was not altered by treatment plan. In conclusion, the results of this study show that a delayed cardioversion approach to management of recent-onset atrial fibrillation is not inferior in obtaining sinus rhythm at 4 weeks.

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Commentary: Much debate exists about whether or not cardioversion should be attempted in the emergency department for recent onset atrial fibrillation. While a larger patient sample would be needed to ensure safety of a delayed cardioversion, this well-done trial shows that the delayed approach may be promising given that both groups had similar rates of returning to sinus rhythm at 1 month and low rates of adverse events. Showing noninferiority may be particularly helpful for those who are practicing in centers where early cardioversion is not always feasible or where resources are limited. This is also helpful to provide clinicians an opportunity to better practice shared decision making when it comes to the treatment options.

☐ DIFFERENCES IN HOSPITAL OUTCOMES FOLLOWING TRAUMATIC INJURY FOR PATIENTS EXPERIENCING IMMEDIATE TRANSFER TO A LEVEL 1 TRAUMA FACILITY VERSUS RESUSCITATION AT A CRITICAL ACCESS HOSPITAL (CAH).

Windorski J, Reyes J, Helmer SD, et al. *The American Journal of Surgery.* 2019;217:643-647

It is well accepted that trauma patients have better outcomes when they receive definitive care by a specialized trauma team. However data is conflicting on whether initial trauma resuscitation also needs to happen at a specialized trauma center or if critical access hospitals can provide comparable, efficient care with subsequent transfer for definitive care.

The objective of this study was to determine if rural trauma patients who were initially resuscitated at a critical access hospital then subsequently transferred to a tertiary center had similar outcomes compared to patients who were initially transported to a level 1 trauma center from the scene. A retrospective database review was completed of adults trauma patients between January 1, 2009 to May 31, 2014 who arrived at a level 1 trauma center in Kansas either directly from the scene or transferred from a critical access hospital. Critical access hospitals were defined as those having no trauma designation. Out of state and local ground EMS trauma patients were excluded. Patients were stratified within each group based on injury severity score, presence of shock (systolic blood pressure <90), and initial Glasgow coma scale (GCS). The primary outcomes measured were mortality, ventilator duration, intensive care unit length of stay, and hospital length of stay.

Ten thousand one hundred and thirty two trauma patients were identified however after the exclusion of local ground transport, out of state transports, and patient from a hospital with a trauma designation, only 1,478 patients were included in this study. Three hundred and ninety four (26.7%) patients were transported directly to a level one trauma center and the other 1,084 (73.3%) patients were first resuscitated at a critical access hospital and then transferred to a level one trauma center for definitive care. Overall, the patients transported directly to a level 1 trauma center were younger ($p<0.001$), had a larger percentage with a GCS <9 ($p<0.001$), were more frequently hypotensive ($p<0.001$), and had a higher injury severity index ($p<0.001$). Almost all of the patients in both groups sustained blunt trauma ($p=0.282$). Patients triaged at a critical access hospital had a similar mortality (OR 0.7, 95% CI 0.41-1.2) and hospital length of stay (OR 0.82, 95% CI 0.7-0.97) to patients triaged at a level one trauma center when adjusted for age, index severity score, GCS score, and hypotension. The use of a critical access hospital was associated with decreased intensive care days (<0.001) but no difference in ventilator days ($p=0.082$), however neither of these were adjusted for age, index severity score, GCS score, or hypotension.

There were a few limitations to the study. To start with this study was retrospective which introduces both selection bias and information bias. The study also did not include any information regarding pre-hospital interventions, resuscitation details at the critical access hospital, or transport time. All of these factors could better explain the comparable mortality between the groups and the decreased morbidity in the critical access hospital group.

The authors concluded that the use of critical access hospitals for the initial resuscitation of trauma patients with subsequent transfer to a tertiary care center for definitive care did not increase mortality after adjusting for age, injury severity, hypotension, and GCS. They also concluded critical access hospitals improved morbidity as shown by both decreased hospital and intensive care unit length of stay, but not ventilator days.

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Comment: Given these data showing morbidity benefits without mortality differences, this study highlights the importance of triage and initial trauma resuscitation at a critical access hospitals. However, these differences could also be due to the fact the group transferred directly to the level one trauma center was sicker as evidenced by a lower GCS, more hypotension, and a higher index of injury severity. Also this study was completed within the state of Kansas only so the generalizability of this data to other areas may be difficulty depending on the type of trauma network available. Finally, this was a small retrospective study and needs to be reproduced with larger, multi-center prospective studies to better elucidate mortality and morbidity benefits.

☐ PREGNANCY-ADAPTED YEARS ALGORITHM FOR DIAGNOSIS OF SUSPECTED PULMONARY EMBOLISM.

Van der Pol LM, Tromeur C, Bistervels IM, et al. *N Engl J Med.* 2019 Mar 21; 380:1139. (https://doi.org/10.1056/NEJMoa1813865)

Pregnancy is associated with an increased risk of thromboembolic events, including pulmonary emboli. This study

was designed to investigate the utility of a pregnancy specific algorithm designed to help reduce the amount of CT pulmonary angiograms that were performed on pregnant patients. The study protocol involved an assessment using the 3 components of the YEARS algorithm: clinical signs of a DVT, hemoptysis, and pulmonary embolism (PE) presumed to be the most likely diagnosis-coupled with an elevated D-dimer.

This was a prospective, multicenter, international study that included pregnant women ages 18 and older that were evaluated for suspected PE. Exclusion criteria included anticoagulation within the last 24 hours, poor likelihood of follow up, contrast allergy, and less than 3 month life expectancy. All patients had a D-dimer drawn and were assessed on the above 3 YEARS criteria. If the patient had signs of a DVT they received 2 point compression ultrasonography. If the ultrasound was positive they were started on anticoagulation. If negative, the patients were then evaluated according to their d-dimer level. For those with at least one of the YEARS criteria, D-dimers greater than or equal to 500 ng/mL went on to be evaluated with CT pulmonary angiography with subsequent initiation of anti-coagulation if the study was positive. Those whose d-dimer was less than 500 ng/mL were considered ruled out for PE and anticoagulation was with held. For those patients meeting none of the YEARS criteria, the d-dimer threshold was 1000 ng/mL. Only those patients whose d-dimer was greater than or equal to 1000 ng/mL underwent CT pulmonary angiography. The primary outcome was to evaluate the incidence of symptomatic venous thromboembolism (VTE), confirmed by objective testing, at 3 months in those patients for whom anticoagulation was with held based on the study algorithm. The secondary outcome was to describe the proportion of patients in whom CT pulmonary angiography was not indicated in order to safely rule out PE.

Five hundred ten patients were enrolled, of which 12 met exclusion criteria. Of the 498 patients analyzed, 252 (51%) did not meet any YEARS criteria and 246 (49%) met one or more criteria. Forty-three (19%) had signs concerning for DVT and 3 (7%) of these patients had DVT confirmed with two-point compression ultrasonography of the affected leg. An additional 79 patients underwent compression ultrasonography without clinical signs of DVT, which were considered protocol deviations. One of these patients was diagnosed with a DVT and anti-coagulated. This patient also had an elevated d-dimer at 1480 ng/mL. Of the 494 remaining patients who did not have a confirmed DVT, the d-dimer level was below the minimum threshold in 195 (39%) and these were considered ruled out for PE. The rest of the patients (299, 61%) all received CT pulmonary angiography and 16 patients were diagnosed with a PE. Therefore, a total of 20 patients were diagnosed with PE (prevalence 4.0%; 95% CI, 2.6 to 6.1). At follow up, 1 patient had a confirmed DVT and 1 additional patient was lost to follow up. There were no confirmed PEs. The algorithm tended to be most efficient in early pregnancy in that 65% who began the study during the first trimester avoided CT pulmonary angiography as opposed to 32% who avoided chest imaging when they entered the study in their 3rd trimester.

The authors concluded that the pregnancy adapted YEARS algorithm was able to safely rule out PE and could potentially reduce the radiation exposure during pregnancy in 40% of cases.

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Comments: This study reveals a promising algorithm for the safe management of suspected PE in pregnant patients utilizing CT pulmonary angiography only in selected cases, with a negative predictive value of 98%. It provides physicians with a clinical decision rule where in the past there has not been one. However, as noted by the authors, a main limitation in the study is that the algorithm was only used in patients for whom there was a clear suspicion of PE. It is not intended to be used as a screening tool for pregnant women with non-specific chest symptoms. While the study had a large sample size and complete follow up, they were also limited by non-randomization and by protocol violations.

☐ ASSOCIATION BETWEEN ELEVATED MEAN ARTERIAL BLOOD PRESSURE AND NEUROLOGIC OUTCOME AFTER RESUSCITATION FROM CARDIAC ARREST: RESULTS FROM A MULTICENTER PROSPECTIVE COHORT STUDY.

Roberts BW, Kilgannon JH, Hunter BR, et al. *Crit Care Med.* 2019 Jan;47(1):93-100

For patients with return of spontaneous circulation (ROSC) after cardiac arrest, in-hospital mortality is greater than 50%. A large percentage of those survivors sustain neurologic disability. There is evidence that cerebrovascular autoregulation is disrupted after cardiac arrest and that mean arterial pressure (MAP) <70 mm Hg is associated with poor neurologic outcomes. At present, the blood pressure target that would optimize neurologic outcomes post ROSC is unknown.

This study tested for association between elevated MAP following ROSC and neurologic outcome. This was a preplanned prospective cohort study across six hospitals in the United States. The inclusion criteria were as follows: age greater than or equal to 18 years; cardiac arrest (defined as receiving CPR); ROSC greater than 20 minutes; unresponsive and on mechanical ventilation after ROSC; and intent to perform targeted temperature management (TTM). Exclusion criteria included persistent hypotension defined as MAP < 70 mmHg. For data collection, MAP was measured with a noninvasive blood pressure cuff immediately after ROSC and each hour for 6 hours post-ROSC. Sequential Organ Failure Assessment (SOFA) score was calculated to estimate severity of illness and vasopressor administration was measured. Blood pressure was dichotomized for the primary analysis - MAP between 70-90 mm Hg and MAP>90 mm Hg. The primary outcome was good neurologic function at the time of hospital discharge, defined as a modified Rankin Score (mRS) of 3 or less. Secondary outcomes were survival to hospital discharge and good early neurologic function.