Establishing a multicenter transfusion recipient database: Feasibility and potential use

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Background

Validated multicenter databases focusing on transfusion (tx) recipients are needed to study current tx practice and associated patient outcomes. The REDS-III program has recently developed a new rigorously validated and controlled tx recipient database utilizing data from hospital electronic health records (EHR).

Methods

- EHR data from 11 of 12 US REDS-III hospitals (**Table 1**) were obtained from the first quarter (Jan. 1, 2013 - March 31, 2013).
- Inpatient (IP) and outpatient (OP) transfused and non-transfused patient data were obtained. A rigorous quality control process was used for all formats (**Table 2**).
- Tx incidence was calculated for key IP demographic variables (# of encounters with tx/total encounters).

Table 1. Characteristics of the participating REDS-III hospitals.

REDS-III Hub and Hospitals	No. of Beds	Trauma level	Ob/Gyn	Heme-Onc	Subspecialty surgery	Subspecialty ICUs	Pediatrics/ neonatology
BloodCenter of Wisconsin: (Milwaukee, WI)							
- Froedtert Hospital	550	I	Y	Y	Y	Y	N
- Aurora St. Lukes Med Ctr	709	II	N	Y	Y	Y	N
- Aurora Sinai/Samaritan	177	IV	Y	Y	Y	Y	Y
- Marshfield Clinic/St Joseph's	319	II	Y	Y	Y	Y	Y
Blood Centers of the Pacific: (San Francisco, CA)							
- UCSF Med Ctr	600	I	Y	Y	Y	Y	Y
- San Francisco General	441	I	Y	Y	Y	Y	Y
- San Francisco VA*	244	NA	Y	Y	Y	Y	N
ITxM: (Pittsburgh, PA)							
- UPMC Presbyterian	792	I	N	Y	Y	Y	N
- UPMC Shadyside	520	NA	N	Y	Y	N	N
- UPMC St. Margaret	249	NA	Y	Y	Y	N	N
American Red Cross, New England: (Farmington, CT):							
- Yale New Haven Hospital	1,541	I	Y	Y	Y	Y	Y
- Bridgeport Hospital	383	II	Y	Y	Y	Y	Y

(key: Y= present at that hospital, N= not present, NA= not available)
*** Data from San Francisco VA not yet available.**

Table 2. The data content collected from the EMR for the REDS-III database.

Data collection tables	Transfused : Inpt or outpt	Not transfused: T & C done Inpt or outpt	Not transfused: T & S only Inpt or outpt	Not transfused: No T & S Inpt only	Not transfused: No T & S Outpt only, but admitted within 45 days
Demographics					
Diagnosis codes					
Encounter types					
Procedure codes					
Diagnostic lab studies					
Medications					
Transfers					
Code status					
Pre admission labs					
Vital signs					
Blood gases					
Respiratory support					
Discharge summary					
Fluids					
Microbiology tests					
Chest Xrays/imaging					
Ventilator duration					
Crossmatch results					
Transfusion Order indications					
Transfusion					
Issued/transfused products					
Transfusion reactions					

(Blue = collected data, Orange= data not collected)
(Key: T & C = type and cross, T & S = type and screen, inpt = inpatient, outpt = outpatient)

Results

- More than 32 million data elements were collected from 89,856 patient encounters, and 13,554 (15.1%) encounters involved a blood tx.
- The median age of tx patients was 63 yrs (IQR 51-74 yrs), with pediatric patients representing 3.6% of transfusion encounters. The incidence of IP tx was significantly higher in adults (13.9%) than in children (4.8%; p<0.001) (**Figure 1a**).
- The incidence of IP tx was significantly higher in Caucasians (13.9%) than in Blacks (11.4%; p<0.001) (**Figure 1b**), but did not differ based on gender (13.2% male; 12.7% female, p=0.09).
- Most blood products are used in the IP setting (9,005, 66.4% of transfusion encounters), and most are given in the general ward (**Figure 2**).
- Septicemia and injury are the leading diagnoses for those receiving blood as an IP, while anemia and neoplasia are the leading diagnoses for OP txs.
- In-hospital mortality was 6.3% for tx IP vs 1.4% for non-tx IP (p<0.001).

Figure 1. Characteristics of IP encounters by age (a) and ethnicity (b) for the REDS-III hospitals.

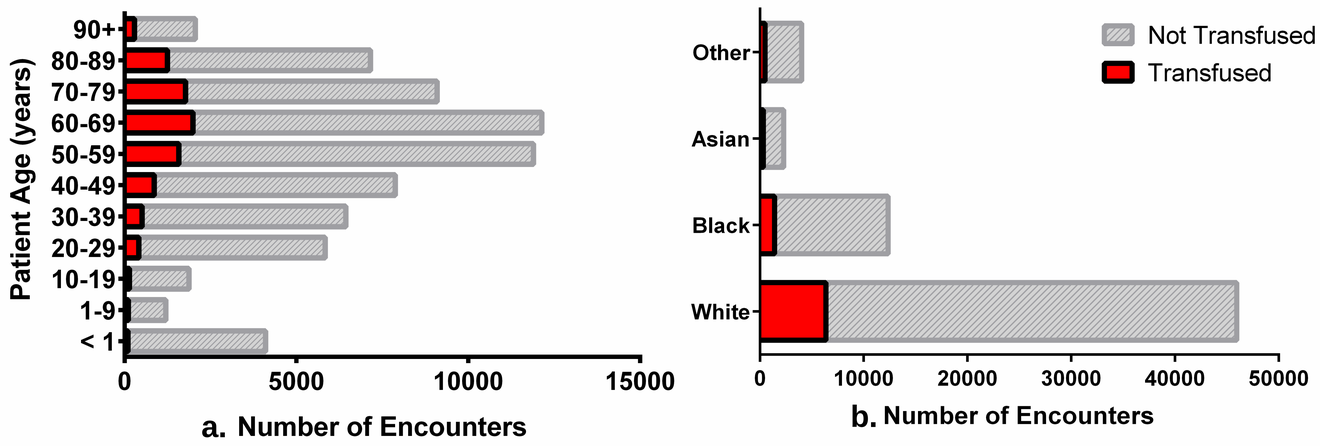
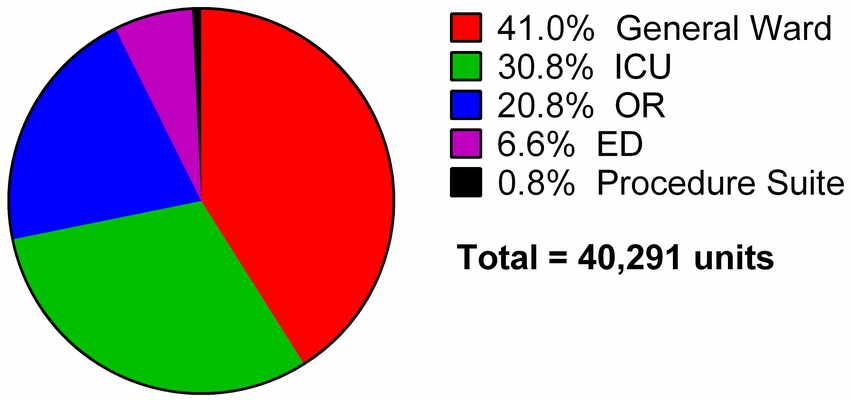


Figure 2. Distribution of transfused units by IP location for the REDS-III hospitals.



Conclusion

•Accurately determining tx incidence has been historically challenging as it requires knowledge of all tx and non-tx medical encounters.

•The initial 3 months of this database revealed significant differences in tx incidence by age and race, and demonstrates the feasibility and potential of this resource.

•This data base represents part of a planned 4 year linked blood donor-transfusion recipient database. In the future, novel longitudinal trends in tx practice by recipient subgroup can be evaluated and potentially linked to donor and unit characteristics.

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