Approved: 18 March 2015

Georgia Trauma Commission

Right Patient, Right Hospital, Right Time, Right Means

Georgia Committee for Trauma Excellence

MEETING MINUTES

Wednesday, 19 November 2014
Scheduled: 11:00 am to 2:00 pm

Grady Memorial Hospital
80 Jesse Hill Jr. Drive, SE
Atlanta, Georgia 30303

Grady Trauma Auditorium

CALL TO ORDER

Ms. Gina Solomon called the meeting of the Georgia Committee for Trauma Excellence to order at 11:04 AM. Quorum was established with 6 members present of 9 members.

MEMBERS PRESENT	REPRESENTING
Gina Solomon, *Chairman*	Gwinnett Medical Center
Laura Garlow, *Vice Chairman*	Kennestone Hospital
Elaine Frantz, *President (Excused)*	Memorial Health University Medical Center
Regina Medeiros, *former chairman & Education & TAG Chairman of Subcommittee (Via Conference Line)*	Georgia Regents University
Emma Harrington, *Chairman of Injury Prevention Subcommittee*	Shepard Center
Tony Volrath, *Chairman of Registry Subcommittee (Excused)*	Grady Memorial Hospital
Jo Roland, *Chairman of PI Subcommittee*	John D. Archbold Memorial Hospital
Tracy Johns, *Chairman of Resource Development Subcommittee (Via conference line)*	Medical Center of Central Georgia
Chairman of Special Projects Subcommittee	*Vacant Chair*
Chairman of Specialty Care Subcommittee	*Vacant Chair*

OTHERS SIGNING IN	REPRESENTING
Michelle Murphy	Appling Healthcare System
Julie W. Long	Appling Healthcare System
Kathy Sego *(Via Conference Line)*	Athens Regional Medical Center
Dayna Vidal	Atlanta Medical Center

Emily Page	Atlanta Medical Center
Rajma Johnson	Atlanta Medical Center
Jennifer Curry	Atlanta Regional Commission
Jaina Carnes *(Via Conference Line)*	Cartersville Medical Center
Ricky Byrd	CHOA
Jackie Hendon	CHOA
Karen Hill	CHOA
Karen Johnson	CHOA
Dewayne Joy	CHOA
Greg Pereira	CHOA
Tracie Walton	CHOA
Sabrina Westbrook *(Via Conference Line)*	Clearview Medical Center
Joni Napier *(Via Conference Line)*	Crisp Regional Hospital
Bruce Bailey	Doctors Hospital of Augusta
Kimberly Moore	Doctors Hospital of Augusta
Kim Whitfield	Doctors Hospital of Augusta
Dana Shores *(Via Conference Line)*	Effingham Health System
Gail Thornton *(Via Conference Line)*	Emanuel Medical Center
Lynn Grant	Fairview Park Hospital
Melissa Parris *(Via Conference Line)*	Floyd Medical Center
Katie Hasty *(Via Conference Line)*	Floyd Medical Center
Lori Mabry *(Via Conference Line)*	Georgia Trauma Foundation
Liz Atkins	Grady Memorial Hospital
Cathy Davis	Grady Memorial Hospital
Dianne McEver	Grady Memorial Hospital
Ashley Steele	Grady Memorial Hospital
Sarah Parker	Grady Memorial Hospital
Colleen Horne	Gwinnett Medical Center
Kim Brown	Hamilton Medical Center
Jan Fowler *(Via Conference Line)*	Hutcheson Medical Center
Ashley Forsythe	Midtown Medical Center
Linda Campfield-Carter	Midtown Medical Center
Tracy Johns *(Via Conference Line)*	Navicent Health formerly MCCG
Inez Jordan *(Via Conference Line)*	Navicent Health formerly MCCG
Olivia Sharpe *(Via Conference Line)*	Navicent Health formerly MCCG
Krystal Smith *(Via Conference Line)*	Navicent Health formerly MCCG
Deb Battle	Northeast Georgia Medical Center
Michael Day	Northeast Georgia Medical Center
Jesse Echols-Gibson	Northeast Georgia Medical Center
Linda Greene	Northeast Georgia Medical Center
Donna Lee	Northeast Georgia Medical Center
Jim Sargent	North Fulton Regional Hospital
Donna Miller *(Via Conference Line)*	Phoebe Putney Memorial Hospital
Tina Wood *(Via Conference Line)*	Redmond Regional Medical Center
LeeAndra Lopez *(Via Conference Line)*	Taylor Regional Hospital
Allison Crosby	Trinity Hospital of Augusta
Trisha Newsome	Trinity Hospital of Augusta
Renee Morgan	DPH/Office of EMS/Trauma
Marie Probst	DPH/Office of EMS/Trauma
Jim Pettyjohn	Georgia Trauma Commission/Staff
Dena Abston	Georgia Trauma Commission/Staff
John Cannady	Georgia Trauma Commission/Staff

WELCOME AND INTRODUCTIONS: Ms. Gina Solomon

Ms. Solomon welcomed everyone to the meeting. Ms. Atkins gave an official welcome from Grady Memorial Hospital. Ms. Solomon reported that she would get the August meeting minutes to everyone via email before the January meeting.

SUBCOMMITTEE REPORTS:

Injury Prevention Ms. Emma Harrington

Ms. Harrington reported there have been 10 CD sets purchased for the Matter of Balance training. They are still working on how to distribute and have CDs returned while keeping track of where they are and when they are to be returned is still being worked out. Having a set of 10 should provide one for each EMS region. The software has some glitches to be worked out and will be reviewed after that. Jaina Carnes from Cartersville has trained 14 coaches.

PI Ms. Gina Solomon

Ms. Solomon presented PI update in Tony Volraths absence. TQIP has a lot of moving pieces right now and they will be working on a chemical prophetic as well as looking at additional piece for Level 3's to be involved. There may be some potential protocols to be formed across the state as a result of the TQIP conference.

They are also working on getting DI to conduct a class on the outcomes module. The class would be in a computer lab where everyone has a computed in front of them to learn in more detail about the outcome modules and what type of reports could be produced.

Ms. Solomon also suggested that PI and Registry subcommittees be un-grouped into two separate subcommittees since the DI installation has occurred. The officers will be working on updating the bylaws to be presented at the January meeting.

Registry Ms. Jo Roland

Ms. Roland reported an adhoc committee including GCTE officers has been working on a project to benefit every trauma center for the new registry software. They are trying to establish a useful tool/guide for every trauma center to use for their data hierarchy, but needs every center to present an algorithm. They started by comparing the first 2 quarters of 2013, without targeted education as an easy way to update and use the audit filter analysis. Creating a pivot table and the audit information while talking to DI about creating that in the software since it is required for the Epidemiologists recorded information.

She asked, "How centers are actually using the standard way of auditing and improving the data?" Maybe Level 3 and 4 centers are already doing this. This committee is working to develop a statewide program to get better and provide consistency across the board to improve data reliability.

A break for lunch was observed at 11:26 AM provided by Erica Casey of TEG (Thrombelastograph). Ms. Casey gave a power point presentation that will be added to the minutes as attachment 1 and passed out a brochure that will also be added to the minutes as attachment 2.

Bylaws Official Changes Ms. Gina Solomon

Ms. Solomon reported that some bylaws changes would be done before the next meeting. Unless anyone is opposed the changes will be to separate the PI and Registry subcommittees back into

two separate groups and combine Resource Development, Special Projects, and Specialty Care into one subcommittee. No one voiced any opposition to the proposed changes to the bylaws. No formal motion or vote was conducted.

COMBINING SUBCOMMITTEES VIA BYLAWS CHANGES

MOTION GCTE 2014-11-01:

I make the motion to approve separating Registry and PI committees as well as combining the Resource Development/Specialty Care/Special Projects into one Subcommittee.

MOTION BY:	**Laura Garlow**
SECOND:	**Jo Roland**
ACTION:	The motion ***PASSED*** with no objections, nor abstentions.
DISCUSSION:	Ms. Garlow mentioned that they must have participation in these subcommittees as well as volunteers to chair them.

Resource Development/Specialty Care/ Special Projects Ms. Tracy Johns

Ms. Johns has been working on some potential ideas for the group to begin with. She would like to start developing resources for new centers for registrars, trauma medical directors and PI managers. She mentioned the Certified Specialist in Trauma Registrar (CSTR) is an outdated course and certification, which makes it hard to study for a course based on past standards vs. present standards. Those wishing to become a CSTR may want to pursue another certification that is more up to date. Ms. Garlow mentioned that Alice Sewell created the study guide for her personally and accidentally posted it a Google group, which then became available to the State of Georgia as well. The American Trauma Society has been revamping the course and bringing it up to date. Promphery and Associates course has been conducting the registry course with all updated material. Potential other certifications for registrars may be based on coding. Ms. Johns would love to see a CSTR certified registrars in every trauma center in the State. At this time, it is not a requirement of the State for a trauma center to have a CSTR in their facility.

Ms. Karen Hill reported that she took the Promphery registrar course and did not feel that it prepared her for the CSTR certification. The content of the course was more coding and introductory only. She mentioned that she believes a registrar should have at least 3 to 5 years of experience prior to studying and attempting the CSTR.

Ms. Johns asked if the GCTE group should have a goal of having around 80% CSRT certified registrars in all the trauma centers in the State? Or would that be unreasonable? Ms. Roland indicated the Registrars Subcommittee group would tackle this and get some ideas together to investigate the prep course for the CSTR. Dr. Medeiros mentioned there is about $10,000 in the budget for the ICD-10 class, but it needs to be decide when, where, and other specifics of the course first. She reported that Michelle from Promphery has said this is a 2 day course that could be online, however Georgia wants to do a face-to-face course and not online because the coding is much different.

Ms. Hill also attended the DI conference, which was great exposure to the ICD 10-codes, which is very complex. She reported that apparently Georgia is the only State not currently using the ICD 10 codes. The training will be very detailed and time consuming.

Ms. Johns reported another idea for the group to work on is program resources to share among the group. Anything that is a requirement of the "new book" should be done across the State uniformly. There is no reason if everyone will have to do it for every to develop how for each institutions. She suggested working on a project for a statewide data validation tool while answering some of the following questions: What affects the risk adjustment in mortality? What affects the information provided to TQIP? Ms. Johns mentioned that she could develop a course eligible for CNE credit providing at least 3 or 4 a year on the "off" month of our GCTE meeting.

Education and TAG Dr. Regina Medeiros

Ms. Roland gave the TAG and Education update for Dr. Medeiros who was unavailable. She reported two ENPC courses were completed and there is another one available to be conducted. Two TNCC courses have also been scheduled. Sabrina Westbrook at Clearview mentioned that she took the TCAR course and it was excellent and recommended everyone take this course. MCCG has TCAR courses scheduled for May and November 2015. Mr. Pereira and CHOA will be conducting a PCAR course in April 2015. There are still two TCAR courses available to be scheduled. There are three RTTDC courses available to be conducted, which Deb Battle volunteered to commit to performing one of the RTTDC courses.

CHOA Rehab Presentation Mr. Ricky Byrd

Mr. Byrd introduced himself as the Practice Manager for CHOA rehab facility, and he introduced, Jacky Hendon, as the public spokesperson for them. He presented a PowerPoint presentation about the new Robotics Center at the Scottish Rite facility. He wanted to remind everyone that CHOA sees patients up to 21 years of old.

Mr. Byrd's PowerPoint presentation will be added to the minutes as attachment 3.

Georgia Trauma Commission Update Mr. Jim Pettyjohn

Mr. Pettyjohn reported the Commission meeting is tomorrow in the same place as today's meeting beginning at 10 AM. The Strategic Planning workshop is in January 2015 in Macon, which will be collaborative efforts between OEMS/T and the Commission.

OEMS/T Update Ms. Renee Morgan

Ms. Morgan reported the peer review questionnaires will not be available until March 2015 when the new site visits expect to be conducted and when the consultative visit will occur on those designated facilities. The re-designation visits will be on the implemented new guidelines that will take affect on 01 July 2015. A letter was sent out from the college on anaesthesiologist issues and updates on policy standards. If you did not receive this letter please let Ms. Morgan know so that she may get it to you.

Updates on trauma centers, Lower Oconee closed and Wills Memorial elected to de-designate. Looking at facilities statewide there are about five rural hospitals that are in jeopardy of closing. At least 4 facilities have purchased the registry software. Doctors Hospital of Augusta is the only hospital that is activity pursuing trauma center designation.

Registry Update Ms. Marie Probst

Ms. Probst reported the data dictionary has been sent out to a small group of 4 to 5 people to review to provide feedback and/or edits.

Ms. Probst indicated the CSRT from her own experience really validates what your registrars know and the class covers all the points that are in the exam along with categories that ATS provides. You will need to know where the registry is held all the way to the end of the process where the trauma coordinators goes through to close all loops. She would like to encourage all trauma coordinators to include their registrars in all things trauma their hospital or the State is

doing. If you begin to require that your registrars be certified via the CSRT then your institution would need to budget for that to occur and if they do not pass the course not to seek any punitive damages funds back because the test is very long and difficult. The State will continue to follow the requirements of the orange book and not require it.

New Business Group Discussion

Ms. Atkins reported the STN brochure should be going to print tomorrow. The conference this year is will be held in Jacksonville with the preconference includes peds. There will also be leadership course added. Day one of the conference will begin will emergency preparedness discussions, which will continue to Day two in the morning as a round table discussion. There will be ten different tables with an expert at each one. Post conference will have an ATCN course.

Ms. Solomon that the next GCTE meeting will be on Wednesday, 21 January and Tracy Johns has already reserved a room at MCCG for it. January meeting discussions will be started by performance-based payment program measures and goals. Review how valuable the current ones are. The COT is deciding about meeting twice a year, which we could have, meetings organized to discuss ICD-10 codes.

Ms. Solomon indicated that she needed help editing the current email list for GCTE. She requested that everyone email her to add or remove people off the list. Ms. Probst indicated that she will be updating the contact list and will email it to the group after updates are made.

Meeting adjourned: 1:41 PM

Minutes crafted by Dena Abston

Lunch Speaker: Erica Casey
Haemonetics

TEG® Hemostasis System Overview

The Big Picture

The TEG® System is indicated for use with adult patients when an evaluation of their blood hemostatic properties is desired.
Haemonetics, TEG, and Thrombelastograph are trademarks or registered trademarks of Haemonetics Corporation in the USA, other countries, or both.
PlateletMapping is a registered trademark of Corumat Technologies, LLC. Effient is a registered trademark of Eli Lilly and Company. Plavix is a trademark of Bristol-Myers Squibb/Sanofi Pharmaceuticals Partnership.

Please refer to the manuals for Indications for Use, Contraindications, Warnings, Precautions, and Potential Adverse Events.

Rx Only

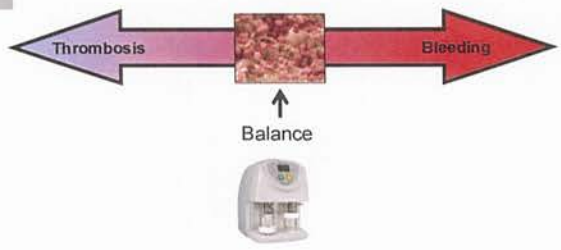
HAEMONETICS
THE Blood Management Company

Objectives

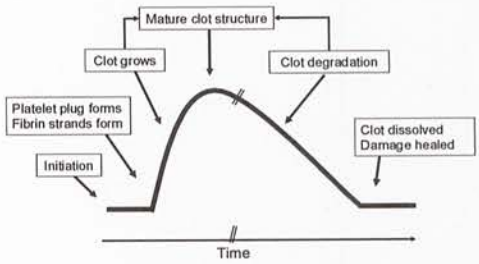
Answer the following questions:

- What is the TEG® System?
- What does it do?
- How does the TEG® System fit into Trauma?

Coagulation continuum

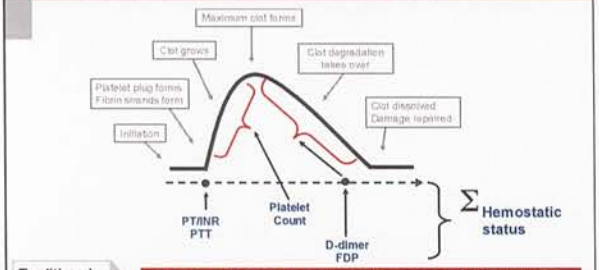


Normal Hemostasis Process
The Life of a Clot



Cotran, Ramsey S., MD. *Robbins Pathologic Basis of Diseases*. Philadelphia, W.B. Saunders Company, 1999.

Traditional hemostasis monitoring



Traditional Hemostasis Tests

Do not define the overall process, just provide pieces of the process!

TEG vs CCTs

- CCT's are Plasma based
  - Ignore clot structure
  - Use static endpoints
- TEG is Whole blood
  - Includes cellular elements
  - Includes platelets and fibrinogen

What is the TEG® Analyzer?

- A real time analyzer of whole blood for coagulation
- Measures the viscoelastic properties of the hemostasis process functionally, the end-result being the hemostatic plug, or clot
- The clot has three main systems and five affecting processes:
  - Enzymatic
  - Platelet
  - lytic

TEG® Hemostasis System Benefits

Hemostasis test results that can aid clinicians in improving patient outcomes

- Help reduce allogeneic blood component use
  - Platelets
  - Fresh Frozen Plasma
  - Cryoprecipitate
  - RBC's – especially in conjunction with Cell Salvage
- Risk stratify for thrombotic complications
  - Myocardial Infarction (MI)
  - Ischemic Stroke
  - Deep Vein Thrombosis (DVT)
  - Pulmonary Embolism (PE)

TEG® Hemostasis System

Initial purchase
- TEG® 5000 Analyzer
- Installation Kit
- Analytical Software/ Remote Viewing

Ongoing disposables
- Test and Assay Kits
- Biological Controls

Protocol set-up

Training and support- **ON- SITE**
- 24/7 hotline
  - 1-800-GET-A-TEG (1-800-438-2834)
- **Local- ATLANTA Account Rep**
- **Local- ATLANTA Clinician**
- **Local- ALPHARETTA Field service**

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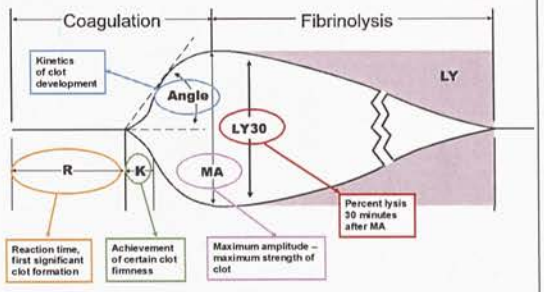
Analytical software
Graphical representation



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How does the TEG® System fit into Blood Management?

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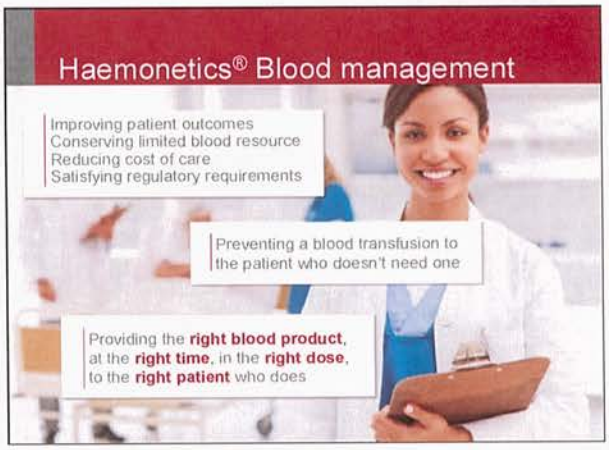
Haemonetics® Blood management



Objectives of TEG-Guided Therapy

- To express function and pinpoint dysfunction in the hemostasis system
  - Reference the appropriate types and amounts of blood products needed to correct bleeding from this dysfunction
  - Allow accurate anticoagulation or antiplatelet interventions to reduce thrombotic complications without inappropriate bleeding

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Objectives of TEG-Guided Therapy

- To distinguish between anatomical and coagulopathic bleeding
- To distinguish primary from secondary fibrinolysis, including the consumptive phase
- To reduce the use of unnecessary blood products and reduce thrombotic complications

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TEG Assays

- **Standard TEG Assays-** Kaolin, Heparinase
  - Sensitivity of TEG allows LMWH to be seen with assay. Sensitive test= more accurate information
- **Rapid TEG-** faster results/ TRAUMA
- **Platelet Mapping-** Anti-platelet drug effect and platelet dysfunction/ CABG, CARDIOLOGY, TRAUMA
- **Functional Fibrinogen-** fibrin contribution to clot strength

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TEG in Trauma

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RapidTEG™ Reagent

- A faster TEG® assay
- R time in < 1 minute
- Activates both extrinsic and intrinsic coagulation pathways

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Case Example- Trauma patient RapidTEG

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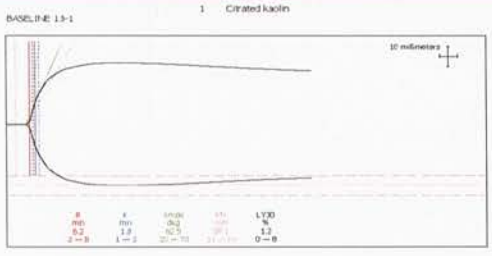
Case Example - Standard TEG Baseline



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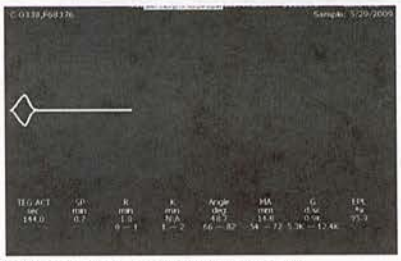
TEG® for Trauma – TXA or NOT? RapidTEG



- Primary fibrinolysis, coagulopathic bleeding
- Treatment: Amicar (or Tranexamic Acid)

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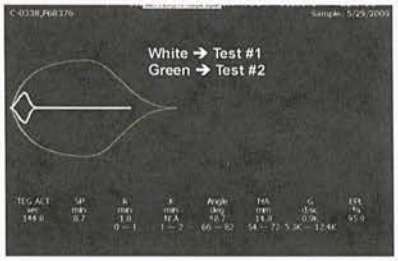
TEG® Test # 2
RapidTEG



- Primary fibrinolysis improving, coagulopathic bleeding slows

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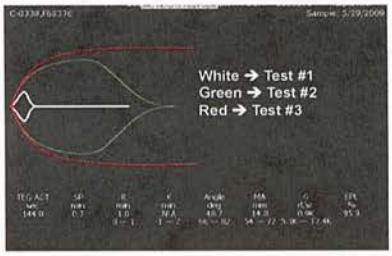
TEG® Test # 3
RapidTEG



- Coagulopathic bleeding stops

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TEG Protocols for Trauma

- Baseline test – determine imbalance in coagulation
- Follow up test – assess response to treatment

Test → Treat → Test

Low platelet function | Platelets | Normal platelet function

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PlateletMapping® assay and results

- Identifies hemostasis to include:
  - Hypercoagulability, lysis, surgical bleed, factor , fibrinogen and platelet function
- Monitors the effect of anti-platelet therapies
  - Modified standard TEG® analysis
- Provides relevance to % Platelet inhibition
  - Due to interventional treatment or pathologic inhibition
- Allows individualization of treatment

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Publications List

More than 3000 total publications.
Key publications available on our website.

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Diverse publications

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TEG and Trauma: Topics of interest

1) Predict massive transfusion and "substantial bleeding"
2) Replace conventional coag tests
3) Detect and treat of fibrinolysis
4) Direct product transfusion
5) Manage DVT prophylaxis
6) Predict pulmonary embolism
7) Manage traumatic brain injury

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TEG Predicts Early Transfusion in Trauma

The Journal of TRAUMA® *Injury, Infection, and Critical Care*

RapidTEG Delivers Real-Time Results that Predict Transfusion within 1 hour of Admission
Cotton BA, Kozar RA, Holcomb JB et al

Key points

1. **Characterized RapidTEG results for "normal" trauma pt**
2. **Identified RapidTEG profile of MT pt**
3. **RapidTEG results are available within minutes**
4. **RapidTEG showed correlation with CCTs**
5. **ACT is predictive of early tx**
   a. ACT>128 sec predicted MTP in 1st six hrs
   b. ACT <105 predicted no tx

***J Trauma* 2011:71:407-417**

TEG and Conventional Coagulation Tests Presentation at ASA 2012

Admission RapidTEG can replace conventional coagulation tests in the ED: Experience with 1974 consecutive trauma patients

Holcomb JB, Cotton BA, et al , UT Health, Houston, Texas

Key points

1. ACT predicted patients with substantial bleeding and RBC transfusion better than PT/PTT or INR ($p = 0.03$)
2. Angle was superior to fibrinogen for predicting plasma transfusion ($p < 0.001$)
3. MA was superior to platelet count for predicting platelet transfusion ($p < 0.001$)
4. LY-30 documented fibrinolysis

CONCLUSION: r-TEG was clinically superior to five CCTs, identifying patients with an increased risk of early RBC, plasma and platelet transfusions, as well as fibrinolysis. Admission conventional coagulation tests can be replaced with r-TEG.

Annals of Surg 2012: Sep; 256(3):476-86

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TEG detects Primary Fibrinolysis

ORIGINAL ARTICLES

Primary Fibrinolysis Is Integral in the Pathogenesis of the Acute Coagulopathy of Trauma

Jeffry L. Kashuk, MD,† Ernest E. Moore, MD,*† Michael Sawyer, MD,*† Max Wohlauer, MD,*† Michael Pezold, BA,*† Carlton Barnett, MD,*† Walter L. Biffl, MD,*† Clay C. Barlow, MD,*† Jeffrey L. Johnson, MD,*† and Angela Sauaia, MD, PhD*†*

Key points

1. RapidTEG illustrated that 34% of MT patients had PF
2. PF was associated with MT, coagulopathy and death
3. Findings allow for potentially earlier diagnosis and treatment

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2 papers in JOT December 2013

- J Trauma Acute Care Surg. 2013 Dec;75(6):961-7. doi: 10.1097/TA.0b013e3182aa9c9f.
- Fibrinolysis greater than 3% is the critical value for initiation of antifibrinolytic therapy.

  Chapman MP, Moore EE, Ramos CR, Ghasabyan A, Harr JN, Chin TL, Stringham JR, Sauaia A, Silliman CC, Banerjee A.

- ***The paper shows that in trauma LY30 of >3% is better to guide the treatment of fibrinolysis***

- J Trauma Acute Care Surg. 2013 Dec;75(6):947-53. doi: 10.1097/TA.0b013e3182a9676c.
- The International Normalized Ratio overestimates coagulopathy in stable trauma and surgical patients.

  McCully SP, Fabricant LJ, Kunio NR, Groat TL, Watson KM, Differding JA, Deloughery TG, Schreiber MA.

- ***This paper shows the superiority of TEG to drive blood product therapy in trauma instead of the conventional coagulation tests***

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Direct Resuscitation with PlateletMapping® Assay

Early Platelet Dysfunction: An Unrecognized Role in the Acute Coagulopathy of Trauma

M Wohlauer, EE Moore, M Walsh et al, U of Colorado, Denver and I U School of Medicine, Notre Dame, IN

Data suggest a potential role for early platelet transfusion in severely injured patients

JACS 214 (5) May 2012

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"Trend toward fewer blood products"

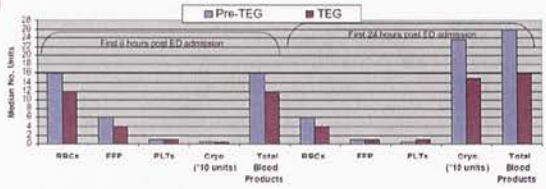

Fig. 5. Total blood products administered: pre-TEG versus TEG. There was a consistent trend toward reduced blood product utilization in the TEG phase. RBC administration at 6 and 24 hours approached significance.

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ICU Management: *Hypercoagulable*

Thromboelastography as a Better Indicator of Hypercoagulable State After Injury Than Prothrombin Time or Activated Partial Thromboplastin Time

Myung S. Park, MD, Wenjun Z. Meriini, PhD, Michael A. Dubick, PhD, José Salinas, PhD, Sandra Butenas, PhD, Bijan S. Kheirabadi, PhD, Anthony F. Pusateri, PhD, Jeffrey A. Tos, MD, Charles H. Guymon, MS, Steven E. Wolf, MD, Kenneth G. Mann, PhD, and John B. Holcomb, MD

Key points

1. **Trauma and burn ICU patients 24 hours after injury**
2. **Injured patients were hypercoagulable by TEG (angle and MA) despite prolonged PT and aPTT compared to healthy controls**
3. **6% of injured patients had PE despite prophylaxis**

Journal of Trauma(2009) 67: 266-276

Hypercoagulability: Presentation at AAST 2011

CME ARTICLE

Admission RapidTEG Predicts Development of Pulmonary Embolism in Trauma Patients

Cotton BA, Radwan ZA, and Holcomb JB
University of Texas

Key points

1. **1225 consecutive trauma patients had rTEG**
2. **2.7% incidence of PE (33 patients)**
3. **MA was predictive of PE**
4. **Patients with MA > 65 mm had 6 time greater chance of having PE**

J Trauma Acute Care Surg
Vol 72, No 6: June 2012

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Traumatic brain injury

Thrombelastography-identified coagulopathy is associated with increased morbidity and mortality after traumatic brain injury

Nicholas R. Kunio, M.D.*, Jerome A. Differding, M.P.H., Katherine M. Watson, B.A., Ryland S. Stucke, B.S., Martin A. Schreiber, M.D.

Department of Surgery, Oregon Health & Science University, 3181 SW Sam Jackson Park Rd, Portland, OR 97239-3098, USA

Key points

1. **Prospectively enrolled 69 pts with TBI with TEG on admission**
2. **8.7% were hypocoagulable by TEG (R > 8 min)**
3. **Hypocoagulable pts had higher mortality rate (50% vs 12%) and higher rate of surgical intervention (83% vs 35%)**

Conclusion: TBI patients that are characterized by enzymatic hypocoagulability have worse prognoses

The American Journal of Surgery (2012) 203, 584–588

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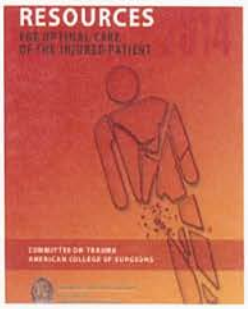
ACS Orange Book Trauma Guidelines 2014



- Chapter 11, under Clinical Laboratory:

Trauma centers of all levels must have a massive transfusion protocol developed collaboratively between the trauma service and the blood bank (CD 11–84). Coagulation studies, blood gas analysis, and microbiology studies must be available 24 hours per day (CD 11–85).

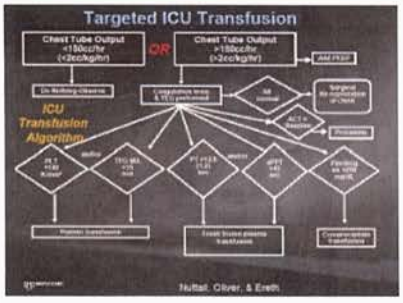
Thromboelastography (TEG) should be available at Level I and II trauma centers.

ACS TEG Trauma Algorithm

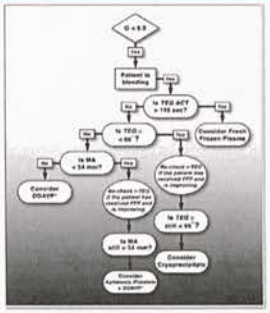
TEG® Transfusion Triggers - ACS-COT

Rapid TEG	
TEG **ACT** > 128 seconds	Consider Plasma
K-time > 2.5 minutes (150 sec)	Consider Plasma and/or Cryoprecipitate (fibrinogen concentrate)
Alpha (α) Angle < 60°	Consider Cryoprecipitate (fibrinogen concentrate) and/or Plasma
mA < 55 mm	Consider Platelets
LY 30 > 3 %	Consider Anti-fibrinolytics (e.g. TXA)
Standard TEG (native)	
R-value > 9 minutes	Consider Plasma
K-time > 4 minutes	Consider Plasma and/or Cryoprecipitate (fibrinogen concentrate)
Alpha (α) Angle < 60°	Consider Cryoprecipitate (fibrinogen concentrate) and/or Plasma
mA < 55 mm	Consider Platelets
LY 30 > 7.5 %	Consider Anti-fibrinolytics
Call TEG Clinical Support at 1-800-498-2034	

Mayo Clinic TEG Algorithm (CTS)



Denver Health Trauma Algorithm



Memorial Hermann Hospital Transfusion Recommendations: r - TEG

Laboratory Values	Blood Product Transfusion
ACT > 128	Plasma and RBCs
r-value > 1.1	Plasma and RBCs
k-time > 2.5	Cryoprecipitate / fibrinogen / plasma
α-angle < 56	Cryoprecipitate / fibrinogen / platelets
MA < 55	Platelets / cryoprecipitate / fibrinogen
LY30 > 3%	Tranexamic acid

Annals of Surgery 2012
Table 7

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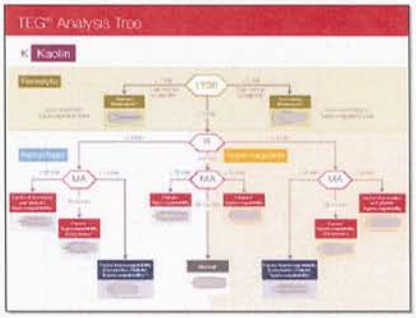
TEG® Analysis Tree



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Thank You

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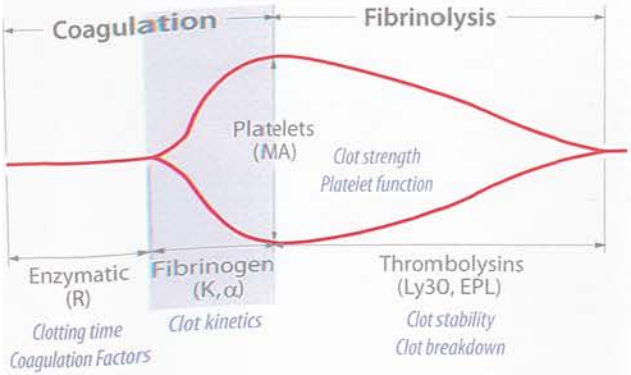
HAEMONETICS

The TEG System provides visual representation of your patient's hemostasis from one test.



> "In fact, evidence suggests that over one third of multiply injured patients are coagulopathic immediately on arrival to the emergency department." [4]
>
> *Kashuk et al, Annal of Surgery*

1. Plotkin et al. A Reduction in Clot Formation Rate and Strength Assessed by Thromboelastography in Indicative of Transfusion Requirements in Patients with Penetrating Injuries. The Journal of Trauma, Injury, Infection and Critical Care. 2008; Volume 64, Number 2; S64-S68.
2. Jeger et al. Can RapidTEG Accelerate the Search for Coagulopathies in the Patient with Multiple Injuries? Journal of Trauma 2009; 66: 1253-1257
3. Kaufman et al. Usefulness of thrombelastography in assessment of trauma patient coagulation. Journal of Trauma 1997; 42; 716-722
4. Kashuk et al. Primary fibrinolyis is integral in the pathogenesis of the acute coagulopathy of trauma. Annals of Surgery Volume 252; 3: September 2010.
5. Gonzalez et al. Coagulation abnormalities in the trauma patient: the role of Thromboelastography. Seminars in Thrombosis and Hemostasis Volume 26; 7: 2010.
6. Kashuk et al. Postinjury coagulopathy management. Annals of Surgery. Volume 66; 4: April 2010.
7. Park et al. Thromboelasography as a Better Indicator of Hypercoaguable State after Injury than Prothrombin Time or Activated Partial Thromboplastin Time. The Journal of Trauma Volume 67, Number 2, August 2009.
8. Van et al. Thrombelastorgraphy Versus AntiFactor Xa Levels in the Assessment of Prophylatic-Dose Enoxaparin in Critically Ill Patients. Journal of Trauma. 2009;66:1509-1517.
9. Johansson. Treatment of massively bleeding patients: introducing real-time monitoring transfusion packages and thrombelastography (TEG). ISBT Science Series (2007) 2, 159-167.
10. Johansson. Treatment of massively bleeding patients: introducing real-time monitoring, transfusion packages and thrombelastography (TEG). ISBT Science Series (2007) 2, 159-167.

TEG® System in Trauma

Comprehensive hemostasis information to make rapid decisions

Erica Casey
Cell Salvage Consultant
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Mobile: 404-610-1962

ATTACHMENT #2

HAEMONETICS®
THE Blood Management Company

Traditional coagulation testing is proven, but limited:

Traditional coagulation tests are used as a starting place when investigating the cause of bleeding in Trauma patients, but have limited utility. These tests are plasma-based tests which offer no information on thrombotic risk and also may not be completed in time to make decisions rapidly. Additionally, they do not include platelet contribution to clot strength and do not include fibrinogen.

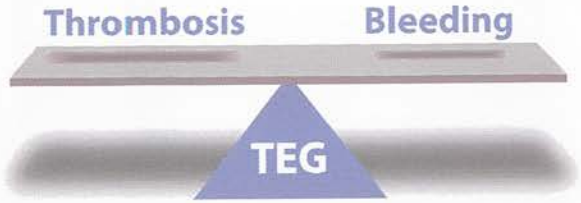
"Thrombelastography was a more accurate indicator of blood product requirements in our patient population than prothrombin time, partial thromboplastin time, and International Normalization Ratio."[1]

Plotkin, et. al. Journal of Trauma

TEG® System provides comprehensive hemostasis information

The TEG System is an easy-to-use, rapid, comprehensive whole blood hemostasis test which can offer personalized information for each patient. The TEG System shows platelet & fibrinogen contribution to clot strength for patients on and not on antiplatelet or anticoagulant therapy. Importantly, the TEG System also aids in assessing:

- Cause of patient bleeding & potential treatment options
- Thrombotic risk
- Antiplatelet & anticoagulant therapy response relative to overall hemostasis



Recent studies suggest that the TEG System has value in a variety of applications in trauma/critical care because of the ability to assess patients, provide therapy and then monitor therapy and hemostasis throughout the patient's stay. Along with clinical assessment of the patient's condition and other tests, the TEG System benefits may include aiding in the:

- Diagnosis of acute coagulopathy in trauma (ACOT)[2,3]
- Early identification of fibrinolysis[4]
- Choice of blood products in bleeding patients[5]
- Avoidance of over-transfusion[6]
- Activation of massive transfusion protocols[6]
- Determination of use of blood products in patients with traumatic brain injury (TBI) on anticoagulant and antiplatelet therapy
- Management of post-traumatic intensive care bleeding complications
- Diagnosis and management of post-traumatic thrombotic conditions (e.g., DVT, PE)[7,8]
- Management of bleeding and thrombotic complications in acute care surgeries[9]
- Differentiation of anatomical bleeding from coagulopathy[10]

ATTACHMENT #2

The Children's Center for Advanced Technology and Robotic Rehabilitation

Children's
Healthcare of Atlanta
Dedicated to All Better

Opened September 2014

Opened September 2014

Our Mission

- Create a center to help optimize functional independence and carryover
- Create a center with equipment patients can experience success and gain confidence and trust in their skill set
- Create a center with multiple options of equipment to meet the needs of many patients and diagnoses
- Create a center that can provide intensive therapy with advanced equipment for optimal performance

Our Schedule

- Patients are seen 2-3 times per week
- 60 minute treatment sessions, 120 minute evaluation sessions
- Duration of episode will vary based on patient diagnoses and evaluation results
- Duration will be monitored and adjusted based on progress, plateaus or decline

Our Equipment

The center encompasses:

- Robotic assistance
- Functional electrical stimulation
- Body-weight support
- Biofeedback devices for extremities

Equipment

PT	OT	PT and OT
Bioness Vector and Woodway Treadmill	Tyromotion Diego	RT300 and RT200 FES bikes
AlterG Treadmill	Tyromotion Tyrostation Pablo/Tymo	Bioness Interactive Therapy System
Bioness L300/L300Plus	Tyromotion Amadeo	Motomed Gracile and VIVA 2 FES bikes

Bioness® Vector

A high-tech over-ground training system that decreases horizontal forces and provides user feedback and body weight support for patients to practice gait, balance and crawling over-ground or over treadmill

AlterG® Treadmill

Can reduce gravity's impact on body and train with decreased stress on joints and muscles. Can be sited forwards or backwards with incline and decline options or for standing activity with reduced gravity up to 80%

L300 and L300Plus System Components

Leg cuff to provide stimulation to the tibialis anterior muscle. Thigh cuff to stimulate the hamstring or quadriceps muscle. Uses gait sensor in shoe to determine foot contact and has wireless remote that can be carried in pocket or purse. Can wear device under clothing. Assists with muscle re-education, prevent muscle loss and decreases spasms

Tyromotion® Diego

Robot-assisted with unilateral or bilateral application. Active and passive therapy based on active gravity compensation.

Natural movements in 3D space with augmented feedback and gaming system to enhance arm functionality for independence with daily tasks.

Tyromotion Tyrostation® Pablo and Tymo

An upper extremity work station to work on various grasp techniques. Measures strength and scope of movement. Can work proximal and distally with augmented feedback. Balance pad can be used in standing, sitting or under hands and provides static and dynamic movements

Tyromotion® Amadeo

A robotic hand that can provide passive, active assistive or active movement for gross hand or individual finger movement. Can work on various grasping techniques with use of augmented feedback

Restorative Therapies RT300®

A passive, active assistive or active biking system for UE/LE with functional electrical stimulation for biofeedback to the muscles

RT 200

A passive, active assistive or active biking system for upper and lower extremities simultaneously with functional electrical stimulation for biofeedback of up to 16 muscles at once

Motomed® Gracile and Viva 2

A passive, active assistive or active biking system for upper or lower extremities with functional electrical stimulation for biofeedback to the muscles and a computerized gaming system for motivation

Take Home Message

- The center is designed to provide another form of therapy to compliment traditional therapy
- Pediatric patients with various neurologic or musculoskeletal conditions
- The center can be used in an outpatient or inpatient setting, allowing patients to work through a continuum of care during their recovery
- There are opportunities for growth and advancement from one piece of equipment to another as patient strengthens improves on functional skills
- Some of the equipment can be ordered for a patient to have at home
- Whether a patients injury is localized to one leg, one arm or the whole body there is something in the center that will be of benefit

Our Clinical Team

PHYSICAL THERAPISTS	LOCATION
Erin Eggebrecht, PT, DPT, NCS	Advanced Technology and Robotics
Kim Carvell, PT, DPT, PCS	MOB
Kelly Moore, PT, DPT	Day Rehab
Diana Duemig, MSPT	CIRU

OCCUPATIONAL THERAPISTS	LOCATION
Sheelah Cochran OTR/L, CPAM	MOB
Leah Guanlao OTR/L, CPAM	Day Rehab
John Tilley OTR/L, CBIS, SIPT	CIRU
Amy Bohn OTR/L, CPAM	MOB

QUESTIONS??????

Children's
Healthcare of Atlanta