AABB Annual Meeting Education Program 2014

October 25-28, 2014 | Pennsylvania Convention Center | Philadelphia, PA

Presentation Handouts

(9119-TC-PBM) Trauma in Developing Countries: Blood Utilization and Management

October 25, 2014 ✧ 2:00 PM - 3:30 PM

Advancing Transfusion and Cellular Therapies Worldwide

Event Faculty List

Event Title: **(9119-TC-PBM)** Trauma in Developing Countries: Blood Utilization and Management
Event Date: October 25, 2014
Event Time: 2:00 PM - 3:30 PM

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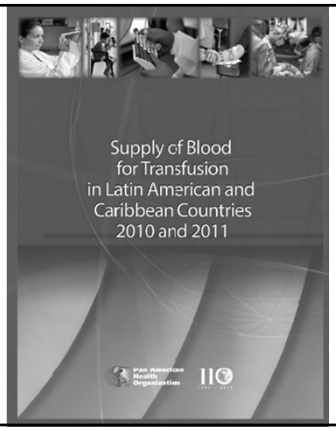
TRAUMA IN DEVELOPING COUNTRIES:
BLOOD UTILIZATION AND MANAGEMENT

A CARIBBEAN PERSPECTIVE

Prof. dr. A.J. Duits
Red Cross Blood Bank Foundation
Curaçao

Country/Territory	Population	Density (Inh/km²)
Antigua and Barbuda	89,000	202
Aruba	102,000	569
Bahamas	372,000	37
Barbados	283,000	659
Belize	324,000	14
Cayman Islands	58,000	240
Cuba	11.27 Million	106
Curacao	152,000	342
Dominica	72,000	96
Dominican Republic	10 Million	213
Grenada	105,000	310
Guyana	795,000	4
Haiti	10 Million	369
Jamaica	2.7 Million	250
Puerto Rico	3.67 Million	413
St Kitts and Nevis	54,000	206
St Lucia	181,000	297
St Martin	31,000	569
St. Maarten	39	1,150
St Vincent and the Grenadines	109,000	280
Suriname	535,000	3
Trinidad and Tobago	1.34 Million	261
Turks and Caicos Islands	32,000	34
US Virgin Islands	105,000	301



DATA

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Table V-1. Regional Summary, 2011

Variable	Caribbean Countries	Latin American Countries
Blood units collected	134,757	9,141,157
Number of voluntary, non-remunerated donors	75,771	3,767,731
Voluntary, non-remunerated donors (%)	56.23	41.22
Number of remunerated donors	0	7,124
Remunerated donors (%)	0	0.08
Screening for HIV (%)	100	99.71
Screening for HBsAg (%)	100	99.71
Screening for HCV (%)	99.23	99.68
Screening for syphilis (%)	100	99.7
Screening for *T. cruzi* (%)	NR	92.38
Screening for HTLV I-II (%)	81.52	67.54

NR = Not reported.

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Table VII-5. Efficiency of Blood Processing, 2011

Country	Number of Units Collected	Number of Collecting Centers	Number of Processing Centers	Annual Processing per Bank	Daily Processing per Bank (260 Days)
ANU	160	1	1	160	0.62
ANT	NR	NR	NR	NR	NR
ARU	2,855	1	1	2,855	10.9
BAH	7,287	3	3	2,429	9.34
BAR	NR	NR	NR	NR	NR
BLZ	4,617	4	7	660	2.54
BER	2,412	1	1	2,412	9.28
BVI	422	1	1	422	1.62
MOT	89	1	1	89	0.34
CUR				6,615	25.44
JAM*	27,307	10	3	9,102	35.01
HAI	19,751	30	1	19,751	75.97
JAM*	27,307	10	3	9,102	35.01
MOT	89	1	1	89	0.34
SKT	368	1	1	368	1.42
STL	2,304	3	1	2,304	8.86
STV	1,157	1	1	1,157	4.45
SUR	10,917	1	1	10,917	41.99
TCI	674	1	1	674	2.59
TRT	17,673	6	3	5,871	22.58

14 of 23 blood banks process < 6000 units/year (<23 units/day)

*Total does not include 2,187 units collected from "uniform recruits."
NR = Not reported.

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TRAUMA IN THE CARIBBEAN:

- **Increasing indicence**
- **23% of ER visits**
- **Inter personal violence**
- **High impact accidents**

Table 3. Mechanisms of Trauma

Unintentional	
• Road traffic crashes	45%
• Burns	4.3%
• Falls	3.7%
• Near drowning	3.7%
Intentional	
• Gunshot	27.3%
• Stabbing	10.5%
• Assault/domestic violence	4.3%
Unspecified	1.2%

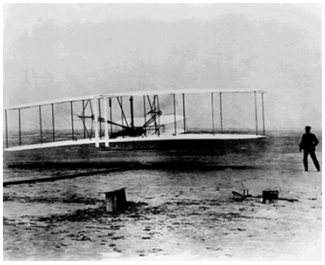
Importance of Massive Transfusion

TRAUMA

- **40% of trauma related deaths by bleeding (leading cause)**
- **2% of trauma patients require massive tx**

Bleeding:
- Vascular injury (surgery related)
- Coagulopathy

MODUS OPERANDI



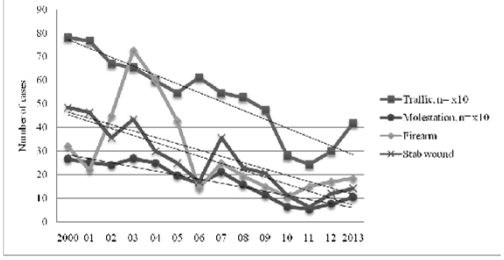
DATA-PROTOCOL/PROCEDURES-AVAILABILITY

TRAUMA RELATED INJURY CURACAO PER 100.000 INHABITANTS

	Traffic		Firearm		Stabwound		Molestation	
Year	n	(%)	n	(%)	n	(%)	n	(%)
2000	781.7	(10.5)	32.1	(7.8)	48.5	(13.2)	266.0	(11.0)
2001	767.4	(10.3)	22.1	(5.4)	46.4	(12.5)	253.2	(10.5)
2002	669.7	(9.0)	44.9	(11.0)	35.7	(9.7)	241.1	(10.0)
2003	653.3	(8.8)	72.7	(17.8)	43.5	(11.8)	268.2	(11.1)
2004	599.1	(8.1)	59.9	(14.6)	30.0	(8.1)	250.3	(10.3)
2005	546.3	(7.4)	42.8	(10.5)	25.0	(6.8)	196.8	(8.1)
2006	611.2	(8.2)	14.3	(3.5)	17.1	(4.6)	163.3	(6.7)
2007	545.6	(7.4)	25.0	(6.1)	35.7	(9.7)	212.5	(8.7)
2008	527.8	(7.1)	19.3	(4.7)	22.8	(6.1)	156.9	(6.5)
2009	474.3	(6.4)	15.0	(3.7)	20.7	(5.6)	113.4	(4.7)
2010	278.9	(3.8)	10.7	(2.6)	11.4	(3.1)	64.2	(2.7)
2011	243.9	(3.3)	15.0	(3.7)	6.4	(1.7)	54.2	(2.2)
2012	298.8	(4.0)	17.1	(4.2)	12.1	(3.3)	77.0	(3.2)
2013	417.9	(5.6)	18.5	(4.5)	14.3	(3.9)	104.8	(4.3)
All	7,415.8		409.4		369.4		2,422.0	
***p* Value**	< 0.001		< 0.001		< 0.001		< 0.001	
Mean/year (95% CI)	529.7 (430.9 - 628.5)		29,2 (18,3 - 40,2)		26.4 (18.4 - 34.4)		173.0 (127.5 - 218.5)	

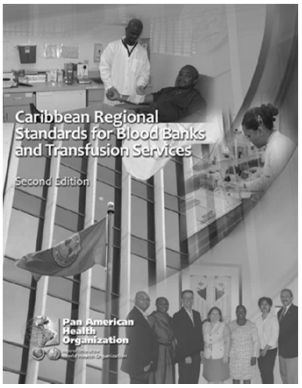
Hollander et al. Submitted

Figure 1. Trauma-related injury presented in ED per 100,000 inhabitants in Curacao from 2000 to 2013.



Hollander et al. Submitted

TRAUMA AND BLOOD UTILIZATION: FACING THE CHALLENGES



PROTOCOLS

CRS 8.10.2 Emergency Release

Blood and blood components that do not meet the requirements of CRS 9.9.2, Transfusion Recipient Blood Samples and Testing, or that are released as a result of emergency need for blood and blood components shall be utilized for transfusion only in conformance with CRS 12. Control of Non-conforming Product.

CRS 12.2 Non-availability of Compatibility Test Results
Blood or blood components that are nonconforming due to the non-availability of final compatibility test results that otherwise conform to CRS 8.9, Compatibility Process, may be transfused when a delay in transfusion could be detrimental to the transfusion recipient.

The following additional requirements shall apply:
a) a transfusion recipient whose ABO group is not known shall receive Group O Red Blood Cells. Children and women of child-bearing age shall receive Group O Rh negative red blood cells. Refer to to Section 8, CRS 8.8.1.2;
b) the requesting physician shall indicate in writing that the clinical situation is sufficiently urgent to require release of blood or blood components before completion of compatibility testing. Records of the request shall be maintained in conformance with Section 15, Control of Records;
c) the container label shall indicate that compatibility testing has not been completed.

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Blood Transfusion Guideline

CURAÇAO

INITIATIVE:
National Users' Board Sanquin Blood Supply

ORGANISATION:
CBO

MANDATING ORGANISATIONS
- Netherlands General Practitioners' Association (NHG)
- Netherlands Internists' Association
- Netherlands Orthopaedic Association
- Netherlands Association of Anaesthesiology Employees
- Netherlands Association of bioMedical Laboratory Employees
- Netherlands Association for Anaesthesiology
- Netherlands Association for Blood Transfusion
- Netherlands Association for Cardiology
- Netherlands Association for Surgery
- Netherlands Association for Haematology
- Netherlands Association for Intensive Care
- Netherlands Association for Paediatric Medicine
- Netherlands Association for Clinical Chemistry and Laboratory Medicine
- Netherlands Association for Medical Microbiology
- Netherlands Association for Obstetrics and Gynaecology
- Netherlands Association for Thoracic Surgery
- Transfusion Medicine in Academic Hospitals
- Association of Haematology Laboratory Research
- Nurses & Carers of the Netherlands

FINANCING:
This guideline was created with financial support from ZonMw as part of the 'Evidence-Based Guideline Development (EBGD)' programme.

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General recommendations for massive blood loss 5.3.1

For acute massive blood loss in a **decompensated situation** (imminent exsanguination, shock), the following is recommended:

1. Start resuscitation quickly according to the 'advanced trauma life support' (ATLS) protocol. Accept so-called 'permissive hypotension'. Ensure good intravenous access and if necessary place an intra-osseous needle.
2. Take measures to stop blood loss as soon as possible.
3. In the case of severe continuing blood loss, consider rapid 'damage control' surgery and/or a radiological intervention (see also Chapter 8.1.1).
4. Aim for normothermia, adequate oxygenation and avoid acidosis.
5. Consider possible extramural transfusions.
6. Correct haemostasis with multi-component transfusions in ratios as listed under recommendation 7. Fibrinogen preparations are indicated early on in the treatment of extreme blood loss (ATLS IV) and in case of coagulopathy.
7. Administer multi-component transfusions, for example in a 3:3:1 ratio between erythrocytes/plasma/platelets.
8. Preheat blood components and infusion solutions in order to prevent hypothermia.
9. Consider tranexamic acid – preferably in a study setting – in the case of massive blood loss following severe trauma.

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AVAILABILITY

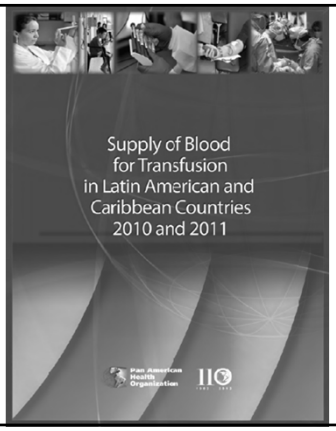

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Table VII-3. Selection of Allogeneic Donors, 2011*

Country	Number of Units Collected	Number of Allogeneic Donors					
		Voluntary		Replacement		Remunerated	
		Interviewed	Deferred	Interviewed	Deferred	Interviewed	Deferred
ANU	164	NR	NR	NR	NR	NR	NR
ANI	NR	NR	NR	NR	NR	NR	NR
ARU	2,835	2,902	57	0	0	0	0
BAH	7,283	3,790	543	4,654	316	0	0
BAR	NR	NR	NR	NR	NR	NR	NR
BLZ	4,617	889	253	5,939	1,958	0	0
BER	2,394	2,699	305	0	0	0	0
BVI	422	NR	NR	NR	NR	0	0
CAY	1,018	1,138	120	0	0	0	0
CUR	6,603	6,623	20	0	0	0	0
DOM	1,041	93	0	1,452	504	0	0
FDA	21,794	25,807	4,917	0	0	0	0
GRA	NR	NR	NR	NR	NR	NR	NR
GUY	6,361	NR	NR	NR	NR	NR	NR
HAI	19,751	NR	NR	NR	NR	NR	NR
JAM	27,262	5,253	873	40,322	17,440	0	0
MOT	89	103	14	0	0	0	0
SKT	368	57	14	484	159	NR	NR
STL	2,299	2,211	672	1,229	469	0	0
STV	1,140	81	13	1,403	331	NR	NR
SUR	10,913	12,272	1,359	0	0	0	0
TCI	674	424	36	303	17	0	0
TRT	17,613	NR	NR	NR	NR	NR	NR

*Autologous donors not included.
NR = Not reported.

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Table VII-9a. Number of Availability of Blood Components, 2011 - Separation into Components

Country	Units Received	RBC	FFP	FP	CRYO	PL
ANU	165	120	NR	NR	NR	NR
ANI	NR	NR	NR	NR	NR	NR
ARU	2,835	2,835	540	0	0	2,229
BAH	7,287	6,353	2,239	0	15	2,018
BAR	NR	NR	NR	NR	NR	NR
BLZ	4,617	1,605	604	1,001	0	603
BER	2,394	2,195	313	0	0	113
BVI	422	159	159	0	0	0
CAY	1,020	936	358	NR	NR	NR
CUR	6,603	6,291	1,505	0	0	3,059
DOM	1,043	1,005	649	NR	25	467
FDA	20,705	20,705	0	0	0	414
GRA	NR	NR	NR	NR	NR	NR
GUY	NR	NR	NR	NR	NR	NR
HAI	19,751	12,490	0	0	0	0
JAM	17,863	9,877	9,249	628	759	2,917
MOT	89	70	0	0	0	1
SKT	368	37	37	0	0	0
STL	2,304	2,300	552	183	0	1,213
STV	1,157	1,075	166	0	0	164
SUR	9,946	9,946	1,756	NR	NR	1,973
TTCI	388	155	29	0	0	5
TRT	17,613	NR	NR	NR	NR	NR

*TCI: Information incomplete; only information on units received from voluntary donations was reported.
NR = Not reported.

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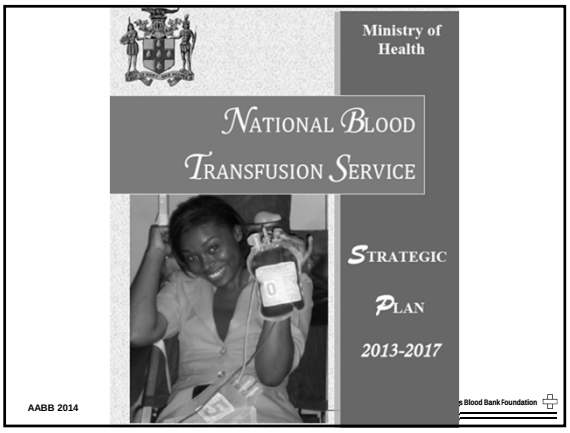
:Blood Bank Foundation



AVAILABILITY

The blood service fails by about 50% to meet the requests for needed blood; and the actual level of blood supplied (25,000 units for 2.8m population – equivalent to less than 10 units per 1000 population) is less than half the rate seen in the least developed Eastern European services, between one quarter and one third of the rate in much of Western Europe (which most experts would accept as the target range) and about 20% of the rates in the USA and Cuba[14].

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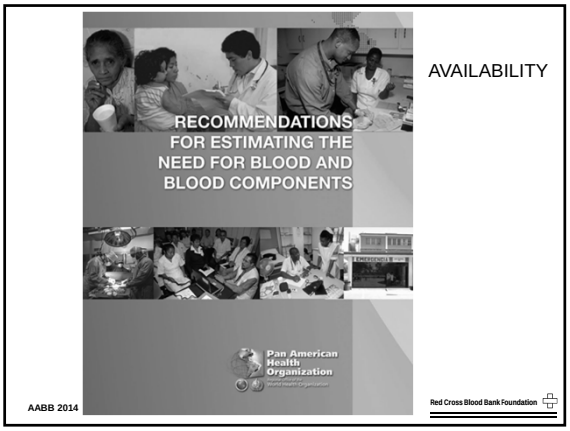
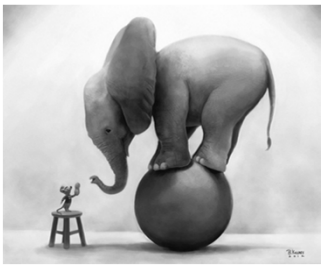


AVAILABILITY



STRICT CONTROL AND MANAGEMENT

Finally, strict monitoring and control of the storage and management of blood units to ensure that the blood components available in hospital services do not reach their expiration date and maintain their original therapeutic effectiveness contribute to an adequate supply of blood and its availability when needed while, at the same time, reducing the waste of valuable health system resources.

STRICT CONTROL AND MANAGEMENT

The proposal is that hospitals obtain information on the use of blood components for their patients and that they validate the coverage and relevance of their transfusion practices. Additionally, each hospital should submit the information to the appropriate health authority, so that databases can be developed for use in estimating the need for blood for transfusion purposes in a given jurisdiction, region, or country.

TABLE 4. **Annual need for PRBC, in relation to the total units used and number of inhabitants in the Autonomous City of Buenos Aires, 2007**

Patient group	Prevalence (%)	Percentage (%) of transfusion recipients	Average UPRBC administered per patient	Total UPRBC	Total (%)
Chronic anemia	0.0022	53.72	8.23	27,002	35.82
Oncology/hematology	0.00047	63.70	11.38	9,458	12.55
Solid organ tumors	0.00711	19.93	2.36	9,270	12.30
Cardiovascular surgery	0.00136	70.00	3.00	7,928	10.60
Trauma and other injuries	0.00258	40.94	2.33	6,831	9.06
Orthopedics	0.005	30.30	1.43	6,014	7.98
Gastrointestinal bleeding	0.001	58.91	2.61	4,268	5.66
Sick neonates	0.00102	37.57	2.50	2,659	3.52
Obstetrics-gynecology *	0.001	20.35	1.98	1,118	1.48
General surgery	0.001	24.50	1.20	816	1.08
Total				75,364	100

Source: Personal communication, del Pozo A., Buenos Aires, Argentina.
** Gynecological tumors were included in the obstetrics/gynecology group.*

ECONOMIES OF SCALE

Injury, poisoning, and other consequences of external causes

This group includes patients that require transfusion for these causes, whether admitted to the emergency room or the operating room, or during the postoperative period.

S00-S09	Injuries to the head
S10-S19	Injuries to the neck
S20-S99	Injuries to the thorax; abdomen, lower back, lumbar spine and pelvis; shoulder and upper arm; elbow and forearm; wrist and hand; hip and thigh; knee and lower leg; and ankle and foot
T20-T32	Burns and corrosions
T33-T50	Frostbite. Poisoining by drugs, medicaments and biological substances

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The Clinical Use of Blood

Handbook

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World Health Organization Blood Transfusion Safety GENEVA

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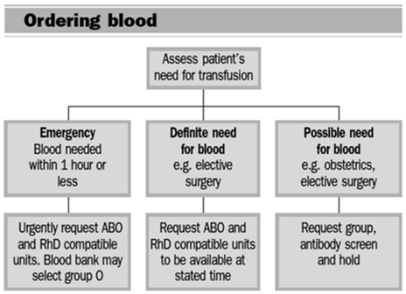
TRAUMA TRANSFUSION PATHWAYS



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ORDERING BLOOD IN AN EMERGENCY

1. Insert an IV cannula. Use it to take the blood sample for compatibility testing, set up an IV infusion of normal saline or a balanced salt solution (e.g. Ringer's lactate or Hartmann's solution). Send the blood sample to the blood bank as quickly as possible.
2. Clearly label the blood sample tube and the blood request form. If the patient is unidentified, use some form of **emergency admission number**. Use the patient's name only if you are sure you have correct information.
3. If you have to send another request for blood for the same patient within a short period, use the same identifiers used on the first request form and blood sample so the blood bank staff know they are dealing with the same patient.
4. If there are several staff working with emergency cases, one person should take charge of ordering blood and communicating with the blood bank about the incident. This is especially important if several injured patients are involved at the same time.
5. Tell the blood bank how quickly the blood is needed for each patient. Communicate using words that have been previously agreed with the blood bank to explain how urgently blood is required.
6. Make sure that both you and the blood bank staff know:
   - Who is going to bring the blood to the patient
   - Where the patient will be: e.g. operating theatre, delivery room.
7. The blood bank may send group O (and possibly RhD negative) blood, especially if there is any risk of errors in patient identification. During an acute emergency, this may be the safest way to avoid a serious mismatched transfusion.

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JAMAICA

CURAÇAO

TRINIDAD & TOBAGO

SURINAM

ST. LUCIA

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Common themes

Blood use and management in the department of orthopedics in Uganda's Major teaching Hospital

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UGANDA FOUND IN EAST AFRICA

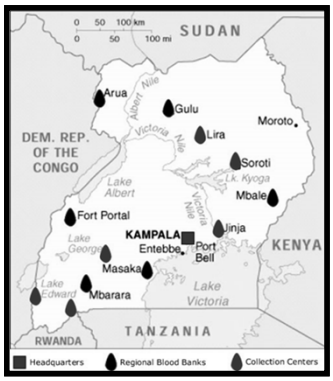
APPROXIMATELY 35 MILLION PEOPLE

RUNS A CENTRALIZED BLOOD SUPPLY SYSTEM BASED ON 100% NON REMUNERATED BLOOD DONATION

54% REPEAT DONOR

MULAGO THE NATIONAL REFERAL AND MAJOR TEACHING HOSPITAL FOUND IN CAPITAL – KAMPALA. A 1500 BED HOSPITAL

DEPARTMENT OF ORTHOPEDICS IS HOUSED IN THIS TEACING HOSPITAL



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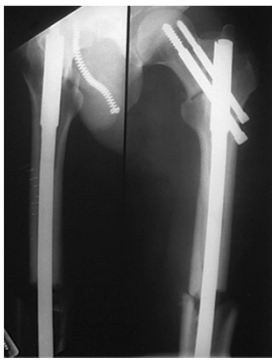
DEPARTMENT OF ORTHOPEDICS

120 BED DEDICATED TO EMERGENCY AND ELECTIVE ORTHOPEDICS.

4 OPERATING ROOMS

[MUSCULOSKELETAL TRAUMA = 50 BEDS AND ELECTIVE ORTHOPEDICS AND ALL OTHER ORTHOPEDIC SUBSPECIALITIES = 70 BEDS



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Type of surgical procedures requiring transfusion

Spine surgery
Thoracotomy
Anterior and posterior instrumentation
Laminoplasty
Discetomy and interbody fusion
Correction of spine deformities
General musculoskeletal trauma
Long bone fratures
Fractures of the pelvis
Hip fracture

Hip and knee arthroplasty

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- Department has four operating rooms and 13 consultant orthopedic surgeons
- Procedures may be major [lasting more than 2 hours and likely to require a transfusion before, during or after surgery]
- Intermediate [lasting between 1 and 2 hours, less likely to require a transfusion]
- Minor [lasting less than an hour [not likely to require a transfusion]

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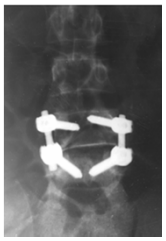
Summary of the period 1st July 2013 to 30th June 2014

A total of 935 procedures performed

792 were major

84 intermediate

59 minor



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300 out 792 [37.9%] patients used blood during the peri-operative time

Range 1-3 Units

Average 2.2 units

20 patients used 1 unit each

222 patients used 2 units each

58 patients used 3 units each

A total of 658 units used by the 300 patients

84 out of the 300 patients had fractured femora and used 122 units of blood.

Blood management

- The prerequisite to blood management in the department of orthopedics has been a careful definition of the blood need in the most frequently performed surgical procedure.

  [FRACTURE OF THE FEMORAL SHAFT]

BLOOD LOSS AND CONTRIBUTING FACTORS IN FEMORAL FRACTURE SURGERY.

Kajja I, Bimenya G.S., Eindhoven G.B.M., ten Duis H.J., Smit Sibinga C.T.

Afr Health Sci 2010;10:18-25

NOTE : Substantial blood losses frequently accompany orthopedic procedures. BOTH ELECTIVE AND EMERGENCY AND THESE REQUIRE BLOOD TRANSFUSION TO MENTAIN OXYGEN CARRYING CAPACITY OF BLOOD.

Methods:

We prospectively noted peri-operative hemoglobin changes in 93 patients undergoing surgery for femoral fracture with an aim of establishing blood loss and related factors.

Additionally , blood use in the same period was noted.

The SIGN [surgical implant generation network] NAIL was used

Patient selection

an isolated fracture of the femoral shaft, sixteen years and older, were included

Excluded patients

> 1 month after injury,

old non-unions of the femur,

repeat surgery for a fractured femur, pathological fractures of the femur,

an open fracture femur,

bilateral femoral shaft fractures , patients with multiple skeletal injuries medical and surgical co-morbidities, cancer chemotherapy,

history of a bleeding disorders

female patients in their menses.

No patient received any thrombo-embolic prophylactic drug during hospital stay.

Pre-opHb – Post-opHb + BU = Hb-lost
……equation 1.

For patients who did not receive allogeneic blood the amount of blood lost was calculated using equation 2

Pre-opHb – Post-opHb = Hb-lost
……equation 2.

Assumption
1 unit of 450mls of whole blood rises the Hb by 1g/dl.

Results

The mean total blood loss assessed 72 hours after the surgical procedure was 3.31 (SD 1.56) units of whole blood.

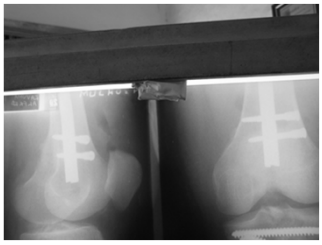
A multiple regression analysis revealed diathermy use and a simple fracture pattern as significant factors in reducing blood loss ($p<0.01$).

MANAGEMENT OF BLOOD: CONTROLLED ORDERING

Surgical blood order equation in femoral fracture surgery
I. Kajja, et al Transfusion Medicine, 2010 , doi: 10.1111/j.1365-3148.2010.01033.x

Aim: This study aimed at establishing the clinical utility of the surgical blood order equation (SBOE) in patients undergoing femoral fracture surgery WITH THE SIGN NAIL.

Haemoglobin lost due to a given surgical procedure – (preoperative haemoglobin – minimal acceptable haemoglobin) = Units of blood required at surgery for that procedure



patients

Table 1. Patient demographics and baseline characteristics

	Cases N(%)	Controls N(%)	p value
Sex			
(Ref-males)	46 (74.2)	45 (72.6)	
females	16 (25.8)	17 (27.4)	0.84
Age mean (SD) Years	37.1 (SD 17.2)	41.1 (SD 19.4)	0.33
Preoperative HB			
(mean (SD) gm.dL-1)	12.2 (SD 2.0)	12.7 (SD 1.9)	0.16
Fracture types			
(Ref-Type A)	32 (51.6)	36 (58.0)	
Type B	17 (27.4)	13 (21.0)	0.38
Type C	13 (21.0)	13 (21.0)	
Blood orders (whole blood)	45 units	75 units	**0.0028**
Blood use (whole blood)	31 units	31 unit	
Post-operative HB			
(mean (SD) gm.dL-1)	9.8 (SD 1.9)	10.1 (2.1)	0.78

HB = Hemoglobin level in gm.dL-1
Ref = Reference category of a given variable.
Bold = statistically significant

- The surgical blood ordering equation was exactly correct in the ordering blood for 46 (74.2%) of 62 patients (cases).
- The current un-aided blood ordering method was exactly correct in ordering blood for 27 (43.5%) of 62 patients (controls).
- Use of the SBOE resulted in a significantly lower crossmatch-to-transfusion (C/T) ratio compared to that of the current ordering system (1.45 vs. 2.45)
- and saved the hospital transfusion laboratory 465 US dollar of cross match and inventory management costs in this cohort of patients. [1unit costs USD 15 to Hosp]

- the surgical blood order equation-SBOE is now in use at the department of orthopedics.
- The 84 patients with fracture femur used 122units [orders having been based on the SBOE.
- Without SBOE, 142 units would have been ordered and/or used in the group of patients
- This saved up to 20 units of whole blood
- 20 units can be compartmentalized into [60 units of pediatric packed cells, up to 5 units of pooled Platelets and various amounts of different plasma products]

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Remarks

- Define the blood need in all details possible for a given setting.
- What is needed?
- How much is needed?
- When is it needed [what time of the day, afternoon or night shift]?
- Who among your staff need what and why?

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Remarks

- What are the cultural dynamics { clinician, patient, community and institutional} that impact on the established need?

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Remarks

- Train your hospital staff about the established need with all its attendant details
- Train the staff on how to communicate the need

remarks

- Slowly [PLAN, DO, CHECK, ACT] implement a well researched blood ordering strategy

Remember the evidence should be local. This will ensure ownership and easy institutionalization of the strategy.

Remarks

- Establish hospital champions for any blood management interventions. These will be pivotal in dissemination of the strategy to other hospital units that use blood.

I APPRECIATE YOUR ATTENTION

&

THANK YOU SO MUCH

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