

# Tranexamic Acid in Pediatric Trauma

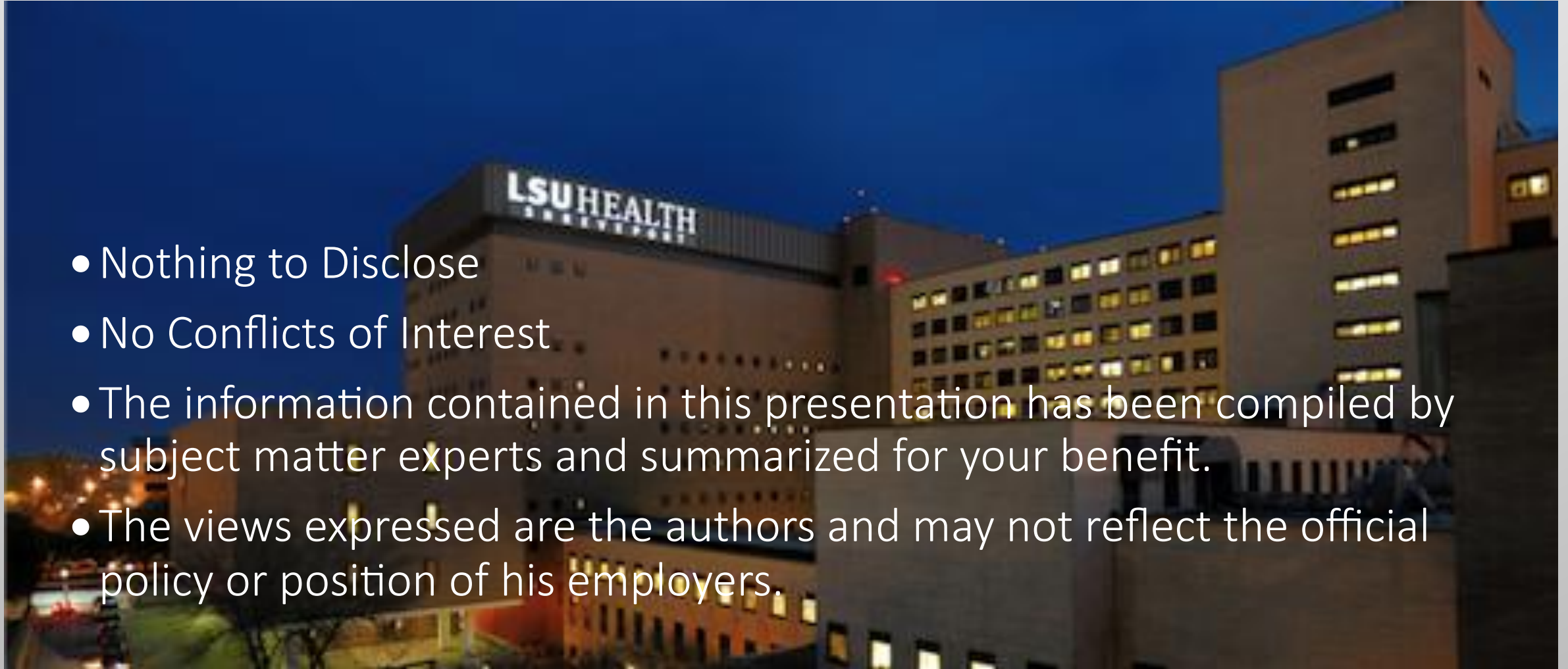
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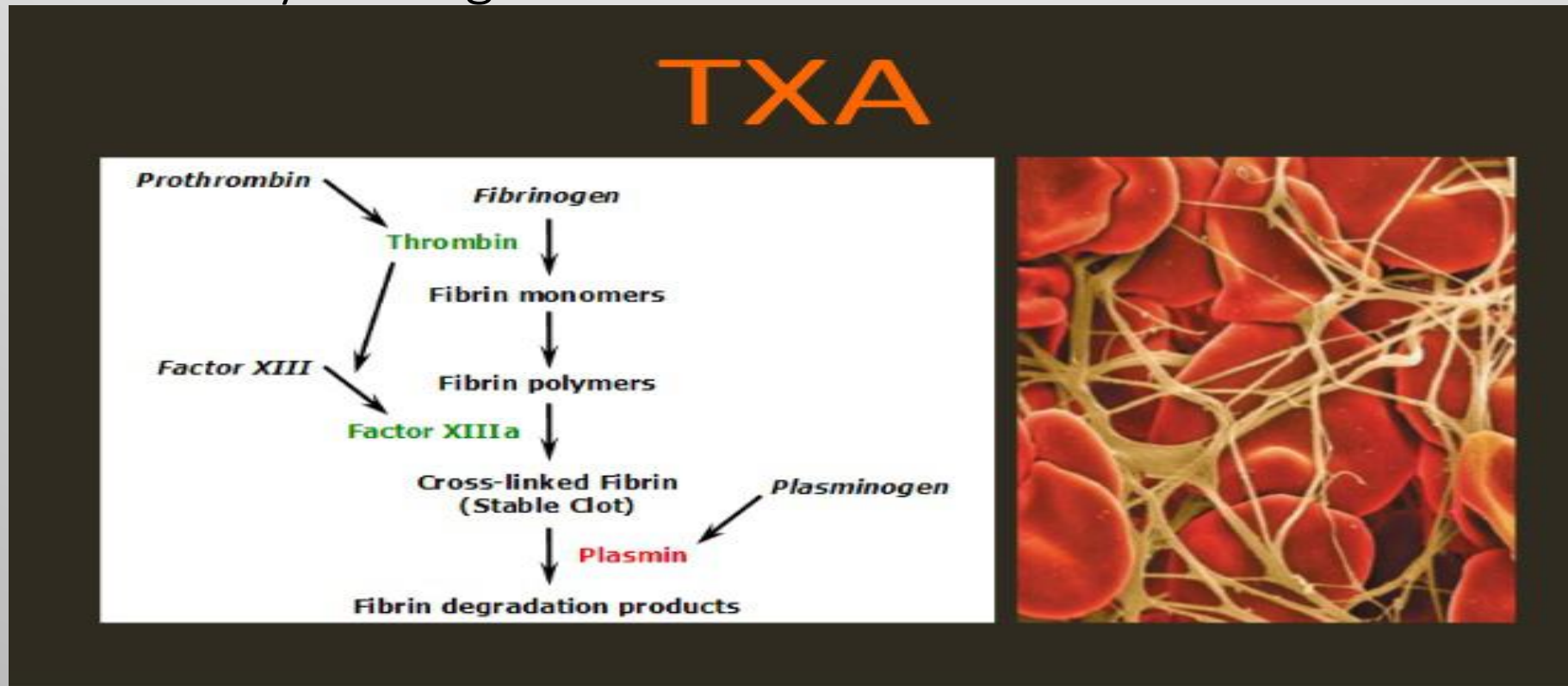
# Disclosure

- Nothing to Disclose
- No Conflicts of Interest
- The information contained in this presentation has been compiled by subject matter experts and summarized for your benefit.
- The views expressed are the authors and may not reflect the official policy or position of his employers.



# Objectives

- Review the evidence for Tranexamic Acid (TXA) in pediatric trauma.
- Identify current knowledge gaps for TXA in pediatric trauma.
- Discuss study findings.



# Trauma by the Numbers

- Leading cause of death in North Americans 1-44 years of age
- Hemorrhage *most preventable cause of death* after trauma in both adults and children
- Hemostatic resuscitation and recognition of *acute traumatic coagulopathy* (ATC) and specifically *hyperfibrinolysis*
- No medical therapy has proven survival benefit in children, but evidence *DOES* exist in adults

# A new Drug.....

- First clinical trial using oral TXA published in 1968 - heavy menstrual bleeding - FDA 2009
- Dental extractions with hemophilia reported in 1972 - FDA approval 1986
- TXA now widely used in many conditions
- Extensive safety and efficacy profile in reducing the need for blood transfusions in elective surgery both adults and children

# Efficacy of tranexamic acid in pediatric craniostyostosis surgery: a double- blind, placebo-controlled trial.

- Children's Hospital Boston
- Forty-three children, ages 2 months to 6 yr, received either placebo or TXA in a loading dose of **50 mg/kg**, followed by an infusion of **5 mg/kg/hr** during surgery.
- TXA Group Resulted in:
  - Lower Blood Loss 65 vs 119ml/kg
  - Lower Blood Transfusion 33 vs 56ml/kg
  - Reduced Exposure to Blood Products 1 vs 3 units

# Tranexamic Acid Reduces Intraoperative Blood Loss in Pediatric Patients Undergoing Scoliosis Surgery

- Children's Hospital Boston
- Forty-four patients, 14 girls and 30 boys, aged 8–18 yr
- Twenty-two patients had idiopathic scoliosis, and 22 patients had secondary scoliosis from various etiologies
- TXA produces significant reduction
  - Blood loss by 48% and of
  - Blood transfusion requirement by 42%

# Tranexamic acid administration to pediatric trauma patients in a combat setting: the pediatric trauma and tranexamic acid study (PED-TRAX).

- All pediatric trauma admissions to the North Atlantic Treaty Organization Role 3 hospital, Camp Bastion, Afghanistan, from 2008 to 2012.
- There were 766 injured patients 18 years or younger
- TXA was used in approximately 10% of pediatric combat trauma patients, typically in the setting of severe abdominal or extremity trauma and metabolic acidosis.
- TXA administration was independently associated with decreased mortality.
- There were no adverse safety- or medication-related complications identified.



# Tranexamic Acid Use in United States Children's Hospitals.

- Multi-Center Consortium of 36 Children's Hospitals
- A total of 35,478 pediatric encounters with a TXA charge were included in the study cohort.
- **Only 110 encounters (0.31%) were for traumatic conditions.**
- Congenital heart surgery accounted for more than one-half of the encounters (22,863; 64%).
- Overall, the median estimated weight-based dose of TXA was **22.4 mg/kg** (interquartile range, 7.3–84.9 mg/kg).

# What's Missing

- Dosage Recommendation
- Indications
- Contraindications
- Time to Administer

# Study Design

- We sought to determine the current practices for TXA administration in pediatric trauma patients in the United States.
- After IRB approval, a survey was conducted of all the American College of Surgeons verified Level One and Two Trauma Centers in the United States (As of July 2017).

# Response Rate

- 363 Qualifying centers
- 99 Verified Pediatric Trauma Center
- These centers saw an average of 513 pediatric trauma patients annually.

# Findings

- Of those centers, 52 (35%) report using TXA in pediatric trauma patients.
- An additional 35 centers (25%) reported only using TXA in adult trauma.
- The average annual pediatric trauma volume of the centers using TXA was 725 vs 437 non-TXA centers.

# Age and Time Frame

- Facility Pediatric Age
  - Age Less than 14 Years 6 (12%)
  - Age Less than 15 Years 12 (24%)
  - Age Less than 18 Years 33 (64%)
- Time Frame
  - Less than 1 Hour 12 (24%)
  - Less than 3 Hours 39 (76%)

# Indications and Contraindications

- Indication
  - Compressible Hemorrhage 1 (2%)
  - Non-Compressible Hemorrhage 8 (15%)
  - Both 42 (83%)
- Contraindication
  - Seizures 1 (2%)
  - Color Blindness 3 (6%)
  - None 34 (67%)
  - Other 13 (25%)
    - Pregnancy, TBI, Known Thromboembolic Event, **NORMAL Thromboelastogram (TEG)**

# Evidence Statement Major trauma and the use of tranexamic acid in children

## November 2012

- Due to the lack of published data on the use of tranexamic acid in pediatric patients who have undergone major trauma there is no evidence for a specific dose in this situation.
- The RCPCH and NPPG Medicines Committee recommend a pragmatic dosage schedule – 15mg/kg tranexamic acid loading dose (max 1g) over 10 minutes followed by 2mg/kg per hour.



# Our Conclusion

- While the clinical evidence for TXA in pediatric trauma patients is limited, we feel that consideration should be given for use in major trauma with hemodynamic instability or significant risk for ongoing hemorrhage.
- If available, resuscitation should be guided by Thromboelastogram (TEG) to identify candidates with thrombolysis (Elevated LY30) that would most benefit from administration.
- This represents a low-cost, low-risk, and high-yield therapy for pediatric trauma patients.

# Summary Recommendations

- Bolus 15mg/kg
- Infusion 2mg/kg/hr over 8 hours
- Age Less than 18 years
- Administered in less than 3 hours
- Indicated for Compressible and Non-Compressible Hemorrhage