

# The Transfusion Decision: A Pillar of Medicine!

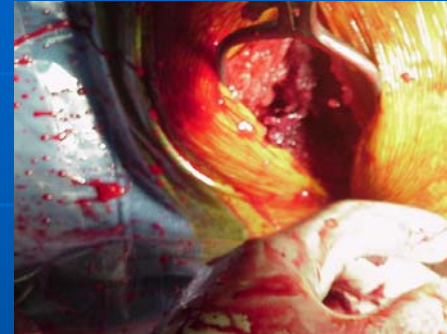
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# There is always a storm lurking somewhere?



# Some decisions are easy! Transfusion is emotional!



# Risk/ Benefit

## ■ Risks

- Immune
- White Cells
- TRALI
- Adverse Outcomes
- ABO-Rh
- Emerging Viruses
- Costs
- Decreased O<sub>2</sub> delivery
- Allergy
- Etc.

## ■ Benefits

- Fresh Blood
- Pediatric Heart
- Historical-Fresh Blood
- Trauma
- Massive Transfusion



# Most Transfusions

- 1-3 units (are they necessary?)
- The transfusion decision is prophylaxis!





# The Transfusion Decision

- No maybe!
- No trial period!
- Deal or No Deal
  - Yes/No



# Transfusion Trigger: History

- 1900-1925 : 3-5gm/dl- cardiac failure/ critical DO<sub>2</sub>
- 1925-1939: 5-7gm/dl- focus on prophylaxis
- 1930: Nobel Prize in Medicine: Landsteiner for histocompatibility
- **1937-1987: 10gm/dl- John Lundy, MD**
- 1987-2006: 7-10gm Consensus Conference, ASA, ACS etc.
- 2006: 6gm/dl. ASA revised guidelines.



# The Religion of 10





# Transfusion Paternalism

- Trust me, I'm a doctor!
- "Your doctor will decide if you need a transfusion."
- "We will transfuse you if we think you really need it."
- Sept. 2002-CDC warning. Tx. utilization, no change!
- What is true informed consent?



# Growth of Transfusion During Hepatitis Epidemic

Year	1971	1982	1986	1987
Tx $10^6$				
Red Cells	6.32	11.47	12.16	12.06
Platelets	0.41	4.18	6.30	7.26
Plasma	0.18	1.95	2.18	2.16

# National Transfusion Hepatitis Study-JAMA 1972;220:692-701

- Study of 300,000 patients with post transfusion hepatitis.
- 15,000 annual hospitalizations.
- Deaths-950/year.
  
- **Critical Question: Who needed to be transfused!**



# Hepatitis Epidemiology and Tx

- 1970-1980's 7-17% sero-conversion US, 2-3% in Australia and 45% in Japan
- 42.5%-70% with elevated ALT develop chronic active disease.
- 20% develop cirrhosis
  
- Times: 13.6 years to chronic active hepatitis, 17.8 years to cirrhosis, 23.4 to hepatocellular carcinoma



# Hepatitis

- How many have died?
- Most die before they develop cirrhosis
- When was the last time you cared for a patient with transfusion contracted cirrhosis?
- Perhaps the largest iatrogenic epidemic





# A Few Words About Risks

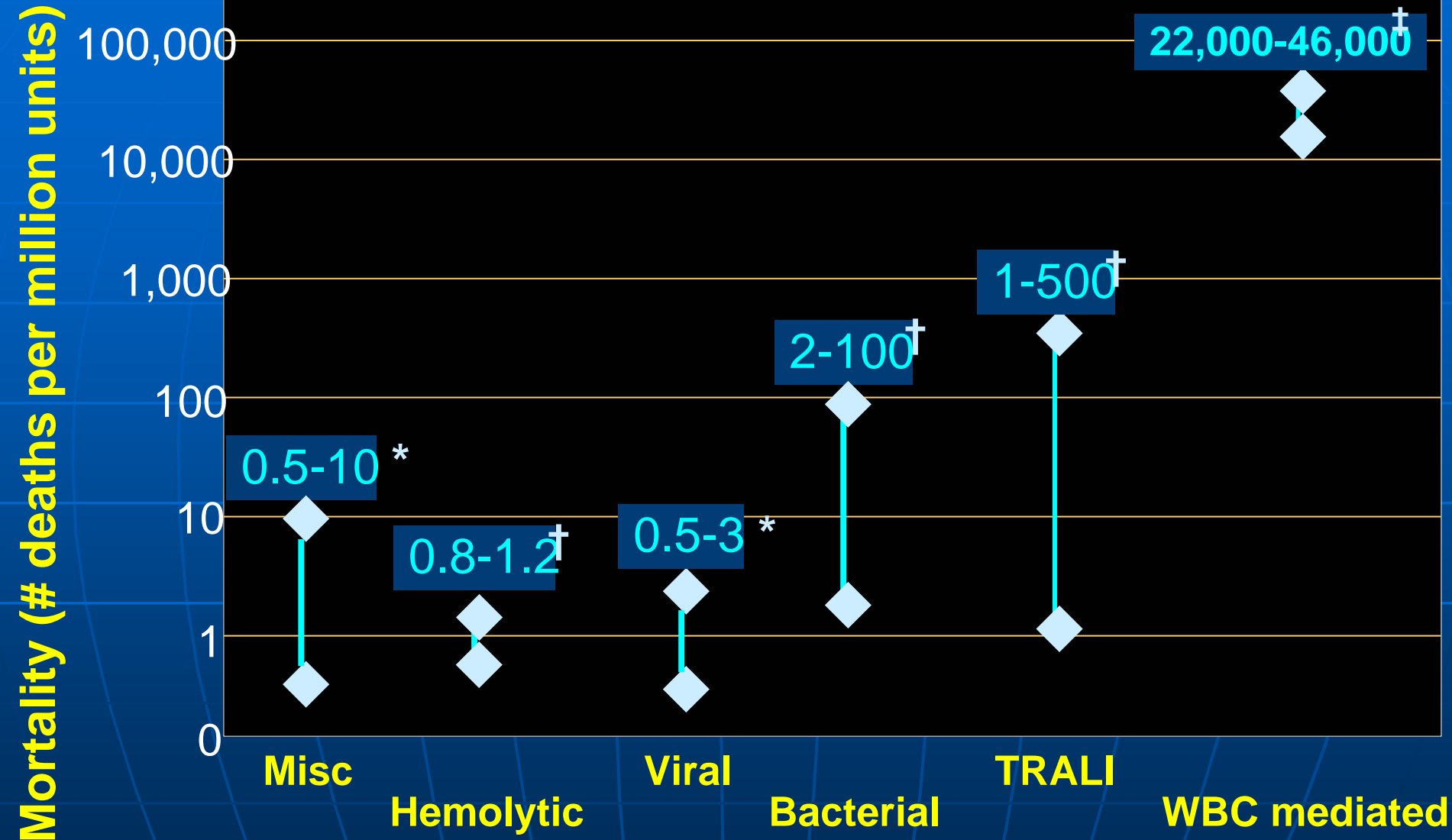


# Older Blood is Associated with Adverse Outcomes in Reop Cardiac Surgery!

- 432 Pts, Reop CABG or Valve
- **After correction for confounders oldest blood was associated with in- hospital mortality (hazard ratio 1.151  $P < 0.0001$ ) and out-of-hospital mortality (1.116  $P < 0.0001$ ).**
- **Association between renal failure, length of stay and ICU stay.**
- Basran S et al. The association between duration of storage of transfused red blood cells and morbidity and mortality after reoperative cardiac surgery. *Anesth Analg* 2006;103-15-20.



# Leading Causes of Transfusion-related Mortality



Misc: Allergic, TA-GVHD, Metabolic, Fe overload

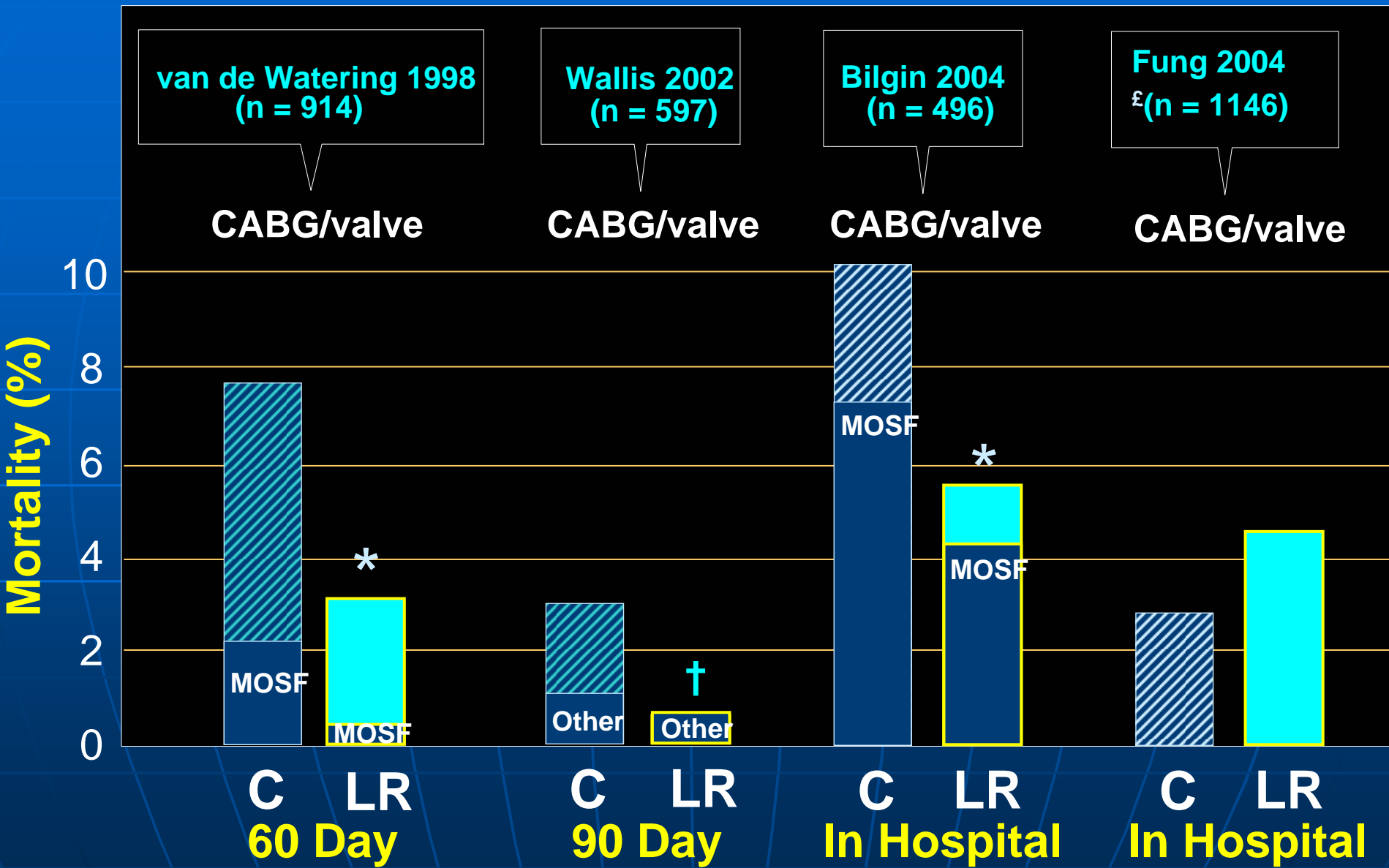
WBC mediated: MOSF, TRIM, end-organ injury

\* Mathematical estimates

† Reported (literature or FDA)

‡ Prospective, randomized studies

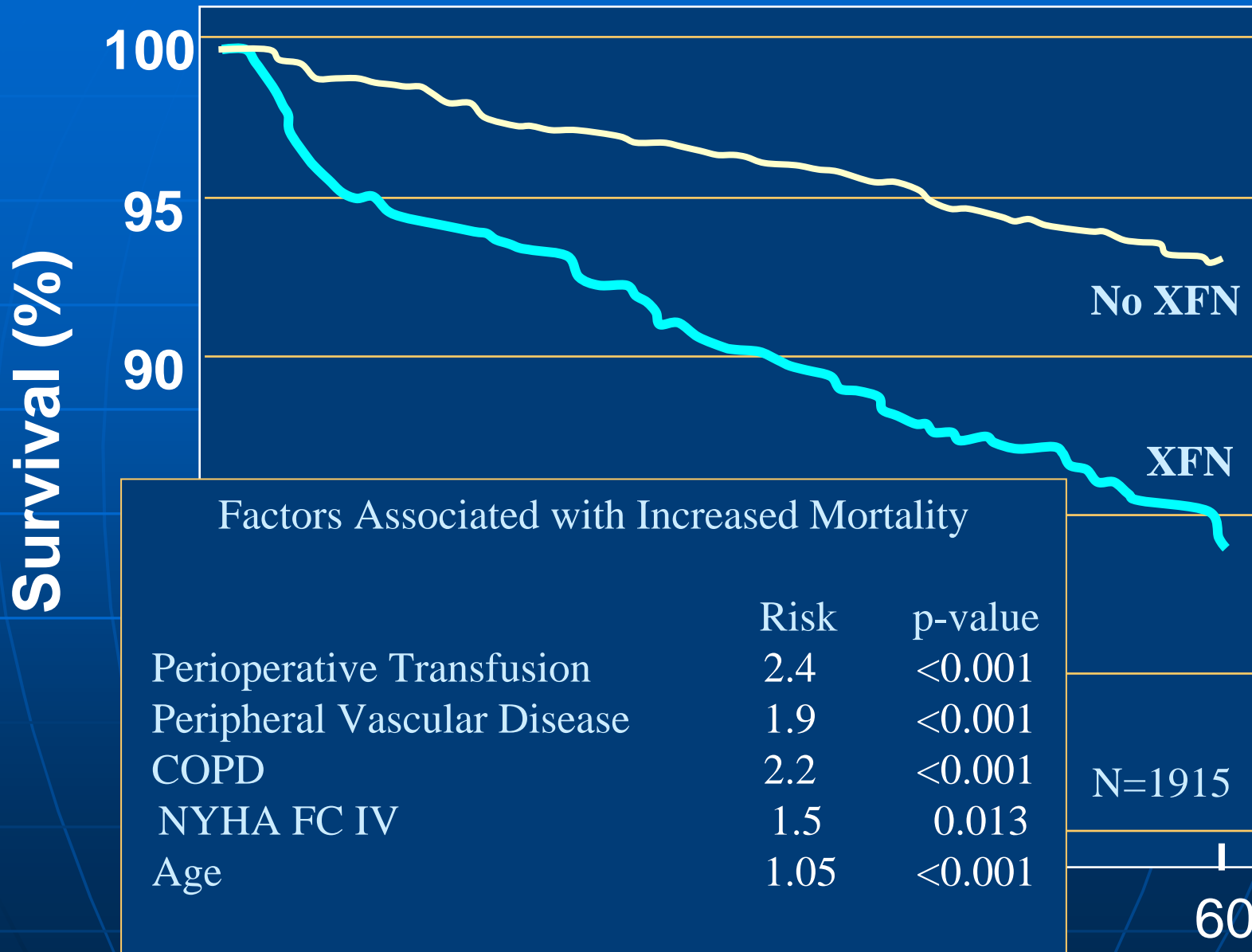
# EFFECT OF RED CELL TRANSFUSION ON MORTALITY



\*  $p < 0.05$ , †  $p = 0.11$  (need to enroll 1174 pts to detect an 80% decrease)

£ Non-randomized trial

# Effect of Transfusion on Long-term Survival



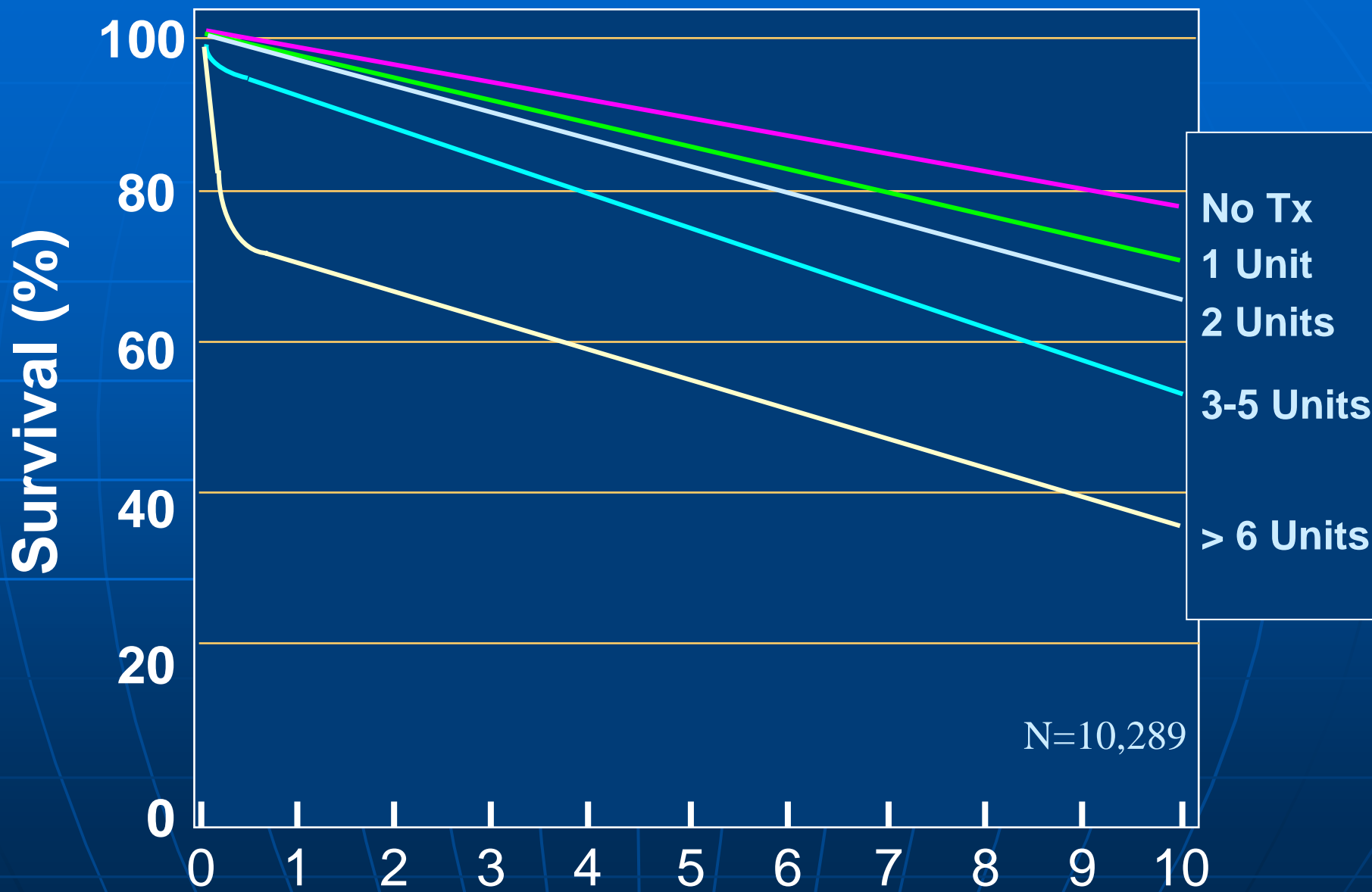


# Quality of Life

- 1995-1999 – 12,536 Pts. Cleveland Clinic
- Duke Activity Status Index, 6 and 12 months
- **Quality of life was incrementally worse the more perioperative red cells transfused ( $P < 0.0001$ ), platelets ( $P < 0.02$ ).**
- Koch CG et al. Persistent effect of red cell transfusion on health-related quality of life after cardiac surgery. *Ann Thorac Surg* 2006;82:13-20.



# Effect of Transfusion on Long-term Survival



N=10,289

# Blood Conservation

- Requires planning
- Must be patient individualized
- Consensus amongst service providers
- **Every drop of blood is precious!**



# Techniques

- **Anemia/ Transfusion Trigger**
- Meticulous Surgical Hemostasis
- Cell Saver
- Post Op Salvage
- **Erythropoietin**
- Anesthetic Techniques (Deliberate Hypotension, Regional)
- **Euvolemic Hemodilution**
- Autologous Pre-Donation
- **RAP**
- Enhanced Coag Testing (TEG, PT, aPTT Plt, Fib)
- Utilize Coag Algorithm
- **Aprotinin (Hearts, Ortho, Neuro, Trauma ???)**
- DDAVP
- Amicar/Tranexamic Acid
- Critical Care (limit blood draws)
- Other New Agents (Bivalirudin, New Serine Protease Inhibitors)



# Aprotinin and Plavix

- **Prospective:** van der Linden, Lindall, Sartipy. Aprotinin decreases postoperative bleeding and number of transfusions in patients on clopidogrel undergoing coronary artery bypass graft surgery: double-blind, placebo controlled randomized clinical trial, *Circulation* 2005;112:1276-0.
- **Retrospective:** Lindavall, Sartipy, van der Linden. Aprotinin reduces bleeding and blood product use in patients treated with clopidogrel before coronary artery bypass grafting, *Ann Thorac Surg* 2005;80:922-7.





# Personal Experience

- 3 JW patients to Hgb < 3gm/dl.
- 1 JW to 1.2 gm/dl.
- All survived without organ damage!
- Coronary disease patients who have ischemia relieved!



# Transfusion Decision: It will change a life!

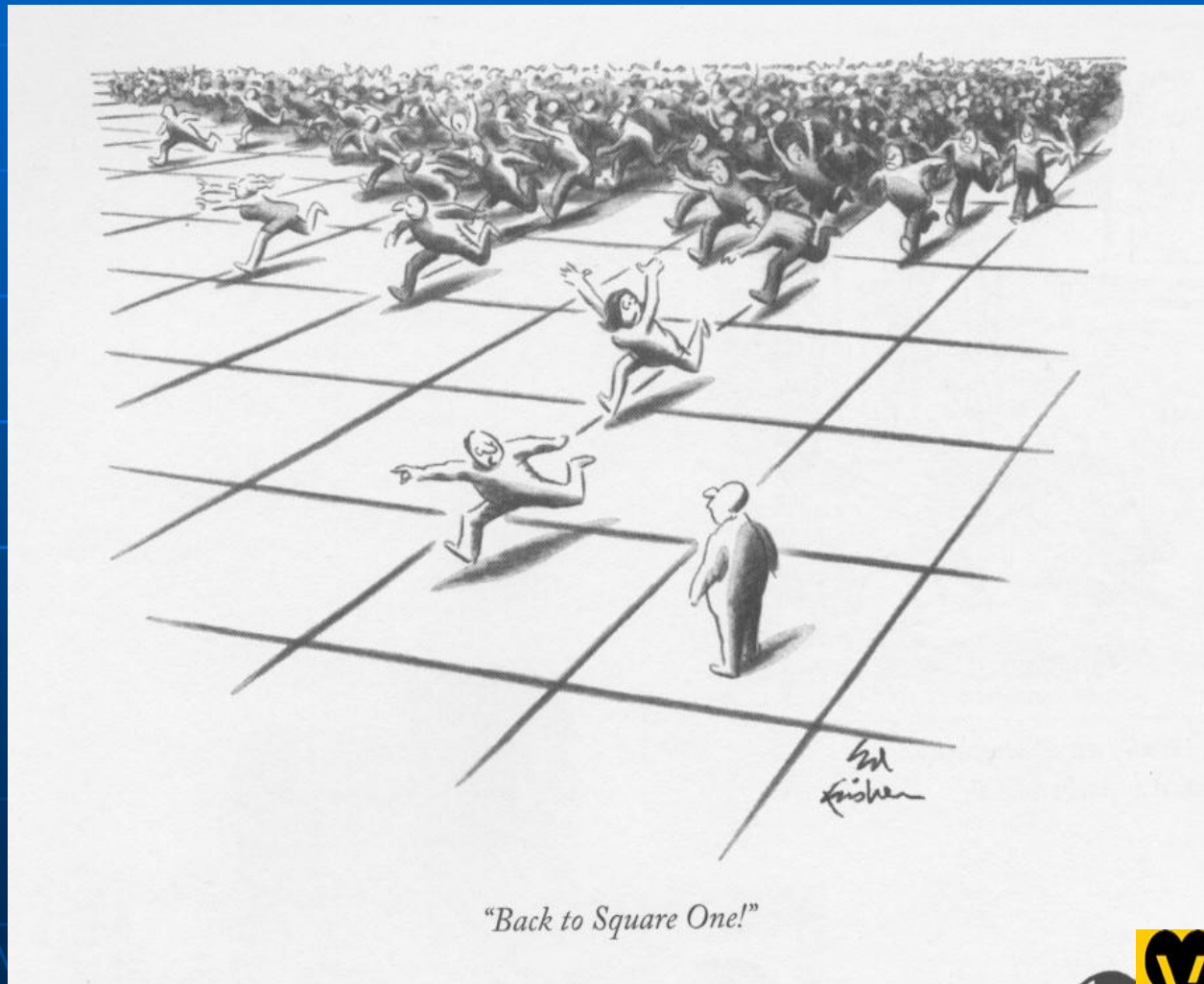
- What is the “best” transfusion trigger?
- **3,5,7,10 Arbitrary!**
- Should it be something other than Hgb/Hct?
- **You have to decide!**



# Transfusion Changed These Lives?

- Arthur Ashe: Transfused for a Hgb. of 8.9gm/dl. **Died of HIV/AIDS!**
- Jackie Kennedy: Transfused when John was born. **Died of non-Hodgkins Lymphoma!**
- **Therapy or Safety Net?**

# What to Do? - Research!



# Lead or Follow/ Learn/Question: What is the Truth?





# Lead or Follow/ Learn/Question: What is the Truth?



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