"Blood Supply, Safety and Transfusion Therapy in Resource Liminted setting

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Disclosures

- Scientific Advisory Board of Fresenius Kabi
- Recent research grants from Terumo and Cerus corp
- Research collaboration and funding with Swiss Red Cross Blood System



World Wide Blood Supply*

- 162 countries
- 5.9 billion people = 92% global population
- Estimated 8000 blood centers
- 85.4 million units of blood collected
- 65% blood is collected in developed countries for
- 25% world's population
- Most countries
 - Blood supply part of Ministry of Health
 - Some blood collection centralized
 - Much collected in hospitals

* WHO survey 2007



Mulago National Referral Hospital and Makerere University College of Health Sciences, Kampala, Uganda











Blood Use at Mulago National Referral Hospital, Kampala Uganda

Clinical diagnoses	Children <mark>b</mark> (n = 1479)	Adult women (n = 2859)	Adult men (n = 1868)	Overall (n = 6330)
UCI cancer	22	15	32	22.
Pregnancy-related		12		12
Non-UCI cancer	81	15	10	11
Sickle cell disease	23	2	2	7
surgery	10	3	8	6
HIV infection <mark>c</mark>	1	7	7	6
Trauma	3	2	12	5
Malaria	5	0.7	2	2
Acute bleeding <mark>e</mark>	0.6	0.4	6	2

Hemoglobin values... Kaeane NATCA MARRADO /RENE. 4yp Acute 4 35d 640 NABATLOOZA 61905 WINNIE F 1140 tel 62 + Landyobonutar O Kisutu Da 604 05 m gy 16c Later Gerald 43 A 60405 m by 16c seren pails Semahah 61443 Acute 48 g/dl M Bt 11 616481 Karkerto Gerala 616481 in MUGERON FRED MIZYS 16 Sere Parlo Other. KABAGANON STRAZON 613476 RA Serveres Paller Brue 6040 KYEMWE KYEUWE CAROS Star F 4: 7glall F Otu JAMBOWR FATUMA 613 476 M Sp Aarte 2. Dg/dl 235 Samueli Sumaya Nanyangs 2316 Mubin At. 61763 1912 New 4:89/28 M 8/12 619030otve Acite 2-9gHl 619030 ot Aute

Blood Typing, Crossmatching and Sample Identification

Before...



After...



Blood Smear example Fixative Methanol often unavailable



Did you know that you can take vodka?! (up to 140 proof)









Blood Donors - Tanzania





Whole blood and components in 10 BTS in SSA Tayou-Tagny et al Trans Clin & Biol 2009; 16: 431-8.



WHO Transmissible Disease Testing

- Recommended testing: HIV, HBV, HCV, Syphilis
- WHO surveyed 160 countries
- % donations screened Syphilis HIV HBV Developed countries 100 94 100 Transitional countries 66 72 71 Developing countries 46 35 48
- Non-reporting 40 countries = 22% global supply
- Global supply ~ 80 M units; ~ 16 M unreported



Detection of HBV Infectious Blood Units by Different Screening Assays

Assay	Limit of Detection	Est % HBV Detect	Time to Result	Price / Test
Agglutination	30-50 ng/ml	54	5-10 min	\$0.65 - \$1-3 0
Dipstick	5-20 ng/ml	77	17-30 min	\$0.75 - \$2.50
EIA	0.5-1 ng/ml	97	-2.5 h	\$1.5 - \$3
NAT	20 IU/ml DNA	100	6-23 h	\$6 - \$20

Lee & Allain, Vox Sang 2004.



Nucleic Acid Testing (NAT) Lab Using Molecular Methods

MICROLAB STAR-New instrument Under IND.

HAMILTON-MICRO LAB AT 2







Afghanistan Blood Center Transmissible Disease Testing Lab





US Blood Collections and Transfusions





US Blood Avialability and Safety

- Blood is a drug and thus regulated by FDA
- Federal requirements create very standard product
 - Donor selection (medical history, hemoglobin, weight)
 - Laboratory testing
 - Anticoagulant preservatives
 - Storage temperature and duration
- Hospitals contract with supplier (s)
 - Obtain FDA standard blood products
- Additional features or testing may be included for some units
 - Based on safety or medical indications





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General Reasons for Transfusing Cancer Patients

Clinical Situation

- Anemia
- Surgical blood loss
- Thrombocytopenia
- Coagulopathy
- Acute blood loss
- Leukopenia
- Stem cell transplant

Blood Product RBCs RBC **Platelets** FFP, Factor conc **RBCs** Granulocytes All products Immuno therapy

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General Considerations in Transfusing Cancer Patients

- **Necessary** for procedures
 - RBC transfusion for surgery
 - FFP or platelets to Improve hemostasis
 - Response to crisis acute bleeding
- Supportive: Consequence of treatment
 - Anemia due to chemotherapy
 - Pancytopenia post stem cell transplantation
- Palliative care
 - Anemia of end stage disease
 - Coagulopathy prevent bleeding
 - Thrombocytopenia prevent bleeding



Resource Related Decisions for Hospital Purchase

- Institution Decision : General Purchase Contract
 - ABO mixture
 - Rh amount avoid Rh positive to Rh negative pt
 - Platelet supply
- Institution resources **plus** medical impact
 - Leukodepleted RBCs avoid HLA immunization
 - Pathogen inactivated platelets or plasma
 - Apheresis vs whole blood derived platelets
 - Babesia tested RBCs
 - HLA or crossmatched platelets



Resource Related Decisions - Contd

- Medical Impact
 - CMV negative RBCs
 - Leukodepleted RBCs stem cell or solid organ transplant patients
 - Type A plasma for trauma patients
 - Extensively typed RBCs patients with sickle cell disease or thalassemia
 - Washed RBCs allergic reactions
 - Platelet supply availability
 - HLA matched or crossmatched platelets



Conclusions

- Resources influence institution blood supply contract and kinds and mix of blood products
- Medical considerations may include some "specialized" products
- Most not specifically related to cancer
 Except platelet supply
- Thus resource limitations do not have major impact on transfusion therapy for cancer patients



