

Blood 101

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Alternate Title?:

*“Inside Knowledge About How We’re
Helping You in the Hematology
Laboratory”*



Overview & Objectives

- Get to know more about the inner workings of a Blood Lab – this is where the nuts & bolts of ***diagnosis*** actually happens!
 - Hematology
 - Blood
 - Bone Marrow
 - Coagulation
 - Transfusion Medicine
- Explore how we can ALL work better together for improved patient care...

About me... (I'm a Nomad!)

- American originally (*don't hold it against me!*) ☺
- **University of Minnesota** — *Bachelor's in Microbiology & French*
- **NIH – Postbaccalaureate Research Fellowship**
- **McGill Medical School**
 - *Electives in Halifax, Ottawa, Edmonton, West Africa*
- **University of Toronto – Hematopathology Residency**
 - *Electives in NYC, Cleveland Clinic, Vancouver, West Africa*
- **Health Services Management Certificate (Toronto)**
- **BloodCenter of Wisconsin TM/Coag Fellowship**
 - *Elective in East Africa*
- **Saskatoon & Northern SK**
- **Edmonton**
- **Vancouver & Yukon Territories**

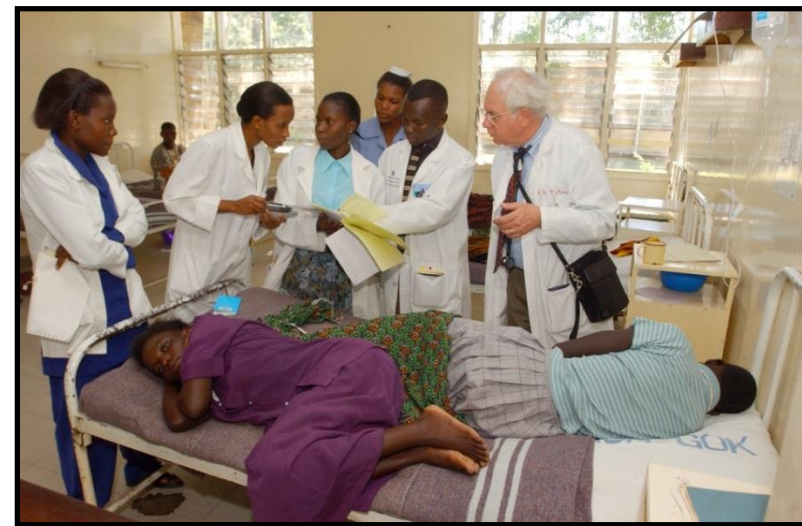


In Vancouver...

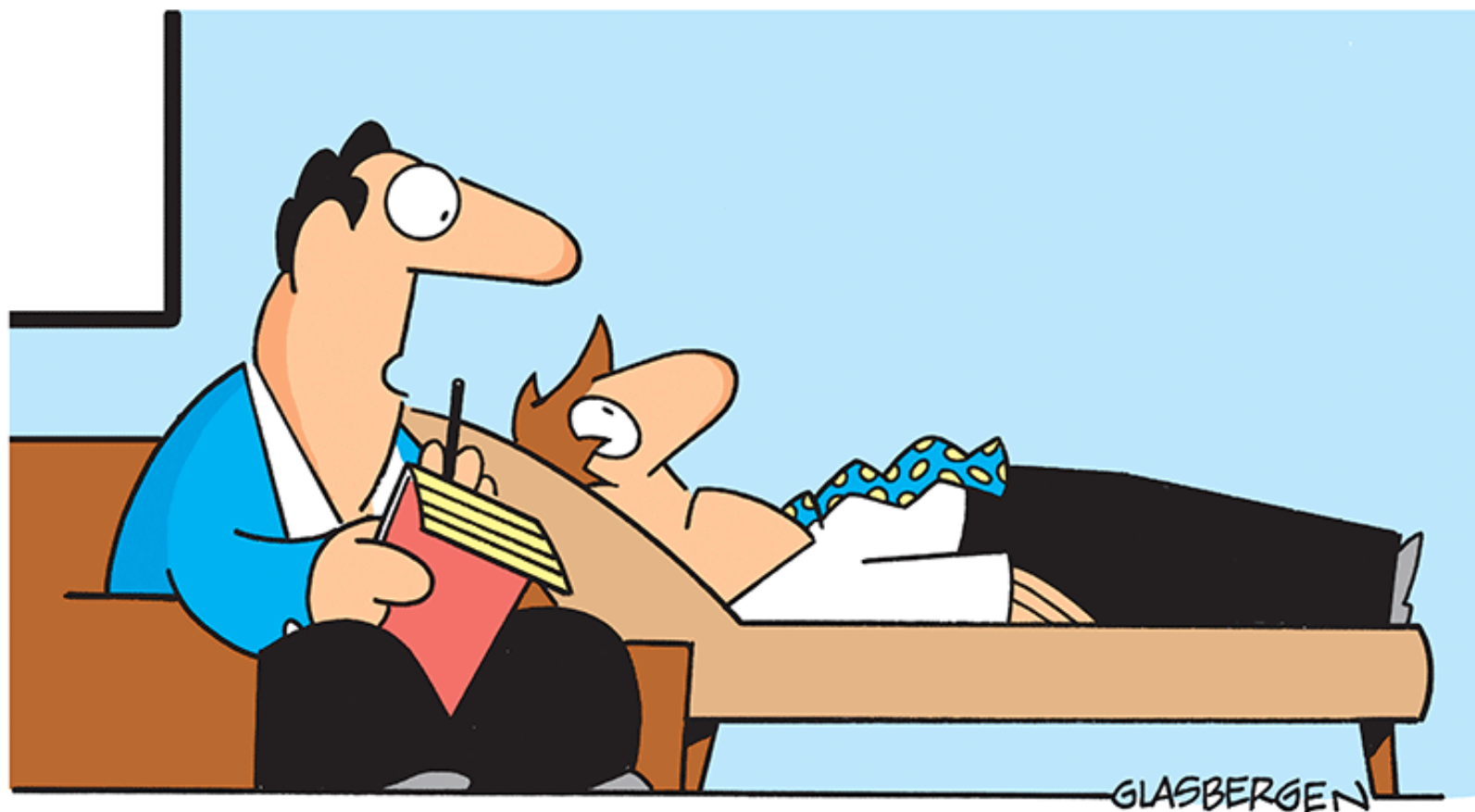
- St. Paul's Hospital
 - City-wide on-call
 - Consultant to Yukon Terr.
- UBC Clinical Associate Prof, TM Program Director
- TMAG (Transfusion Medicine Advisory Group)
- Physician Engagement Committee
- UBC Physician Leadership Program
- Regional Physician-Led QI Steering Committee
- MSA Executive



Putting Quality into Perspective...







"I'm ordering a transfusion. We'll replace your B-negative blood with B-positive and see if that improves your mood."

Patient Blood Management

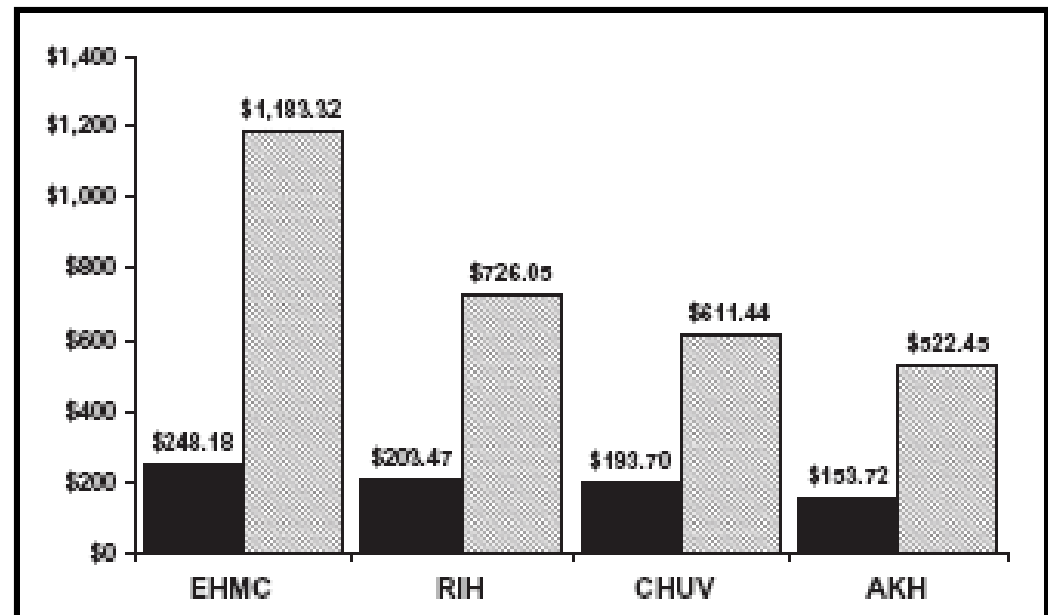
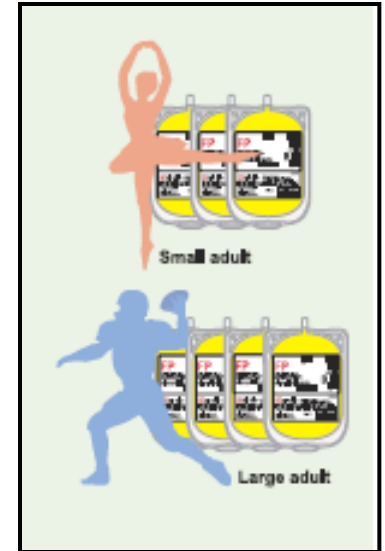
- Current “Hot Topic”
- Fine line in TM...
- Ultimate Goal:

Right product to the right patient at right time and for right reason!



Blood is not FREE!

- RBC → \$422 /unit
- Platelets → \$185-485 /dose
- Plasma → \$100-375 /unit
- aFVII → \$1200 /1 mg

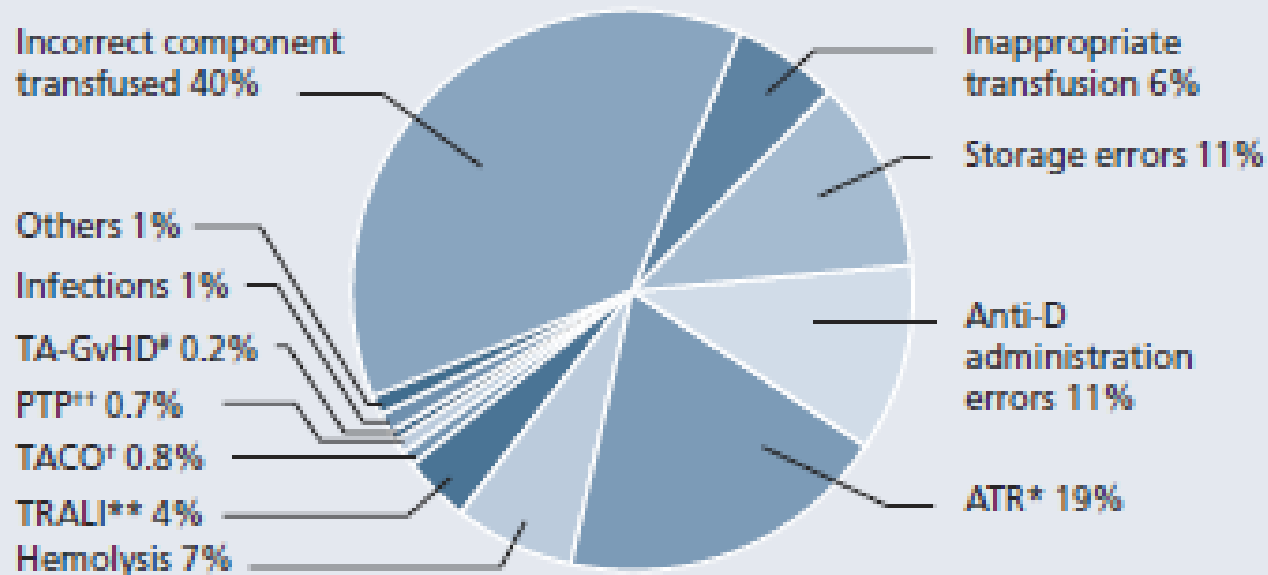


Blood is also not without RISK

- “Serious Hazards Of Transfusion” = SHOT
- Confidential Survey of UK and Irish hospitals, 10/96 to 9/98 (and ongoing...)
- Deaths and Major complications of Transfusion
 - 65% participation
 - 191 (52%) wrong blood to patient
 - 3 deaths due to ABO incompatibility

SHOT Continued...

SERIOUS HAZARDS OF TRANSFUSION (SHOT), UNITED KINGDOM
MAJOR ADVERSE EVENTS REPORTED 1996-2009 (6653 REPORTS) ⁴⁴



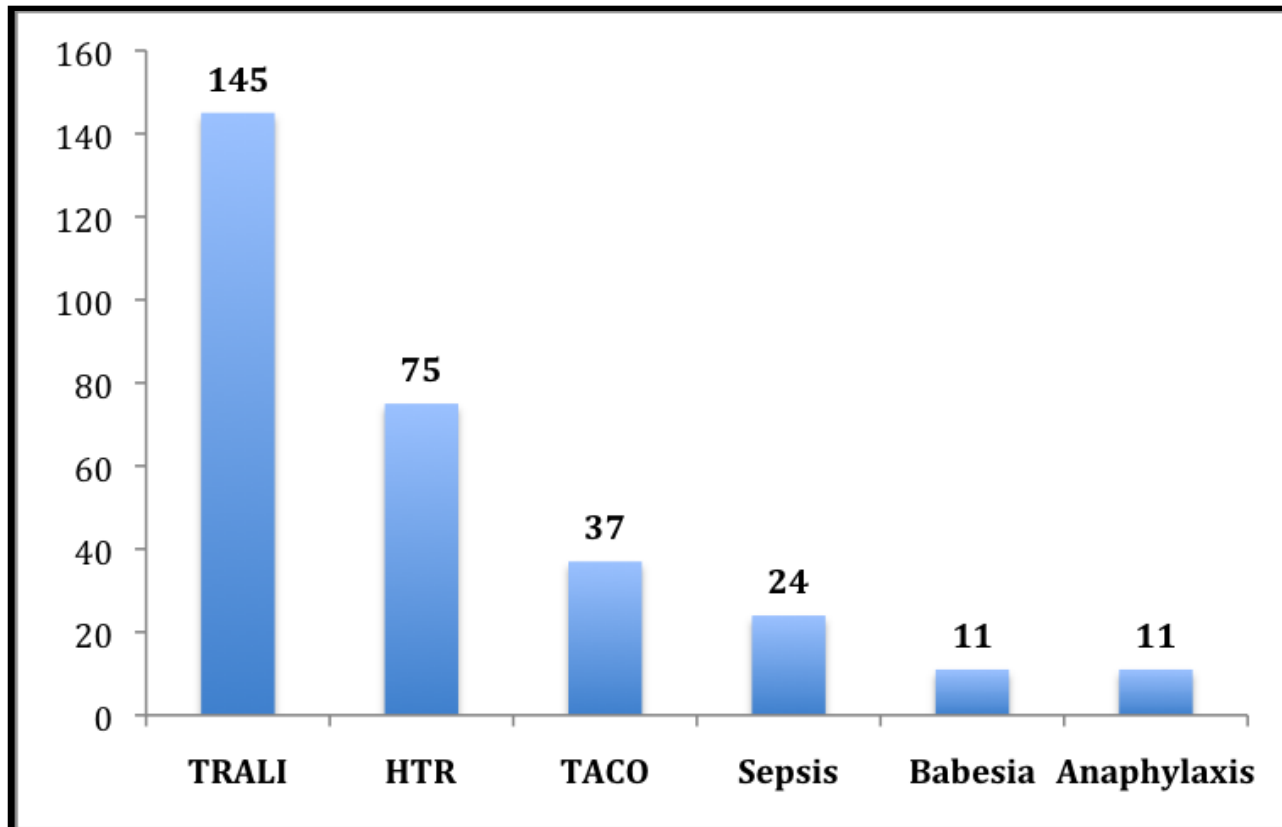
Transfusion Safety

- Lab/Blood Bank errors alone: 29%
- Non-blood bank errors alone: 56%
- Combination of errors: 15%
- **Failure to identify the patient is the major error found during investigation**

But what *IS* transfusion safety?

- The promotion of patient safety during the blood transfusion process:
 - sample collection
 - sample testing
 - ordering of transfusion
 - administration
 - post-transfusion assessment
- Goal: Getting the *right* blood product to the *right* patient at the *right* time and for the *right* reason!

Deaths reported to the FDA (2005-2010)

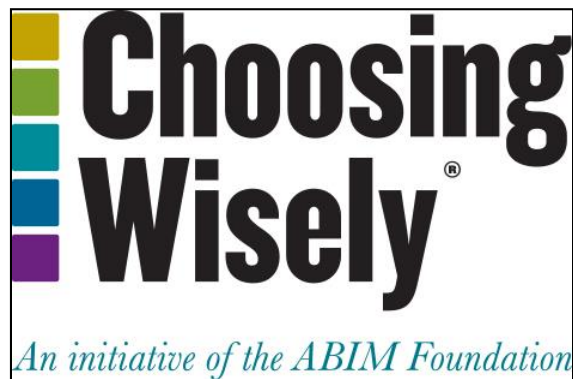


Transfusion still kills!

Who is involved in transfusion safety?

- Physician/Medical
- Phlebotomy
- Transfusion service
(Blood Center & Blood Bank)
- Nursing
- Patient/Family





- Launched in 2012 by the ABIM Foundation
- Goal of advancing a national dialogue on avoiding wasteful or unnecessary medical tests, treatments & procedures
- More than 70 specialty societies have joined in with their recommendations
- Choosing Wisely Canada! 😊



<http://www.choosingwiselycanada.org/>

- Cool lists
- Cool videos
- Cool patient materials
- Cool APP

A poster with a teal and white background. At the top, a large teal speech bubble contains the text "When it comes to your health sometimes LESS is more". Below this, a smaller teal speech bubble contains the text "Next time you see your doctor, have a conversation." The bottom section is divided into four columns, each with a question and a brief explanation. The bottom right corner features the "Choosing Wisely Canada" logo and text.

When it comes to your health sometimes LESS is more

When it comes to your health, more medical tests, treatments and procedures are not always better. In fact, sometimes they are unnecessary and could do more harm than good.

Next time you see your doctor, have a conversation.

Do I really need this test, treatment or procedure? Tests should help you and your doctor decide how to treat your problem, and treatments and procedures should help you live a longer, healthier life.	What are the downsides? Discuss the risks as well as the chance of inaccurate results or findings that will never cause symptoms but may require further testing. Weigh the potential complications against possible benefits and the symptoms of the condition itself.	What happens if I do nothing? Ask your doctor if your condition could get worse — or get better — if you don't have the test, treatment or procedure now.	Are there simpler, safer options? Sometimes lifestyle changes will provide all the relief you need.
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ChoosingWiselyCanada.org
@ChooseWiselyCA

Choosing Wisely Canada
In partnership with the Canadian Medical Association



Ten Things Physicians and Patients Should Question

1 Don't transfuse blood if other non-transfusion therapies or observation would be just as effective.

Blood transfusion should not be given if other safer non-transfusion alternatives are available. For example, patients with iron deficiency without hemodynamic instability should be given iron therapy.

2 Don't transfuse more than one Red cell unit at a time when transfusion is required in stable, non-bleeding patients.

Indications for red blood transfusion depend on clinical assessment and the cause of the anemia. In a stable, non-bleeding patient, often a single unit of blood is adequate to relieve patient symptoms or to raise the hemoglobin to an acceptable level. Transfusions are associated with increased morbidity and mortality in high-risk hospitalized inpatients. Transfusion decisions should be influenced by symptoms and hemoglobin concentration. Single unit red cell transfusions should be the standard for non-bleeding, hospitalized patients. Additional units should only be prescribed after re-assessment of the patient and their hemoglobin value.

3 Don't transfuse plasma to correct a mildly elevated (<1.8) international normalized ratio (INR) or activated partial thromboplastin time (aPTT) before a procedure.

A mildly elevated INR is not predictive of an increased risk of bleeding. Furthermore, transfusion of plasma has not been demonstrated to significantly change the INR value when the INR was only minimally elevated (<1.8).

4 Don't routinely transfuse platelets for patients with chemotherapy-induced thrombocytopenia if the platelet count is greater than $10 \times 10^9/L$ in the absence of bleeding.

A platelet count of $10 \times 10^9/L$ or greater usually provides adequate hemostasis. Platelet transfusions are associated with adverse events and risks. Considerations in the decision to transfuse platelets include the cause of the thrombocytopenia, comorbid conditions, symptoms of bleeding, risk factors for bleeding, and the need to perform an invasive procedure.

5 Don't routinely use plasma or prothrombin complex concentrates for non-emergent reversal of vitamin K antagonists.

Patients requiring non-emergent reversal of warfarin can often be treated with vitamin K or by discontinuing the warfarin therapy. Prothrombin complex concentrates should only be used for patients with serious bleeding or for those who need urgent surgery. Plasma should only be used in this setting if prothrombin complex concentrates are not available or are contraindicated.

Hemostatic Process

Endothelium damaged



Platelet plug formed
(white clot)



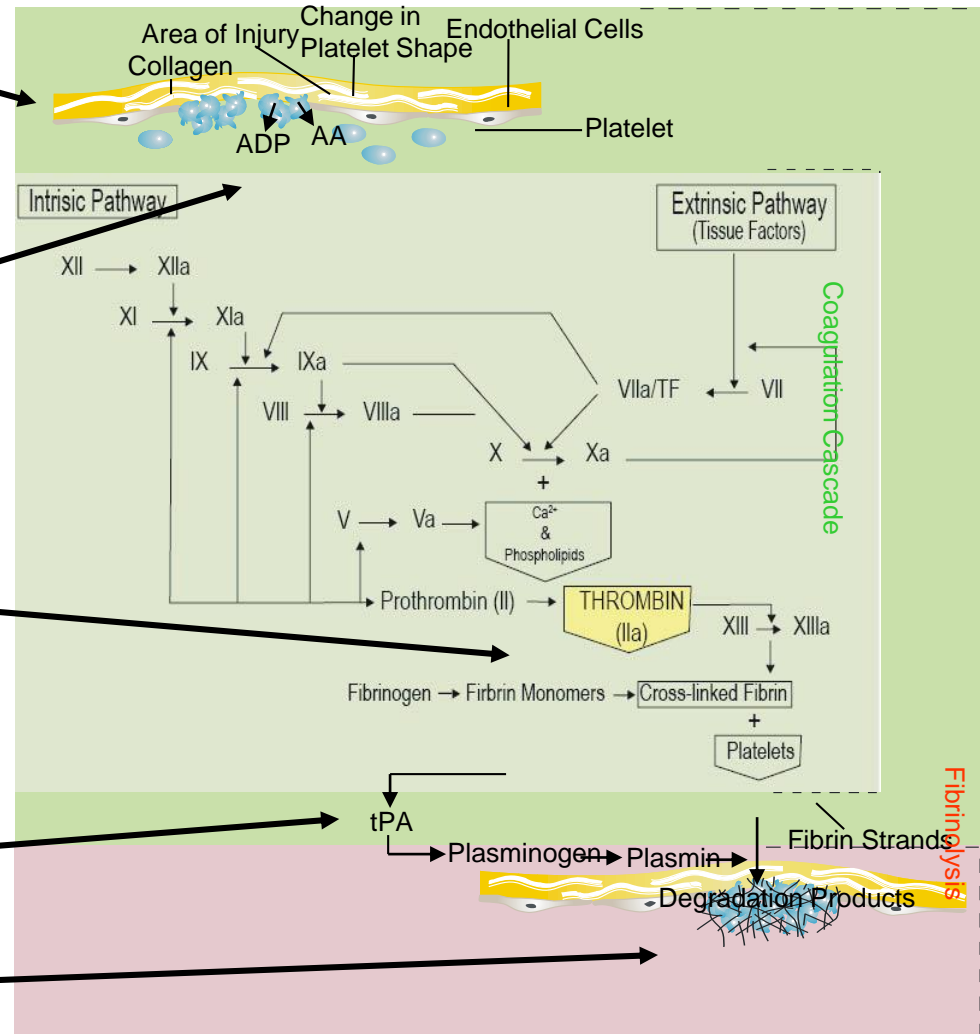
Thrombin generated on
platelet surface



Platelet-fibrin plug formed
(red clot)



Clot lysis



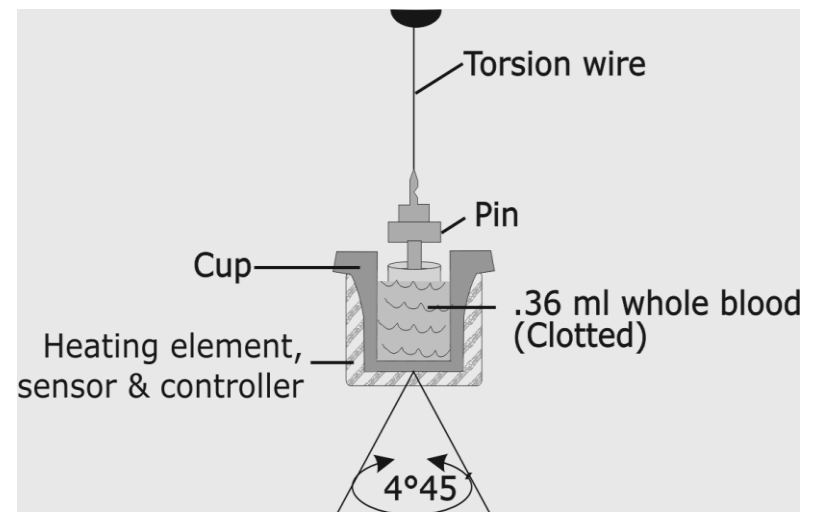
Routine Coagulation Tests

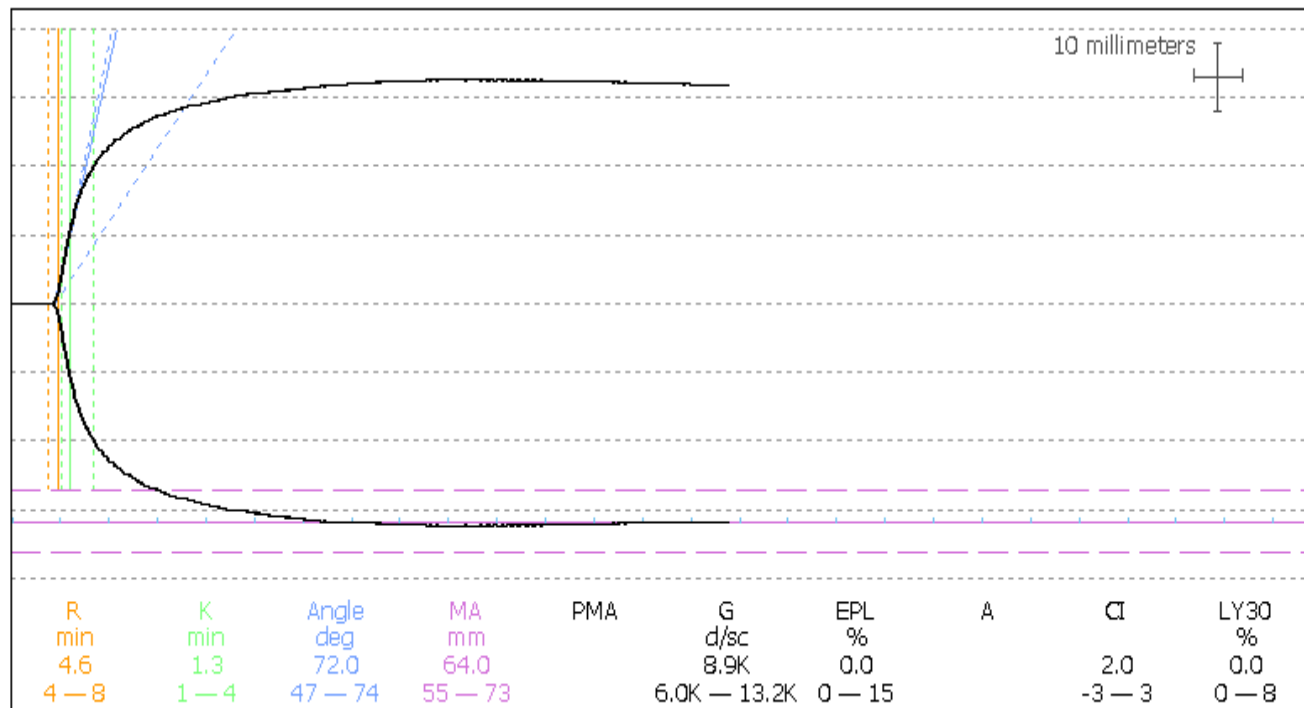
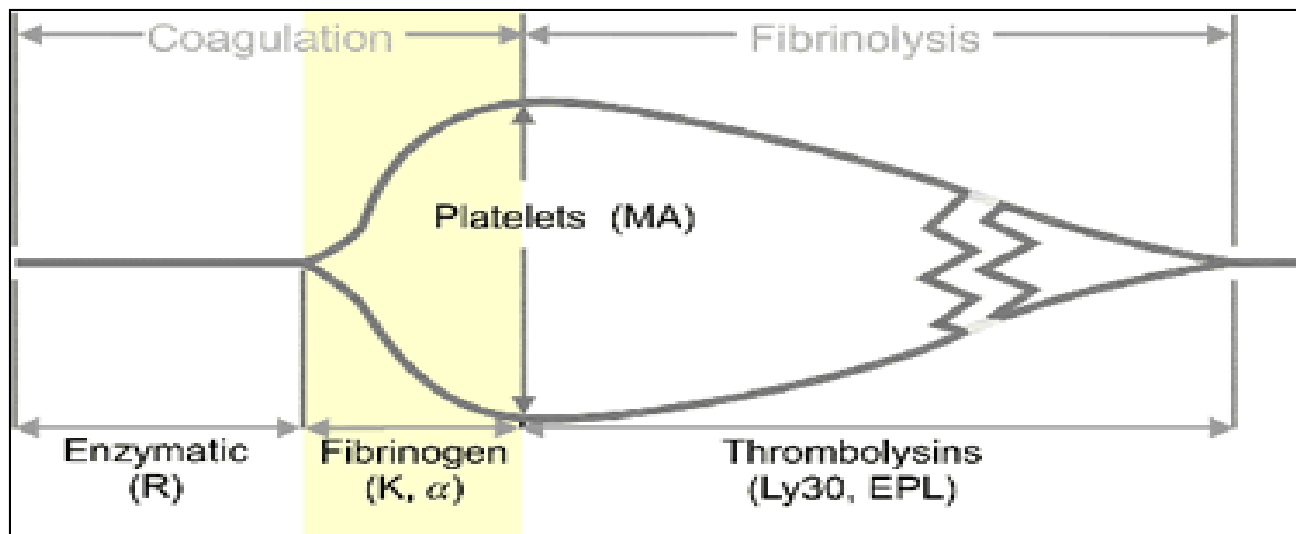
- Based on cascade model of coagulation
 - Measure protein interaction in plasma (thromboplastin)
 - Exclude cellular contributions (platelets, monocytes, etc.)
 - Determine adequacy of coagulation factor levels
- Use static endpoints
 - Ignore altered thrombin generation
 - Ignore cellular elements
 - Ignore overall clot structure

TEG / ROTEM

- Whole blood test
- Measures hemostasis
 - Clot initiation through clot lysis
 - Net effect of components
- TEG/Rotem system
 - Laboratory based
 - Point of care
 - Remote, can be networked
 - Flexible to institution needs

Thromboelastography (TEG)





Normal

Coagulopathy/
anticoagulants

Reduced platelet
function

Primary fibrinolysis

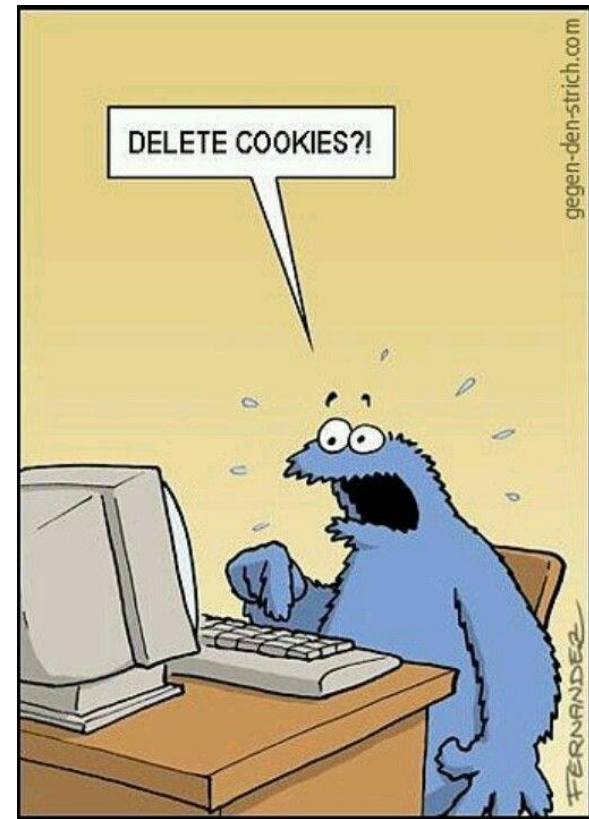
Hypercoagulable

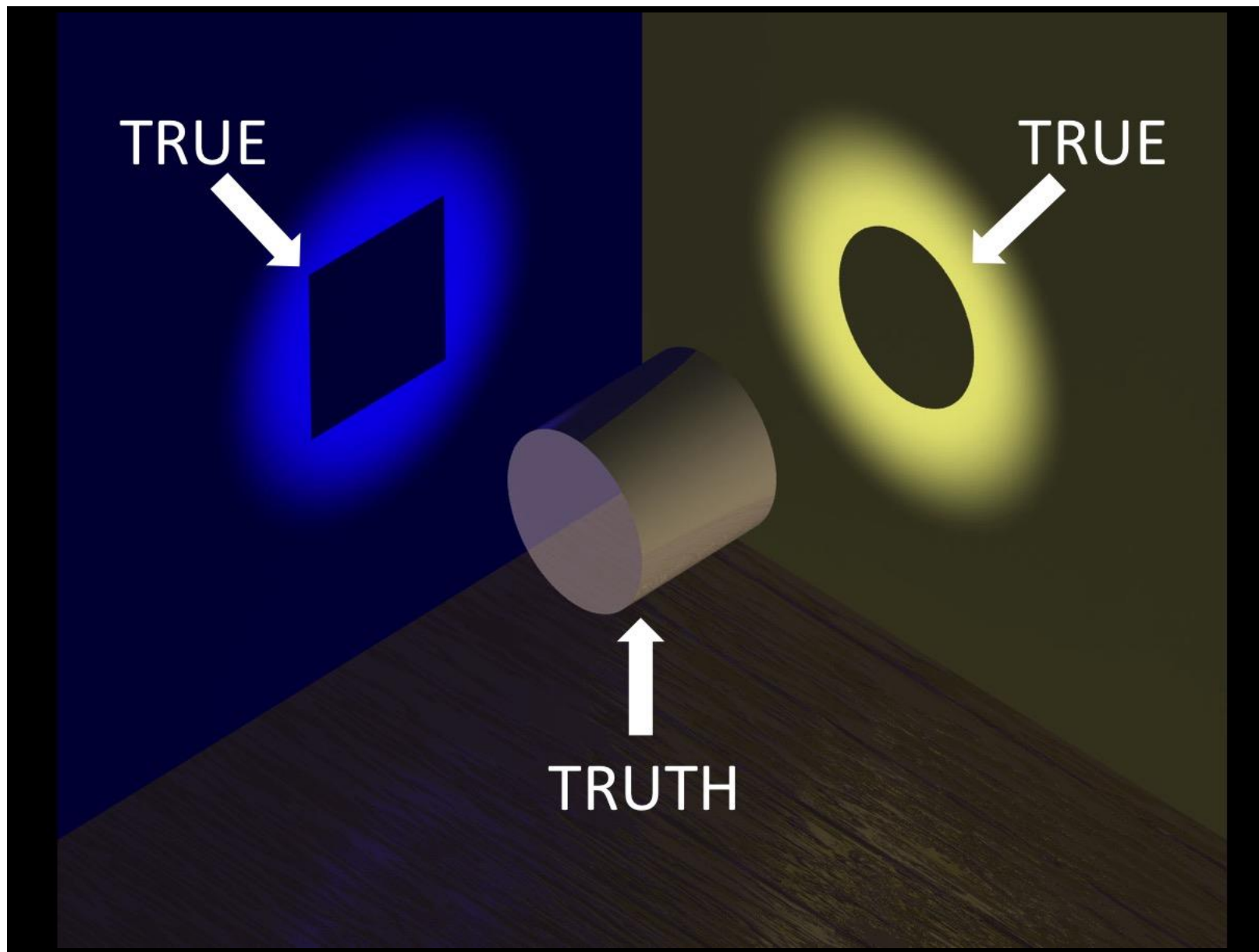
DIC - Stage 1

DIC - Stage 2

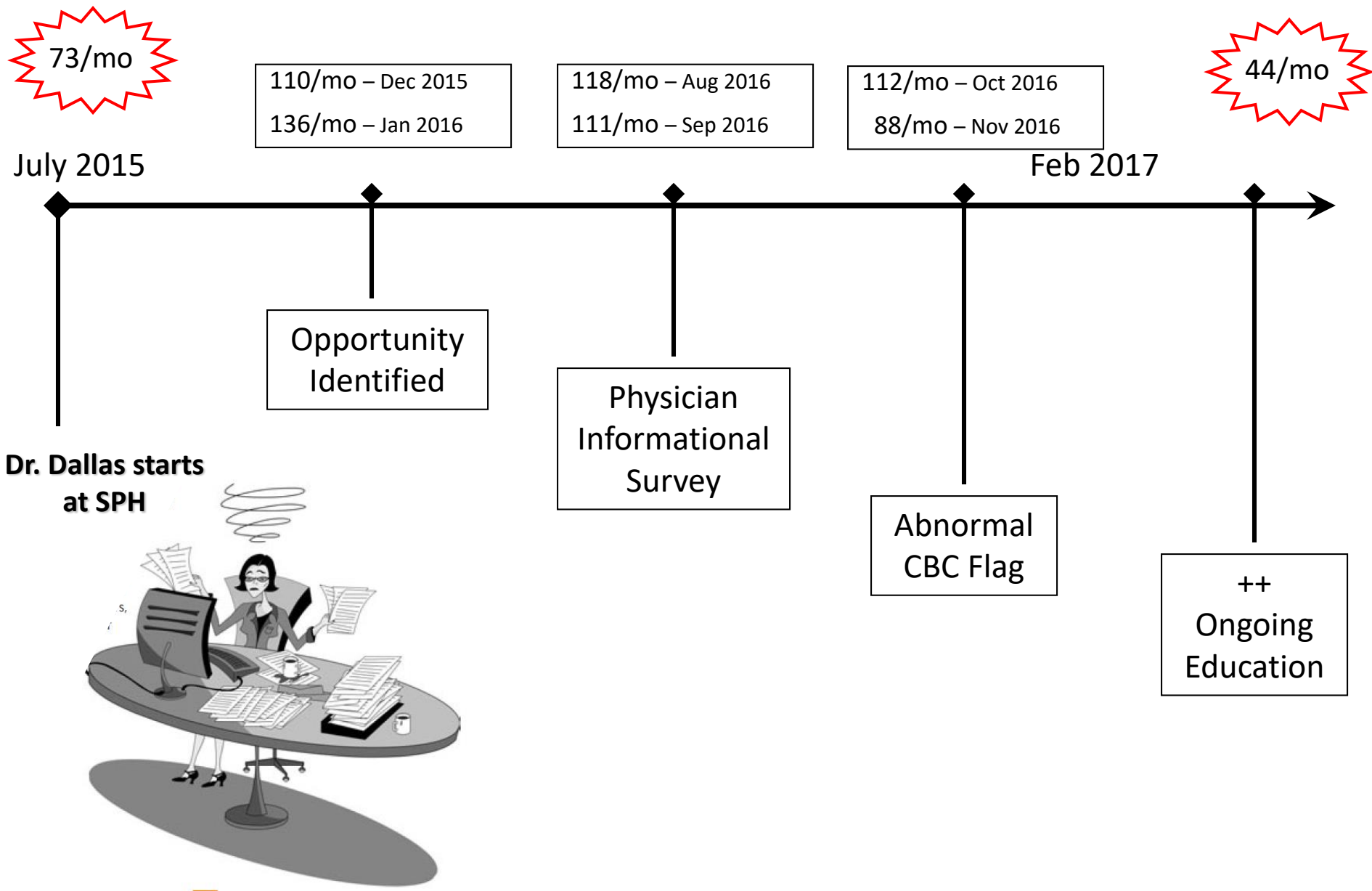
Informational E-survey

- $n = 30$
 - ER Docs
 - ICU Docs
 - GIM Docs
- Results:
 - 73% Do not typically order PBF's
 - 47% Did not know Lab auto-generates PBF's
 - 67% Have received a PBF report when not ordered
 - 7% Unaware
 - Majority felt we could improve!*





Our Stepwise Change Implementation



#2: BM Biopsy “Drill”



ARROW OnControl

Reported Benefits:

- Better specimen quality
- Higher patient satisfaction
 - Less pain during and 24 hours later
 - Less need for repeat procedures
- Time saving
 - Reported 55% faster procedure time!



Questions?

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