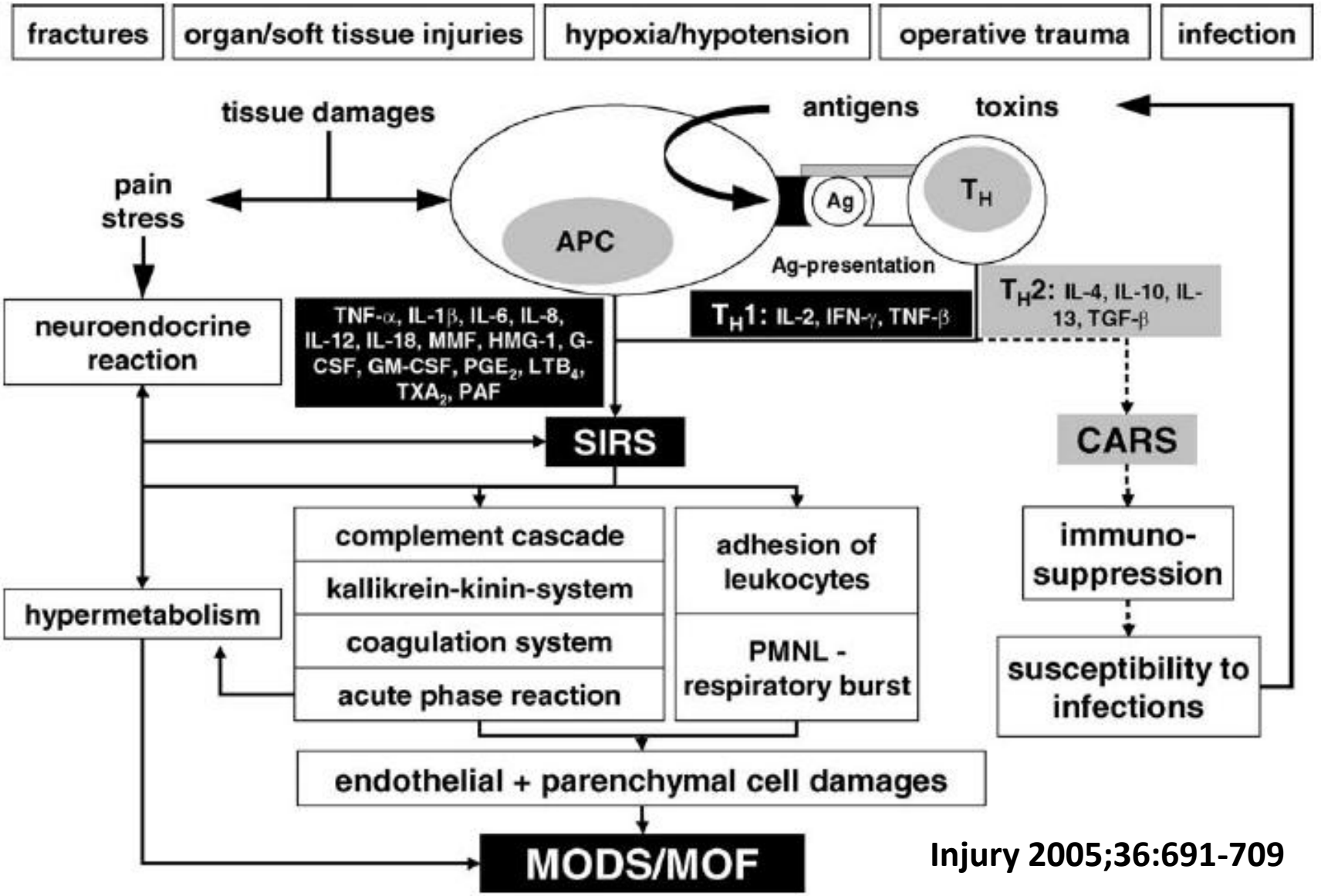
WHO SHOULD BE THE CAPTAIN OF THE SHIP IN POLYTRAUMA SETTING?

MUST BE THE GENERAL SURGEON: THE ULTIMATE TRAUMA SURGEON

Dr MS MOENG

PRETORIA CONTROVERSIES
10-11 OCT 2014

TRAUMA IS A SYSTEMIC DISEASE !!

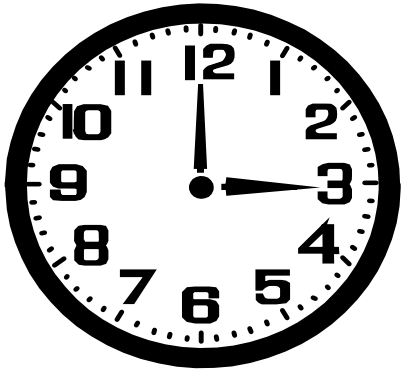


Injury 2005;36:691-709

TWO MAJOR CAUSES OF EARLY MORTALITY

- Severe head injury

- Exsanguination
  - Compressible bleeding
  - Non-compressible bleeding



GOOD TRAUMA SYSTEM

- Expedite trauma care from time of injury to definitive care
  - Prehospital
  - **Acute hospital care (ED, Theatre, ICU & Ward**)
  - Rehabilitation

Injury 2014 Morrisey et al : Better outcome in major centres

Orthopaedic Training in RSA

- Three phases of Training
  - Undergraduate (more didactic)
  - Post Graduate (Registrar)
  - Super specializations (Fellowship)
- 50% of Trauma is orthopaedic

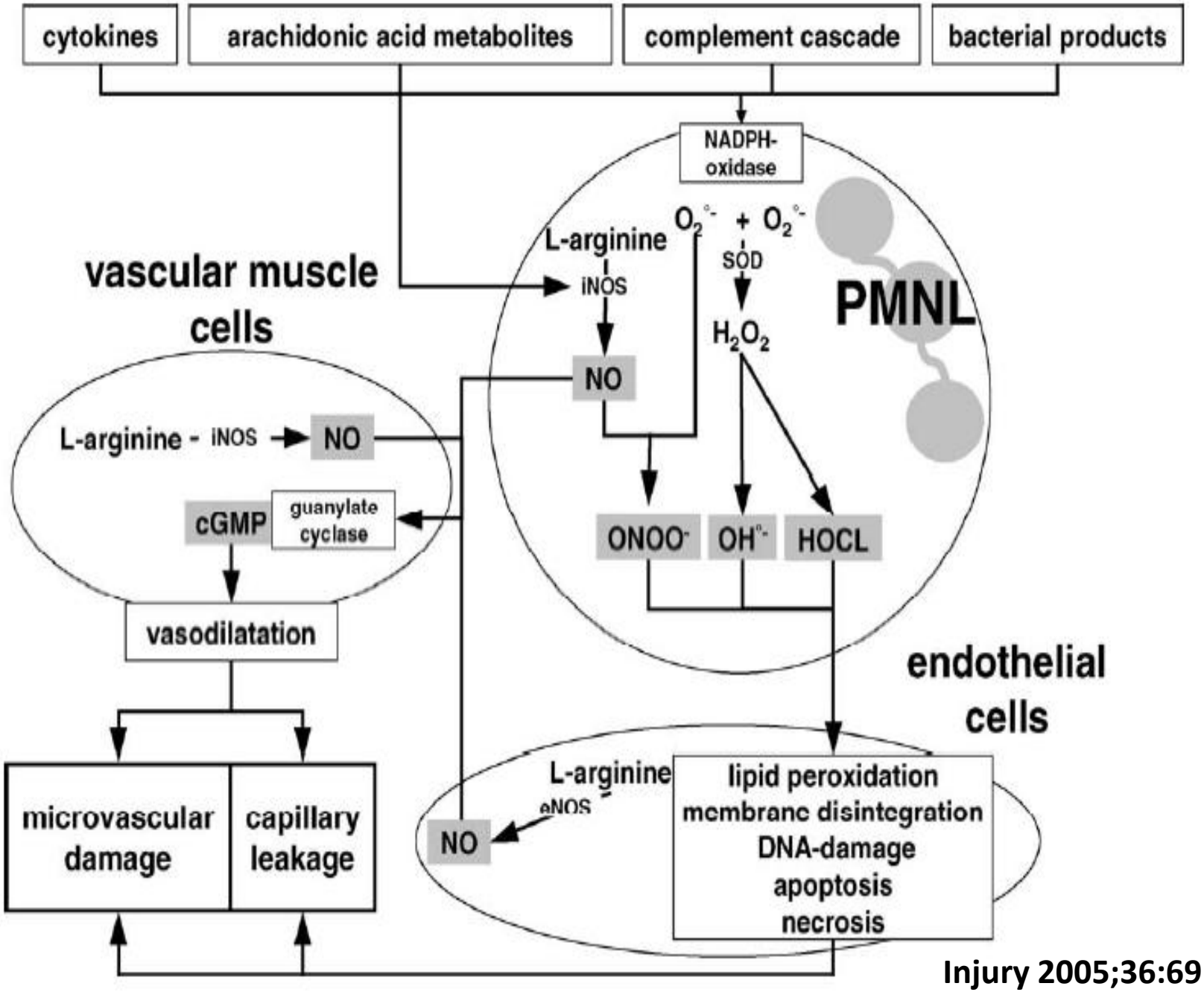
MESSAGE FROM THE PRESIDENT

Orthopaedic training in South Africa

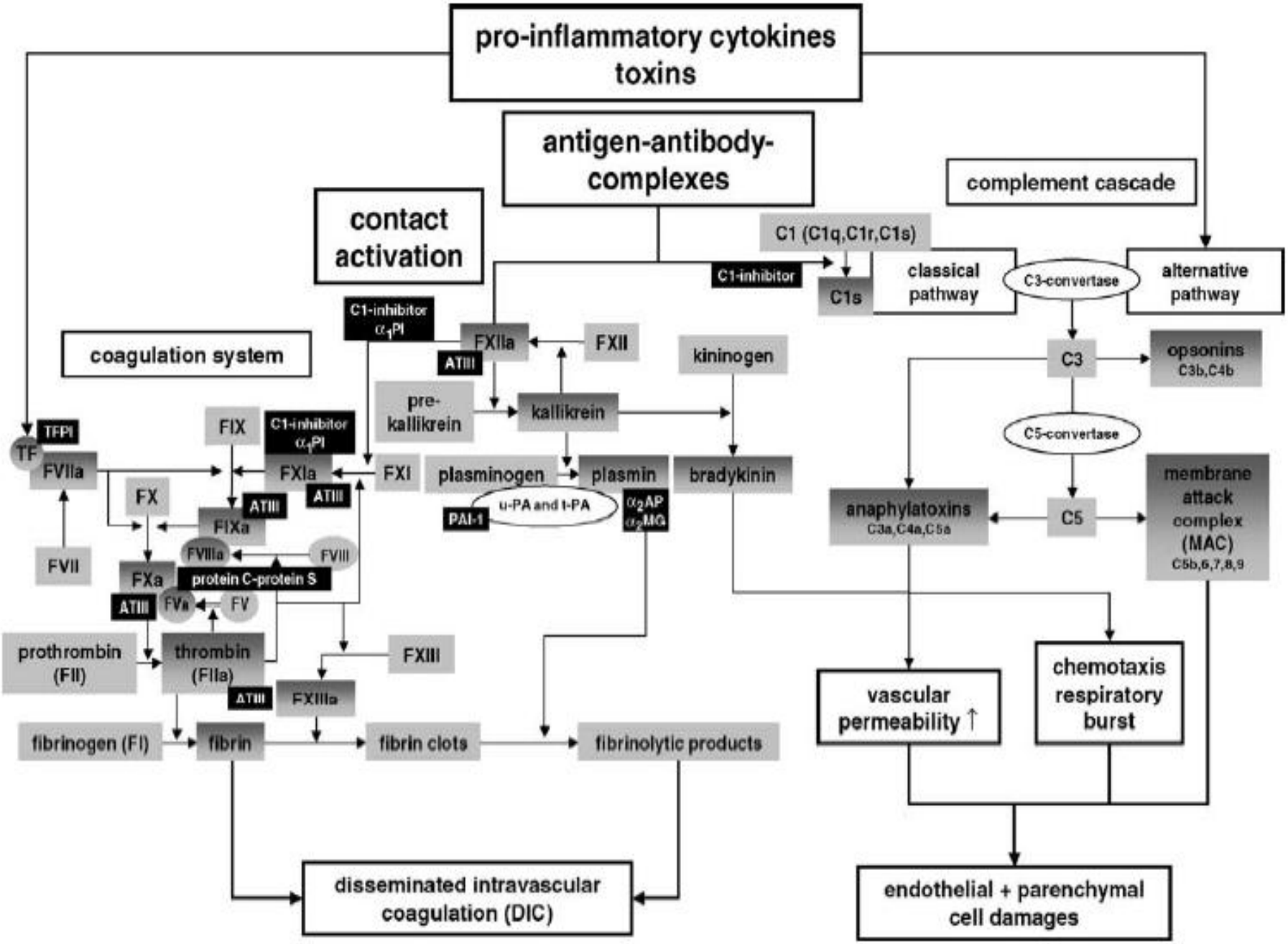
SA Orth Journal 2010

Advantages of General Surgical Training

- At least 60 months in surgical disciplines
- ICU exposure including Trauma rotation
- Disciplines that encourage a holistic approach to care
  - Vascular rotation
  - Trauma rotation
  - Hepatobiliary
  - GIT rotation
- Better prepared to deal with critical care decisions necessary in major polytrauma



Injury 2005;36:691-709


pro-inflammatory cytokines toxins
antigen-antibody-complexes
contact activation
complement cascade
C1 (C1q,C1r,C1s)
C1-inhibitor
C1s
classical pathway
C3-convertase
alternative pathway
coagulation system
C1-inhibitor α_1PI
FXIIa
ATIII
FXII
kininogen
C3
opsonins C3b,C4b
pre-kallikrein
kallikrein
C5-convertase
TFPI
TF
FIX
C1-inhibitor α_1PI
FVIIa
FXIa
FXI
plasminogen
plasmin
bradykinin
FX
ATIII
ATIII
PAI-1
u-PA and t-PA
α_2AP
α_2MG
anaphylatoxins C3a,C4a,C5a
C5
membrane attack complex (MAC) C5b,6,7,8,9
FIXa
FVII
FVIIIa
FVIII
FXa
protein C-protein S
ATIII
FVa
FV
prothrombin (FII)
thrombin (FIIa)
FXIII
ATIII
FXIIIa
vascular permeability ↑
chemotaxis respiratory burst
fibrinogen (FI)
fibrin
fibrin clots
fibrinolytic products
disseminated intravascular coagulation (DIC)
endothelial + parenchymal cell damages

Trauma team approach

- Allows for horizontal distribution of work
- Shown to have better outcomes
- Leader is essential in co-ordinating the team

BJA 2014; 113 (2): 258–65 Groenestege-Kreb
J Trauma 1999; 47: 576–81 Khetarpal et al
Injury 1992; 23: 107–10 Driscoll et al
Postgrad Med J 1996; 72: 587–93 Adedeji et al

It matters who leads the Trauma Team!

TABLE 2. Factors Predicting Missed Injury

Variable	Overall	Missed Injury	No Missed Injury	*p*
n (%)	300 (100)	46 (15)	254 (85)	–
Age, mean (SD), y	42.43 (19)	42.43 (20)	42.42 (18)	0.87
Male sex, n (%)	217 (72)	38 (84)	179 (71)	0.053
ISS, mean (SD)	**27.5 (11)**	**29.6 (11)**	**25.4 (11)**	**<0.01**
MAIS head, mean (SD)	3.63 (1.2)	3.77 (1.3)	3.48 (1.2)	0.26
MAIS thorax, mean (SD)	**3.46 (0.88)**	**3.67 (0.84)**	**3.24 (0.92)**	**<0.01**
MAIS abdomen, mean (SD)	2.64 (0.66)	2.55 (0.62)	2.72 (0.71)	0.15
Surgeon as TTL, n (%)	**150 (50)**	**16 (35)**	**134 (53)**	**0.02**
Nonsurgeon TTL, n (%)	**150 (50)**	**30 (65)**	**120 (47)**	**0.02**
High-volume TTL, n (%)*	221(74)	31 (67)	190 (75)	0.29
Day time arrival, n (%)	128 (43)	21 (46)	107 (42)	0.66

2956 Resusces: 15% missed injury rate in 300, 5% significant
J Trauma Acute Care Surg. 2013;00: 387-390. Leeper et al

We can all enhance our skills!

Table 2. Communication and Teamwork Skills Metrics: Improved Post Implementation

Observation metric	Pre-CRM (n = 25), %*	Post-CRM (n = 38), %*	p Value
Briefing	40	89	<0.0001
Verbalize plan of care	44	89	<0.0001
Establish team leader	12	82	<0.0001
Assign roles	4	89	<0.0001
ED gives patient summary to trauma personnel	48	84	0.0021
Request external resources if needed	12	87	<0.0001
Ask for help from team as needed	28	68	0.0016
Cross monitoring	16	87	<0.0001
Closed loop	8	76	<0.0001
Verbal updates-think aloud	8	71	0.0007
Use names	8	84	<0.0001

Crew Resource Management Program tailored for Resus
J Am Coll Surg 2014;219:545-551 Hughes et al

Expectations of team co-ordination

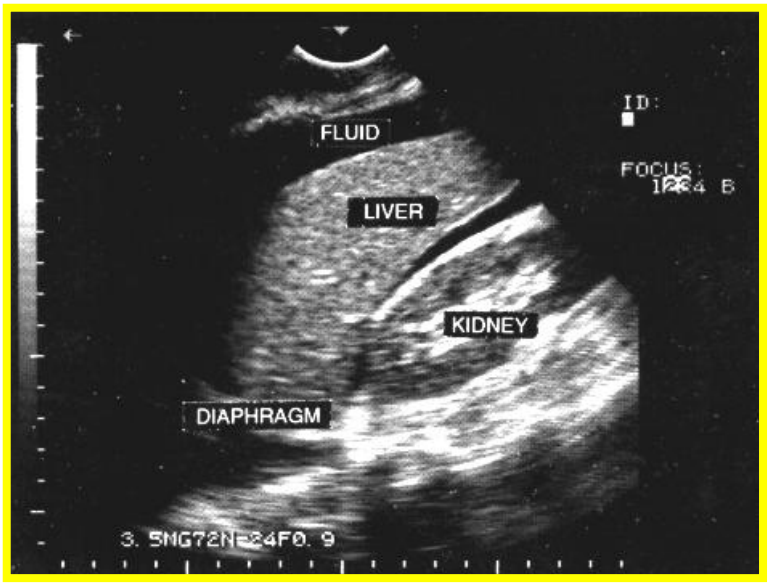
Table 3. Communication and Teamwork Skills Metrics: No Change after Intervention

Observation metric	Pre-CRM (n = 25), %*	Post-CRM (n = 38), %*	p Value
Verbalize expected time frames	0	6	0.5135
Visually scan environment	96	100	0.3968
Verbalize adjustments in plan as changes occur	4	13	0.3885
Verbally request team input	8	5	0.5220
Verbal assertion	0	5	0.5135
Escalation of asserted concern	0	5	0.5135
Receptive to assertion and ideas	0	8	0.2703
Appropriate volume and tone of voice	100	92	0.2703
Critical language	0	3	1
Trauma staff pay attention to EMS report	92	100	0.1536

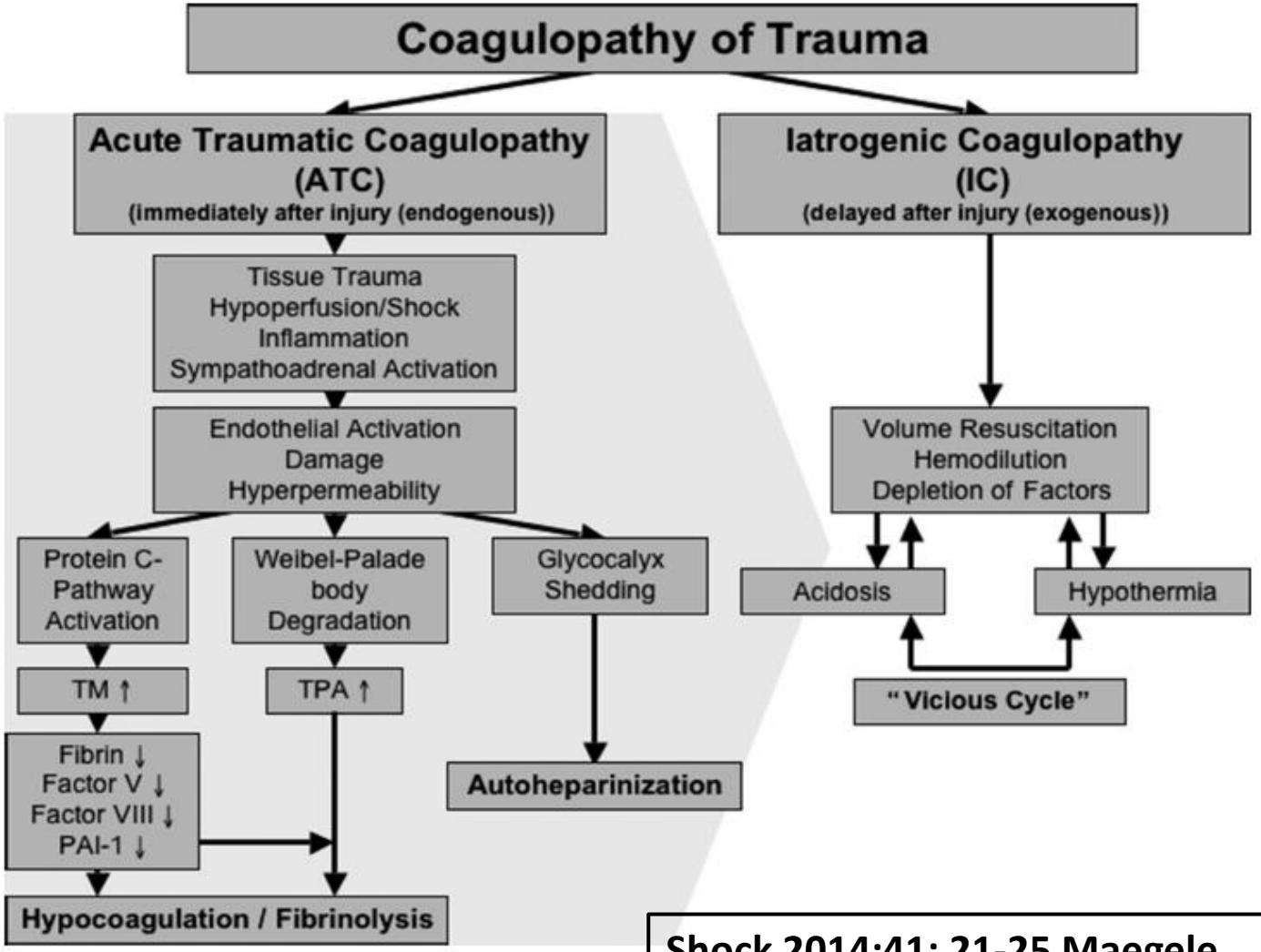
J Am Coll Surg 2014;219:545-551 Hughes et al

Leadership requirements

- Good communication skills
- Good judgement
- Excellent knowledge about the task at hand
- Ability to prioritize
- etc. etc.



Understanding Trauma Coagulopathy is key

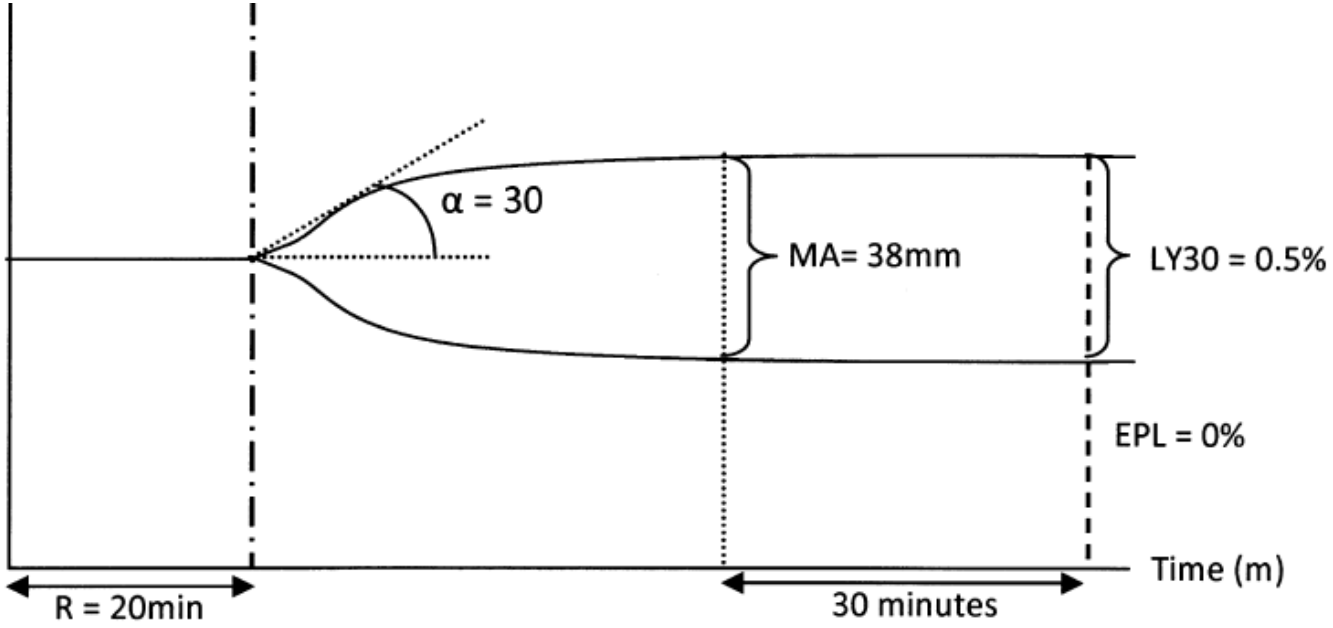


Shock 2014;41: 21-25 Maegele

TEG-guided resuscitation is superior to standardized MTP resuscitation in massively transfused penetrating trauma patients

J Trauma Acute Care Surg 2013;74:378-386

Nicole M. Tapia, MD, Alex Chang, MD, Michael Norman, MD, Francis Welsh, MD, Bradford Scott, MD, Matthew J. Wall, Jr., MD, Kenneth L. Mattox, MD, *and* James Suliburk, MD, *Houston, Texas*



R time (mm)
- 7-10: 1 unit FFP or 4ml/kg
- 11-14: 2 units FFP or 8ml/kg
- >14: 4 units FFP or 16ml/kg

MA (mm)
- 48-54: 0.3mcg/kg DDAVP
- 41-48: 5 units platelets
- ≤ 40: 10 units platelets

Alpha (degree)
- < 45: 0.6u/kg cryoprecipitate

EPL (percent)
- ≥ 7.5: give fibrinolytic of choice

-165 patients
-TEG better guide than MTP alone

Damage Control Resuscitation

- Resuscitation is limited to keep blood pressure at ~90 mm Hg
- Stop the bleeding !!!!
- Start resuscitation early with FFP
- Ratio of 1:1:1 for PRBC/FFP/Platelets as a start
- Fresh whole blood if available

Timing of the DCS

- Time to laparotomy for intra-abdominal bleeding from trauma affects survival
- 1% increase in mortality for each 3 minutes beyond 90 minutes
- Key: triage for DCS earlier

J Trauma 2002 Mar;52(3):420-425

There is hope though!!

Becoming the "Captain of the Ship" in the OR

Timothy S. Achor, MD and Jaimo Ahn, MD, PhD†*

TABLE 1. How to Be a Leader in the OR

Lead by example
Treat others with respect
Do not shout at people
Do not swear at people
Don't throw anything (especially at anyone…)
It's not a race. Take your time
Be a facilitator
Be approachable
Let your work speak for itself
Be open to suggestions
Admit to your failures
Know your limitations
Treat others as you would want to be treated

J Orthop Trauma 2014;28:S18–S19

Yes there are challenges in Surgical Training as well

- The exposure to advanced skills (laparoscopy/endovascular work)
- Perception of deteriorating training for younger trainee

S Afr J Surg 2014;52(3):67-71 De Beer
S Afr J Surg 2014;52(3):66. Smith

The need for properly Trained Trauma Surgeons

- A 2 year fellowship
- Surgical decision making including ICU care
- Appropriate examination and certification
- To have an impact on the Trauma System not just an individual unit