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PROS AND CONS: Waiting Room Medicine

Does embracing waiting room medicine hurt our efforts to fix the ED boarding crisis?

by AMY FAITH HO, MD, MPH, FACEP

In the March episode of *ACEP Nowcast*, I spoke with Luke LeBas, MD, FACEP, about our opposing viewpoints on waiting room medicine. The inevitable fallout of boarding is that now there are no beds in which to see patients. So, we deploy forward into the waiting room.

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SKEPTICS' GUIDE TO EMERGENCY MEDICINE

Vector Change or Double Sequential?

A case study looking at the pros and cons of both methodologies

by KEN MILNE, MD

Case

A 64-year-old man has a witnessed out-of-hospital cardiac arrest (OHCA) while attending a hockey game. Bystander CPR is immediately started while an automatic external defibrillator (AED) is located. He is found to be in ventricular fibrillation and receives two defibrillation attempts with the AED. Emergency Medical Services (EMS) arrive and provide another defibrillation with their machine, but the patient remains in refractory ventricular fibrillation.

Clinical Question: In patients with refractory ventricular fibrillation, does vector change (VC) of the pads or double sequential external defibrillation (DSED) work?

Background: Multiple different therapies have been tried to improve the survival of OHCA patients. This has included

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A Classic Case, Modern Mystery

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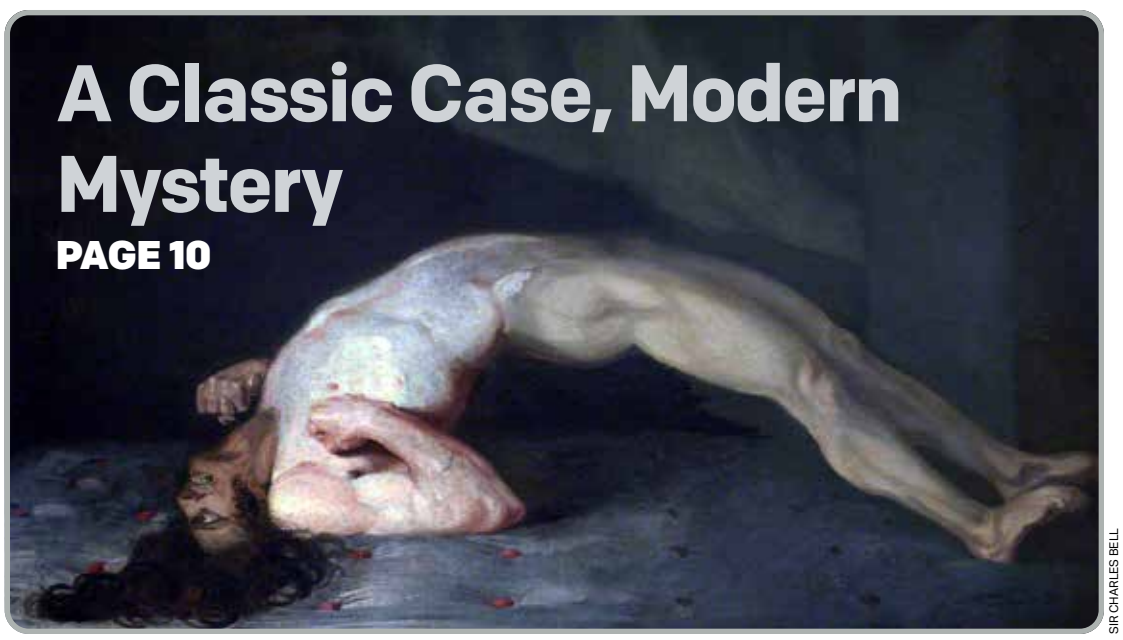

SIR CHARLES BELL

FOR ADULTS WITH SCHIZOPHRENIA OR BIPOLAR I OR II DISORDER,

LET'S FIND COMMON GROUND IN THE TREATMENT OF AGITATION

Not an actual patient or healthcare provider.

IGALMI is a sublingual film purposefully designed to support a cooperative approach to agitation intervention[1,2]

INDICATION

IGALMI is indicated for the acute treatment of agitation associated with schizophrenia or bipolar I or II disorder in adults.
Limitations of Use: The safety and effectiveness of IGALMI have not been established beyond 24 hours from the first dose.

IMPORTANT SAFETY INFORMATION

WARNINGS AND PRECAUTIONS

Hypotension, Orthostatic Hypotension, and Bradycardia: IGALMI causes dose-dependent hypotension, orthostatic hypotension, and bradycardia. In clinical studies with IGALMI, patients were excluded if they had treatment with alpha-1 noradrenergic blockers, benzodiazepines, other hypnotics or antipsychotic drugs four hours prior to study drug administration; had a history of syncope or syncopal attacks; SBP < 110 mmHg; DBP < 70 mmHg; HR < 55 beats per minute; or had evidence of hypovolemia or orthostatic hypotension. Because IGALMI decreases sympathetic nervous system activity, hypotension and/or bradycardia may be more pronounced in patients with hypovolemia, diabetes mellitus, or chronic hypertension, and in geriatric patients. Avoid use of IGALMI in patients with hypotension, orthostatic hypotension, advanced heart block, severe ventricular dysfunction, or history of syncope. After IGALMI administration, patients should be adequately hydrated and should sit or lie down until vital signs are within normal range. If a patient is unable to remain seated or lying down, precautions should be taken to reduce the risk of falls. Ensure that a patient is alert and not experiencing orthostatic hypotension or symptomatic hypotension prior to allowing them to resume ambulation.

QT Interval Prolongation: IGALMI prolongs the QT interval. Avoid use of IGALMI in patients at risk of torsades de pointes or sudden death, including those with known QT prolongation, a history of other arrhythmias, symptomatic bradycardia, hypokalemia, or hypomagnesemia, and in patients receiving other drugs known to prolong the QT interval.

Somnolence: IGALMI can cause somnolence. Patients should not perform activities requiring mental alertness, such as operating a motor vehicle or operating hazardous machinery, for at least eight hours after taking IGALMI.

Risk of Withdrawal Reactions, Tolerance, and Tachyphylaxis: IGALMI was not studied for longer than 24 hours after the first dose. There may be a risk of physical dependence, a withdrawal syndrome, tolerance, and/or tachyphylaxis if IGALMI is used in a manner other than indicated.

IGALMI IS THE FIRST AND ONLY SUBLINGUAL FILM FORMULATION OF DEXMEDETOMIDINE

Igalmi™
(dexmedetomidine)
sublingual film · 120 mcg, 180 mcg

- **TARGETS** a key mediator of agitation[1,3,4]*
- **NONINVASIVE** sublingual film with a mucoadhesive design, so it cannot be spit out[1,4]
- **PATIENT ADMINISTERED** under the supervision of a healthcare provider[1]

Learn more about the proven reduction in agitation related to schizophrenia and bipolar I or II disorder at IGALMIhcp.com

*IGALMI reduces the release of norepinephrine, a key mediator among other neurotransmitters thought to be involved in agitation.[1,3,4]

IMPORTANT SAFETY INFORMATION (continued)

ADVERSE REACTIONS

The most common adverse reactions (incidence ≥5% and at least twice the rate of placebo) were somnolence, oral paresthesia or oral hypoesthesia, dizziness, dry mouth, hypotension, and orthostatic hypotension.

DRUG INTERACTIONS

Drugs That Prolong the QT Interval: Avoid use. Concomitant use of drugs that prolong the QT interval may add to the QT-prolonging effects of IGALMI and increase the risk of cardiac arrhythmia.

Anesthetics, Sedatives, Hypnotics, and Opioids: Concomitant use may cause enhanced CNS-depressant effects. Reduction in dosage of IGALMI or the concomitant medication should be considered.

USE IN SPECIFIC POPULATIONS

Hepatic Impairment and Geriatric Patients (≥65 years old): A lower dose is recommended in patients with hepatic impairment and geriatric patients. See the full Prescribing Information for the recommended dosage depending on the agitation severity.

Please see the Brief Summary of the full Prescribing Information on the following pages.

To report SUSPECTED ADVERSE REACTIONS, contact BioXcel Therapeutics, Inc. at 1-833-201-1088 or medinfo@bioxceltherapeutics.com, or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

References: 1. IGALMI. Package insert. BioXcel Therapeutics, Inc.; 2022. **2.** Wilson MP, et al. *West J Emerg Med.* 2012;13(1):26-34. doi:10.5811/westjem.2011.9.6866 **3.** Miller CWT, et al. *West J Emerg Med.* 2020;21(4):841-848. doi:10.5811/westjem.2020.4.45779 **4.** Data on file. BXCL501-301 CSR (SERENITY I). BioXcel Therapeutics, Inc.; January 2021.

bioxcel therapeutics®

Igalmi™
(dexmedetomidine)
sublingual film · 120 mcg, 180 mcg

IGALMI™ (dexmedetomidine) sublingual film, for sublingual or buccal use. Rx Only. Brief Summary of Prescribing Information (PI) for IGALMI. See full PI.

Indication: IGALMI is indicated for the acute treatment of agitation associated with schizophrenia or bipolar I or II disorder in adults. Limitations of Use: The safety and effectiveness of IGALMI have not been established beyond 24 hours from the first dose.

Important Recommendations Prior to Initiating IGALMI and During Therapy: IGALMI should be administered under the supervision of a healthcare provider. A healthcare provider should monitor vital signs and alertness after IGALMI administration to prevent falls and syncope.

IGALMI is for sublingual or buccal administration. Do not chew or swallow IGALMI. Do not eat or drink for at least 15 minutes after sublingual administration, or at least one hour after buccal administration.

Recommended Dosage: The initial dose of IGALMI is based on agitation severity, with lower doses recommended in patients with hepatic impairment and geriatric patients. If agitation persists after the initial dose, up to two additional doses may be administered at least two hours apart, depending upon the patient population and agitation severity. Assess vital signs including orthostatic measurements prior to the administration of any subsequent doses. Due to risk of hypotension, additional half-doses are not recommended in patients with systolic blood pressure (SBP) less than 90 mmHg, diastolic blood pressure (DBP) less than 60 mmHg, heart rate (HR) less than 60 beats per minute, or postural decrease in SBP ≥ 20 mmHg or in DBP ≥ 10 mmHg.

The recommended dose in adults is 120 mcg for mild or moderate agitation and 180 mcg for severe agitation. Patients with mild or moderate hepatic impairment and mild to moderate agitation should receive 90 mcg. Patients with mild or moderate hepatic impairment and severe agitation should receive 120 mcg. Patients with severe hepatic impairment and mild to moderate agitation should receive 60 mcg. Patients with severe hepatic impairment and severe agitation should receive 90 mcg. Geriatric patients (patients ≥65 years old) with mild, moderate or severe agitation should receive 120 mcg. See Full Prescribing Information for recommendations on administering up to two additional doses and maximum recommended dosages.

CONTRAINDICATIONS: None.

WARNINGS AND PRECAUTIONS

Hypotension, Orthostatic Hypotension, and Bradycardia: IGALMI causes dose-dependent hypotension, orthostatic hypotension, and bradycardia. In clinical studies, 18%, 16%, and 9% of patients treated with 180 mcg of IGALMI, 120 mcg of IGALMI, and placebo, respectively, experienced orthostatic hypotension (defined as SBP decrease ≥ 20 mmHg or DBP decrease ≥ 10 mmHg after 1, 3, or 5 minutes of standing) at 2 hours post-dose. In those studies, 7%, 6%, and 1% of patients treated with 180 mcg of IGALMI, 120 mcg of IGALMI, and placebo, respectively, experienced HR ≤ 50 beats per minute within 2 hours of dosing. In clinical studies with IGALMI, patients were excluded if they had treatment with alpha-1 noradrenergic blockers, benzodiazepines, other hypnotics or antipsychotic drugs four hours prior to study drug administration; had a history of syncope or syncopal attacks; SBP < 110 mmHg; DBP < 70 mmHg; HR < 55 beats per minute; or had evidence of hypovolemia or orthostatic hypotension.

Reports of hypotension and bradycardia, including some resulting in fatalities, have been associated with the use of another dexmedetomidine product given intravenously (IGALMI is for sublingual or buccal use and is not approved for intravenous use). Clinically significant episodes of bradycardia and sinus arrest have been reported after administration of this other dexmedetomidine product to young, healthy adult volunteers with high vagal tone and when this product was given by rapid intravenous or bolus administration.

Because IGALMI decreases sympathetic nervous system activity, hypotension and/or bradycardia may be more pronounced in patients with hypovolemia, diabetes mellitus, or chronic hypertension, and in geriatric patients. Avoid use of IGALMI in patients with hypotension, orthostatic hypotension, advanced heart block, severe ventricular dysfunction, or history of syncope. After IGALMI administration, patients should be adequately hydrated and should sit or lie down until vital signs are within normal range. If a patient is unable to remain seated or lying down, precautions should be taken to reduce the risk of falls. Ensure that a patient is alert and not experiencing orthostatic hypotension or symptomatic hypotension prior to allowing them to resume ambulation.

QT Interval Prolongation: IGALMI prolongs the QT interval. Avoid use of IGALMI in patients at risk of torsades de pointes or sudden death including those with known QT prolongation, a history of other arrhythmias, symptomatic bradycardia, hypokalemia or hypomagnesemia, and in patients receiving other drugs known to prolong the QT interval.

Somnolence: IGALMI can cause somnolence. In placebo-controlled clinical studies in adults with agitation associated with schizophrenia or bipolar I or II disorder, somnolence (including fatigue and sluggishness) was reported in 23% and 22% of patients treated with IGALMI 180 mcg and 120 mcg, respectively, compared to 6% of placebo-treated patients. Patients should not perform activities requiring mental alertness, such as operating a motor vehicle or operating hazardous machinery, for at least eight hours after taking IGALMI.

Risk of Withdrawal Reactions: Symptoms of withdrawal have been observed after procedural sedation with another dexmedetomidine product administered intravenously. In this study, 12 (5%) adult patients who received intravenous dexmedetomidine up to 7 days (regardless of dose) experienced at least 1 event related to withdrawal within the first 24 hours after discontinuing dexmedetomidine and 7 (3%) adult patients who received intravenous dexmedetomidine experienced at least 1 event related with withdrawal 24 to 48 hours after discontinuing dexmedetomidine. The most common withdrawal reactions were nausea, vomiting, and agitation. In these subjects, tachycardia and hypertension requiring intervention occurred at a frequency of <5% in the 48 hours following intravenous dexmedetomidine discontinuation. IGALMI was not studied for longer than 24 hours after the first dose. There may be a risk of physical dependence and a withdrawal syndrome if IGALMI is used in a manner other than indicated.

Tolerance and Tachyphylaxis: Use of another dexmedetomidine product administered intravenously beyond 24 hours has been associated with tolerance and tachyphylaxis and a dose-related increase in adverse reactions. IGALMI was not studied for longer than 24 hours after the first dose. There may be a risk of tolerance and tachyphylaxis if IGALMI is used in a manner other than indicated.

ADVERSE REACTIONS, Clinical Studies Experience: Because clinical trials are conducted under widely varying conditions, adverse reactions rates observed in the clinical trials of a drug cannot be directly compared to rates in clinical trials of another drug and may not reflect the rates observed in practice.

The safety of IGALMI was evaluated in 507 adult patients with agitation associated with schizophrenia (N=255) or bipolar I or II disorder (N=252) in two randomized, placebo-controlled studies (Studies 1 and 2). In both studies, patients were admitted to a clinical research unit or a hospital and remained under medical supervision for at least 24 hours following treatment. Patients were 18 to 71 years of age (mean age was 46 years old); 45% were female and 55% were male; 66% were Black, 31% were White, 2% were multiracial, and 1% were other.

In these studies, patients received an initial dose of IGALMI 180 mcg (N=252), IGALMI 120 mcg (N=255), or placebo (N=252). Patients who were hemodynamically stable (i.e., those with systolic blood pressure (SBP) > 90 mmHg, diastolic blood pressure (DBP) > 60 mmHg, and heart rate (HR) > 60 beats per minute) and without orthostatic hypotension (i.e., reduction in SBP < 20 mmHg or DBP < 10 mmHg upon standing) were eligible for an additional dose after 2 hours. An additional half dose (90 mcg, 60 mcg, or placebo) was given to 7.1% (18/252), 22.7% (58/255) and 44.0% (111/252) of patients in the IGALMI 180 mcg, IGALMI 120 mcg or placebo arms, respectively. After at least an additional 2 hours, an additional second half dose (total IGALMI dose of 360 mcg, total IGALMI dose of 240 mcg, or placebo, respectively) was given to 3.2% (8/252), 9.4% (24/255), and 21.0% (53/252) of patients in the IGALMI 180 mcg, IGALMI 120 mcg or placebo arms, respectively.

In these studies, one patient discontinued treatment due to an adverse reaction of oropharyngeal pain.

The most common adverse reactions (incidence ≥ 5% and at least twice the rate of placebo) were: somnolence, oral paresthesia or oral hypoesthesia, dizziness, dry mouth, hypotension, and orthostatic hypotension.

Adverse reactions that occurred in IGALMI-treated patients at a rate of at least 2% and at a higher rate than in placebo-treated patients in Studies 1 and 2 were as follows (adverse reaction is followed by percentage of patients treated with IGALMI 180 mcg (n = 252), IGALMI 120 mcg (n = 255) and placebo (n = 252): Somnolence, includes the terms fatigue and sluggishness, (23%, 22%, 6%); Oral paresthesia or oral hypoesthesia (7%, 6%, 1%); Dizziness (6%, 4%, 1%); Hypotension (5%, 5%, 0%); Orthostatic hypotension (5%, 3%, <1%); Dry Mouth (4%, 7%, 1%); Nausea (3%, 2%, 2%); Bradycardia (2%, 2%, 0%); Abdominal discomfort, including dyspepsia, gastroesophageal reflux disease (2%, 0%, 1%).

Hypotension, Orthostatic Hypotension, and Bradycardia in Two Placebo-Controlled Studies: In clinical studies, patients were excluded if they were treated with alpha-1 noradrenergic blockers, benzodiazepines, antipsychotic drugs, or other hypnotics four hours prior to study drug administration; had a history of syncope or syncopal attacks; their SBP was less than 110 mmHg; their DBP was less than 70 mmHg; their HR was less than 55 beats per minute; or they had evidence of hypovolemia or orthostatic hypotension. In these studies, vital signs were monitored (at 30 minutes, 1-, 2-, 4-, 6-, and 8- hours post-dose), including orthostatic vital signs at 2-, 4-, and 8-hours post-dose. Maximum positional decreases in SBP and DBP after standing were observed at two hours post-dose. Maximal reductions on BP and HR were observed two hours post-dose.

The mean BP (in mmHg) and HR decrease (in bpm) across all patients from both studies at 2 hours post-dose were as follows for patients treated with IGALMI 180 mcg (n = 252), IGALMI 120 mcg (n = 255) and placebo (n = 252): Mean SBP Decrease (15, 13, 1), Mean DBP Decrease (mmHg) (8, 7, <1), Mean Heart Rate Decrease (9, 7, 3). In the clinical studies: 13%, 8%, and <1% of patients in the single dose 180 mcg IGALMI, 120 mcg IGALMI, and placebo groups, respectively, experienced SBP ≤ 90 mmHg and a decrease ≥ 20 mmHg of SBP within 24 hours of dosing; 19%, 17%, and 2% of the patients in the 180 mcg IGALMI, 120 mcg IGALMI, and placebo groups, respectively, had a DBP ≤ 60 mmHg and a DBP decrease ≥ 10 mmHg within 24 hours of dosing; 4%, 3%, and 0% of patients in the 180 mcg IGALMI, 120 mcg IGALMI, and placebo groups, respectively, had a HR ≤ 50 beats per minute and a HR decrease ≥ 20 beats per minute within 24 hours of dosing.

At 8 hours post-dose, 2% of patients in the IGALMI 180 mcg group experienced a SBP ≤ 90 mmHg and decrease ≥ 20 mmHg compared with one patient (<1%) in the IGALMI 120 mcg group and none in the placebo group. At 8 hours post-dose, none of the patients in the IGALMI 180 mcg group experienced a SBP ≤90 mmHg and decrease ≥ 20 mmHg compared with one patient (<1%) in the IGALMI 120 mcg group and none in the placebo group. At 24 hours, none of the patients in the IGALMI 180 mcg group experienced a SBP ≤90 mmHg and decrease ≥ 20 mmHg compared with one patient (<1%) in the IGALMI 120 mcg group and none in the placebo group. At 8 hours post-dose, none of the patients in the IGALMI 180 mcg group had a HR ≤ 50 beats per minute and a HR decrease ≥ 20 beats per minute compared with one patient in the 120 mcg group (<1%) and none in the placebo group.

Postmarketing Experience

The following adverse reactions have been identified during post approval use of another dexmedetomidine product given intravenously (IGALMI is not approved for intravenous use). Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

Blood and Lymphatic System Disorders: Anemia; *Cardiac Disorders:* Arrhythmia, atrial fibrillation, atrioventricular block, bradycardia, cardiac arrest, cardiac disorder, extrasystoles, myocardial infarction, supraventricular tachycardia, tachycardia, ventricular arrhythmia, ventricular tachycardia; *Eye Disorders:* Photopsia, visual impairment; *Gastrointestinal Disorders:* Abdominal pain, diarrhea, nausea, vomiting; *General Disorders and Administration Site Conditions:* Chills, hyperpyrexia, pain, pyrexia, thirst; Hepatobiliary Disorders: Hepatic function abnormal, hyperbilirubinemia; Investigations: Alanine aminotransferase increased, aspartate aminotransferase increased, blood alkaline phosphatase increased, blood urea increased, electrocardiogram T wave inversion, gammaglutamyltransferase increased, electrocardiogram QT prolonged; *Metabolism and Nutrition Disorders:* Acidosis, hyperkalemia, hypoglycemia, hypovolemia, hypernatremia; *Nervous System Disorders:* Convulsion, dizziness, headache, neuralgia, neuritis, speech disorder; *Psychiatric Disorders:* Agitation, confusional state, delirium, hallucination, illusion; *Renal and Urinary Disorders:* Oliguria, polyuria; *Respiratory, Thoracic and Mediastinal Disorders:* Apnea, bronchospasm, dyspnea, hypercapnia, hypoventilation, hypoxia, pulmonary congestion, respiratory acidosis; *Skin and Subcutaneous Tissue Disorders:* Hyperhidrosis, pruritus, rash, urticaria; *Surgical and Medical Procedures:* Light anesthesia; *Vascular Disorders:* Blood pressure fluctuation, hemorrhage, hypertension, hypotension

DRUG INTERACTIONS

Drugs that Prolong the QT Interval: Concomitant use of drugs that prolong the QT interval may add to the QT-prolonging effects of IGALMI and increase the risk of cardiac arrhythmia. Avoid the use of IGALMI in combination with other drugs known to prolong the QT interval.

Anesthetics, Sedatives, Hypnotics, and Opioids: Concomitant use of IGALMI with anesthetics, sedatives, hypnotics, or opioids is likely to lead to enhanced CNS depressant effects. Specific studies with another dexmedetomidine product given intravenously have confirmed these effects with sevoflurane, isoflurane, propofol, alfentanil, and midazolam. Due to possible enhanced CNS effects when given concomitantly with IGALMI, consider a reduction in dosage of IGALMI or the concomitant anesthetic, sedative, hypnotic, or opioid.

USE IN SPECIFIC POPULATIONS

Pregnancy, Risk Summary: There are no available data on IGALMI use in pregnant women to evaluate for a drug-associated risk of major birth defects, miscarriage or other adverse maternal or fetal effects. Available data from published randomized controlled trials and case reports over several decades of use with intravenously administered dexmedetomidine during pregnancy have not identified a drug-associated risk of major birth defects or miscarriage; however, the reported exposures occurred after the first trimester. Most of the available data are based on studies with exposures that occurred at the time of cesarean-section delivery, and these studies have not identified an adverse effect on maternal outcomes or infant Apgar scores. Available data indicate that dexmedetomidine crosses the placenta.

In animal reproductive studies fetal toxicity occurred in the presence of maternal toxicity with subcutaneous administration of dexmedetomidine to pregnant rats during organogenesis at doses 5 times the maximum recommended human dose [MRHD] of 360 mcg/day based on mg/m^2 body surface area. Adverse developmental effects, including early implantation loss and decreased viability of second generation offspring, occurred when pregnant rats were subcutaneously administered doses less than or equal to the MRHD based on mg/m^2 from late pregnancy through lactation and weaning *(see Data)*.

The estimated background risk of major birth defects and miscarriage for the indicated population 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.

Data: *Animal Data*: Increased post-implantation losses and reduced live pups in the presence of maternal toxicity (decreased body weight) occurred in a rat embryo-fetal development study in which pregnant dams were administered subcutaneous doses of dexmedetomidine of 200 mcg/kg/day (equivalent to 5 times the MRHD of 360 mcg/day based on mg/m^2) during the period of organogenesis (Gestation Day (GD) 5 to 16). No embryo-fetal toxicity was observed at 20 mcg/kg/day (less than the MRHD of 360 mcg/day based on mg/m^2). No malformations were reported at any dose level.

No malformation or embryo-fetal toxicity were observed in a rabbit embryo-fetal developmental study in which pregnant dams were administered dexmedetomidine intravenously at doses up to 96 mcg/kg/day (equivalent to 5 times the MRHD of 360 mcg/day based on mg/m^2) during the period of organogenesis (GD 6 to 18).

Reduced pup and adult offspring weights and grip strength were reported in a rat developmental toxicology study in which pregnant females were administered dexmedetomidine subcutaneously at 8 mcg/kg/day (less than the MRHD of 360 mcg/day based on mg/m^2) during late pregnancy through lactation and weaning (GD 16 to postnatal day [PND] 25). Decreased viability of second generation offspring and an increase in early implantation loss along with delayed motor development occurred at 32 mcg/kg/day (equivalent to the MRHD of 360 mcg/day based on mg/m^2) when first generation offspring were mated. This study limited dosing to hard palate closure (GD 15-18) through weaning instead of standard dosing from implantation (GD 6-7) to weaning (PND 21).

Lactation, *Risk Summary*: Available published literature report the presence of dexmedetomidine in human milk following intravenous administration. There is no information regarding the effects of dexmedetomidine on the breastfed child or the effects on milk production. Advise women to monitor the breastfed infant for irritability. The developmental and health benefits of breastfeeding should be considered along with the mother's clinical need for IGALMI and any potential adverse effects on the breastfed child from IGALMI or from the underlying maternal condition.

Pediatric Use: The safety and effectiveness of IGALMI have not been established in pediatric patients.

Geriatric Use: Fifteen geriatric patients (≥ 65 years of age) were enrolled (no patients were 75 years of age and older) in the clinical studies for acute treatment of agitation associated with schizophrenia or bipolar I or II disorder. Of the total number of IGALMI-treated patients in these clinical studies, 11/507 (2.2%) were 65 years of age and older. Dosage reduction of IGALMI is recommended in geriatric patients. A higher incidence of bradycardia and hypotension was observed in geriatric patients compared to younger adult patients after intravenous administration of another dexmedetomidine product. The pharmacokinetic profile of intravenous dexmedetomidine was not altered in geriatric subjects. Clinical studies of IGALMI did not include sufficient numbers of patients 65 years of age and older to determine whether there were differences in the effectiveness of IGALMI in the acute treatment of agitation associated with schizophrenia or bipolar I or II disorder compared to younger adult patients.

Hepatic Impairment: Dexmedetomidine clearance was decreased in patients with hepatic impairment (Child-Pugh Class A, B, or C). Thus, a dosage reduction of IGALMI is recommended in patients with hepatic impairment compared to patients with normal hepatic function.

DRUG ABUSE AND DEPENDENCE

Controlled Substance: IGALMI contains dexmedetomidine, which is not a controlled substance.

Dependence, Physical Dependence: Physical dependence is a state that develops as a result of physiological adaptation in response to repeated drug use, manifested by withdrawal signs and symptoms after abrupt discontinuation or a significant dose reduction of a drug. The dependence potential of dexmedetomidine has not been studied in humans. However, because studies in rodents and primates have demonstrated that intravenous dexmedetomidine exhibits pharmacologic actions similar to those of clonidine, it is possible that dexmedetomidine may produce a clonidine-like withdrawal syndrome upon abrupt discontinuation. IGALMI was not studied for longer than 24 hours after the first dose. There may be risk of physical dependence and a withdrawal syndrome if IGALMI is used in a manner other than indicated.

Tolerance: Tolerance is a physiological state characterized by a reduced response to a drug after repeated administration (i.e., a higher dose of a drug is required to produce the same effect that was once obtained at a lower dose). IGALMI has not been studied for longer than 24 hours after the first dose. There may be a risk for tolerance if IGALMI is administered in a manner other than indicated.

OVERDOSAGE: In a tolerability study of intravenous dexmedetomidine in which healthy adult subjects were administered doses at and above the recommended dose of 0.2 to 0.7 mcg/kg/hour, the maximum blood concentration was approximately 13 times the upper boundary of the therapeutic range for the intravenous dexmedetomidine (IGALMI is not approved for intravenous use). The most notable effects observed in two subjects who achieved the highest doses were first degree atrioventricular block and second-degree heart block.

Five adult patients received an overdose of intravenous dexmedetomidine in intensive care unit sedation studies. Two patients who received a 2 mcg/kg loading dose (twice the recommended loading dose) over 10 minutes, experienced bradycardia and/or hypotension. One patient who received a loading intravenous bolus dose of undiluted dexmedetomidine (19.4 mcg/kg), had cardiac arrest from which he was successfully resuscitated.

Consider contacting a Poison Center (1-800-222-1222) or a medical toxicologist for overdosage management recommendations for IGALMI.

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New Haven, CT 06511

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NEWS FROM THE COLLEGE

UPDATES AND ALERTS FROM ACEP

ACEP is Powered by People Like You

In honor of National Volunteer Week (April 17–21), ACEP extends its deepest gratitude to the many volunteers who help the College develop events, publications, resources, and communities that support emergency physicians everywhere. From peer reviewers to task force members, international ambassadors, committee members, section leaders and more, volunteers are ACEP's most treasured resource. Learn more about volunteer contributions and how to get more involved at acep.org/volunteering.

ACEP and the American Red Cross Launch Bystander Training Course

Given each organization's ongoing commitment to providing lifesaving education, the American Red Cross and ACEP released a course in March called "Until Help Arrives" designed to educate and empower bystanders to take action and provide lifesaving care if they are first on the scene during an emergency. The 90-minute online course covers five fundamental actions that can be taken during a life-threatening emergency that can help sustain or save a life until EMS arrives: Hands-only CPR, AED use, choking first aid, severe bleeding control, including use of a tourniquet, and administering naloxone for an opioid overdose.
Learn more at redcross.org/untilhelparrives.

ACEP Participates in Medical Summit on Firearm Injury Prevention

ACEP President Chris Kang, MD, FACEP, represented the College as 46 organizations convened for the second Medical Summit on Firearm Injury Prevention in September 2022. The Summit focused on identifying consensus-based, non-partisan strategies that can be effective in reducing the burden of firearm injury in communities across the United States. The proceedings from the Summit were published in March the *Journal of the American College of Surgeons* (*JACS*), and a detailed summary is available at acep.org/firearm-injury-prevention-summit.

ACEP Members Prepare to Lobby for Three Key Legislative Issues

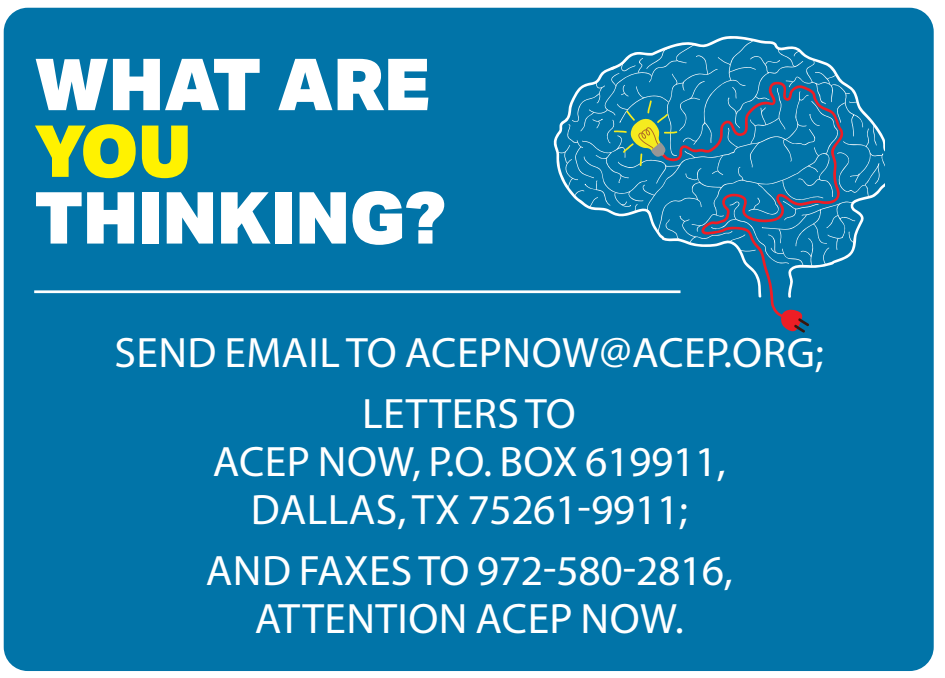
ACEP's Leadership & Advocacy Conference is coming up April 30–May 3, and every year the attendees are briefed on the key issues to advocate for during legislative meetings. This year, attendees will speak to their legislators about the ongoing emergency department (ED) boarding crisis, Medicare payment reform, and ED violence. Join the group in Washington, D.C., to lend your voice to these important causes. Learn more at acep.org/lac.

Modest Dues Increase Approved to Catch Up With Inflation

ACEP's Board of Directors unanimously approved a dues increase of approximately nine percent for regular members—a decision that the organization has resisted for almost a decade. The increase will help ensure ACEP is adequately funded to meet the expanding needs of our members. The new dues will be reflected in April invoices. Learn more at acep.org/duesupdate.

Deadline Approaching for Research Forum Abstract Submissions

Act quickly to get your abstracts in for the 2023 Research Forum! The deadline for submissions is May 3. Held annually in conjunction with the ACEP Scientific Assembly, the Research Forum is emergency medicine's premier research event. The Research Forum typically selects more than 400 abstracts per year, presented live and virtually during the event. Learn more at acep.org/rf.



RESIDENCY SPOTLIGHT

PRISMA HEALTH GREENVILLE MEMORIAL HOSPITAL

Location: Greenville, SC
Twitter: @GreenvilleSCEM
Instagram: @PrismaGreenvilleEM
Facebook: @GreenvilleSCemergencymedicine
Year founded: 2017
Number of residents: 30
Program length: Three years

CAMIRON L PFENNIG

2022 Residency Wellness Retreat

What does your program offer that residents can't get anywhere else?

Our mix of longitudinal community exposure with academic experience is a highlight of the program. We expose residents not just to community medicine, but to a spectrum of community emergency departments (EDs) in both rural and suburban environments, helping them determine their future practice preferences. Despite this, we are very intentional about not sending our residents everywhere all the time. It is very important for our residents to develop a sense of community and to understand each location. To do this, we give them longitudinal community-ED exposure, targeting a particular community ED each year. In addition, they are able to choose to spend dedicated time in any of the EDs in our system.

What is the work-life balance like?

Living in Greenville, South Carolina, allows residents to have work-life balance thanks to the wonderful city. Our vibrant downtown is a place where you will always find something to do. Whether it's exploring the Swamp Rabbit trail during the day, attending a local market or downtown event, catching a play, listening to music at the outdoor amphitheater, attending one of our minor league team sporting events (baseball, soccer, hockey), or enjoying a night out at a new restaurant, there is endless opportunity for evenings or days off. We are also situated in the foothills of the mountains, making it easy to explore waterfalls, day hike, mountain bike, or rock climb. Greenville's multiple awards for best places to visit and live make sense once you have been here.

How should potential applicants learn more about your program?

They can reach out to us on any of our social media platforms with questions. For a general overview of the program, check out our website at www.greenvilleem.com.

—Dr. Pfenning, Dr. Pittman, Dr. Drake, Dr. Hogan, & Dr. Nickels

FACEPs IN THE CROWD

Get to know the Fellows of the American College of Emergency Physicians

DAN MAYER, MD, FACEP

ACEP Fellow and retired emergency physician Dan Mayer, MD, FACEP, was 14 when his local YMCA began offering free guitar lessons. Soon he was hooked. He bought himself a cheap guitar and threw himself into learning the folk rock that was popular during the 1960s.

As Dr. Mayer went to medical school, became an emergency physician, got married and started a family, his guitar provided the soundtrack for many memories. Dr. Mayer played music for his children, and eventually his grandchildren, to sleep with the family's favorite bedtime song—"Ripple" by the Grateful Dead.

ABOVE: Dr. Mayer enjoying a vacation.

RIGHT: Dr. Mayer playing for his daughter when she was young.

PHOTOS: DAN MAYER

Fast forward to three years ago when Dr. Mayer, who retired in 2014 after 27 years as faculty at Albany (NY) Medical College, began driving his granddaughter to her classical guitar lessons. Though he had played the guitar since his teens, he wasn't classically trained. As he watched her lessons, he thought to himself: It's never too late to learn, right? He asked her teacher to give him lessons as well. Now, he's swapping chords for notes and reading off music instead of playing it by ear. As he takes on more complicated songs, Dr. Mayer is reminded of how good it feels to learn something new. "It's such a feeling of accomplishment," he said.

Dr. Mayer's wife suffers from dementia, and one of the things that changed with the onset of her illness was that she could no longer tolerate music being played in the house. That's another pro for his switch to the classical guitar. "It's quieter," Dr. Mayer explained.

Reflecting on his long career in emergency medicine, Dr. Mayer said it was more than just his guitar that helped him decompress after stressful shifts. He credited his family's routine—they were strict about resting on Sabbath Saturdays, per Jewish tradition—and his years as a peer reviewer and malpractice consultant for providing the variety that led to career longevity. Dr. Mayer encourages young physicians to stay open to new opportunities, both clinical and personal, because, "you never know where your balance is going to come from."

5 Fun Things with Dr. Mayer

1. **Sipping:** Single malt scotch (although I did enjoy the bourbon tasting during the first Zoom meeting of ACEP's new Exploring Retirement Section—I'm a charter member.)
2. **Exercising:** I have three pilates classes per week that I hold sacred. It helps keep my new shoulder and knee in place.
3. **Listening to:** If I'm reviewing a paper, it's classical music like Mozart's Requiem. I can't multitask to the Grateful Dead because I always start singing along.
4. **Reading:** I'm a history buff. "Berlin Diary" was a recent read that really affected me. I like audiobooks. My wife and I used to walk a few miles every day listening to an audiobook together.
5. **Eating:** Food is definitely a guilty pleasure, and I like to try interesting recipes. My most recent success was Syrian Black Cherry Meatballs.

KNOW AN ACEP FELLOW WHO SHOULD BE FEATURED IN "**FACEPs in the Crowd**"? SEND YOUR SUGGESTIONS TO **ACEPNOW@ACEP.ORG.** LEARN HOW TO BECOME A FACEP AT **WWW.ACEP.ORG/FACEPSINTHECROWD.**

ACEP HAS YOUR BACK

FIGHTING FOR PHYSICIAN-LED CARE

PUSHING FOR SOLUTIONS TO THE BOARDING CRISIS

INCREASING THE VALUE OF YOUR WORK

BUILDING A SUSTAINABLE WORKFORCE

PROTECTING YOUR AUTONOMY

HELPING YOU NAVIGATE THE POST-ROE ERA

WE ARE STRONGER TOGETHER.

See how ACEP fights for you and how you can join the cause at acep.org/StrongerTogether

American College of Emergency Physicians®

ADVANCING EMERGENCY CARE

As a department administrator, I took a "pro" approach to waiting room medicine. I tried to convert waiting room medicine into a streamlined process so that our doctors could see more patients safely. Dr. LeBas—who lives in New Orleans and has worked at a Level I tertiary care, academic trauma center for over 11 years, recently transitioned to a 50,000 visit community hospital, and also moonlights at a rural access hospital—took the opposite viewpoint.

The following interview has been edited for clarity and space.

"I've been seeing boarding. It's getting worse and I don't think it's our problem to fix through the emergency department (ED)."

Dr. Amy Ho: What makes you so staunchly against waiting room medicine, knowing that you and I agree boarding is here and it's a problem?

Dr. Luke LeBas: I'm against it, but I do it. As much as I don't enjoy doing it, as much as I don't think it's good for the patient, it is absolutely a necessity. We're not just abandoning people to flail out in the waiting room. I like to think that I do what all emergency medicine doctors do—we make the best of a bad situation. We bring care to the patients where it's needed. We are problem solvers. We are MacGyver individuals, and anytime a system is broken, we will make it work. Now, that goes back to why I don't like waiting room medicine. At least at places that I've worked, it's always been the emergency department had to bend over backwards—bend and don't break to make up for the shortcomings within the hospital. But the entire hospital's problems shouldn't be laid on the shoulders of the emergency doctors.

Dr. Amy Ho: I can appreciate that. I think I have a little bit of bias because my background is actually in administration. Most everyone knows me from my role with *ACEP Now*, but in my day job, I work for a medium size medical group that's physician owned, physician led, and founded by a physician, which I think really slants how we approach these issues. I came up in administration fresh out of residency doing an administrative fellowship and then worked as an assistant medical director and kind of made my way up in day-to-day operations. But, we accepted that it was inevitable. We are literally the specialists at making things work, but we also know that holding patients as collateral as a way to ransom the hospital into trying to come up with solutions isn't part of the narrative we want to put out there.

I think waiting room medicine, if you do it efficiently, shows our partners that we're here doing our best. And when I say partners, I mean our partners in hospital medicine, our partners in social work, our partners in the ICU, our partners in EMS, and our partners, obviously, in administration at the hospital level. But, I think playing nice makes it so that having finesse in waiting room medicine helps the overall problem. A lot of time that I spent was working on, how do you make waiting room medicine better? What is good patient selection? Obviously, you want to do probably lower acuity patients. You want emergency physicians that can be a little bit minimalist, that can churn patients.

You might want to have dynamic staffing for both physicians and nurses so that you can handle day-to-day surges. You want to come with processes where there's a nurse, tech, or phlebotomist resources or physical access resources, i.e., nearby Pyxis's, having internal waiting rooms, having a process for doing "waiting room medicine," but in a way that is ... ensuring privacy for patients. Also what do you do with these patients if they need a consult or admission? How do you facilitate that?

Dr. Luke LeBas: You seem to be very lucky in that you're working at a facility that has such strong physician leadership and physicians who are in the C-suite and who are being listened to. Unfortunately, some of the jobs that I've had in the past, people that have been removed from the bedside from decades or people with an MBA that have no clinical background whatsoever are trying to dictate to me best practices. And you can clearly see that they don't know what they're talking about. And that gets to be a little frustrating whenever Blue Cottage comes in or McKenzie comes in or different organizations like that and they don't understand the world that I'm living in. You're lucky that is you, you're on both sides of that fence. You're able to talk to both sides of that equation. And that is a plus for the practicing pit doctor to have somebody like you that's on their side.

Dr. Amy Ho: I think I certainly was welcomed to have walked into a facility where physicians were already very well liked and very well listened to by administration.

Dr. Luke LeBas: The planning that you've discussed, the internal waiting rooms, the throughput issues and all of this, I like all of that. And whenever it's instituted as a new change within a hospital setting, I think that you would get more buy-in from the practicing doctors based off of how you sell it to them. Have a practicing doctor pitch it to them. Don't have an MBA pitch it to them, don't have somebody from the C-suite that you've never met before. Have somebody that you've worked hand in hand with to sit down with you and explain how this new process is going to work. Also, give explanations to the ED doctors what the rest of the hospital is doing. Acknowledge the difficulties that are going on in the ED and show me that the hospitalist and the surgeons and the other folks that are upstream and upstairs understand what we're dealing with. Show me what sacrifices they're making to try to help the situation as well.

Dr. Amy Ho: In my current role in administration, it's almost purely in data and analytics. We look at things like, what is the arrival-to-triage time? What is the arrival-to-room time? What is the disposition-to-departure time for discharge patients and also for admitted patients? So that has, in a lot of ways, allowed us go to our counterparts and say, "Hey guys, we've looked at the ICU patients admitted in the ED, what's going on? Because your admit hold rates are four times what hospitalist medicine is!"

Dr. Luke LeBas: The emergency department is more likely to not be stuck in a silo. We can speak surgeon, we can speak ICU, we can speak medicine. I do understand some of the difficulties these other specialties have, and I hope that they would also understand some of the difficulties that I have. Again, if everybody's on the same page and everybody is equal within the conversation, I think that would be a great way to work toward improving the situation. But again, boarding is a hospital-wide, very complex issue, and expanding the ED, expanding the capabilities of the ED providers, I don't think is a good answer to a problem that's upstairs.

Dr. Amy Ho: Boarding is a problem that trickles down to us, right?

Dr. Luke LeBas: Yeah. I'm willing to work hard and I'm willing to bend over backwards, but I also want to see that other folks are doing the same. Prove to me that the hospital is trying to help out. One problem that we occasionally run into is there's going to be one housekeeper for the entire facility on an overnight shift. Well, you expect me to turn over beds. I can't do it unless I'm mopping floors and changing sheets myself.

Dr. Amy Ho: Sometimes the multiple internal waiting rooms feels a little bit like Disneyland. You wait in the line and you're like, "Oh boy, I'm about there." Then you turn the corner and you're like, "Nope. Another internal waiting room, another turn." From the perspective of the pit doc, not every hospital tries to address this solution administratively. What is there to do if you are at a facility where there isn't an answer?

Dr. Luke LeBas: We're constantly being told to do more, do it faster, do it quicker, do it with less. See 20 people in the waiting room with one nurse. And even if there is an emergency, your best nurse already has four ICU patients, two of which are intubated. I mean, we are revving the engine so fast, and at some point we're going to break the engine. There needs to be help to unload the system.

COVID accelerated everything. As did burnout and the nursing shortage. What can we do to help unload us in the emergency department instead of getting tasks added to us? Every time I open up my emails, I see, "Hey, here's something else that we want y'all to do in the emergency department."

And again, these might be good things, these might be helpful things, but you also got to show me how the hospital's trying to, on the backend, unloading tasks instead of giving me new things to do.

Dr. Amy Ho: Are we here for emergencies? Are we the experts in being resuscitation? Or are we actually just availablists?

Dr. Luke LeBas: I like to work. I like medicine. I like taking care of patients. I love working with the ED team. I don't believe that boarding is an ED problem. I believe it's a hospital problem. And I think one of the ways to fix this is to get more practicing doctors at the higher levels of the hospital who are able to speak on even footing, that there's no hierarchy, there's no, "Well, this person is more important because they generate more money for the hospital."

Those kinds of issues, I think, need to be put to bed. And there needs to be a hospital wide response to all of this. And the answer can't just be laying it on a few people in the emergency department and expect them to do more and more work.

Dr. Amy Ho: I think you touch on a couple really important things. I think one is the importance of physician leadership. Two is the importance of hospital-wide initiatives, which to me, I think someone's got to take the first step. And a lot of times it is emergency physician leaders because it's what we see, it's what we know extremely well, the waiting room is right there. To me, a lot of times the onus can be on the emergency medicine to take those first steps because the hospitals are our collaborative partners.

They're not really our adversary. No one wants boarding. No hospital administrator walked around saying, "Wow, I wish I had more boarding hours in my hospital." And I think the takeaways that I have is to first talk to your administration in the ED about options in the ED, i.e., is there a flex area or kind of a vertical area that you could use to take care of the waiting room patients where it's appropriate?

I'm reminded of one of our pit docs actually, who used to show up at 3:00 p.m. with 80 patients in the waiting room. He would grab a nurse, he would grab a tech, he would walk out to the waiting room, make a large announcement of like, "Hi, I'm Dr. so-and-so. I'm going to try to take care of some of you that I can just get it addressed and let go. Please don't be offended if I pass over you." And then he would just start pulling patients into what was functionally a closet to get them seen. That was the beginning of waiting room medicine and I think that starts at a local level.

We mentioned multiple times that both of us think that this is a hospital-wide initiative. If you're at a place where discussing boarding at the hospital level is appropriate, I think you can start opening up conversations about hallway patients on the inpatient ward, doing things like patient discharge lounges to help inpatient throughput, admit hold areas to move patients out of the ED, increasing social work, mobilizing physical therapy, occupational therapy, and speech therapy to help with the inpatient boarders.

Dr. Lebas, I want to say thank you for taking the time to discuss this important topic to which I agree, I don't know that there is a solution. But boy do we try.

Listent to the full interview online. Scan the QR Code below to access the podcast.

DR. HO is assistant editor of *ACEP Now.*

Hidradenitis suppurativa

HS hides in the shadows

TOGETHER, WE CAN CHANGE THAT

Under-recognized and undiagnosed, patients with HS may suffer an average of up to 10 years before accurate diagnosis.[1-3] Meanwhile, HS may wreak havoc, causing irreversible scarring, debilitating pain, and emotional burden.[2-5] If your patient suffers from recurring or persistent abscesses at flexural sites, consider referring them to a dermatologist. This may be HS.

Learn more about recognizing HS and referral options at HS-Awareness.com

SHINE A LIGHT ON HS

NOVARTIS

Patient portrayal.

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A Classic Case Presenting a Modern Mystery

A CASE REPORT OF A DISEASE THAT IS AS OLD AS DIRT

by ALEXIS JOHNSON, MD, MPH, RDMS; YEHUDIS WEISS, RPA-C, MS

A 38-year-old Hispanic male who immigrated from Ecuador in 2001 and who, at the time of his initial presentation, had been working in construction, landscaping and masonry, presented to our emergency department (ED) with a chief complaint of trismus, voice changes, stiffness, and tremors. At the time of his presentation to our ED, he had already had two prior ED visits elsewhere, where he was treated with nonsteroidal anti-inflammatories, prednisone, and cyclobenzaprine that did not offer any significant relief.

The patient's third ED visit occurred about 10 days after the initial onset of symptoms with reports of worsening of all the aforementioned symptoms, impairing his ability to ambulate and eat. He denied a history of any recent cuts or open wounds, tick bites, headache, fever, or rash.

Physical exam revealed a non-intoxicated middle-aged gentleman sitting in a wheelchair, requiring assistance from his wife to ambulate. His vital signs were normal and his exam was notable for trismus, mild voice muffling, left lower extremity rigidity, 3+ brisk reflexes throughout, and right ankle clonus. Diphenhydramine was initially attempted for treatment of presumed dystonic reaction. This treatment was unsuccessful.

Hospital Course

Given the history provided along with exam findings, tetanus was high on the differential diagnosis. He was given a tetanus toxoid injection, started on metronidazole, and was given tetanus immune globulin. Neurology and infectious-disease teams were contacted and the patient was admitted to the hospital under the neurological service. Initial laboratory exams were unremarkable, including a normal serum lactate, complete blood count, comprehensive metabolic panel, troponin, respiratory multiplex, and thyroid stimulating hormone.

The infectious disease consult team agreed with the diagnosis of potential tetanus infection with a possible source being spore inhalation considering his type of work; strychnine poisoning was also raised as a consideration. During his admission, he was continued on treatment for suspected tetanus infection and had further inpatient testing with the following results: tetanus antitoxoid antibodies: <10 (recall he was last vaccinated for tetanus 12 years prior) and a serum drug screen which was positive for diazepam, nordiazepam, and metronidazole. His strychnine level was negative. The rest of the workup, including MRI of the brain and cervical spine with and without contrast, were unremarkable.

The patient received metronidazole and diazepam during admission with some improvement of his symptoms and was discharged to rehabilitation with instructions to continue metronidazole for 10 days and follow up with the infectious-disease clinic to complete his tetanus toxoid vaccine series. During his follow-up visit, the patient was found to have improvement of symptoms along with a left popliteal fossa wound that was considered the true source of his tetanus.

Discussion

The patient reported his last Tdap was 12 years prior. Tetanus occurs when spores of *Clostridium tetani*, an obligate anaerobe normally present in the gut of mammals and widely found in soil, gain access to damaged human tissue. After inoculation, *C. tetani* produces the metalloprotease tetanus toxin (also known as tetanospasmin). The incubation period of tetanus is approximately eight days but ranges from three to 21 days.[1]

After reaching the spinal cord and brainstem within the motor neuron, tetanus toxin is secreted and enters adjacent inhibitory interneurons, where it blocks neurotransmission by its cleaving action on the membrane proteins involved in neuroexocytosis.[2-5] The net effect is inactivation of the inhibitory neurotransmission that normally modulates anterior horn cells and muscle contraction. This loss of inhibition of anterior horn cells and autonomic neurons results in increased muscle tone, painful spasms, and widespread autonomic instability.

The most common and severe clinical form of tetanus is generalized tetanus. The presenting symptom in more than 80 percent of such patients is trismus (lockjaw) but they may present with tonic and periodic spastic muscular contraction such as stiff neck, opisthotonos, risus sardonicus (sardonic smile), a board-like rigid abdomen, periods of apnea and/or upper airway obstruction due to vise-like contraction of the thoracic muscles and/or glottal or pharyngeal muscle contraction, and dysphagia.

SIR CHARLES BELL

Patients with generalized tetanus typically have symptoms of autonomic overactivity that may manifest as profuse sweating, tachycardia, cardiac arrhythmias, labile blood pressure, and fever.

Modern Management of an Ancient Disease

Tetanus-toxin-induced effects are long-lasting (up to four to six weeks) because recovery is believed to require the growth of new axonal nerve terminals.

The recommended treatment for tetanus is:

1. Human tetanus immune globulin is the antitoxin of choice to neutralize unbound toxin. The Centers for Disease Control and Prevention recommends a single dose of 500 units intramuscularly (IM).[1,6]
2. Since tetanus does not confer immunity following recovery from acute illness, all patients with tetanus should receive active immunization with a full series of tetanus- and diphtheria-toxoid-containing vaccines, immediately upon diagnosis. Such vaccines should be administered at a different site than tetanus immune globulin.
3. Metronidazole (500 mg intravenously [IV] every six to eight hours) is the preferred treatment for tetanus, but penicillin G (2 to 4 million units IV every four to six hours) is a safe and effective alternative.[8] Treatment duration of seven to 10 days is recommended.
4. In patients with severe tetanus, the mainstay treatment is additional supportive care as needed. This may include mechanical ventilation and benzodiazepines as needed for spasticity.

Accidental or intentional strychnine poisoning may produce a clinical syndrome similar to tetanus and should be strongly considered in a patient who is fully vaccinated or has no obvious wounds. Strychnine was first used as a rodenticide in Germany in the early 16th century. Although rare, most strychnine poisonings today result from the adulteration of street drugs (e.g., cocaine, heroin) as well as from small amounts found in herbal medications and homeopathic remedies.[7]

The case presented above, with a classic picture of tetanus, is an infrequently seen disease process in the United States but offers excellent learning opportunities.

Key Points

- **Spore inhalation may be a source of tetanus even if there are no open wounds.**
- **Trismus that presents without an associated oropharyngeal source should raise concern for tetanus.**
- **Treatment includes cleaning the wound, halting the toxin, neutralization of the unbound toxin, antibiotics, and supportive management.**
- **Strychnine poisoning may produce a clinical syndrome similar to tetanus and should be strongly considered in a patient who is fully vaccinated or has no obvious wounds.**

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DR. JOHNSON is a board-certified emergency physician. He serves as the point of care emergency ultrasound director for two hospital sites within his network and enjoys teaching. Dr. Johnson has given many ultrasound lectures to different services within the hospital including the emergency department and surgical team. He continues to lead two emergency departments in POCUS and ultrasound training.

YEHUDIS WEISS has been practicing as a physician assistant since 2011 and is currently working in the emergency department at Westchester Medical Center in Westchester, N.Y., where she has been for the past eight years.

MATCH 2023: RESULTS AND IMPLICATIONS

Multiple reasons factor into fewer U.S. medical students applying for EM residencies

by LEON ADELMAN, MD, *with additional reporting from Jonathan Fisher, MD, MPH, FACEP and Cedric Dark, MD, MPH, FACEP*

Table 1: Data snapshot from March 23, 2023

An updated chart will be posted to acep.org/workforce in May when Match 2023's final numbers are released. The numbers below are subject to updates from NRMP/ERAS.

YEAR	APPLICANTS[1]	EM PROGRAMS[2]	EM POSITIONS OFFERED[2]	EM POSITIONS FILLED[2]	EM UNFILLED POSITIONS[2]
2018	3,576	220	2,278	2,265	13 (0.6%)
2019	3,584	238	2,488	2,458	30 (1.2%)
2020	3,788	256	2,665	2,652	13 (0.5%)
2021	4,391	273	2,840	2,826	14 (0.5%)
2022	3,632	277	2,921	2,702	219 (7.5%)
2023	3,282	287	3,010	2,456	554 (18.4%)

1. ERAS Preliminary Data as of 2/23 each season - https://www.aamc.org/media/6231/download?attachment
2. NRMP advanced data tables 2023 -https://www.nrmp.org/wp-content/uploads/2023/03/2023-Advance-Data-Tables-FINAL.pdf

For decades, emergency physicians took pride in being a much-desired specialty for graduating medical students. Emergency medicine residencies routinely filled 99 percent of their available positions in the Match. On Monday, March 13, 2023, 554 emergency medicine spots went unfilled, a dramatic and abrupt increase in just a couple of years. The majority of those spots were filled by March 17 during the National Resident Matching Program's Supplemental Offer and Acceptance Program (SOAP), but the final data won't be released until May.[1,2]

Emergency medicine's desirability among medical students has dramatically decreased over the past two residency application cycles, falling below the number of applicants who applied to emergency medicine before the onset of the COVID-19 pandemic. U.S. student applicants to emergency medicine residencies accredited by the Accreditation Council for Graduate Medical Education (ACGME) and the American Osteopathic Association (AOA) dropped by 16.8 percent from 2021 to 2022.[1] In the 2023 residency Match year, emergency medicine applicants dropped by an additional 18.1 percent. In this article, we explore key reasons for the abrupt decrease in the competitiveness of the emergency medicine Match and recommend changes the specialty can undertake to reverse this trend.

The 2021 Match results marked a change for the specialty. However, long-term challenges such as night shifts, intoxicated patients, and the administrative burden of emergency medicine residents cannot explain the recent change in medical student preferences. The decrease in applications for emergency medicine residencies is specialty-specific. While total residency applications grew at a steady rate and other specialties have faced the same COVID-19 pandemic and similar nursing workforce shortages, they did not see the same declines in applications that emergency medicine has witnessed.

There are many speculations about what caused this shift. Like most things, the origins are likely multifactorial and still evolving. There are certainly many challenges facing the emergency physician today including workforce concerns, emergency department (ED) boarding, the impact of the COVID-19 pandemic, the corporatization of medicine, and violence directed toward health care workers, among many others.

The Shifting Emergency Medicine Workforce

In March 2021, eight emergency medicine organizations released the "Emergency Medicine Physician Workforce: Projections for 2030" report with its data published in the December 2021 issue of *Annals of Emergency Medicine*.[3,4] The report painted a startling picture for the future jobs of emergency physicians. The analysis's base "scenario would result in a surplus of 7,845 emergency physicians in 2030." After seeing residents face unprecedented challenges finding attending jobs in 2020 and 2021, medical students were faced with the prospect that job shortages were not just a one-time, pandemic-related problem, but a systemic problem in emergency medicine.[5]

Details within the workforce projections were especially concerning for future emergency physician prospects. While emergency medicine residency graduates had been increasing by 3.5 percent per year over the past decade, the number of physician assistants (PAs) and nurse practitioners (NPs) working in emergency medicine had been increasing by six percent per year.[5] Between 2013 and 2019, the number of PAs and NPs working in emergency medicine practices increased by 48.4 percent, compared with an increase of 11.1 percent for physicians.[6] Since PAs and NPs earn significantly less than residency-trained physicians, the prospect of being pushed aside by lower-skilled, lower-cost professions may have driven some medical students to choose other specialties.

Back-to-Back Burnout Champions

Concurrent with predictions of career insecurity for emergency physicians, the job became more difficult and less fulfilling. In the 2018 Medscape Physician Burnout Report, 45 percent of emergency physicians reported being burned out.[7] By 2023, the percentage who reported burnout increased to 65 percent, five percent higher than any other specialty. As emergency physician burnout rises, there has been a corresponding increase in emergency physician attrition.[8] A recent survey of all physicians (not just emergency medicine) by the Massachusetts Medical Society showed that 50 percent of physicians plan to reduce their clinical workload by June of 2023, and about 25 percent plan on leaving medicine in the next two years.[8]

The underlying cause of EM's burnout crisis stems largely from moral injury, the "social, psychological, and spiritual harm that arises from a betrayal of one's core values, such as justice, fairness, and loyalty."[9] Delivering high-quality patient care in the ED has always been challenging. But in America's post-pandemic health care system, it has been nearly impossible.

Over the last two years, decreased hospital staffing has caused increased ED boarding nationwide.[10] Already under-resourced EDs were tasked with caring for admitted patients in addition to incoming ED patients. That led to ED patients waiting for prolonged periods, becoming frustrated, and suffering adverse outcomes. Dr. Laura Haselden, MD, MPM, an emergency physician in Virginia, opined on Twitter, "The number of times I've said, 'I don't want to teach you to practice waiting room medicine but it's what we've got,' probably didn't help sell anybody." The sickest patients, often needing transfer to higher levels to care, were stuck in community EDs where emergency physicians did their best, knowing the care being delivered was substandard. Meanwhile, hospital administrators have been depositing ever-increasing paychecks.[11]

Prior to the pandemic, many emergency physicians could turn to a closely knit group of nurse and clinician colleagues for support. However, 2021 and 2022 saw an unprecedented level of nursing turnover.[12] At the same time, emergency medicine groups were rapidly consolidating, fraying bonds previously formed within smaller partnerships.[13]

Low Money, More Problems

While emergency physician job security and career satisfaction were being eroded, so were our financial prospects. In the 2017 Medscape Physician Compensation Report, 68 percent of emergency physicians reported feeling fairly compensated, the highest among the specialties surveyed.[14] By the 2022 survey, only 53 percent of emergency physicians reported feeling fairly compensated, a decrease of 15 percentage points.[15] Compensation no longer matches the rigors of the profession.

These compensation headwinds have come from several sources. Because of sales of emergency medicine practices to consolidators, such as private equity firms, emergency physicians now have the lowest rate of practice ownership among the specialties surveyed by the American Medicine Association (AMA).[16] The *No Surprises Act*, passed in 2021, has limited emergency medicine groups' bargaining power with private insurers.[17,18] Simultaneously, government payers have been chipping away at physician reimbursement.

Correcting Course

Emergency physicians, who are trained to improvise and make the most of difficult situations, will need to rely on that ingenuity to reverse these workforce challenges. Many of the factors impairing emergency medicine's desirability to medical students—such as boarding—are out of an emergency physician's control. However, much can be done by emergency physicians to improve the specialty's popularity.

The most important step is to balance the supply and demand for emergency physician labor. Counterintuitively, decreased interest by medical students is actually beneficial in this process. In the 1990s, when anesthesiology-experienced a significant drop-off in medical student interest because of the increased use of certified registered nurse anesthetist (CRNAs), the number of available U.S. anesthesia residency positions decreased by almost a third.[19] As emergency medicine organizations lack the power to shut down residency programs, decreases in applicants are likely the most effective mechanism for right-sizing the number of emergency medicine residents.

The rapid increase in PAs and NPs working in EDs can also be tempered by emergency medicine's physician leaders. While individual employer groups are incentivized to hire low-cost, less trained clinicians, the specialty's national organizations can push back on hiring practices that harm ED patients and physicians. For example, ACEP is planning to expand its ED accreditation programs.[20] Just as the American College of Surgeons would not accredit a Level I trauma center that did not staff the correct set of board-certified physician specialists, ACEP's accreditation can ensure that PAs and NPs are not managing higher acuity patients without proper post-graduate training and active real-time supervision.

The supply side, of physicians, can also be addressed. Traditionally, most emergency physicians have practiced general emergency medicine rather than a subspecialty. However, academic emergency-medicine programs should increase emergency physicians' access to fellowship training in pain, geriatrics, psychiatry, critical care, and other subspecialties.

Emergency medicine leaders must create workplaces more conducive to emergency-physician career fulfillment. Moral injury can be addressed by advocating for policies that promote high-quality emergency care. For example, psychiatric boarding is a scourge that can be addressed through increasing state-level behavioral health funding.

Establishing financial incentives for hospitals to improve flow can lead to significant downstream improvements.[21] EDs will likely continue being hospital dumping grounds until hospital administrators have financial incentives to move patients out of the ED.[22]

Clinical autonomy can be encouraged by granting ownership to emergency physicians. Ownership matters; no one washes a rented car. Even private equity firms have the ability to grant ownership stakes to their physician employees.[23]

Promoting employer competition for emergency-physician labor would incentivize im-

CONTINUED *on page 23*

A NEW SPIN

Point One, Dance One, Teach One

Is there a place for TikTok in EM practice?

ADOBESTOCK

by MOHAMAD MOUSSA, MD, FACEP

In the midst of a busy emergency department (ED) shift, it's common for an emergency physician to consult UpToDate, WikiEM, and YouTube to obtain information on a medication dosage or some zebra of a medical condition. It is our practice to review a YouTube video of a paracentesis just before doing one or referencing UpToDate to dose sulfamethoxazole/trimethoprim for a child. In recent years, social media has taken the world of medicine by storm and the sharing of medical knowledge has grown on these open platforms. In fact, a recent study showed that up to 70 percent of physicians in the United States use social media in some capacity.[1] Launched in 2017, TikTok, a video-based social media platform, has evolved past the original Facebook, Twitter, and Instagram era and has grown to over one billion active global users. Its under 60-second video format appeals to society's shortening attention spans.

Learn more about what this means for the emergency profession by following the QR code link below.

Reference

1. Hameed I, Oakley CT, Ahmed A, et al. Analysis of physician use of social media. *JAMA Netw Open*. 2021;4(7):e2118213.

"A New Spin" is the personal perspective of the author and does not represent an official position of *ACEP Now* or ACEP.

Honoring the Stories Well Told

Every year, ACEP's Medical Humanities Section hosts its Writing and Visual Arts Awards as part of the section's mission to promote the medical humanities as a source and means of lifelong learning for emergency physicians. The winners of the 2022 prose and poetry categories are featured below, and the 2023 contest will open this summer. Connect with other emergency physicians who are interested in fine arts, literature, and the humanistic social sciences by plugging into the Medical Humanities section at acep.org/humanities.

2022 Medical Humanities Section Writing Award Winner – Poetry Category

And Breathe

by ELIZABETH MITCHELL, MD

And when you hear it, my tongue tapping the two D's on
my palate with the little puff of air in between,
you come at me wild eyed and disbelieving.
I do not flinch as you pound on my chest with your
hands flat in a plea to God and to me that it is not true
that he is not dead that we didn't try hard enough
that it isn't him that we got it wrong that this can't be
happening.

And while you hurl yourself around the room
possessed with unbearable grief we wait,
and then we walk, holding you up
through the waiting room gravely quiet
down one long hall, and then another,
until finally we are there. Somewhere
I hear laughter and I want it to stop
to shut out the sounds of the living.

And you draw a breath. I open up the doors and let you in
and you are gentle, reverential, asking him to wake
tapping him, caressing him, blowing on his face,
whispering in his ear, pushing back his hair

and then you are yelling at him to "wake up"
and I stand there and I wait and I breathe
and I try not to think about the time and the other patients
and you are rocking his head back and forth and back and forth
and you ask if you can blow into the tubing in his mouth
and you try to find him there in the sleeping dead man you love
and wake him, save him, "just one more night" you implore.
and finally it ends. But not for you. Never for you.
And you.

You go back to work. Then you go home.
You eat toast with butter and jam.
You drink scotch and take a shower.
You stand in the hot water and you breathe
and you shake and you cry
and then you stop. And you put it all away
and you give the dog a hug
and rub your hands upon her silky chest
and then you go to bed and sigh as you slip under the cool
sheets
and you pray to god for sleep.

2022 Medical Humanities Section Writing Award Winner – Prose Category

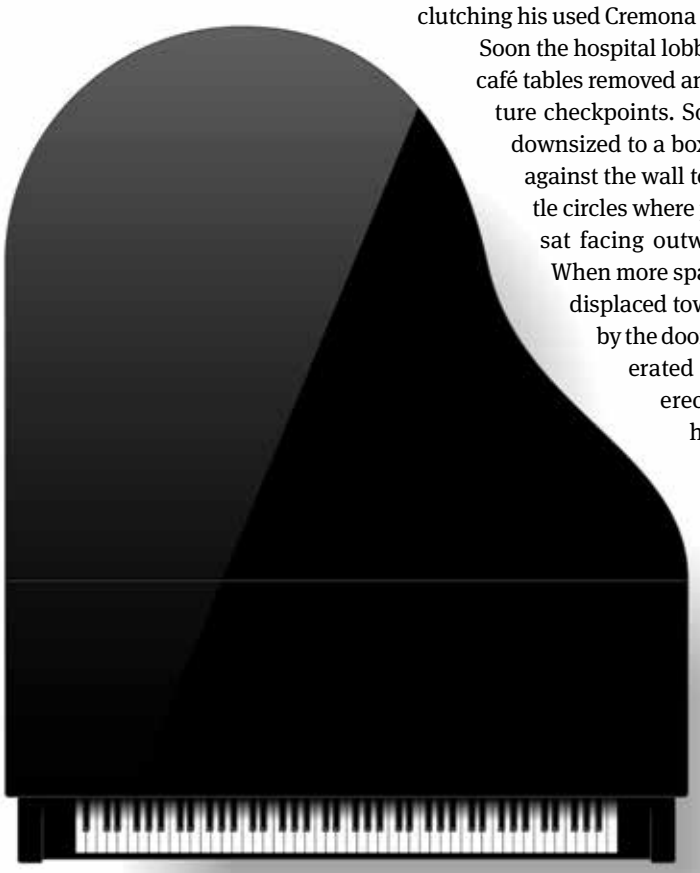
The Pianist

by RACHEL KOWALSKY, MD

Solomon was fifty-five now, and done with the constraints of tempo and time. He worked at Mercy Hospital, where nobody cared if he played forte instead of piano, pried open a crescendo like a piece of fruit and mined it for its very seeds and pulp, or held a resounding note a few beats longer than specified by the dead man who'd written it. The notes on the page were a conversation, that's what, between the living and the dead. Inflecting them with his own thoughts and feelings did not make him a jazz pianist (as had been suggested at conservatory); it confirmed his humanity, signaled that he was alive.

Mercy was a paying gig, rare in the world of hospital music. There were three pianists on the payroll, and a violinist who came once a week—or had come. Mack had been let go. The hospital was in the red, and Mack was the most recent hire.

The virus was the culprit. It changed everything. Early on, Linda from Special Events had snapped a mask onto Solomon's face (he was grateful, masks were hard to come by), and the next day she click-clacked across the busy lobby while Mack was finishing up his shift. She took him aside, saying whatever one says to fire a hospital violinist. He shuffled out the revolving door with shoulders hunched, clutching his used Cremona to his chest.



Soon the hospital lobby was transformed, the café tables removed and replaced by temperature checkpoints. Solomon's Steinway was downsized to a boxy upright, and pushed against the wall to make space for the little circles where people had to stand. He sat facing outward, back to the wall. When more space was needed, he was displaced towards the northern exit, by the door to the new white refrigerated trucks. A crew of men erected plexiglass around him.

Solomon knew the plexiglass was important, but it pained him. His music bounced back to him, clawed its way desperately up and over the wall, falling flat over the sides of his enclosure. Between the upright's muddy tone and its suffocated soundwaves, even the delicate Für Elise sounded like funhouse music.

Worse yet, he felt solitary behind the plastic. While he had few friends, he was not a loner, and the disconnection from his audience made him lightheaded with anxiety. Doctors and nurses rolled stretchers past him on their way to the trucks, banging into the plexiglass and shaking the little fishbowl of an enclosure, their eyes sometimes brimming with tears, sometimes bleary or blank above their masks. When their gaze met his, he felt a kinship: they were all caught in a type of cage, they were alive together, yet each was profoundly alone.

Around that time, the other two pianists went the way of Mack, so Solomon was the only musician left on the payroll of Special Events. Sometimes Linda came by to listen to him play. She brought a folding chair down in the elevator with her, and she sat with her elbows on her thighs and her chin in her palms. Some days she removed her glasses and wept openly, others she acted like nothing was happening, like she was at Lincoln Center and the banging of the stretchers was nothing but a bunch of loudmouths taking their seats after intermission. Sometimes she brought a boy with her—her grandson, she said—and they both unfolded chairs and sat listening, two birds on a branch.

Despite the fog of grief and fear that had seized the hospital, or perhaps because of it, Solomon was at his most musical during that time. He had often wondered whether he felt too much, as when the sight of the moon (the MOON!) moved him to tears. The great hunk of rock and metal glowed with such outrageous beauty, it made him tremble from head to toe. But the enormous emotions that possessed him ad nauseum—inchoate and disallowed as they were—seemed to be acceptable when channeled into music. Not everywhere, because of the complete abandon with which he played, but certainly here at Mercy. The hospital existed as he did, with great crescendos and decrescendos of sorrow, hope and devastation. So while his head thrummed with fear and loneliness, he did not look away. He did not even know how. His music grew richer, more nuanced.

In those days, everybody knew somebody who died, and in Solomon's case that person was the piano tuner. There was a hiring freeze at Mercy, so Linda asked Solomon if he could tune the little upright himself. He didn't know how to tune a piano, but she sent him a link to an online course and he vowed to do his best. The trouble was, he needed tools—a tuning hammer and a set of mutes. The only dot com that had them in stock displayed a message saying nothing could be shipped until the following year, but he placed the order anyway, and waited.

The upright, already compromised by its verticality—its trills sluggish, its action for the dogs—grew outrageously out of tune.

One day in mid-April, Mercy banned all visitors. They would step up to the information desk ready with names and room numbers, only to be turned away. Their protests filled the enormous lobby, swam over Solomon's plexiglass and moved him. He considered his programme du jour: Clair de Lune, Moonlight, Mendelssohn in A Major, or better yet in E. But inexplicably, the variations on Ah, Vous Dirais-Je Maman came to mind and eclipsed all. The would-be visitors, unable to visit, would be moved by the familiar sweetness of its theme, then amazed by Mozart's brief and brilliant adaptations. Each little gem—there were twelve variations—would recall the durability of the moon in its orbit, the flower on its STEM!

He began immediately.

CONTINUED *on page 14*

He delivered the theme in two-four, as Mozart had prescribed. A few people pivoted inside their designated circles, craning towards the sudden bright sound. Solomon did not look up from the keys, but he could see their bodies shifting beyond the plexiglass as if through a fog.

He had nearly completed the theme when a run of trills broke away from him, and he gave chase. He skidded into the first variation, letting the high D's and E's really have it. Then he ripped through the second-third-and-fourth, slowing only for the fifth variation so that his two hands could speak and listen properly to one another--he was not a barbarian after all—but by the seventh he was riled up again, striking the dotted quarters like his very life depended on it: DA DA DA DEEEEEEEEE DA DA! Solomon leaned hard into F sharp and G, he filled the lobby with their splendor. A few people had stepped out of their circles now, and drew near the plexiglass, arms folded, heads inclined towards the sound.

He nodded at them, a pilot at the ready, all systems go for variation number eight. It was a morose and tentative tune which he knew could be quite deadly on his twanging instrument, more haunted wood than heavenly grove, but he had committed, he would have to press on.

Decrepit eight, airy nine, lovely lyrical ten.

A boy with a shock of orange hair rapped on the plexiglass, startling him. Solomon glanced up and the boy made a conducting gesture with his index finger, drawing a delicate arc in the air. It was Linda's little grandson, of the folding chair and bird-like countenance. The boy wore a strange expression—what was it? Suffering and what? Affiliation? As though he'd found some precious thing that had gone missing.

But Solomon turned away: it was time for the Adagio. He closed his eyes, sighed, let his shoulders rise and his heart fill, empty, fill as he played. When he came to the fermata—a quick breath before the final phrase of music—he mined the thing for all it was worth, raised his hands high above the keys, let the penultimate notes fill the space above and around him, and silence follow. He bowed his head. One man sat down right on the floor. One woman cried on the shoulder of a stranger. A few people clapped. When he finished the song, the un-visitors drifted slowly away. Solomon was alone.

Shortly thereafter his hours were cut in half, and he struggled to make ends meet. Linda offered him per-diem work folding the face shields printed in the 3-D lab, so he set to work in his spot behind the plexiglass, folding the edges and fitting the elastic straps into place. This was hard on his hands, which grew calloused and stiff. His knuckles swelled with arthritis. But he did his best.

One Friday afternoon while the doctors crept around him, barely breathing as they pushed their stretchers towards the trucks, Solomon sat at his upright and felt that he could not play. His hands ached, but it wasn't his arthritis; his heart felt heavy, as empty as the sky.

He summoned all his strength and began a lacrimosa. He played haltingly, painfully, sending tendrils of music over the thick plexiglass like little boats onto his beloved Hudson, accepting the twang and buzz of his un-tuned piano, the tin and the echo of it. But part way through, just as Mozart had gunned the motor, Solomon's heart sputtered and stopped. Not that he died, but his spirit did, right in the middle of the music, and so he removed his hands from the keys and folded them quietly on his lap.

There came a loud rap from outside his fishbowl. He turned and saw a wild-eyed woman, middle aged, with a child at her side. Her hair was tangled and makeup smeared. She wore sweatpants, a ragged Henley, and dark glasses.

"Play the piano!" She shouted. She pounded against the plexiglass. He scanned the lobby; she must have come through a different door—the one by the trucks—bypassing security. The boy at her side was weeping, and now Solomon could see that it was Linda's grandson again, with the orange hair. Didn't he ever go to school? Of course not, nobody did anymore. And here came Linda clacking down the hall towards them, so that the little family—Linda from Special Events, her distraught daughter and weeping grandson—all stood on the other side of the plexiglass, staring at Solomon with bottomless need.

He lifted his hands to the piano but they fell like lead, discord bursting from the little matchbox. He raised one finger and tried to play a few notes of Ah Vous but nothing happened. He shook his head helplessly.

Don't just sit there! screamed the woman, Linda's daughter, pounding the plexiglass so that it heaved and shook around him. Have some humanity!

Solomon trembled. How she misunderstood him. The problem was precisely his humanity, which had been sapped, drained, dismissed together with Mack, extinguished beside the piano tuner, and folded, during long hours of painful labor, into the masks they all wore.

Linda apologized. She took her daughter's hand and led her away, gesturing to her orange-haired grandson to follow. Heels click-clacking, she crossed the lobby and led them out the revolving door to the taxi stand, where she kissed and hugged them and helped them into a cab.

Mother and son rode the taxi through the city's empty streets and entered their apartment in silence. She put her keys down and opened the window. Closed it, opened it again. When she crumpled at the kitchen table with her head in her hands, the boy sang alone in his room. In a warble full of melancholy, he made up his own lacrimosa for his ill father and the hunched-over pianist who had not been able to play. He sang with the sweet brassy heft of an unfolding life, the ineffable moon, the OCEAN that would always reach for it. His mother sat and listened, her heart breaking, emptying, filling up again.

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EM LITERATURE OF NOTE

PEARLS FROM THE MEDICAL LITERATURE

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Masks: The Good, the Bad, and Systematic Reviews

Using studies to help advise emergency physicians

by RYAN RADECKI, MD, MS

At least as important as carving out the time to read new studies, it is important to develop the skills to critically appraise new studies. The last few years may not be different than any previous decade as far as the quantity of biased, half-baked, and simply fraudulent research published, but the lack of practiced skill in evaluation is on prominent display.

While examples of bias across pandemic-related topics are not restricted to any single point-of-view, a recent Cochrane Review publication has yet again refreshed a persistent topic of disagreement: the efficacy of masks and other non-pharmaceutical interventions to prevent the spread of respiratory viruses.[1] In a world of mostly transient obsessions with hydroxychloroquine, ivermectin, and various and sundry vitamins, the mask provocations remain.

Use of the PICO Structure

The best approach to understanding the outcome of this Cochrane Review is first to understand the methods of a systematic review. Using the "population, intervention, comparison, and outcomes" (PICO) structure, a research question is posed. Certain types of evidence are then chosen for inclusion in the review, ranging across observational, retrospective, prospective, or randomized controlled trials (RCTs). Specific medical literature databases are searched for articles meeting criteria, and distilled down into the a relevant cohort. Finally, the results are pooled and analyzed together to generate an estimate of treatment effect, ostensibly with greater certainty and across a broader population than any individual study.

At its foundation, therefore, the inputs determine the outputs. The ultimate conclusions are shaped by rules governing which studies are included, and, by definition, excluded. With all the levers available for manipulation, it becomes clear the scales can be tilted to produce objective results aligned with a particular chosen conclusion.

Assessment of Biases

The Cochrane Review methodology does not prevent erroneous results, rather, it governs primarily the structure of the analysis and reporting. Each included study is required to undergo an assessment of biases. These biases include assessments of threats to balanced enrollment, outcomes assessment, and completeness of results. Likewise, each study included is formally tabulated to describe its relationship to the initial PICO question, and the quality of its measurement of the effects. Unfortunately, these formal processes still do not prevent inclusion and pooling of largely irrelevant results from poorly conducted trials.

For example, a Cochrane Review of parachutes to prevent death from jumping from an aircraft could be proposed. There is a great deal of observational evidence of poor outcomes absent parachute use, but little in the way of randomized-controlled trials. However, a structured search restricted to RCTs alone would uncover one such trial.[2] The risk of bias assessment would identify concerns regarding some elements in this trial. However, because this RCT of parachute use to prevent death failed to show a difference between groups, this would become the unavoidable output of such a Review. This is, naturally, akin to madness, and similar to the flaws misleading those who amplify this most recent review concerning masks.

To determine the beneficial effect of a protective intervention, each group should have equal exposure to potential harms. The experimental group should deploy the intervention with perfect adherence, and deploy the intervention in all settings for which an exposure event may occur. In doing so, any adverse outcome would solely result from lack of intervention efficacy.

Among the trials of mask wearing included in this Cochrane Review, none remotely resemble this standard. For example, an included trial examined mask use while in tents used by pilgrims during the Hajj.[3] In the intervention group, self-reported daily mask use was a mere 25 percent, while the control group reported daily mask use of 14 percent. Another trial recruited students in a University of Michigan residence hall, from which staff observed an average of 0.0007 participants properly wearing a mask for each hour of observation.[4] Three other trials described use of masks within households of patients with influenza-like illness, with adherence to mask use measured in a handful of hours per day, if at all.

Similarly problematic issues arise with respect to trials comparing the effectiveness of medical masks and N95 respirators in health care settings. A few of these trials, performed primarily in Chinese hospitals during influenza seasons, showed dose-dependent positive effects favoring N95 respiratory use when comparing continuous, intermittent, and no respiratory use in hospitals.[5,6] In contrast, a more prominently published trial failed to show any advantage.[7] In the trial failing to demonstrate any difference, however, N95 masks were worn solely when caring for patients with febrile respiratory illness. The remaining time, whether in staff stations, with other patients, or in the community, trial participants were unmasked. Clearly, an intervention is not reliably tested if exposure events occur outside the time in which the intervention is deployed.

However, the pooled results cannot reflect anything other than the included trials, and it becomes inevitable the authors of this Cochrane Review report a failure to demonstrate advantages to mask use. The vast majority of the amplification of this review focuses on this finding, including by the lead author to the lay media.[8] This runs in stark contrast to the actual conclusions of the review, which lead off with a very sensible: "The high risk of bias in the trials, variation in outcome measurement, and relatively low adherence with the interventions during the studies hampers drawing firm conclusions."

In most cases where RCT evidence is too weak upon which to draw any firm conclusions, the prudent course of action is to incorporate evidence from further down the evidence pyramid. Retrospective cohorts, case-control studies, before-and-after reports, and other quasi-experimental designs may have additional susceptibilities to bias, but frequently remain the best option to inform medical and policy decision-making when the RCT evidence is unhelpful.

An informative resource to this effect is, actually, the Cochrane Review on the same topic published in 2011.[9] Curiously, this version was led by much the same authorship team as the present version, but arriving at quite different conclusions. The primary difference, other than including studies only up through 2010, was the inclusion of any comparative design in which some attempt was made to control for confounding. This included case-control, before-and-after, and other quasi-experimental designs.

The results are starkly different. These additional studies include those evaluating use of simple surgical masks comprising over 3,000 participants during the initial Severe Acute Respiratory Syndrome (SARS) epidemic in 2003. In these case-control studies, those wearing a mask were one-third as likely as controls to contract SARS. Fewer case-control studies assessed the use of N95 respirators, but the risk for contracting SARS was halved yet again in those who regularly wore N95 masks when caring for infected cases. In contrast to the present-day apparent inability to draw conclusions regarding masks, the prepandemic view of these same authors was: "Simple and low-cost interventions would be useful for reducing transmission of epidemic respiratory viruses."

These previously included studies also require the same critical eye as those trials included in the most recent review, and possess their own limitations and generalizability issues. However, it is fallacious and unserious to suggest a lack of relevance to the present day, or to imply the most recent Cochrane Review has any bearing on the question of whether masks "work." Rather than addressing mask efficacy, which is still best informed by the those original studies, the more recent trials raise a different question regarding the *effectiveness* of mask *recommendations*. Masking certainly reduces viral transmission, but in order to develop relevant infection control effects at a population level, other factors relating to mask use, uptake, and other public health measures require consideration. Regrettably, in self-reinforcing fashion, casting doubt upon the efficacy of masks ultimately diminishes their population-level effectiveness, a vicious cycle favoring those who decry the usefulness of masks.

As the pandemic winds down, more individuals have durable protection against severe disease and community viral prevalence is subsiding. These factors make routine mask use dramatically less important than early in the pandemic. However, preventing mischaracterization of these data, and other specious representations of studies, remains critical preparation for future public health activities.

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Cutting-Edge Management of Blunt Tracheal Injury

A case when surgical management was needed for the difficult airway

by JONATHAN GLAUSER, MD

Case

A 34-year-old male was involved in a motorcycle rollover. His vehicle hit a pole, and he was hit in the throat with the handlebars of his bike. He presents alert and awake, with gross facial and neck swelling, and no history of loss of consciousness. His Glasgow Coma Scale is 15. Notable on his physical examination is subcutaneous emphysema diffusely, including crepitus to palpation of radial pulses, and crepitus in his face, neck, torso, and scrotum. X-ray confirms subcutaneous emphysema (see Figure 1). There are no external lacerations.

To protect his airway, an awake intubation is planned. He is administered nebulized lidocaine and ketamine. He develops severe respiratory distress and becomes unable to phonate. Intubation with a Glidescope is unsuccessful, and he is biting the tube.

The surgery team performed an emergency surgical airway.

The surgical procedure note read as follows: "His midline had been marked. Incision with a 10 blade was made over this line. The scalpel was used to divide the subcutaneous tissue, which was bleeding profusely. Then I suddenly encountered massive spewing of dark red non-pulsatile blood into the field.

"With suctioning, gauze packing, and retractors, I was able to somewhat control the bleeding, and I used my finger to explore the wound. I felt the laryngeal prominence and traced this down to a boggy area that I hoped was the cricoid membrane. There were crunchy things in the area which I assumed were shattered pieces of cartilage. I used a hemostat to bluntly poke a hole into the boggy area and spread to dilate the hole. I used my finger to explore the hole and initially felt the inside of the larynx, so I knew I was in the airway.

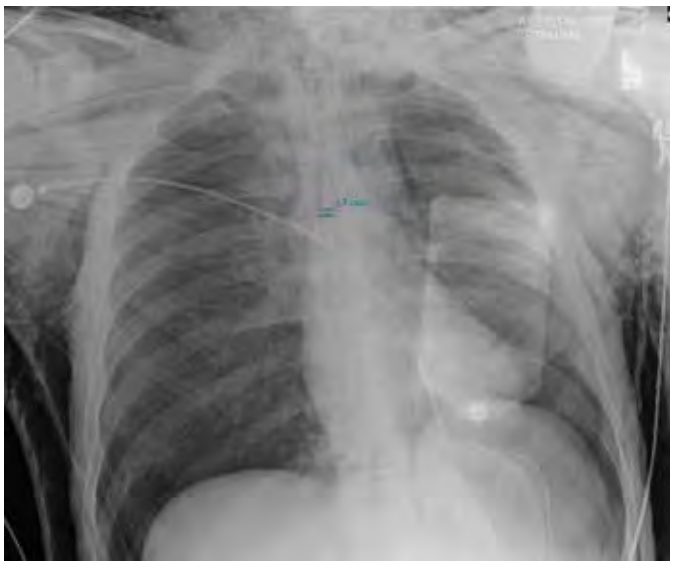
"At a very sharp angle inferiorly, I was able to feel tracheal rings. I passed a pediatric bougie into the trachea and then over this slid a 6-0 cuffed endotracheal tube (ETT) into the airway. One of my colleagues blew up the balloon and began ventilating the patient. The endotracheal tube is sutured to the skin of the anterior neck with 0 silk. End-tidal CO_2 confirms placement in the trachea."

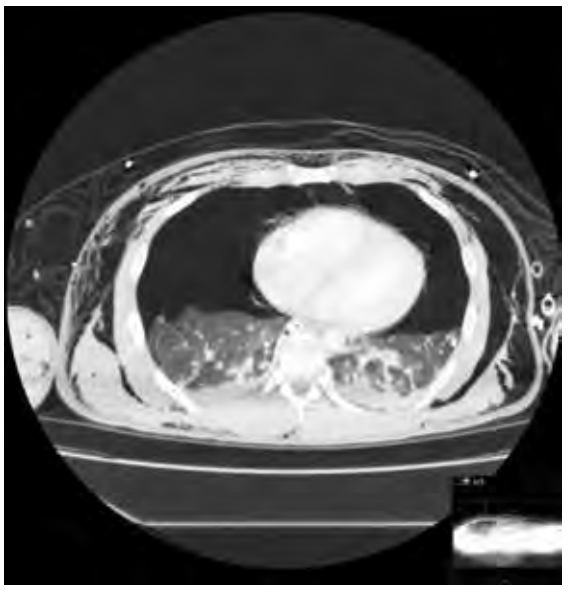
How Difficult Airways Present

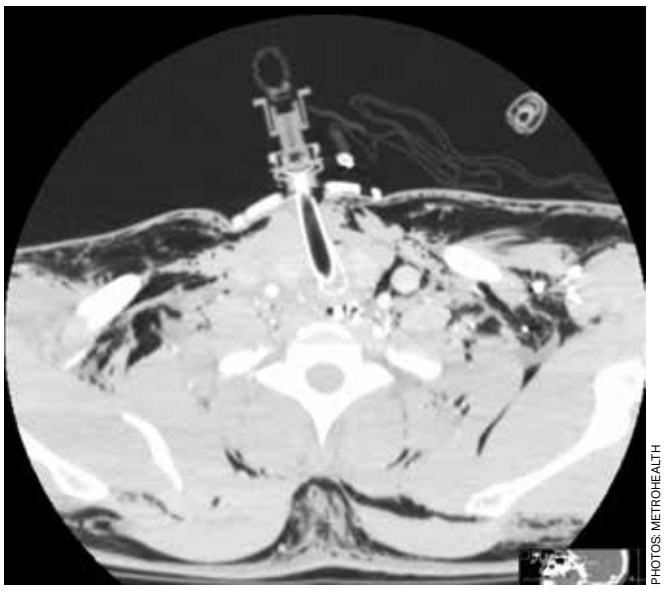
The American Society of Anesthesiologists' practice guidelines define a difficult airway as a clinical situation in which a conventionally trained anesthesiologist experiences difficulty with facemask ventilation of the upper airway, difficulty with tracheal intubation, or both. Difficult laryngoscopy is defined as inability to visualize any portion of the vocal cords after multiple attempts. Difficult tracheal intubation entails multiple attempts at intubation, in the presence or absence of tracheal pathology.[1]

Table 1: Signs, symptoms and radiologic findings of laryngotracheal trauma

Subcutaneous emphysema	Crepitus
Ecchymosis	Hematoma: expanding or pulsatile
Dyspnea	Stridor, wheezing
Dysphonia	Dysphagia
Drooling	Tracheal deviation
Hemoptysis	Disruption of the larynx or trachea
Neurologic deficit	Sucking neck wound







PHOTOS: METROHEALTH

Figure 1 (LEFT): Initial chest X-ray taken supine demonstrating massive subcutaneous emphysema. Of note: Bilateral pneumothoraces are visible on the chest CT (See Figure 2) but are not clear on the initial chest X-ray. He received chest tubes thereafter.

Figure 2 (BELOW LEFT): CT chest demonstrating large bilateral pneumothorax and subcutaneous emphysema. Laryngeal-tracheal separation may occur. Insertion of an endotracheal tube may cause separation of the trachea from the larynx, if the connection is tenuous. A transected cervical trachea may retract into the mediastinum and have to be surgically retrieved/extracted to establish an airway.

Figure 3 (BELOW RIGHT): CT demonstrating T-tube in airway, at approximately the C3-4 level, along with air diffusely in soft tissue. An important takeaway is that if the tracheostomy tube is dislodged, the patient cannot be intubated from above. The neck must be re-explored to establish an airway. The author does not in general recommend CT to confirm airway placement. In fact, there was positive end tidal CO_2 after the 6-0 cuffed ETT was sutured into the patient's airway.

There are many non-traumatic disease states which may contribute: ankylosis, degenerative osteoarthritis, subglottic stenosis, lingual thyroid, tonsillar hypertrophy, or congenital nontraumatic abnormalities such as Down syndrome, Pierre Robin, and Treacher-Collins. For purposes of this discussion, we will concentrate on traumatic injury.

Tracheobronchial injury occurs in an estimated 10 to 20 percent of patients with penetrating trauma to the neck.[2] In a retrospective review of 12,187 patients treated at a civilian trauma center in Toronto over 16 years, 36 patients (0.3 percent) suffered blunt airway injury.[3] Blunt trauma to the neck may be more complicated. Of course, in these cases, intubation directly through the wound is not an option. Over recent decades, the availability of video-laryngoscopy (VL) and fiberoptic intubation/ bronchoscopy (FOB) have reduced both the rate of failed intubation and the need to perform emergency surgical airways.

Another report enumerating over 12,000 trauma cases over a seven-year period listed 242 patients requiring a surgical airway. When only the 3,271 patients with trauma to the head and neck were considered, a mere 51 cases required a surgical airway, and of these, 47 cases made it to the operating room for a surgical tracheostomy.[4] Since traumatic airway injury is rare, assessment and management are not well characterized. Trauma may also entail a variety of contributing factors. For example, retropharyngeal hematomas have been reported following cervical spine injury, foreign body ingestion, central line placement, and coagulation disorders.[5,6]

Other measures may help, although they were of limited value in the above case. Opportunities for supplemental oxygen include oxygen delivery by nasal cannula, facemask or laryngeal-mask airway, and blow-by. Clearly, in the case above, these measures were temporizing at best. In fact, the patient's arterial blood gas just prior to surgical intervention revealed a pH of 7.105, pCO_2=87, and pO_2=62.

The four basic considerations in cases such as these are:

- Awake intubation versus intubation after induction agents
- Noninvasive techniques versus invasive techniques (surgical or percutaneous airway)
- Video-assisted laryngoscopy as the initial approach to intubation, and
- Preservation versus ablation of spontaneous ventilation[1]

Findings

CT may demonstrate distortion of the airway and surrounding structures, fracture or tear of larynx or trachea, edema, and hematoma in a case of blunt airway injury.[7] (see Figure 2).

Since cases of blunt injury to the airway are rare, a unified standard of care for emergency invasive airway access would of necessity be difficult to define. The American Society of Anesthesiology guidelines for invasive airway access in their practice guidelines list surgical or percutaneous airway, jet ventilation, and retrograde intubation.[1]

Indications for urgently securing the airway generally have been cited as respiratory distress, hypoxia, severe agitation, inability to protect the airway (e.g., Glasgow Coma Scale of 8 or less), altered mental status, and hematoma or mucosal edema compromising the airway, as from smoke and chemical burns. A surgical airway may be mandated in the hypoxic or hypotensive patient who cannot be intubated.[8]

Alternatives to surgical intervention in the patient with respiratory distress include awake intubation, video-assisted laryngoscopy, intubating stylets or tube-changers, supraglottic airways such as laryngeal mask airways, rigid laryngoscopic blades, fiberoptic-guided intubation, and lighted stylets or light wands.[7]

To The Operating Room

The patient was transported from the ED with the aforementioned 6-0 airway in place. Multiple shattered pieces of cartilage were found by the operating otolaryngologist. The patient underwent a laryngotracheal reconstruction with rib graft and primary repair of a laryngotracheal separation at the right cricothyroid joint. A T-tube was placed at the third tracheal ring (see Figure 3), and a 6-0 proximal XLT Shiley tube placed. He was discharged 14 days after the injury, neurologically intact.

Conclusions

Blunt neck traumas producing a situation of "cannot intubate, cannot ventilate" are relatively rare, and consistently challenging. Surgical management must always be an option.

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ADOBE STOCK

SKEPTICS' GUIDE

CONTINUED FROM PAGE 1

therapeutic hypothermia, supraglottic devices, crowd sourcing CPR and epinephrine.[1–4] A couple of issues that have not been looked at is pad placement and double sequential external defibrillation.

Reference: Cheskes S, Verbeek PR, Drennan IR, et al. Defibrillation strategies for refractory ventricular fibrillation. *N Engl J Med.* 2022;387(21):1947–1956.

- **Population:** Adult patients (18 years of age or older) and had an OHCA and refractory ventricular fibrillation (three standard shocks).
- **Intervention:**
  - » **Vector Change Defibrillation:** Pads are placed in an anterior-posterior pad placement after standard anterior-anterior configuration following the third shock.
  - » **Double Sequential External Defibrillation:** Pads are placed in both the anterior-anterior and the anterior-posterior pad placements following the third shock with standard defibrillation.
- **Comparison:** Standard defibrillation with pads placed in anterior-anterior configuration
- **Outcome:**
  - » **Primary Outcome:** Survival to hospital discharge
  - » **Secondary Outcomes:** Termination of ventricular fibrillation, return of spontaneous circulation (ROSC), good Neurologic outcome (modified Rankin scale [mRS] score less than three)

Authors' Conclusions: "*Among patients with refractory ventricular fibrillation, survival to hospital discharge occurred more frequently among those who received DSED defibrillation or VC defibrillation then among those who received standard defibrillation.*"

Results: They enrolled 405 patients into the study. The mean age was 64 years, over 84 percent were male, 68 percent were witnessed arrests, 58 percent had bystander CPR performed, and median response time was eight minutes.

Key Result: Survival was greater in those patients who had vector change or double sequence defibrillation compared to standard treatment.

- **Primary Outcome:** Survival to hospital discharge
  - » Vector Change vs standard group 21.7 percent versus 13.3 percent; relative risk 1.71 (95 percent CI, 1.01 to 2.88).
  - » DSED 30.4 percent versus standard 13.3 percent; relative risk 2.21 (95 percent CI, 1.33 to 3.67)
- **Secondary Outcomes:** DSED but not VC defibrillation was associated with a higher percentage of patients having a good neurologic outcome than standard defibrillation (relative risk 2.21 [95 percent CI, 1.26 to 3.88] and 1.48 [95 percent CI, 0.81 to 2.71] respectively)

EBM Commentary

1. Blinding—This was a double blinded study. The patients and outcome assessors were unaware of group allocation while the treating paramedics were aware of the assigned defibrillation strategy. It is unclear what would have biased the primary outcome of survival to hospital discharge.

2. Cluster Randomized Control Trials—There is a difference between individual RCTs and cluster randomized trials. Cluster randomization means you cluster groups of individuals as a unit making the number of independent units allocated smaller than the actual number of observations. There are some advantages and disadvantages to performing cluster RCTs.[5]

3. Stopping Early—Stopping a trial early can introduce potential bias into a trial.[6–8] Some of these biases can be mitigated by deciding a priori what conditions would result in halting the trial. This trial, like many others, was stopped due to COVID. They were only able to get 44 percent of their planned sample size.

SGEM Bottom Line

Consider changing your vector or doing double sequential external defibrillation in patients with refractory ventricular fibrillation.

Case Resolution

The EMS paramedics add their defibrillator with pads in the anterior-posterior position and provide DSED. The patient is successfully defibrillated and transported to the local emergency department.

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

Thank you to Dr. Seam Moore, an emergency physician working in Kenora Ontario, for his help with this review.

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Table 1

OUTCOME	STANDARD	VC	DSED	DSED V STANDARD	VC V STANDARD
Termination of Ventricular Fib.	67.6%	79.9%	84.0%	1.25 (1.09-1.44)	1.18 (1.03-1.36)
Return of Spont. Circulation	26.5%	35.4%	46.4%	1.72 (1.22-2.42)	1.39 (0.97-1.99)
Modified Rankin Scale Score <3	11.2%	16.2%	27.4%	2.21 (1.26-3.88)	1.48 (0.81-2.71)

BRINGING DATA TO THE BEDSIDE

BENCHMARKING ALLIANCE

DR. AUGUSTINE is national director of prehospital strategy for US Acute Care Solutions based in Canton, Ohio; clinical professor of emergency medicine at Wright State University in Dayton, Ohio; and vice president of the Emergency Department Benchmarking Alliance.

Diagnostic Test Turnaround Times are Improving across EDs

Turnaround time for diagnostic testing is one area of improvement post-COVID

by JAMES AUGUSTINE, MD

So many difficulties have cropped up in the emergency department (ED) during the almost three years of the pandemic. However, there is good news: many ED diagnostic test turnaround times have improved.

Improving Hospital Operations

Hospital leaders are looking to the ED for improved operations and flow of patients moving into inpatient units or being discharged. ED physicians are being called on to provide guidance on efficiency and the ability to reduce bottlenecks and frustrations for hospital staff. The performance of emergency departments in 2020 and 2021 has been summarized by the Emergency Department Benchmarking Alliance (EDBA) in its annual survey report. One of the operational challenges that occurred in the pandemic years was a marked change in the average daily volumes presenting to departments. After an initial decrease in ED volumes, subsequent ED patient counts seemed to change rapidly, and most EDs saw an increase in acuity.[1]

The EDBA data survey for 2021 was the third year that data were collected and reported on turnaround times for testing in the ED. Trends are generally good.

TAT for Select Laboratory Diagnostic Tests

For radiology, the turnaround time (TAT) for select metrics is reported as a median time interval from "order placed in EHR (electronic health record) by ED provider" to "first result available to ED provider." For imaging procedures, the results-available time stamp may be when a "preliminary" or "final" report is complete, depending on the ED's policy of decision-making for a given imaging modality.

The EDBA collected and reported data for the following imaging procedures:

- Plain X-ray imaging
- Ultrasound procedures
- CT procedures
- MRI procedures

The EDBA survey collects data based on the median time interval from "order for diagnostic test placed in EHR by ED provider" until "first result available to ED provider." The laboratory diagnostic tests in the survey are the following:

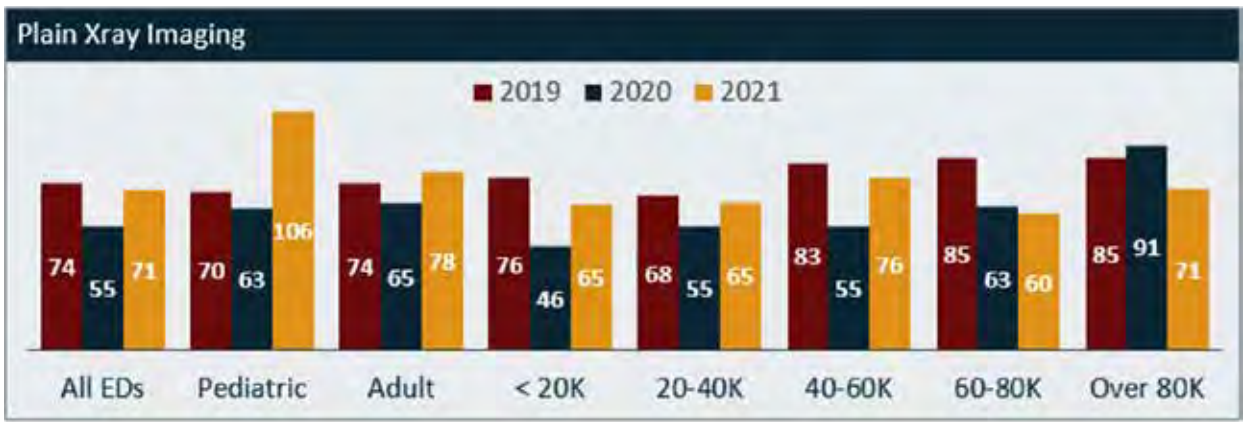
- Complete blood count
- Basic metabolic panel
- Lactate
- Troponin
- Urinalysis

The intervals reported for imaging procedures and laboratory tests are all median times, reported in minutes.

The EDBA survey reports in the usual cohorts used by the Alliance over many years, first reported in 2014.[2] There are differences by volume cohorts, and in pediatric and adult-serving EDs.

The survey indicates that turnaround time performance improved on many radiology measures, shortening from 2019 to 2021. Notable exceptions include the turnaround time for CT procedures, which increased by a few minutes across the board in 2021 and for imaging at pediatric facilities. A possible explanation could be the increase in CT volume compared to prior years.

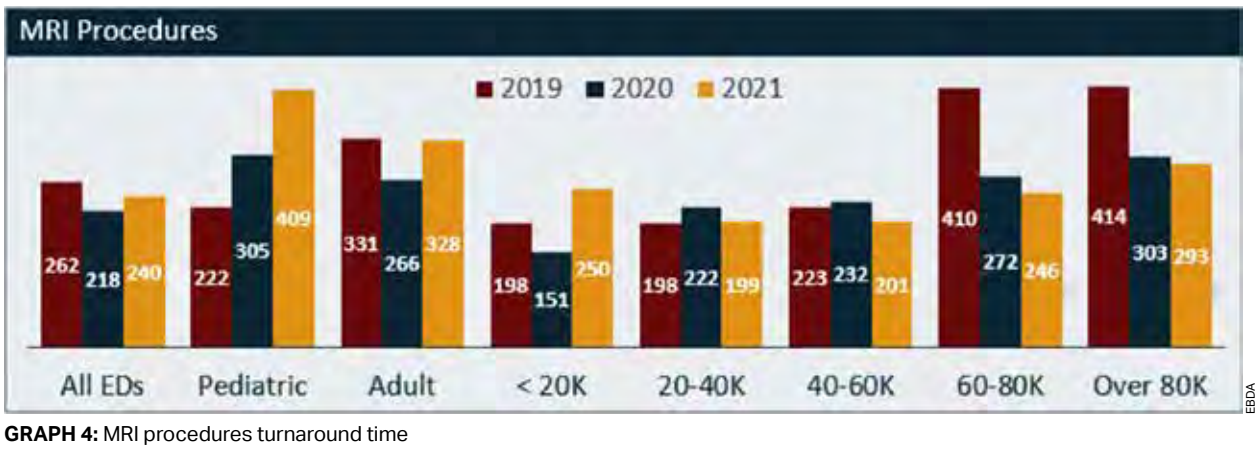
Quick diagnostic test results are important to the practice of emergency medicine, as it provides critical information related to acute medical conditions and allows the emergency physician and consultants to have information necessary for quality ED decision making and disposition. Shorter intervals for diagnostic testing can ultimately improve patient flow for all patients.



GRAPH 1: Plain X-ray imaging turnaround time

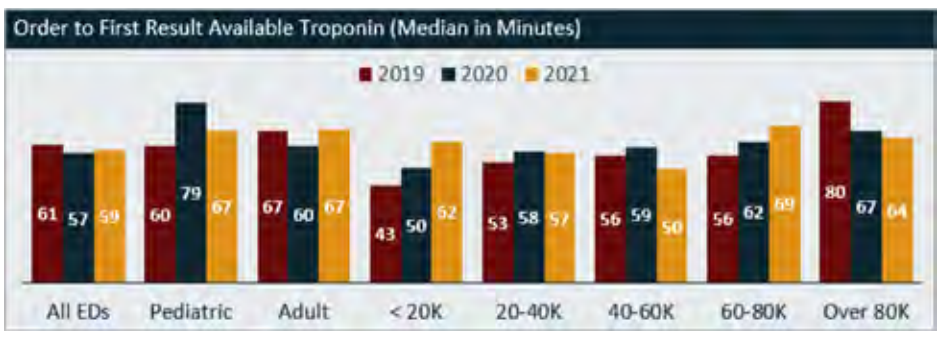
GRAPH 2: Ultrasound procedures turnaround time

GRAPH 3: CT procedures turnaround time

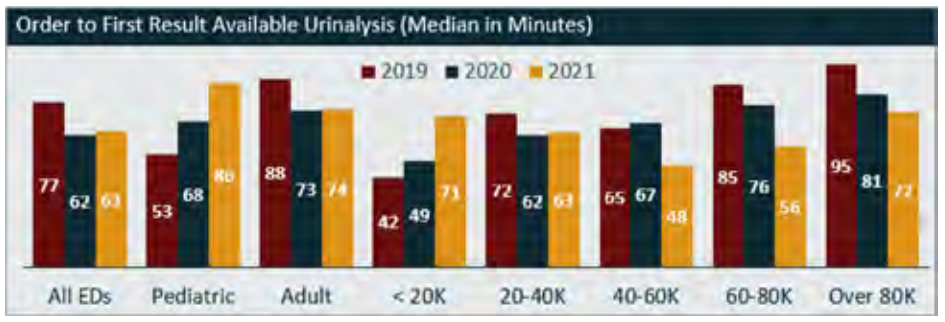


GRAPH 4: MRI procedures turnaround time

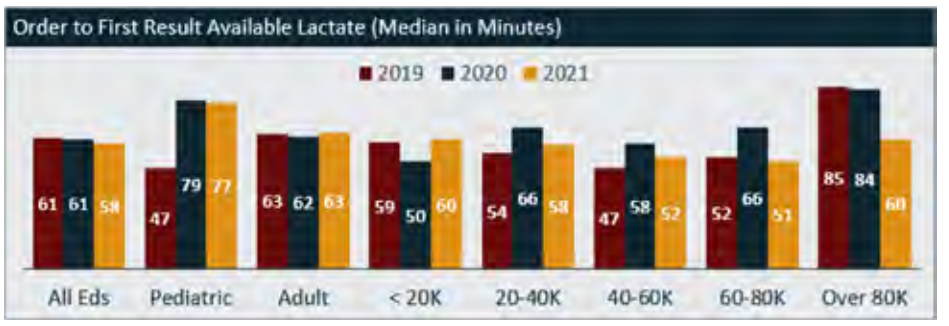
GRAPH 5: Order to first result available complete blood count turnaround time



GRAPH 7: Order to first result available troponin turnaround time



GRAPH 6: Order to first result available urinalysis turnaround time



GRAPH 8: Order to first result available lactate turnaround time

These diagnostic-test turnaround times from EDBA should give emergency physician leaders the opportunity to compare the times in their own institutions. One area for uncluttering the emergency department is improving the turnaround time for diagnostic tests. The EDBA annual survey found a slight trend toward improvement in turnaround times from 2019 to 2021. ED leaders should discuss methods to further improve with the leaders of radiology and laboratory services, and work with hospital leaders to improve overall patient flow.

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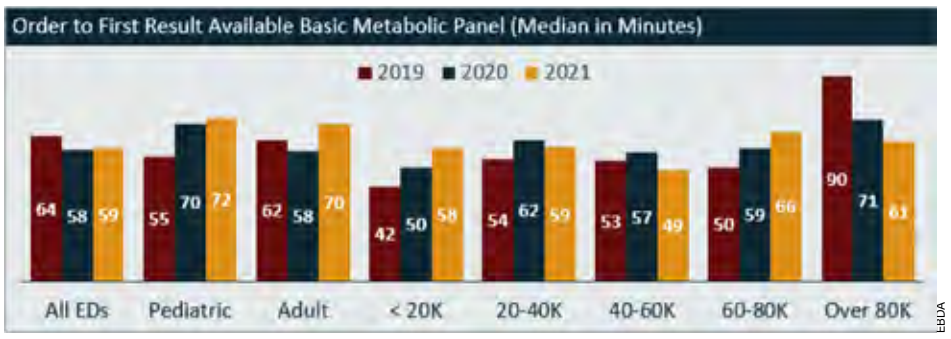

GRAPH 9: Order to first result available basic metabolic panel turnaround time

ONE MORE REASON NOT TO ORDER AN X-RAY

SOUND ADVICE

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Ultrasound-Guided Supraclavicular Brachial Plexus Block for the ED Physician

Looking at targeted analgesia for upper extremity injuries

by ALEX AYALA MD; HENRY ASHWORTH, MD MPH; ARUN NAGDEV, MD

Introduction

Injuries to the upper extremity (e.g., fractures, dislocations, lacerations, abscesses, and foreign bodies) are common, but can be challenging to manage in the emergency department (ED) due to severe pain.[1] Procedural sedation and/or hematoma blocks can be great tools for pain control but, in our experience, often fail to provide adequate analgesia. While the use of hematoma blocks for lower forearm injuries such as distal radius fractures have been shown to be effective, there is little evidence suggesting that they are effective in upper arm injuries.[2-4] Also, procedural sedation requires significant resources (e.g., additional nursing staff, a respiratory therapist, and monitoring equipment).[5-7]

Single-injection, ultrasound-guided, brachial plexus blocks provide targeted analgesia for upper extremity injuries. Specifically, the interscalene block is effective for proximal injuries including the deltoid and shoulder and the supraclavicular block may be ideal for injuries at the elbow or lower.[8] The supraclavicular brachial plexus block has a number of advantages including visualization of the brachial plexus, clearly defined ultrasonographic landmarks, and having been used for various arm injuries (from distal humeral injuries to distal radius fractures) in our ED. By delivering sonographically guided anesthesia, we can effectively reduce pain, opioid utilization, and need for procedural sedation.

The following sections outline important clinical anatomy, equipment for the block, and procedural steps that will allow for a successful supraclavicular brachial plexus block.

Indications and Considerations

The supraclavicular brachial plexus block is indicated for anesthesia and analgesia to common ED injuries below the shoulder including but not limited to: deltoid abscess, midshaft and distal humerus fractures, and elbow dislocations. For simplicity we think of the interscalene brachial plexus block for injuries from the proximal shoulder to the distal humerus and the supraclavicular brachial plexus block for injuries beyond the distal humerus.[8] The decision to perform a brachial plexus block is a multifactorial decision. The clinician should be aware of the patient's underlying medical history as well as have clear communication with the other services who may need to be involved in the patient's care. Also, in our experience, sonoanatomy of the brachial plexus can be varied (both in location and overlying vasculature). Finding the right location (whether supraclavicular or interscalene) or not performing the block will depend on the patient's underlying sonoanatomy as well as the ability to position an acutely injured patient.

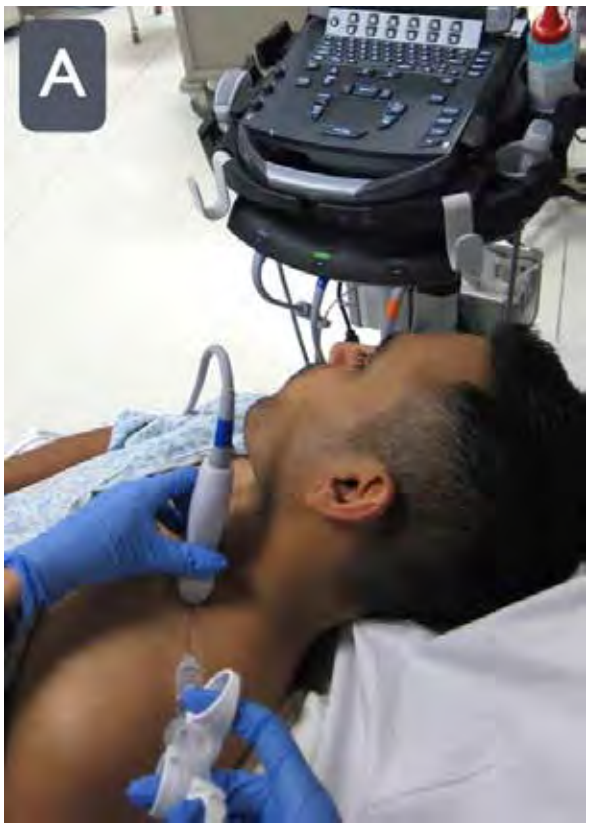
Allergies, overlying infections, and coagulopathy are important contraindications, as with all peripheral nerve blocks.[9] There are a few important limitations to the supraclavicular brachial plexus block that should be considered:

1. Injuries to the to the medial upper arm are not covered by brachial plexus blocks.
2. Interscalene blocks often provide better analgesia for shoulder dislocations.
3. For injuries to the hand (distal to the wrist crease), a forearm nerve block may be more appropriate.

Anatomy

The brachial plexus is composed of nerves from the C5 to T1 nerve roots that travel from the cervical spine and innervate the neck, axilla, and arm. The brachial plexus branches as it travels from the cervical spine to the upper extremity, and the location of a block should be tailored to cover the nerve distribution of the injured region.

When performed correctly, the supraclavicular nerve block will provide motor and sensory blockade to the radial, median, ulnar, musculocutaneous, and axillary nerve distributions of the arm. This leads to almost complete anesthetization of the arm, sparing the shoulder joint (suprascapular nerve) and the medial side of the upper arm (intercostobrachial nerves).



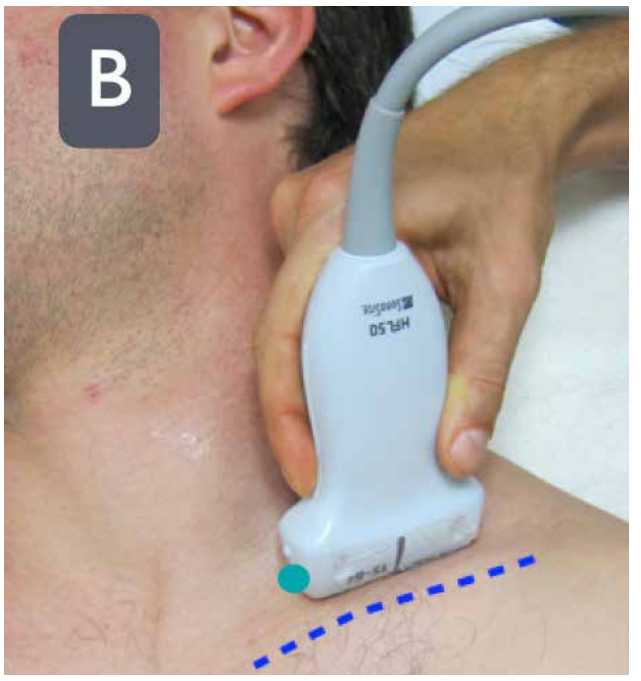


FIGURE 1A(LEFT): The ultrasound system is placed contralateral to the affected extremity and in the clear line of sight for the provider.

FIGURE 1B(ABOVE): Place the ultrasound probe (green dot indicating probe marker) above the clavicle aiming the beam into the thorax.

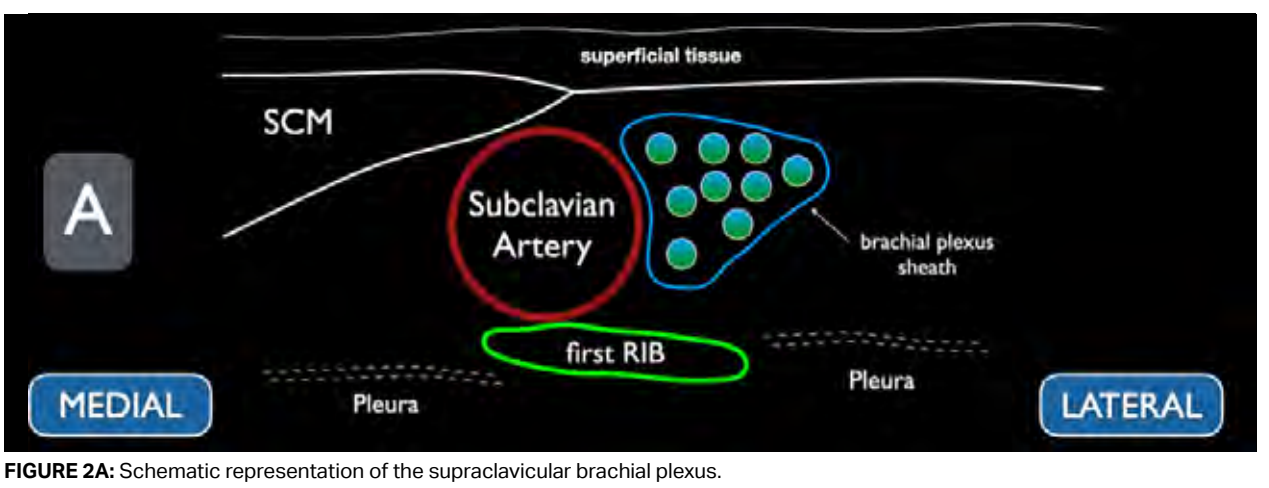


FIGURE 2A: Schematic representation of the supraclavicular brachial plexus.

PHOTOS: ARUN NAGDEV

FIGURE 2B: Ultrasound image of the supraclavicular brachial plexus.

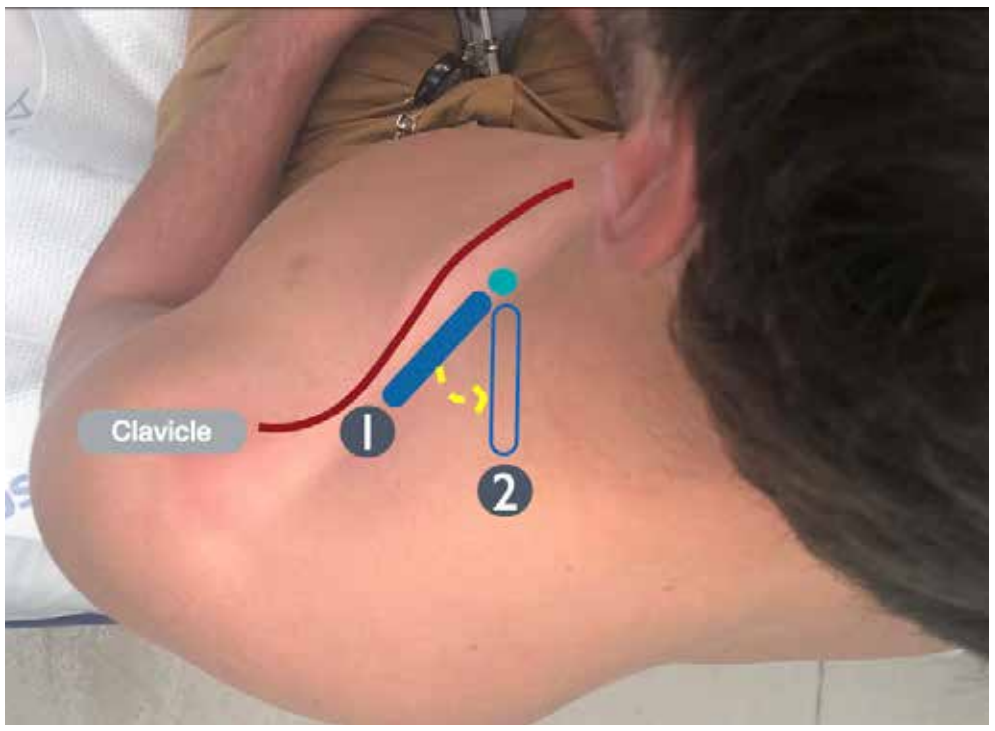
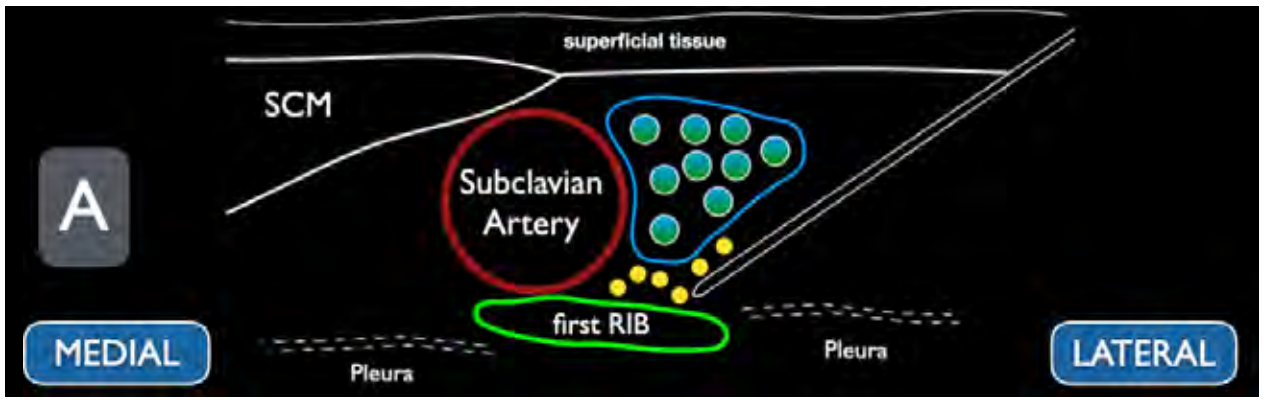
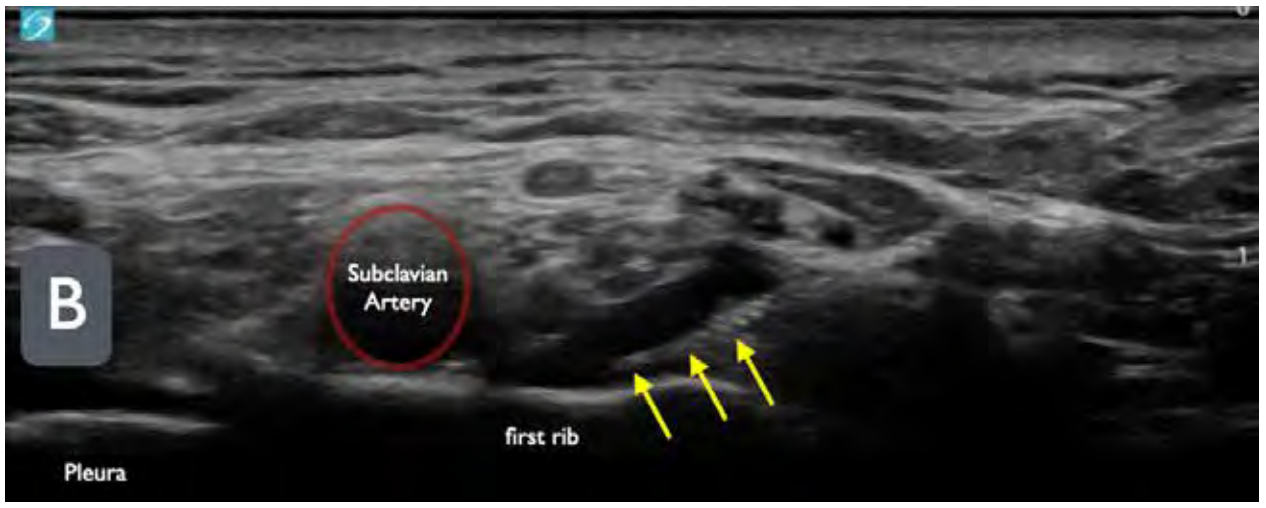


FIGURE 3 (LEFT): By rotating the ultrasound probe in a counterclockwise manner, the first rib can often be seen more clearly in cross-section on ultrasound.

FIGURE 4A (MIDDLE): Schematic representation of a block needle entering lateral to medial in-plane and depositing anesthetic between the brachial plexus and first rib.

FIGURE 4B (BOTTOM): Ultrasound image of a supraclavicular brachial plexus block. (yellow arrows = block needle). Note the anechoic (black) fluid between the first rib and the brachial plexus.





PHOTOS: ARUN NAGDEV

Equipment

Overall, the supraclavicular brachial plexus block requires similar equipment as other ultrasound guided nerve blocks:

- An ultrasound system with high-frequency 15-6 MHz or 10-5 MHz linear transducer set at the nerve (or soft tissue)
- A block needle: Preferably a 20- or 21-gauge, blunt-tipped, regional-block needle
- Appropriately sized syringe to draw local anesthetic
- Sterile saline flushes for hydrodissection
- Transparent adhesive ultrasound probe cover (Tegaderm, etc.)
- Antiseptic (e.g., alcohol, povidone/iodine, chlorhexidine)
- Sterile ultrasound gel

Procedure

Set-up

Place the patient on a cardiac monitor and ensure stable intravenous access. Position the patient supine in a 45-degree semi-upright position. Position the ultrasound system across from the affected extremity so that the patient's exposed neck and the ultrasound screen are in the same line of sight. We recommend placing either a pillow or roll of blankets beneath the ipsilateral shoulder to improve block ergonomics (Figure 1A: picture of screen contralateral plus pillows to roll the patient). Set the ultrasound system to the "nerve" preset and cover the linear (high frequency) transducer with a transparent adherent dressing. We recommend using sterile surgical lubricant as a coupling agent if possible.

Also, always perform and document a neurovascular examination *prior* to performing your block.

Sonoanatomy

Place the high-frequency linear transducer above the upper border of the mid-to-lateral clavicle in a coronal oblique plane (parallel to the clavicle and aiming the beam into the thorax) (Figure 1B). Move the transducer medially to find the anechoic, round, and pulsatile subclavian artery (can be confirmed by color Doppler). The brachial plexus often appears superior and lateral to the artery, and often looks like a "cluster of grapes." Note the first rib, a hyperechoic line with distal shadowing just under the brachial plexus. This should be contrasted to the normal lung sliding in the far field (Figure 2). In many patients, the first rib may not be clearly seen and the clinician will have to rotate the tail of the transducer in a counterclockwise manner to bring this sonographic landmark into view (Figure 3).

An alternative technique, should you have difficulty finding the brachial plexus, is to start in the neck by identifying the carotid artery and internal jugular vein about the level of the cricoid cartilage.[8] Slide the probe inferiorly toward the clavicle, reducing the angle between the probe and the skin as the probe is moved. In addition to using the subclavian vessels as a landmark, also be sure to identify any other vascular structures in the area of interest. After locating the brachial plexus and the projected needle path, we recommend use of color Doppler to prevent inadvertent vascular puncture.[10]

Performing the Block

Once the optimal transducer position and needle path is identified, place a small skin wheal of local anesthetic just lateral to the transducer to anesthetize the overlying skin. After properly disinfecting the skin, enter through the skin wheal for a lateral to medial in-plane approach with the nerve block needle. Ensure continuous needle visualization and advance the needle tip until it touches the first rib. The goal is to find the area between the first rib and nerve bundle to inject anesthetic. Once you have clear needle-tip visualization within this space and have gently aspirated to ensure the needle tip is not intravascular, we recommend gently injecting a small amount of normal saline to ensure proper spread of anechoic fluid (hydrodissection). The clinician should clearly visualize the fluid deposition on the ultrasound screen, and use this fluid to lift the nerve bundle away from the first rib (Figure 4). The clinician should then deposit small aliquots (3 to 5 cc max) every 15 to 30 seconds until the predetermined total anesthetic is deposited. If the needle location is adequate, a single injection should suffice, but repositioning the needle superiorly may be necessary to surround the nerve sheath completely with anesthetic. Once your injection is complete, gently remove the needle and dress the injection site as needed.

Aftercare

Mark the affected extremity with the date, time, and type of block performed. Document the block in the electronic health record. Communicate with nurse(s), other providers, and any relevant consultants that a block was performed. Reassess the patient to ensure adequate analgesia and assess the efficacy of the block. Also, reassess and document a repeat neurovascular examination.

Conclusion

For upper extremity injuries, traditionally procedural sedation, local anesthesia, and hematoma blocks have been used for pain management during procedures in the ED. However, these strategies have their own disadvantages such as increased resource allocation for procedural sedation and possibly incomplete analgesia for hematoma blocks depending on the location. Brachial plexus blocks such as the supraclavicular block provide adequate analgesia for a larger variety of upper arm injuries when compared to the hematoma block and require fewer resources when compared to procedural sedation. This nerve block is safe, easily learned, and does not require advanced ultrasound training to perform.[11] With an increase in the number of patients boarding in the ED, potentially decreased availability of procedural sedation rooms, and increasing patient-to-nurse ratios, ED physicians must adapt and become more efficient with limited resources. The supraclavicular block will not solve these systemic issues, but rather provides a more efficient strategy to manage pain better from acute upper extremity injuries as well as an alternative to procedural sedation in the ED.

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PUTTING RESEARCH TO WORK FOR YOU

PRACTICE CHANGERS

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Stop Prescribing Antibiotics for Diverticulitis

You can still provide high-quality care even when skipping the antibiotics

by LAUREN WESTAFAR, MD

Not all patients with acute, uncomplicated diverticulitis need antibiotics. This practice is not cutting-edge—it is ready for retirement. Although antibiotics have been considered the cornerstone of the treatment of acute, uncomplicated diverticulitis, this practice was based on anecdotes and plausibility rather than empirical data that antibiotics were necessary. Now that we have quality data, however, it is clear that this practice pattern did not necessarily generate improved patient outcomes.

The idea of withholding antibiotics for uncomplicated diverticulitis in all but a select group of patients has been brewing for years. In fact, this was covered in an *ACEP Now* article over half a decade ago, shortly after the American Gastroenterological Association published a recommendation that antibiotics not be given routinely in acute, uncomplicated diverticulitis.[1,2] At that time, two randomized trials demonstrated the safety of observation in select patients.[3,4] Now, in 2023, all major professional-society guidelines recommend only selective use of antibiotics in patients with acute uncomplicated diverticulitis rather than all comers.[2,5,6]

What is the Evidence for Symptomatic Treatment Without Antibiotics in Select Patients?

There are several randomized and observational studies supporting treatment without antibiotics in select emergency department (ED) patients.[3,7–10] The two largest trials of ED patients are the DIABOLO and DINAMO studies. The DIABOLO open-label randomized trial analyzed 528 ED patients with acute, uncomplicated first-time diverticulitis to either observational treatment or antibiotics (48 hours of intravenous amoxicillin-clavulanic acid followed by 8 days of oral antibiotics). Interestingly, 8 percent of patients in this study had diverticulitis with a pericolonic abscess of less than five cm. The median time to recovery was 14 days without antibiotics and 12 days with antibiotics and met the criteria for non-inferiority. On long-term follow-up (two years), outcomes remained similar between groups. Recurrent diverticulitis occurred in a nearly identical number of patients (no antibiotics, 15.4 percent versus antibiotics 14.9 percent,) and fewer than 5 percent in each arm had complicated diverticulitis.[9]

Most recently, the DINAMO study randomized 488 ED patients, aged 18–80 years, with acute uncomplicated diverticulitis without significant comorbidities to no antibiotics and symptomatic treatment or amoxicillin-clavulanic acid and symptomatic treatment. The primary outcome, hospitalization, met non-inferiority criteria, as 3.3 percent in the no-antibiotic arm were hospitalized compared with 5.8 percent in the antibiotic arm (difference 2.58 percent [95 percent CI, 6.32 to -1.17 percent]). There were no significant differences between groups in ED revisits (no antibiotics 6.7 percent versus antibiotics 7 percent) or pain at follow-up on days 2, 7, 30, and 90. Interestingly, fewer than half of the patients in the no antibiotic group who returned to the ED were subsequently prescribed antibiotics.[8]

Which Patients are Eligible for Initial Treatment without Antibiotics?

The list of those who should receive antibiotics is intuitive—patients with high-risk comorbidities or those patients with severe diverticular disease. In the randomized trials supporting the guideline recommendations, patients could have clinical signs of inflammation (fe-

ver, leukocytosis, tachycardia); however, patients could not have signs of sepsis or more than one of these features. Perhaps surprisingly, elderly patients do not automatically fall into a high-risk category. The DIABOLO trial did not have an upper age limit for exclusion and the DINAMO study randomized patients up to age 80. Further, updated guidelines from the World Society of Emergency Surgery recommend that antibiotics be avoided in elderly immunocompetent patients with acute, uncomplicated diverticulitis.[11]

In medicine, particularly in the United States, we have a preference for aggressive, interventional treatment—*more* is often conflated with *better*. As a result, the de-implementation of low-value treatments is particularly difficult for clinicians. There are several potential avenues that may ease the change brought by these guidelines and help clinicians provide high-quality care to patients.

- Share the plethora of national professional society guidelines with your group to help establish local practice patterns.
- Develop a quick script for patients who meet the criteria for non-antibiotic treatment that pre-empts expectations for antibiotics and establishes confidence in non-antibiotic treatment (e.g., recommended by specialists who focus on diverticular disease).
- Provide symptomatic treatment with analgesia.
- Consider a "wait and see" prescription and guidance for select patients.

Follow the QR code for more.

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MATCH DAY

CONTINUED FROM PAGE 11

proved working conditions. Currently, crucial information regarding potential alternative workplaces, such as staffing ratios and compensation, is difficult for physicians to find. The information asymmetry decreases physicians' negotiating leverage and lowers the likelihood that physicians will change jobs. This stagnant marketplace suppresses employers' incentive to improve and offer competitive compensation. Noncompete clauses similarly hamper flexibility for the physician workforce.

Every system is perfectly designed to get the results it gets.[24] We strongly believe that emergency medicine is a great specialty with a powerful mission, and many medical students agree. There were numerous posts on social media by medical students who received notification they had indeed matched in emergency medicine and were excited for their future.

While many were excited to join the specialty, its workforce structure and clinical climate no longer appeals to many graduating medical students, which has resulted in decreased applications for emergency medicine residencies.

References for this article are available online. Please scan scan QR Code for more information.

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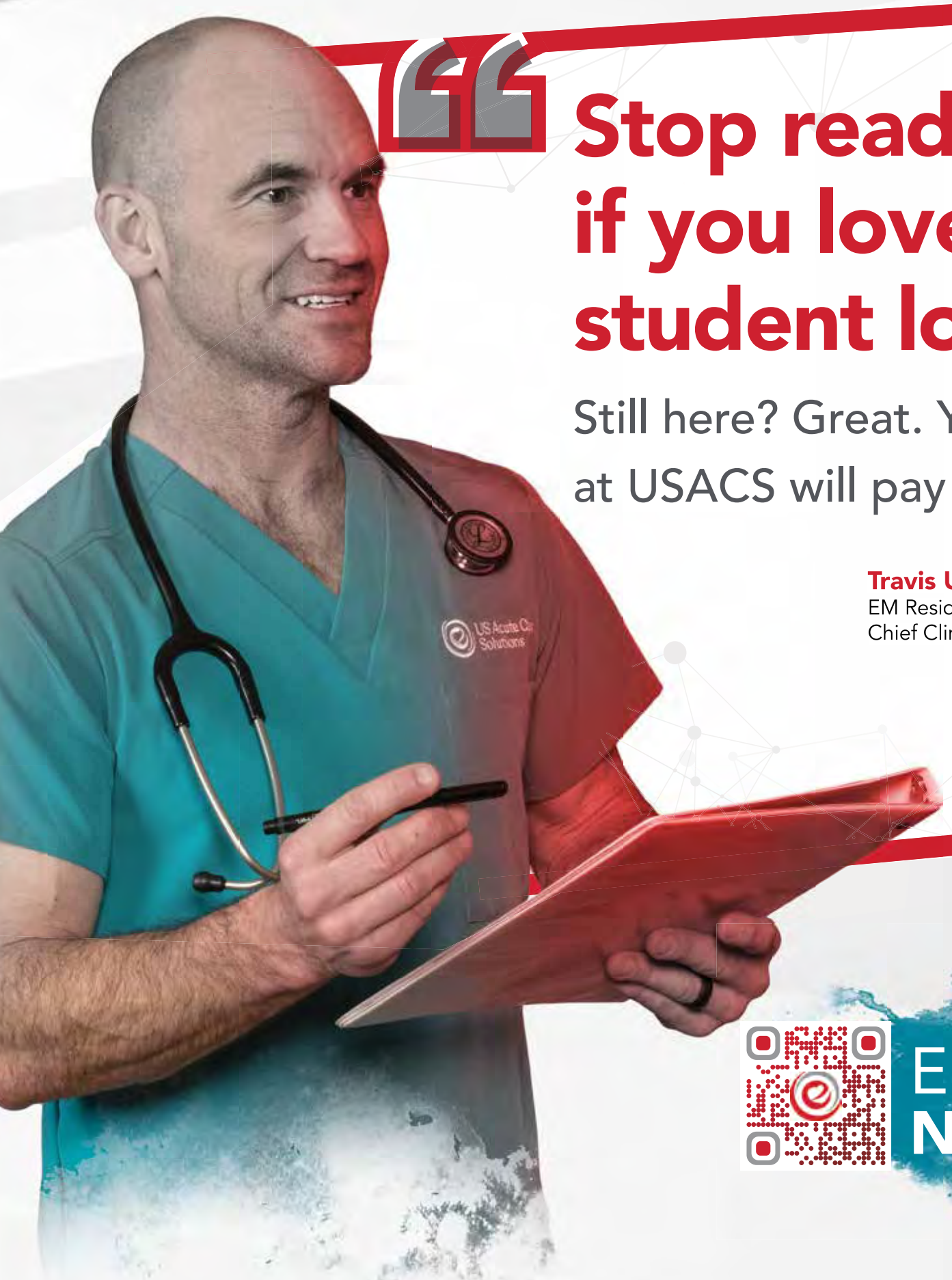

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