

undertransfusion

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Risk of under transfusion

- Identified « At risk » situations
 - During and immediately after anesthesia
 - Maternal haemorrhage in obstetric
 - Multiple trauma patients
- Various causes
 - Fear of transfusion
 - Lack of emergency transfusion protocols
 - Lack of communication between BTC and hospital

Deaths related to anesthesia - 1

Lienhart A, Auroy Y, Péquignot F,
Benhamou D, Warszawski J, Bovet M,
Jougla E.

Survey of anesthesia-related mortality in
France. Anesthesiology, 2006. 105 (6)
10087-1097

Analysis of death certificates of 1999
Study performed in 2003

Deaths related to anesthesia - 2

- France 1999 : 537,459 death certificates
- Analysis of ICD9 codes where anesthesia could be involved
 - Classification in two groups :
 - Interventional death :
 - In direct relation with anesthetic
 - In relation with interventional procedure
 - Violent death :
 - Trauma, traffic accident, falls, etc.

Deaths related to anesthesia - 3

Method for sampling	ratio	n
• Interventional death		
– Direct role of anesthesia	1/1	281
– Age < 40	1/1	734
– > 40 and < 75	1/7	923
– > 75	1/11	921
• Violent death (All cases)	1/10	841
• Unrelated death in hospital	1/365	500
<i>Total death certificates analysed</i>		4200

Deaths related to anesthesia - 4

Analysis of the 4200 death certificates

- 2709 : excluded (no anesthesia/clear other explanation)
- 1491 : questionnaire sent to certifier
- 1452 Responses (97%) analyzed by an expert panel
 - 1217 responses OK
 - 235 responses requiring further informations
 - Second questionnaire + Peer review for 227 (96%)

Deaths not related to anesthesia : 1025

Deaths partially related to anesthesia : 366

Deaths totally related to anesthesia : 53

Deaths related to anesthesia - 5

Results (for the blood transfusion side only...) -_1

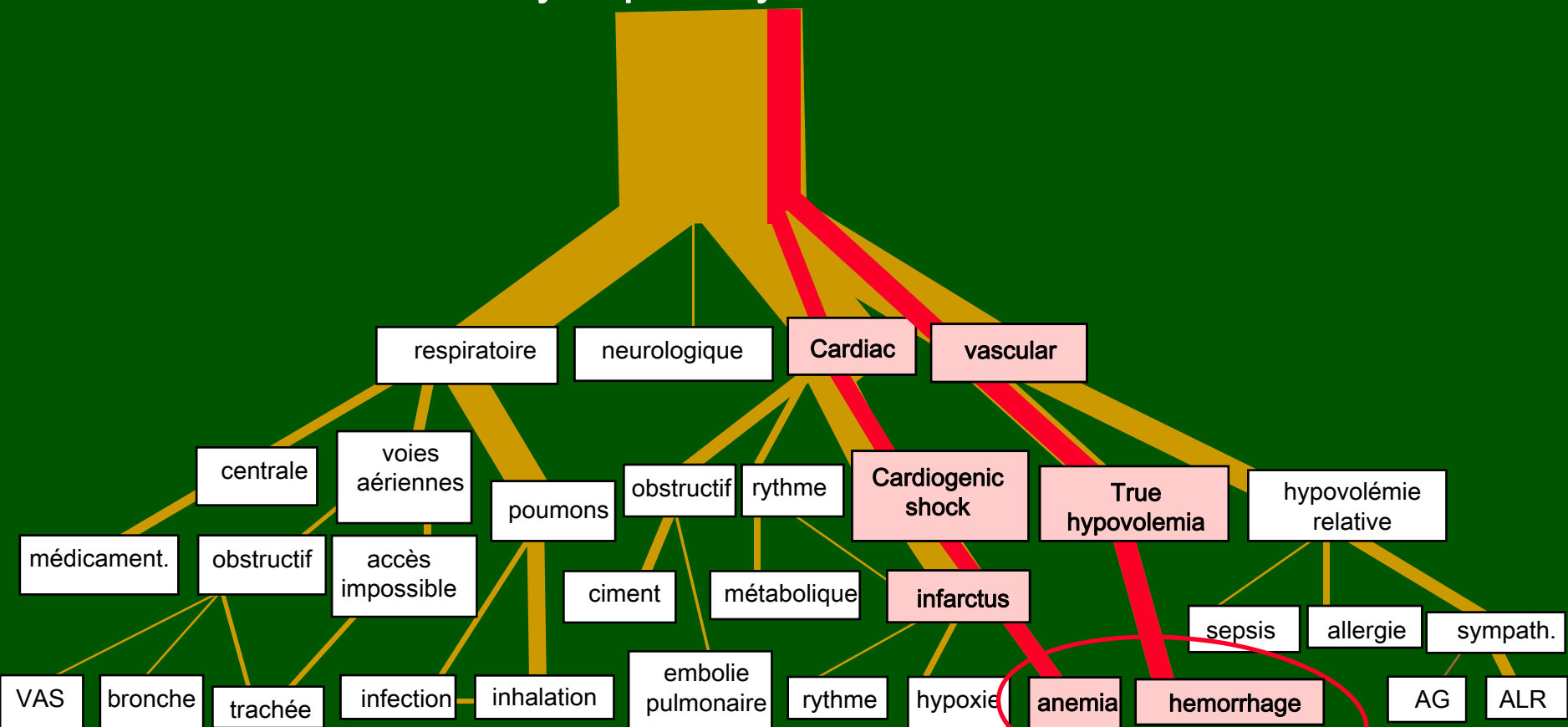
In 419 deaths partially or totally related to anesthesia

- Deviations from rules/standard/recommendations
 - Management of hypotension n = 21 (5%)
 - Post-op management of blood loss n = 9 (2%)
- Lack of adequate Hb monitoring n = 150 (36%)



Mechanisms leading to death during anesthesia

Death totally or partially linked with anesthesia



Death associated with failure
of correction of blood loss ≈ 100 / year

Lienhart et al 2003

Clinical observation : post operative management of blood loss

- Hip replacement in a 75y old male patient
- Known stenotic coronary pathology
- Hb = 9.8 g/dL at the end of surgery
- Prescription of blood count day 1 post-op :
 - Sample taken at 8 am
 - Blood count result available (1 pm)
 - Patient develops fatal myocardial infarction (2 pm)
 - Blood count (of 8 am) read after : 6.2 g/dL

Deaths related to anesthesia - 6

Results (for the blood transfusion side only...) -_2

National projection (from 1999 data):

- about 100 deaths / year directly related to inadequate blood management
- + Much more deaths partially related to delayed or absent blood transfusion
 - Lack of Hb monitoring
 - Low threshold for transfusion
 - Reluctance to transfuse

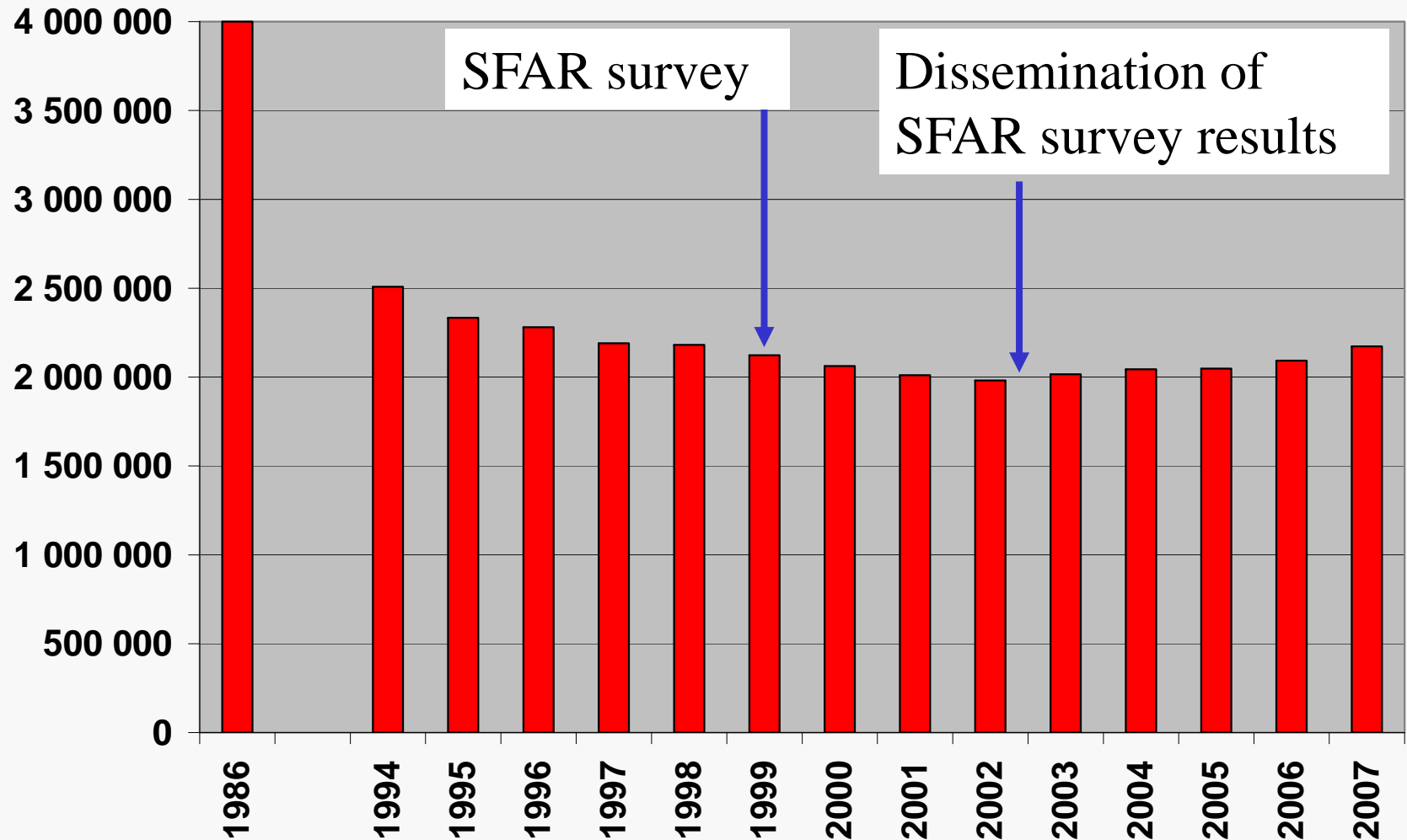
Death related to hemorrhage in obstetric

- Maternal Mortality Rate in France :
 - 1989 : 18 per 100,000 live births
 - 1999 : 9 per 100,000 live births

Hemorrhage was the leading obstetric cause of maternal death (21%).

→ *there are more than 10 deaths per year related to untransfused or incorrectly transfused maternal hemorrhage*

Red Cell Concentrates use in France 1986-2005 and risk of undertransfusion



Delayed transfusion of platelets

48y old female, AML5b

Induction chemotherapy since August 11, 2006 :

Anti-HLA at entry : anti-B7 (non cytotoxic)

Transfusions :

August 7 : 2 RCC

August 10 : 2 RCC 1 APC

August 13 : 2 RCC 1 APC (low recovery)

August 14 : 1 APC (low recovery)

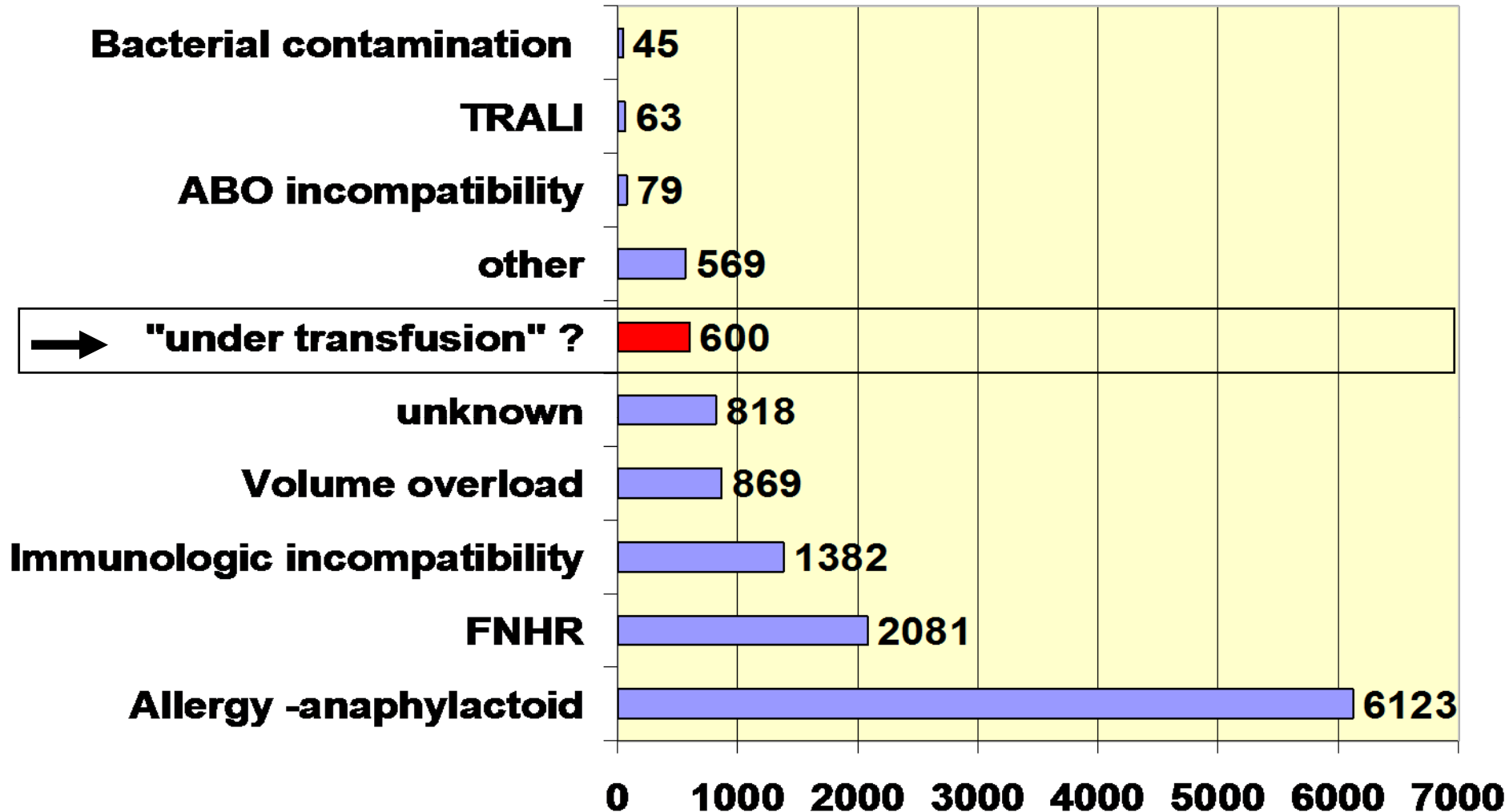
August 17 : 2 RCC 1 APC (prescr at 1.16pm, delivered 10.15pm)

August 18 : ***blood count = 1G/L*** 1 APC prescribed at 11.22 am
major Haemorrhage at 5pm, APC issued at 5.48 pm

August 19 : death (intracranial haemorrhage)

Immediate incidents notified in France

2000 – 2005 (n = 12,029)



How to capture undertransfusion ?

1. Standard notification through hemovigilance :
 - Data from the French Hemovigilance network since 1994 : 7 deaths related to no or delayed blood transfusion !
2. Selection of patients' files according to criteria :
 - Hb laboratory results
 - And known risk of blood loss
3. Analysis of time from blood count prescription to blood transfusion :
 - In a context of low Hb level
 - In a context of emergency



Selection of patients files according to criteria
Example of selection based on :

- $\text{Hb} < 80 \text{ g/L} + \text{surgery} + \text{Age} > 60$
- 2 consecutive $\text{Hb} < 80 \text{ g/L}$
- Indication for blood transfusion ?
 - Patient transfused ?

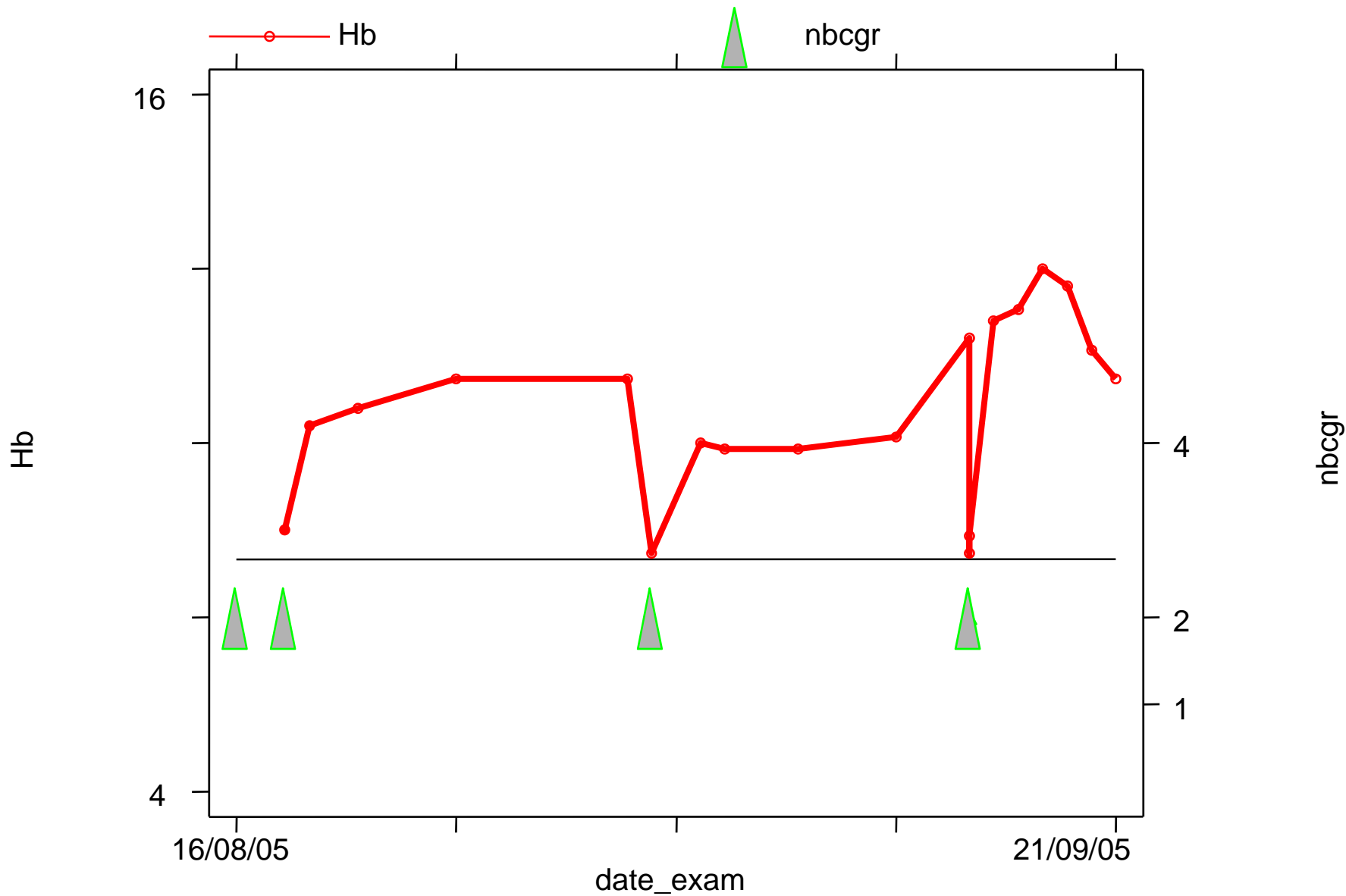
*conclusion undertransfusion :
yes or no*

Hospital A

Age of patient

Hb

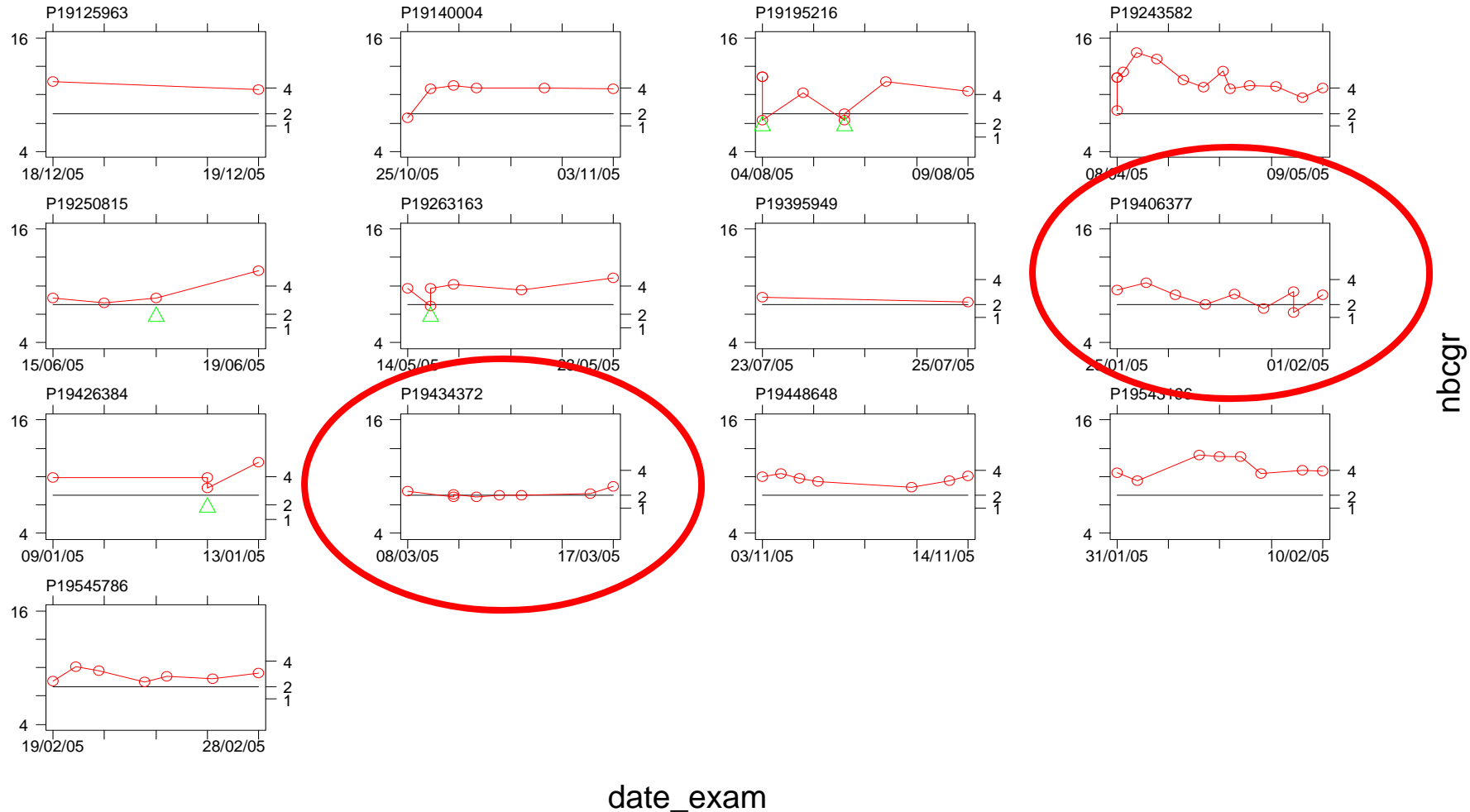
	[15-50]]50-60]]60-70]]70-80]]80-90]]90-+]
]12-+]	277	38	24	20	12	0
]11-12]	45	10	11	6	3	1
]10-11]	32	11	10	22	5	3
]9-10]	17	6	9	15	10	3
]8-9]	10	6	12	12	14	6
]7-8]	11	0	3	7	5	5
]6-7]	2	1	0	0	1	0
]0-6]	3	0	0	1	1	1



Orthopedy AND Hb < 9 g/dL AND age >90

—○— Hb

△ nbcgr



date_exam
Graphs by NIP

undertransfusion

G Andreu EHS Frankfurt 2008 03 01

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Selection of patients files according to criteria

Example of selection based on time measurements :

- from Blood count prescription to beginning of tranfusion

In two different conditions :

- BC prescribed with the mention “emergency”
- BC prescribed for low Hb level with no emergency

Pilot study (emergency): 2 centers, 90 observations

Pilot study (low Hb) : 4 centers, 111 observations

Blood count prescription Blood sampling		Emer- gency	Low Hb
Blood sample arrival in lab	1	62'	45'
Result available			
BC prescription			
Prescription arrival in BTS	2	41'	81'
BC delivered (available)			
BC taken away from BTS	3	58'	43'
BC reception in clinical ward			
Begining of transfusion			

2

8

3

3

9

7

Transfusion process quality indicators

step		actors		reference	official (EU) indicator	T r a n s f u s i o n Q u a l i t y
donor	safety	BE		Guidelines	HV : adverse reactions in donors	
	selection	BE		Guidelines	HV : prevalence of viral markers in donors	
blood component	quality	BE		GMPs	HV : events	
	safety	BE		GMPs	HV : events	
	availability	BE	(HOS)	Management	?	
	outdating	BE	(HOS)	Management	?	
prescription	existence of prescription		HOS	Guidelines	?	
	good indication	(BE)	HOS	Guidelines	?	
transfusion	compatible	BE	HOS	Guidelines	HV : adverse reactions in recipients	
	to the right patient	(BE)	HOS	Guidelines	HV : adverse reaction or event in recipient	
	on time	(BE)	HOS	Guidelines	?	
	checked for tolerance		HOS	Guidelines	HV : adverse reactions in recipients	
	checked for efficiency	(BE)	HOS	Guidelines	HV : adverse reactions in recipients	

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« time to BC issuing in case of Emergency »

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