FIGURES FROM THE ANNUAL SHOT REPORT 2017

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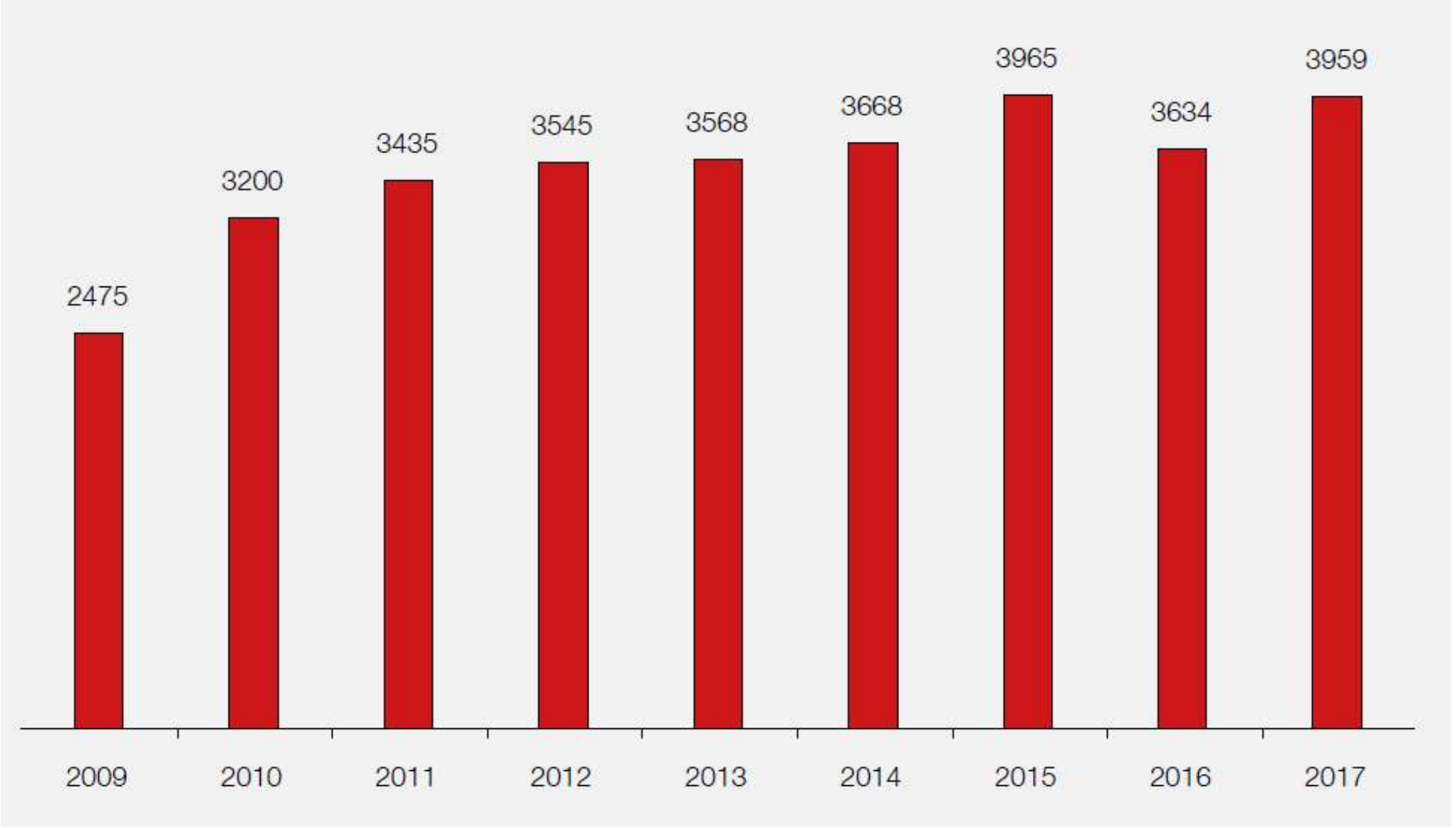
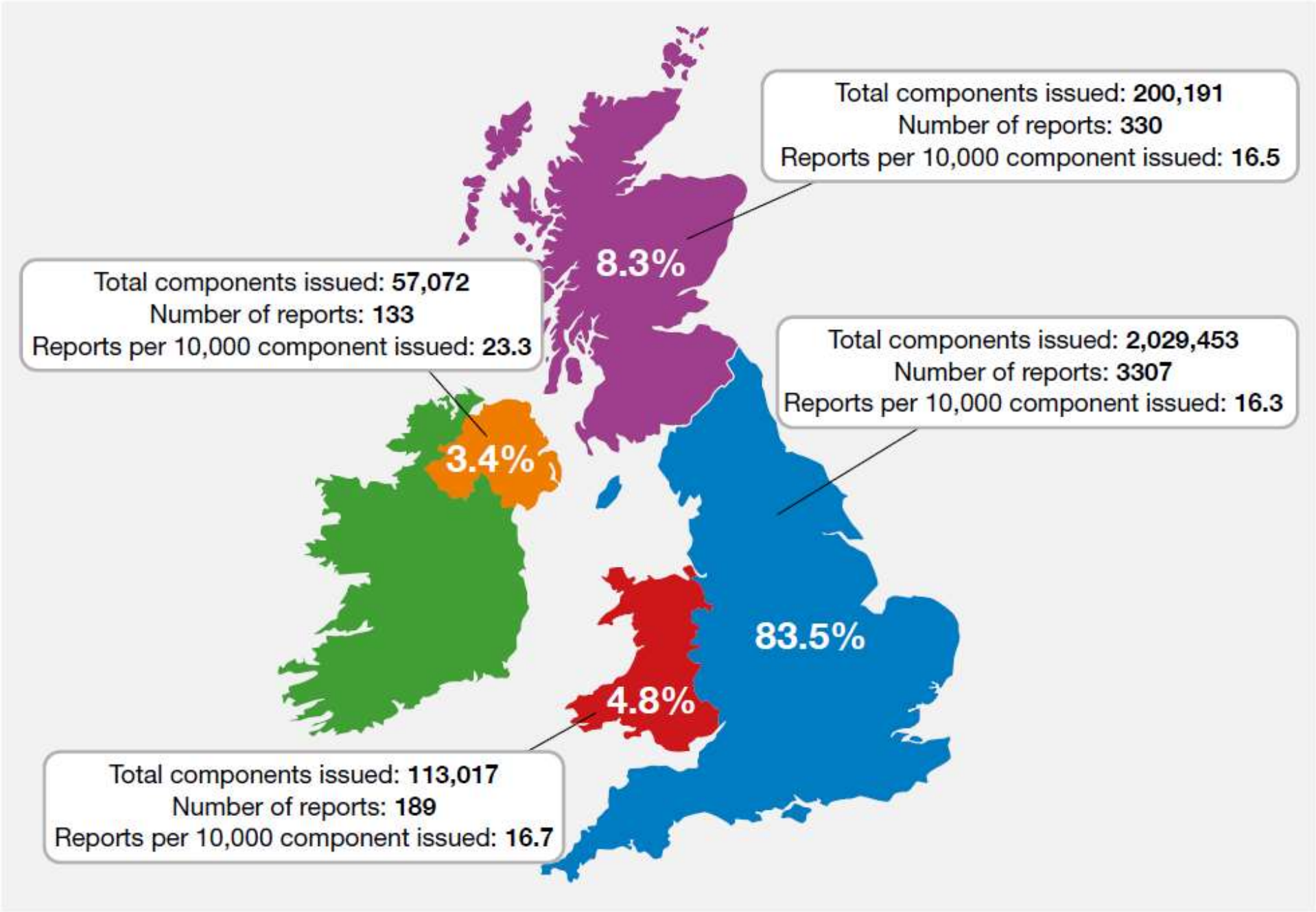
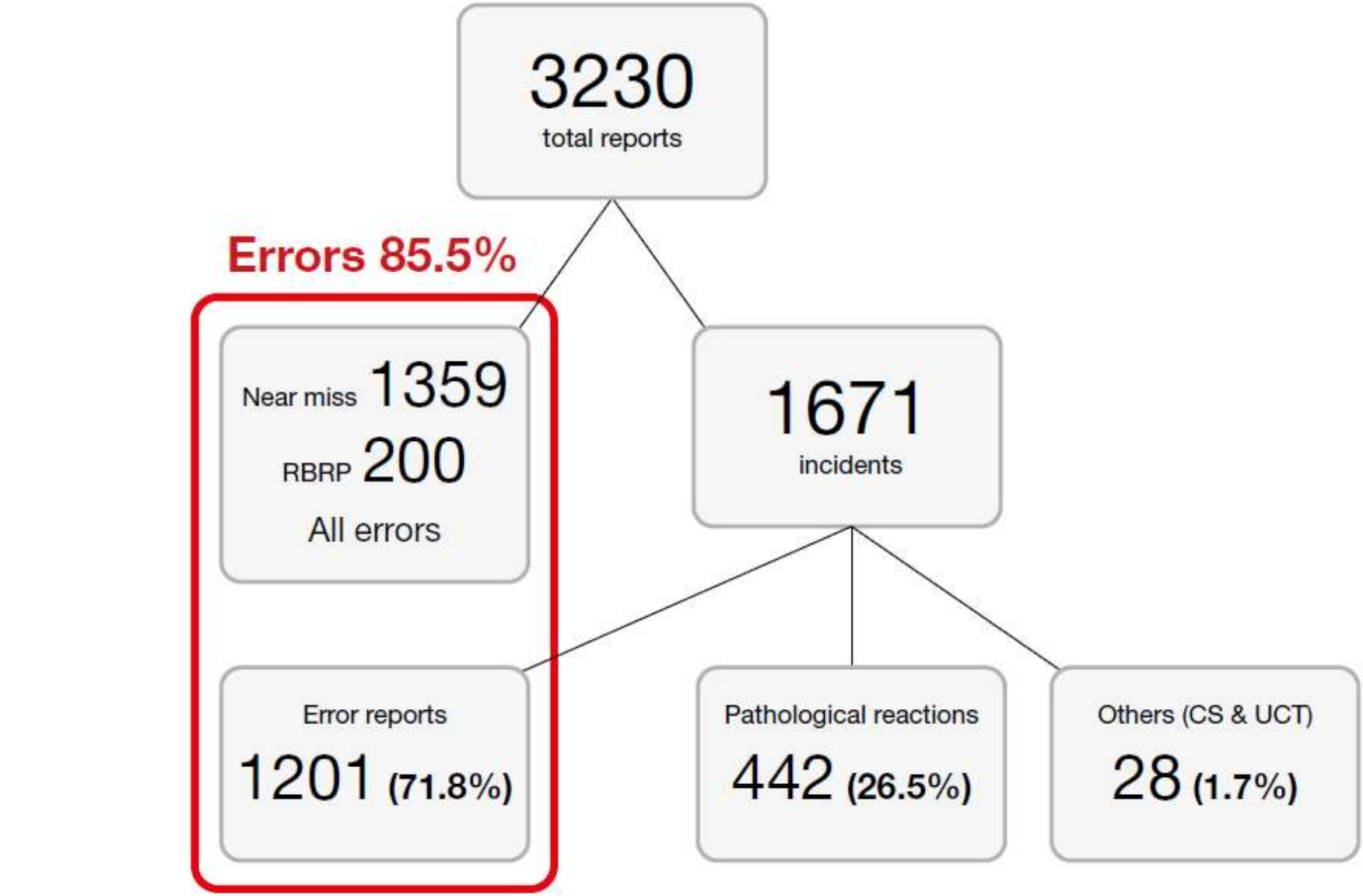
Key recommendation from the first SHOT Report 1996-1997

The bedside check is vital in preventing transfusion error. Staff should be vigilant in checking identification details of the component against those of the patient. Every hospital should have a policy for formally checking the identity of the patient against the blood component label at the bedside. Nursing observations during transfusion also show wide variation. National guidelines for the administration and monitoring of transfusion are being developed by the British Committee for Standards in Haematology (BCSH) on behalf of the British Society for Haematology (BSH).

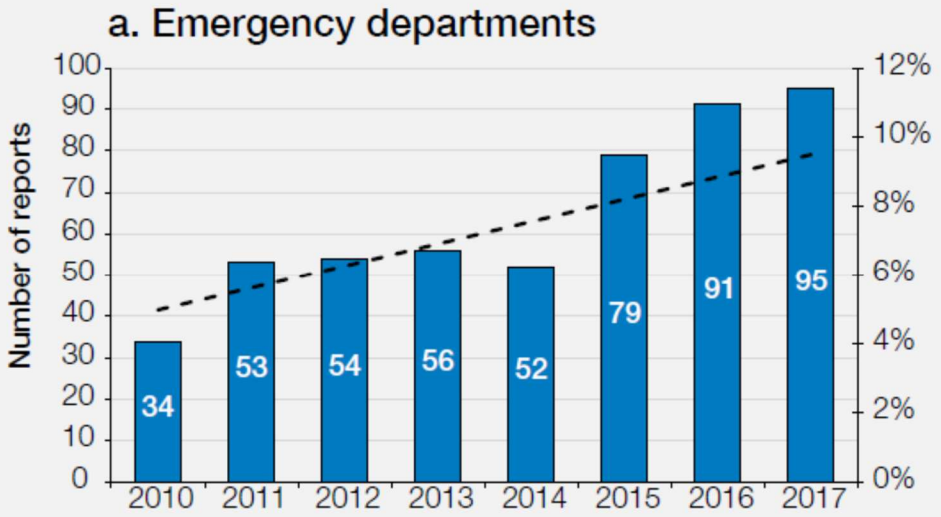
Number of reports submitted to SHOT by year

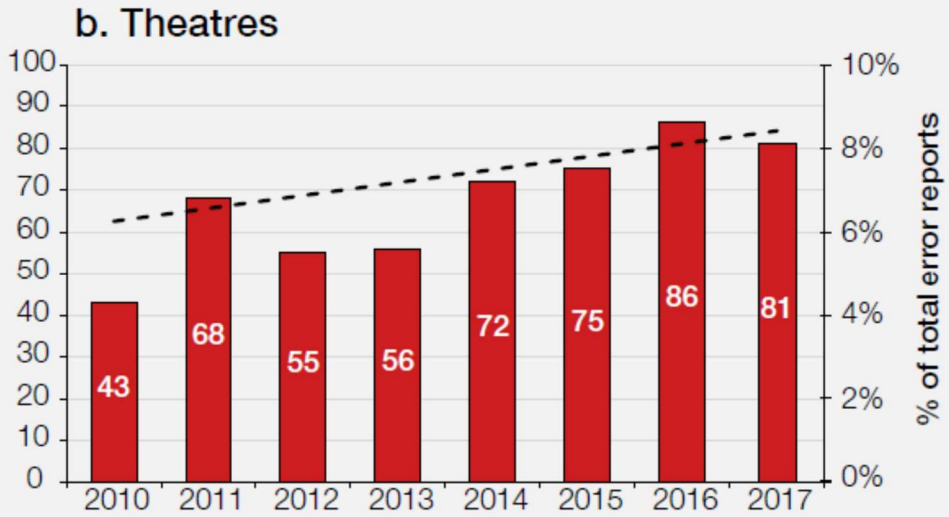


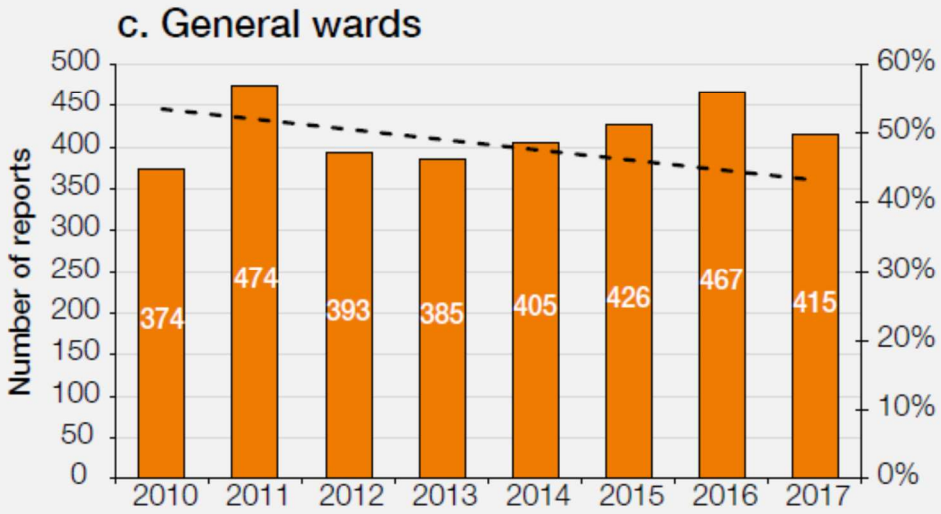

Total components issued: 200,191
Number of reports: 330
Reports per 10,000 component issued: 16.5
8.3%
Total components issued: 57,072
Number of reports: 133
Reports per 10,000 component issued: 23.3
3.4%
Total components issued: 2,029,453
Number of reports: 3307
Reports per 10,000 component issued: 16.3
83.5%
4.8%
Total components issued: 113,017
Number of reports: 189
Reports per 10,000 component issued: 16.7

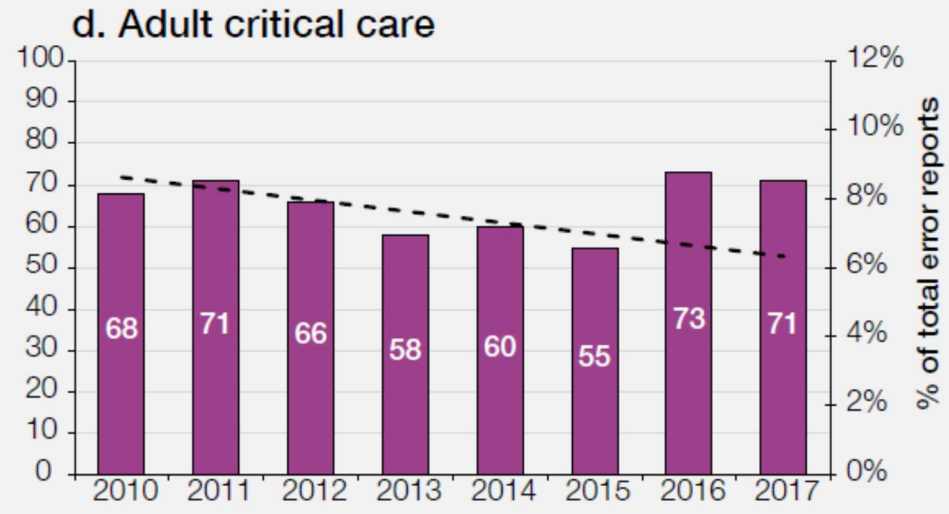


RBRP=right blood right patient; CS=cell salvage; UCT=unclassifiable complications of transfusion

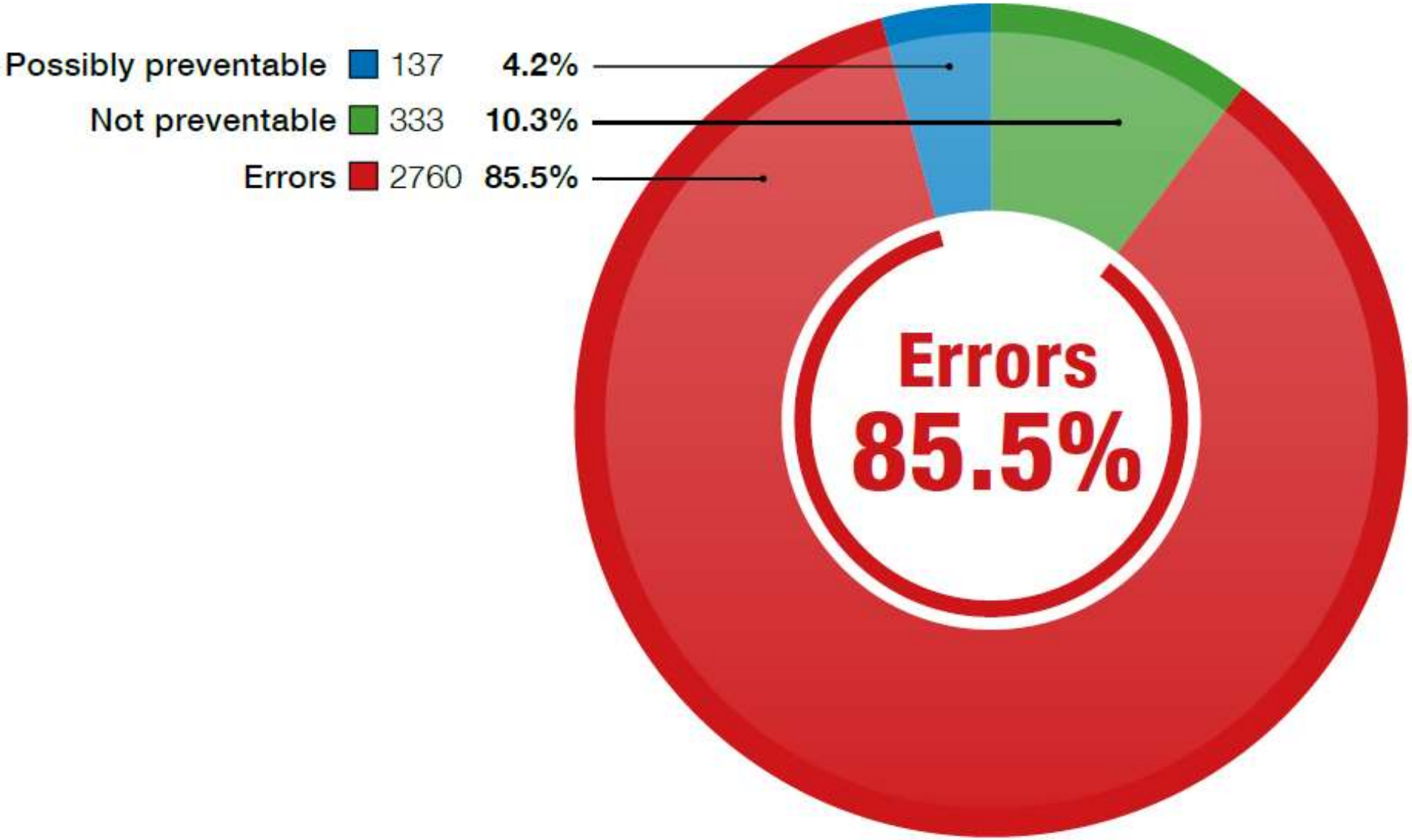

a. Emergency departments
Number of reports
% of total error reports
2010 2011 2012 2013 2014 2015 2016 2017
34 53 54 56 52 79 91 95


b. Theatres
% of total error reports
2010 2011 2012 2013 2014 2015 2016 2017
43 68 55 56 72 75 86 81

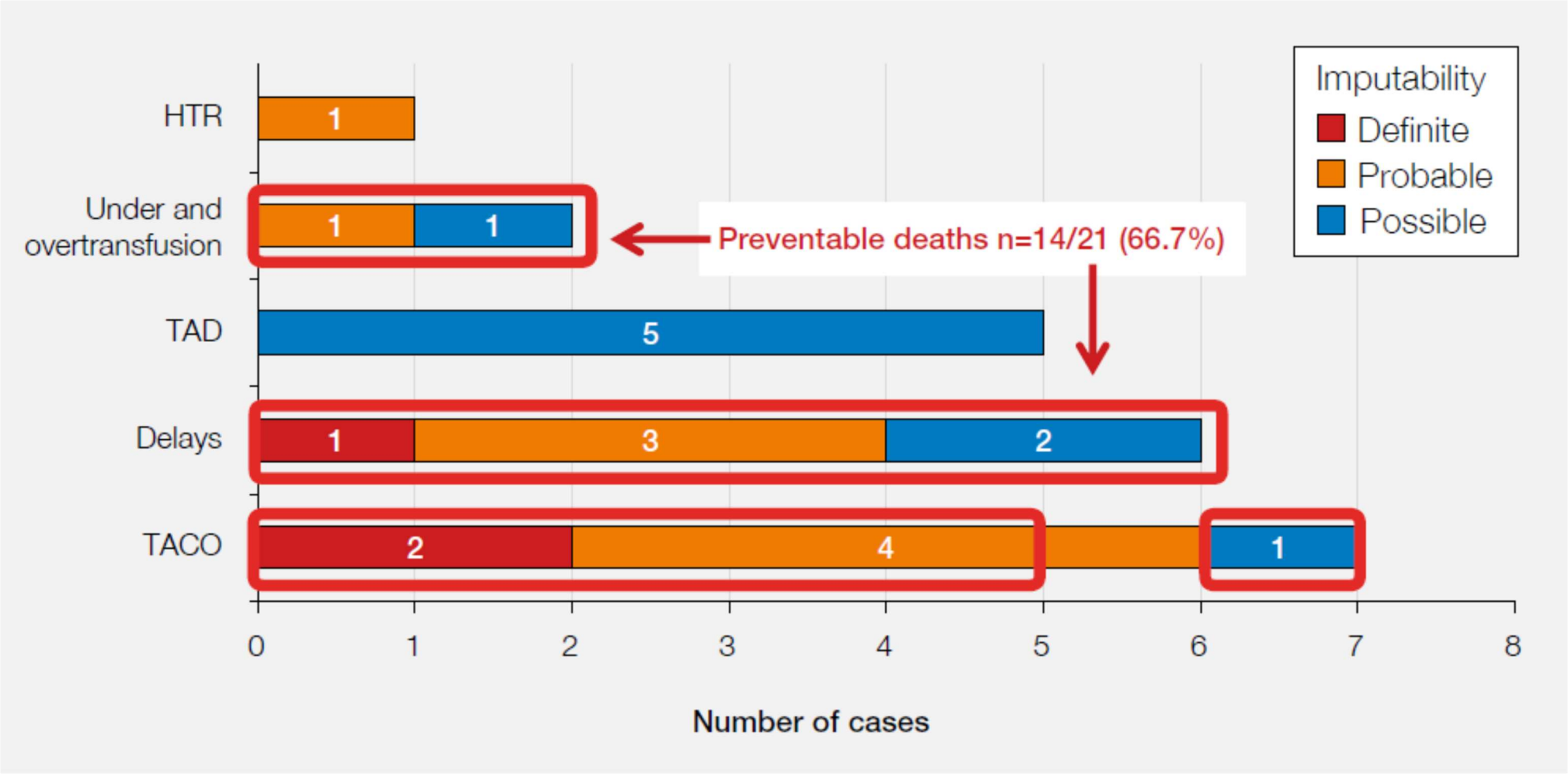

c. General wards
Number of reports
2010 2011 2012 2013 2014 2015 2016 2017
374 474 393 385 405 426 467 415


d. Adult critical care
% of total error reports
2010 2011 2012 2013 2014 2015 2016 2017
68 71 66 58 60 55 73 71

Errors account for the majority of SHOT reports in 2017: 2760/3230

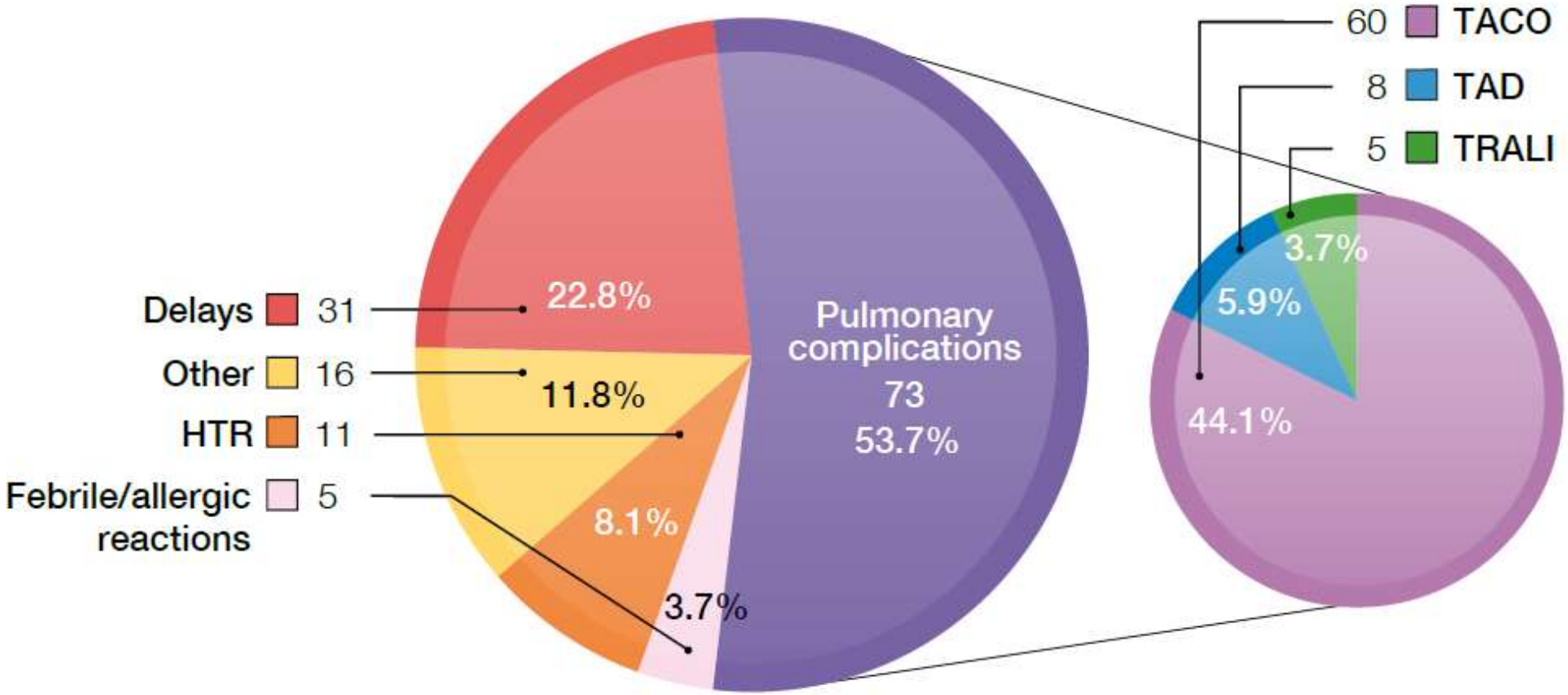


Deaths related to transfusion in 2017 n=21



HTR=haemolytic transfusion reaction; TAD=transfusion-associated dyspnoea; TACO=transfusion-associated circulatory overload

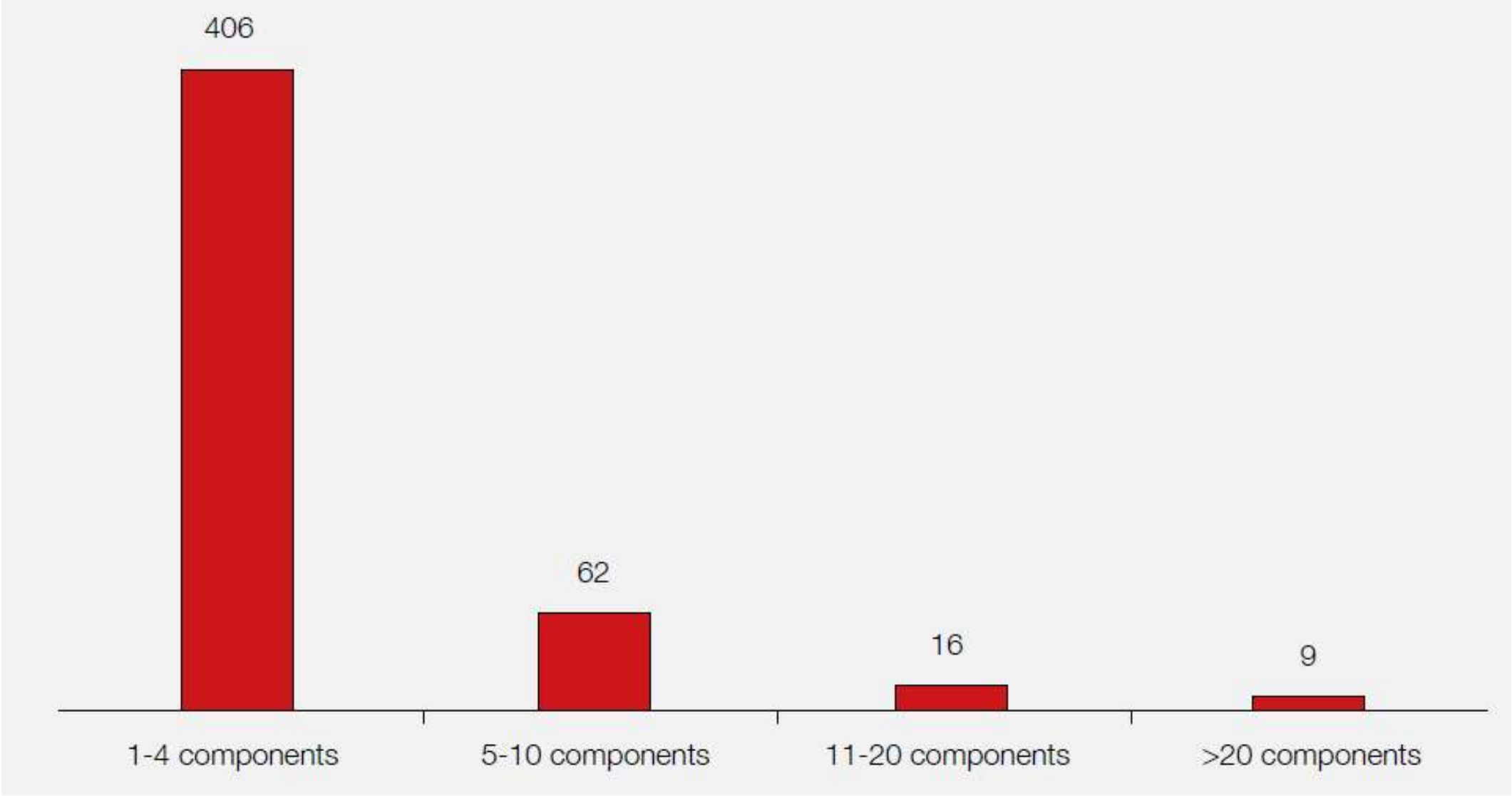
Transfusion-related deaths 2010 to 2017 n=136

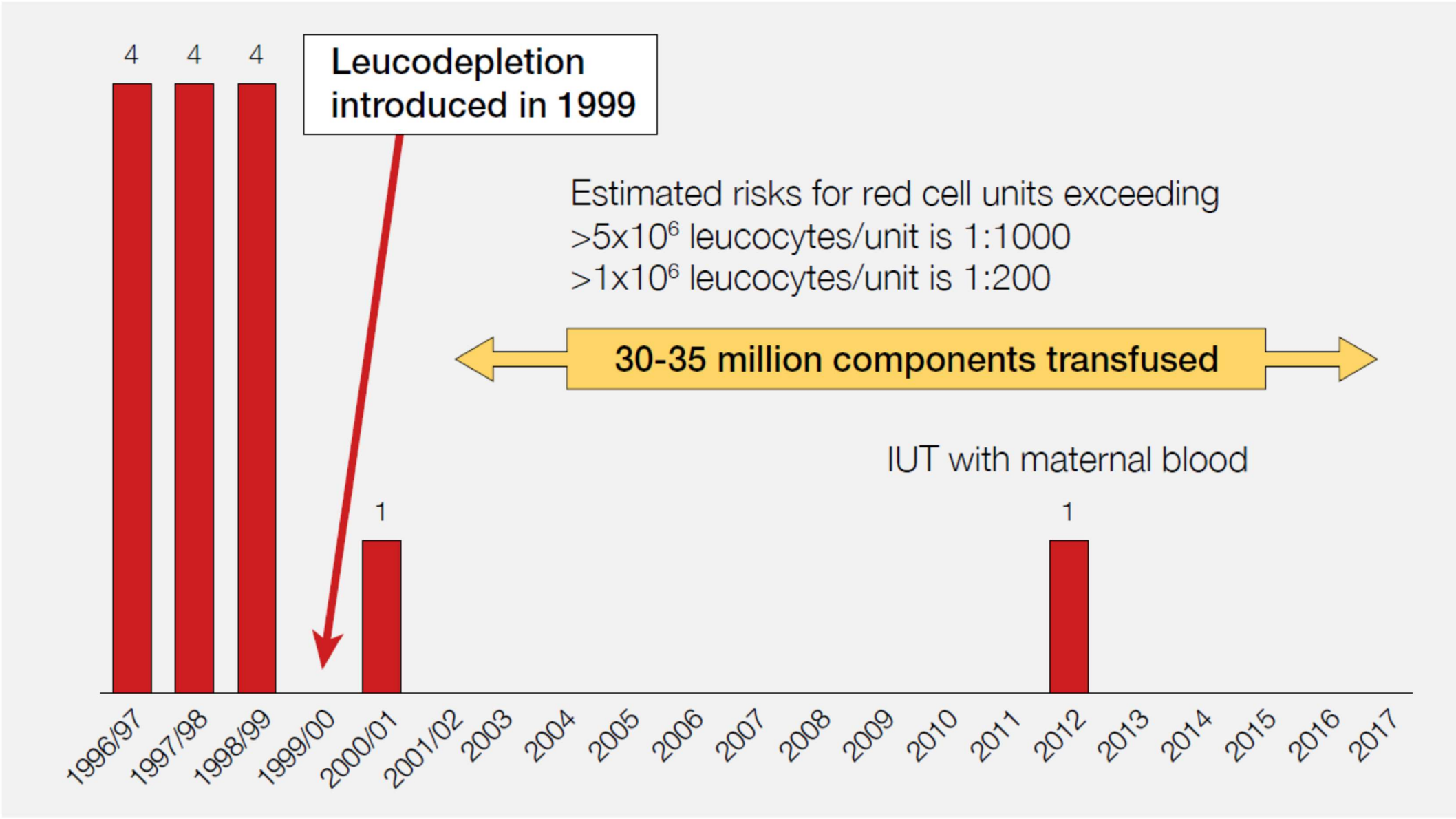


HTR=Haemolytic transfusion reactions; TACO=Transfusion-associated circulatory overload; TRALI=Transfusion-related acute lung injury; TAD=Transfusion-associated dyspnoea

'Other' includes 1 each for transfusion-transmitted infection, post-transfusion purpura, transfusion-associated graft-versus-host disease and anti-D related; there were 5 in the avoidable, over or undertransfusion category and 7 deaths related to other unclassified reactions

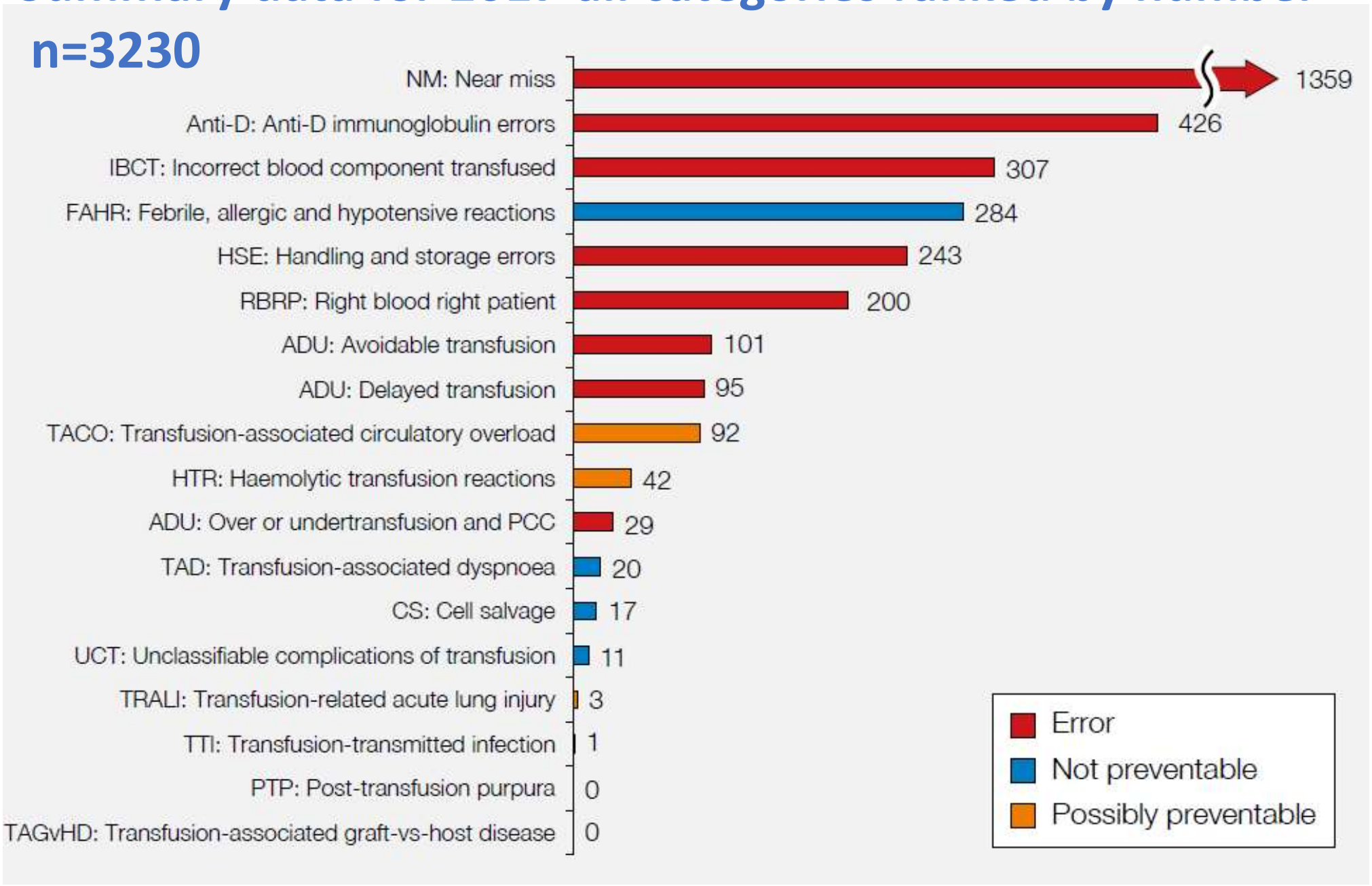
Number of components received by individual patients exposed to non-irradiated components 2011 to 2016 n=493



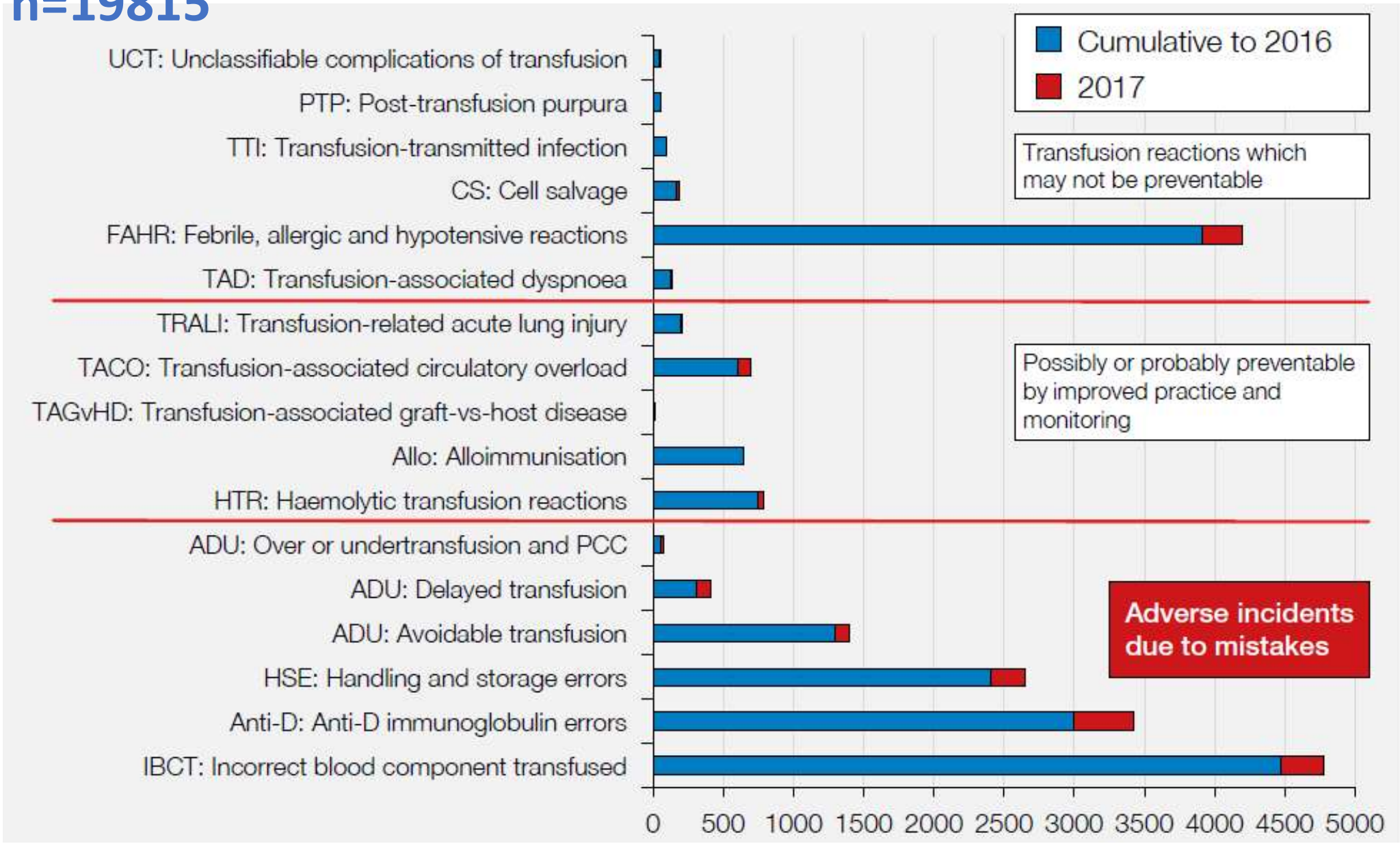


IUT=intrauterine transfusion.

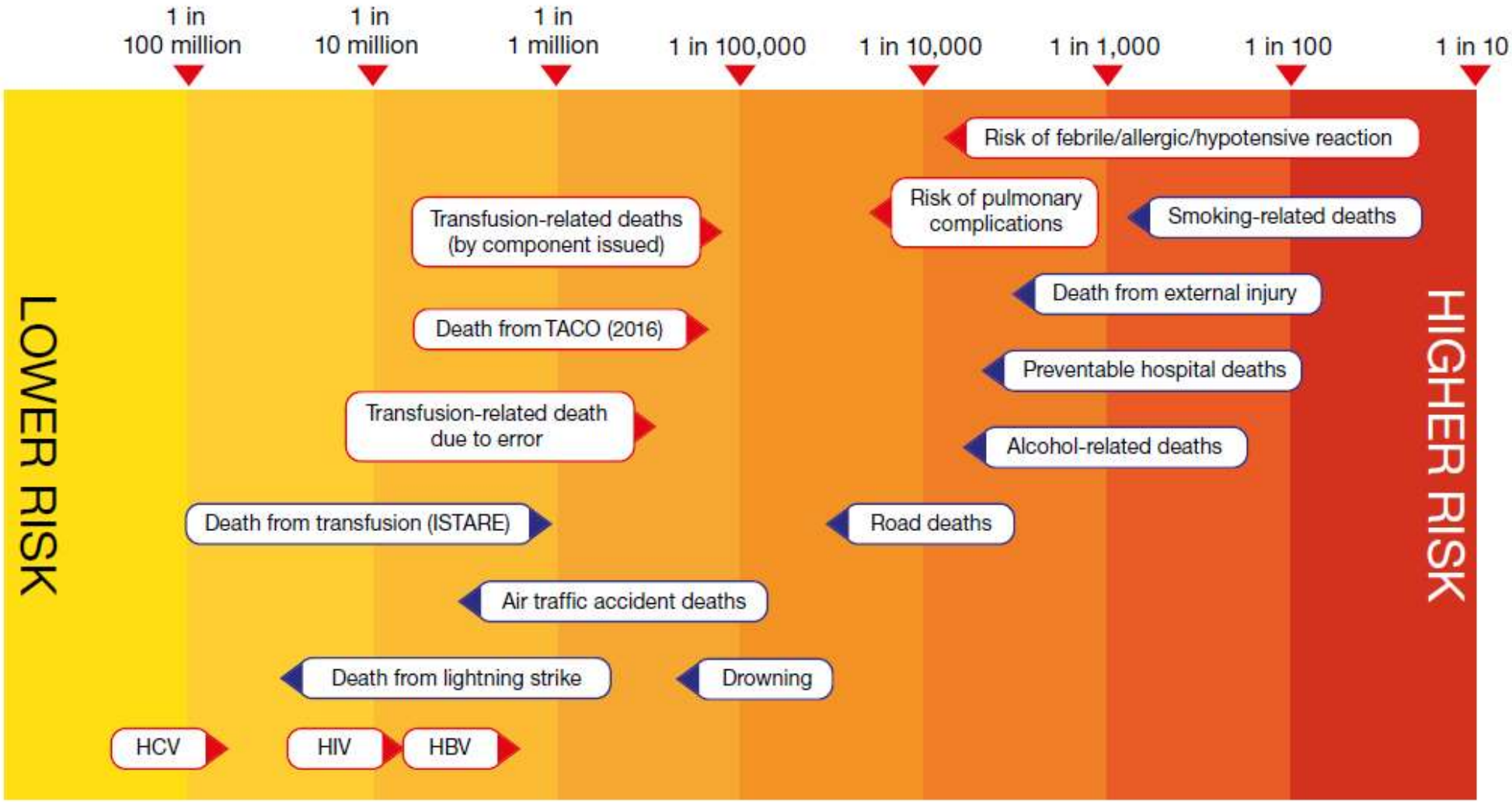
Summary data for 2017 all categories ranked by number n=3230



Cumulative data for all SHOT categories 1996 to 2017 n=19815

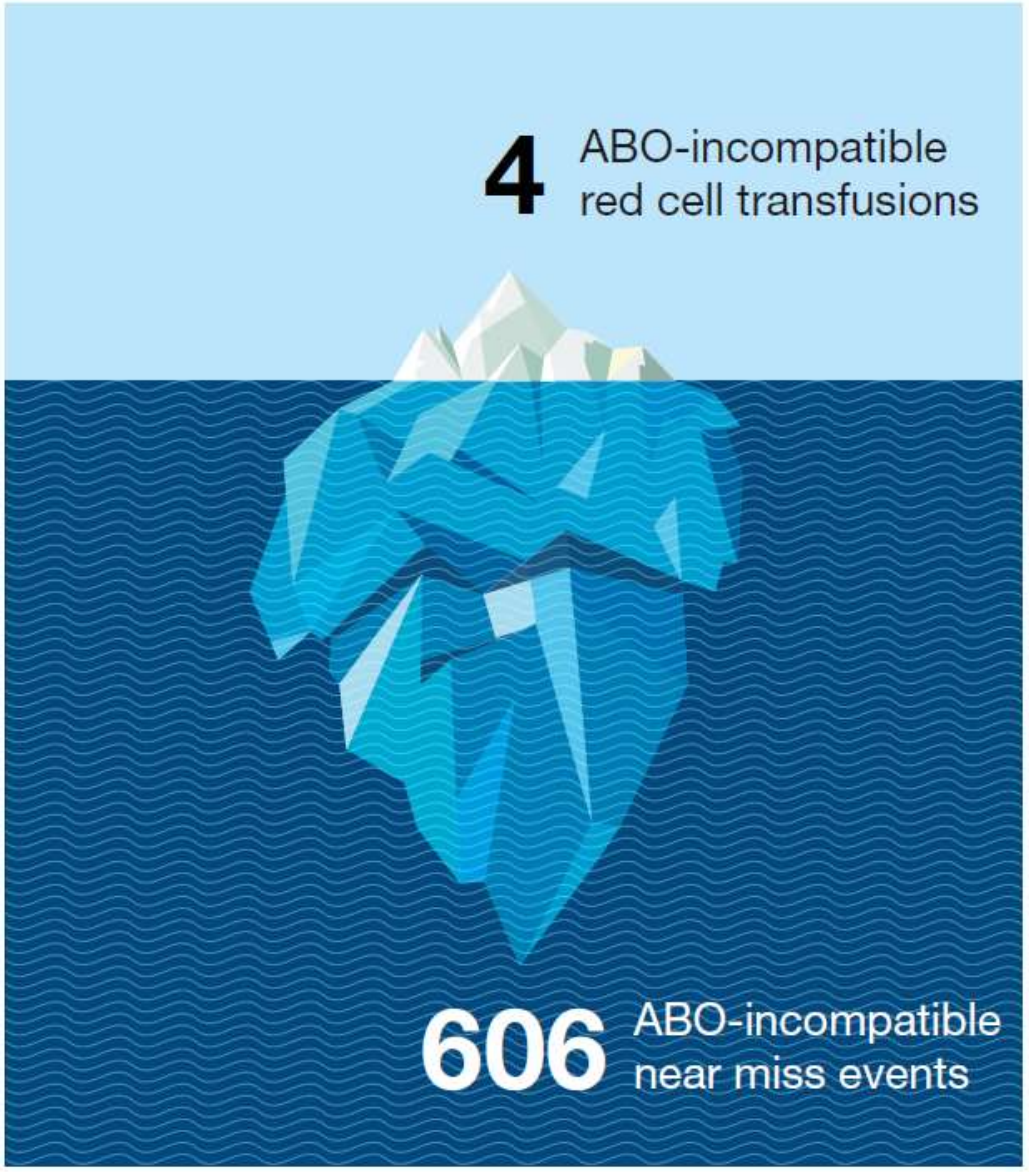


Approximate risks of transfusion complications compared with other risks, UK data



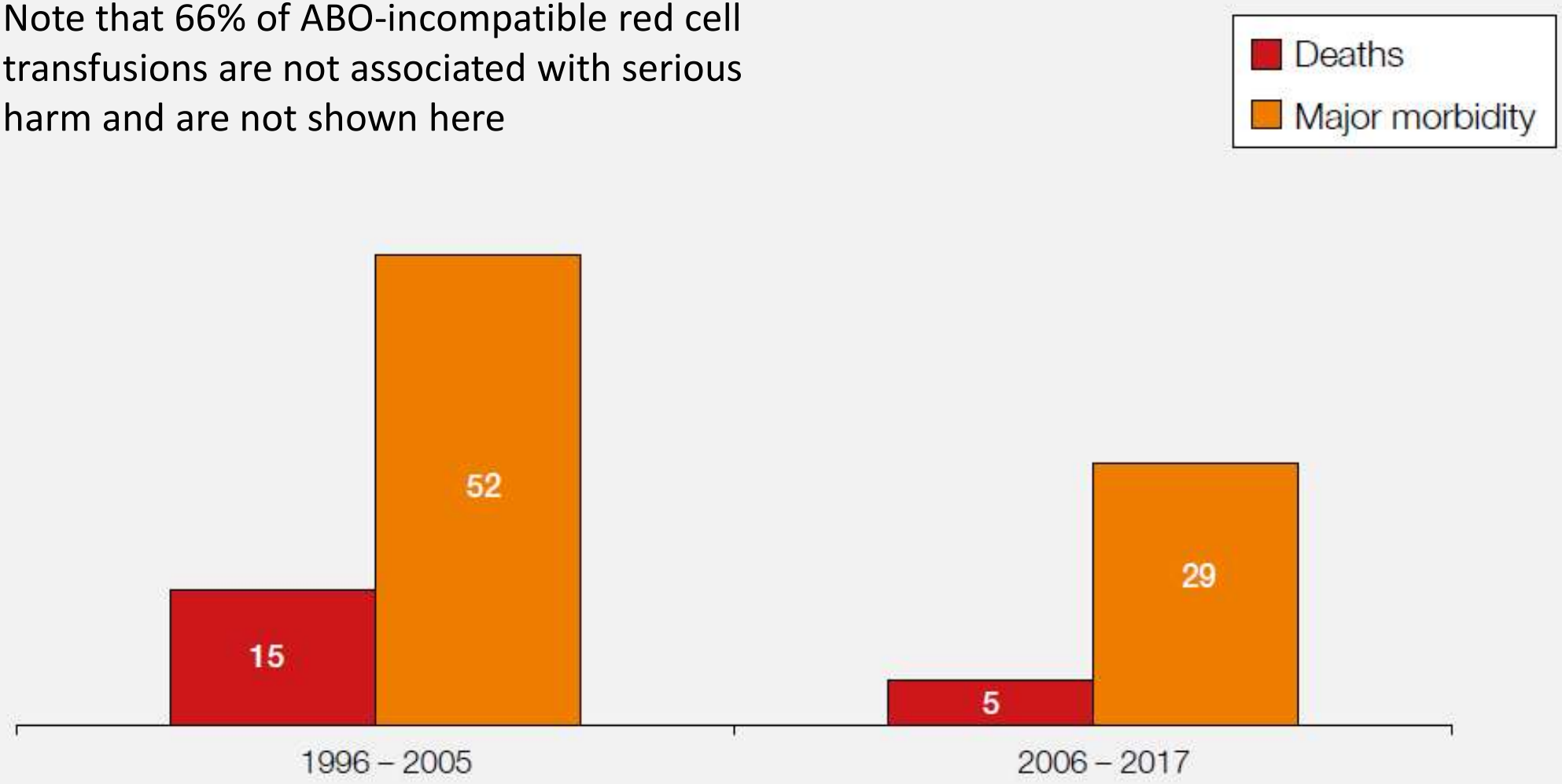
Sources of data: Many of these are found online in the UK office for national statistics. Red outline indicates SHOT data, blue outline indicates data from other sources. ISTARE is the International Haemovigilance Network database for the surveillance of adverse reactions and events in donor and recipients. Viral transmissions denote risk of infection, not deaths. HCV=hepatitis C virus; HIV=human immunodeficiency virus; HBV=hepatitis B virus. A full list of sources is available in supplementary information on the SHOT website www.shotuk.org.

ABO-incompatible transfusions compared to near miss 2016 and 2017



Reduction in ABO-incompatible red cell transfusions that resulted in serious outcomes in 2 decades of reporting

Note that 66% of ABO-incompatible red cell transfusions are not associated with serious harm and are not shown here



Key SHOT messages

- Guidelines or rules? Guidelines must not be translated into inflexible rules which may put patients at risk. Proportionate application of knowledge and experience may lead to a different course of action in individual circumstances. However, the final bedside check is a rule and must be completed in full
- Basic training: It is essential that all staff participating in transfusion fully understand ABO groups so that they can recognise potential ABO-incompatibility
- Information technology (IT) systems have the potential to increase transfusion safety by minimising human factors and should be considered for all transfusion steps
- Patients who develop respiratory distress during or up to 24 hours after transfusion where transfusion is suspected to be the cause must be reported to SHOT. The national comparative audit of TACO in 2017 demonstrated that risk factors are being missed

Key recommendation 1

- Training in ABO and D blood group principles is essential for all laboratory and clinical staff with any responsibility for the transfusion process. This should form part of the competency assessments

Action: Hospital Chief Executives and Medical Directors, National Blood Transfusion Committee, Hospital Transfusion Teams

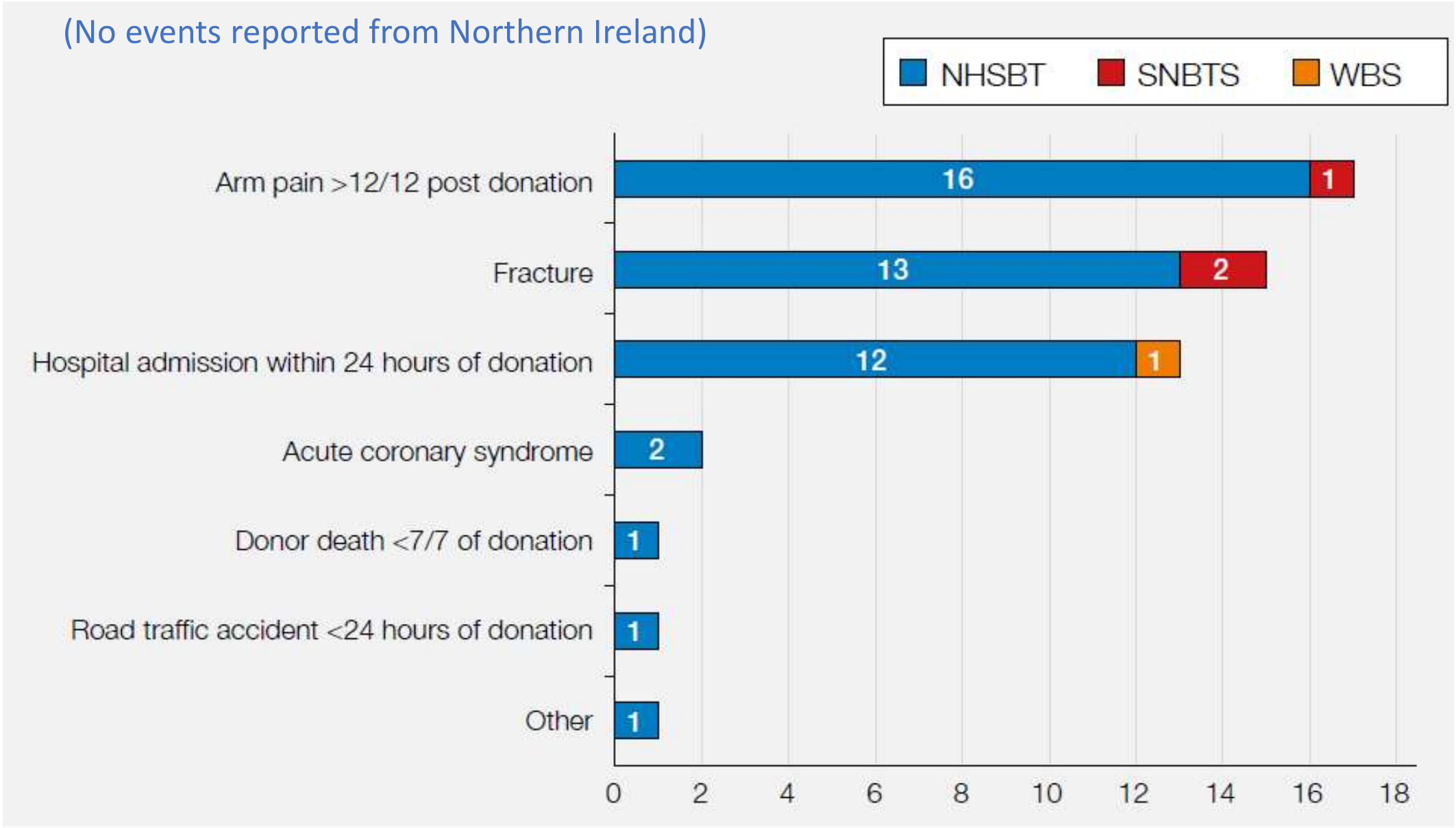
Key recommendation 2

- All available information technology (IT) systems to support transfusion practice should be considered and these systems implemented to their full functionality. Electronic blood management systems should be considered in all clinical settings where transfusion takes place. This is no longer an innovative approach to safe transfusion practice, it is the standard that all should aim for

Action: Hospital Chief Executives, Hospital Risk Managers and Hospital Transfusion Teams

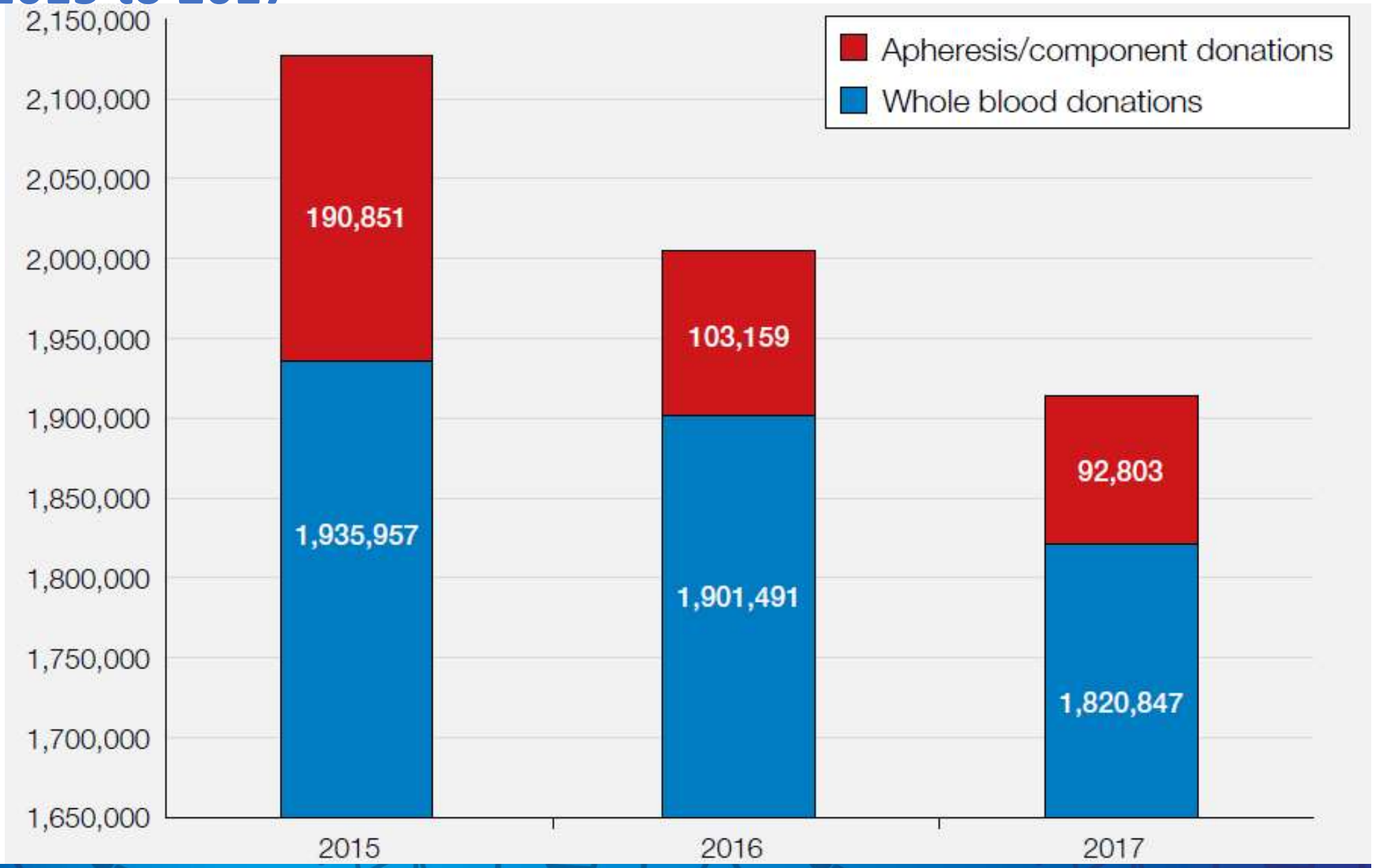
Serious adverse events in donation 2017

(No events reported from Northern Ireland)

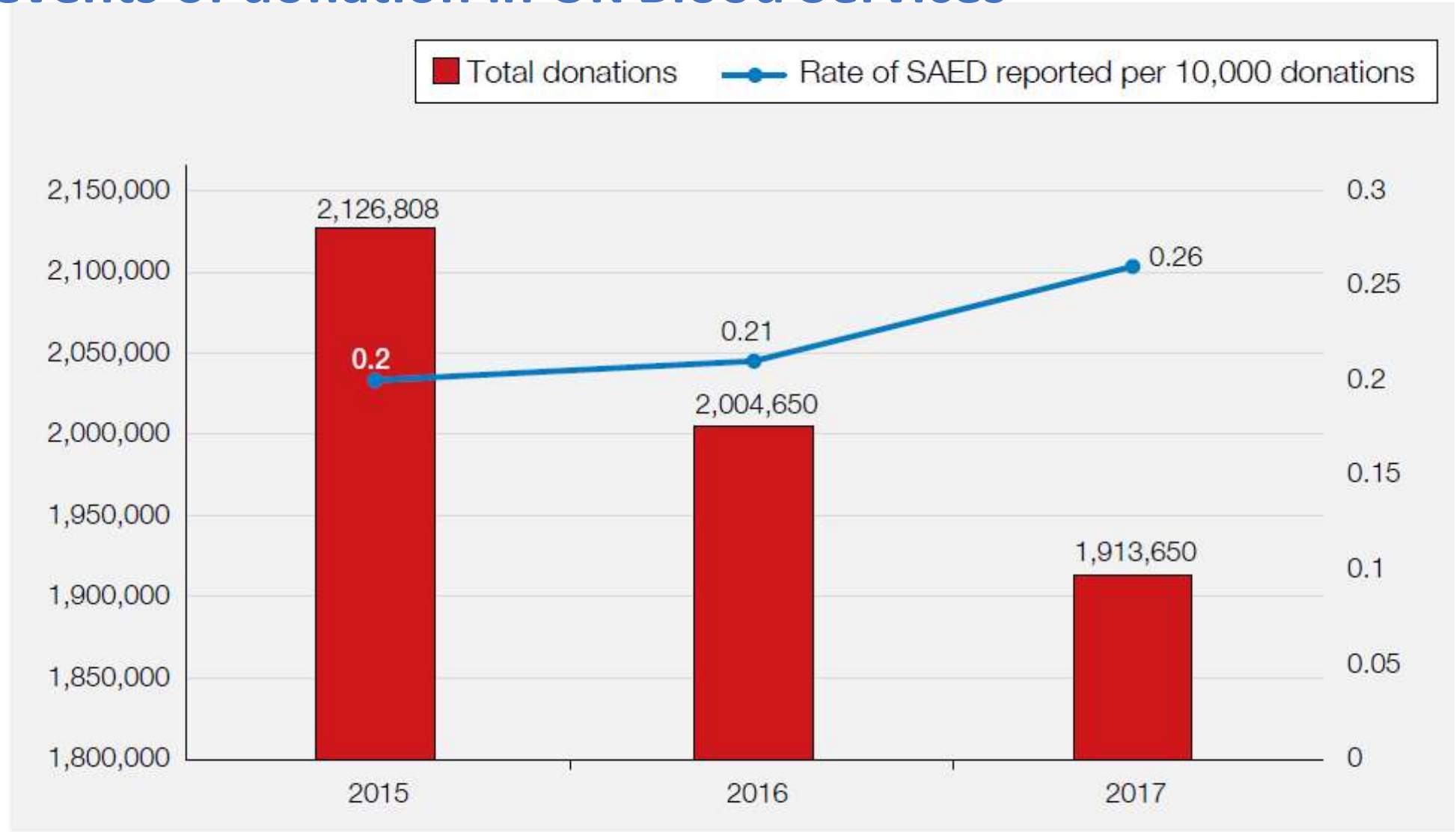


NHSBT=National Health Service Blood & Transplant; SNBTS=Scottish National Blood Transfusion Service; WBS=Welsh Blood Service;

Trend in whole blood and apheresis donations in the UK 2015 to 2017

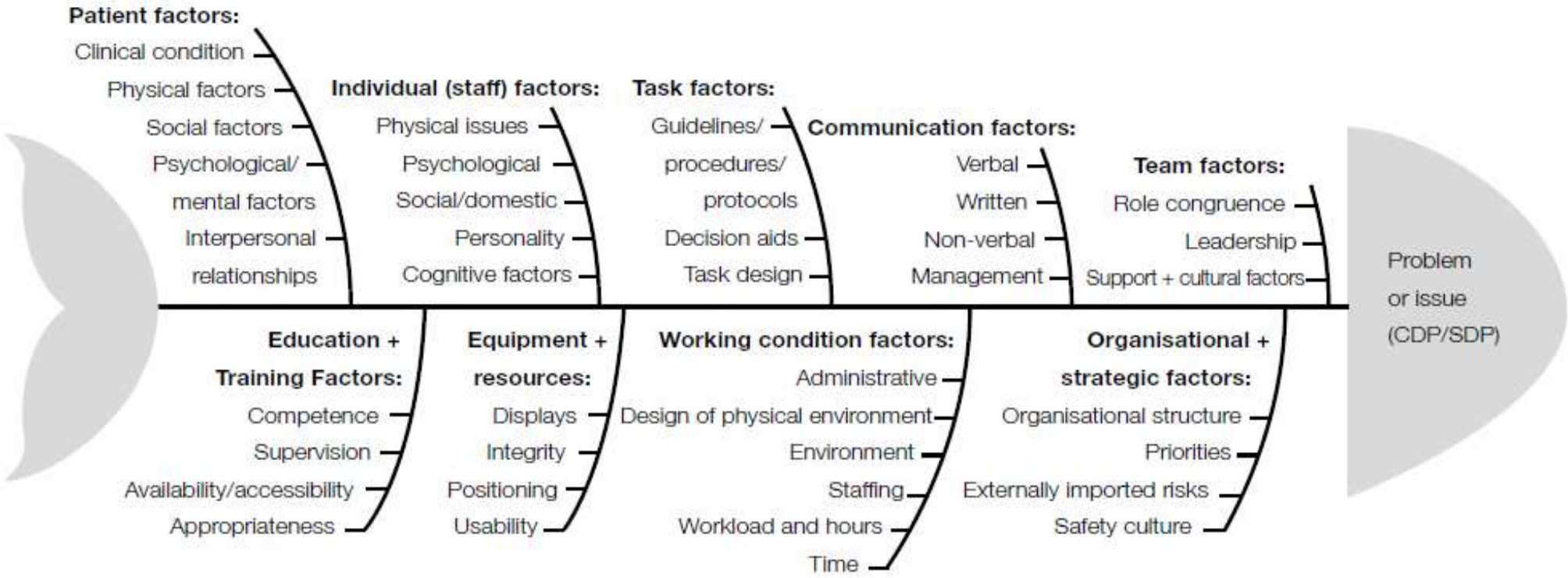


Trends in donations and reported rate of serious adverse events of donation in UK Blood Services

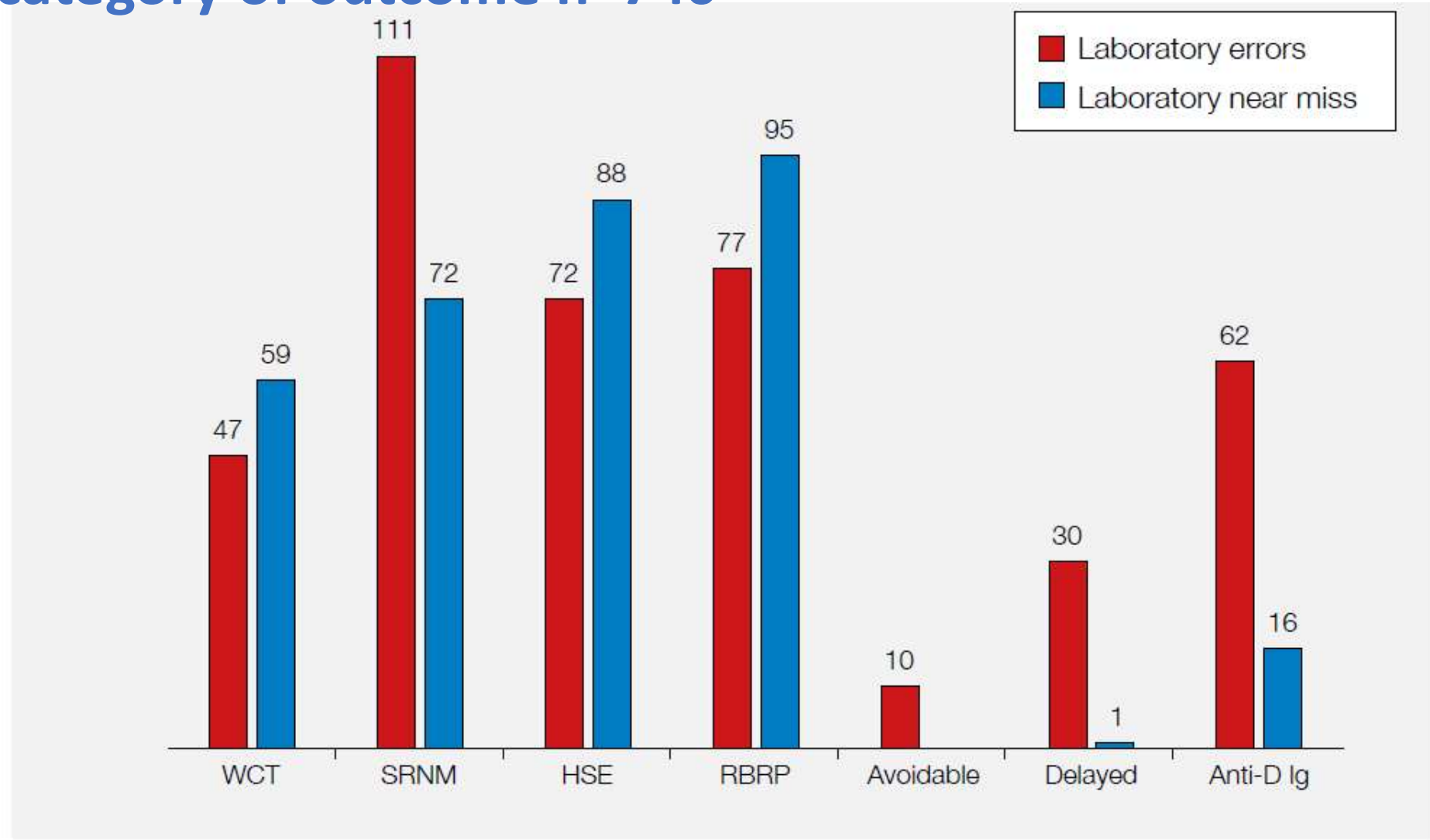


SAED=serious adverse event of donation

Fishbone template for analysis of root causes

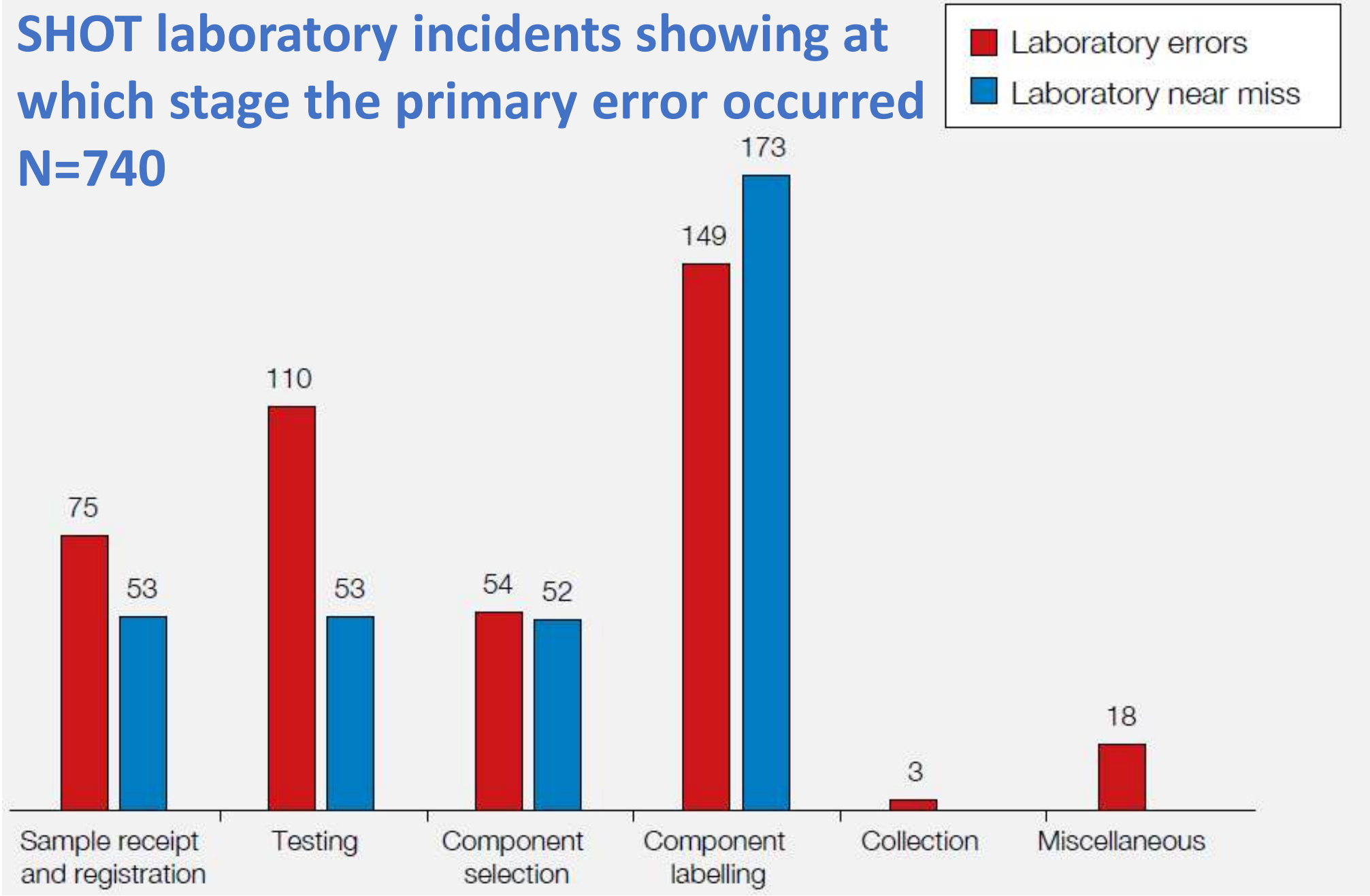


Laboratory incidents and near misses by category of outcome n=740



WCT=wrong component transfused; SRNM=specific requirements not met; HSE=handling and storage errors; RBRP=right blood right patient; Ig=immunoglobulin

SHOT laboratory incidents showing at which stage the primary error occurred N=740



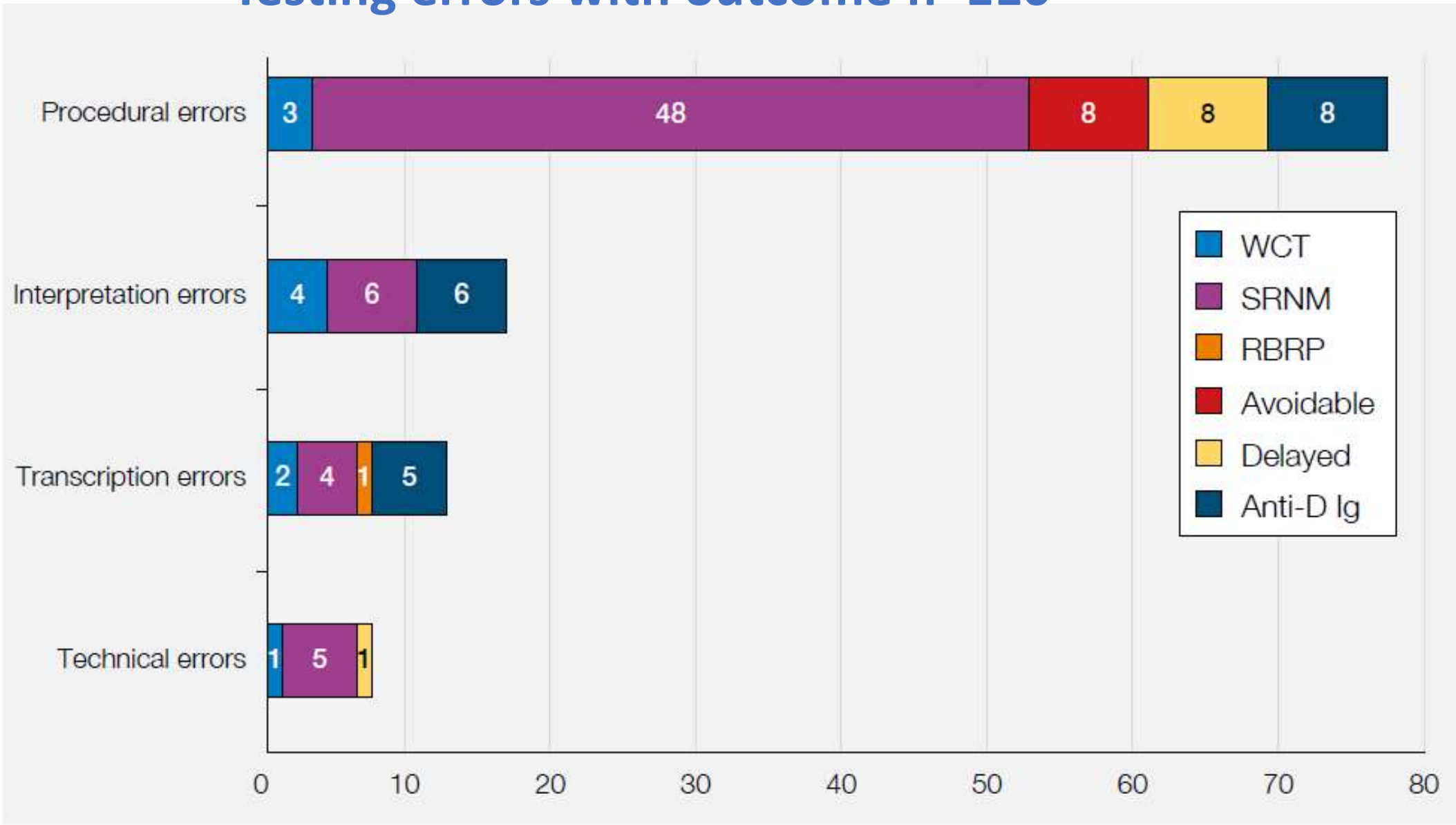
Laboratory errors (n=409) showing at which stage the error occurred and the outcome

WCT=wrong component transfused; SRNM=specific requirements not met; HSE=handling and storage errors; RBRP=right blood right patient; Ig=immunoglobulin

Sample receipt and registration errors with outcome n=75

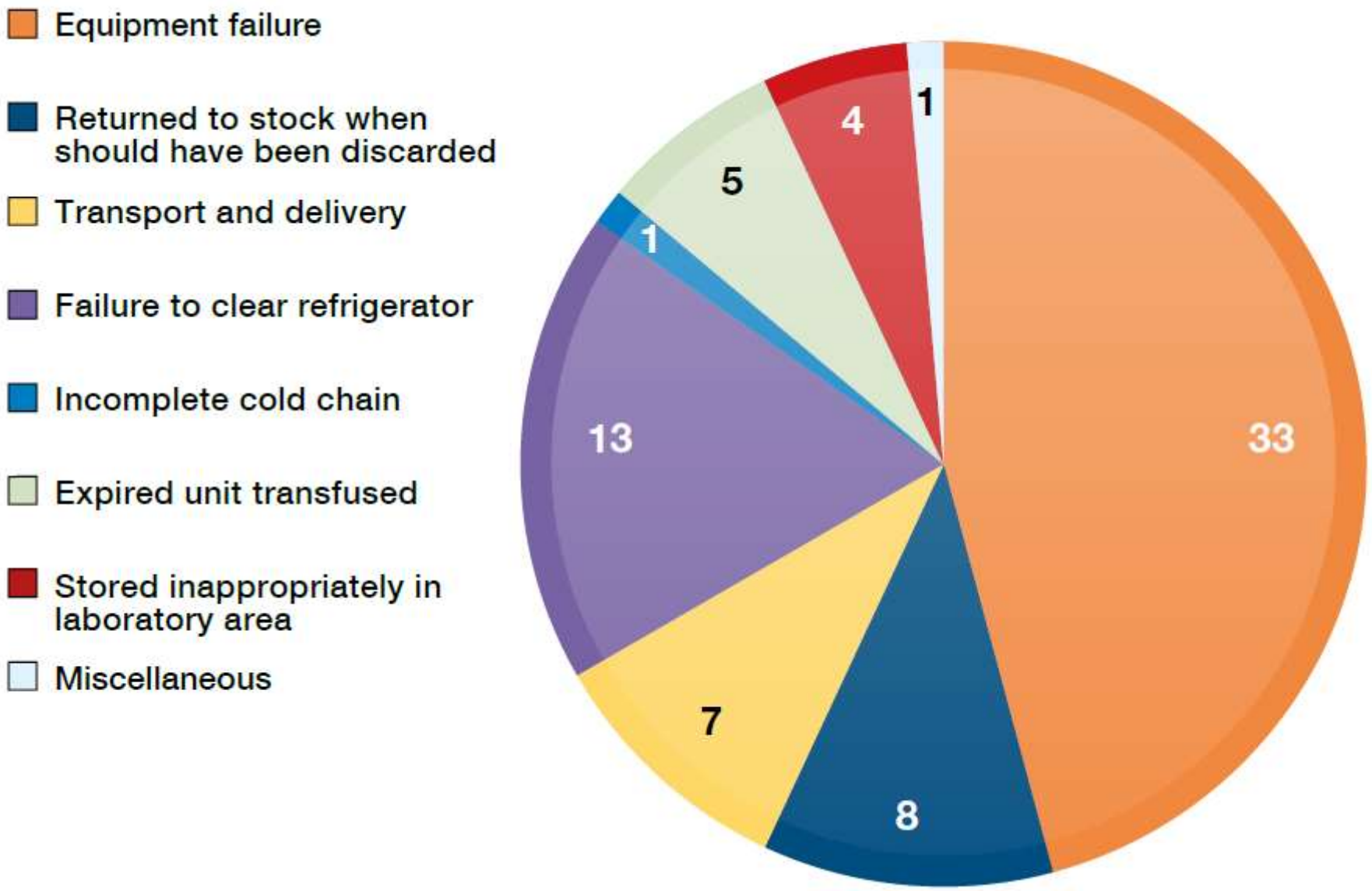
WCT=wrong component transfused; SRNM=specific requirements not met; RBRP=right blood right patient; Ig=immunoglobulin

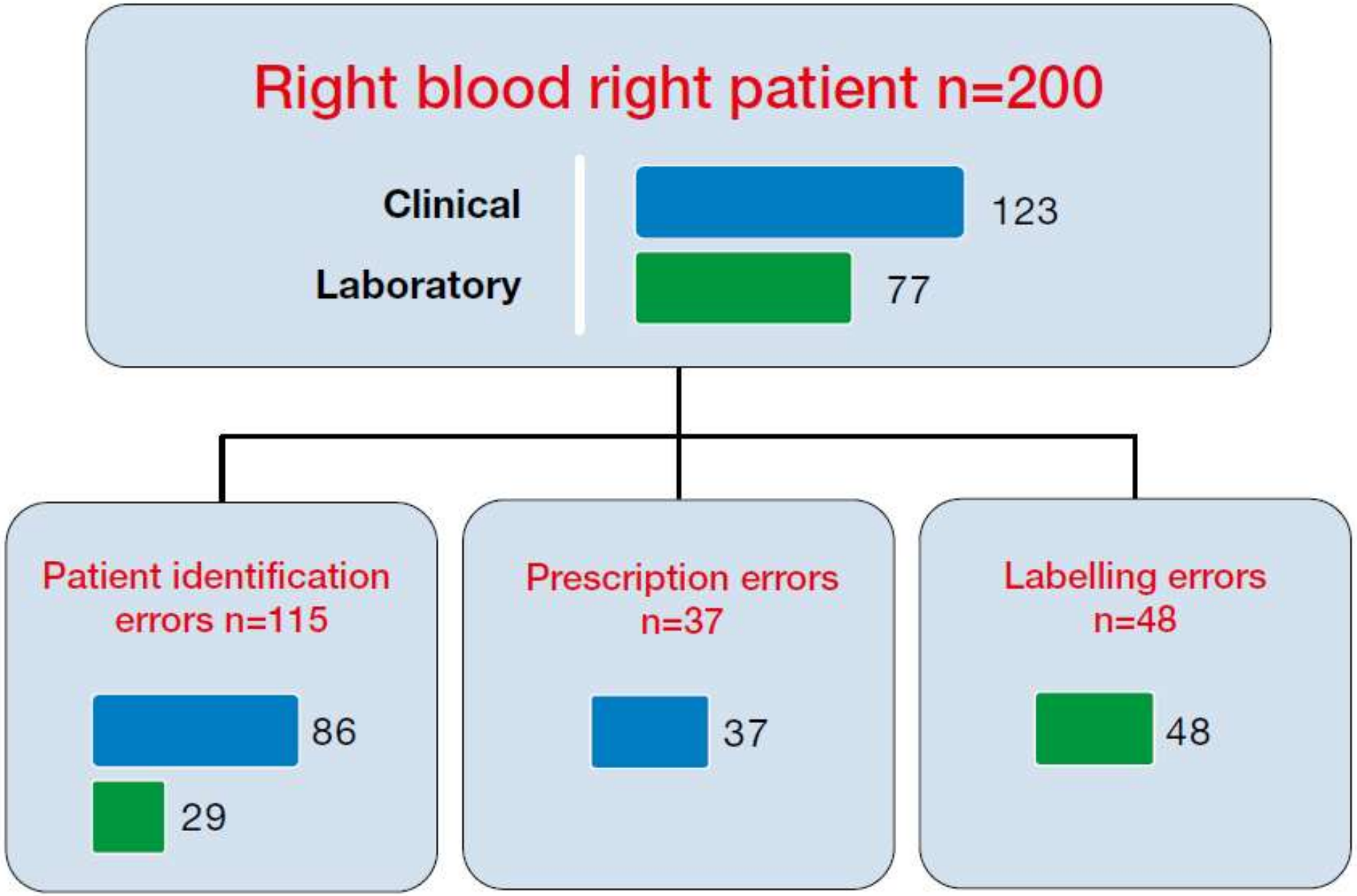
Testing errors with outcome n=110



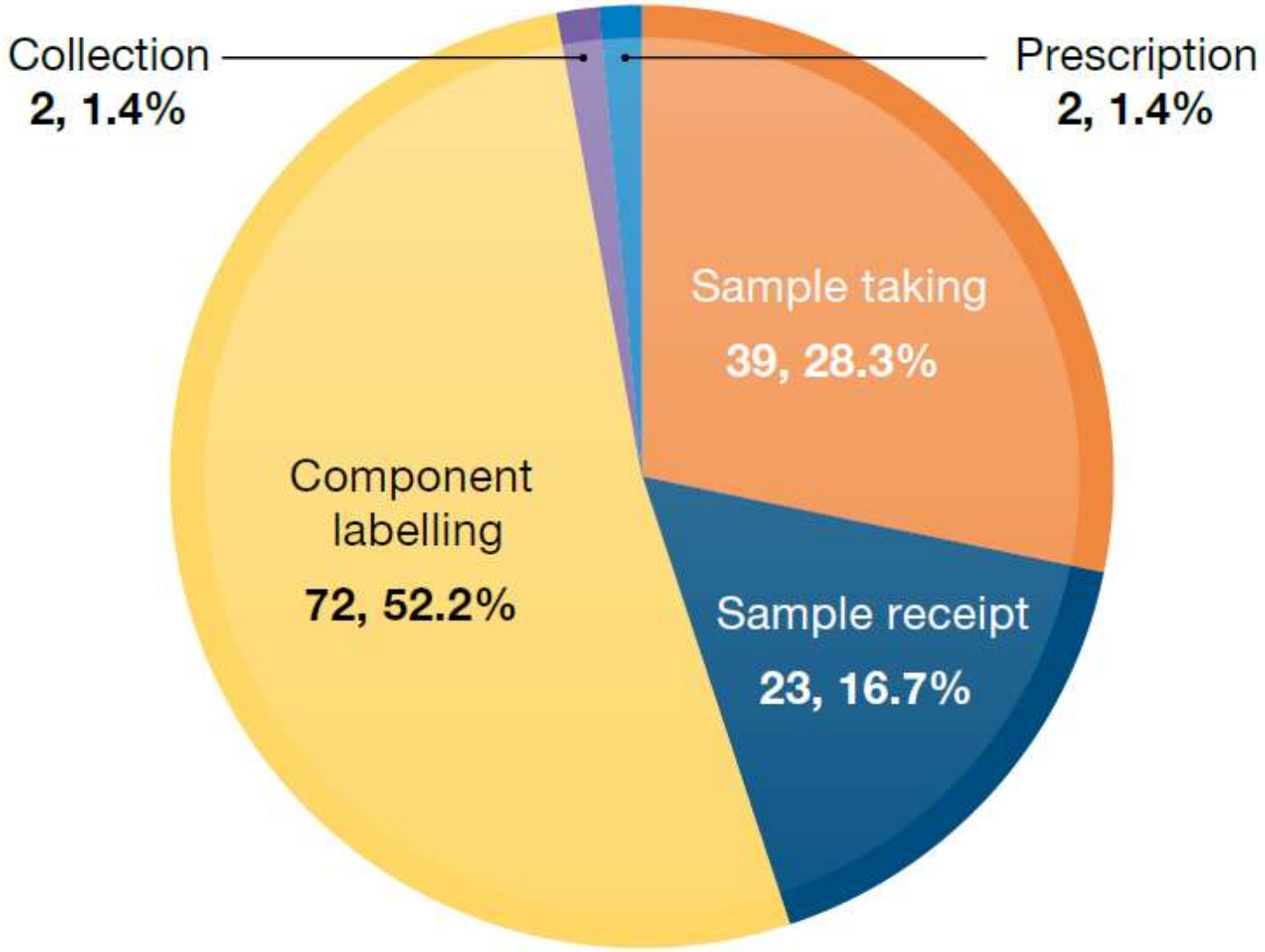
WCT=wrong component transfused; SRNM=specific requirements not met; RBRP=right blood right patient; Ig=immunoglobulin

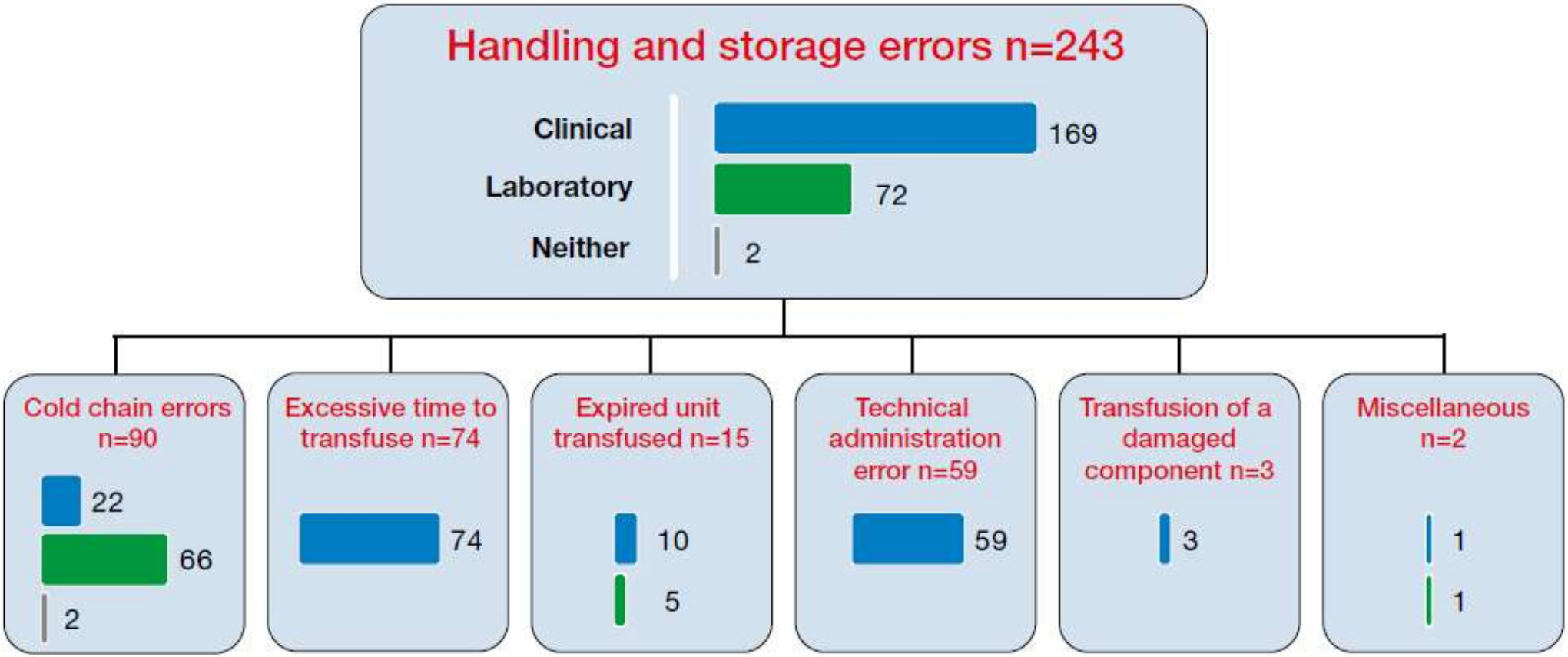
Laboratory-related handling and storage errors with outcome n=72



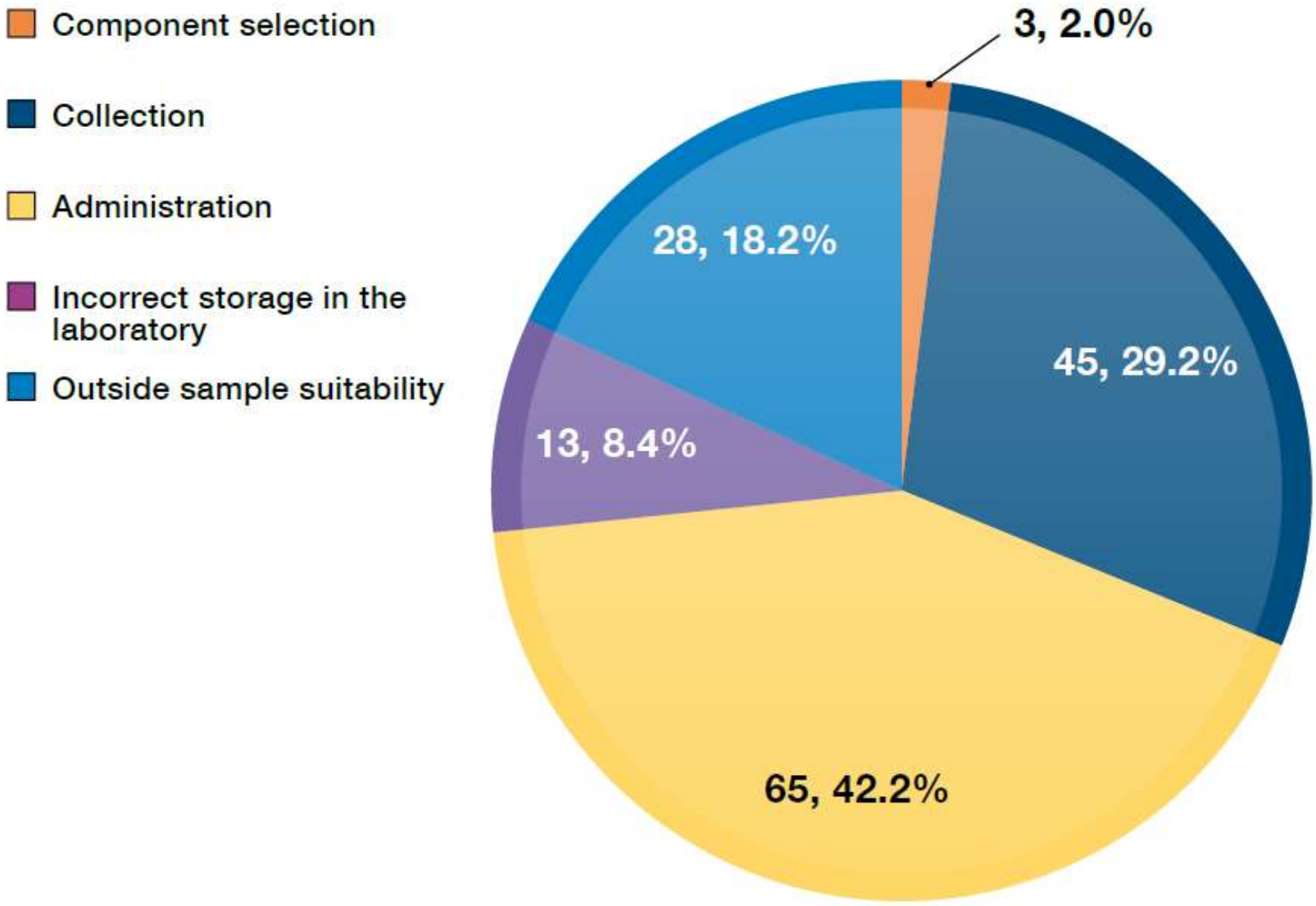

Right blood right patient n=200
Clinical
123
Laboratory
77
Patient identification errors n=115
86
29
Prescription errors n=37
37
Labelling errors n=48
48

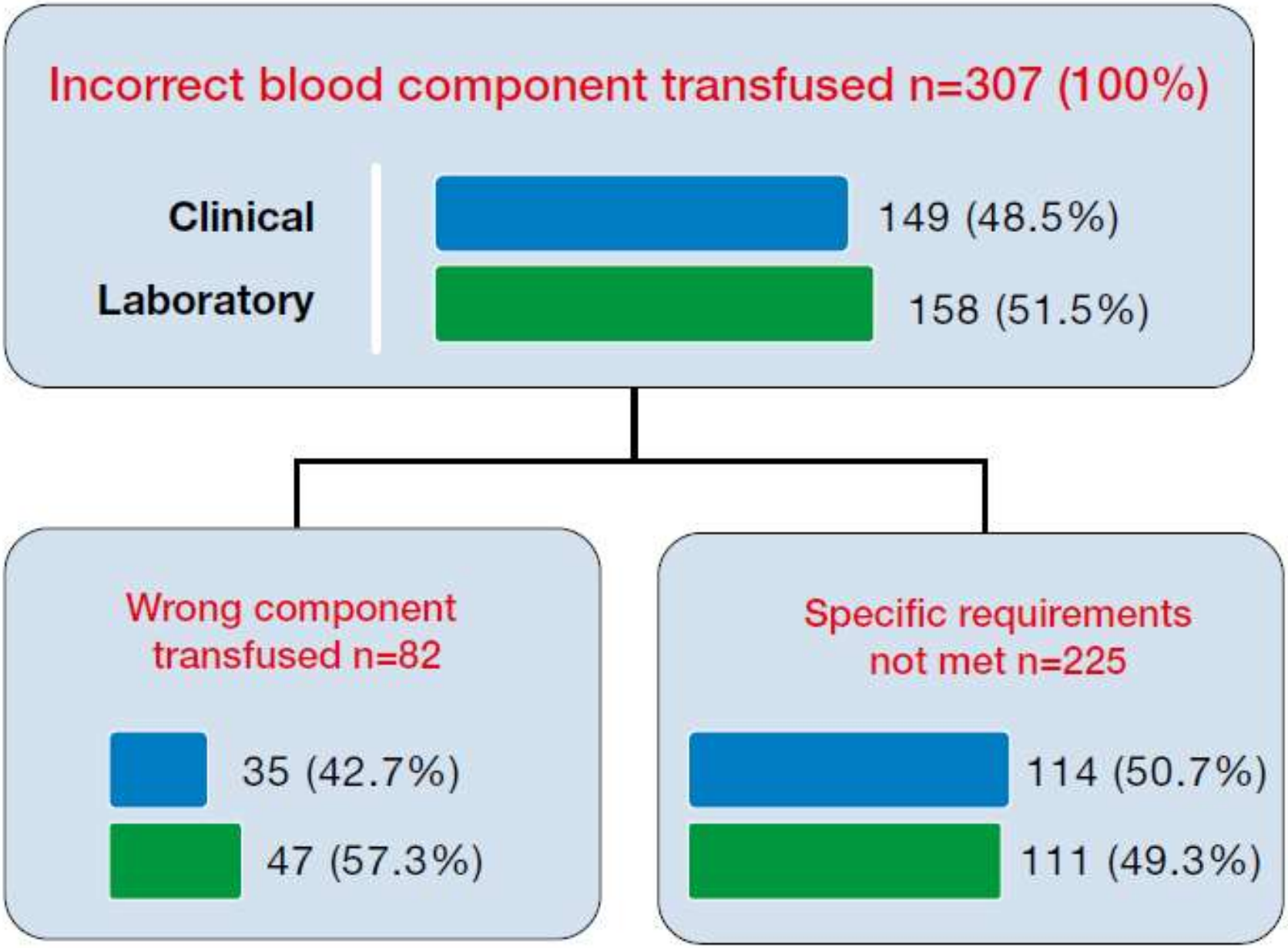
Near misses that could have led to RBRP n=138



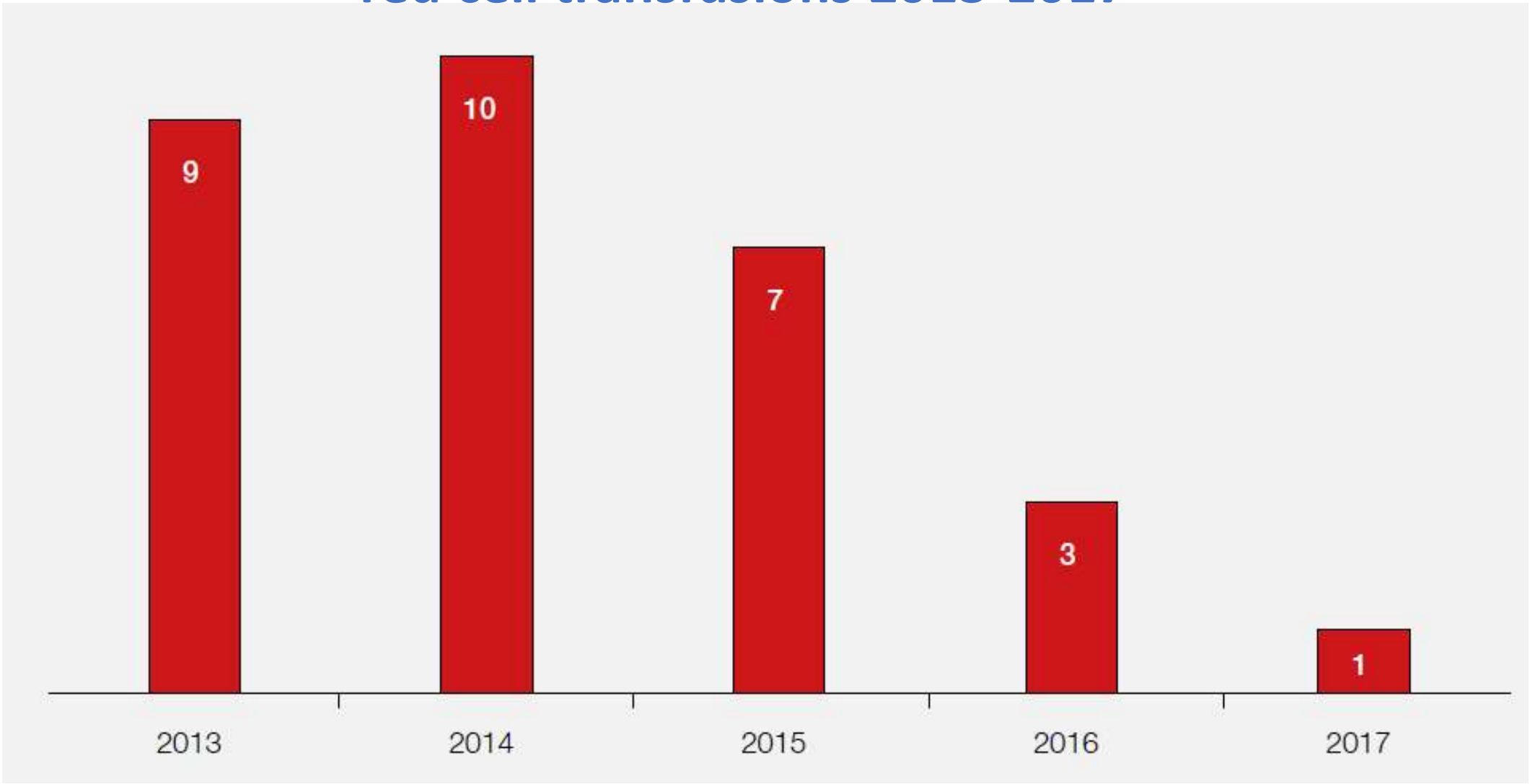

Handling and storage errors n=243
Clinical
169
Laboratory
72
Neither
2
Cold chain errors n=90
22
66
2
Excessive time to transfuse n=74
74
Expired unit transfused n=15
10
5
Technical administration error n=59
59
Transfusion of a damaged component n=3
3
Miscellaneous n=2
1
1

Near miss events that could have led to handling and storage errors n=154



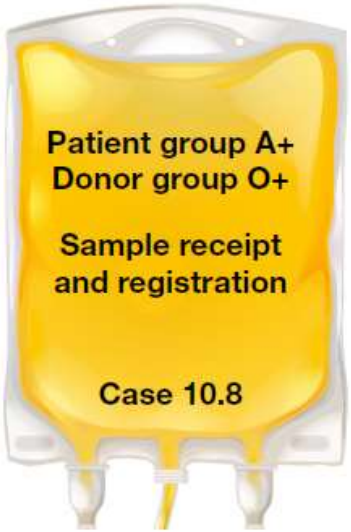

Incorrect blood component transfused n=307 (100%)
Clinical
149 (48.5%)
Laboratory
158 (51.5%)
Wrong component transfused n=82
35 (42.7%)
47 (57.3%)
Specific requirements not met n=225
114 (50.7%)
111 (49.3%)

Reduction in the number of ABO-incompatible red cell transfusions 2013-2017

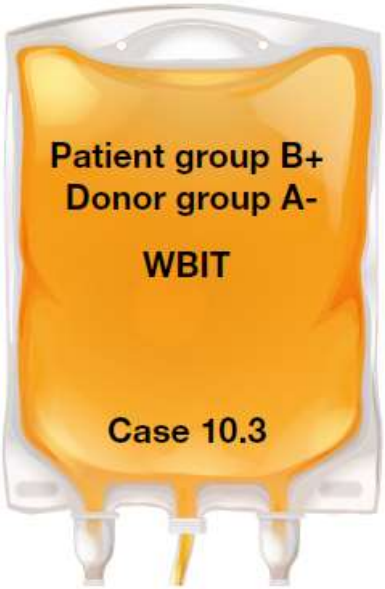


Transfusion of ABO-incompatible components 2017

FFP n=4

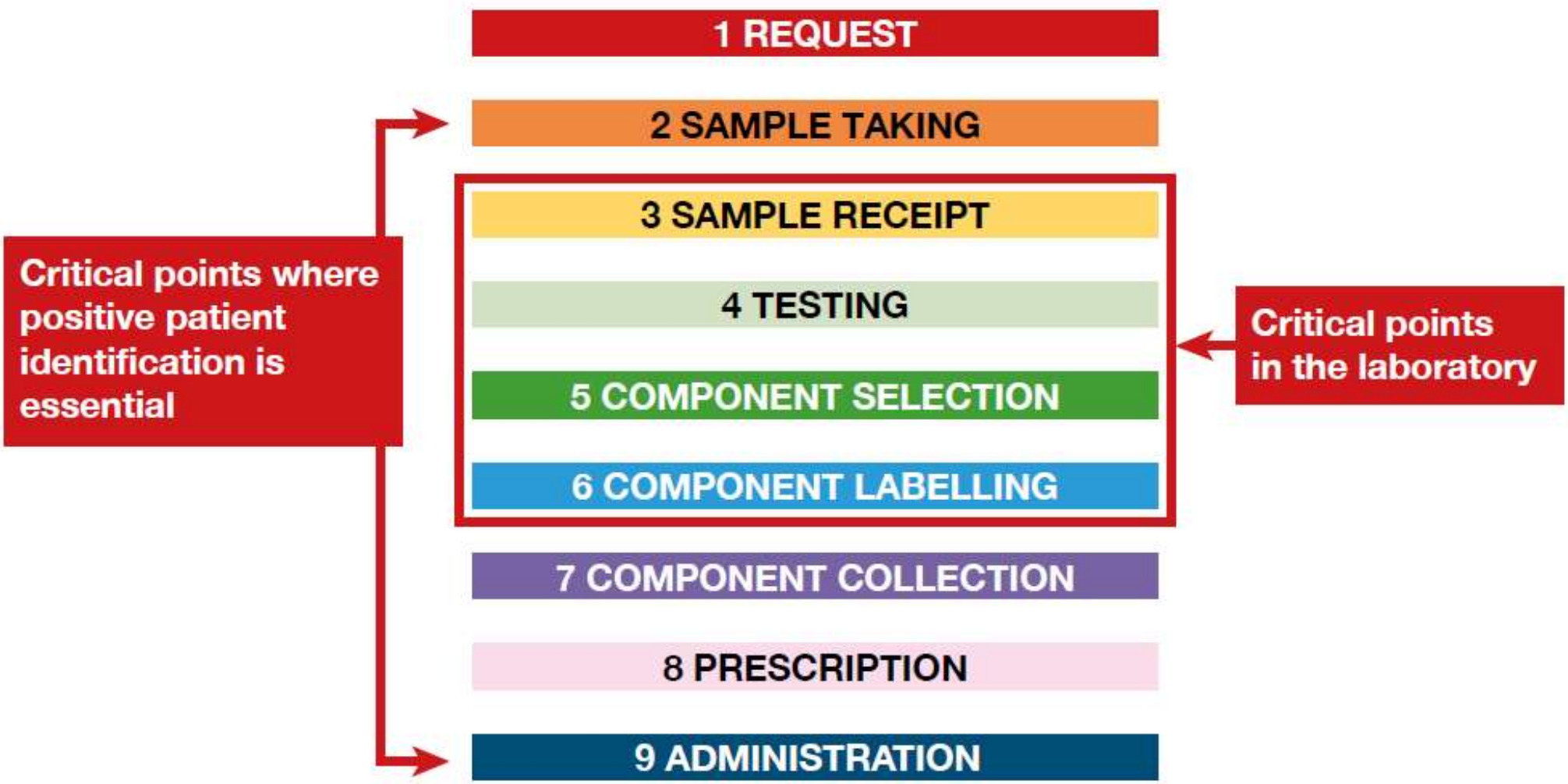


Platelets n=2



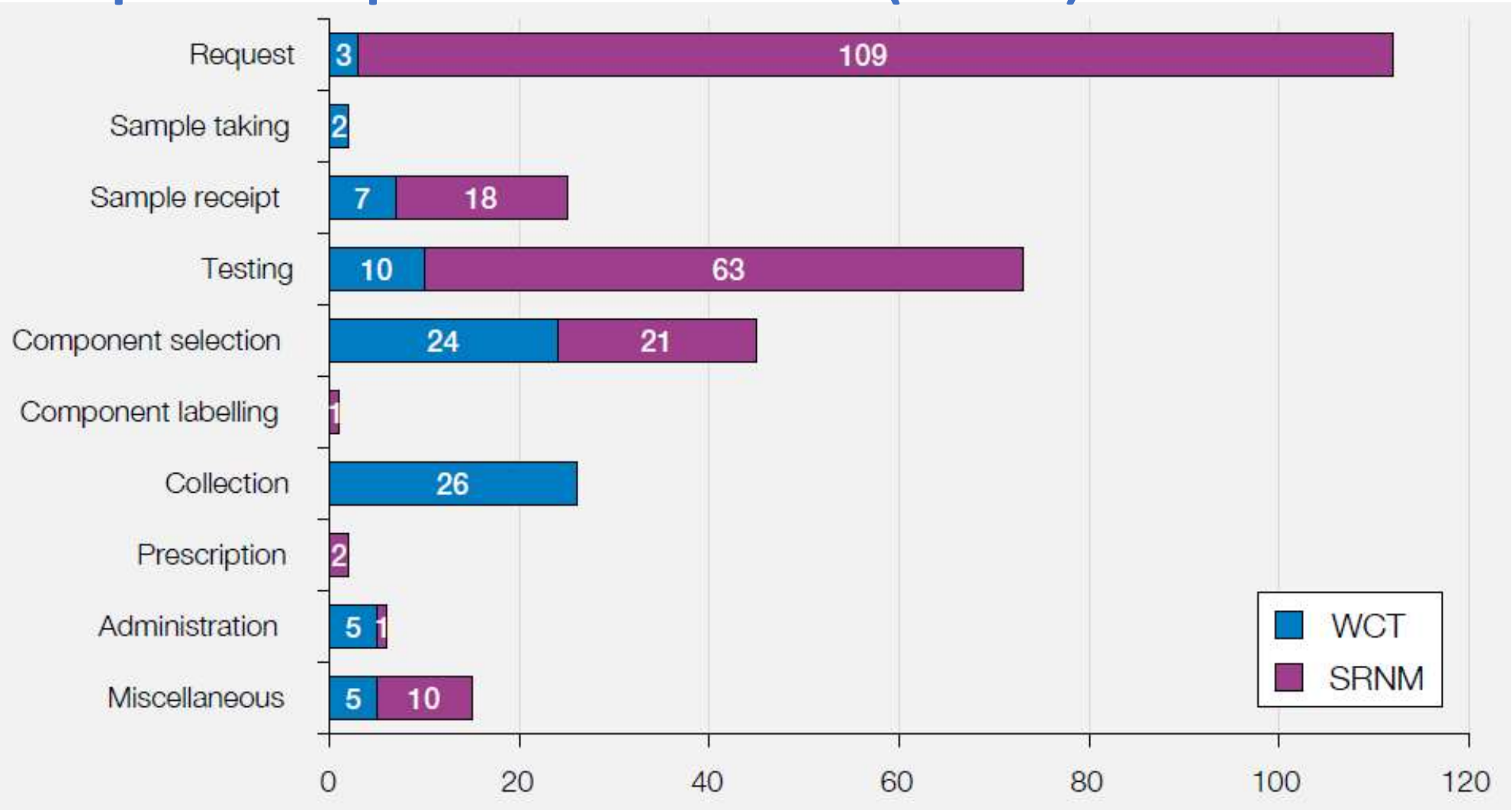
Red cells n=1

Nine steps in the transfusion process

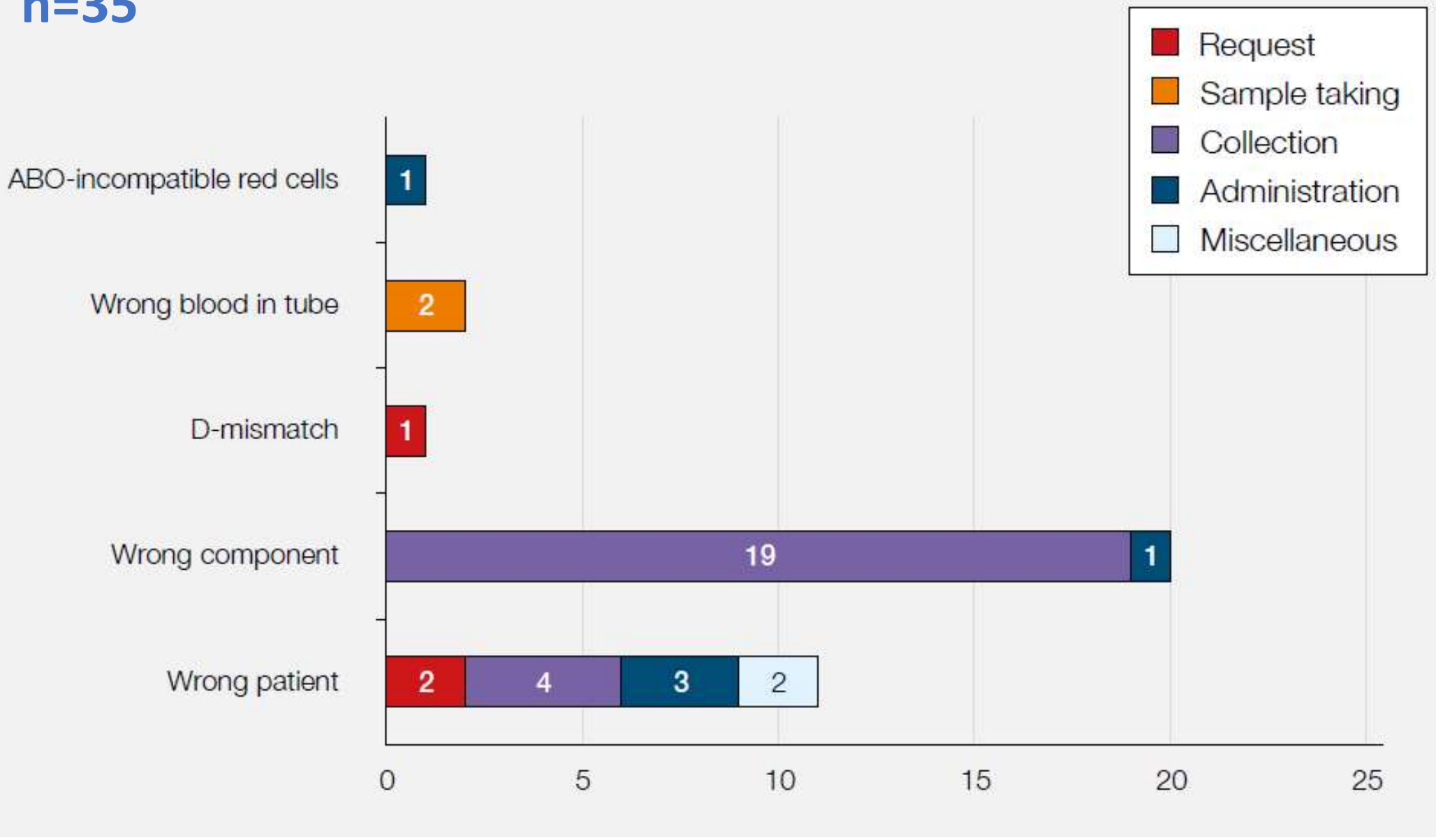


Note: Once a decision to transfuse is made, the authorisation or prescription may be written at variable times during this sequence, but ***must be checked during the final stage***

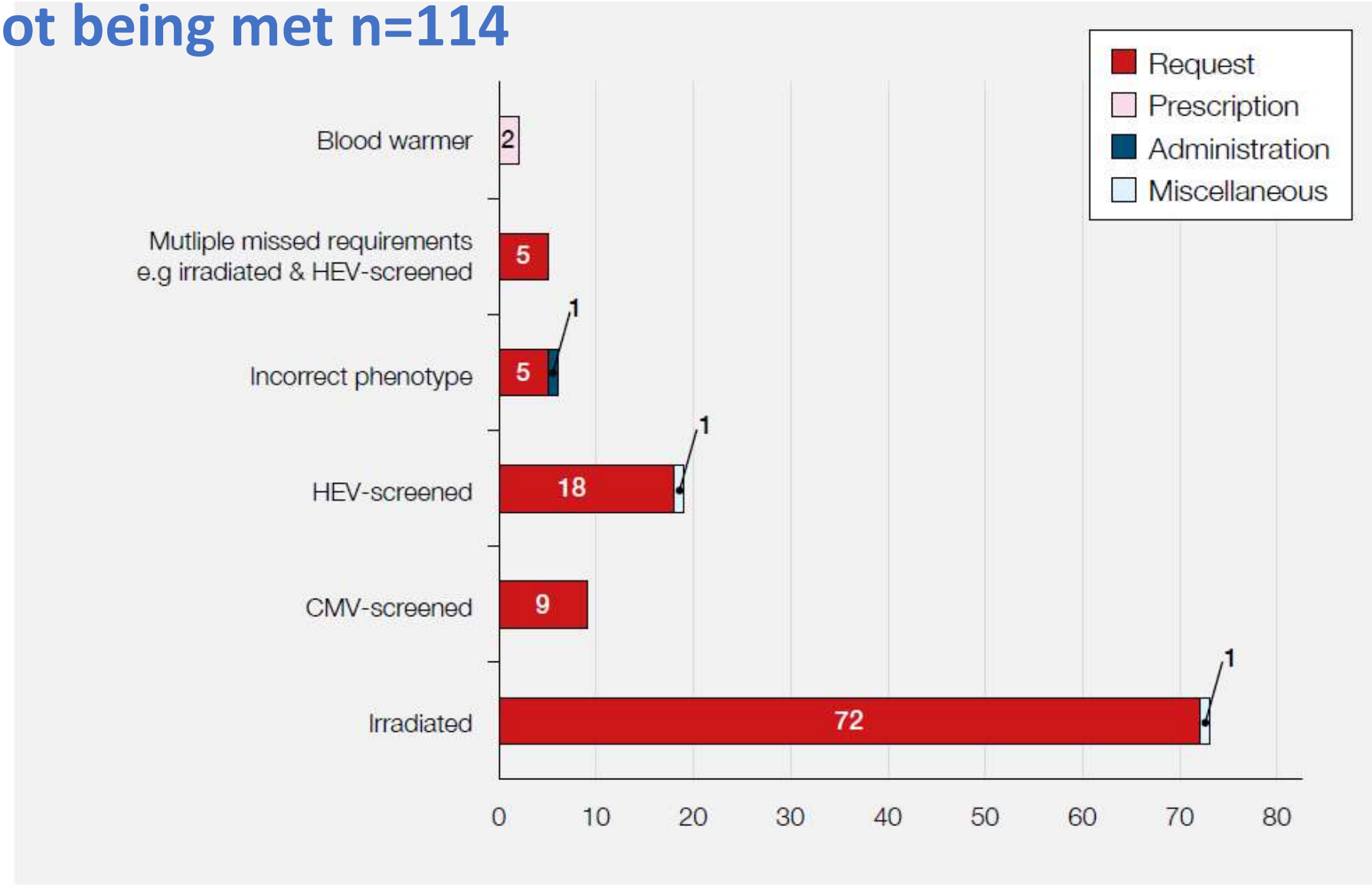
Point in the process where the first mistake occurred leading to wrong component transfusion (WCT) or specific requirements not met (SRNM)



Clinical errors resulting in wrong component transfused n=35

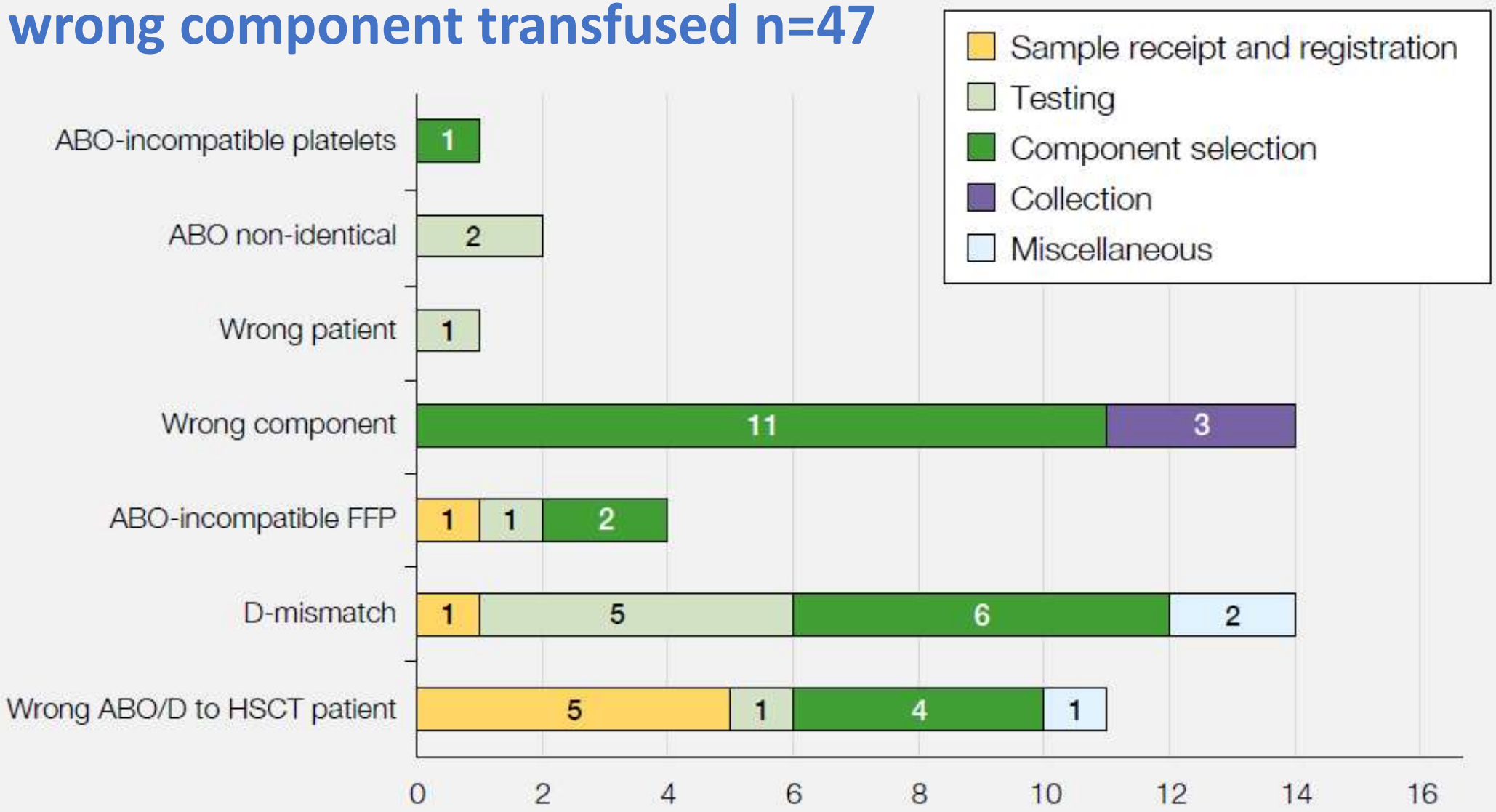


Clinical errors leading to specific requirements not being met n=114



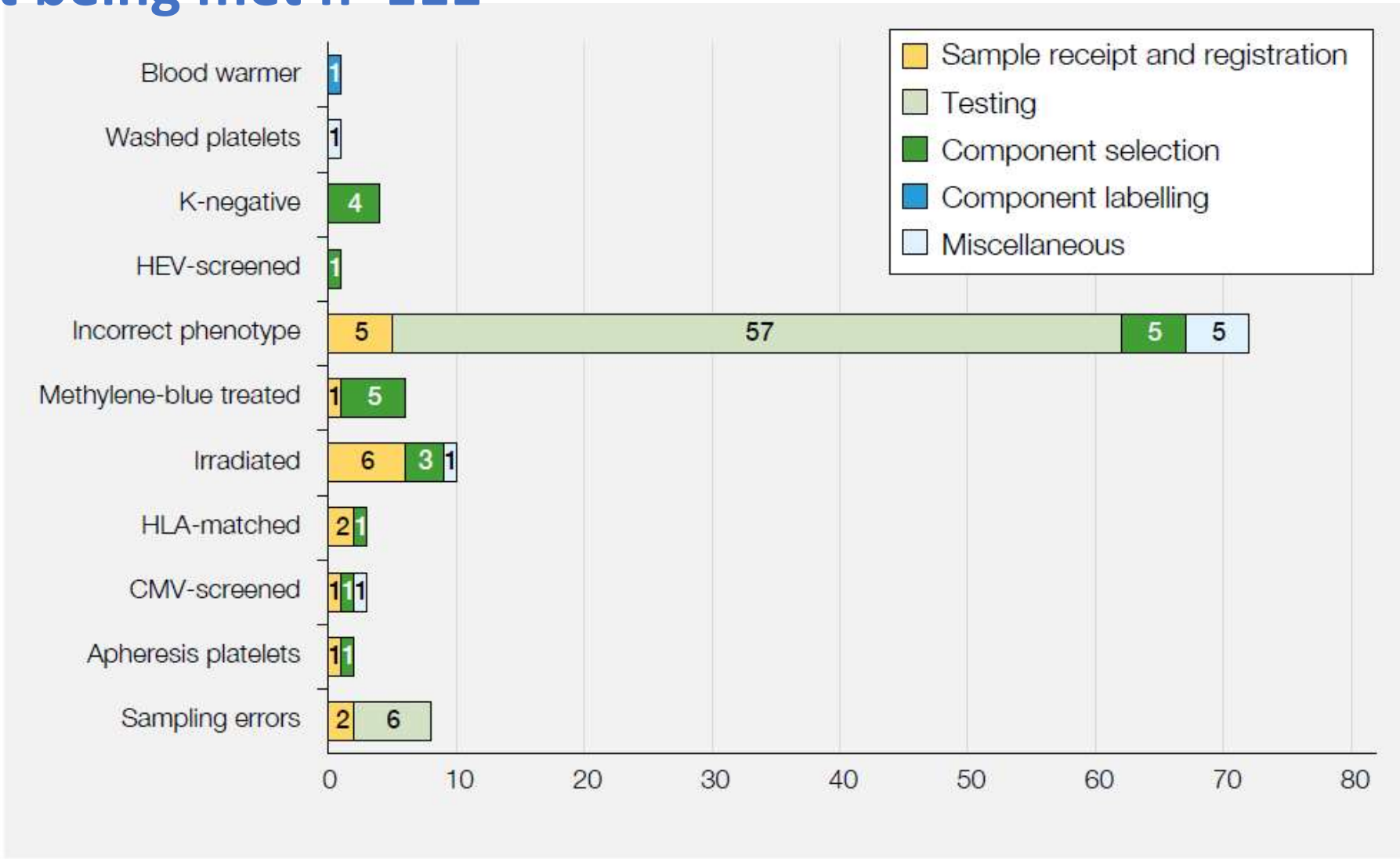
HEV=hepatitis E virus; CMV=cytomegalovirus

Laboratory errors resulting in wrong component transfused n=47



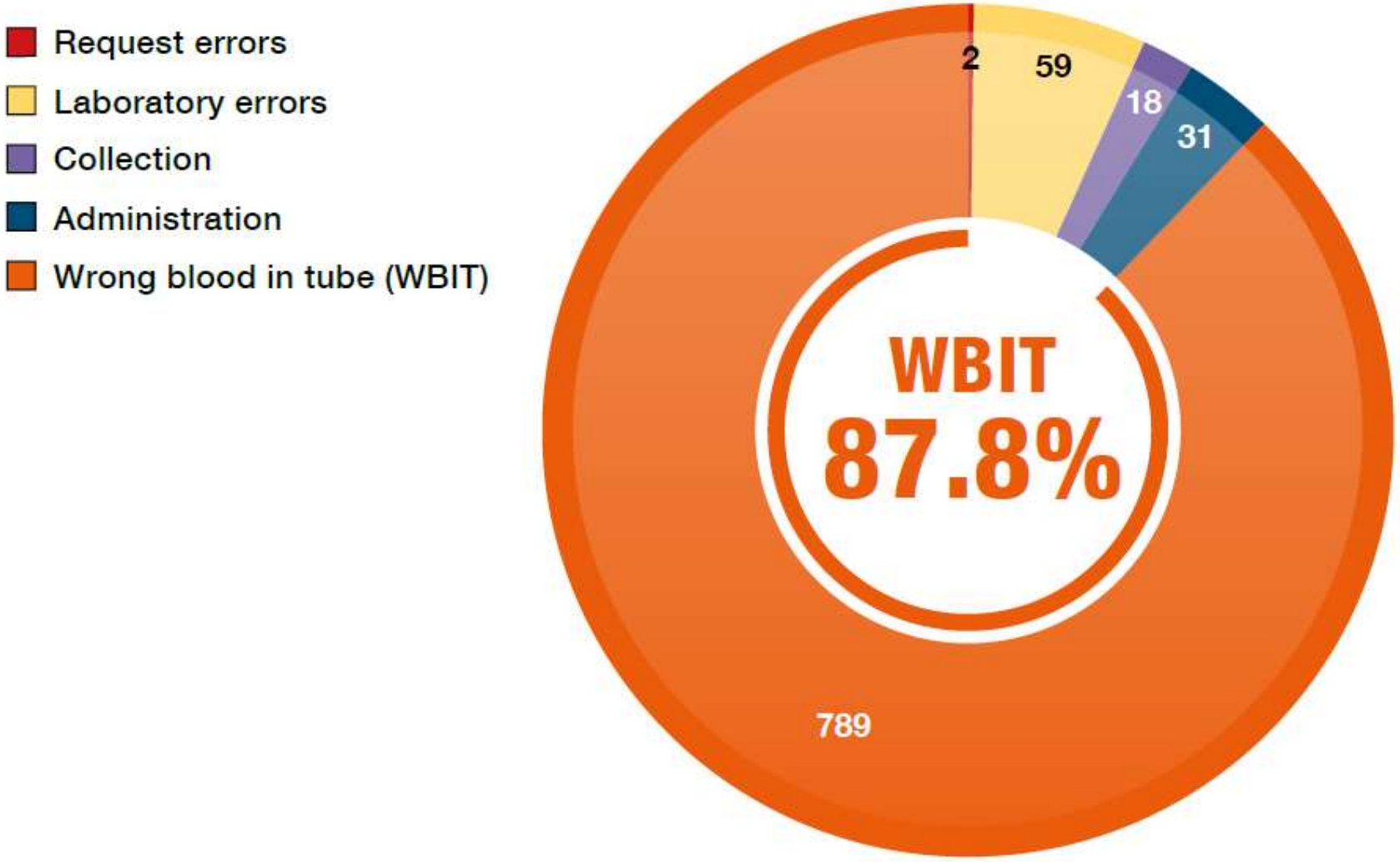
FFP=fresh frozen plasma; HSCT=haemopoietic stem cell transplant

Laboratory errors leading to specific requirements not being met n=111

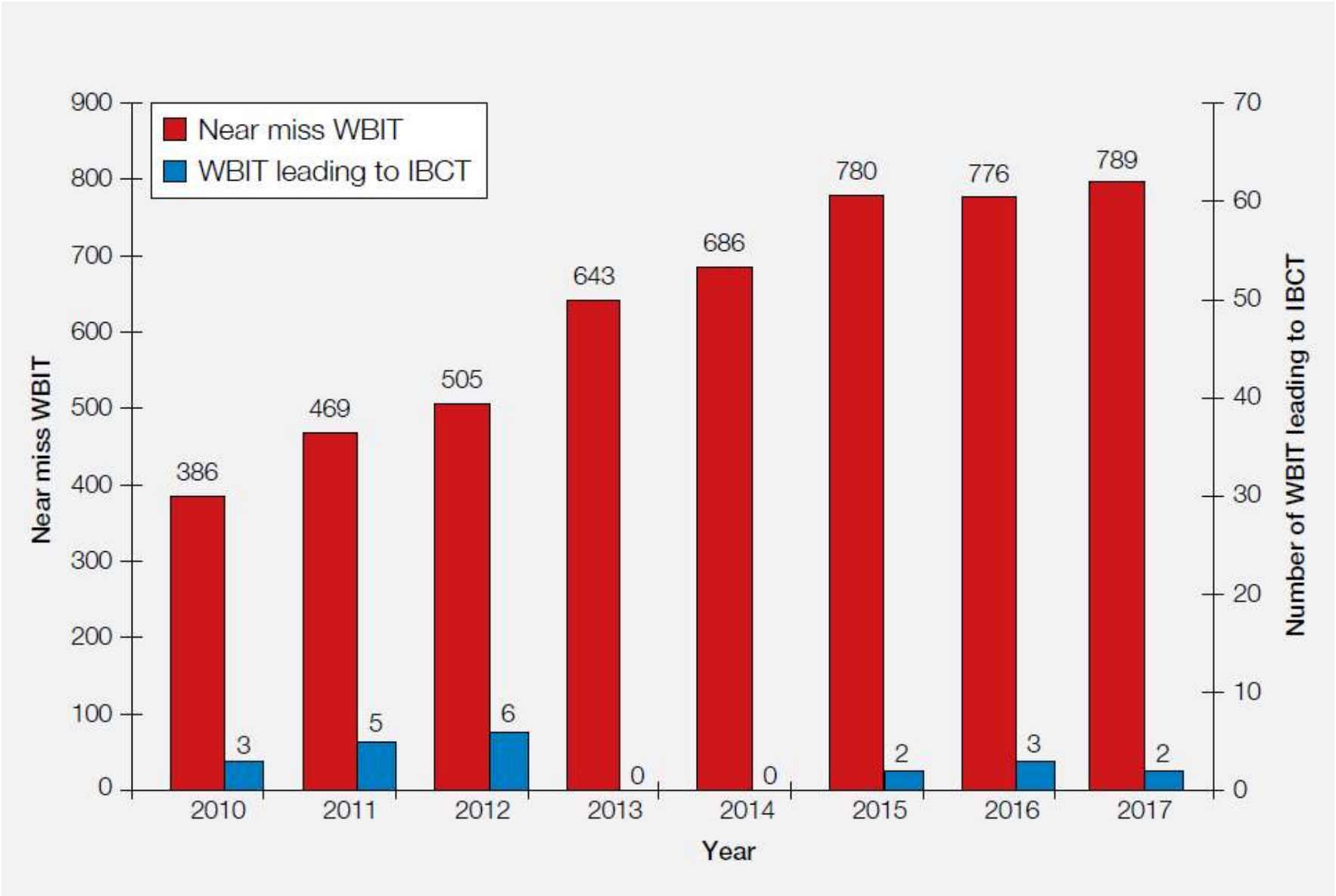


HEV=hepatitis E virus; HLA=human leucocyte antigen; CMV=cytomegalovirus

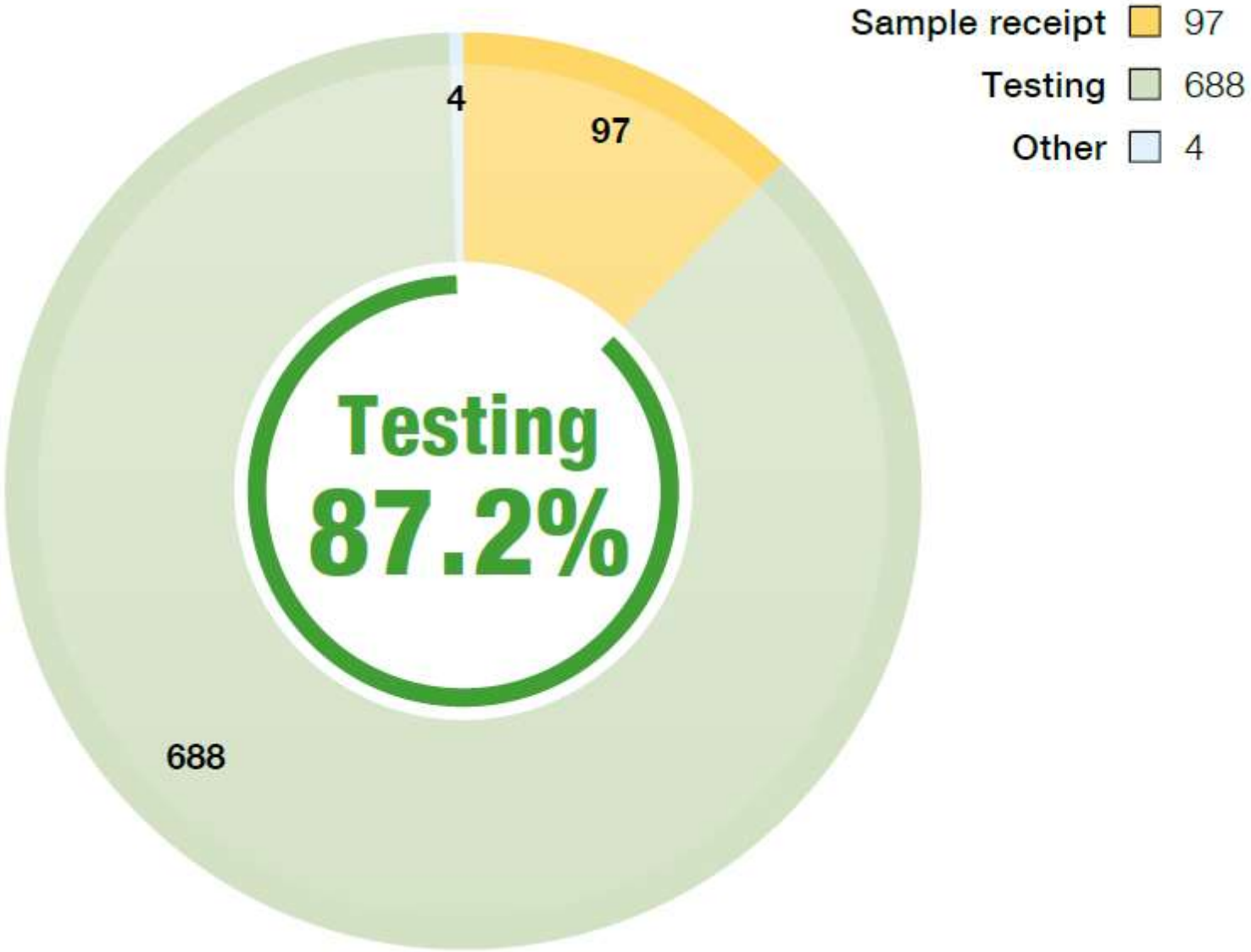
Most ‘near miss’ incorrect blood component transfused were wrong blood in tube errors



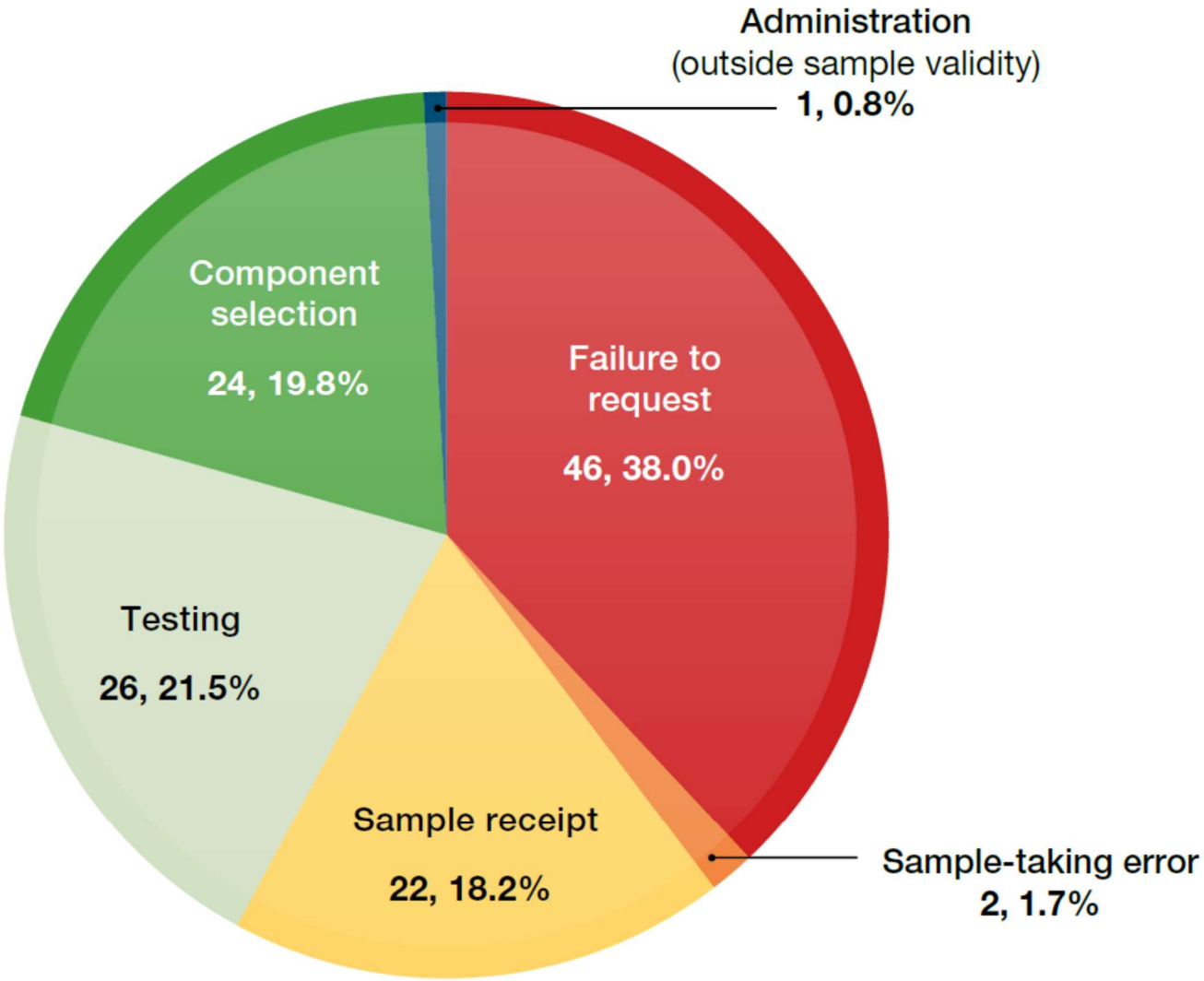
Comparison of near miss and actual wrong blood in tube errors leading to incorrect blood components transfused



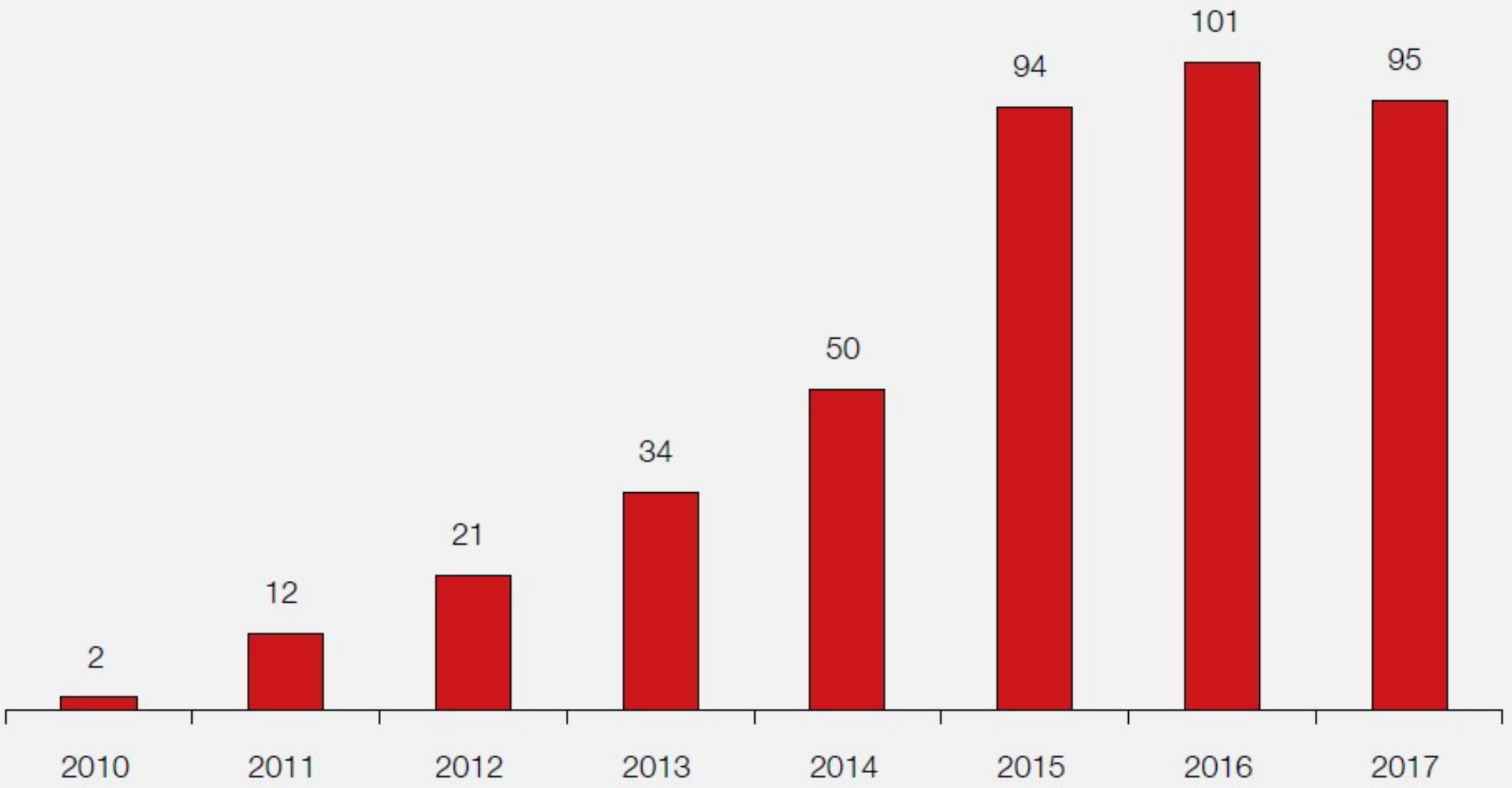
Point in the process where a wrong blood in tube incident was detected



Near misses that could have led to specific requirements not being met n=121

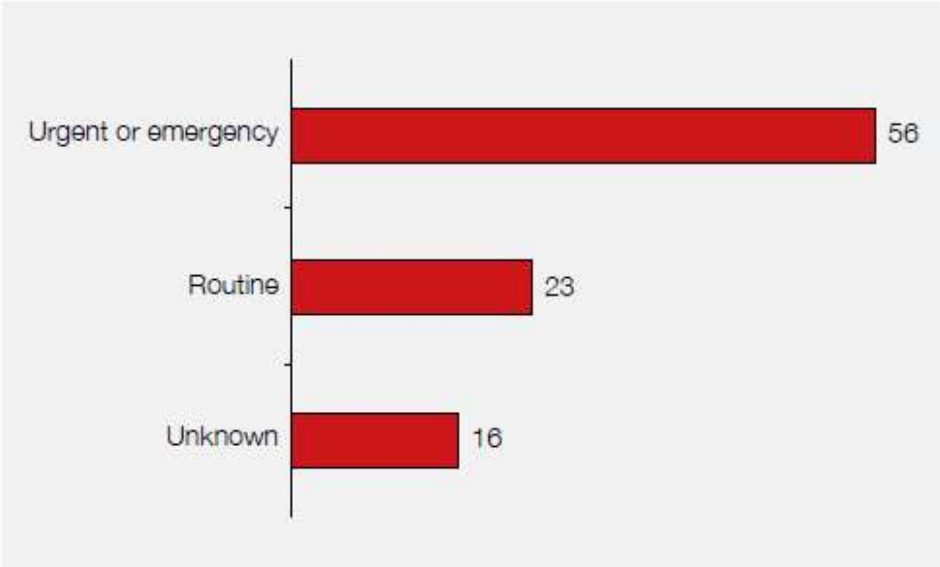


Delayed transfusion reports by year 2010-2017

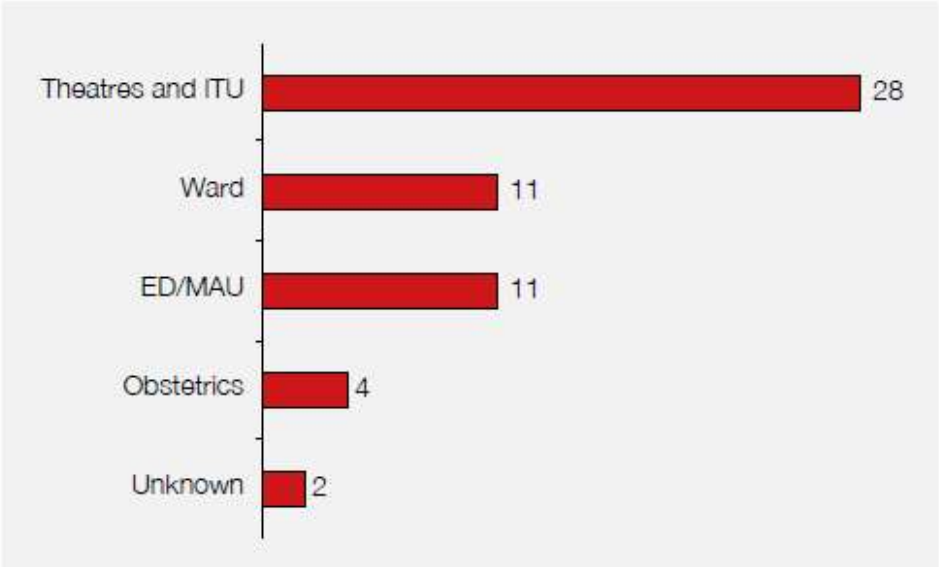


Delayed transfusions 2017: urgency and location

Urgency of delayed transfusions n=95

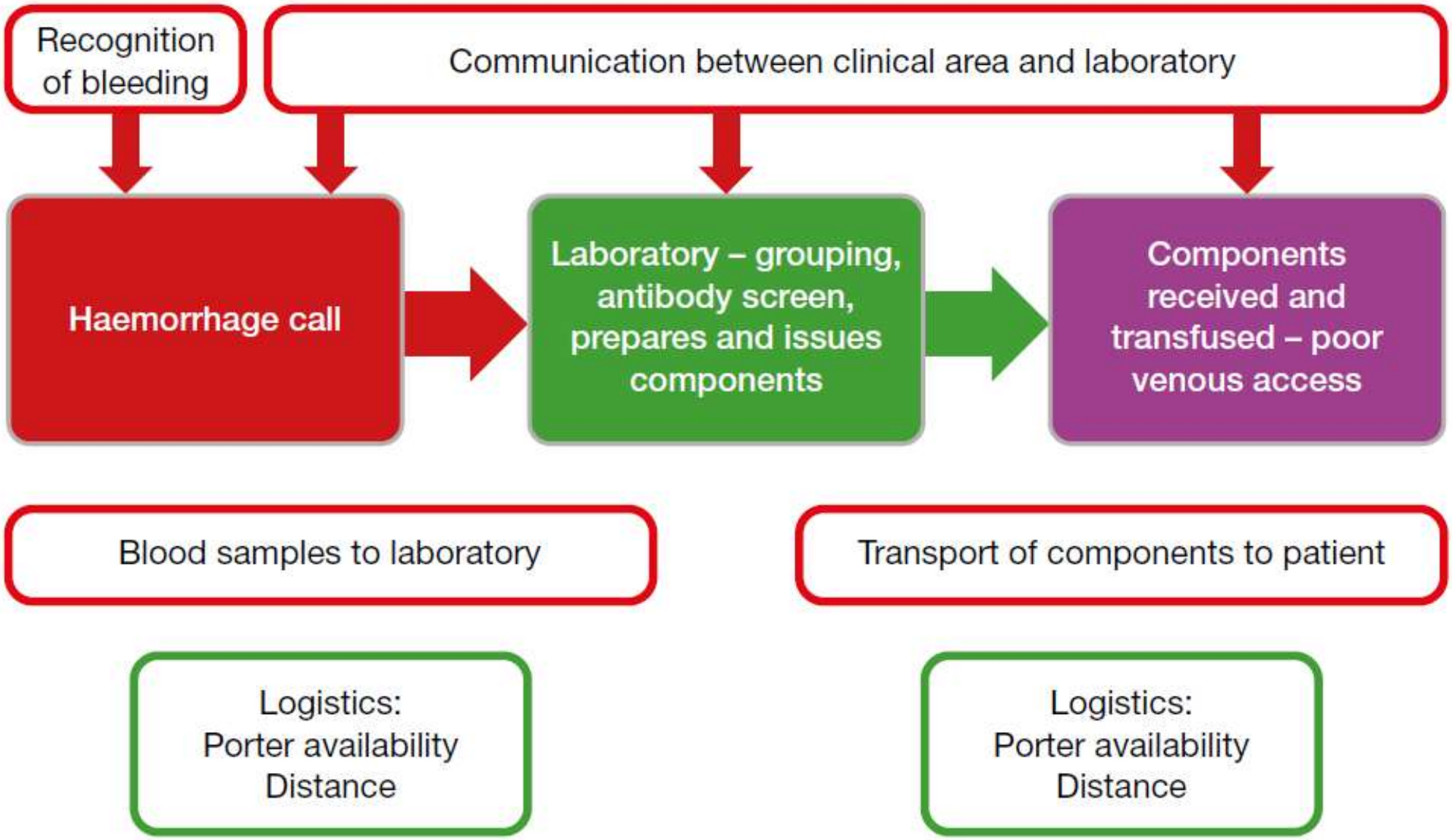


Location of emergency and urgent transfusions n=56

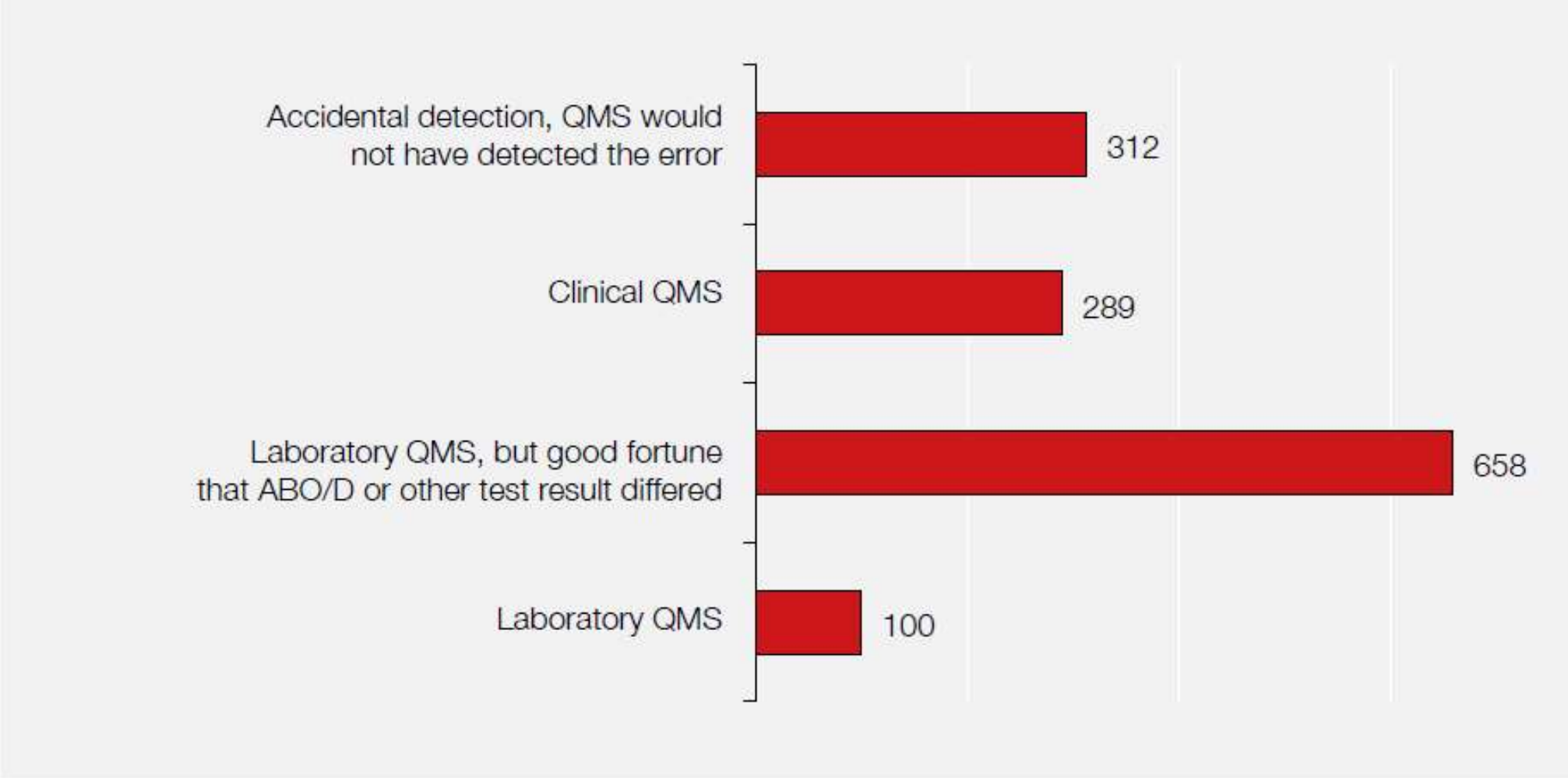


ED=emergency department; MAU=medical admissions unit; ITU=intensive therapy unit (all types)

Potential hold-up points in the transfusion pathway

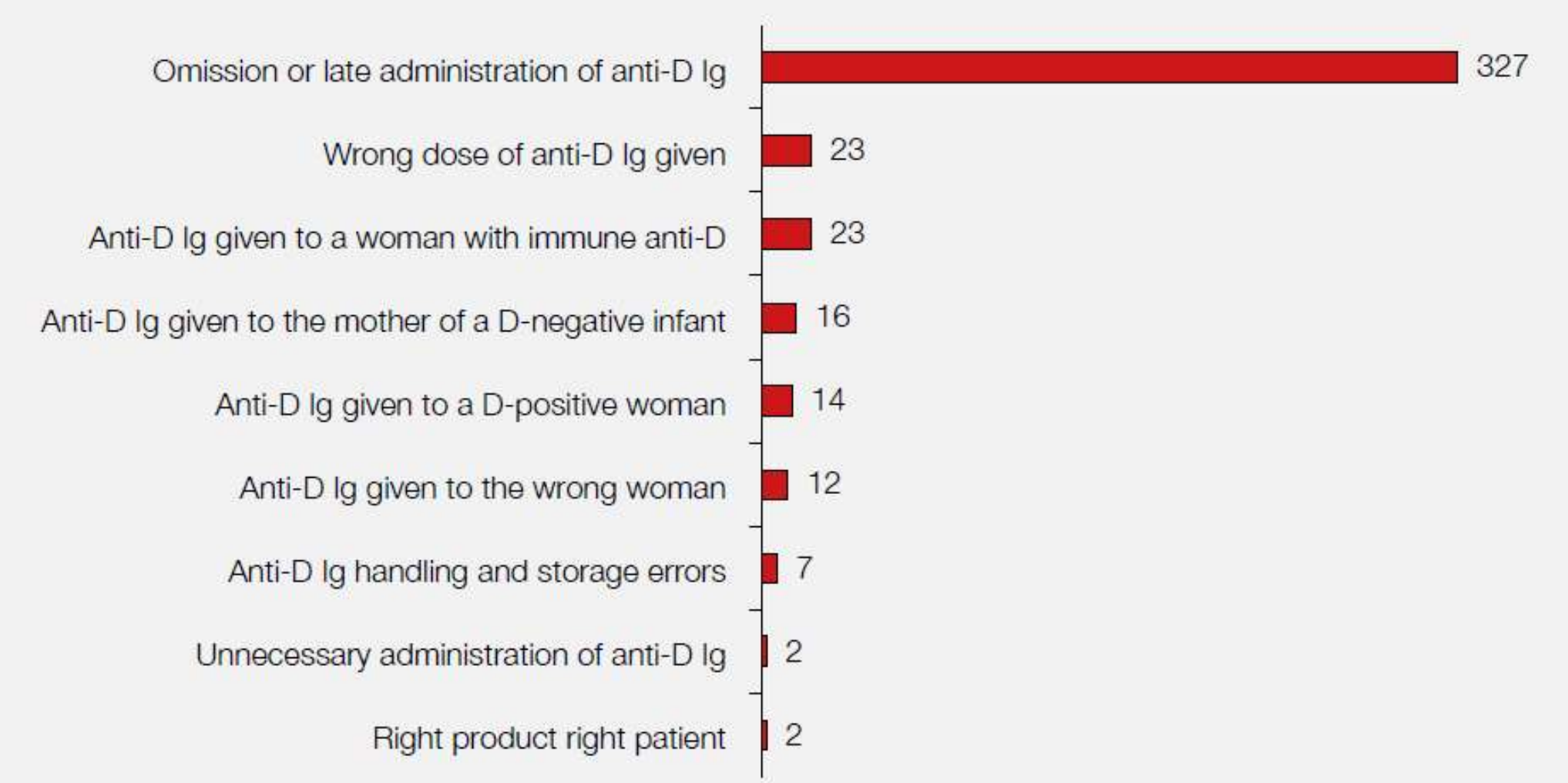


Near miss events detected by quality management systems or good fortune

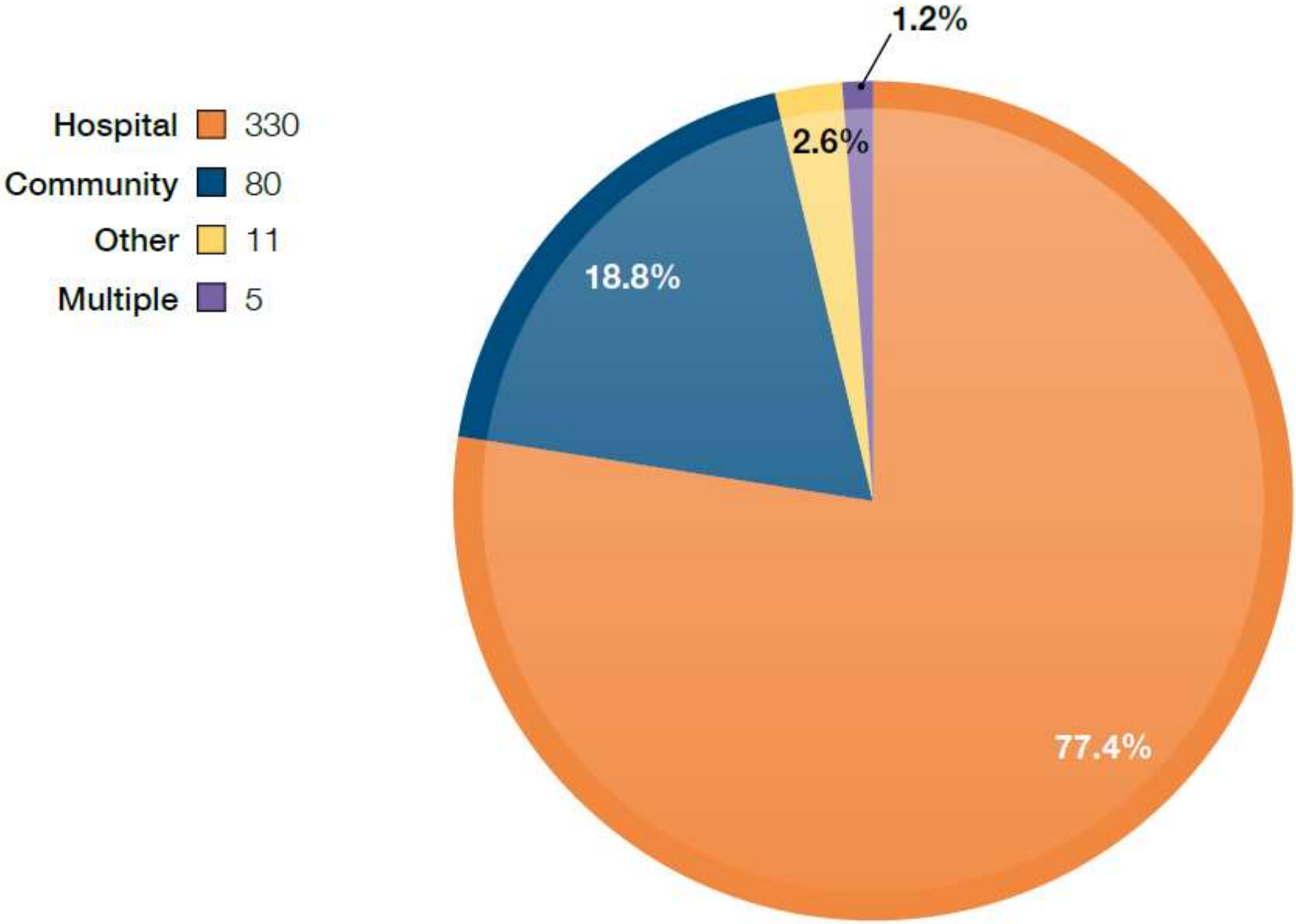


QMS=quality management system

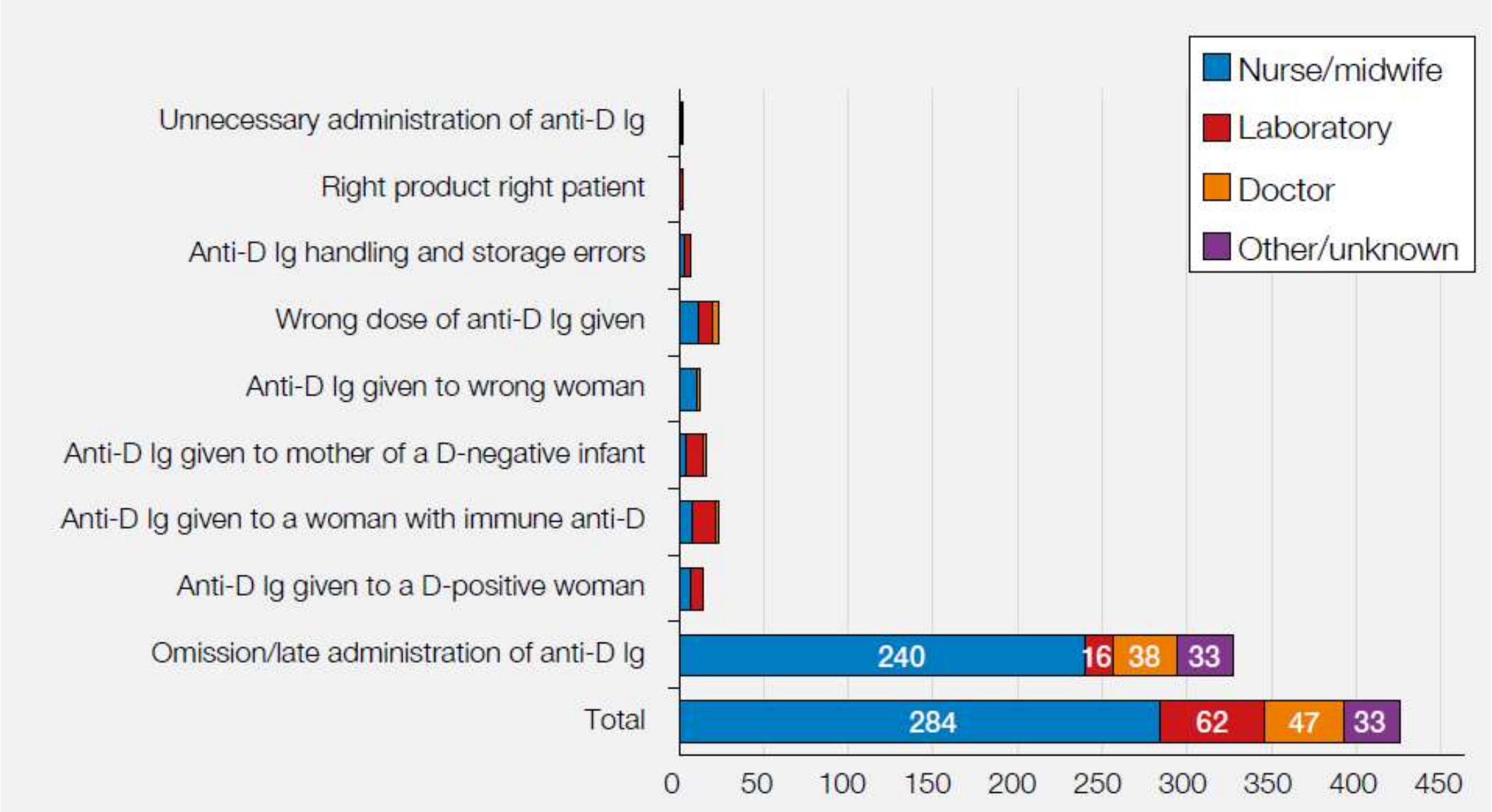
Anti-D immunoglobulin errors in 2017 n=426



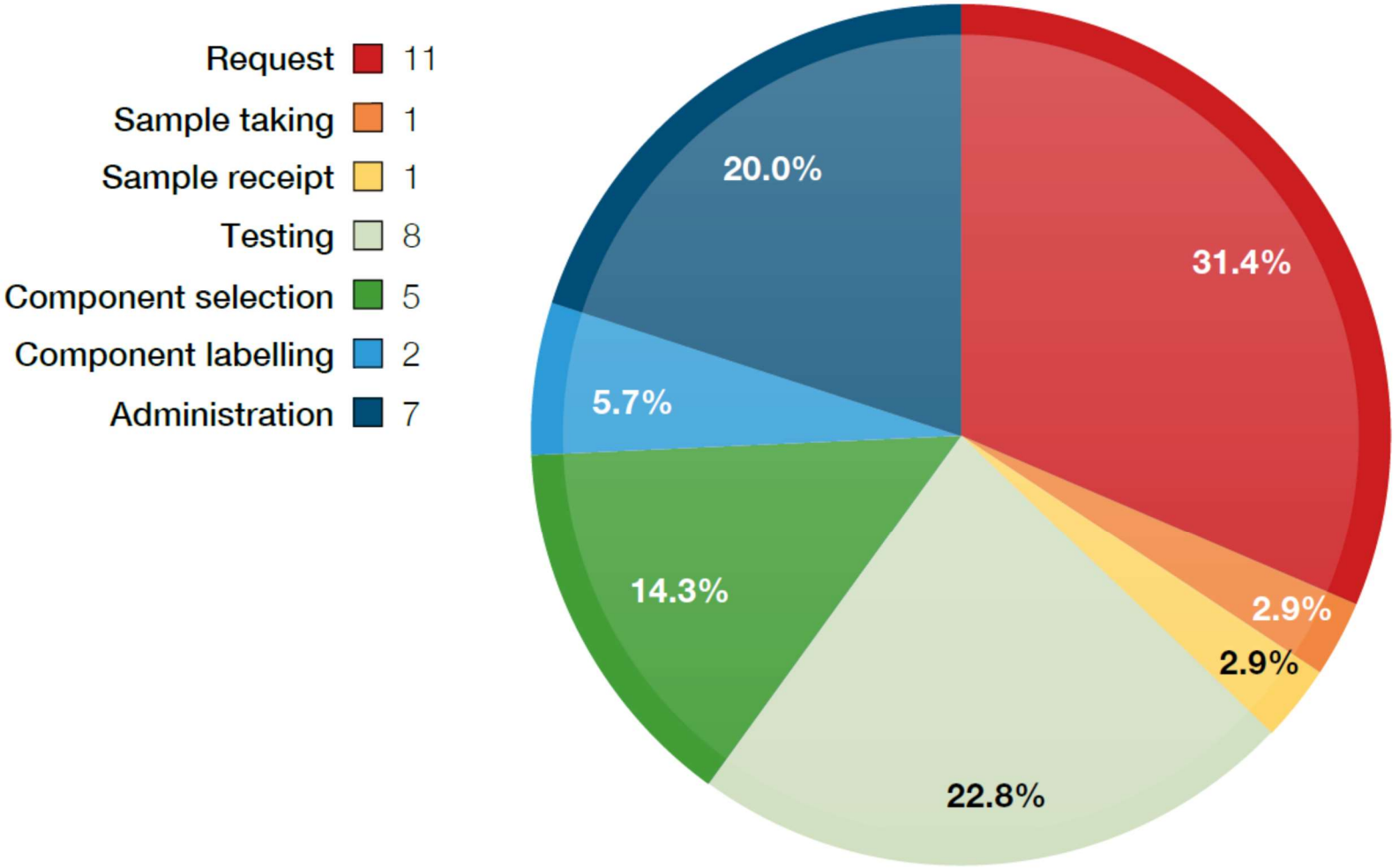
Location of anti-D immunoglobulin errors n=426



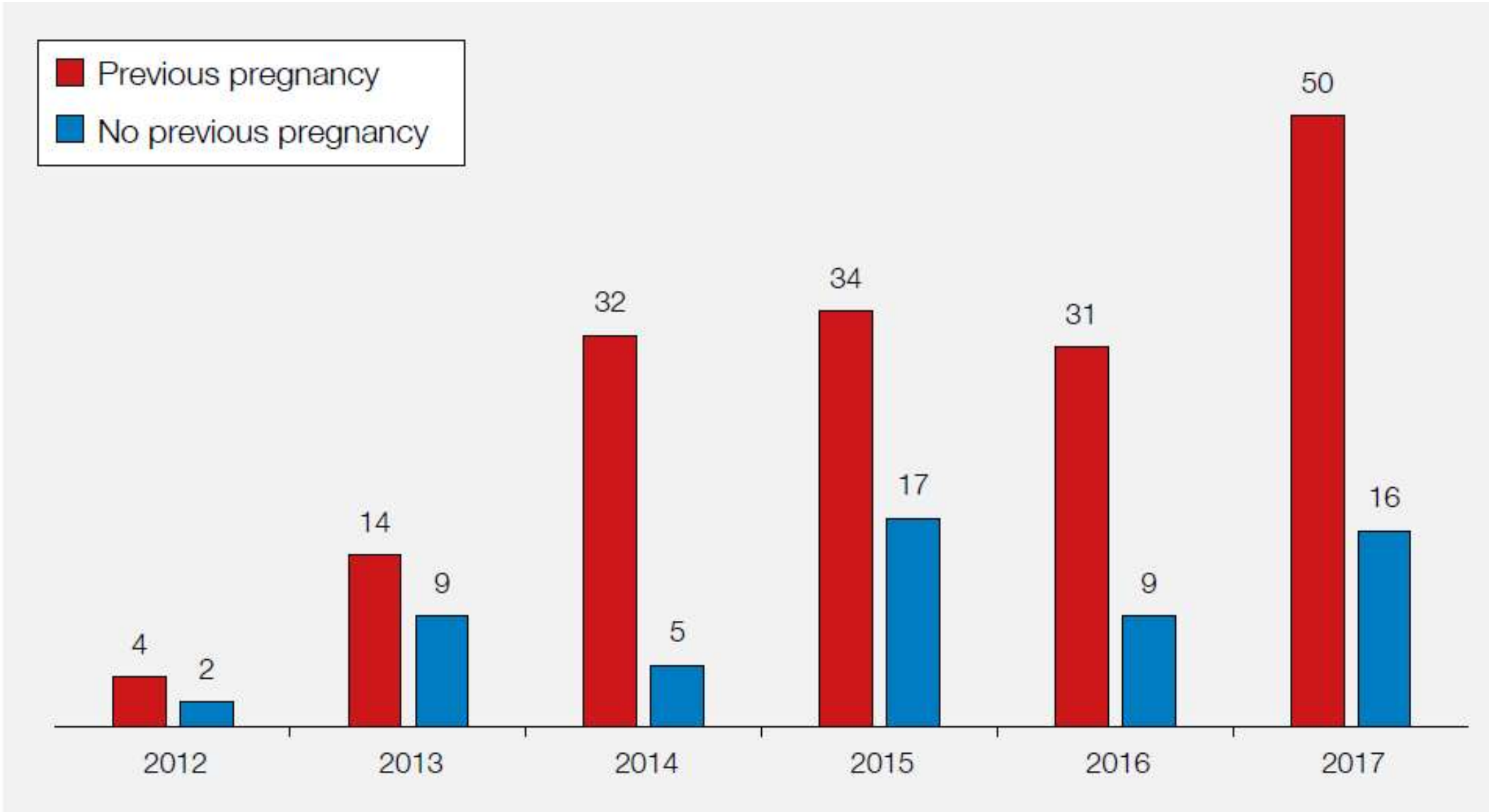
Staff group responsible for primary error by category



Near misses that could have led to anti-D immunoglobulin errors n=35



Number of reports of anti-D immunisation in pregnancy



Febrile and allergic reactions: targeted treatment

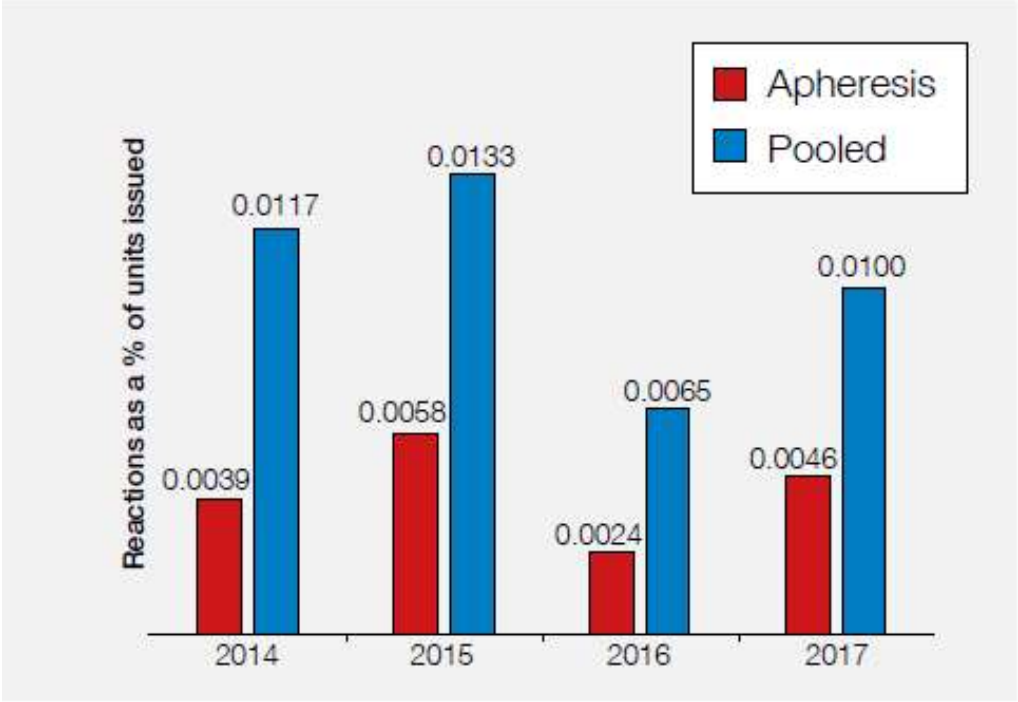
Key SHOT messages

- For febrile reactions alone, give paracetamol
- For allergic reactions give an antihistamine as first line; give adrenaline if anaphylaxis is suspected. The effect of steroids is delayed by several hours, will have no immediate effect, and should only be used to prevent a late recurrence. The use of steroids may further immunosuppress already immunocompromised patients and increase the risk of side effects such as infection

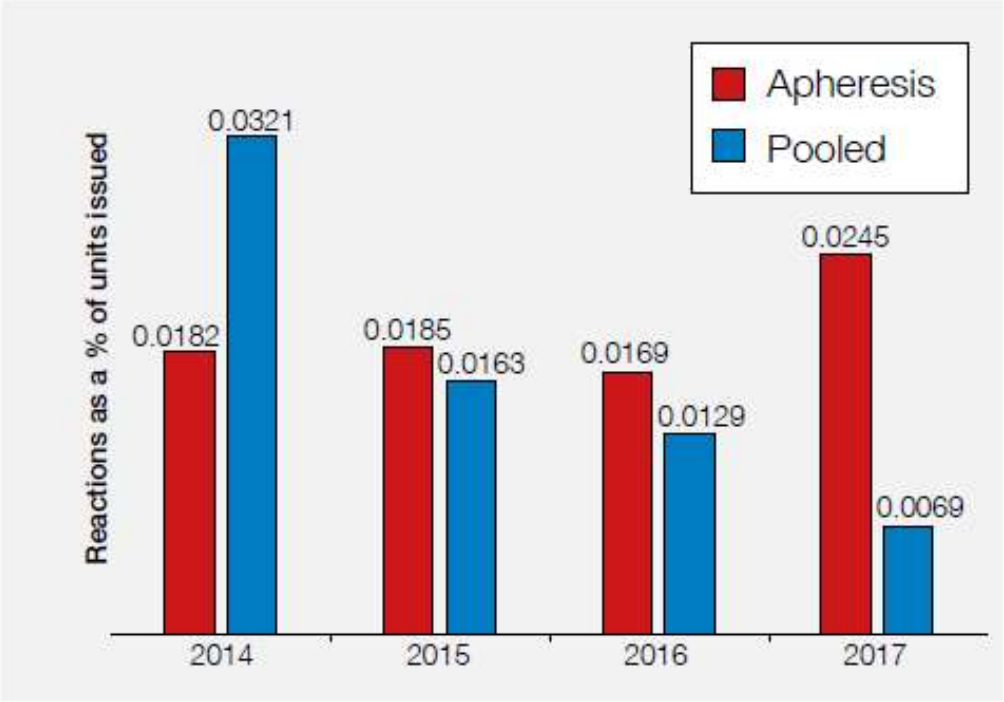
Reaction	Treatment	Prevention of recurrent reactions
Febrile	Paracetamol	Paracetamol 60 minutes before anticipated time of reaction
Allergic	Antihistamine (steroid should not be used routinely) If anaphylaxis, adrenaline is essential	If previous reaction with apheresis platelets try pooled platelets in PAS If reactions continue, give pre-transfusion antihistamine If reactions continue, consider washed platelets/red cells; for fresh frozen plasma (FFP) try a pooled component e.g. solvent-detergent treated plasma

Percentage of reactions to apheresis and pooled platelets 2014 to 2017

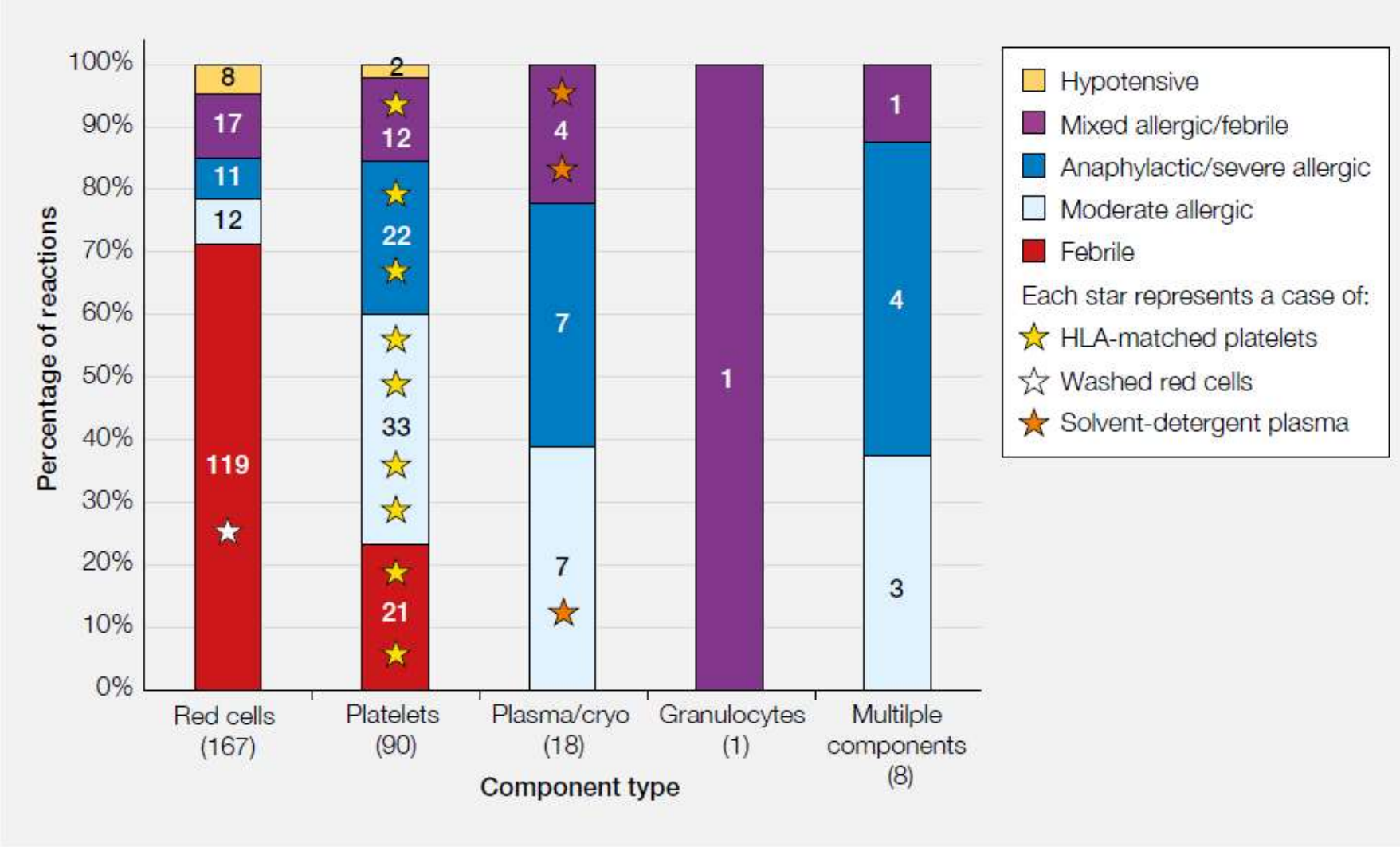
a: Febrile type reactions



b: Allergic reactions

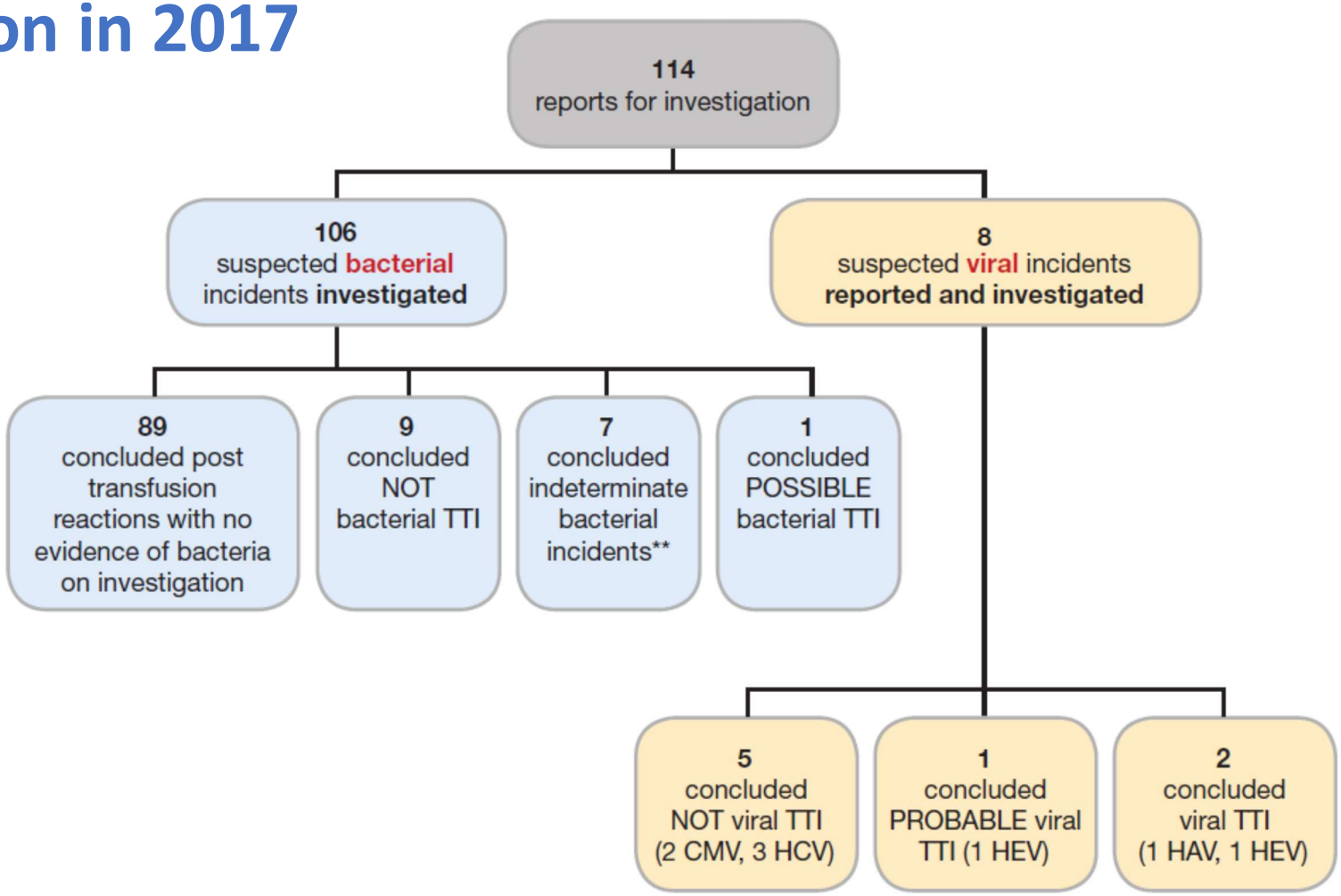


Reactions by component type



HLA=human leucocyte antigen; cryo=cryoprecipitate

Outcome of reports of suspected transfusion-transmitted infection in 2017

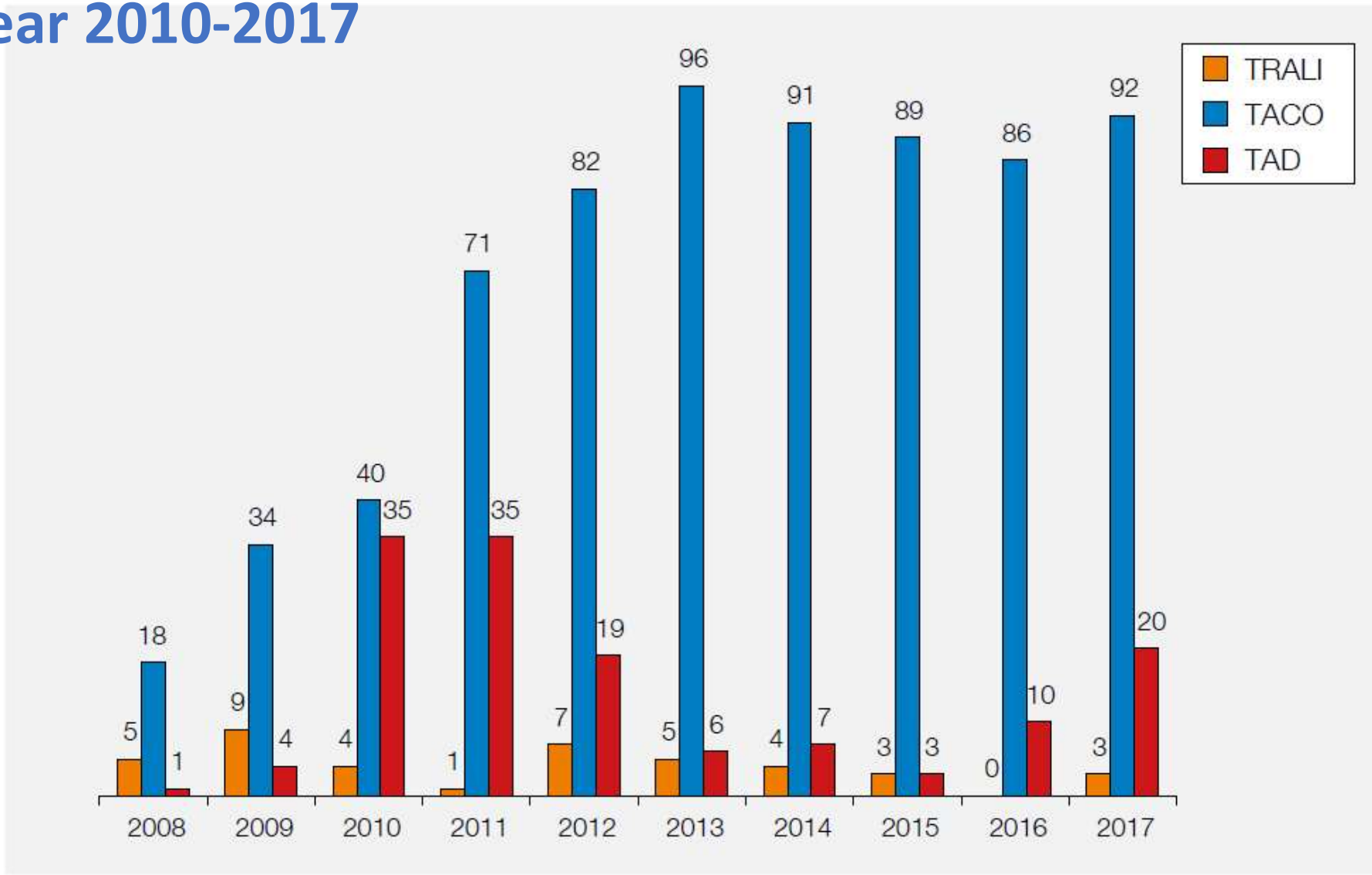


**Hepatitis C virus (HCV) investigations where the transfusion was prior to screening are not included in the above figure (1 HCV incident reported in 2017, transfusion pre-1991)*

***No packs to test but investigation based on information received indicates unlikely to reflect a TTI*

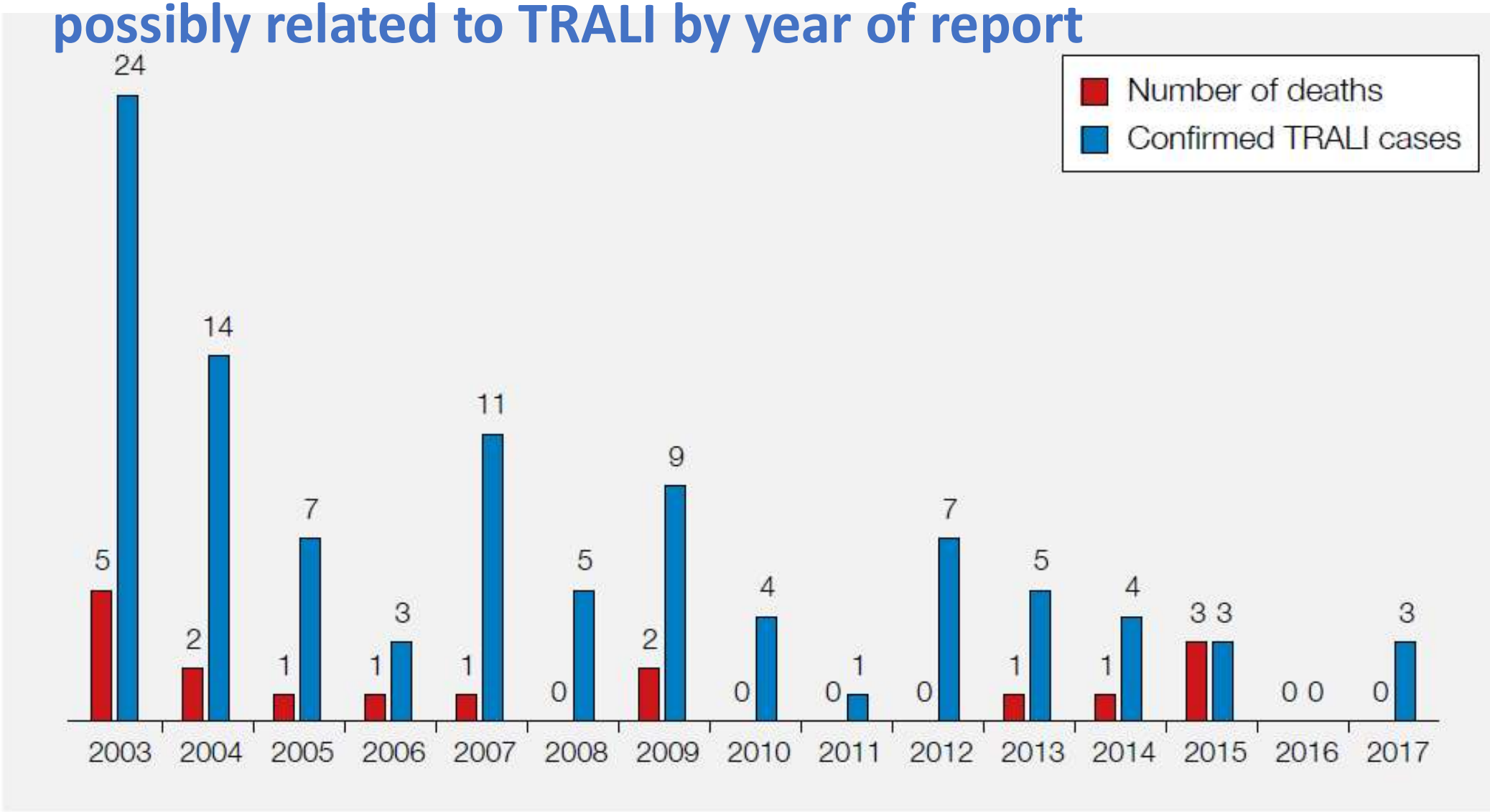
TTI=transfusion-transmitted infection; CMV=cytomegalovirus; HEV=hepatitis E virus; HAV=hepatitis A virus

Reports of pulmonary complications by year 2010-2017



TRALI=transfusion-related acute lung injury; TACO=transfusion-associated circulatory overload; TAD=transfusion-associated dyspnoea

Number of suspected TRALI cases and deaths at least possibly related to TRALI by year of report



TRALI=transfusion-related acute lung injury

TACO Checklist	Red cell transfusion for non-bleeding patients
	Does the patient have a diagnosis of 'heart failure' congestive cardiac failure (CCF), severe aortic stenosis, or moderate to severe left ventricular dysfunction? Is the patient on a regular diuretic?
	Is the patient known to have pulmonary oedema? Does the patient have respiratory symptoms of undiagnosed cause?
	Is the fluid balance clinically significantly positive? Is the patient on concomitant fluids (or has been in the past 24 hours)? Is there any peripheral oedema? Does the patient have hypoalbuminaemia? Does the patient have significant renal impairment?

If 'yes' to any of these questions

1

- Review the need for transfusion (do the benefits outweigh the risks)?

2

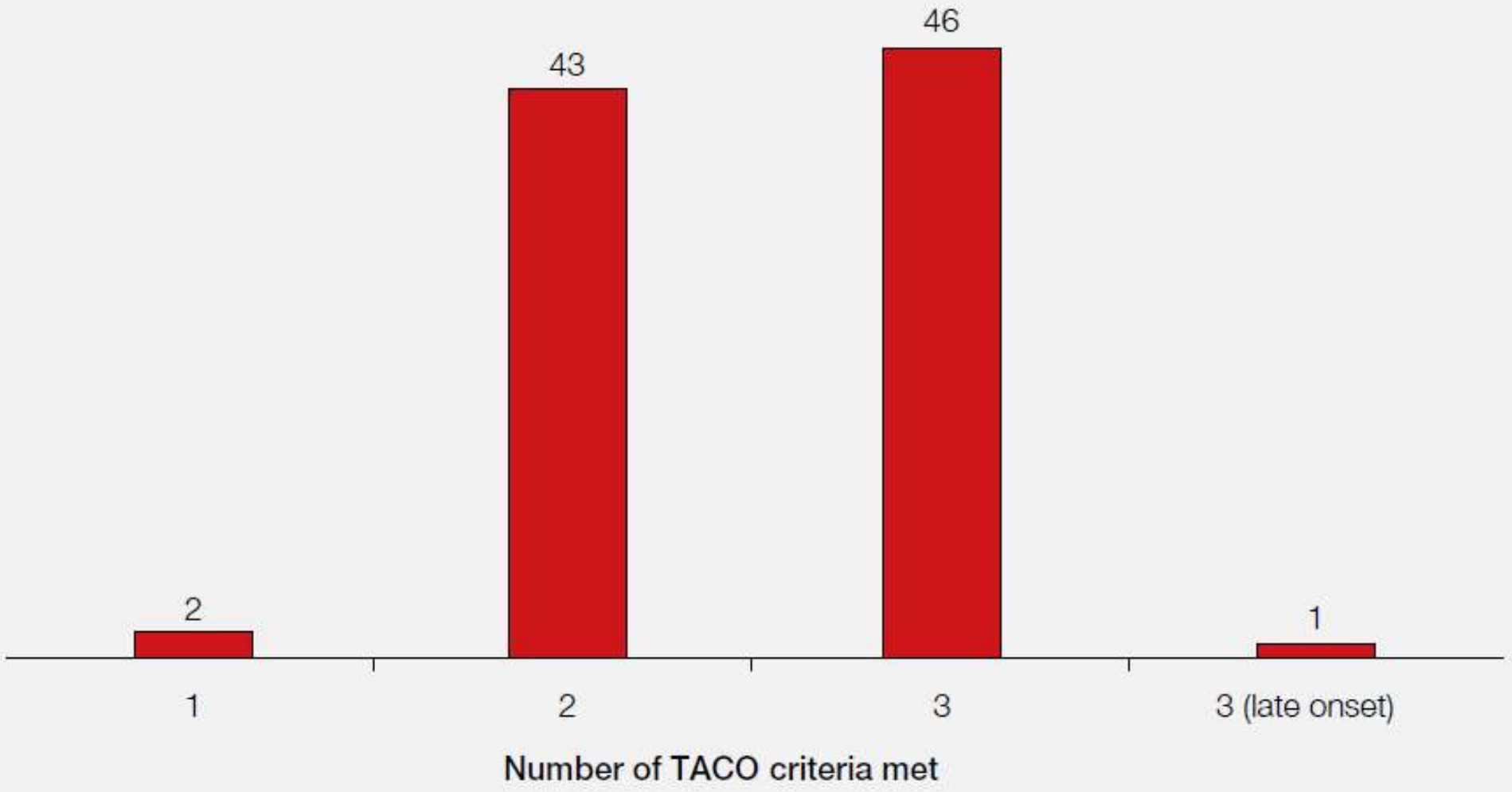
- Can the transfusion be safely deferred until the issue can be investigated, treated or resolved?

3

- Consider body weight dosing for red cells (especially if low body weight)
- Transfuse one unit (red cells) and review symptoms of anaemia
- Measure the fluid balance
- Consider giving a prophylactic diuretic
- Monitor the vital signs closely, including oxygen saturation

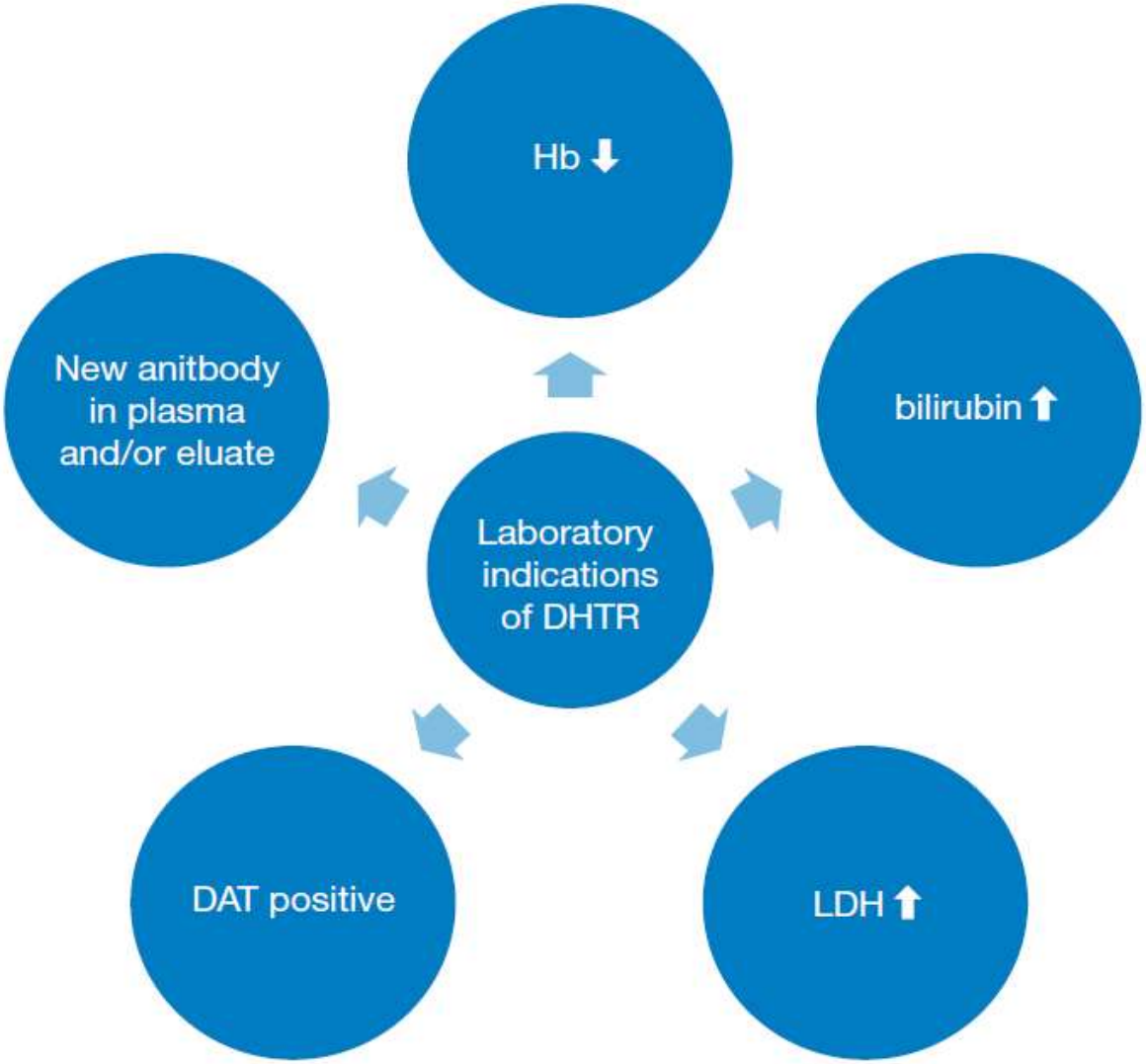
Due to the differences in adult and neonatal physiology, babies may have a different risk for TACO. Calculate the dose by weight and observe the notes above.

Analysis of TACO reports by revised surveillance diagnostic criteria



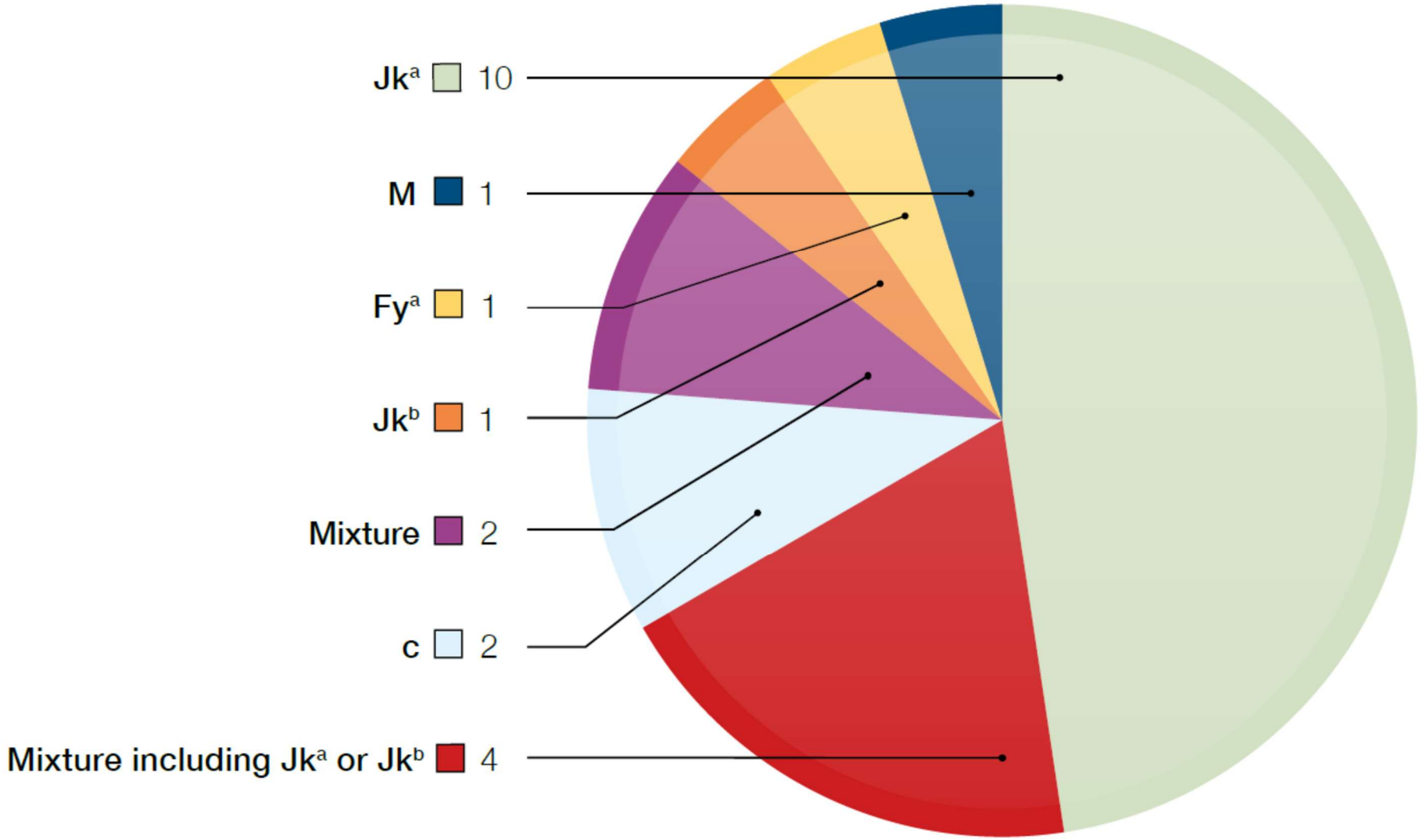
TACO=transfusion-associated circulatory overload

Laboratory indications of delayed haemolytic transfusion reactions

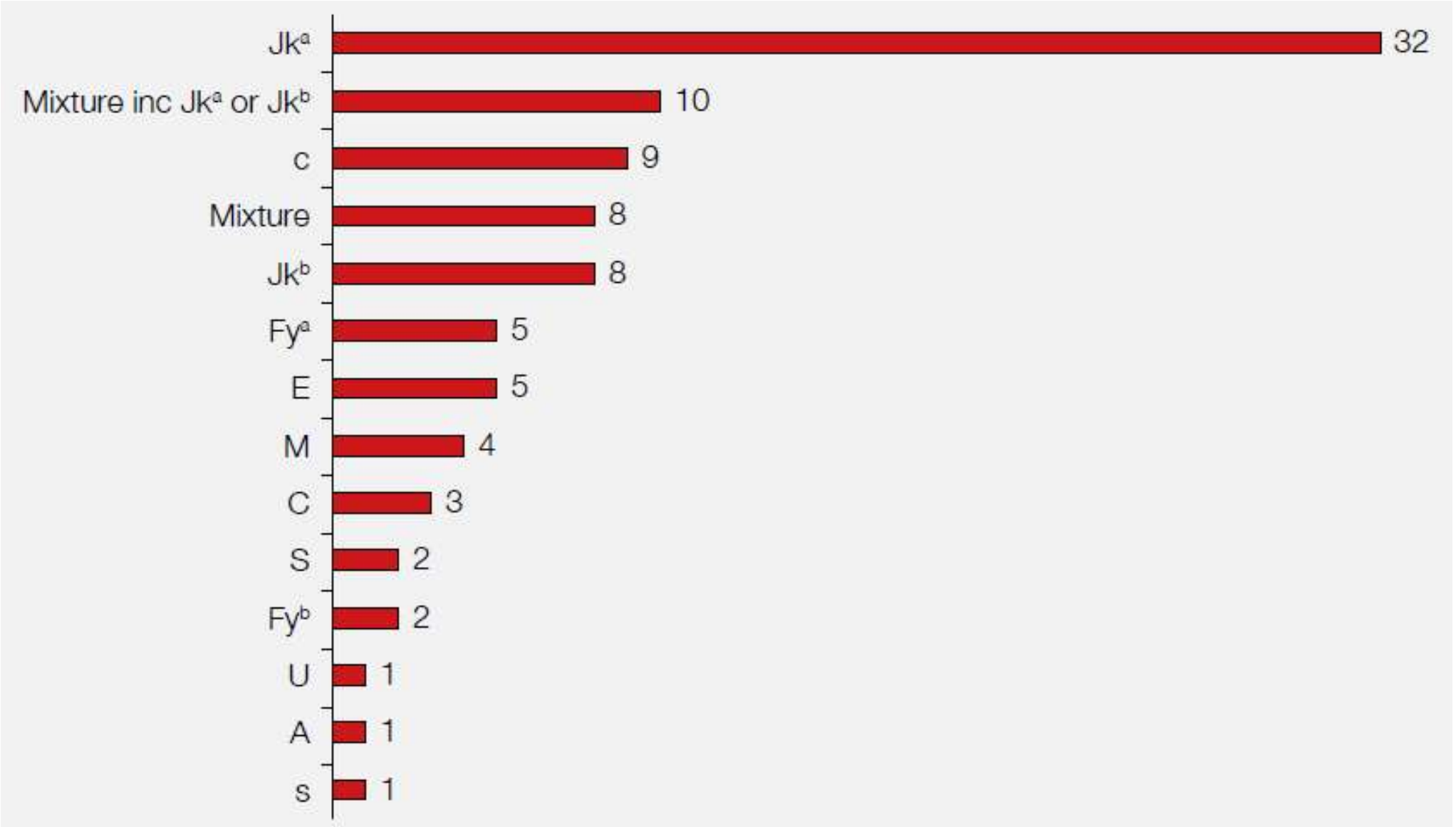


DHTR=delayed haemolytic transfusion reaction; Hb=haemoglobin; DAT=direct antiglobulin test; LDH=lactate dehydrogenase

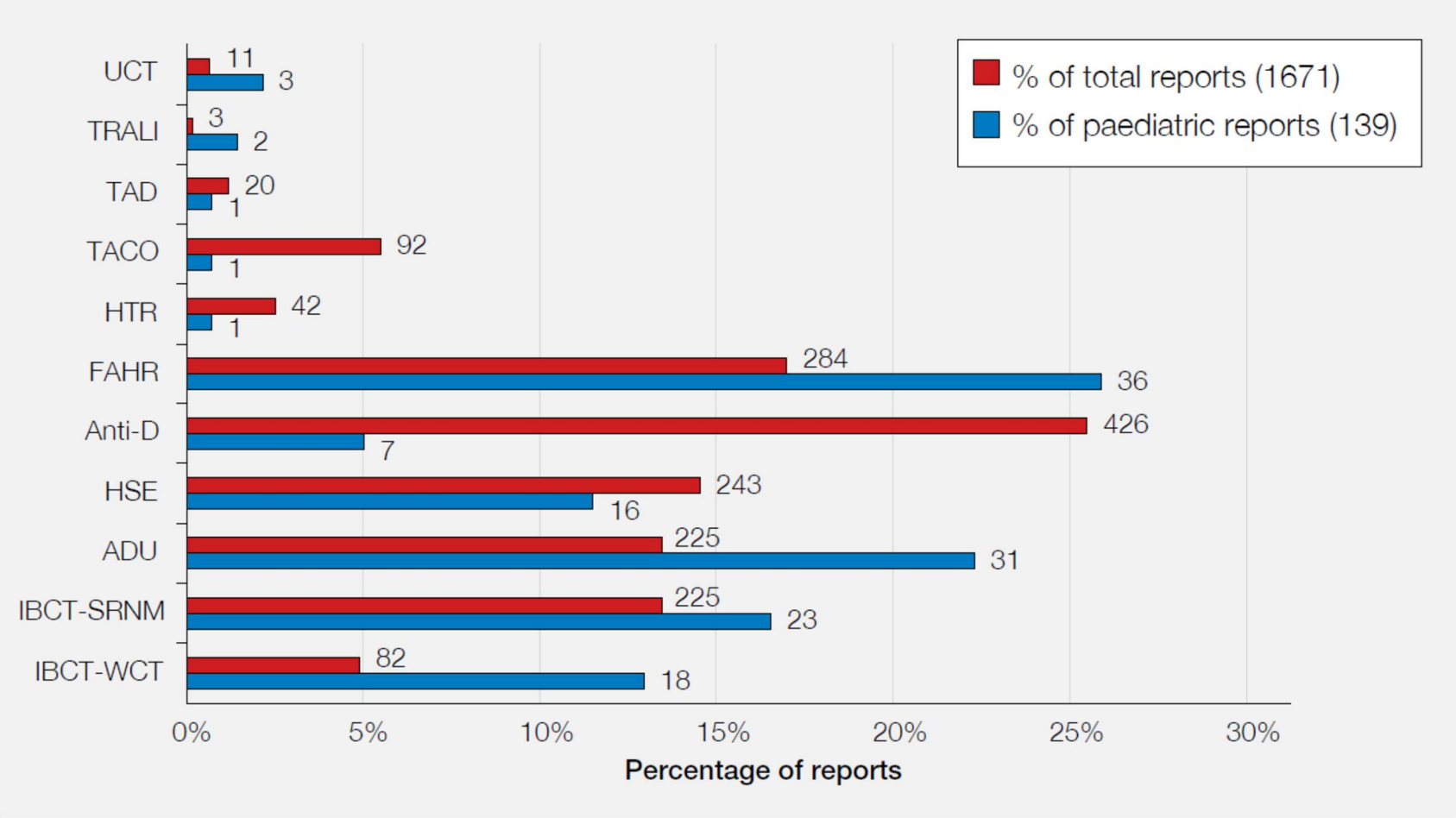
Antibodies implicated in delayed haemolytic transfusion reactions 2017



Antibodies implicated in delayed haemolytic transfusion reactions 2013-2017

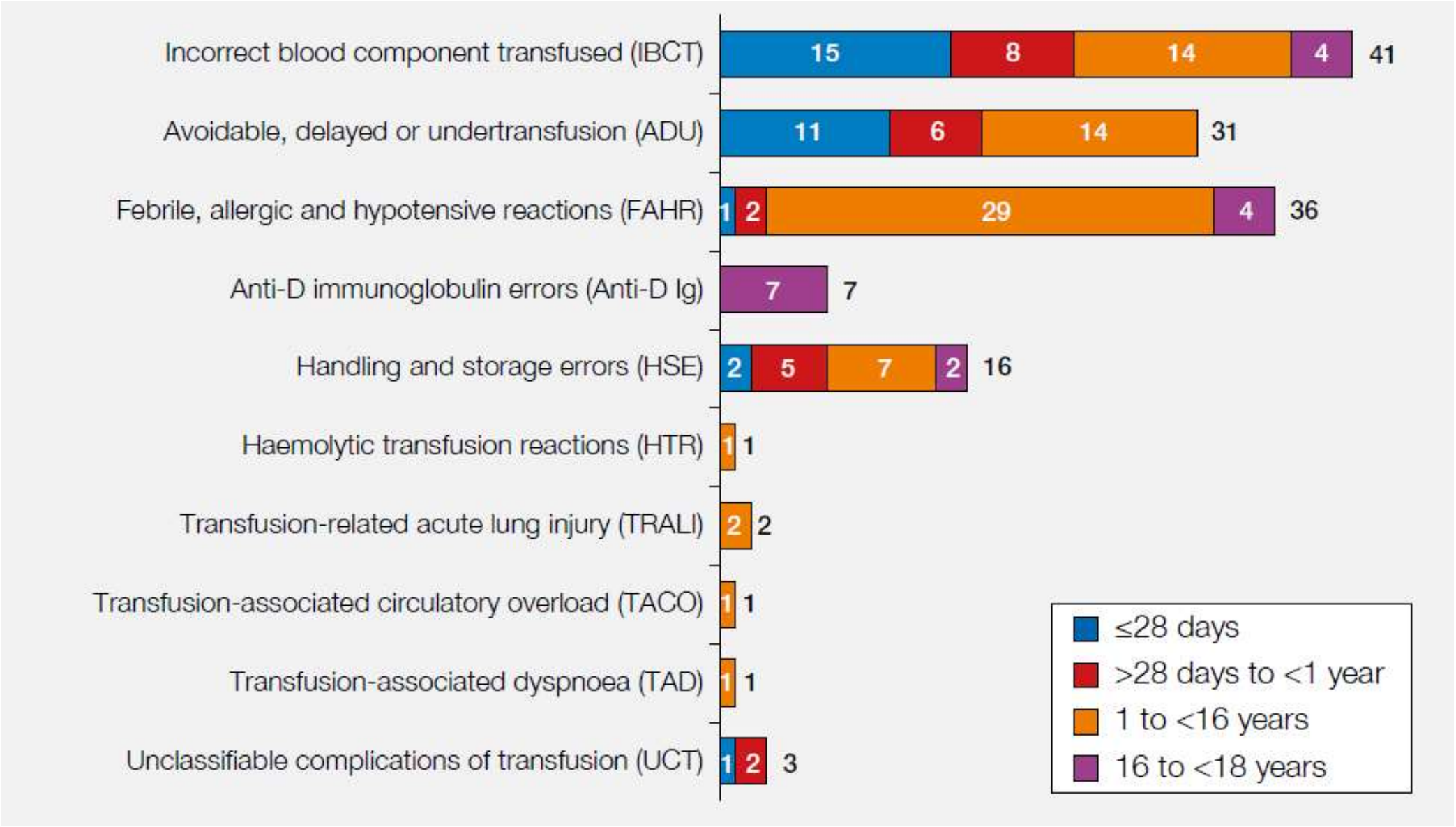


Percentages of paediatric and total reports in each category



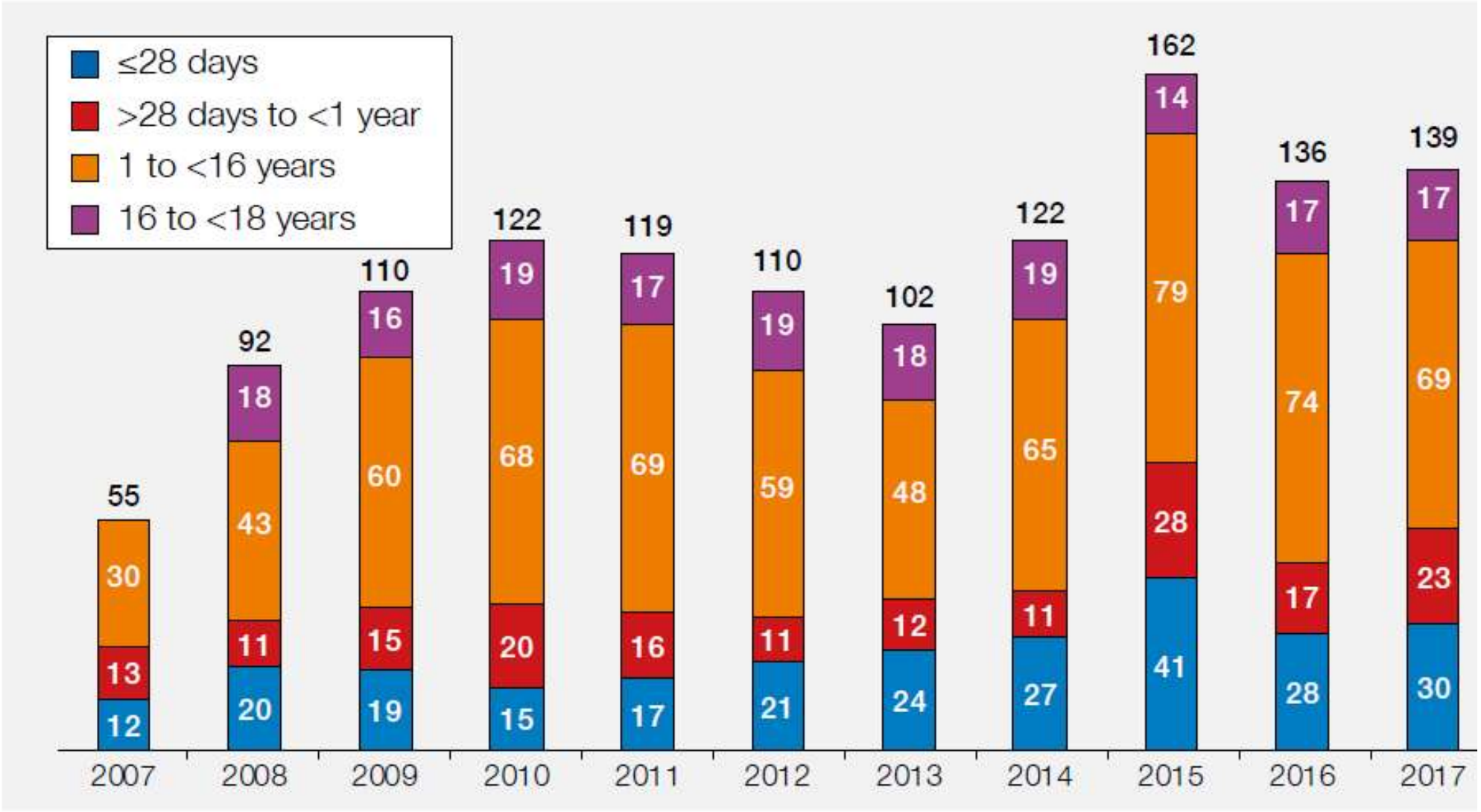
UCT=unclassifiable complications of transfusion; TRALI=transfusion-related acute lung injury; TAD=transfusion-associated dyspnoea; TACO=transfusion-associated circulatory overload; HTR=haemolytic transfusion reactions; FAHR=febrile, allergic and hypotensive reactions; HSE=handling and storage errors; ADU=avoidable, delayed or undertransfusion; IBCT-SRNM=incorrect blood component transfused-specific requirements not met; IBCT-WCT=IBCT-wrong component transfusion

Summary of paediatric reports by category and age 2017



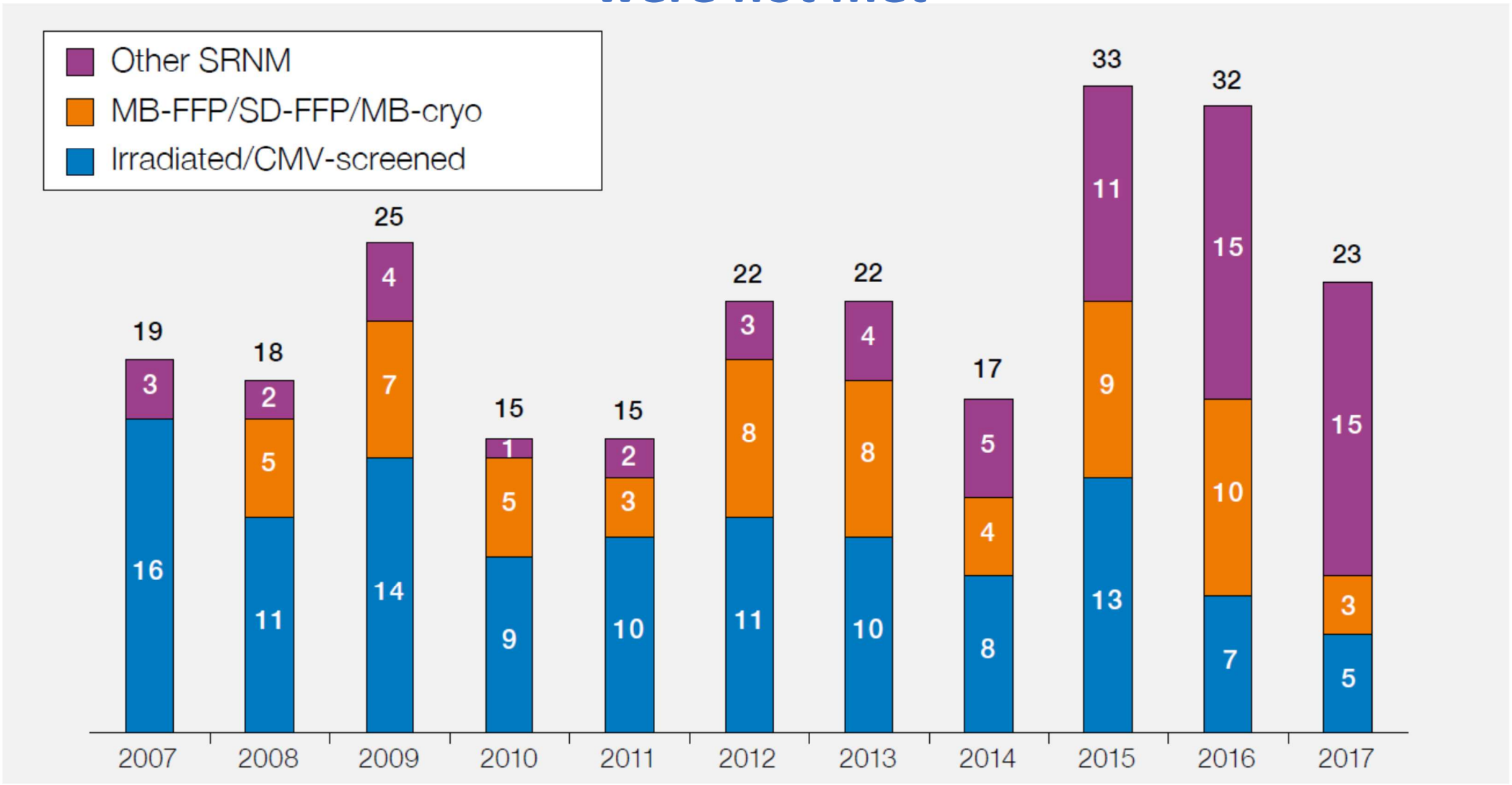
Trends in paediatric reports 2007 to 2017

a. Total paediatric reports subdivided by age



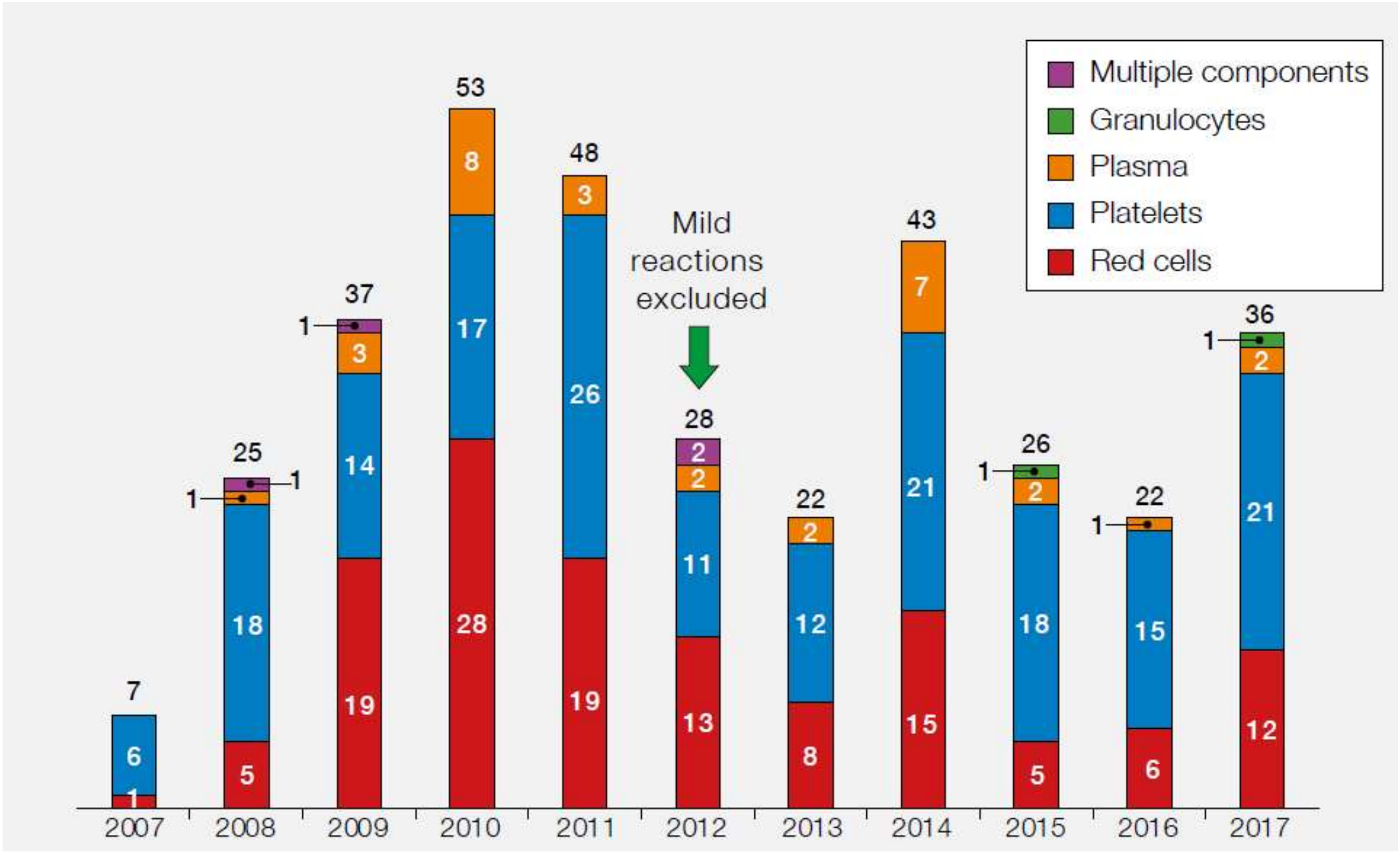
In 2007 only cases <16 years were included

Paediatric reports where specific requirements were not met

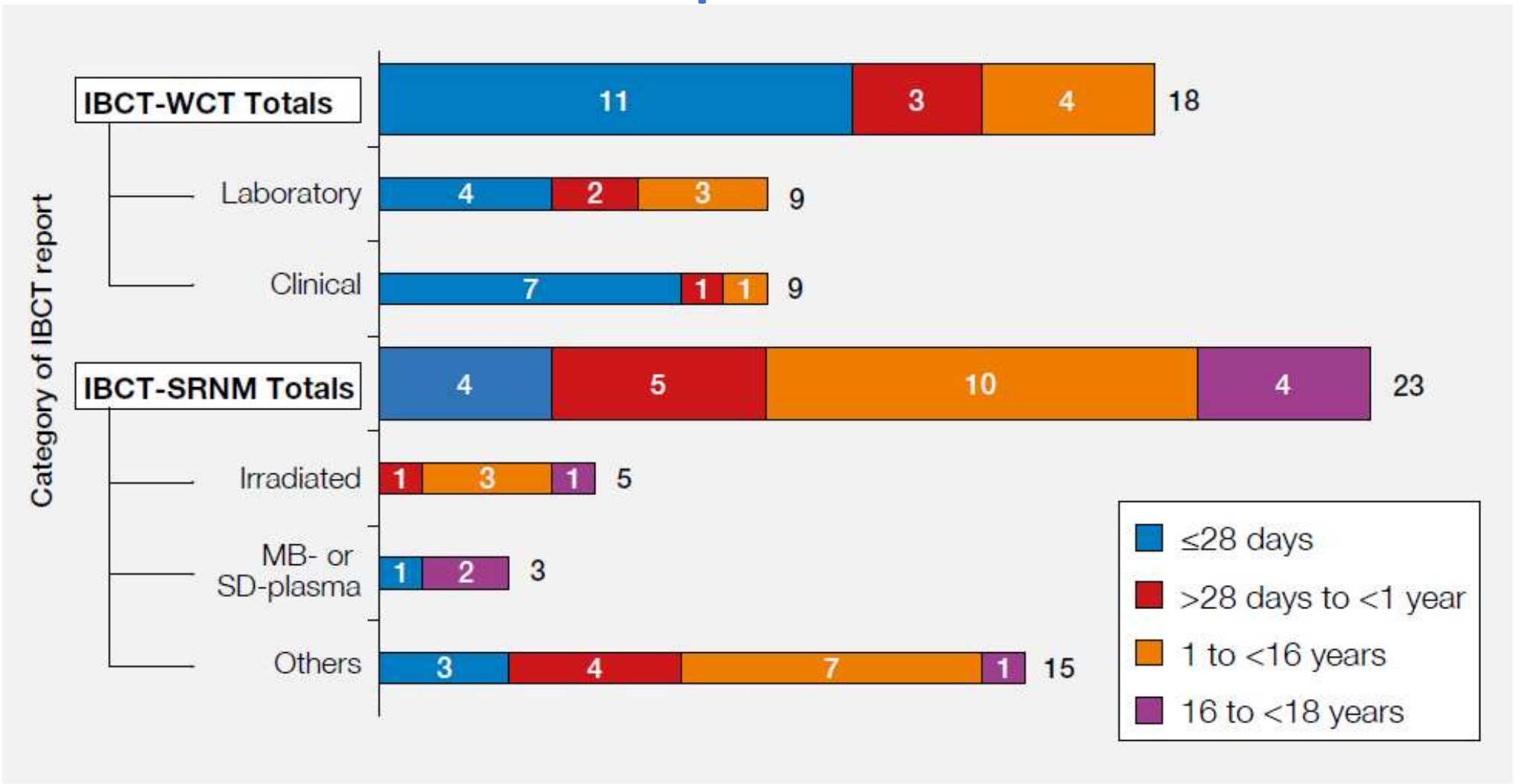


MB-FFP=methylene-blue treated fresh frozen plasma; SD-FFP=solvent detergent-treated FFP; cryo=cryoprecipitate; CMV=cytomegalovirus

Febrile, allergic and hypotensive reactions by component



Incorrect blood component transfused n=41

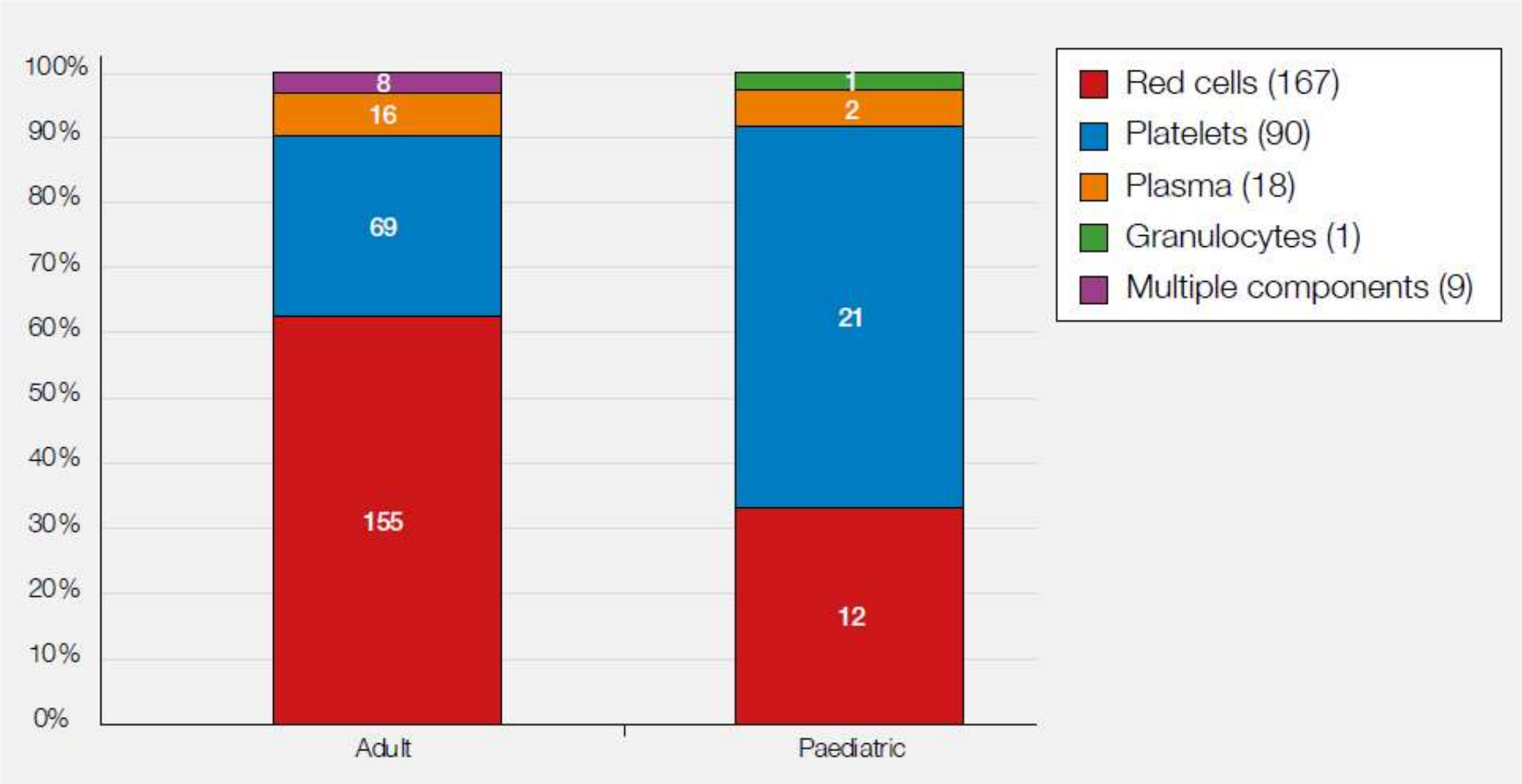


IBCT-WCT=incorrect blood component transfused-wrong component transfused; IBCT-SRNM=IBCT-specific requirements not met; MB=methylene blue-treated; SD=solvent-detergent treated

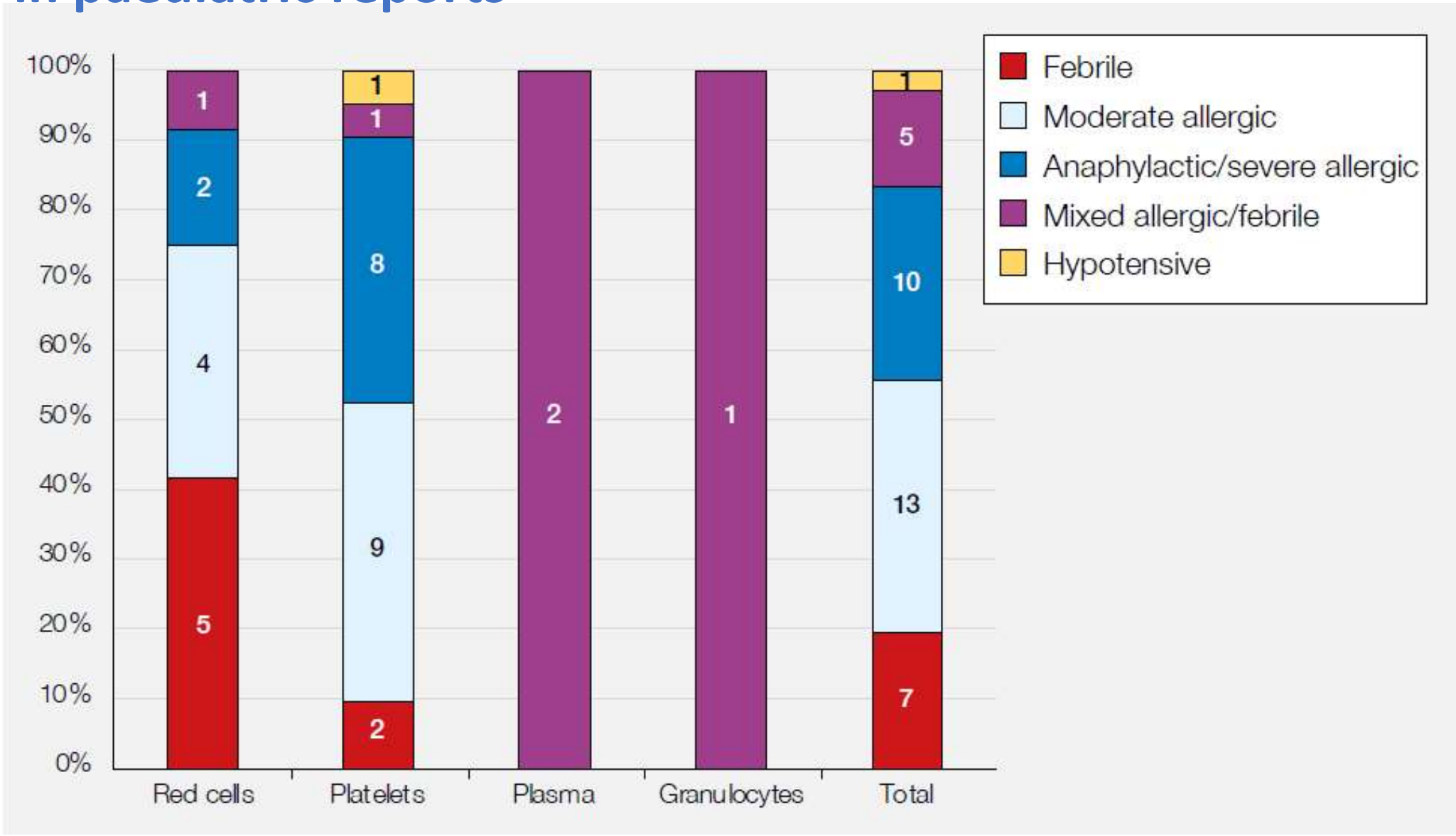
Identify your neonatal emergency group O D-negative units

With permission from Rachel Moss

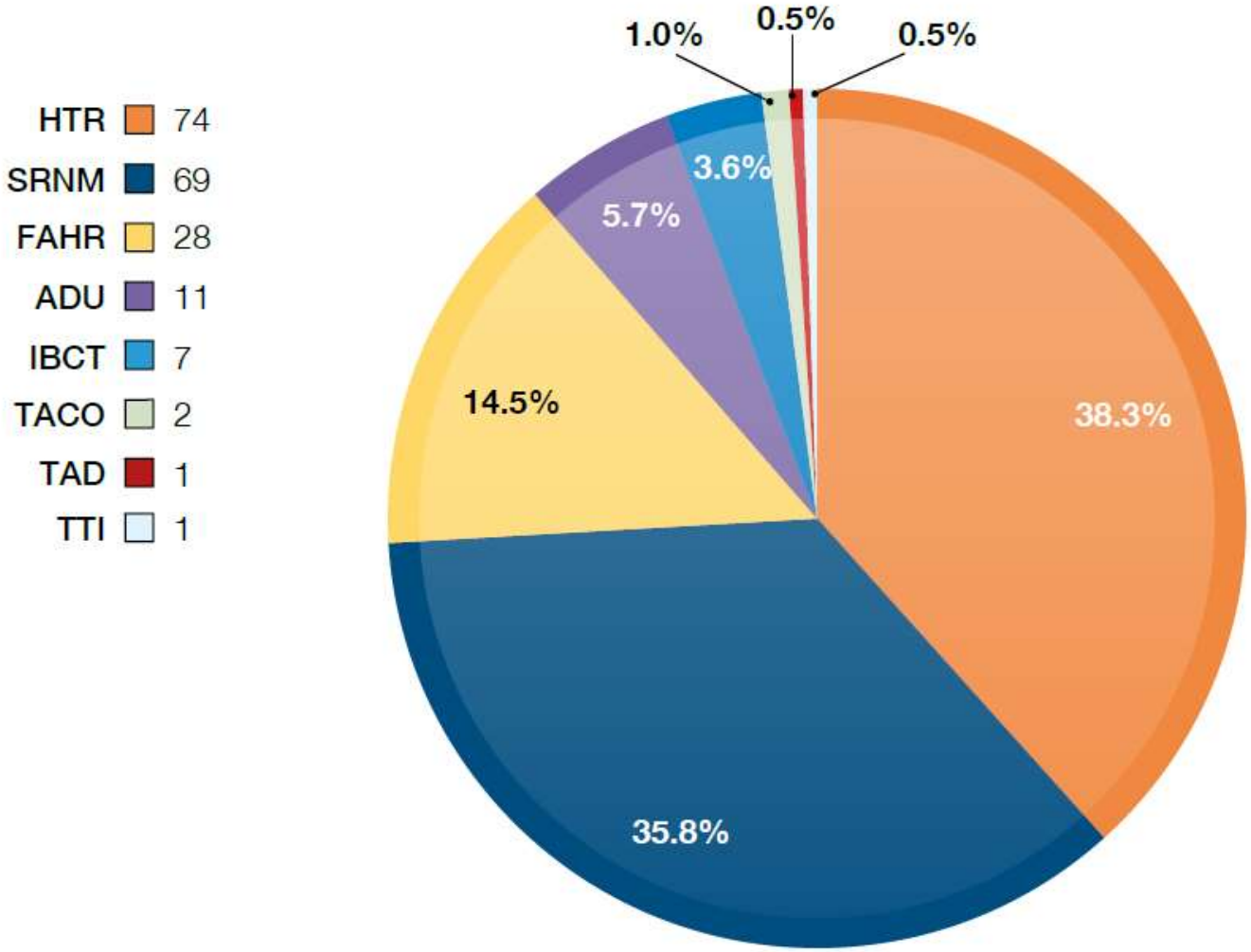
a. Comparison of proportions of adult and paediatric FAHR related to different components



Percentages of reaction types for each component in paediatric reports

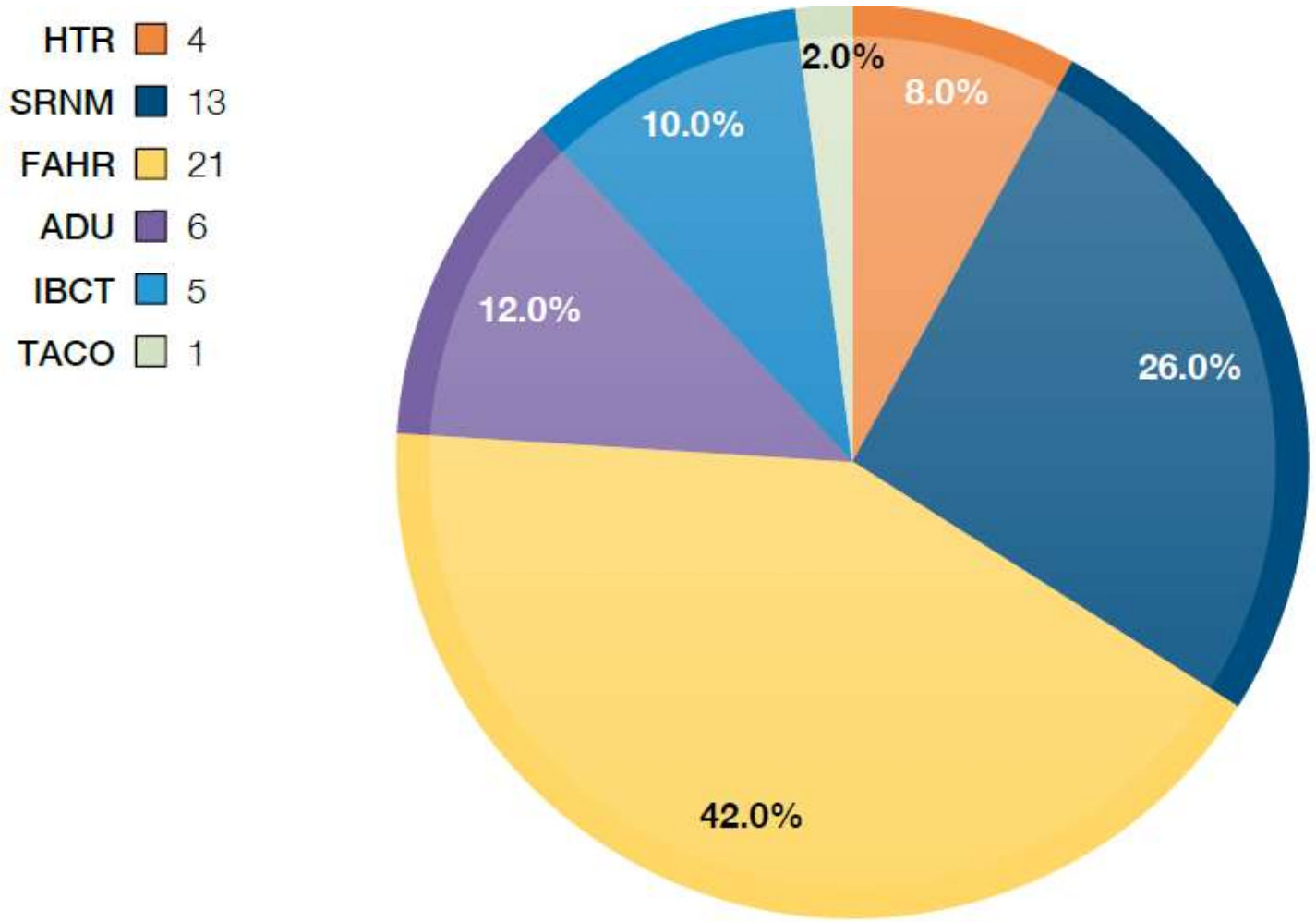


Cumulative data for sickle cell disease 2010-2017 n=193



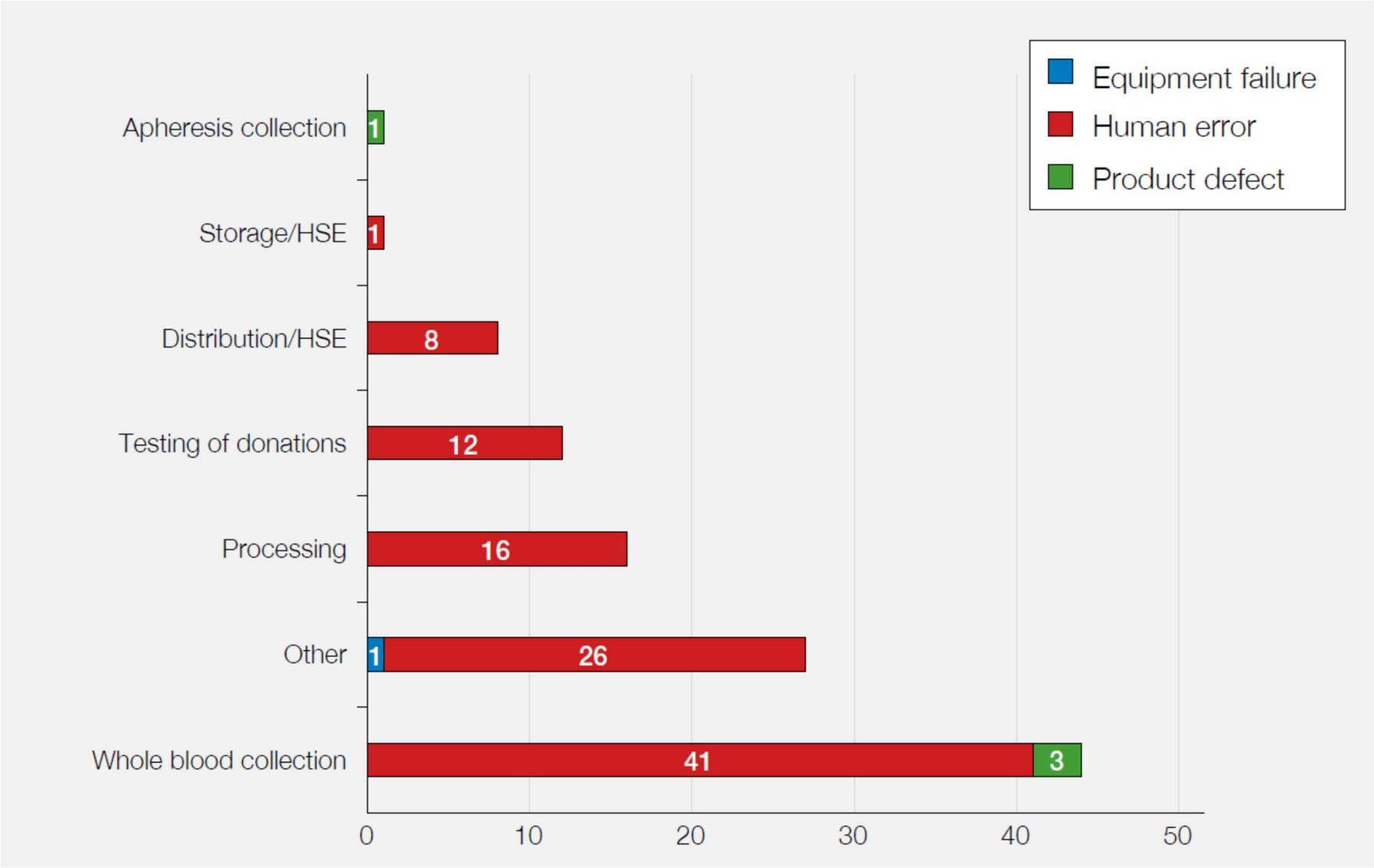
FAHR=febrile, allergic or hypotensive reactions; ADU=avoidable, delayed or under or overtransfusion; IBCT=incorrect blood component transfused; SRNM=specific requirements not met; TACO=transfusion-associated circulatory overload; TAD=transfusion-associated dyspnoea; HTR=haemolytic transfusion reactions; TTI=transfusion-transmitted infection

Cumulative data for thalassaemia 2010-2017 n=50



FAHR=febrile, allergic or hypotensive reactions; ADU=avoidable, delayed or under or overtransfusion; IBCT=incorrect blood component transfused; SRNM=specific requirements not met; TACO=transfusion-associated circulatory overload; TAD=transfusion-associated dyspnoea; HTR=haemolytic transfusion reactions; TTI=transfusion-transmitted infection

Serious adverse event reports to MHRA 2017



SABRE reports, human error 2017

QMS=quality management system