 21, the U.S. House of Representatives and Senate approved a comprehensive end-of-year spending package, and President Donald Trump signed it into law on Dec. 27. The 5,593-page bill includes funding of the federal government for the fiscal year through September 2021, additional COVID-19 relief, and continued funding of health care "extender" programs. Most important for emergency medicine as a profession, the package also has key provisions to address the out-of-network balance billing (OON/BB) issue and delivers significant relief to the previously proposed 2021 Medicare Physician Fee Schedule cuts, which would have been extremely painful ones (see page 11 for more on the fee schedule).

The federal surprise billing law applies nationally to ERISA plans (employer self-funded plans under the Employee and Retirement Income Security Act of 1974) and to all state-regulated (fully insured) plans in states that do not have a state-based law. Although the bill applies to patients who receive care from an out-of-network physician or facility, more importantly, it affects the negotiation leverage between insurers and physicians for in-network contracting and care.

Overall, this legislation will achieve two major goals:

1. Protecting patients from unexpected medical bills when they seek emergency care
2. Incentivizing insurers to keep physicians and other health care workers in-network and pay reasonably when unexpected out-of-network care occurs

Here are highlights of the OON/BB legislation, which goes into effect on Jan. 1, 2022:

- Creates a framework of initial payment with an opportunity for a simplified arbitration (called independent dispute resolution, or IDR) if insurers don't make a fair initial payment
- Establishes strong criteria for the IDR arbitrator to consider when determining which side's offer is "most reasonable," including the history of contracting between the health care–providing entity and the plan that occurred during the previous four years
- Declares that there be no threshold dollar requirement to use IDR and allows for batching of multiple claims that relate to care provided by the same clinician, for the same service, and in the same geographical area over a 30-day period
- Prevents plans from reducing the "median in-network" rate considered by the arbitrator by fixing it to a point in time, plus adds an inflation adjustment yearly
- Sets "baseball-style" arbitration, where the arbitrator must pick the most reasonable offer and the loser pay all IDR fees
- Requires plans to make all payments directly to the health care–providing entity (insurers must pay the clinician or entity that provided the care directly, rather than provide the payments to patients who would then have to turn around and make payments to hospitals, physicians, or other care-providing entities)
- Prohibits the arbitrator from considering Medicare and Medicaid rates when determining a fair payment for commercial claims

The next important step in the process will be working with federal agencies to do rulemaking to operationalize the law in time for its implementation on Jan. 1, 2022.

Make no mistake: ACEP was *the* specialty organization for emergency medicine at the table battling against the insurance industry to prevent what looked to be a "bad" bill from being passed into law. The ramifications would have taken years, if not decades, to ameliorate. This compromise, a much better outcome for physicians and our patients, came at the end of a dogfight that lasted almost three years. Despite some knockdowns during the process, we got back up and kept fighting on behalf of every emergency physician and our patients. Our success was due to the efforts of ACEP physician and staff leaders; ACEP's Washington, D.C., lobbying team; and members like you who called, tweeted, texted, emailed, and visited their members of Congress. Together, we made a difference.

DR. CIRILLO serves on the ACEP Board of Directors. He still actively practices emergency medicine and serves as the director of government affairs for US Acute Care Solutions.

CMS Updates for 2021

LAST-MINUTE INTERVENTION BY CONGRESS MAY TURN A LOSS TO A GAIN FOR EM

by MICHAEL GRANOVSKY, MD, CPC, FACEP; AND DAVID MCKENZIE, CAE

The Centers for Medicare & Medicaid Services (CMS) has released the 2021 Physician Fee Schedule, which will impact emergency medicine reimbursement significantly. The final rule was released Dec. 1, 2020, a month later than usual due to the public health emergency. More analysis will be included in a future issue, but here are points you need to know now to prepare for the rule, which took effect Jan. 1, 2021.

2021 RVUs Increase for ED E/M Services

Acting to protect the safety net, ACEP asked CMS to recognize the intensity of ED services and maintain the relativity between the ED evaluation and management (E/M) codes and the new patient office codes, which received increased values in 2021. Even though the ED codes received increases of about 5 percent for levels 1–4 in 2020, CMS has accepted our arguments and agreed to increase the ED relative value units (RVUs) for 99283–99285 again in 2021 (see Table 1).

In addition to increasing the work RVUs, each year CMS tweaks the practice expense and professional liability insurance components of our RVUs, with the three components together making up our total RVUs for the year (see Table 2).

2021 Conversion Factor Decrease

On Dec. 2, 2020, the 2021 Physician Fee Schedule published a conversion factor (payment per RVU) of $32.4085, a 10.2 percent decrease from the 2020 conversion factor of $36.0896. This significant decrease was due to the CMS decision to increase reimbursement for the office visit codes, a boon for urgent care facilities (which report using office codes). Importantly, the large increase in the office codes triggered a statutory requirement to decrease the conversion factor to maintain budget neutrality. ACEP has worked with Congress, highlighting the unprecedented strain emergency physician practices already face due to the ongoing COVID-19 pandemic.

Learn more about the 2021 Physician Fee Schedule at the Regs & Eggs blog by Jeffrey Davis, ACEP's regulatory affairs director, at www.acep.org/2021-PFS-blog.

Congressional Action

On Dec. 21, 2020, Congress passed the Consolidated Appropriations Act of 2021, and President Donald Trump signed it into law on Dec. 27. The 5,593-page document that included several favorable adjustments to offset the 10.2 percent budget neutrality cuts, including:

- Delaying for three years the implementation of an add-on code (G2211) to office and other outpatient E/M services, which adds back about 3 percent to the conversion factor
- Authorizing new additional funds to support the conversion factor by 3.75 percent
- Delaying the 2 percent sequestration cuts for three months to allow time for the next Congress to address that issue on a more permanent basis

The above changes significantly improve emergency medicine's outlook for 2021.

As noted above, the work RVUs for 99283–99285 were increased by more than 5 percent for 2021. Those three codes account for about 90 percent of the ED E/M services reported to Medicare.

Net Impact of RVU Increase and Congressional Actions

10.2% (the conversion factor cut) **–** **5.0%** (a conservative estimate of all the ED code RVU increases combined) **=** **5.2%** prior to the recent Congressional action.

With the relief provided by the Consolidated Appropriations Act of 2021 reducing cuts by 3.75 percent through an influx of congressionally approved funds and eliminating a roughly 3 percent contribution to budget neutrality by delaying the implementation of the office add-on code G2211, overall emergency medicine could potentially swing to a positive for 2021.

All in, emergency medicine went from a potential 10.2 percent cut to a gain, which could be as much as 2 percent, depending on the group.

The temporary removal of the sequestration cuts is a bonus. However, if sequestration is not delayed again and goes back into effect in April 2021, all Medicare physician payments will be reduced by 2 percent for the remainder of the year.

This is a tremendous win based on the advocacy work through the ACEP Relative Value Scale Update Committee Team and the legislative and regulatory efforts of ACEP's staff.

ED Continued Traction with Telehealth Services

CMS considered which codes temporarily on the list of approved Medicare telehealth services during the COVID-19 public health emergency will remain on the list permanently. Ultimately, CMS agreed to keep ED E/M code levels 1–5 (Current Procedural Terminology [CPT] codes 99281–99285), critical care, and observation codes 99217 and 99224–99226 on the list of approved Medicare services through the duration of the year the public health emergency expires. Unfortunately, CMS did not add any of these codes to the permanent approval list for telehealth, citing these services as too intense to be routinely performed via telehealth.

Teaching Physicians and Residents

For **rural settings only**, CMS has made oversight via telemedicine permanent for teaching physicians supervising residents in residency training sites outside of an Office of Management and Budget–defined metropolitan statistical area (generally defined as an urban cluster of more than 50,000 people). Moonlighting resident flexibilities, allowing an emergency medicine resident to work elsewhere outside the scope of their residency duties, have been extended to Dec. 31, 2021, or may be made permanent to help cover physician shortages due to the public health emergency.

Medical Documentation Requirements

In last year's rule, CMS finalized numerous changes to the medical record documentation requirements for physicians and other health care practitioners. In this 2021 Final Rule, CMS is clarifying that physicians and other health care practitioners, including therapists, can review and verify documentation entered into the medical record by members of the medical team for their own services that are paid under the Physician Fee Schedule.

Merit-based Incentive Payment System (MIPS)

For 2020 and 2021, the four typical reporting categories—quality, cost, improvement activities, and promoting interoperability—continue (see Table 3).

CMS is granting hardship exemptions on a case-by-case basis due to COVID-19. It is therefore possible for clinicians or groups to request to be exempted from all four performance

CONTINUED *on page 14*

Table 1: 2021 Increases to ED E/M Code Work RVUs

Code	2020 Work RVUs	2021 Proposed Work RVUs	% Increase in Work RVUs in 2020
99281	0.48	0.48	0%
99282	0.93	0.93	0%
99283	1.42	1.60	12.68%
99284	2.60	2.74	5.38%
99285	3.80	4.00	5.26%

Table 2: 2021 ED E/M Code Total RVUs and Components

Code	2020 Work RVUs	2021 Work RVUs	2020 PE RVUs	2021 PE RVUs	2020 PLI RVUs	2021 PLI RVUs	2020 Total RVUs	2021 Total RVUs
99281	0.48	0.48	0.11	0.11	0.05	0.05	0.64	0.64
99282	0.93	0.93	0.21	0.21	0.09	0.10	1.23	1.24
99283	1.42	1.60	0.29	0.33	0.13	0.17	1.84	2.10
99284	2.60	2.74	0.51	0.54	0.27	0.29	3.38	3.57
99285	3.80	4.00	0.71	0.74	0.40	0.42	4.91	5.16

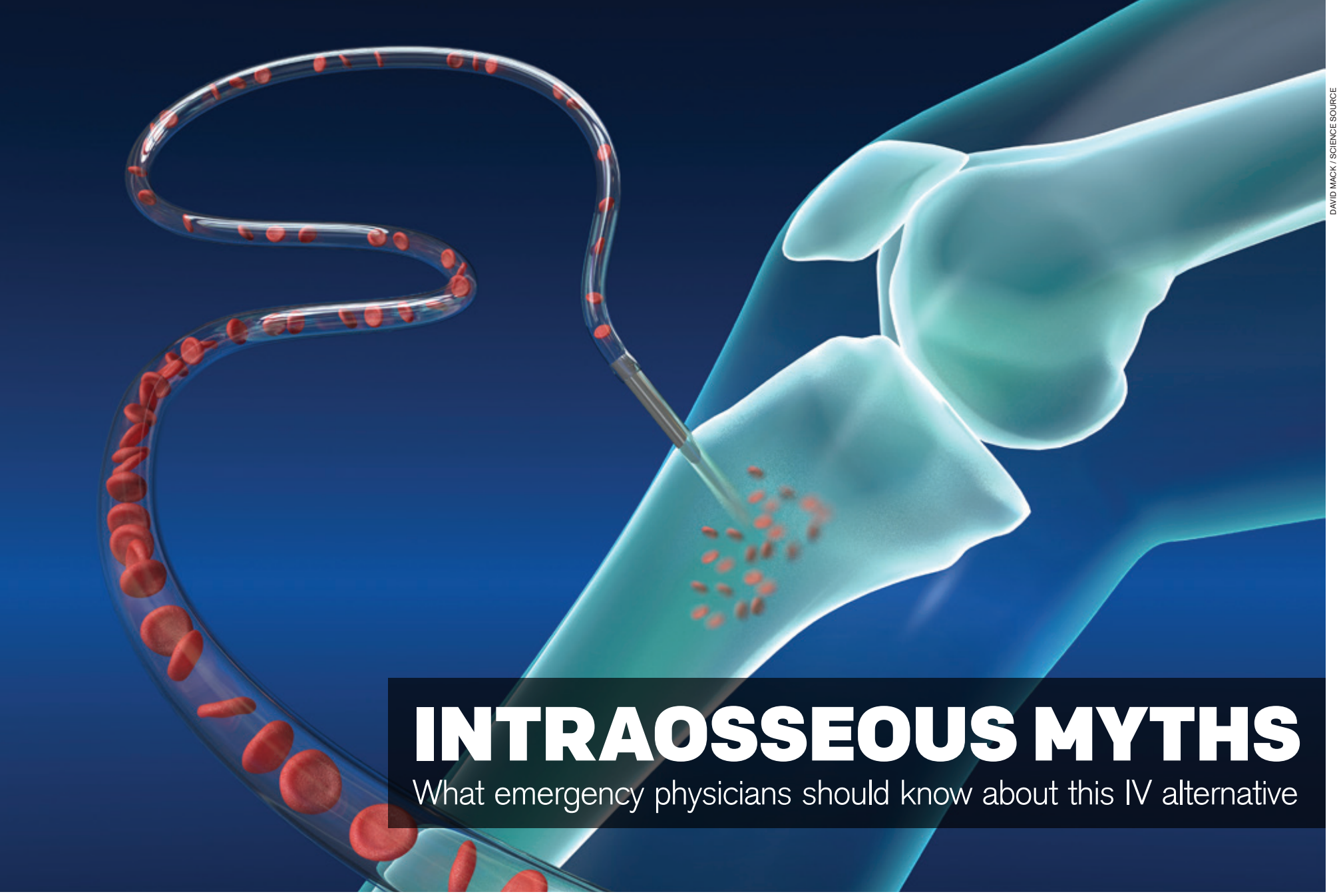
RVU= relative value units; PE=practice expense; PLI=professional liability insurance

Table 3: 2020 and 2021 MIPS Performance Category Weighting

Category	2020	2021
Quality	45%	40%
Cost	15%	20%
Improvement Activities	15%	15%
Promoting Interoperability	25%	25%

Table 4: OPPS Rates for ED E/M Codes

Facility Level	APC	2020
99281	5021	$74.19
99282	5022	$134.57
99283	5023	$236.87
99284	5024	$372.01
99285	5025	$535.13
99291	5041	$708.57



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INTRAOSSEOUS MYTHS

What emergency physicians should know about this IV alternative

by CHRISTOPHER SAMPSON, MD, FACEP

When you're in an adult code and intravenous (IV) access can't be obtained, the first option we reflexively go to is intraosseous (IO) access. Anyone who has practiced emergency medicine for more than a decade knows that was not always the case. In the 1980s, IO access was introduced as a standard of care by the American Heart Association as a component of pediatric advanced life support. During the decade or two that followed, IO access was mainly reserved for use in the pediatric population as an alternative to IV access. But in the early 2000s, its use in the adult population began to rise. The introduction of IO drills and use by the military helped increase adult use.

First a little history: IO infusions were accidentally discovered in 1936 during experiments on bone marrow transplant in rabbits by Leandro Tocantins, MD, and John O'Neill, MD, in Philadelphia. When 5 mL of saline was injected into the proximal end of the bone, only 2 mL was recovered at the distal end, with no evidence of infiltration. Further studies were conducted using blood, and eventually a clinical trial was conducted using 14 human patients (including two children younger than 1 year old!), infusing blood, plasma, glucose, and saline. Initial injection sites used were the sternal body, manubrium, and distal femur or proximal tibia in infants. IO soon became a favored route for patients in shock, and it was also noted during the blitz of World War II that sternal puncture could even be carried out under poor light conditions.[1]

Despite the rise in its use and across nine decades of research, there are still many myths that persist regarding IO access.

MYTH 1: **The proximal tibia is the only location for insertion.**

The proximal tibia is the most common site used, but there are multiple alternative locations an IO can be placed. Other locations include the distal tibia, proximal humerus, iliac crest, and sternum.

MYTH 2: **Only medications and crystalloid solutions can be infused through an IO.**

As far back as the initial experiments with rabbits, IO access has been an option for more than just crystalloid fluids. Not only can *any medication* given intravenously be given through the IO route, but blood products and even IV contrast have been given successfully in some case reports.[2,3] When paralytics for rapid sequence intubation were given via the IO route, first-pass success rate was 97 percent.[4]

MYTH 3: **IO infusions are too slow, and pressure bags can't be used.**

One concern is that because the IO is placed in the intermedullary space, flow rates need to be slower. But studies show flow rates of 4.96 mL/min in the proximal tibia and 2.07 mL/min in the distal tibia. Use of pressure bags increased the flow rate to 7.70 mL/min in the proximal group.[5] These are still lower rates than a 14-gauge IV (366 mL/min) or triple lumen central venous catheters (CVCs) distal port (79 mL/min) but it provides a safe and effective path to the vascular system.[6]

MYTH 4: **IO access is hard to obtain.**

In a study looking at out-of-hospital cardiac arrest, first-attempt success was more likely in the tibial IO group (91 percent) compared to the humeral (51 percent) or peripheral (43 percent) IV group. In a setting where medication delivery speed matters, it was also quicker to place the tibial IO (4.6 minutes) when compared to IV group (5.8 minutes).[7] Success rates were also higher and achieved more quickly for IO when compared to CVC (85 versus 60 percent; 2 versus 8 minutes).[8]

MYTH 5: **There are no complications to placement of an IO.**

All the above is true, but a procedure is a procedure. Though quick and easy to place, complications can occur. The most common complication is extravasation from a misplaced IO line. This can lead to compartment syndrome or tissue necrosis. Inappropriate placement can also lead to placement in the joint and not the intermedullary space.[2] An IO line should never be placed in a limb that is fractured or has a vascular injury. If overlying cellulitis is present, or if previous orthopedic surgery has occurred in the location, IO placement may be unwise unless other options have been completely exhausted and the patient is crashing. A study performed in 1985 found the frequently reported serious adverse event was osteomyelitis (0.6 percent). All of these events occurred after prolonged IO infusions, suggesting that, once time permits, better intravascular access should be obtained.[9]

MYTH 6: **IO doesn't hurt.**

Awake patients do report pain, especially with infusions that create increased pressure in the intermedullary space. Recommendations for the awake patient include infusing lidocaine 2% (preservative free) over 120 seconds followed by allowing 60 seconds for the anesthetic to dwell in the IO space. In adults, the typical dose is 40 mg, and the pediatric dose is 0.5 mg/kg (maximum of 40 mg).[10]

Hopefully, this dispels any myths surrounding IO access and safe use. Next time you need to rapidly give medications and no IV access can be obtained, when appropriate, reach for the IO needle and drill.

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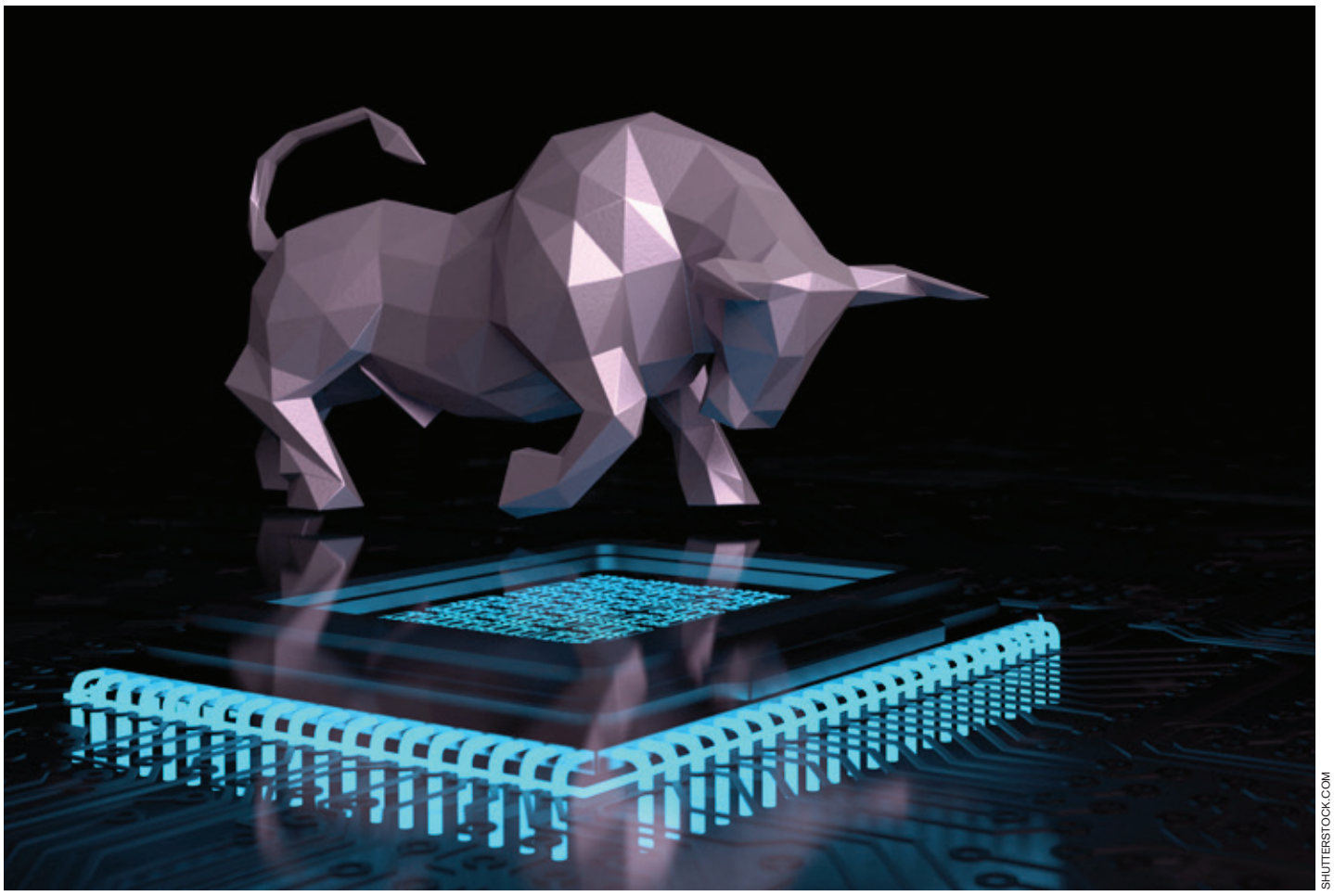
DR. SAMPSON is director of education, director of clinical research, and assistant medical director of MU Emergency Medical Services and associate clinical professor in the department of emergency medicine at the University of Missouri–Columbia.

Bullish on AI

EMBRACE ARTIFICIAL INTELLIGENCE, AND WE CAN MAKE IT WORK FOR US

by NUPUR GARG, MD



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Any time artificial intelligence (AI) is mentioned to doctors, it elicits a mixture of reactions that include discomfort, disgust, and distrust—sometimes all at once. Because my reaction when AI is mentioned in any health care context is engaged, hopeful, and possibly even giddy, I was unprepared these sentiments when I began my career in emergency medicine.

Even with a proper understanding, criticism of AI in health care reflects ongoing distrust. Distrust in medical research is not unique to AI. Furthermore, AI does not promise to be a silver bullet for many of our problems. But AI is a tool through which we can look at data already being collected and possibly garner more meaningful conclusions.

Even most experts agree that AI cannot predict anything that a human would not have been able to. So why is AI better?

The two primary advantages AI brings to medicine relate to reducing errors and improving financial sustainability by reducing inefficiencies.

Change is hard in medicine. That's especially true when new technology is involved. I propose that AI in health care has the potential to be the singular most disruptive change we see in medicine over the next 20 years. If emergency physicians continue to ignore it, it will be a change that happens *to us* and to the detriment of our patients and our practice. Instead, we should embrace AI so the changes it brings are by us and for us.

AI in EM

Currently, more than 1,000 companies are integrating AI in various aspects of health care. Last year, more than $4 billion was invested by venture capital in this space. These numbers are expected to increase this year, reflecting the magnitude in anticipated future savings that may come from tackling widespread inefficiencies in the health care system. As we know, inefficiencies exist in almost every single link in the U.S. health care delivery chain. Let's explore some novel projects in five different categories that stand to have substantial impact on our practice of emergency medicine.

1. **Information collection and processing:** Smart devices are already collecting and interpreting information for patients, including everything from ECG bands for professional athletes to heart monitors on smart watches. There are "medical grade" smart devices such as pacemakers and Holter monitors that track heart rates, label what they see, and send alerts. By now, we have all seen or heard about patients seeking medical evaluation because of an alert they received or an anomaly they noticed from these devices. Now, it's not just wearables that are making their way into hospitals. Aside from the telemetry monitoring devices, we will soon have other devices hooked up to our patients, analyzing (quite literally) their outputs. For example, Potrero has a bedside Foley device to automatically detect anomalies in urine output for early detection of acute kidney injury in ICU patients. It has been tested at Grady Hospital in Atlanta. With COVID-19 in our midst, the value proposition for remotely monitoring anything has skyrocketed. Think of all the personal protective equipment saved and the reduced risks to staff.
2. **Medical decision making:** Not everything in AI in health care comes from for-profit vendors. Researchers at Stanford University and Duke University completed a study on more than 3,000 patients, showing their AI algorithm's ability to detect pulmonary embolism to be highly effective. It may even be the best existing algorithm from an accuracy perspective. Their model evaluated more than 750 different variables, including medications, demographics, vital signs, and all the data from an individual's prior visits. As a patient, which algorithm would you choose to decide whether you should get a CT angiogram? In this case, the accuracy was only about 80 percent. That's still higher than other algorithms (about 70 percent), but some wiggle room remains. My prediction and hope: Can sepsis be next?

   Also included in this category are direct patient care algorithms. For example, CLEW is a platform that analyzes data from critically ill patients to give a dynamic work list for the optimization of patient outcomes over the following metrics: venous thromboembolism prevention, lung protective ventilation, stress ulcer prophylaxis, blood transfusions, and accelerated mechanical ventilation weaning and liberation.
3. **Communication:** Are you ready to hear about an AI start-up with technology that has already been approved for Medicare reimbursement? Viz.ai detects large vessel occlusion (LVO) on head CT/CTA. It is integrated into imaging software and sees the images as they are being collected. If an LVO is detected, it sends a message to all the current and future caregivers of the patient, from ED nursing to the neurointerventionalist who may perform a procedure. In other words, the downstream caregivers might automatically receive a text message about a patient before they have even seen them, depending on your center's stroke workflow. Knowing this, are you surprised centers that adopt Viz.ai have seen a 50 percent increase in interventions?

   Regarding the technology, in comparison with an experienced neuroradiologist, the Viz.ai algorithm performs with very high sensitivity (though mediocre specificity), with an overall accuracy of about 80 percent. This means it catches almost all the LVOs and then some. All of the cases are then presented to the neurointerventionalist directly. That said, some of the evidence that endovascular intervention for LVO is better than the best medical management for even mild stroke symptoms (NIH Stroke Scale ≤5) has been published by the same people who are evaluating the efficacy of the Viz.ai algorithm. Conflict of interest, anyone? The same people also argue that ASPECTS, a radiology scoring system to determine LVO from noncontrast head CTs, performs *better* than CT angiogram of the head and neck for determining presence of important and intervenable LVOs. Viz.ai evaluates both noncontrast CT and CT angiograms.

   Enter Medicare. Viz.ai has Food and Drug Administration (FDA) approval for its technology, and in a milestone decision made in August 2020, Medicare now reimburses for it. Interestingly, the model for Medicare reimbursement only comes into play if your center is *not* currently benefiting from increased revenues coming from an increased number of performed interventions. Thus, it is basically a consolation prize to the community hospitals that are losing stroke admission–related revenue to the interventional centers that would have previously never accepted transfer of such patients (or treated them directly). Of course, clot retrieval is not without risks. Hopefully, an increase in these procedures will provide patients more benefits than harm.

   Other start-ups in radiology and pathology are conducting clinical analyses on other imaging and specimen evaluations and their effect on medical decision making. As with strokes, though, the validation studies are often completed by researchers who either own stock or stand to reap financial benefits from AI technologies. Does this necessarily negate the effectiveness of the technology? No. Should we demand better standards of validation research? Absolutely.
4. **Billing:** While not part of direct patient care, the myriad applications of AI to medical billing that are ongoing right now should be discussed. In general, billing is the most underappreciated and underdiscussed determinator of our practice in emergency medicine. Changes in reimbursement patterns can alter our practices. Arguably, AI was first introduced in health care for reasons related to medical billing, and this makes sense since the revenue benefits are easy to measure and immediately realized and recognized. For example, natural language processing is used to scan through charts to find diagnoses we forgot to include, add procedures we forgot to document, and add missing information needed to justify the billing codes we used. AI is also used to better understand coverage denials and to identify strategic areas for potential fair increases in revenues.

   In terms of billing for their own "services," AI start-ups are seeing success in getting FDA approval. Medicare reimbursement is the natural next step. For example, Digital Diagnostics came out with a

CONTINUED *on page 14*

BULLISH ON AI | CONTINUED FROM PAGE 13

technology called IDx-DR that can detect retinopathies mostly caused by diabetes. Its technology is used internationally and for a low cost and has shown to be instrumental in early detection of diabetic retinopathy. Another example: Caption Health received FDA approval to deploy Caption Guidance, which is used for helping ultrasound operators capture high-quality cardiac ultrasound images. It was tested on previously untrained nurses. These caregivers were found to be able to capture high-quality images using this technology. Both of these technologies could be readily and legally adopted into our workflows. In fact, the only thing preventing widespread adoption probably is the economics (ie, billing). Given the reimbursement model described above, the floodgates of Medicare reimbursement for AI can be considered open now. It is only a matter of time before we begin to see how AI changes our diagnostic algorithms.

5. **Process improvement:** Imagine changes in staffing recommendations being made by an algorithm rather than management. The reality is that this is already happening and not just for physicians, physician assistants, and nurse practitioners. AI algorithms are being used to make recommendations on nurse staffing in the emergency department as well. Could this be a good thing and an answer to our understaffing problems? Yes! Unfortunately, right now, the opposite has been happening. To implement any technology, a cost-benefit analysis has to be done. If a staffing algorithm promises to save a system money, then one easy way to do this is by cutting hours, not increasing them. That said, research on predictive models for staffing emergency departments has been described in academic literature. There are even algorithms that take into account surges in patient volume.

Other areas of process optimization using AI include patient flow, protocol initiation, and really almost any computer-based task. A platform called Olive is designed as a health care bot, or a "digital employee." It assists hospital employees across many departments including revenue cycle, supply chain, information technology, human resources, finance, accounting, pharmacy operations, and clinical operations. Olive provides a timely pop-up of what it "thinks" is useful information based on what it has learned about the user so far. One example is in patient information verification.

Conclusion

There are many steps that need to be taken so we physicians continue to have agency in our own practices. AI is not about ceding that; it's about taking it back. We need to engage with researchers, vendors, administrators, insurers, and regulators so our voices as physicians can be heard. We need to advocate for our patients and our colleagues.

Ignoring AI is not the answer. We need to embrace AI and make it serve our needs. Decisions are being made with or without us. We all would prefer to be at the table that will shape the future of health care. Let's do one better: Let's be at the center of these conversations.

DR. GARG is assistant clinical professor of emergency medicin at Yale University School of Medicine in New Haven, Connecticut, and an emergency physician at Lawrence & Memorial in New London, Connecticut.

CMS UPDATES | CONTINUED FROM PAGE 11

categories in 2020. If clinicians submit a hardship exemption application and their application is approved, they will be held harmless from a payment adjustment due to that category in 2022—meaning that they will not be eligible for a bonus and not face a penalty based on their MIPS performance in 2020. Importantly, the Final Rule published a continuation of the hardship exemption process for 2021.

- **Performance Threshold:** CMS has set the threshold that clinicians need to achieve to avoid a penalty in 2021 at 60 points. In the proposed rule, CMS had stated that the performance threshold would be 50 points in 2021, but CMS is now instituting a higher threshold.
- **MIPS Value Pathways (MVPs):** CMS is committed to developing MVPs that would combine all four categories of MIPS reporting into a single more harmonized process. However, due to COVID-19, the implementation of MVPs is being delayed until 2022. ACEP is working with CMS on developing an MVP for emergency medicine and is examining how ACEP's Qualified Clinical Data Registry, the Clinical Emergency Data Registry (CEDR), can help emergency physicians participate in an MVP (see page 11 for more on CEDR).

2021 ED Facility Payments

CMS is increasing the Hospital Outpatient Prospective Payment System (OPPS) rate by 2.4 percent for 2021. Payments for the ambulatory payment classifications (APCs) related to the five ED E/M codes and critical care appear in Table 4.

DR. GRANOVSKY is president of LogixHealth, an ED coding and billing company, and currently serves as the course director of ACEP's Coding and Reimbursement courses. He may be reached at mgranovsky@logixhealth.com.

MR. MCKENZIE is ACEP's reimbursement director and can be reached at dmckenzie@acep.org.

ACEP4U: Transforming Emergency Care

ACEP'S QUALITY TEAM IS LEADING DIGITAL HEALTH CARE DEVELOPMENT IN FIVE AREAS

by JORDAN GRANTHAM

In a few short years, ACEP has grown its Quality Team to include five major areas that collectively drive digital transformation in emergency medicine: Clinical Emergency Data Registry (CEDR), Emergency Quality Network (E-QUAL), Quality Measures, Data Science, and Health Information Technology (HIT). Together, the ACEP Quality Team provides products and programs to help protect earned revenue, improve patient outcomes, coordinate care, and reduce clinician burden. Learn more at www.acep.org/quality.

CEDR, the first EM specialty-wide Qualified Clinical Data Registry (QCDR), is now five years old. While the Centers for Medicare and Medicaid Services (CMS) has substantially reduced the number of approved QCDRs, CEDR is a shining example of success within emergency medicine. CEDR not only gathers and reports data, it provides participating departments with measure refinement and improvement strategies. In 2019, CEDR participants received more than $3.4 million in CMS' Merit-based Incentive Payment System (MIPS) bonuses.

2020 CEDR Data Elements

- 200+ EM practice groups
- 700+ locations
- 15,000+ clinicians
- 20 million unique visits

For 2021: Having gathered data from more than 30 million distinct patients since 2015, totaling more than 75 million encounters, CEDR will enter its next phase; it will leverage the database beyond MIPS by de-identifying and aggregating the data to create an accessible research platform. CEDR is working to customize and streamline the digital data cycle and resulting policies within electronic health records to reduce burden on clinicians and improve outcomes. Learn more at www.acep.org/cedr.

E-QUAL EMERGENCY QUALITY NETWORK

E-QUAL is a virtual learning community designed to achieve higher-quality patient outcomes at lower cost by creating and accumulating meaningful tools for emergency clinicians and quality improvement leaders. E-QUAL works to advance local quality improvement efforts focused on high-impact areas that demonstrate the value of emergency care including improving sepsis outcomes, reducing avoidable imaging, reducing chest pain hospitalizations, reducing harm from opioids, and improving stroke care.

Emergency departments participate in an E-QUAL initiative by joining a learning collaborative offered annually focusing on a single clinical topic. With a learning collaborative, each emergency department designates a local ED champion who leads a quality improvement project supported by the data and education available in the virtual E-QUAL portal.

E-QUAL had great success from 2015 through 2020 efforts to improve care across multiple practices. With 1,017 EDs participating, including 389 rural, critical access, or safety-net hospitals, and 32,000 emergency clinicians, some highlights include:

- 6,000+ improvement activity credits earned for the CMS Quality Payment Program
- 35 percent decline in opioids administered
- 23 percent increase in alternatives to opioids prescribed
- 25,000 lives saved from better sepsis care
- 30,000 fewer patients exposed to ionizing radiation
- $55 million saved in avoidable imaging studies and hospitalization

E-QUAL enrollment for 2021 is now open. This year's Opioid Wave IV, with enrollment closing on Feb. 14, is focused on helping emergency departments develop programs to treat addiction for patients with opioid use disorder or nonfatal opioid overdose. The 2021 Stroke Wave II collaborative, with enrollment closing March 14, is expanding its focus to both hemorrhagic and ischemic stroke. Emergency departments can enroll for free. Learn more at www.acep.org/equal.

QUALITY MEASURES

ACEP's Quality Measures initiative enables clinicians to lead the development of metrics that matter in emergency care. This approach links measures to outcomes, reduces clinician burden, and delivers meaningful information to clinicians and patients. Through CEDR, clinicians may choose to report QCDR measures and MIPS measures to receive credit for MIPS quality reporting. Learn more at www.acep.org/quality-measures. In 2020, the Quality Measures initiative supported:

- 21 QCDR measures
- 22 MIPS measures

For 2021, CMS has approved ACEP's yearly QCDR self-nomination for the fifth straight year. In addition to measures available this year, the Quality Team successfully built and nominated five new measures:

- ACEP 54: Appropriate Utilization of FAST Exam in the Emergency Department
- ACEP 55: Emergency Department Utilization of CT for Minor Blunt Head Trauma for Patients Aged 2 Through 17 Years (formerly ACEP 20)
- ACEP 56: Follow-Up Care Coordination Documented in Discharge Summary
- ACEP 57: Avoidance of Opioid Therapy for Migraine, Low Back Pain, and Dental Pain
- ACEP 58: Appropriate Treatment for Adults with Upper Respiratory Infection (URI)

DATA ANALYTICS PLATFORM

Data alone don't solve problems; they must be transformed into knowledge to have applicable value. The Data Science team utilizes five years of CEDR data to bridge the clinical gaps and democratize data through the analytics platform that will drive improved outcomes and facilitate new EM research. Current data science projects include:

- Build relationships with the Centers for Disease Control and Prevention (CDC) National Syndromic Surveillance Program:
  - » **Outbound Data:** Diagnostic information on influenza-like visits
  - » **Inbound Data:** Department of Health and Human Services (HHS) region breakdown of ED visits
- Improve the performance of the CDC National Hospital Ambulatory Medical Care Survey process
- Opioid research with the National Institutes of Health/National Institute on Drug Abuse
- Cutting-edge health IT tools for scaling health research with HHS Office of the National Coordinator/Medstar
- National diagnostic performance dashboard with the Agency for Healthcare Research and Quality/Johns Hopkins University
- A bacterial meningitis measure with the American Academy of Neurology
- A Moore Grant for pulmonary embolism measure development

HEALTH INFORMATION TECHNOLOGY

HIT encompasses a broad scope of work that includes mining health information exchanges to improve health care quality, safety, and efficacy. HIT programs help discover and drive efforts to reduce clinical burnout, especially by addressing inefficiencies across electronic medical record systems. Learn more at www.acep.org/healthinfotech.

HIT efforts are stewarded by ACEP's newest committee, the Health Innovation & Technology Committee (HITC). The HITC is working with ACEP staff to "develop a plan to insert ACEP at the center of health information/innovation policy development and management, using data-driven advocacy and leveraging new technologies to improve emergency care delivery and patient outcomes."

The landscape of emergency medicine and acute care has changed so much in the past five years and continues to transform rapidly. While the future is difficult to predict, the ACEP Quality Team is taking the pioneering spirit that built the College to move boldly forward with a vision for the future.

Osteomyelitis and Vascular Insufficiency

A case of morbidity due to fear of COVID-19

by DHISHANT M. ASARPOTA, MS, MBA; KYLEY J. WYSS, MD; AND CATHERINE A. MARCO, MD, FACEP

During the COVID-19 pandemic, there has been a documented decline in emergency department visits for medical and traumatic conditions, myocardial infarctions, stroke, and hyperglycemic crises.[1–3] Four in 10 adults have deferred care for fear of contracting the novel coronavirus, which complicates a patient's disease course and places them in a higher-mortality cohort.[4] A recent survey conducted by ACEP found that 80 percent of respondents were concerned about contracting COVID-19 from another patient or visitor in the emergency department, and 29 percent have actively delayed or avoided seeking medical care due to concerns about contracting COVID-19.[5] Another survey found that, regarding non-COVID-19-related complaints, 59 percent of respondents were unlikely to utilize emergency care, with an additional 20 percent of respondents who "don't know."[6]

We present a case study of a patient whose fear of contracting COVID-19 led to significant morbidity.

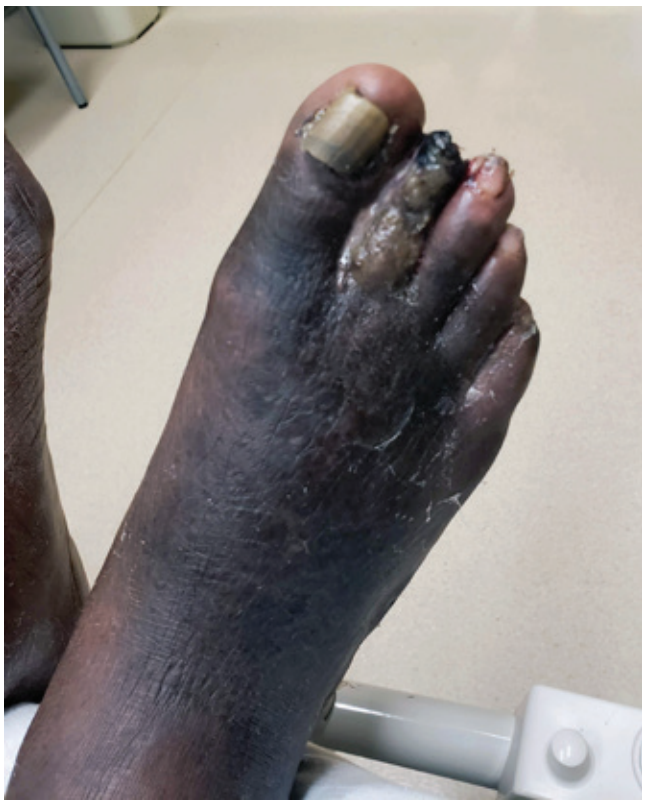
Case Report

A 79-year-old African American male presented to the emergency department with a two-week history of right leg swelling and darkness of his right second toe. He denied any history of trauma, pain, or erythema. The patient did not report any systemic symptoms, including fever, malaise, or weakness. His medical history was notable for hypertension and ulcerative colitis, the latter of which was managed by infliximab. The patient reported smoking 0.5 packs per day. He had delayed seeking medical treatment for two weeks due to fear of COVID-19.

On examination, the patient appeared well, with normal speech and mental status. Vital signs were normal. Cardiac, pulmonary, and abdominal exams were unremarkable. Examination of the right leg demonstrated moderate edema of the calf. Moderate erythema and edema were seen on the dorsum of the right foot. Right dorsalis pedis and posterior tibial pulses were not palpable. The right second toe was notable for gangrene, purulence, and an absent distal phalanx (see Figure 1).

Laboratory studies included a glucose of 103 mg/dL, hemoglobin of 12.3 g/dL, and erythrocyte sedimentation rate (ESR) of 100 mm/h. A plain radiograph of the right foot showed osteomyelitis of the second middle phalanx (see Figure 2). Ultrasound of the right lower extremity revealed an occlusion extending from the right superficial femoral artery through the popliteal artery. No deep vein thrombosis was found.

Empiric antibiotic treatment with intravenous vancomycin and piperacillin/tazobactam was initiated in the emergency department. The patient was admitted to the hospital and received consultations from infectious disease, podiatry, and vascular surgery specialists. On hospital Day 3, he underwent right iliofemoral endarterectomy with bovine patch angioplasty, right proximal superficial femoral artery endarterectomy, and right femoral artery to tibial artery saphenous vein bypass. On hospital Day 7, he underwent a right second digit amputation and flap. He was discharged home after 11 days in good condition.



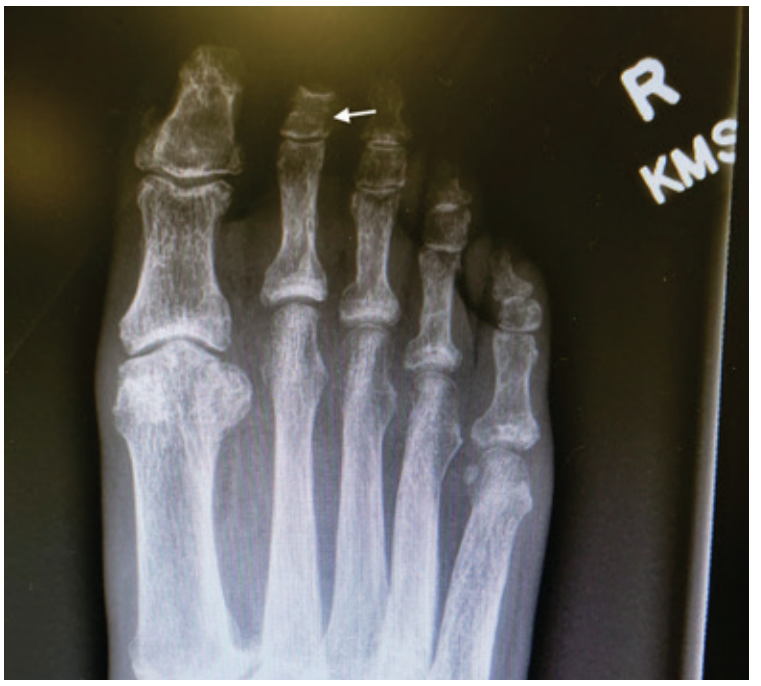


Figure 1(LEFT): Gross observation of the right foot demonstrates gangrene with purulence, edema, and absent distal phalanx.

Figure 2(ABOVE): X-ray of right foot revealing osteomyelitis of the second middle phalanx (arrow) and absent second distal phalanx in AP view.

Discussion

Critical limb ischemia (CLI) is the most advanced stage of peripheral artery disease (PAD) and is associated with significant morbidity and mortality.[7,8] A 2019 report estimates the U.S. prevalence of CLI to be 1.3 percent in patients above the age of 40 (2 million people), while PAD affects more than 200 million people worldwide.[8,9]

The "5 P's" of CLI are pain, pulselessness, pallor, paresthesia, and paralysis. These features are found in 48 to 90 percent of the acute presentations of limb ischemia.[10,11] Rarely, progression to severe ischemia leads to ulceration of the digits of the foot (8.5 percent of cases) and frank gangrene (5.2 percent of cases).[7,11]

Smoking and diabetes are the most significant risk factors of CLI, but others include African American race, male sex, being more than 40 years old, hypertension, dyslipidemia, elevated C-reactive protein, hypercoagulable states, hyperhomocysteinemia, chronic renal insufficiency, and history of cardiovascular disease.[7,9,10] The one-year mortality in CLI patients with gangrene is 33.2 percent, which jumps to 68.5 percent over four years.[12]

The COVID-19 pandemic has resulted in fear of seeking health care, which can contribute to preventable morbidity and mortality.

This case describes a significant delay in seeking medical care due to fear of COVID-19, resulting in worsening osteomyelitis and gangrene and ultimately requiring multiple surgical interventions and prolonged antibiotic therapy. Although our patient had risk factors for PAD, the development of severe and life-threatening CLI potentially could have been mitigated with early intervention.

Many local and national organizations are working to educate the public about seeking appropriate medical care.[13–17] Continued patient education at the local and national level is necessary to ensure timely and appropriate medical treatment.

KEY POINTS

- Peripheral arterial disease may result in significant mortality, including infection, gangrene, and limb ischemia, but prompt treatment may prevent complications.
- Fear of seeking medical attention during the COVID-19 pandemic may result in significant morbidity and mortality.
- Patient education at the local and national level is crucial to ensure timely medical treatment.

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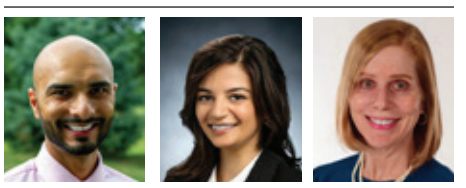


MR. ASARPOTA is a medical student; **DR. WYSS** is chief resident, emergency medicine; and **DR. MARCO** is professor of emergency medicine at the Wright State University Boonshoft School of Medicine in Dayton, Ohio.

AstraZeneca adenovirus-based coronavirus vaccine had not yet received EUA from the FDA, though published data suggested efficacy ranging from 62 to 90 percent, with recent reports claiming even higher numbers.[1,2] When the pandemic began, very few experts believed that an effective vaccine would be available so soon, making vaccines the high-point of an otherwise dismal year for science and public health.

In the United States, the first wave of individuals to receive the Pfizer and Moderna vaccines outside of clinical trials has mainly been composed of health care workers. The "vaccine selfie" quickly became the meme of the moment, with many emergency physicians posting pictures and videos of themselves getting their first dose on social media for all to see. Naturally, the media covered a few instances of systemic allergic reactions requiring epinephrine, but so far, among the nearly 2 million doses given here, the safety reports have been encouraging. Many people experienced pain at the injection site, and a sizeable number, perhaps 3 percent, experienced symptoms bothersome enough to temporarily inhibit usual activities of daily life and work. But all of that pales in comparison to the more than 3,000 Americans currently dying daily of COVID-19 among those who have not yet been vaccinated.

Three Big Questions Answered

Over the next few months, we can expect three common questions: 1) Should I get the vaccine when it is available to me? 2) Should I be vaccinated if I was already infected with the coronavirus and I recovered? 3) Which vaccine is best?

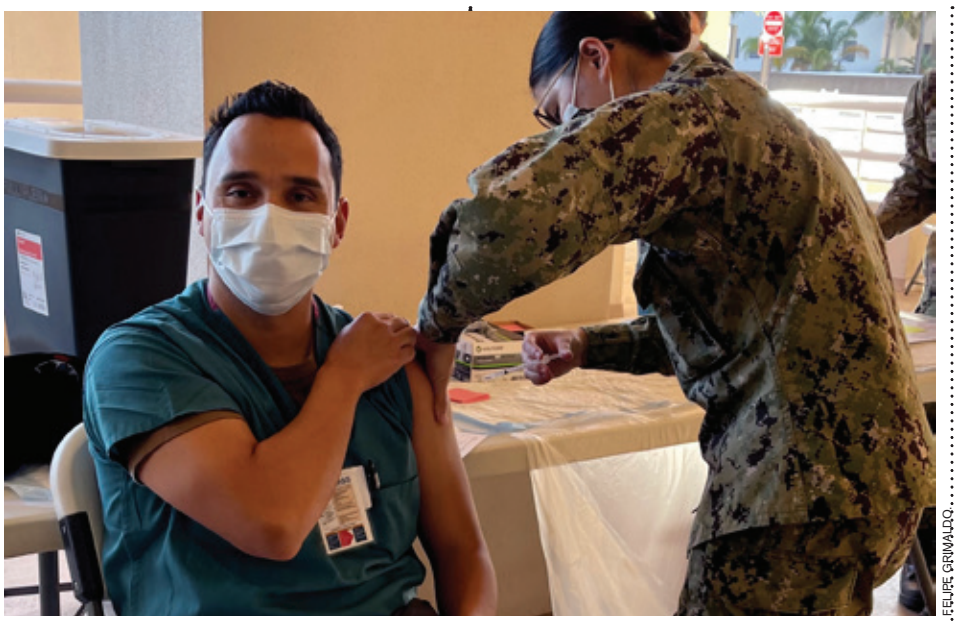
The answer to the first question is easy in most cases: yes. Compared to getting COVID-19, which has killed 1 in 1,000 Americans already, the side effects associated with these "reactogenic" vaccines are minor. The answer to the second question is that those with suspected or confirmed previous infections *should* be vaccinated, though only after symptoms have ceased. (Note: It is possible that immunity from the vaccines will be stronger and longer-lasting than that from natural infection, though research is ongoing.)

The answer to the third question is both easy and complicated. The most straightforward answer: "Get the one available to you first." But for those who want to know more about the differences between the Pfizer-BioNTech and Moderna mRNA vaccines, let's dive in.

Pfizer-BioNTech Versus Moderna

The differences between these two vaccines can be summarized as follows: differences in age indications, storage temperatures, dosing schedule, efficacy at preventing COVID-19 in persons ≥65 years of age, and frequency of systemic side effects and injection site reactions. (For more granular information, visit ACEPNow.com to view the table accompanying this article).

Both vaccines appear remarkably efficacious at preventing COVID-19 disease in general, and severe COVID-19 specifically.[3-6] The second dose of both the Pfizer-BioNTech and Moderna vaccines appears to induce a strong immune response resulting in a higher frequency of influenza-like illnesses than experienced after the first dose.[4,6] Health care workers should be aware of the potential to feel ill for a day or two after receiving either vaccine (especially after the second dose) and should be familiar with their hospital policy regarding post-vaccine symptoms that warrant work restrictions and testing for SARS-CoV-2.



FELIPE GRIMALDO

Emergency physician Felipe Grimaldo, MD, FACEP, receives his COVID-19 vaccine.

Data are currently limited regarding vaccine safety and efficacy in demographics *not* included in the clinical trials, such as persons who are immunocompromised, have an autoimmune disorder, are pregnant or currently lactating, or are under the ages of either 16 or 18 years. Nevertheless, at the time of this writing, the Centers for Disease Control and Prevention (CDC) recommends the mRNA vaccine for persons who are immunocompromised, are living with HIV, have been diagnosed with an autoimmune disorder, have a history of Guillain-Barré syndrome stemming from a prior vaccination, or have a history of Bell's palsy, provided that they have no contraindications to vaccination such as a history of anaphylaxis to any of the ingredients in the formulations.[7]

At the time of this writing, children younger than 16 or 18 years of age are not authorized to receive the Pfizer-BioNTech or Moderna vaccine, respectively.[4,6,7] We expect further recommendations from the American Academy of Pediatrics in the coming months.

Pregnancy and Lactation Concerns

Data are limited regarding safety of the mRNA vaccine among persons who are pregnant or lactating. The CDC and FDA state that pregnant persons in any demographic otherwise recommended to receive the vaccine, such as health care workers, *may* choose to be vaccinated.[7,8] Both the American College of Obstetricians and Gynecologists (ACOG) and the Society for Maternal-Fetal Medicine (SMFM) recommend routine vaccination with the mRNA COVID-19 vaccine in those who are pregnant or lactating if they are in one of the priority groups identified by the Advisory Committee on Immunization Practices (a committee within the CDC).[9,10] Notably, ACOG does not recommend routine pregnancy testing before receiving the COVID-19 vaccine.[9]

Moreover, SMFM states that for breastfeeding mothers, the biological plausibility of harm to the child is essentially nil.[11] Even if the mRNA or lipid packaging of the vaccine made its way into breastmilk (unlikely), the child's own digestive tract would metabolize it such that even if such substances *were* somehow dangerous (though they are not believed to be), the exposure risk actually approaches zero. Currently, only smallpox and yellow fever vaccines are contraindicated for breastfeeding mothers, as they are based on live-attenuated viruses.

For more information regarding COVID-19 vaccines, follow the CDC and Infectious Diseases Society of America.

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DR. NIFORATOS is an emergency medicine resident at the Johns Hopkins School of Medicine in Baltimore and research editor of Brief19.com. Follow him on Twitter @ReverendofDoubt and follow Brief19 @Brief_19.

DOGMA FEELS RIGHT UNTIL YOU STEP IN IT

SKEPTICS' GUIDE TO EMERGENCY MEDICINE

Dr. Milne is chief of emergency medicine and chief of staff at South Huron Hospital, Ontario, Canada. He is on the Best Evidence in Emergency Medicine faculty and is creator of the knowledge translation project the Skeptics' Guide to Emergency Medicine (www.TheSGEM.com).

ED Staffing

How physician assistants and nurse practitioners perform in emergency departments

by KEN MILNE, MD

The Case

Community emergency departments have seen volumes increase over the years. Previously, departments responded to increases in patient volume by adding more physician coverage. Lately, hospital administrations have looked to advanced practice providers (APPs) such as physician assistants (PAs) or nurse practitioners (NPs) to meet volume demands. Your hospital is considering hiring some APPs.

Clinical Question

What is the impact of APP staffing on ED productivity, flow, and safety?

Background

There has been an increased use of APPs in staffing U.S. emergency departments in recent years, justified in part on economic considerations. Advocates claim APPs can be just as productive as physicians and provide safe ED care while costing less money. This financial calculation could work if APP productivities are similar enough to that of physicians to offset differentials in billing rates and compensation. However, there are few data comparing productivity, safety, flow, or patient experiences in emergency medicine.

ACEP has published a number of documents discussing various issues around APPs in the emergency department. Recent concerns about postgraduate training of APPs in the emergency departments led to a joint statement issued in September 2020 by multiple organizations, including ACEP, that said the terms "resident," "residency," "fellow," and "fellowship" in a medical setting must be limited to postgraduate clinical training of medical school physician graduates within GME training programs.[1]

The debate is only heating up.

Reference: Pines JM, Zocchi MS, Ritsema T, et al. The impact of advanced practice provider staffing on emergency department care: productivity, flow, safety, and experience. *Acad Emerg Med*. 2020;27(11):1089-1099.

- **Population:** 13 million ED visits from 94 hospitals in 19 states from one national emergency medicine group
- **Exposure:** Proportion of total clinician hours staffed by APPs in a 24-hour period at a given emergency department
- **Comparison:** Emergency physician staffing
- **Outcomes:**
  - » **Primary Outcome:** Productivity (patients/hour, relative value units [RVUs]/hour, RVUs/visit, RVUs/relative salary for an hour)
  - » **Secondary Outcomes:** Proportion of 72-hour returns and proportion of 72-hour returns resulting in admission, length of stay (LOS), and left without completion of treatment (LWOT)

Authors' Conclusions

"In this group, APPs treated less complex visits and half as many patients/hour compared to physicians. Higher APP coverage allowed physicians to treat higher-acuity cases. We found no economies of scale for APP coverage, suggesting that increasing APP staffing may not lower staffing costs. However, there were also no adverse observed effects of APP coverage on ED flow, clinical safety, or patient experience, suggesting little risk of increased APP coverage on clinical care delivery."

Key Results

There were more than 13 million ED visits over five years at 94 hospitals in 19 states. Of the ED visits, 75 percent were treated by a physician independently, 18.6 percent by a PA, 5.4 percent by an NP, and 1.4 percent by both a physician and an APP.

Physicians were more productive than APPs (PAs or NPs) (see Table 1).

- **Effect of 10 percent increase in APP coverage:**
  - » Patients/hour: −0.12 (95 percent CI, −0.15 to −0.10)
  - » RVUs/hour: −0.4 (95 percent CI, −0.5 to −0.3)
- **Safety and Outcome:** No significant effect on LOS, LWOT, and 72-hour returns

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Table 1: Productivity in the Emergency Department

OUTCOME	PHYSICIANS	PAS	NPS
Patients/hour (95% CI)	2.2 (2.2–2.3)	1.1 (1.0–1.3)	1.1 (1.0–1.2)
RVUs/hour (95% CI)	8.5 (8.1–8.1)	3.0 (2.7–3.3)	3.1 (2.7–3.5)
RVUs/visit	3.8	2.8	2.7

Evidence-Based Medicine Commentary

1. **Surprise:** These results were a surprise and do not reflect many of our own personal experiences working with APPs. Often APPs see lower-acuity patients in "fast-track" areas.
2. **Safety:** It was reassuring to not see any signal of increased harm. However, LOS, LWOT, and 72-hour return rate is probably not granular enough to identify any potential safety concerns.
3. **External Validity:** This was a large study with 19 states, 94 sites, and 13 million ED visits from one national organization. We need to be careful not to overinterpret these results to other practice locations like small community groups, democratic physician-led groups, or rural sites.

Bottom Line

We do not have good evidence that APPs will improve productivity or negatively impact safety. However, in regions with physician shortages, these data suggest that APPs might represent an important opportunity to reach underserved communities.

Case Resolution

You inform hospital administration that a large study has just been published showing physicians were more productive compared to APPs. Adding more APPs appears to have decreased patient flow and RVUs/hour. However, no safety issues were identified. It is unclear if the results can be applied to your community hospital. Successful implementation depends on how APPs are used in the emergency department. Departments should assess their own local data and think carefully about whether adding APPs to a department is warranted.

Thank you to Dr. Corey Heitz, an emerrgency physician in Roanoke, Virginia.

Remember to be skeptical of anything you learn, even if you heard it on the Skeptics' Guide to Emergency Medicine.

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BRINGING YOU CANADA'S BRIGHTEST MINDS IN EM

EM CASES

DR. HELMAN is an emergency physician at North York General Hospital in Toronto. He is an assistant professor at the University of Toronto, Division of Emergency Medicine, and the education innovation lead at the Schwartz/Reisman Emergency Medicine Institute. He is the founder and host of Emergency Medicine Cases podcast and website (www.emergencymedicinecases.com).

Hepatic Encephalopathy

A 7-step approach to diagnosis and treatment

by ANTON HELMAN, MD, CCFP(EM), FCFP

A known complication of cirrhosis of the liver is newly altered level of awareness (LOA). Although several entities can cause altered LOA, hepatic encephalopathy (HE) must be near the top of your differential because it is associated with poor survival and a high risk of recurrence when left untreated.[1]

Unfortunately, the definition of HE is rather nebulous: "a brain dysfunction caused by liver insufficiency and/or porto-systemic shunting; it manifests as a wide spectrum of neurological or psychiatric abnormalities ranging from subclinical alterations to coma." HE is graded in four stages accordingly. The characteristic asterixis may be absent in stage 1 and missed in stage 4. (While present in stage 4, it is often overlooked because patients are too obtunded to follow commands; however, asterixis can still be elicited by the clinician passively). As a result, HE can be difficult to diagnose in the emergency department.[1]

Below, I outline a simple seven-step approach to diagnosis and treatment of HE.

Step 1: Rule Out Other Causes

Rule out alternative or concurrent causes of altered LOA, including sepsis, renal failure, alcohol withdrawal, intracranial hemorrhage, or trauma.

Step 2: Assess/Address Precipitants

Assess for and address common precipitants of HE, which include medications (ie, nonadherence or overdosed diuretics, or benzodiazepines), gastrointestinal bleeding, hypokalemia, alkalosis, volume depletion, and sepsis. Addressing and treating precipitating factors in HE management is important because almost 90 percent of patients with HE can be effectively treated by correcting the precipitating factor alone. If your HE treatment does not produce the expected effect, you must reconsider the diagnosis or search for unrecognized precipitating factors and correct them.

Step 3: Make the Diagnosis

After excluding other altered LOA causes, consider HE. Look for the constellation of symptoms that includes personality changes as reported by the patient's family (eg, apathy, irritability, or disinhibition), disturbances of the sleep-wake cycle (ie, excessive daytime sleepiness or complete reversal of the sleep-wake cycle), and extrapyramidal dysfunction (eg, muscular rigidity, bradykinesia, monotony, slowness of speech, parkinsonian-like tremor, dyskinesia).[2] The physical examination plays a major role. The onset of asterixis or disorientation heralds onset. Asterixis can be easily elicited by actions that require postural tone (eg, hyperextension of the wrists with separated fingers or rhythmic squeezing of the examiner's fingers). If the patient cannot follow commands due to LOA, one trick to elicit asterixes is to place the patient's forearm on the stretcher railing and forcibly extend the wrist. However, remember that asterixes are not specific for HE and are also seen in patients with renal insufficiency. A reversal of HE manifestations with treatment clinches the diagnosis.

Step 4: Ammonia Levels

The number-one recommendation on the Choosing Wisely Canada website's Hepatology page is, "Don't order serum ammonia to diagnose or manage hepatic encephalopathy." Elevated serum ammonia levels do not add diagnostic or prognostic value in liver patients suspected of HE because encephalopathy may precede the rise in ammonia levels.[3] Ideally, we would like to know how much ammonia enters the brain, not how much is in the blood. A common pitfall is to incorrectly rule out HE via a normal ammonia level—ammonia levels can be normal or near normal in HE. Serial measurements of ammonia may help evaluate the efficacy of ammonia-lowering drugs. But have a low threshold to treat HE on speculation, as this condition is difficult to definitively diagnose in the emergency department.

Lactulose has been found to significantly reduce mortality and serious complications of HE in a Cochrane review of 38 randomized controlled trials (RCTs). Dosing is 20 g (30 mL) orally and is titrated to three to four soft stools per day.[4] A common myth is that increasing the dose of lactulose will be effective after standard doses have failed. But overdosing lactulose can lead to worsening volume depletion, aspiration, hypernatremia, and even precipitation of HE.[1] If the patient with HE is rendered NPO, polyethylene glycol (PEG) via nasogastric dosed at 4 L over four hours has been shown to resolve HE more rapidly than lactulose in one small RCT of hospitalized patients.[5,6]

It is important to understand that patients with HE have excess gamma aminobutyric acid (GABA) stimulation. This makes them sensitive to GABAergic medications such as benzodiazepines and propofol. Such medications should be dose-adjusted or avoided whenever possible. When endotracheal intubation is necessary, ketamine may be a better choice of induction agent than propofol for this reason.

Step 5: Top Off Fluids, Glucose, Potassium

One way to remember some of the important aspects of treating HE is that everything besides the liver enzymes and liver function tests tends to be low: circulatory volume, serum potassium, and glucose. For fluid replacement, consider albumin in addition to normal saline for patients with a low serum albumin, as there is some RCT evidence (although weak) that it may improve outcomes when added to lactulose in patients with HE.[7] Intravenous albumin will likely be especially effective in patients with concurrent hepatorenal syndrome and/or acute liver failure.

It is important to understand that patients with HE have depleted glycogen stores. That's why a single bolus of D50W is unlikely to achieve normoglycemia for an extended period of time. An ongoing infusion of D10W or D25W is often required to prevent hypoglycemia and worsening LOA.

Another pitfall is ignoring mild hypokalemia. Treat even the mildest hypokalemia because low potassium contributes to hyperammonemia by decreasing ammonia excretion. Correcting hypokalemia is thought to decrease ammonia levels in patients with HE.[8] Magnesium also must be corrected if low because failure to address hypomagnesemia will make potassium replacement ineffective.

Step 6: Assess/Treat Cerebral Edema

Cerebral edema resulting from rapid accumulation of ammonia in the brain is the most common cause of death in patients with HE.[9] While ammonia levels generally do not help diagnose or prognosticate hepatic encephalopathy (a fact many are surprised to learn), a Danish study suggests that arterial ammonia levels >150 µmol/L, measured within 24 hours of reaching grade III hepatic encephalopathy, were associated with a higher likelihood of developing cerebral edema.[10] Cerebral edema in these patients may be clinically subtle, so maintain suspicion in comatose patients with HE. If signs of raised intracranial pressure are present, keep the head of the bed elevated at 45 degrees and consider hypertonic saline (20 mL of 30 percent sodium chloride targeting a serum sodium level of 145–150 mmol/L). Mannitol is not recommended for treating cerebral edema in this setting.[11]

Step 7: Consider Rifaximin for Antimicrobial Coverage

Rifaximin 400–550 mg orally is the antibiotic of choice for long-term maintenance in patients with recurrent HE because it is poorly absorbed in the gut and therefore both reaches and covers ammonia-producing *E. coli*. Initiating this drug in the emergency department is reasonable. Rifaximin in combination with lactulose is effective for the prevention of HE recurrence.[12]

Summary

Next time you are faced with an altered LOA patient who is flapping their wrists as soon as you extend them, remember that HE is a clinical diagnosis and that serum ammonia levels are unreliable. Assume high central nervous system ammonia levels and treat with lactulose and/or polyethylene glycol and rifaximin. Intravenous albumin must be considered in the patient with HE, especially if they are in acute liver failure and have a low threshold to treat for HE on speculation because it is a diagnosis of exclusion.

A special thanks to Dr. Walter Himmel and Dr. Brian Steinhart, the guest experts on the EM Cases podcast that inspired this article.

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BE A MEDICAL DETECTIVE—BONE UP ON YOUR FORENSIC SKILLS

FORENSIC FACTS

Dr. Rozzi is an emergency physician, director of the Forensic Examiner Team at WellSpan York Hospital in York, Pennsylvania, and chair of the Forensic Section of ACEP.

Dr. Riviello is chair and professor of emergency medicine at the University of Texas Health Science Center at San Antonio.

Child Sex Trafficking

Tips for recognizing, treating, and reporting it in the ED

by RALPH J. RIVIELLO, MD, MS, FACEP; AND HEATHER V. ROZZI, MD, FACEP

The Case

A 14-year-old male presents with a retained foreign body in his rectum. He states a glass bottle broke during sex with his boyfriend, who is 16 years old. He reports pain and bleeding. Chart review reveals a history of intravenous drug use, bipolar disorder, and history of child welfare involvement. He has had prior ED visits for psychiatric care, sexually transmitted infections, and an opioid overdose. On exam, he has moderate lower abdominal tenderness and bright red blood per rectum. His vital signs are stable. The foreign bodies are unable to be visualized. He repeatedly asks for pain medication.

Case Resolution

Initial hematocrit is at the patient's baseline. The surgical service is consulted. Staff members are noted to be joking about his condition. After treating the patient's pain, you update him on the clinical plan. Sitting at eye level, you say, "Some of my patients have sex with people they would rather not have sex with. Sometimes they do that to pay for things they need to get by. If someone is hurting you, I'd need to tell someone. That also may get you help that I wouldn't be able to connect you with otherwise." The patient then discloses that he was with a "date" this evening and things turned violent. Since running away from his foster home two years ago, he does what he has to in order to survive, including commercial sex. You thank him for sharing this. The patient is taken to the operating room. You make a report to child welfare.

The Definition

According to U.S. law, any individual under the age of 18 who has engaged in commercial sex is considered to be trafficked. While the word "trafficking" connotes movement, someone may be trafficked in their own home, without crossing town, state, or country borders. While prevalence estimates are limited, given the clandestine nature of the issue, what is known is that those with an experience of trafficking come into contact with emergency clinicians, and few emergency clinicians are equipped to respond.[1–3]

Red Flags

The goal of an encounter with a potentially trafficked person is not disclosure or rescue. It is educating and empowering them with resources. The recognition of exploited children may prove challenging. The trafficked child may be accompanied by someone posing as a family member, significant other, or friend but who is in fact a trafficker or another trafficking victim. In many cases, the trafficker may actually be a relative of the patient.[4]

There may be clues in the patient's presentation suggesting they may be vulnerable to trafficking. Patients may present to the emergency department for a number of issues, including retained foreign bodies, sexually transmitted infections, substance use or overdose, psychiatric issues, chronic pain, pregnancy, or abortion complications. The adult accompanying the patient may be unwilling to leave the patient alone with emergency department staff.

Children who are in the child welfare system; runaways; children who identify as LGBTQ; those with a history of substance use; and those with a history of physical abuse, sexual abuse, or neglect are at high risk to become victims of sexual exploitation.[5]

Inquiring about a trafficking experience should be done thoughtfully and is not as simple as going through a checklist of questions. One approach, the Privacy, Education, Ask, Respect, Respond (PEARR) tool, adapted from the field of domestic violence, shows promise for assessing a patient for trafficking and was used in this patient scenario. It is important to speak with the patient alone and to use a trained interpreter if necessary. Questions should be direct and nonjudgmental. Of note, screening tools for child sex trafficking are currently in the process of validation.[6,7]

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There are several potential barriers to disclosure. First, clinicians may unconsciously or consciously judge a patient, which obscures the ability to see their patient's exploitation.[8] Lack of awareness of trafficking and its diversity of presentations can prevent a clinician from identifying a trafficked person. On the patient side, males in particular may not recognize the exploitation of their situation or resonate with the word "victim." Shame and stigma may also block disclosure. A patient may sense a judgmental attitude, as in the case described, and be less open as a result.[9] Furthermore, if a patient's presence in the United States is unauthorized, they may be afraid to tell their doctor for fear of deportation.[10]

Treat and Report

As with any emergency department patient, the priority is to identify and treat all life-, limb-, and organ-threatening issues. The history and physical examination will direct the laboratory and radiographic workup needed. If requested or consented to by the patient, sexual assault evidence collection should be performed early in the emergency department visit. Patients should be tested for sexually transmitted infections and pregnancy, as applicable. Placement for drug and/or alcohol rehabilitation should be considered if indicated.

According to the revised federal Child Abuse Prevention and Treatment Act, the sexual exploitation of minors is child abuse, and health care professionals are mandated reporters of child abuse. As such, calls should be made to the relevant authorities. As was done in this case, a discussion of the limits of confidentiality should be completed prior to asking questions that may elicit a disclosure.[11]

Departments should develop specific evidence-based policies regarding the evaluation, care, and management of suspected trafficking victims.[12] In addition, other resources should be engaged, including local legal aid, social work, victim advocates, and, when appropriate, law enforcement. The National Human Trafficking Hotline (888-373-7888) is available 24 hours a day and can help with assessment, access to shelter, and safety planning. For non-U.S. residents, the Office of Refugee Resettlement of the U.S. Department of Justice can provide refugee status to victims of trafficking.[13]

Edited by Hanni Stoklosa, MD, MPH, an emergency physician at Brigham and Women's Hospital in Boston and executive director and co-founder of HEAL Trafficking.

KEY POINTS

- Sex trafficking is a common crime, and children/adolescents are often victimized.
- Trafficking victims often seek care in the emergency department, which may be their only access to health care.
- Because of shame, stigma, and judgment from health professionals, trafficked persons may not readily disclose their situation.
- Clinicians should be aware of biases that may lead to judgment or obscure a patient's victim status from their clinical assessment and maintain a high index of suspicion.
- Inquiry about trafficking should be done in a private setting, in a manner that is caring, customized to the patient's circumstances, and educates the patient about resources.
- Treatment of child sex trafficking victims includes a multidisciplinary approach that varies with state and local resources and requirements and may include child protective services, social service agencies, and sometimes law enforcement.
- Emergency departments should have specific policies regarding the evaluation, care, and management of suspected trafficking victims.

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PROTECT YOURSELF FROM LEGAL RISK

MEDICOLEGAL MIND

DR. PENSA is clinical associate professor of emergency medicine at the Warren Alpert Medical School of Brown University in Providence, Rhode Island; associate director (education) of the Emergency Digital Health Innovation program at Brown; and creator and host of the podcast "Doctors and Litigation: The L Word."

Know When to Fold 'Em

Sometimes it's better to settle a lawsuit than go all in with a trial

by GITA PENSA, MD

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Consider Dr. V, an emergency physician who is sued after the death of a young patient. Dr. V exceeded the standard of care, but he was unable to save the patient's life due to agonizing circumstances. He was initially eager to defend his care at trial. However, due to mounting pressures from the plaintiff's attorney, he and his insurance carrier eventually agreed to settle the case.

We covered this case on my podcast. Listeners have described this outcome as "heartbreaking." Dr. V explained his reasoning and has come to terms with the events. But settling a case is fraught with conflicting emotions for physicians, whether or not one feels responsible for a bad outcome. Even though we have been told that settling a case is not an admission of malpractice, we often *feel* that it is and worry that others will think the same. Being reported to the National Practitioner Data Bank (NPDB) and having to list the settlement outcome on every job or licensure application for years feels like an indictment on its own—and since our medical practice often becomes a core part of our identities, we tend to take this all rather personally. We fear the judgment of our peers, our families and friends, and our patients, as this information is often public. Settling a case can make us feel like a bad doctor, though it inherently means nothing of the sort.

Just as many good physicians are sued, many cases are settled even though the physician met or exceeded standard of care. Recall that only a small fraction of cases go all the way to verdict at trial; most insurance carrier payments to plaintiffs are through settlement agreements.

Why Settle?

There are two main advantages in agreeing to a settlement for *both* sides: speed and certainty. The road to trial is stressful and can take many years. Juries are notoriously unpredictable, and judges' rulings can influence outcomes. Neither side can ever be certain of a win at trial, and an agreed-upon pretrial settlement eliminates that risk.

Although many eleventh-hour settlement agreements occur on the courthouse steps, a successful negotiation earlier in the course of the lawsuit spares both sides the work and significant costs of trial preparation. However, each side must also give something up: The plaintiff loses the chance for an outsize windfall, the insurer loses the chance at walking away without paying the plaintiff anything, and the physician has to accept being reported to the NPDB—and the emotional cost that accompanies it.

Malpractice insurers often serve as the final arbiters on whether a case goes to trial or is settled. It is important to understand your individual malpractice insurance policy. Depending on your policy, your consent may not even be required for the insurer to settle the claim. In some cases, your consent is not necessary, though most good insurers will take the wishes of the physician into account. Some policies do have a "consent to settle" clause, meaning the physician can choose to decline an offered settlement, thus forcing the case to trial. However, these policies often also include a "hammer clause," stipulating that if you reject a settlement offer and subsequently lose at trial, you will be responsible for any judgment that exceeds the proposed settlement. For example, if the plaintiff's attorney offers to settle for $500,000 but you decline and then the plaintiff is awarded $1 million at trial, then *you* would be personally responsible for the other $500,000. It's not hard to see why many physicians waive their consent to settle.

Physicians often base decisions on whether to accept a settlement offer on emotion; feelings of fairness, shame, fear of judgment, and anger can come into play. To insurers, however, it's all a business decision. They must make shrewd calculations of their odds of winning—or losing big—at trial. What are some factors that go into their deliberations?

First: math. Insurers know approximately how much it will cost to go to trial, adding up attorneys' hours and the high costs of expert testimony. The more complex the case, the more experts and the higher the cost. Cases often cost hundreds of thousands of dollars, not including any liability payments required of insurers if they lose. How do these costs compare against any settlement offer—and how low a settlement might they negotiate in the end?

Next, what are the optics of the case? If the physician made a significant error, the carrier will often push for a settlement. However, it takes two to tango. The plaintiff might be hoping for a big win at trial and refuse to settle. But this is risky for them, too; they know that the majority of trial verdicts *favor the physician*.

Another consideration for both sides is how well the physician performs as a witness. Do you have a demeanor that a jury will like? Both sides will consider your deposition performance as a bellwether of your trial persona. A composed, compassionate, prepared physician presents a formidable foe for a plaintiff's attorney at trial.

Sadly, the optics of who the plaintiff is makes a difference. A plaintiff's attorney hopes to play on the emotions of a sympathetic jury, knowing that younger patients, unexpected deaths, bereaved families, and visible (ie, cosmetic) damages may push the scales in their favor. In our podcast, Rick Bukata discusses a case of fulminant meningococcemia in a young woman. Even though the physician involved did everything possible to save her, he did not succeed. His team felt that a jury would naturally sympathize with the plaintiff's family and not easily comprehend how the outcome could not have been changed. They opted to negotiate a settlement.

Still other considerations come into play. How strong are the experts, and will the jury trust them? Who is the assigned judge, and what is their track record? Who are the co-defendants, if any, and how strong are they? Is this a shared defense with the hospital, and how might that change things? What is the track record of the involved attorneys? Where is the case being tried, and what is the liability standard there? What are the population characteristics of the potential jury pool? What other losses has the insurance carrier incurred recently, and can it afford to take risks?

Insurers do not want to settle every case, as they could be marked as easy targets for attorneys with weak cases. On the flip side, every trial is expensive. The calculations are complex. Despite what many might think, whether the physician actually met the standard of care is often not the driving determinant.

Best Among Bad Choices

For those who have not been involved in litigation, it's easy to assume that any physician who feels their care was reasonable would want to have their day in court. However, when weighed against years of stress on themselves and their families, the uncompensated time involved in preparation and attending trial, and the risks of an unfavorable verdict, sometimes settling a case feels like the best choice among bad choices. In my own case, I agreed to go to trial the first time—but when the plaintiff appealed and we found ourselves headed back to trial, I very much wanted to just settle. *I wanted it all to just be over*. My insurer made the final decision to refuse an offer for a policy limits settlement, and we won at trial a second time. Nevertheless, I still personally understand why physicians might *want* to settle a case. Remember: In and of itself, settling a case says nothing about the care you rendered or your skills as a physician.

My next column will discuss trial preparation and testimony when settling isn't in the cards.

"Are Children Allowed?", Kass et al surveyed childcare family policies at academic conferences from 2016 to 2018.[3] Though they found significant variability in their survey of childcare policies across different specialties, not a single conference in the study had reported completely subsidized childcare. Practices also differed among specialties in terms of allowing children at exhibit halls, lectures, and social events, although every conference did report providing an area for lactation. Clearly, there is a need to improve the way we go about in-person conferences to support women. But has the move to virtual conferences during the pandemic brought any gains for women who face obstacles of balancing childcare needs with their professional development?

Emergency Physicians Weigh In

Many of the women I spoke with say they have found virtual conferences easier to attend. Nikita Joshi, MD, emergency department medical director at Alameda Hospital, Alameda Health System in Oakland, California, states that she "can attend many more conferences now than before without the additional cost and travel and fatigue associated with that." She explained, "I am available for bedtime, bath, and story time, which are important." In regard to perceived value, she commented, "In the past, if you weren't there in person, the perception was that you weren't engaged."

Shideh Shafie, MD, FACEP, assistant professor of emergency medicine at the Warren Alpert School of Medicine at Brown University in Providence, Rhode Island, said she has been able to attend more of her department's meetings and notes the advantage of not having to commute allows her time to drop off kids at school and then jump onto the call. "I feel I can be there and participate without missing a beat." She hopes that when the meetings do go back to in-person, there can continue to be an option to call in. "I think that would allow for people whose opinions actually are very important and often marginalized to have their voices and opinions be heard."

Carol Pak-Teng, MD, FAAEM, founder and CEO of APA Emerge, attended ACEP's Council and Board meetings this year and reported an increased number of participants at the Board meeting. She feels this type of inclusion allows for increased transparency and may lead to new voices and increased representation.

Throughout the pandemic, we have seen that women have disproportionately taken on increased childcare responsibilities while balancing a professional identity. That's why Nicole Battaglioli, MD, FACEP, FAWM, assistant professor of emergency medicine at Emory University in Atlanta, is a critic of blanket claims that virtual meetings have greatly benefited women. "I've been very aware of women who are juggling children, including myself, while attending these conferences," she said. "It's easier to put these obligations aside when you are physically distant." And Dr. Pak-Teng said, "Sometimes things give the illusion of balance when truly they are just making more of a complicated mess. With too much optionality of a virtual way to attend, women may get more pressure not to go and instead to do the balancing act at home while trying to work. Sometimes we just need an excuse to get away and fully immerse ourselves in the work."

Carrying Benefits of Virtual Forward

Virtual conferences were never intended as a solution to gender bias and gender inequity. These issues still remain and will be with us long after the pandemic unless deliberately addressed. Those of us hosting virtual conferences need to ask, "Do women truly have a seat at the virtual table?" by looking at variables such as the number of women speakers and women leading and chairing committees at our conferences, and ensuring that the content of the conference is inclusive.

One can argue whether virtual conferences truly benefit the professional development of women in our field. To do so, we would first need to investigate measures of leadership and contribution. However, there are other reasons to favor virtual meetings from home. The financial cost to individuals and departments for travel and conference attendance can be substantial, representing a barrier for those in our field who have less funding or persons with larger debt. The cost of travel also extends beyond the dollar sign. It's time away from our daily lives, it's jet lag, and it's the inconvenience.

We are all looking forward to a time when we can be back together in person. Clearly, virtual conferences can't replicate everything we value about conferences: side conversations, introductions, and escape from our usual habitat. For those of us presenting at a conference with a child on our lap, we might truly need the physical separation to actually be present. The pandemic has placed a unique and unbalanced strain on professional women with young children. Gender expectations, bias, and discrimination still need to be confronted head on. Yet, we have also witnessed the advantages of virtual options: increased inclusivity and feasibility for time at home as well as decreased cost, that benefit all of us.

I hope when the restrictions are lifted, we don't default to our old habits. Instead, let's take away some of the good and continue to work on areas that still need improvement to achieve equity in our field. Our mission should be to continue to create and advocate for options that allow more of us to participate in conferences and lead in our organizations.

Editor's Note: Visit ACEPNow.com for the references for this article.

DR. HABER is director of clinical education and director of simulation in the department of emergency medicine at University Medical Center and assistant professor at University of Nevada, Las Vegas School of Medicine.

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