

Predictive factors associated with bleeding control in multiple trauma patients with massive transfusion

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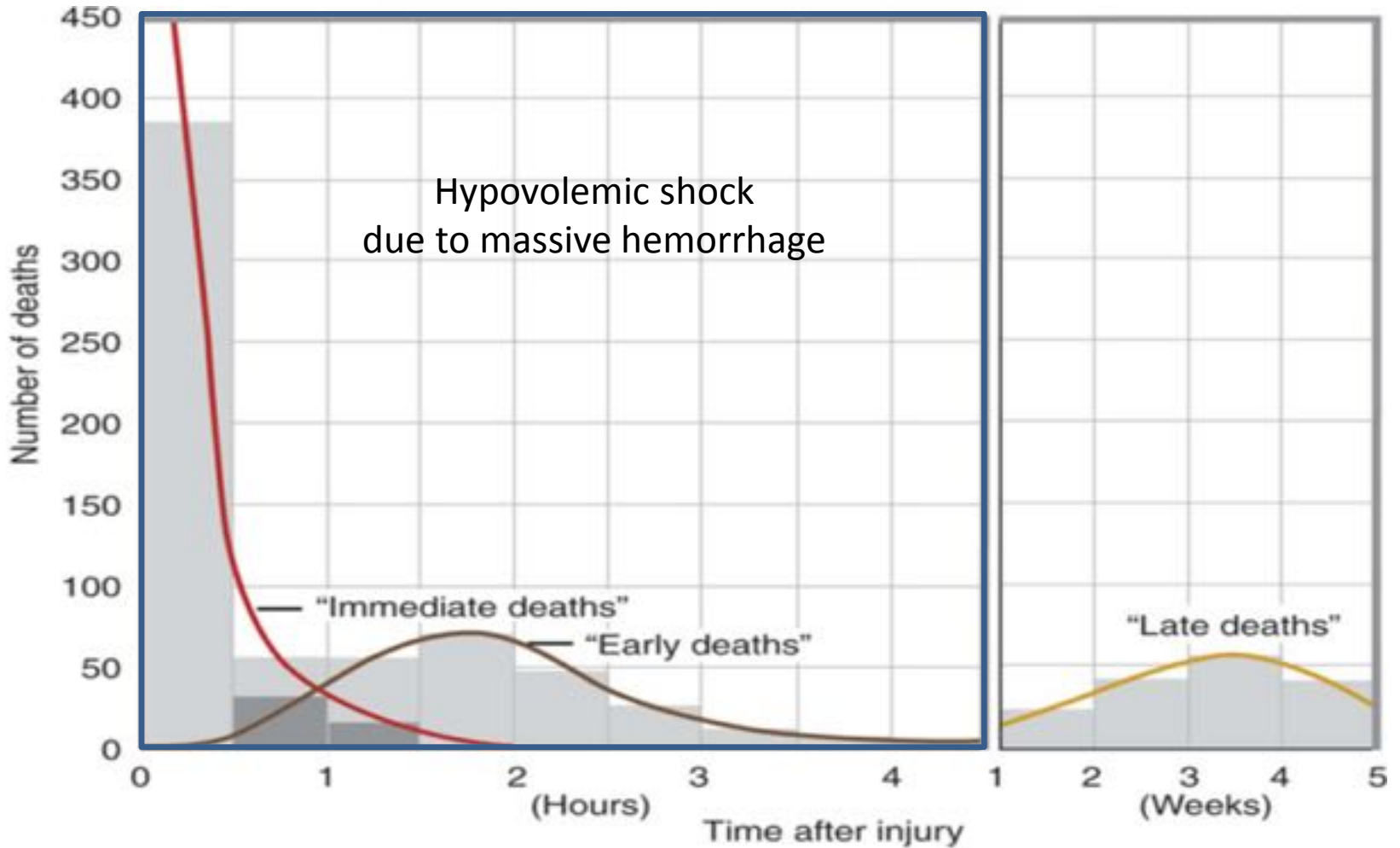


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INTRODUCTION



Trimodal distribution of trauma deaths

BACKGROUND

- ✓ Traumatic injury is the leading cause of mortality in patients aged 15-44.
- ✓ Uncontrolled hemorrhage is accountable for more than 50% of all trauma-related deaths within the first 48 hours following hospital admission.
- ✓ Majority of these deaths occur within the first few hours.
- ✓ Up to 20% of deaths after trauma might be preventable.

BACKGROUND

- ✓ Surgical intervention and transfusion of blood product is the current recommended management for control of severe bleeding, Majority of that patients can require massive transfusions.
- ✓ Early recognition and adequate aggressive management reduce mortality and improve outcome in severely injured bleeding patients.
- ✓ This study is to identify clinical predicting factor affecting the outcome of bleeding control in multiple trauma patients with massive hemorrhage.

*The treatment of bleeding is to stop the bleeding. Treatment of trauma-related hemorrhage.
Boffard et al transfusion 2009;49:240S-247S.*

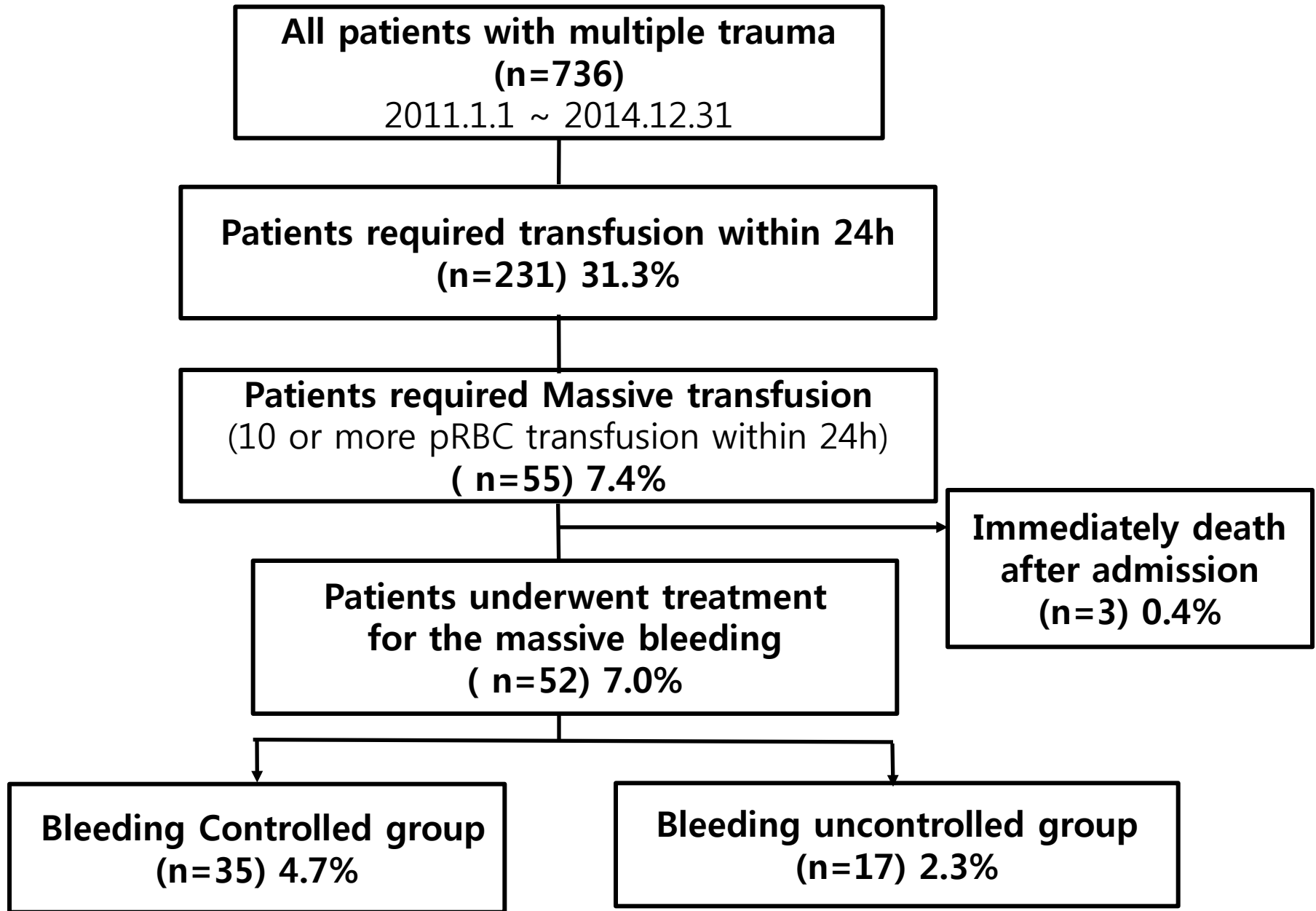
METHODS

Patients

- ✓ 55 of multiple trauma patients with massive bleeding underwent 10 or more PRBC transfusion within 24 hours (except 3 immediately death at admission)
- ✓ Asan medical center, Seoul
- ✓ from January 1, 2011 to December 31, 2014

Study design

- ✓ Retrospectively collected data
- ✓ Comparison between bleeding controlled group and uncontrolled group



Methods

- ✓ Characteristics

 - Sex, Age, Trauma mechanism , Injury site, Injury severity score (ISS)

- ✓ Initial clinical factors of patients

 - Initial vital sign, laboratory data

- ✓ Amounts and component of transfusion

- ✓ Surgical and angiographic intervention for the bleeding focus

Table 1. Characteristics of the multiple trauma patients with massive bleeding

	Bleeding controlled group (n=35)	Bleeding uncontrolled group (n=17)	P value
Age (years)	47.6 ± 19.2	49.0 ± 19.7	0.812
Sex			
Male	26 (74.3%)	8 (47.0%)	0.053
Female	9 (25.7%)	9 (53.0%)	
Mechanism of the accidents			
Traffic accidents	19 (54.3%)	10 (58.8%)	0.912
Falldown	7 (20.0%)	4 (23.6%)	
Workings	5 (14.3%)	2 (11.7%)	
Uncatergorized	4 (11.4%)	1 (5.9%)	
Injury location			
Neck	2 (5.7%)	0 (0.0%)	0.065
Chest	7 (20.0%)	3 (17.6%)	
Abdomen	8 (22.8%)	8 (47.2%)	
Pelvis	10 (28.7%)	3 (17.6%)	
Ext	7 (20.0%)	0 (0.0%)	
Intracranium	1 (2.8%)	3 (17.6%)	
ISS (Injury severity score)	34.6 ± 14.4	51.1 ± 16.5	0.001
Time from the accident to admission (mins)	159.1 ± 227.0	59.0 ± 89.1	0.027

Table 2. comparison for initial vital signs and clinical data in multiple trauma patients

	Bleeding controlled group (n=35)	Bleeding uncontrolled group (n=17)	P value
GCS	11.0 ± 4.9	5.5 ± 4.8	0.000
Shock (at arrival)	18 (51.4%)	14 (82.3%)	0.032
pH	7.22 ± 0.21	7.16 ± 0.22	0.400
Lactate (mmol/l)	6.8 ± 3.7	7.3 ± 4.0	0.577
Hb (g/dl)	11.4 ± 3.4	11.3 ± 3.6	0.925
Hct (%)	32.5 ± 10.1	33.8 ± 10.4	0.681
PLT (x10 ³)	189.4 ± 70.5	188.0 ± 75.2	0.950
INR (>1.5)	9 (25.7%)	7 (41.1%)	0.257
aPTT(s) (>60s)	3 (8.5%)	5 (29.4%)	0.032

Table 3. Amounts and ratio of the transfusion within 24h after admission

	Bleeding controlled group (n=35)	Bleeding uncontrolled group (n=17)	P value
Transfusion			
Total transfusion	42.9 ± 36.3	71.5 ± 56.1	0.031
PRBC	19.0 ± 11.1	32.5 ± 23.9	0.040
FFP	12.5 ± 12.5	20.7 ± 20.7	0.084
PC	11.2 ± 16.0	18.2 ± 17.1	0.159
Ratio			
FFP:PRBC			
≤ 0.6	22 (62.8%)	5 (29.4%)	0.024
> 0.6	13 (37.2%)	12 (70.6%)	
PC:PRBC			
≤ 0.6	23 (65.7%)	8 (47.0%)	0.198
> 0.6	12 (34.3%)	9 (53.0%)	
Time from admission to initial transfusion (mins)	87.2 ± 49.2	49.2 ± 45.4	0.295

Table 4. Interventions for the bleeding site control

	Bleeding controlled group (n=35)	Bleeding uncontrolled group (n=17)	P value
Intervention	27 (77.1%)	15 (88.2%)	0.341
Type of the intervention			
Surgery	18 (51.4%)	6 (35.3%)	0.152
Embolization	6 (17.1%)	8 (47.2%)	
Surgery & embolization	3 (8.5%)	1 (5.8%)	
no intervention	8 (22.8%)	2 (11.7%)	
Time from admission to the intervention (mins)	429.8 ± 359.4	165.3 ± 98.4	0.001

Table 5. univariate analysis of odds ratio of the variables affecting clinical outcome

variable	odds ratio	CI (95%)		p-value
Age	1.004	0.974	1.035	0.807
Sex	3.250	0.962	10.978	0.058
ISS	1.070	1.024	1.119	0.003
GCS	0.817	0.720	0.927	0.002
Shock	4.407	1.074	18.092	0.040
Lactic acid	1.045	0.898	1.217	0.569
Hb	0.992	0.839	1.173	0.923
Hct	1.013	0.955	1.074	0.674
PLT	1.000	0.992	1.008	0.949
INR>1.5	2.022	0.592	6.903	0.261
aPTT>60s	5.167	1.044	25.565	0.044
Intervention	2.222	0.417	11.842	0.350
pRBC	1.055	1.007	1.106	0.025
FFP	1.033	0.992	1.076	0.114
PC	1.025	0.990	1.061	0.170
FFP:pRBC>0.6	4.062	1.166	14.154	0.028
PC:RBC>0.6	2.156	0.662	7.022	0.202

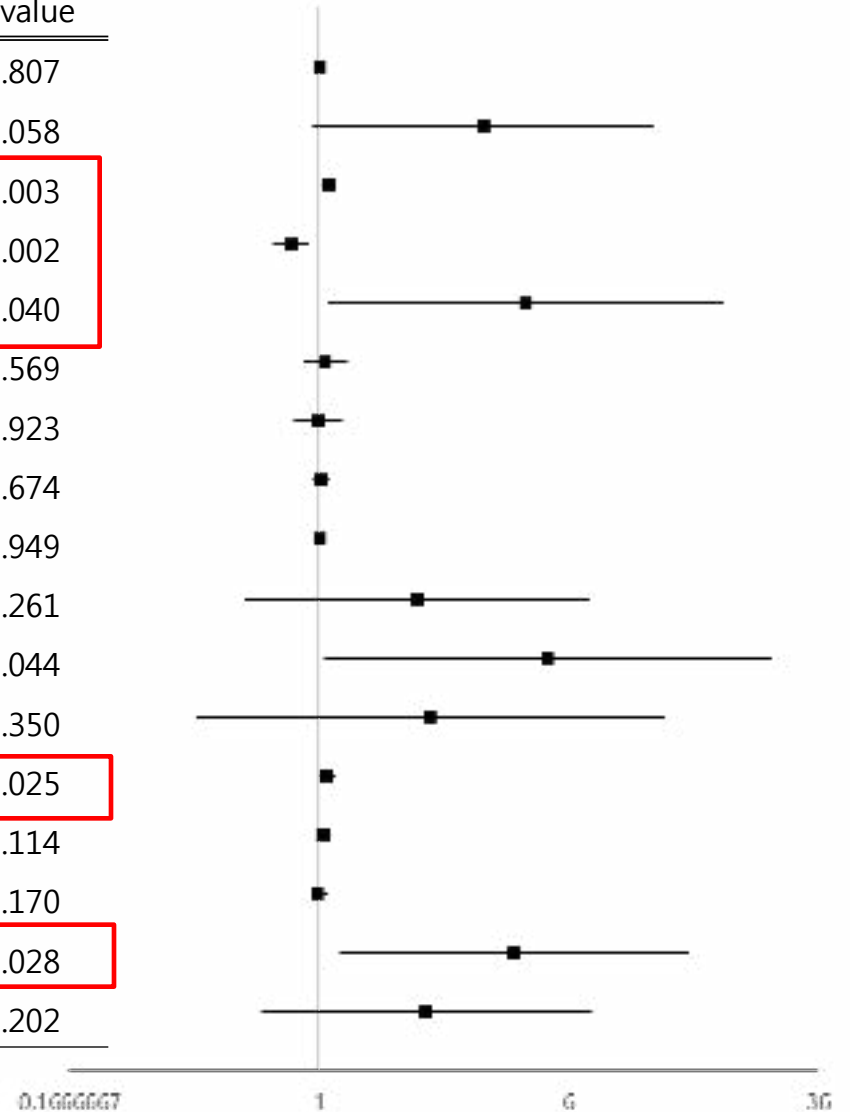
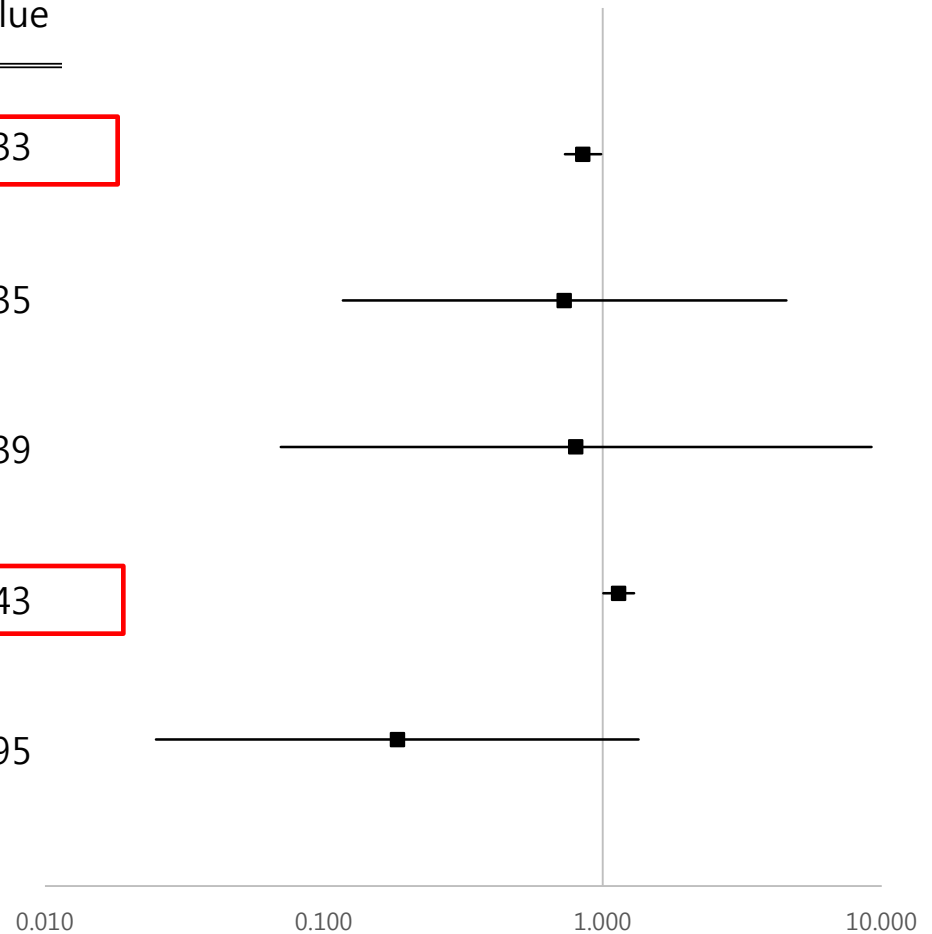


Table 6. multivariate analysis of odds ratio of the variables affecting clinical outcome

Variable	Odds ratio	CI (95%)		p-value
GCS	0.849	0.731	0.987	0.033
Shock	0.729	0.117	4.548	0.735
aPTT>60s	0.802	0.070	9.180	0.839
pRBC	1.140	1.004	1.294	0.043
FFP:pRBC>0.6	0.184	0.025	1.342	0.095



Discussion : GCS vs massive bleeding

- ✓ In our study, low GCS at admission to hospital was associated with mortality due to multiple trauma with uncontrolled bleeding.
- ✓ In a retrospective review, patients with a GCS score of 7 or greater had no PT/PTT abnormalities at admission. 81% were coagulopathic (GCS \leq 6) and 100% were coagulopathic (GCS =3,4)

MacLeod, J. B.J Trauma. 2003;55:39–44.

- ✓ Traumatic brain injury has been noted with increased bleeding thought due to release of brain specific thromboplastins with subsequent inappropriate clotting factor consumption

Preston FE. J Neurol Neurosurg Psychiatry. 1974;37:241–248.

Discussion : Massive transfusion

- ✓ Massive transfusion is a lifesaving treatment of hemorrhagic shock, but can be associated with significant risk of increased mortality and complication
- ✓ In our study, massive transfusion occurred in 7.4% of entire multiple trauma patients, 32.6% of patients underwent massive transfusion was occurred trauma death due uncontrolled bleeding
- ✓ Other studies have reported a significant relationship between increasing number of RBC unit and the incidence of multiple organ failure.
- ✓ In our study, odds ratio of transfused pRBC was 1.141, increasing amounts of pRBC increased risk of uncontrolled bleeding associated with mortality.

CONCLUSION

- ✓ Decreased mental status, severe injury, presence of shock at arrival, prolonged aPPT was different significantly in two groups.
- ✓ Poor clinical outcome could not correct with more amounts of FFP transfusion and rapid intervention for the bleeding site.
- ✓ Massive transfusion (more pRBC), decreased mental status increased risk of poor clinical outcome.
- ✓ This study have limitation of the retrospective design and difficulty to infer correct a cause-relationship.

Thank you for your attention