

## Supplementary Online Content

Sherwood MW, Wang Y, Curtis JP, Peterson ED, Rao SV. Patterns and outcomes of red blood cell transfusion in patients undergoing percutaneous coronary intervention. *JAMA*. doi:10.1001/jama.2014.980

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This supplementary material has been provided by the authors to give readers additional information about their work.

## **eAppendix. Outcomes Definitions**

**Transfusion** = the receipt of either packed red blood cells or whole blood during hospitalization

**Bleeding events within 72 hours** = suspected or confirmed access site bleeding, retroperitoneal bleeding, gastrointestinal bleeding, or genitourinary bleeding that occurred in conjunction with either a hemoglobin drop of  $\geq 3$  g/dL, transfusion of whole blood or packed red blood cells, or procedural intervention/surgery at the bleeding site to reverse/stop or correct the bleeding

**Myocardial infarction** = the occurrence of symptoms and/or ECG changes consistent with myocardial infarction and biomarker elevation with tests obtained between 6 and 24 hours post PCI

**Congestive heart failure** = the onset or acute recurrence of clinical symptoms of heart failure (unusual dyspnea on light exertion, recurrent dyspnea occurring in the supine position, fluid retention, the description of rales, jugular venous distension, pulmonary edema on physical exam or on chest x-ray) that necessitated new or increased pharmacologic therapy

**Cardiogenic shock** = a sustained ( $>30$  minutes) episode of systolic blood pressure  $<90$  mmHg, and/or cardiac index  $<2.2$  L/min/m<sup>2</sup> determined to be secondary to cardiac dysfunction, and/or the requirement for parenteral inotropic or vasopressor agents or mechanical support (e.g., IABP, extracorporeal circulation, ventricular assist devices) to maintain blood pressure and cardiac index above those specified levels

**Stroke** = a loss of neurologic function caused by an ischemic or hemorrhagic event with residual symptoms lasting at least 24 hours after onset or leading to death during hospitalization, these may or may not be documented by neurologic imaging.

**Death** = expiration of the patient during hospitalization

**eTable 1.** Hospital Site Characteristics

Characteristics	Tertiles of Hospital RSTR			
	Total N=1431	Low RBCT <1.78% N=477	Middle RBCT 1.78 to <2.79% N=477	High RBCT ≥2.79% N=477
Number of Pt Beds (mean, SD)	349 (269)	302 (254)	346 (259)	399 (283)
Hospital PCI Volume (median, IQR)	1578 (1523)	1208 (1223)	1628 (1588)	1899 (1647)
Owner (%)				
Public	138 (9.6)	49 (10.3)	48 (10.1)	41 (8.6)
Not-for-profit	1006 (70.3)	304 (63.9)	336 (70.4)	365 (76.5)
Private	255 (17.8)	108 (22.6)	83 (17.4)	64 (13.4)
Region (%)				
New England	55 (3.8)	11 (2.3)	19 (4.0)	25 (5.2)
Mid-Atlantic	132 (9.2)	57 (11.9)	40 (8.4)	35 (7.3)
South Atlantic	280 (19.6)	89 (18.7)	98 (20.5)	93 (19.5)
Central	656 (45.8)	207 (43.4)	224 (47.0)	225 (47.2)
Mountain	101 (7.1)	36 (7.5)	37 (7.8)	28 (5.9)
Pacific	174 (12.2)	61 (12.8)	49 (10.3)	64 (13.4)
Rural (%)	13 (0.9)	8 (1.7)	3 (0.6)	2 (0.4)
Metropolitan (%)	955 (66.7)	326 (68.3)	322 (67.5)	307 (64.4)
Teaching (%)	561 (39.2)	140 (29.4)	188 (39.5)	233 (48.9)
CABG ability (%)	1032 (72.1)	311 (65.2)	345 (72.3)	376(78.8)
Visits*	2258711	576010	776731	905970
Procedure site and medications				
Radial Access Use	232311 (10.3)	60128 (10.4)	86612 (11.2)	85571 (9.4)
Bivalirudin Use	1317465 (58.3)	355312 (61.7)	457463 (58.9)	504690 (55.7)
GIIbIIIa Use	589792 (26.1)	135571 (23.5)	192413 (24.8)	261808 (28.9)
Discharge Med Use				
ASA	2127420 (94.2)	540863 (93.9)	734799 (94.6)	851758 (94.0)
ACE inhibitor	1140738 (50.5)	282679 (49.1)	395405 (50.9)	462654 (51.1)
Beta-blocker	1832336 (81.1)	460686 (80.0)	632811 (81.5)	738839 (81.6)
P2Y12 Inhibitor	2148706 (95.1)	546561 (94.9)	742537 (95.6)	859608 (94.9)
Statin	1958421 (86.7)	492567 (85.5)	679427 (87.5)	786427 (86.8)

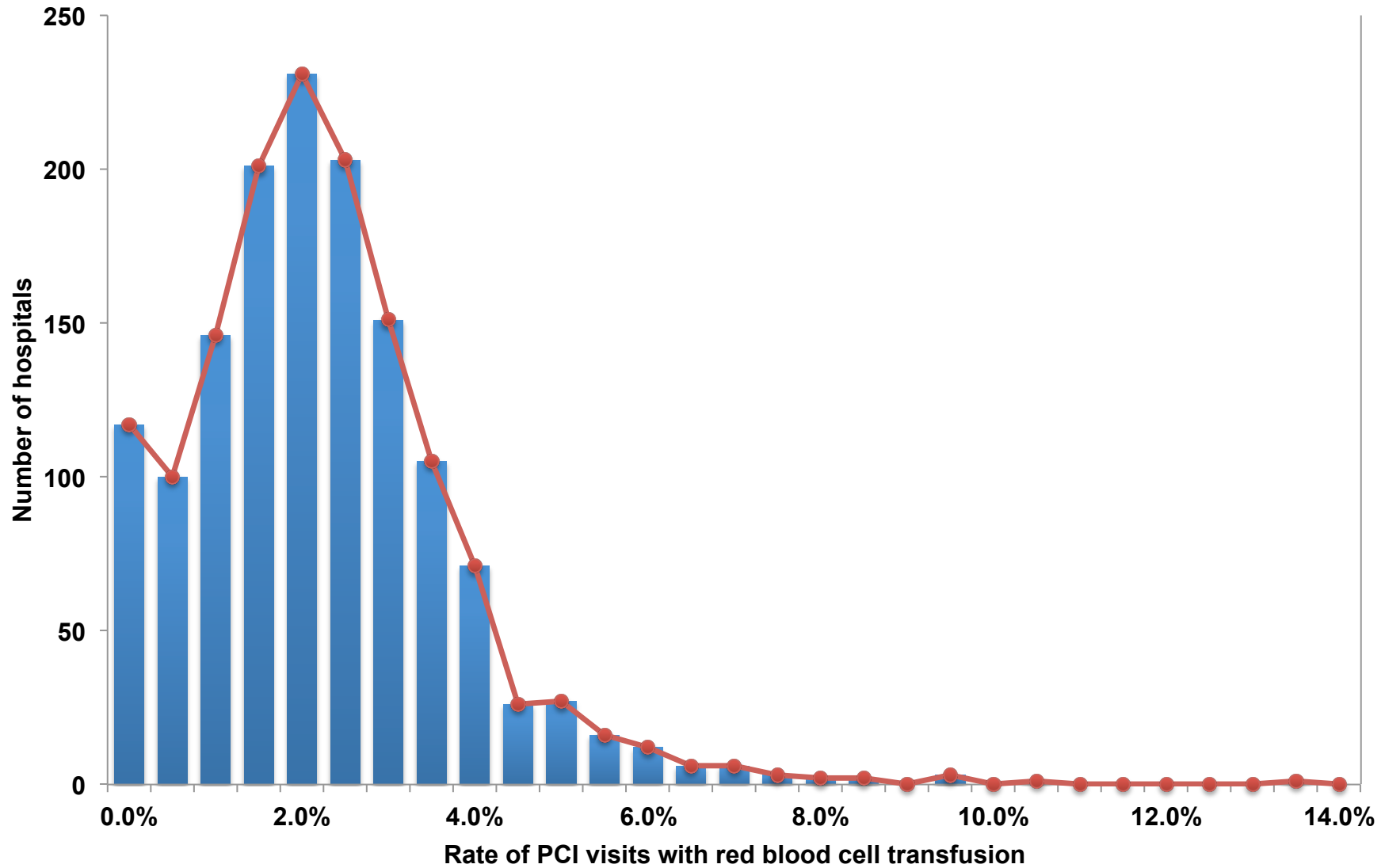
\* For all characteristics listed below visits, frequency is per visits due to data provided by sites; RBCT = Red blood cell transfusion, SD = Standard deviation

**eTable 2.** Clinical Outcomes Stratified by Transfusion Status

<b>PCI Visit Outcomes</b>	<b>Without RBCT N=2210281 No. (% , 95% CI)</b>	<b>With RBCT N=48430 No. (% , 95% CI)</b>
MI	40601 (1.84, 1.82-1.85)	2202 (4.55, 4.36-4.73)
Stroke	4023 (0.182, 0.176-0.188)	988 (2.04, 1.91-2.17)
CHF	17237 (0.78, 0.77-0.79)	4658 (9.62, 9.36-9.88)
Cardiogenic Shock	17141 (0.78, 0.77-0.79)	5021 (10.37, 10.10-10.64)
In-hospital Death	25833 (1.17, 1.15-1.18)	6052 (12.50, 12.20-12.79)
Bleeding Events (within 72 hours)	18650 (0.84, 0.83-0.86)	17185 (35.48, 35.06-35.91)
Access Site bleeding	5847 (0.264, 0.258-0.271)	3999 (8.26, 8.01-8.50)
Non-Access Site bleeding	7047 (0.32, 0.31-0.33)	10943 (22.60, 22.22-22.97)

RBCT = Red blood cell transfusion, MI = myocardial infarction, CHF = congestive heart failure

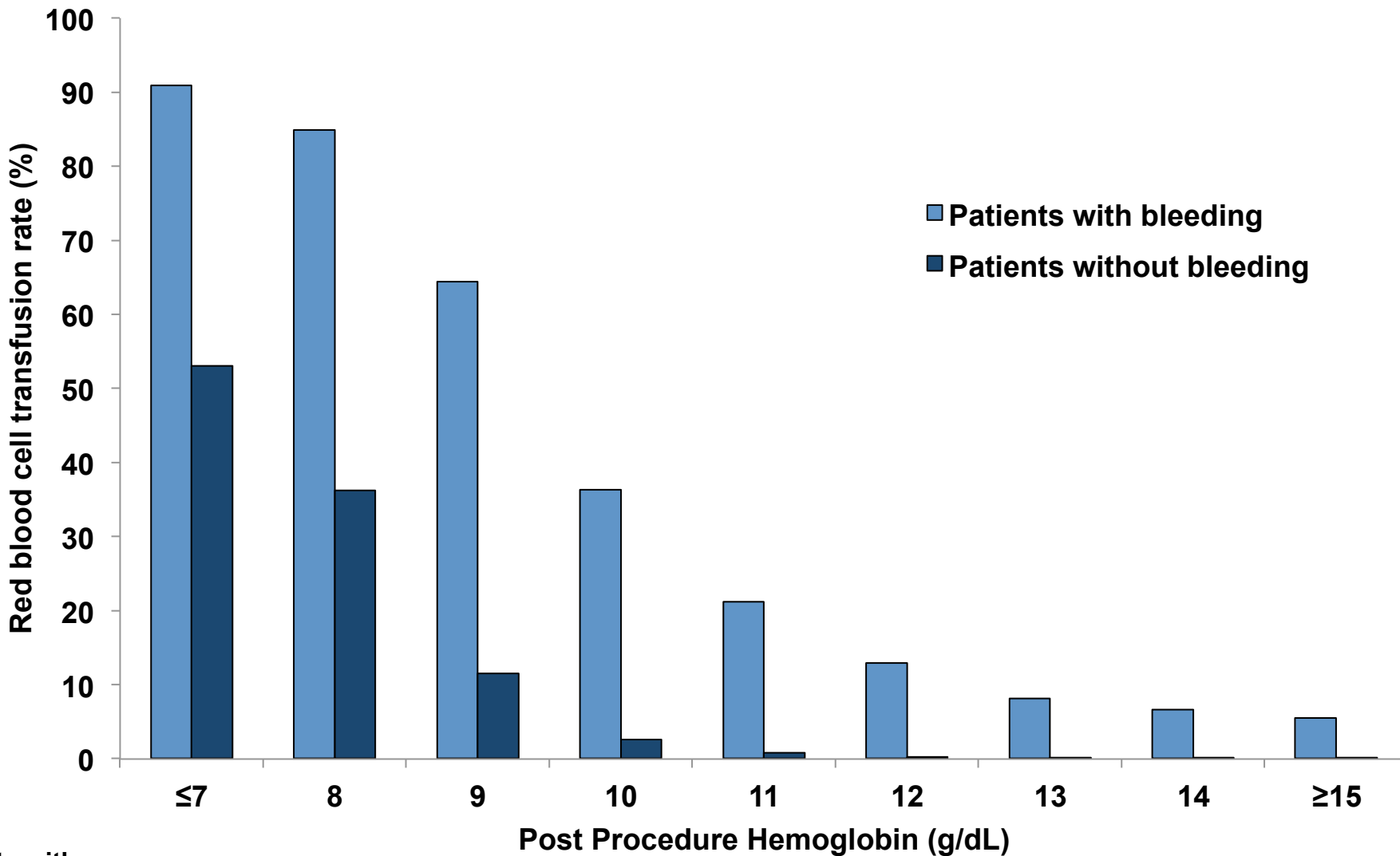
**eFigure 1.** Distribution of Hospital Observed Transfusion Rates



Distribution of the percent of PCI visits during which transfusion was given among hospitals -- Shows the variation in frequency of receipt of transfusion by hospital site (1431 total sites) in our study sample.

## eFigure 2. Use of RBCT by Postprocedure Hgb Value Stratified by the Presence or Absence of a Bleeding Event

Use of RBC transfusion by post procedure Hgb value among PCI visits stratified by the presence or absence of bleeding event within 72 hours -- Shows the frequency of RBC transfusion in our study sample (2,258,711 patient visits) by post procedure hemoglobin value in PCI visits with and without bleeding events. The transfusion threshold hemoglobin in patients without bleeding events seems to be 8 gm/dL.



Patients with bleeding, No. of PCI visits

3774	6693	6791	4987	4352	3498	2540	1489	797
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Patients without bleeding, No. of PCI visits

7521	29485	77428	147356	241638	346362	407668	347625	260770
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