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Transfusion Ratio of Plasma to Packed Red Blood Cells Yields Better Outcomes in Both Trauma and Surgical Patients

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Commentary

In our prior meta-analysis, on the proper transfusion ratio of fresh frozen plasma (FFP): packed red blood cell (RBC) that included 16,607 patients from 36 studies, we found that lower ratio was associated with less 24-h and 30-day survival (OR=2.41, 95% CI=1.94-3.01 and OR= 1.74, 95% CI=1.51-2.02 respectively) with a ratio of 1:1.5 gave the best 24-hour and 30-day survival benefit (OR=0.25, 95% CI=0.09-0.73 and 0.43, 95% CI=0.19-0.88 respectively, p < 0.001) in trauma and non-trauma settings [1]. This results run in parallel with prior evidences by Borgeman et al [2] who found best benefit with transfusion ratio of 1:1.5.

The role of early balanced transfusion is most critical within the first few hours of admission as being reported in PROMMTT and PROPPR study with 24 hour is the cut-off period after which other factors start to affect survival [3,4].

The ratio was not associated with acute respiratory distress syndrome (ARDS; OR= 0.68, 95% CI=0.40-1.16) or acute lung injury (ALI; OR= 1.23, 95% CI= 0.81-1.86). The national implementation of balanced transfusion protocol was opposed by the concern of possible rise in transfusion-associated injuries, especially if patients were massively transfused [5]. However, our results run in parallel with prior randomized clinical trials (RCTs) that did not find influence of transfusion ratio on the incidence of ARDS or ALI (Figure 1) [4,6,7].

24 hrs Mortality										30days/ in-hospital mortality									
A) Study or Subgroup	LOW R/	HIGH RA Events		Weight I	Odds Ratio J. H. Random, 95% Cl		Odds Ratio M.H. Random, 95% Cl		B)	LOW RATIO		HIGH RA		Weight 1	Odds Ratio M.R. Rasdom, 95% CI	1	Odds Ratie M.H. Random, 95% CI	_	
Eiasi 2011	85	199	97	245	5.8%	1.17 (0.80, 1.71)		-		Borgman 2007	58	84	31	162	3.4%	3.49 [1.95, 6.2			_
Borgman 2011	83	237	86	422	5.9%	2.11 (1.47, 3.01)				Borgman 2011	113	237	147	422	5.5%	1.70 (1.23, 2.36)		+	
Dente 2009	1	23	7	50	2.2%	2.69 (0.01, 0.07)				Brown 2011	- 35	100	25	215	3.6%	1.76 [1.01, 3.07]			
Duchesene 2008	84	196	n	189	5.2%	3.55 (2.22, 5.87)				Brown 2012	68	476	8	118	2.5%	2 25 [1 05, 4 82]			
Hardin 2014	113	432	76	476	61%	1.70 [1.29, 2.46]		-		Duchesene 2009	30	63	23	72	2.0%	1 94 (0.96, 3.90)			
Holcomb 2015	58	342	42	338	58%	1.4010.91, 2.151				Ounter 2008 Historyph 2008	120	185	26	84 256	3.5%	2 34 [1 31, 4 10]		-	
	44	81	23	50						Holcomb 2008	120	342	76	138	5.0%	2.21 (1.53, 3.20) 1.23 (0.07, 1.25)			
Kashuk 2008			23		4.2%	1.86 (0.94, 0.68)				Hotoena 2015 Xim 2014	14	72	22	10	215	1.62(2.69, 3.06)		-	
k3m 2014	- 9	32	- 2	88	1.5%	12.91 (2.60, 64.21)				Lustenberger 2011	36	52	23	177	2.8%	7.01 (3.55, 13.86)			
Lustenberger 2011	31	52	18	177	39%	13.04 [6.23, 27.27]				Maepele 2008	222	404	76	229	5.4%	1.71 (1.22, 2.37)		+	
Maegele 2008	158	484	32	229	5.6%	2.98 [1.96, 4.54]				Marzoff 2016	13	88	28	364	2.7%	2.00 [1.03, 4.20]		-	
Magnotti 2011	13	37	7	66	2.7%	4.57 [1.62, 12.84]				Met 2010	16	41	13	87	21%	3.64 (1.54, 8.62)			
Mitra 2010	41	275	3	56	2.2%	3 10 (0.92, 10 38)				Mitra 2010	10	56	83	275	21%	0.93 [0.49, 1.74]			
Peinider 2011	159	379	157	871	6.4%	3 29 [2 52, 4 29]		+		Nascimento 2013	3	32	.11	37	1.0%	0.24 (0.06, 0.87)			
Rowell 2011	128	375	71	328	6.0%	1 88 [1.34, 2.62]				Peiniger 2011	.206	379	217	871	6.2%	2.00 [1.62, 2.66]		-	
Sharpe 2012	31	86	20	69	41%	2.17 [1.07, 4.41]				Rowell 2011	167	375	113	258	5.6%	1.63 (1.13, 2.07)		-	
Shar 2010	65	114	20	100	4.5%	5.50 [2.97, 10.17]		_		Shar 2010	50	114	41	100	2.7%	1.12 (2.65, 1.94)		-	
Speny 2008	43	313	4		275					Snyder 2009	43	74	29 29	60	2.0%	1.59 (0.80, 3.15)			
	222			102		3.59 [1.25, 10.29]				Speny 2008 Roinella 2011	110 22	213 185	29	102 276	4.1%	1.36 (0.64, 2.22) 1.36 (0.74, 2.48)			
Spoerke 2011		1498	14	146	4.8%	1.64 (0.93, 2.90)				Spoetke 2011	351	1499	32	145	47%	1.0910.72, 1.64			
Stanworth 2015	26	92	25	206	4.5%	2.05 [1.54, 5.29]				Televice 2009	1.31	268	20		415	27115.60.4.30			
Undurraga 2015	29	172	22	174	4.7%	1.33(0.74, 2.41)				Undurage 2015	43	172	26	174	4.0%	1.28 (0.77, 2.11)		-	
Wataissde 2011	114	760	50	682	6.0%	1.95 [1.37, 2.77]				Van 2018	10	18	11	159	20%	1.7210 70.4 24			
Yang 2015	22	186	86	862	52%	1,21 (0.74, 1.99)		-		Watercade 2011	205	780	318	602	8.1%	1.52 (1.17, 1.06)		+	
										Zink 2009	161	401	13	51	3.0%	1.96 (1.01, 3.00)			
Total (\$5% CD		6345		5833	100.0%	2.41 [1.94, 3.01]													
Total events	1563		895					S		Total (95% CI)		7209		5866	100.0%	1,74 [1.51, 2.02]		•	
		- 01 52		10.01	00001 2-	74%				Total events	2440		1507			100 C	1		
Helerogeneity Tau?=0.18, Chi?=0.152, cf = 21 (P < 0.00001); P=74% 0.01 0.1 10 100 Test for overall effect Z = 7.87 (P < 0.00001)						100	Heterogeneity: Tau ^a				(P × 0.0	995); P= 1	57%	0.005	0.1 1 10	2			
LEDI VL ALGENI KORT	A-1813	- 4/999	WV.				HIGH RATIO	LOW RATIO		Test for overall effect	2=7.440	* 0.000	991)					HIGH RATIO LOW RATIO	

Figure 1:

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Copyright © 2018 Rahouma M. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. and red blood cells in a 1:1:1 vs a 1:1:2 ratio and mortality in patients with severe trauma: the PROPPR randomized clinical trial. JAMA. 2015; 313: 471–482.

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