L'errore trasfusionale ABO.

Cosa fare e cosa evitare di fare

Roma, 27 giugno 2013

Analisi e gestione multidisciplinare del rischio di errore trasfusionale ABO

Le possibili criticità nel servizio trasfusionale

Giancarlo Maria Liumbruno

La probabilità di ricevere un'unità ABO incompatibile

Gruppo del ricevente	Gruppo del donatore	Calcolo della probabilità	Probabilità di incompatibilità
O	O	0,46 x 0,46 = 0,21	-----
	A	0,46 x 0,41 = 0,19	0,19
	B	0,46 x 0,09 = 0,04	0,04
	AB	0,46 x 0,04 = 0,02	0,02
A	O	0,41 x 0,46 = 0,19	-----
	A	0,41 x 0,41 = 0,17	-----
	B	0,41 x 0,09 = 0,04	0,04
	AB	0,41 x 0,04 = 0,02	0,02
B	O	0,09 x 0,46 = 0,04	-----
	A	0,09 x 0,41 = 0,04	0,04
	B	0,09 x 0,09 = 0,01	-----
	AB	0,09 x 0,04 = 0,00	0,00
AB	O	0,04 x 0,46 = 0,02	-----
	A	0,04 x 0,41 = 0,02	-----
	B	0,04 x 0,09 = 0,00	-----
	AB	0,04 x 0,04 = 0,00	-----
Totale		1,00	0,35

Brecher ME, Hay SN, 2004

How good luck can help us…..

- By chance alone there is a **35%** possibility that a **random unit** administered to a **random patient** will be **incompatible** (Linden JV, Transfusion 1992; Greenwalt TJ, Transfusion 1997).

- Even if an incompatible unit is transfused, the likelihood of of **fatal outcome** is **less than 10%** (Linden JV, Transfusion 2000).

TABLE 27-1. Categories and Management of Adverse Transfusion Reactions*

Type	Incidence	Etiology	Presentation	Diagnostic Testing	Therapeutic/Prophylactic Approach
Acute (<24 hours) Transfusion Reactions—Immunologic					
Hemolytic	♦ ABO/Rh mismatch—1:40,000 ♦ AHTR—1:76,000 ♦ Fatal HTR—1:1.8 million	Red cell incompatibility	Chills, fever, hemoglobinuria, hypotension, renal failure with oliguria, DIC (oozing from IV sites), back pain, pain along infusion vein, anxiety	♦ Clerical check ♦ DAT ♦ Visual inspection (free Hb) ♦ Repeat patient ABO, pre- and posttransfusion sample ♦ Further tests as indicated to define possible incompatibility ♦ Further tests as indicated to detect hemolysis (LDH, bilirubin, etc)	♦ Keep urine output >1 mL/kg/hour with fluids and IV diuretic (furosemide) ♦ Analgesics (may need morphine) ♦ Pressors for hypotension (low-dose dopamine) ♦ Hemostatic components (platelets, CRYO, FFP) for bleeding

Vox Sanguinis (2009) **97**, 240–246

ORIGINAL PAPER

DOI: 10.1111/j.1423-0410.2009.01199.x

Consecutive national surveys of ABO-incompatible blood transfusion in Japan

Y. Fujii,[1] Y. Shibata,[2] S. Miyata,[3] S. Inaba,[4] T. Asai,[5] Y. Hoshi,[6] J. Takamatsu,[7] K. Takahashi,[8] H. Ohto,[9] T. Juji[10] & K. Sagawa[11]

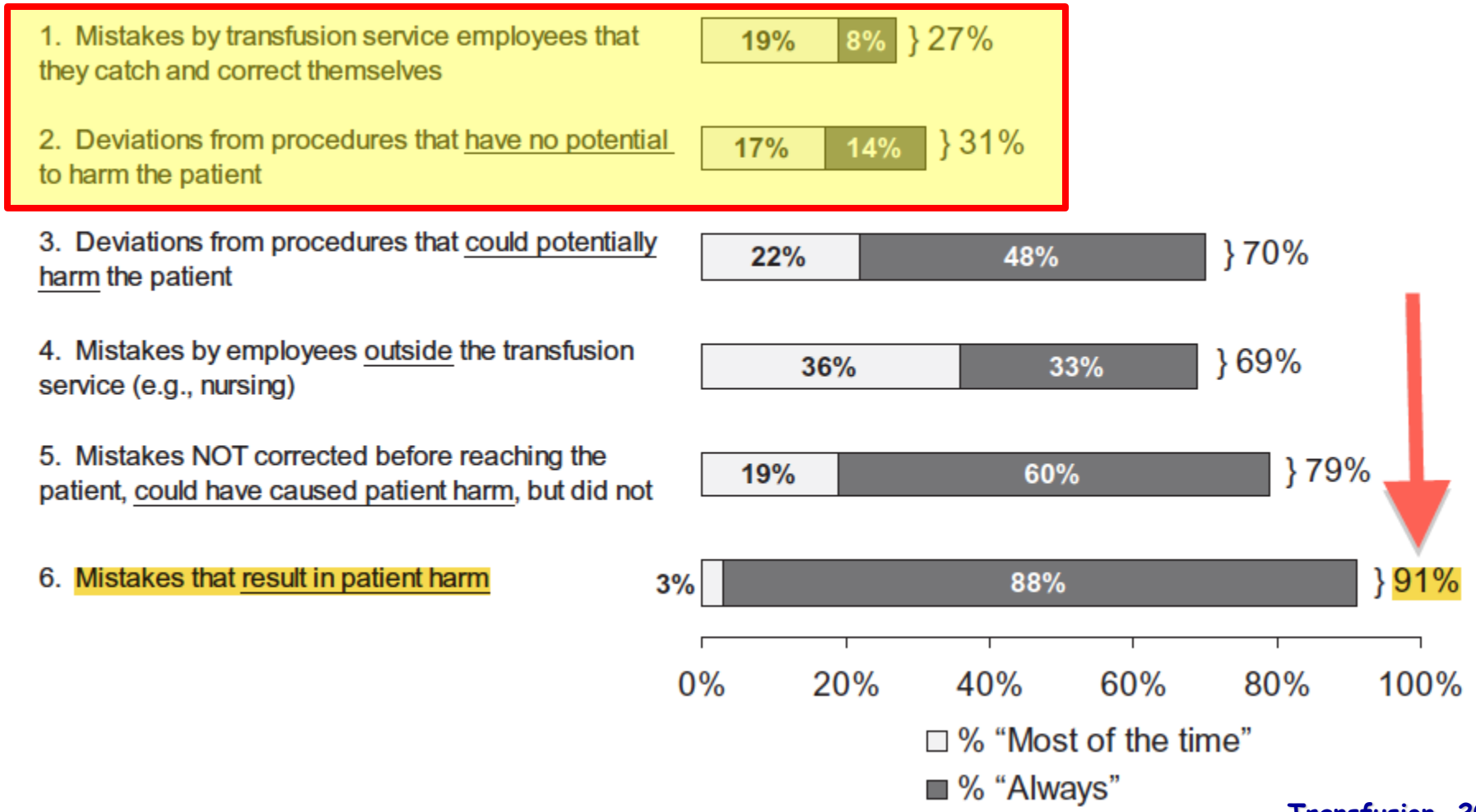
Data from the second survey suggest a **risk of ABO-incompatible transfusion** as **1:200,000** and a risk of the **death** as **1:3 million**.

AABB Technical Manual, 17th ed.

Staff attitudes about event reporting and patient safety culture in hospital transfusion services

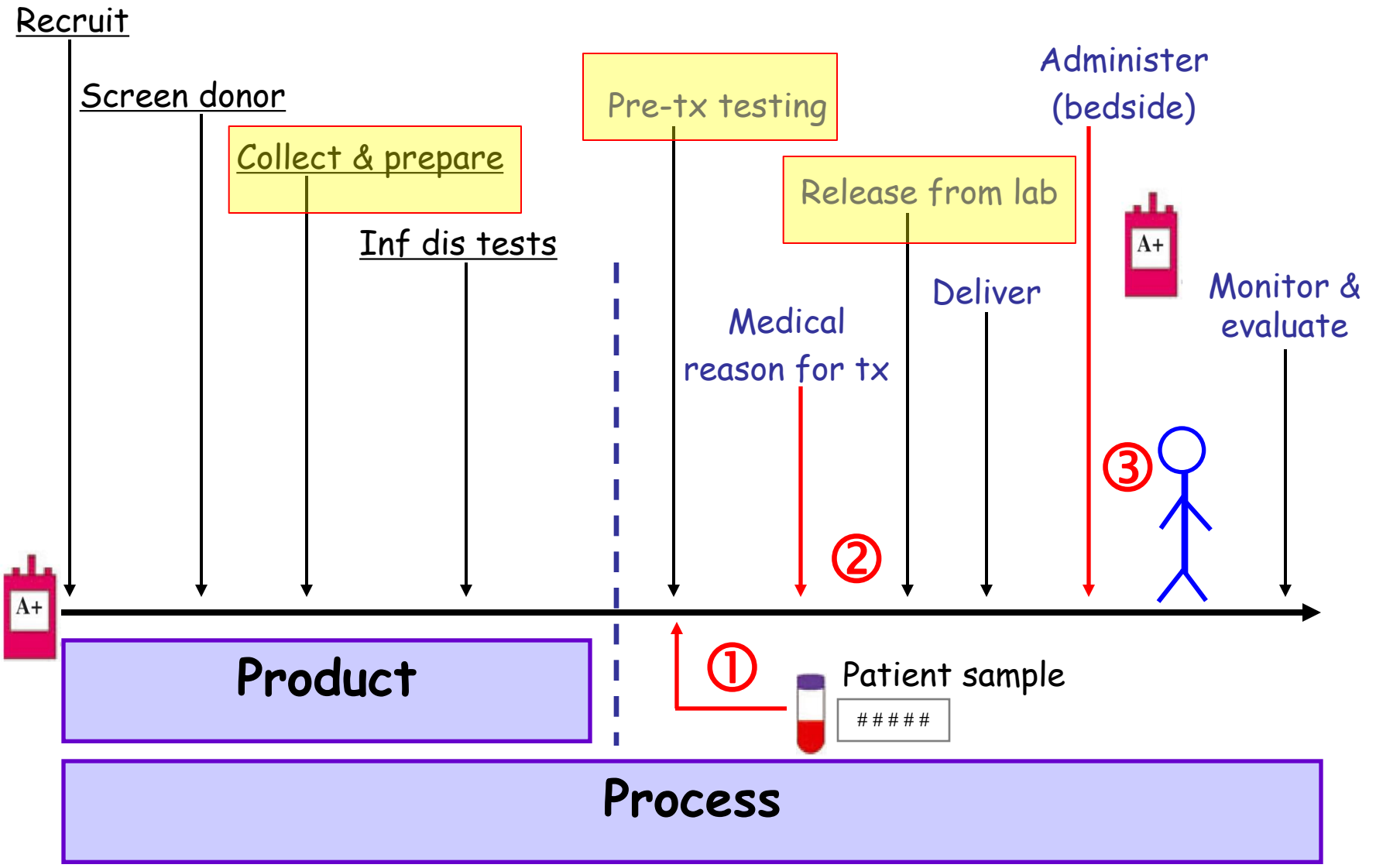
Joann Sorra, Veronica Nieva, Barbara Rabin Fastman, Harold Kaplan, George Schreiber, and Melissa King

Frequency of event reporting (in a log or written report)



Transfusion, 2008

Transfusion safety is more than component safety. Safe transfusion therapy depends upon an interconnected series of processes that begin with the donor and end with the patient (Dzick WH, Transfusion 2003).



Dzick WH, Br J Haematol 2006

Staff attitudes about event reporting and patient safety culture in hospital transfusion services

Joann Sorra, Veronica Nieva, Barbara Rabin Fastman, Harold Kaplan, George Schreiber, and Melissa King

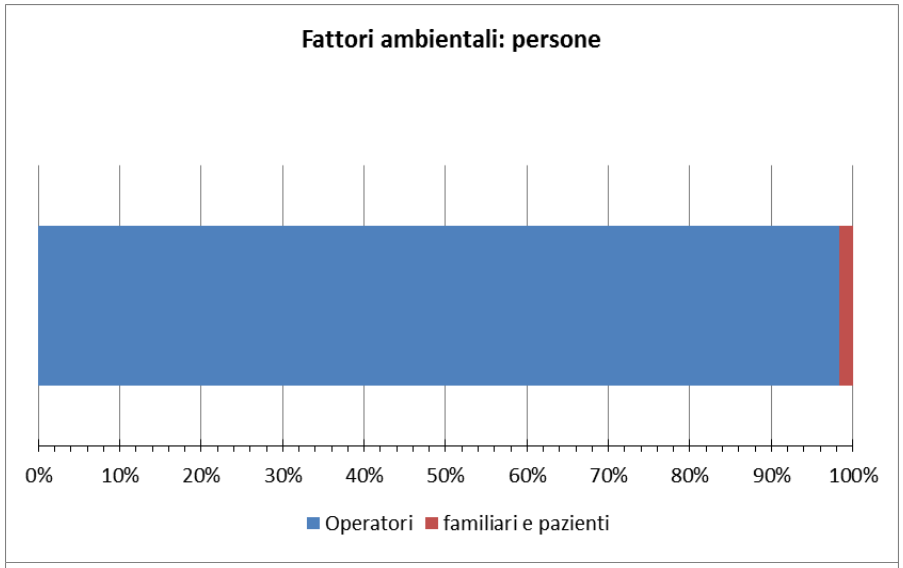
TABLE 1. Top reasons mistakes occur in hospital transfusion services (% of respondents indicating the item is a reason "a lot," "most of the time," or "always")

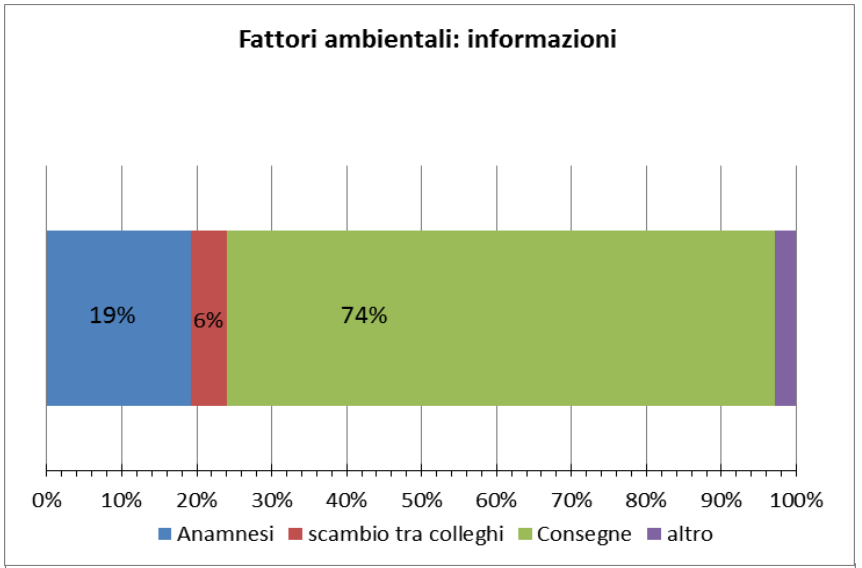
1. Interruptions (by phone calls, product requests, etc.)	51%
2. Staff in other hospital departments (like nursing) not knowing or understanding proper procedures	49%
3. Pressure to deliver products quickly	34%
4. Not enough staff to handle the workload	34%
5. Individuals not following standard operating procedures	32%
6. Individual slip or lapse	31%

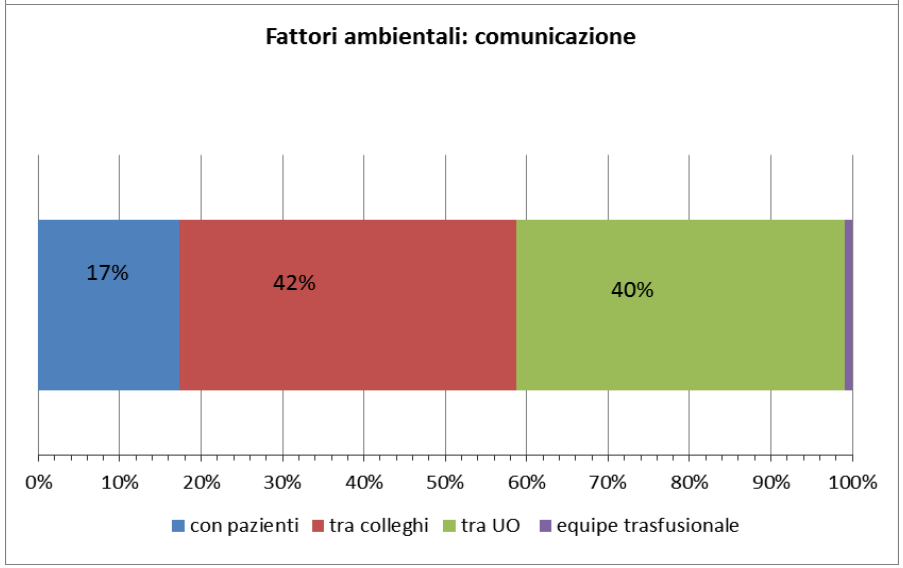
Transfusion, 2008

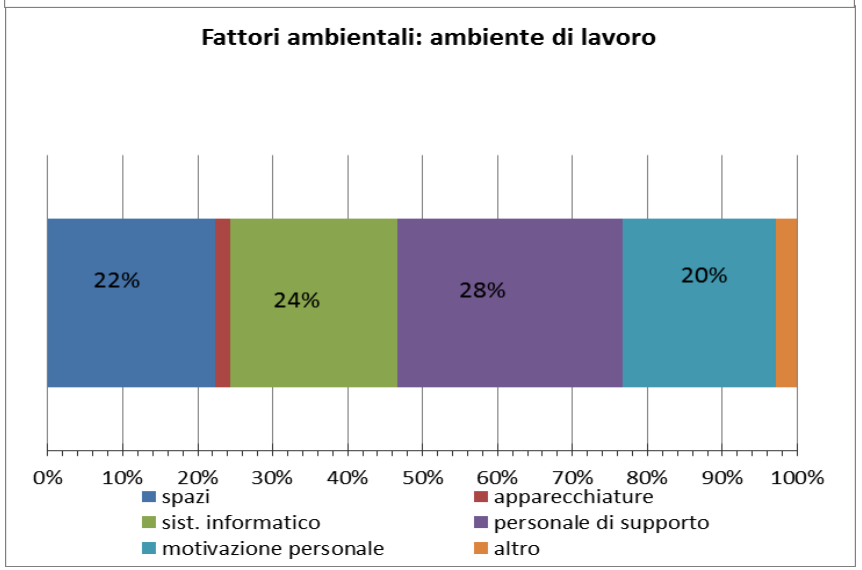
Gli elementi ambientali di rischio per la trasfusione di sangue

A quali elementi ambientali potrebbe essere correlato un futuro evento avverso? (max tre risposte)







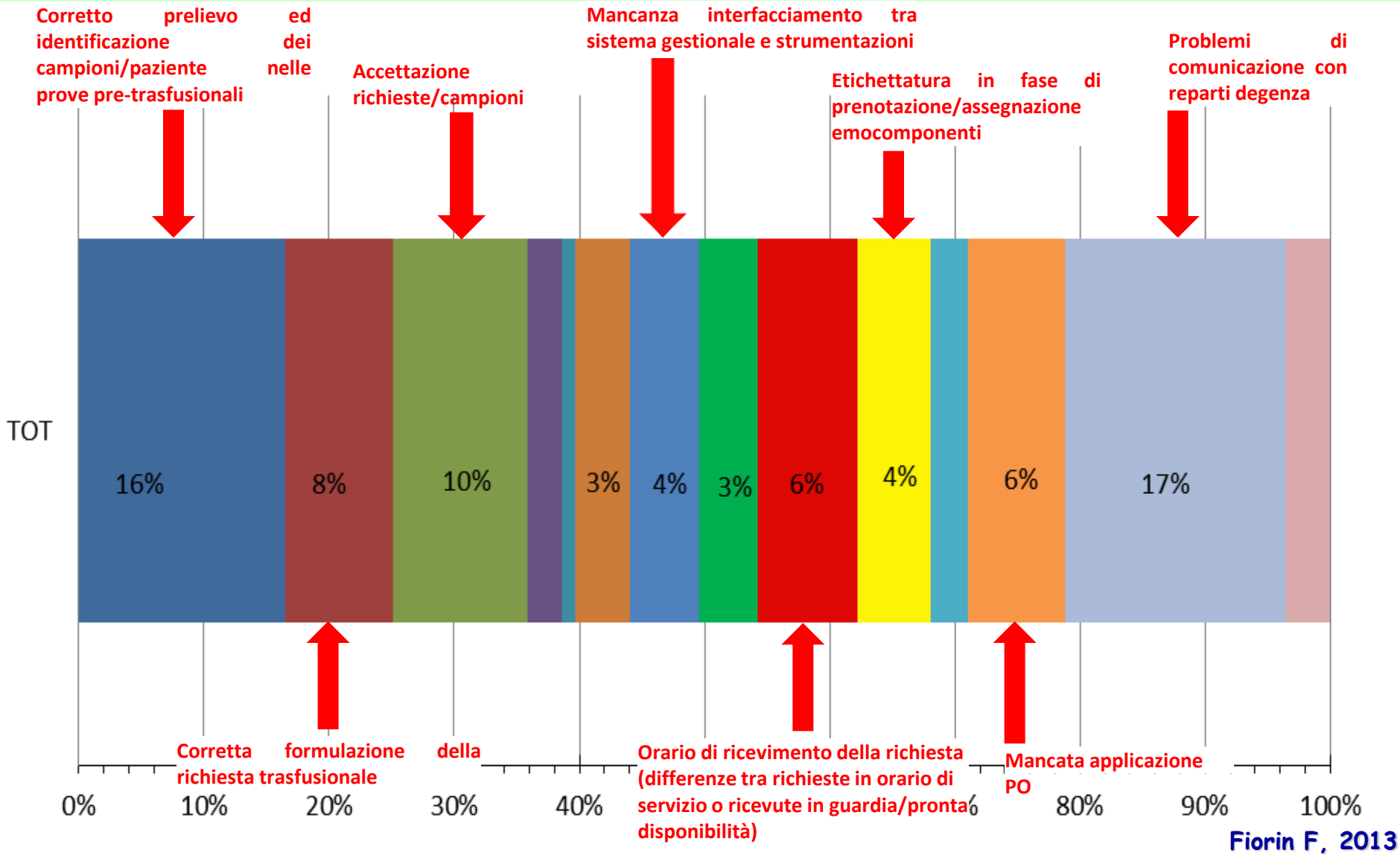


Fiorin F, 2013

Le aree critiche per l'errore nelle ST

Quali sono, nel vostro ST, le aree più critiche per l'errore in MT? (max 3 risposte)

NB: le domande sono riferite alle attività espletate direttamente dalle ST (compresi prelievi e richieste trasfusionali)



Fiorin F, 2013

Predictable and avoidable human errors in phlebotomy area – an exclusive analysis from a tertiary health care system blood bank

P. Pandey, R. Chaudhary, R. Tondon & D. Khetan *Department of Transfusion Medicine, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow 226014, India*

Table 1. Categorization and frequency of technical errors ($n = 194$)

Sample collection errors may occur **when samples are drawn from donors** during blood donation, as well as when drawn from patients prior to transfusion-related testing.

Minor	112 (57·7)
Sampling error	40 (35·7)
Sample not collected	14 (35)
Sample collected in wrong pilot tubes	20 (50)
Missing labelled pilot tubes	6 (15)
Phlebotomy error	46 (41·1)
High cuff pressure during blood collection	20 (43·5)
Kink in tube during blood collection	18 (39·1)
Tube not placed in biomixer clamp leading to OC <10%	8 (17·4)
Miscellaneous errors	26 (23·2)
Inappropriate discard of needle	16 (61·5)
Mishandling of pilot tubes	10 (38·5)

Table 2. Categorization and frequency of clerical errors ($n = 158$)

	N (%)
Major	16 (10·1)
UC or OC of >10%	16 (100)
Due to wrong volume entry in biomixer	
Minor	142 (89·9)
UC or OC <10%	36 (25·4)
Wrong volume entry in biomixer	36 (100)
Donor identification error	12 (8·5)
Labelling error	94 (66·2)
Bags	36 (38·3)
Donation card	40 (42·6)
Pilot tubes	18 (19·1)

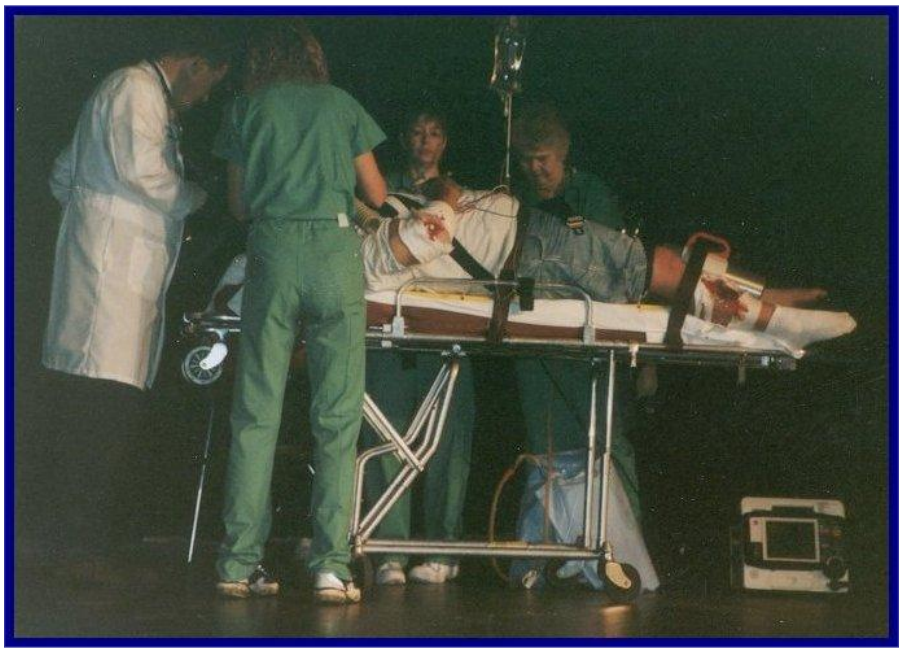
Transfus Med, 2007

Where do things go wrong?

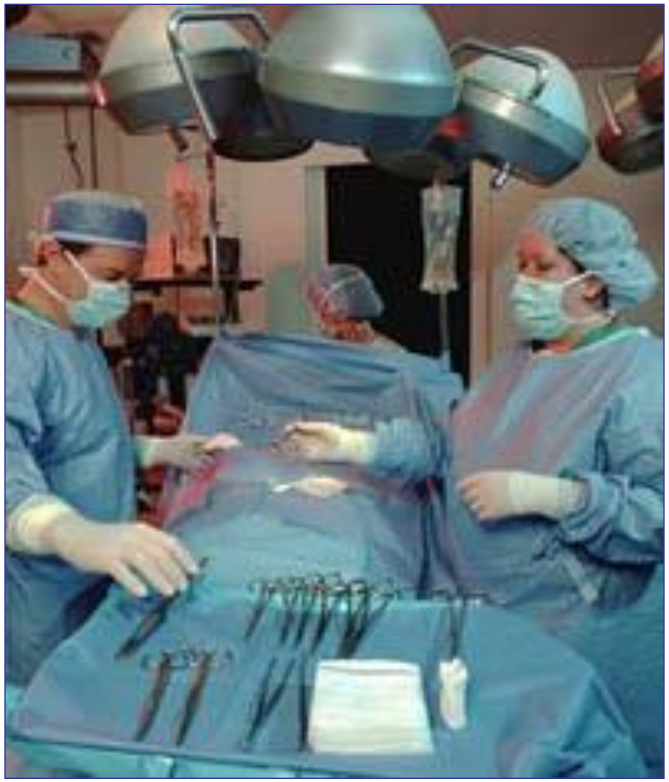
30% inside the laboratory

(in 50% of cases, > 1 error contributes to an adverse outcome)

When do things go wrong?



During accident and emergency and surgical emergencies



When wards are busy with distractions

Vox Sanguinis (2009) **97**, 240–246

ORIGINAL PAPER

DOI: 10.1111/j.1423-0410.2009.01199.x

Consecutive national surveys of ABO-incompatible blood transfusion in Japan

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Laboratory error during regular (daylight) hours

These errors included **technical testing errors** in three cases, **clerical error in transcription** in one case, **issuance of the wrong units** in two cases, and **use of the wrong patient sample** in three cases.

When experienced staff are thinly spread

And in the middle of the night

Vox Sanguinis (2009) **97**, 240–246

ORIGINAL PAPER

DOI: 10.1111/j.1423-0410.2009.01199.x

Consecutive national surveys of ABO-incompatible blood transfusion in Japan

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Laboratory error outside of core hours

Example: an O D negative sample in a card read from correct side					
Anti-A	Anti-B	Anti-D	Ctrl	A_1 Cells	B cells
-	-	-	-	+	+
Same card read from the reverse side appears to be AB D negative					
B cells	A_1 Cells	Ctrl	Anti-D	Anti-B	Anti-A
+	+	-	-	-	-

Examples of critical control points in the compatibility process and risk reduction strategies

Critical Control Point	Examples of Risk	Examples of Risk Reduction Measures
Barcode labelling of samples and request forms	• Mixing up labels between different samples and request forms	• Labelling samples from a single patient only • Checking sample barcode against LIMS system after booking in
Testing samples and entering results	• Manual testing – possible transcription errors • Automated testing – possible interface / testing errors	• Use automated testing in both routine and emergency situations • Validation of testing system and interface
Reservation of red cells	• ABO mismatching • Special requirements missed • Labelling wrong donations – mix up between patients	• Validate LIMS to show wrong ABO cannot be reserved • Warning in LIMS system if wrong component selected Highlighting requirements on request form • Perform only one crossmatch / electronic issue labelling at a time

KEY RECOMMENDATION

The laboratory must identify all critical control points in pre-transfusion testing and build in security at these points.

Milkins C, 2012 BCSH guidelines for pre-transfusion compatibility procedures in blood transfusion laboratories

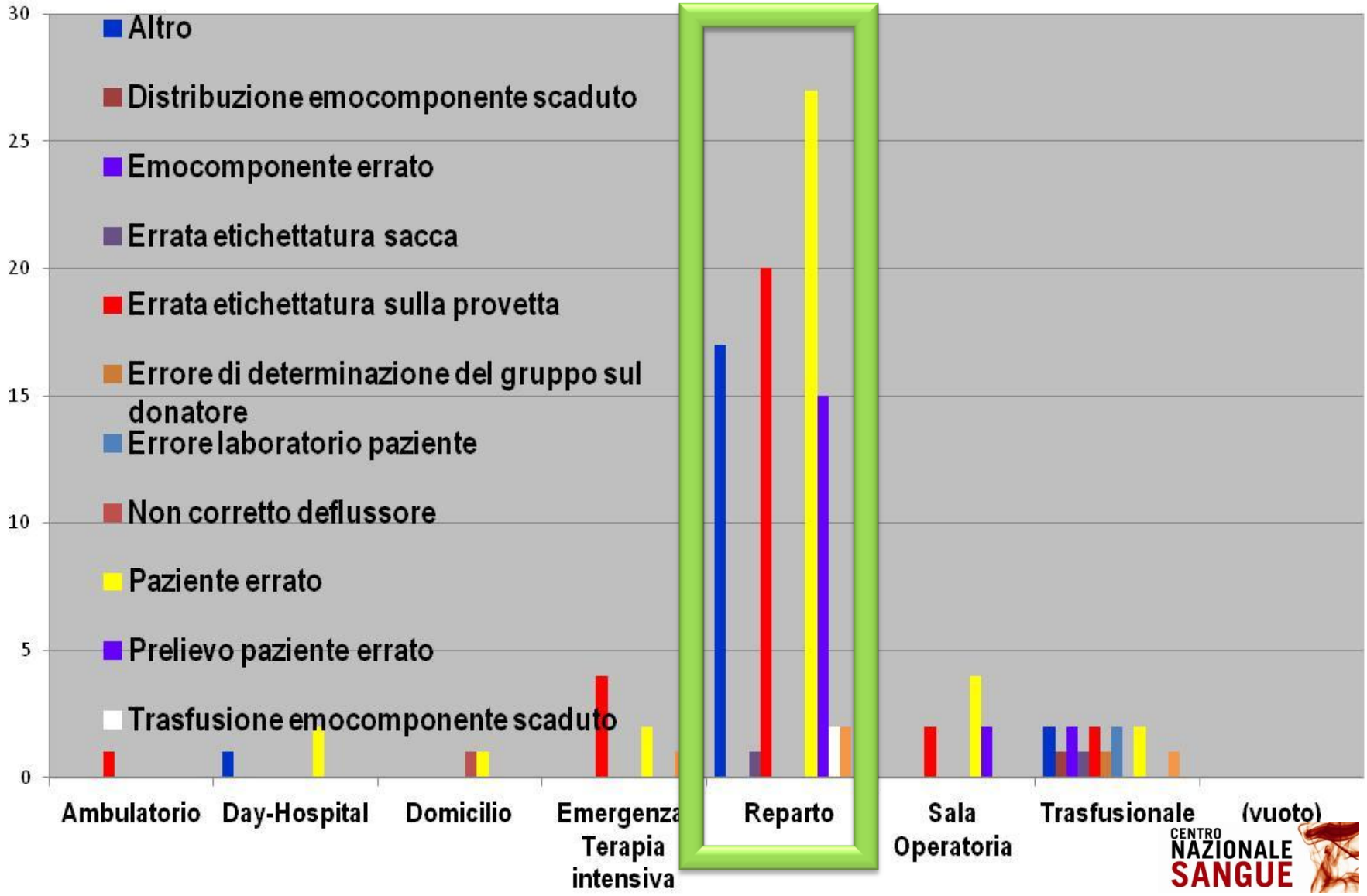
Assegnazione e consegna

ERRORI con Reazione Emolitica	2009	%	2010	%
Identificazione del paziente		25,0		11,8
Paziente errato	6		2	
Etichettatura		4,2		17,6
Errata etichettatura provetta	1		2	
Errata etichettatura sacca			1	
Assegnazione / distribuzione dell'emocomponente		29,2		11,8
Utilizzo di unità non destinata al paziente	7		2	
Errore di determinazione		41,7		17,6
Errore di determinazione del gruppo sul donatore	4		1	
Limite di determinazione del gruppo sul donatore	6		2	
Altro			7	41,2
Totale	**24**		**17**	

CENTRO NAZIONALE SANGUE

G. Facco: Dati preliminari SISTRA

Assegnazione e consegna: dove avvengono errori e *near miss*



CENTRO NAZIONALE SANGUE

G. Facco: Dati preliminari SISTRA

Hospital-based transfusion error tracking from 2005 to 2010: identifying the key errors threatening patient transfusion safety

Transfusion 2013, in press

Carolyn Maskens, Helen Downie, Alison Wendt, Ana Lima, Lisa Merkley, Yulia Lin, and Jeannie Callum

- A total of 15,134 errors were reported over 72 months with a median of 215 (range, 85-334) errors reported per month. A median of 118 errors were reported in 2006, increasing to a median of 267 in 2010.
- Overall, 9083 (**60%**) errors occurred in the **transfusion service** and 6051 (**40%**) on the **clinical services**.

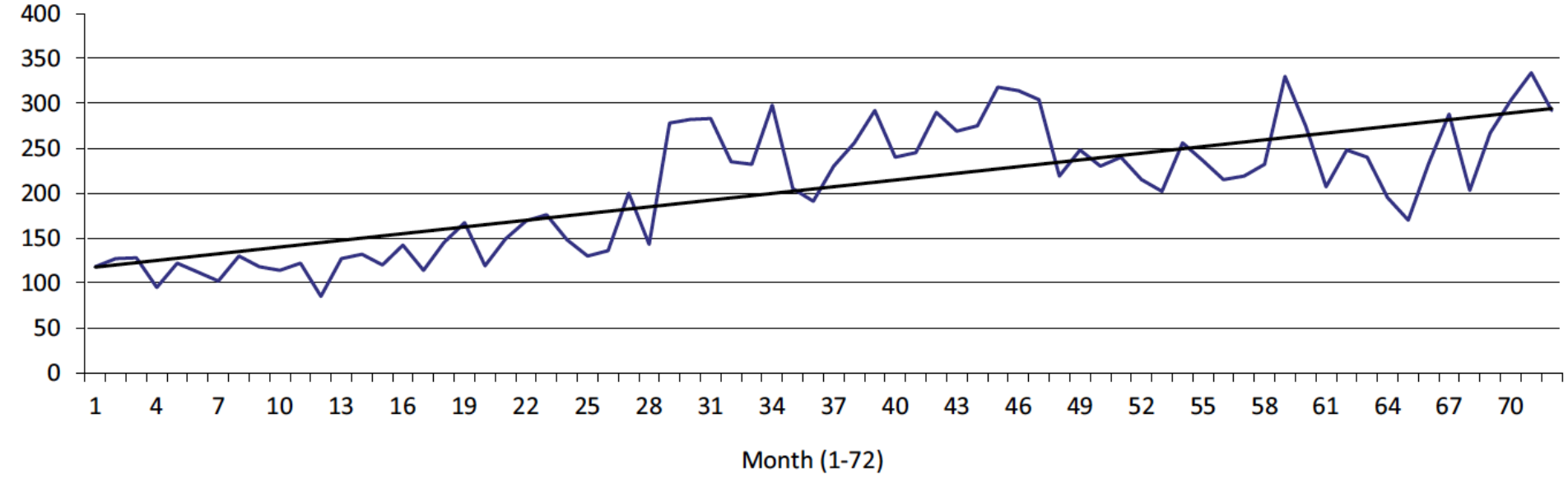


Fig. 1. Number of errors detected per month from January 2005 to December 2010.

Hospital-based transfusion error tracking from 2005 to 2010: identifying the key errors threatening patient transfusion safety

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Top 5 errors

Error	Number (%)
Clinical service (n = 6051)	
SH—No phlebotomist or witness identification	792 (13)
SC—Sample hemolyzed	653 (11)
PR—Inappropriate request of blood product	633 (10)
SC—Sample label incomplete for key patient identifiers	306 (5)
SC—Sample not labeled	254 (4)
Transfusion service (n = 9083)	
US—Inappropriate monitoring of storage device*	2546 (28)
ST—Data entry incorrect, incomplete or not done*	1651 (18)
SR—Demographic review or entry incorrect/not done	952 (10)
PC—Data entry incomplete, not performed, or incorrect	674 (7)
UM—Data entry incomplete or incorrect	516 (6)

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Top 5 high-severity errors

Error	Number (%)
Clinical service (n = 6051)	
PR—Inappropriate order of blood products	395 (6.5)
SC—Paperwork and sample identification from two different patients	205 (3.3)
SC—Label incomplete for key patient identifiers	186 (3.0)
SC—Sample not labeled	162 (2.7)
SC—Sample labeled with wrong patient identification	149 (2.5)
Transfusion service (n = 9083)	
SR—Sample accepted in error	48 (0.5)
ST—Data entry incorrect, incomplete, or not done	44 (0.5)
UI—Wrong product issued to the right patient	21 (0.2)
ST—Final check not done or incorrect	15 (0.2)
SR—Demographic review or entry incorrect/not done	12 (0.1)

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TABLE 4. Error rates for transfusion service errors per 1000 denominators for 2005 to 2010

Event code	Error rate per 1000 denominators	Denominator
Product check-in	4	Products received
Sample receipt	8	Samples received
Sample testing	10	Tests performed
Unit storage	13	Products received
Product selection	0.4	Products prepared
Unit manipulation	4	Products prepared
Unit issue	4	Products issued

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- 9083 out of 15,134 errors (60%) occurred in the transfusion service:
  - **263 out of 15,134 (1.7%) were high severity errors** (2.7% of all transfusion service errors).
  - Two laboratory errors resulted in **patient harm: 0.02% of all transfusion service errors** (one harm per 4540 errors detected). No ABO incompatibility errors were detected.
  - **Near-miss: 97%**.
- 6051 out of 15,134 errors (40%) occurred in the clinical service:
  - **1392 out of 15,134 (9.2%) were high severity errors** (23% of all clinical service errors).
  - 21 errors resulted in **patient harm: 0.35% of all clinical errors**.
  - **Near-miss: 89%**.

Group O platelets & AHTRs

ABO/RhD compatibility

The PCs transfused must be ABO-identical, or at least ABO-compatible, in order to give a good yield (Table VII)[3,4,10,31].

Group O PC can be used for patients with blood groups A, B, and AB only if they are resuspended in additive/preservative solutions, or if negative for high titre anti-A/A,B [critical titre (in a gel-test) of anti-A/A,B: IgM ³ 1:64 and/or IgG ³ 1:256] (*Grade of recommendation: 2C+*)[64-67].

Liumbruno GM, Blood Transfus 2009

Group O platelets can cause acute haemolytic reactions even when tested and labelled negative for 'high-titre haemolysins'. They should only be used for non-group O patients (particularly paediatric patients) as a last resort

Errors in Transfusion Medicine: Have We Learned Our Lesson?

Barbara Rabin Fastman, MHA, MT(ASCP)SC, BB and Harold S. Kaplan, MD

- The opportunity for error in complex organizations is huge, and humans are often set up to commit mistakes by preexisting factors and systems that are lying in wait for human interaction.
- Like the chemical and airline industries blood transfusion can be considered as a controlled risk system with an **accident rate of between 1 in 1,000 and 1 in 100,000**. Safety in controlled risk systems depends on **careful monitoring** by safety management experts. (Chiaroni J, Transfusion 2004)

Mount Sinai Journal of Medicine 78:854–864, 2011

We have good standards, but should stay alert !!

Grazie dell'attenzione!