FIGURES FROM THE ANNUAL SHOT REPORT 2022

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SHOT Serious Hazards of Transfusion

Figure 2.1: Haemovigilance reports submitted by year 2010-2022

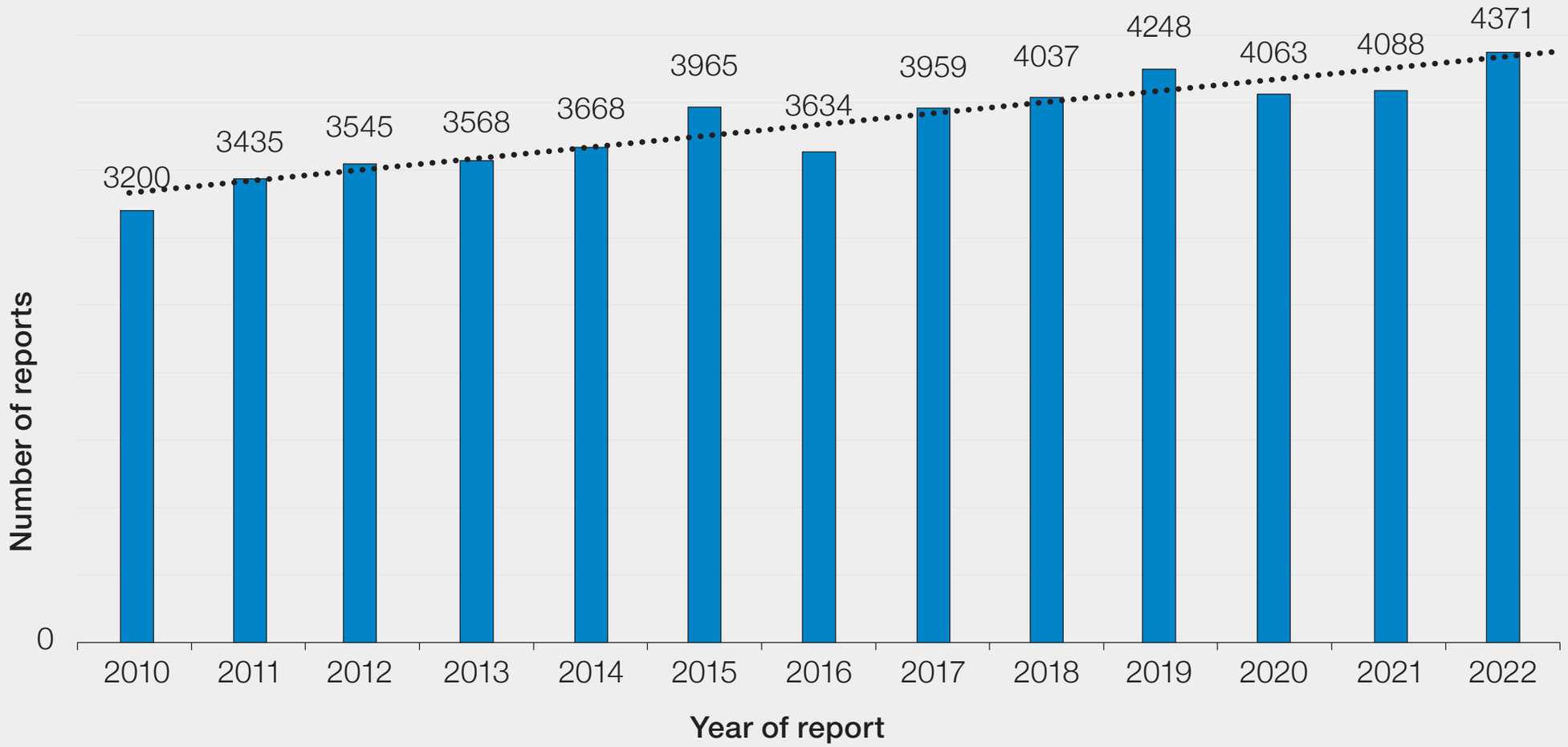
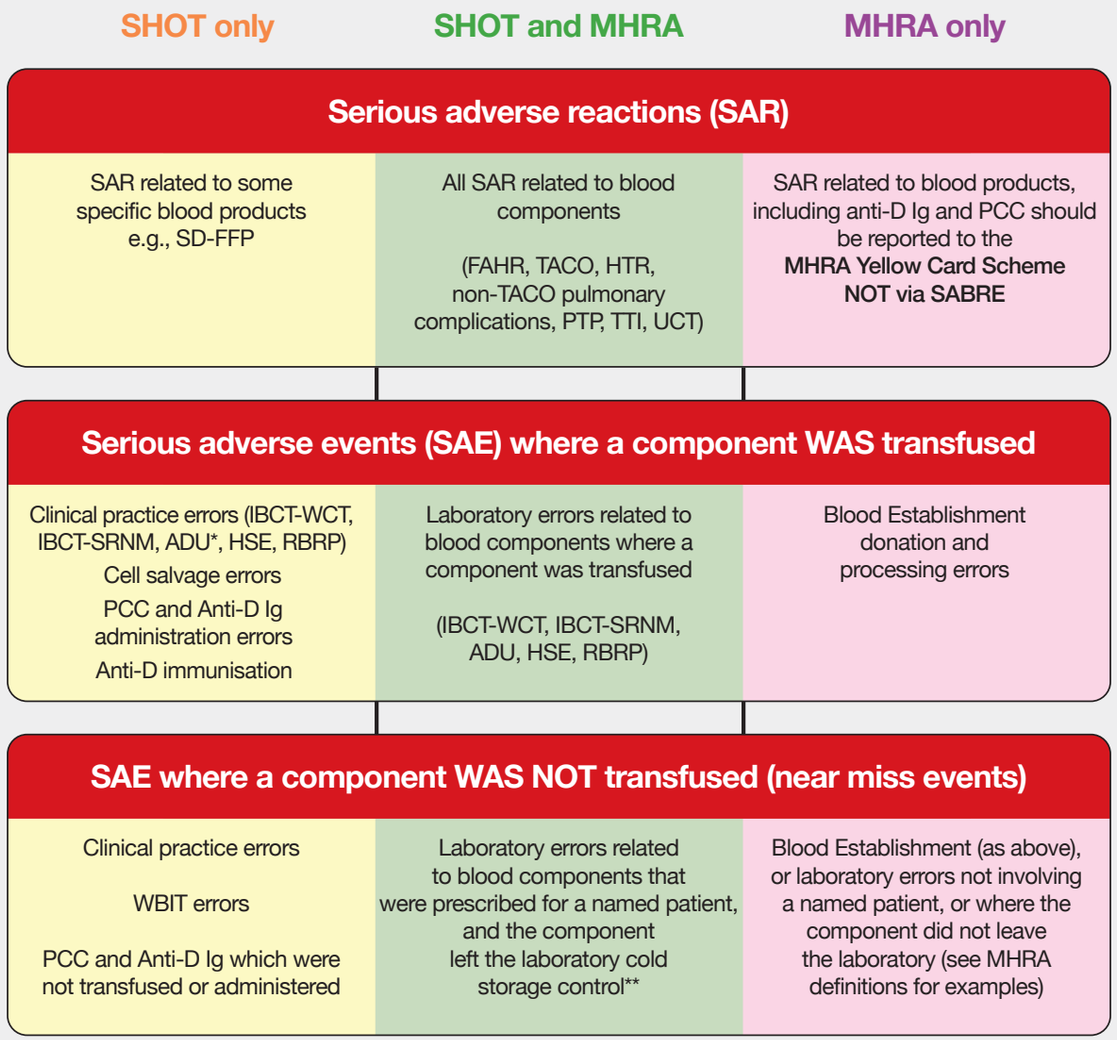


Figure 2.2: SHOT and the MHRA reporting criteria infographic



This infographic is for guidance purposes only. It may not cover all reportable events and does not represent a change to existing reporting requirements.

Full reporting definitions for SHOT and MHRA (Joint UK Haemovigilance User Guide) are available at: https://www.shotuk.org/reporting/ and for BSQR definitions of blood components/products see https://www.legislation.gov.uk/uksi/2005/50/made. A 'blood component' means a therapeutic constituent of human blood (red cells, white cells, platelets, and plasma) that can be prepared by various methods; while a 'blood product' means any therapeutic product derived from human blood or plasma.

* Includes cases where a component should have been transfused but was not due to a significant delay.
** Clinical errors relating to collection, storage and distribution, or where the primary error was in the laboratory, but detected later in the clinical area are MHRA-reportable.

ADU=avoidable, delayed and under/overtransfusion; FAHR=febrile, allergic and hypotensive reactions; HSE=handling and storage errors; HTR=haemolytic transfusion reactions; IBCT-SRNM=incorrect blood component transfused-specific requirements not met; IBCT-WCT=IBCT-wrong component transfused; Ig=immunoglobulian; MHRA=Medicines and Healthcare products Regulatory Agency; PCC=prothrombin complex concentrates; PTP=post-transfusion purpura; RBRP=right blood right patient; SABRE=Serious Adverse Blood Reactions and Events; SD-FFP=solvent-detergent fresh frozen plasma; TACO=transfusion-associated circulatory overload; TTI=transfusion transmitted infections; UCT=uncommon complications of transfusion; WBIT=wrong blood in tube

Figure 2.3: Reports submitted to SHOT and the MHRA in the calendar year 2022 (n=4371)

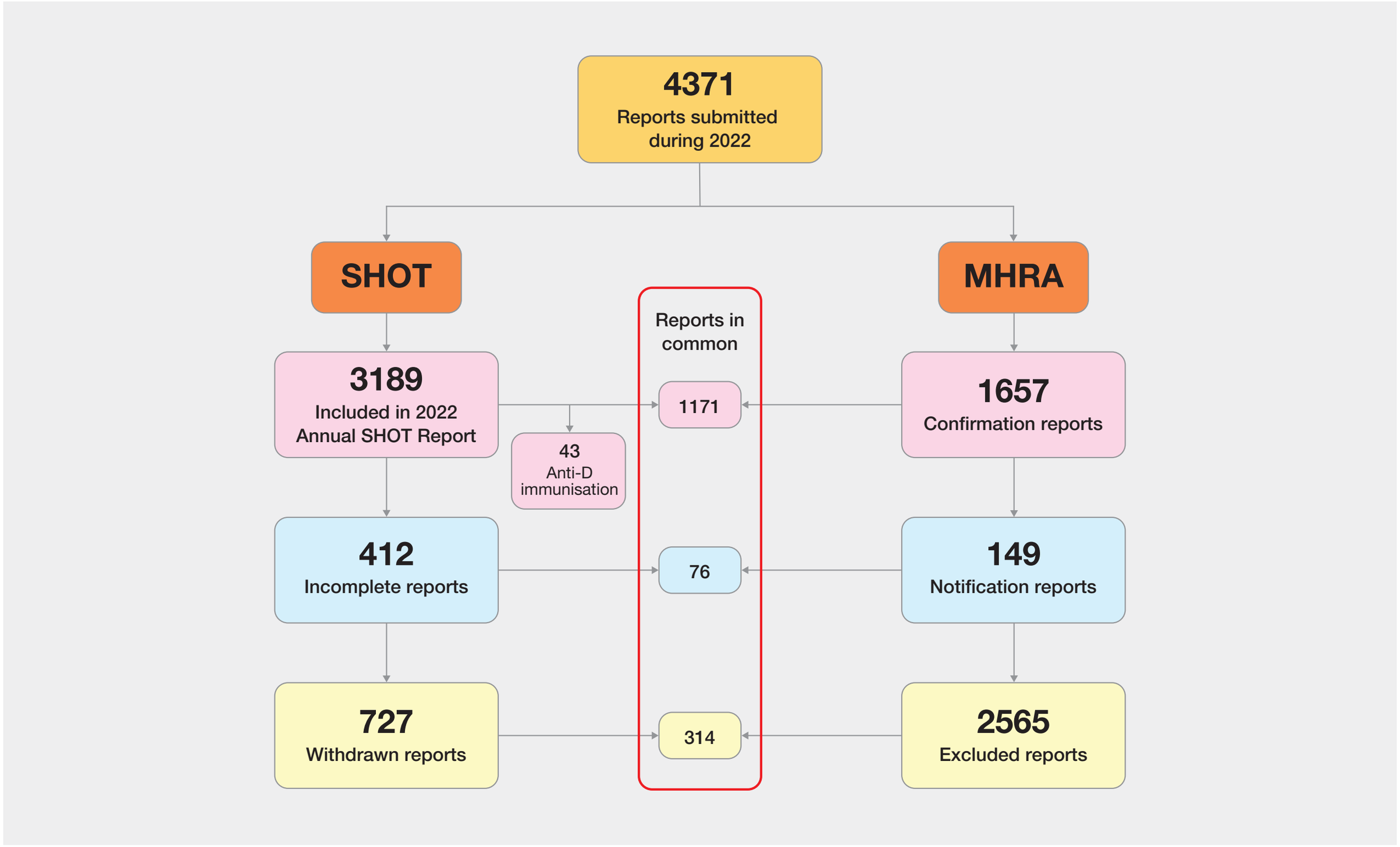
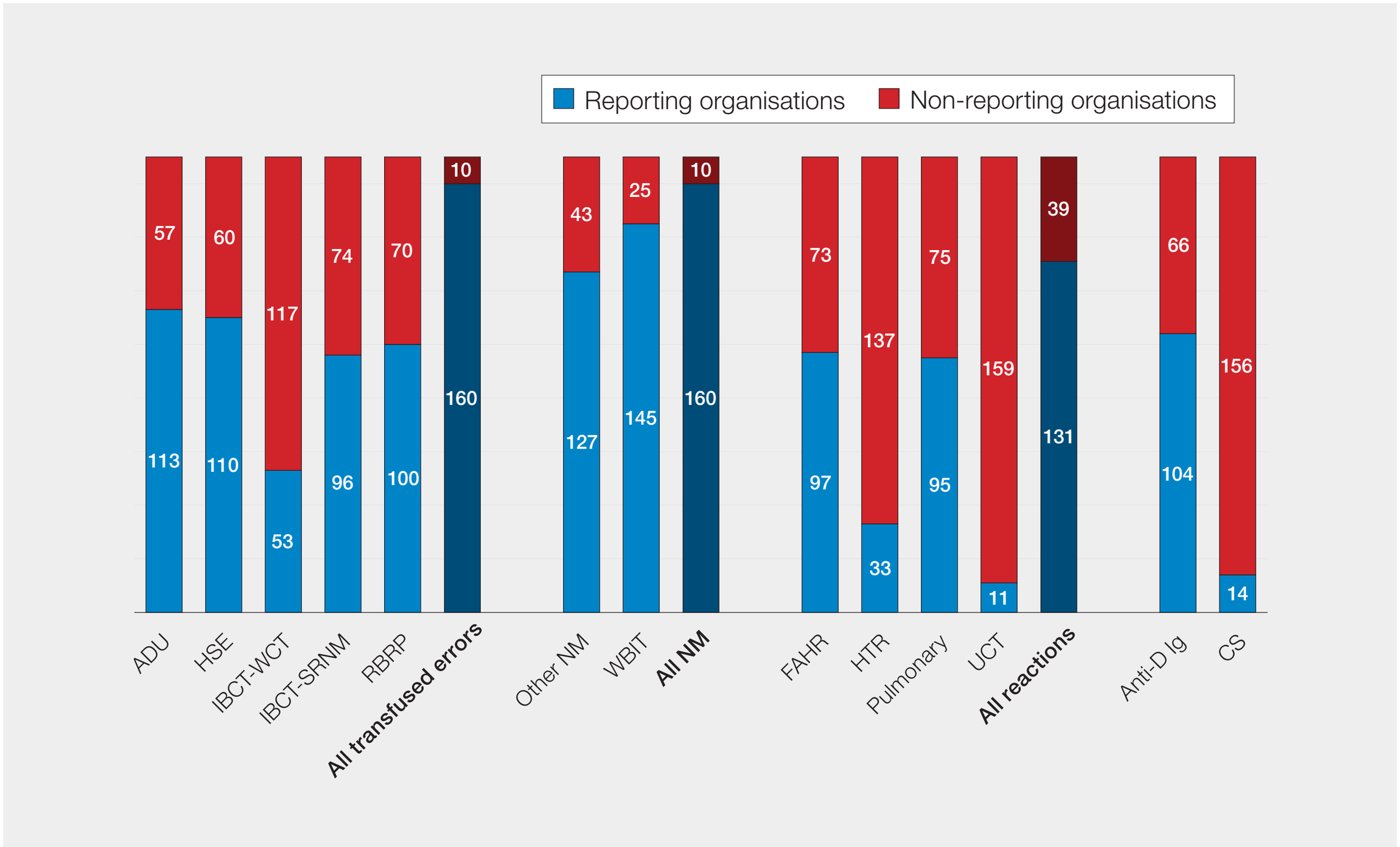


Figure 2.4: Number of NHS Trusts/Health Boards submitting reports by reporting category included in the 2022 Annual SHOT Report



ADU=avoidable, delayed and under/overtransfusion; HSE=handling and storage errors; IBCT-WCT=incorrect blood component transfused-wrong component transfused; IBCT-SRNM=IBCT-specific requirements not met; RBRP=right blood right patient; NM=near miss; WBIT=wrong blood in tube; FAHR=febrile, allergic and hypotensive reactions; HTR=haemolytic transfusion reactions; UCT=uncommon complications of transfusion; Ig=immunoglobulin; CS=cell salvage

Figure 2.5: Number of 2022 reports by NHS reporting organisation and component usage level

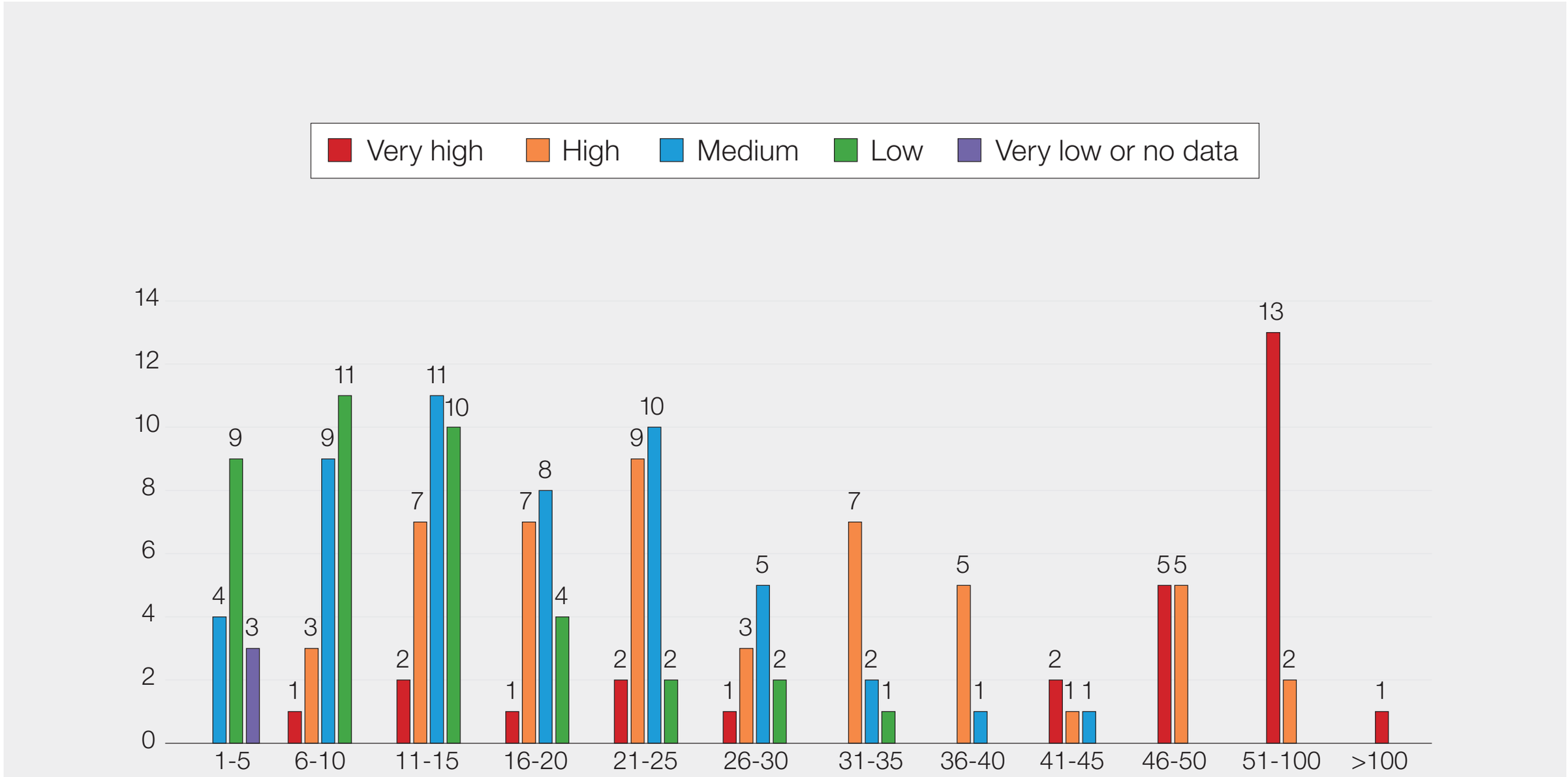


Figure 2.6a: Blood component issue data in the UK 2011-2022

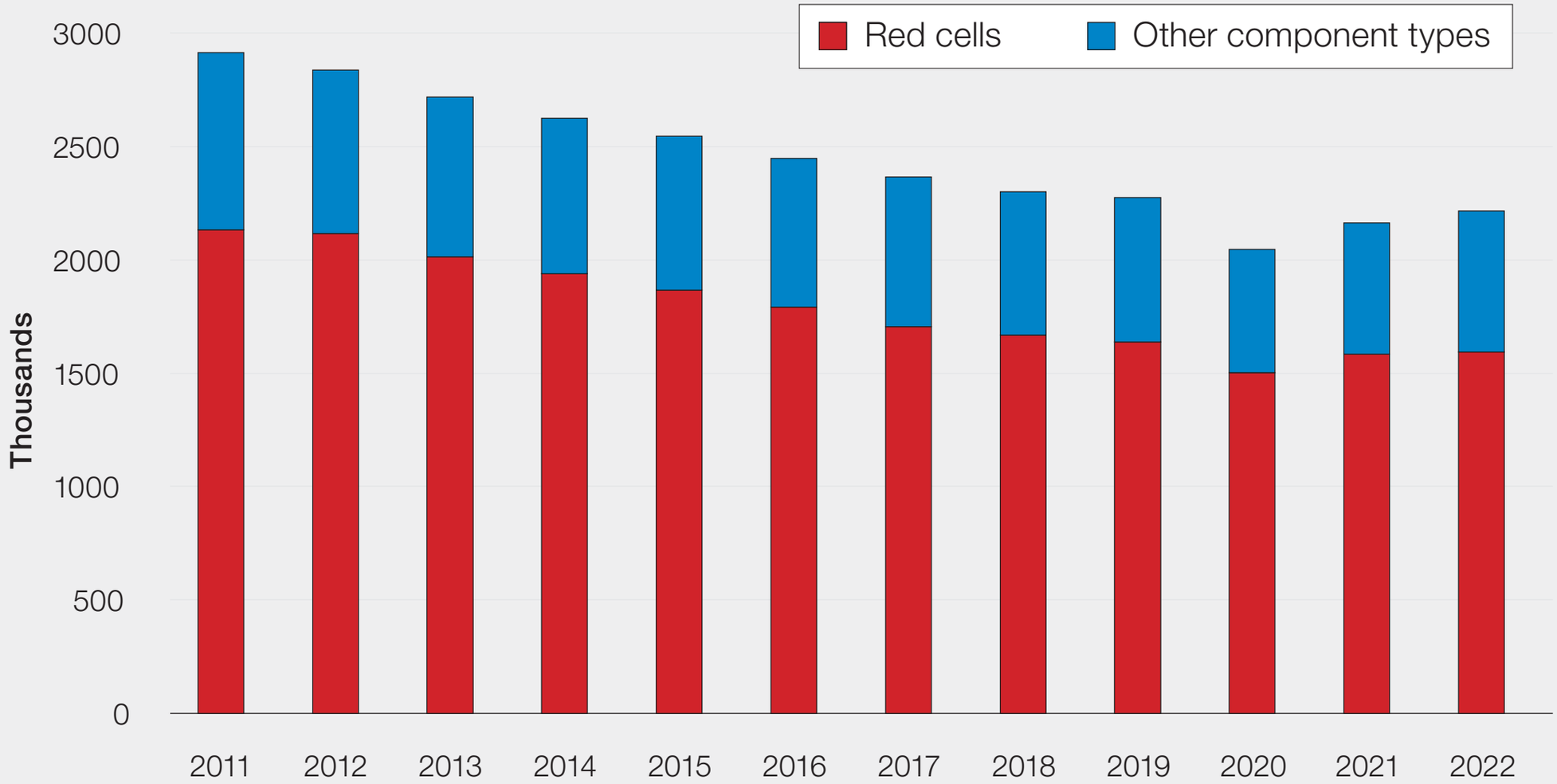
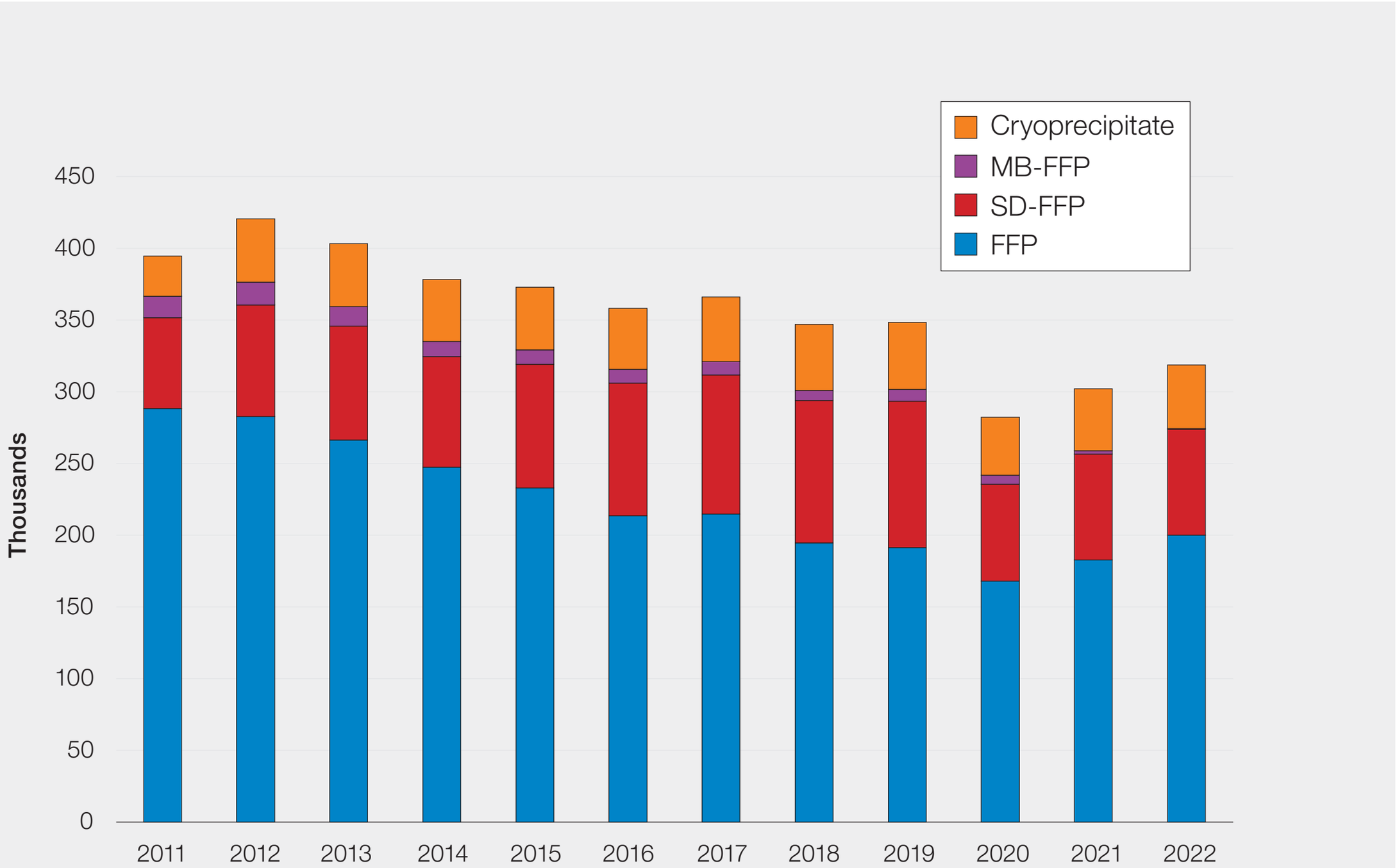
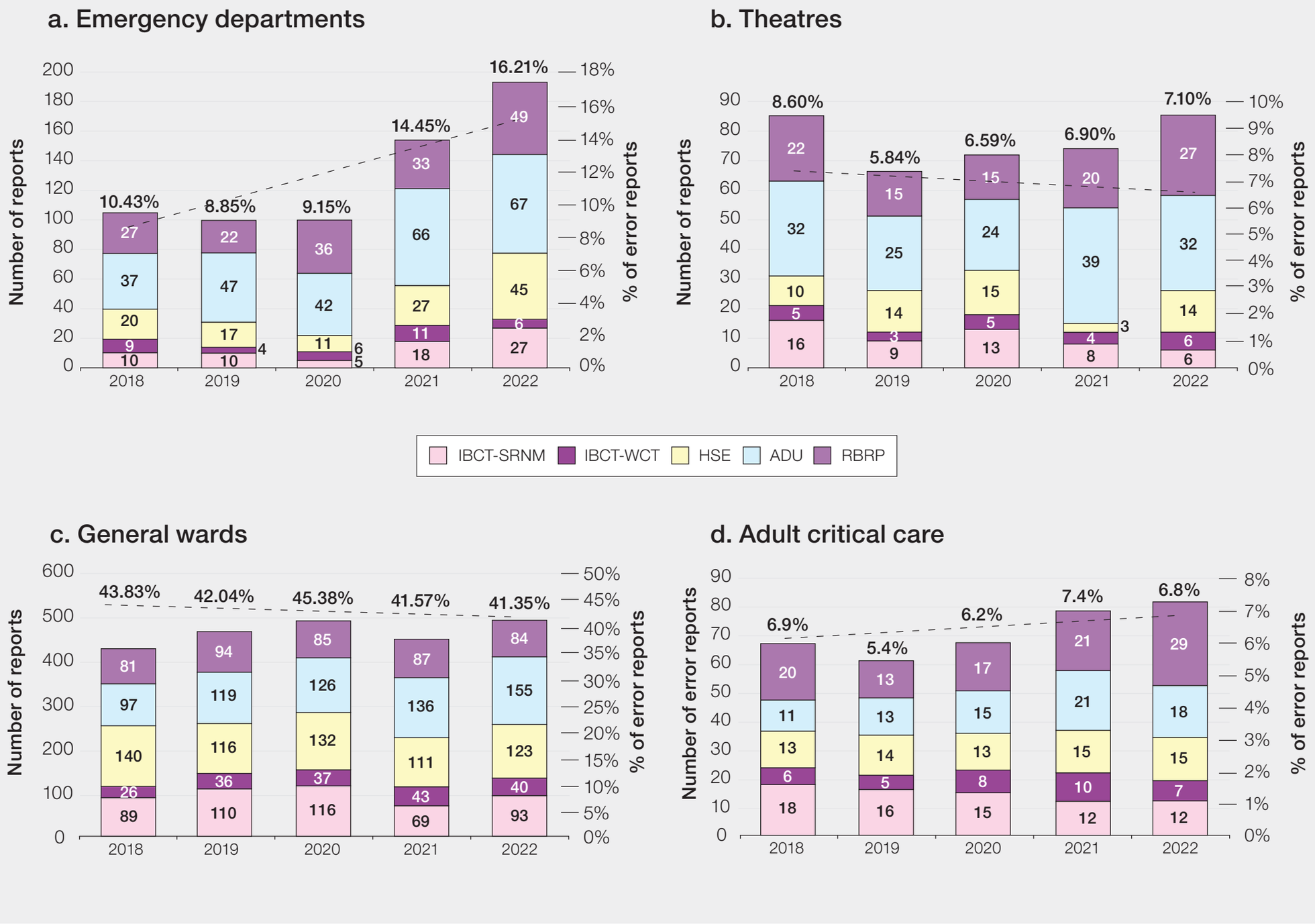


Figure 2.6b: Non-cellular component issue data in the UK 2011-2022



FFP=fresh frozen plasma; SD=solvent-detergent; MB=methylene blue

Figure 2.7: Five-year trend of error reports from different departments



ADU=avoidable, delayed and under/overtransfusion; HSE=handling and storage errors; IBCT-SRNM=incorrect blood component transfused-specific requirements not met; IBCT-WCT=IBCT-wrong component transfused; RBRP=right blood right patient

Figure 2.8: Using SHOT participation benchmarking data to drive improvements

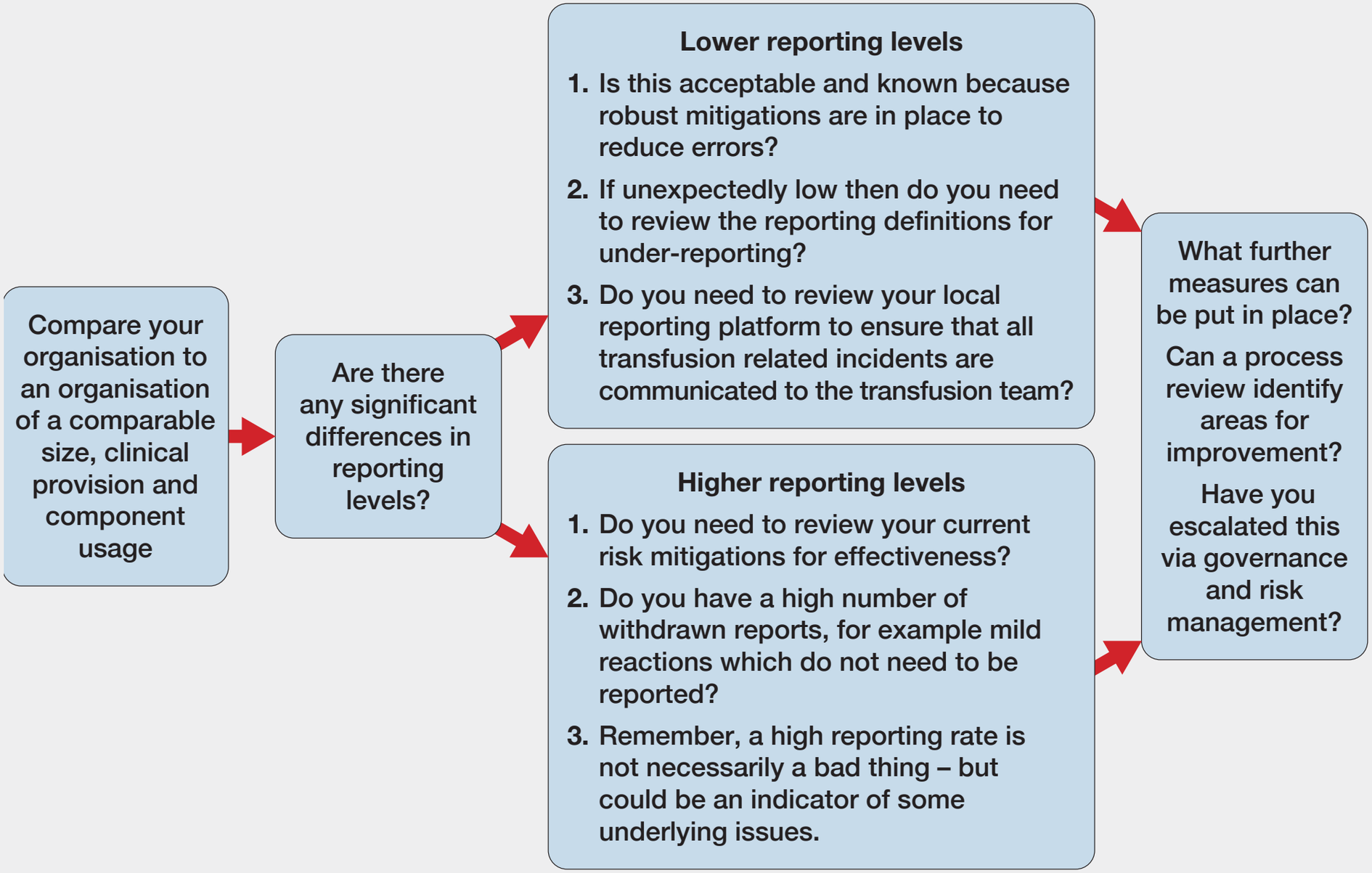


Figure 3.1: Errors account for most reports (n=2908/3499)

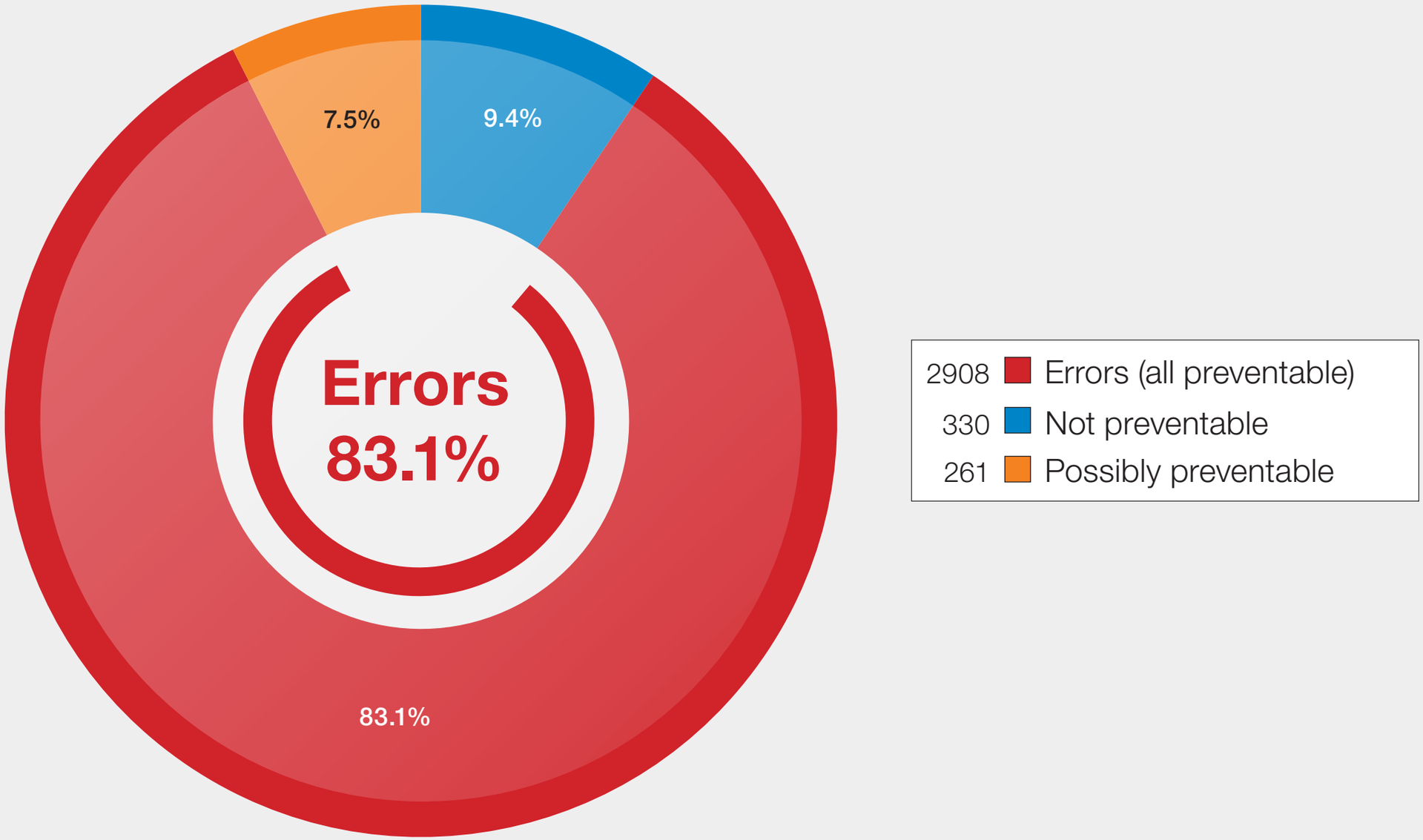


Figure 3.2: Errors as a percentage of total reports 2014-2022

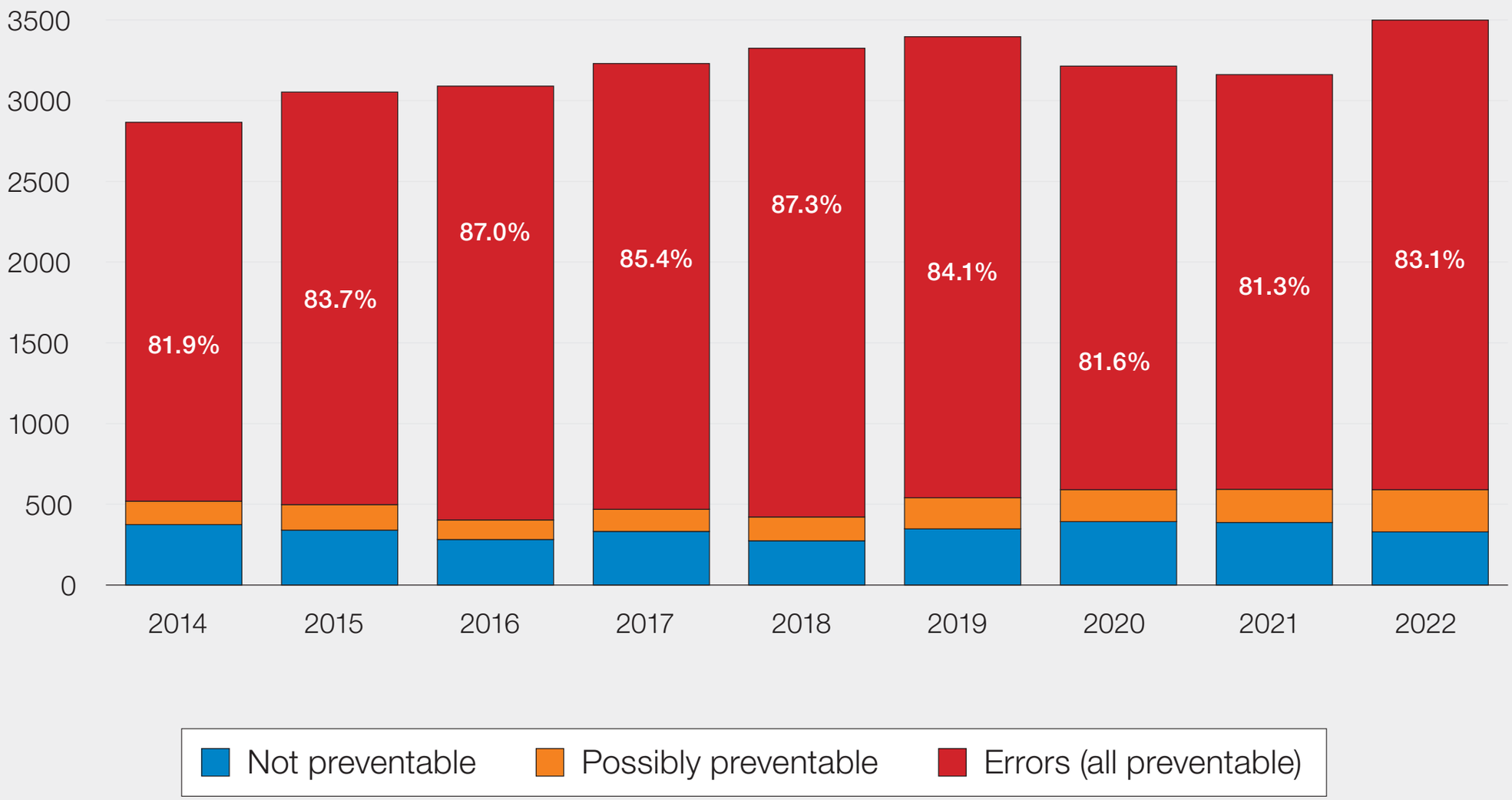
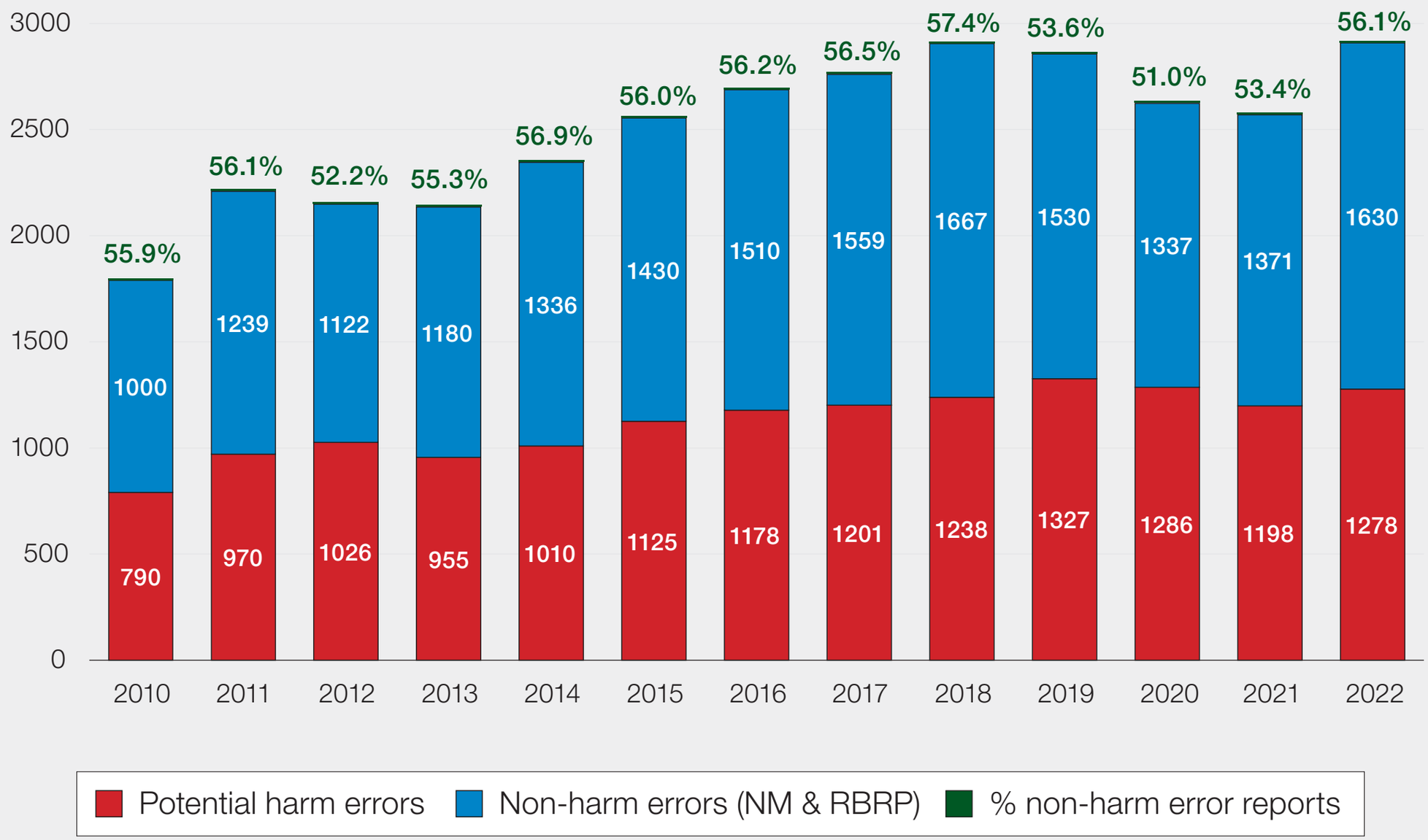
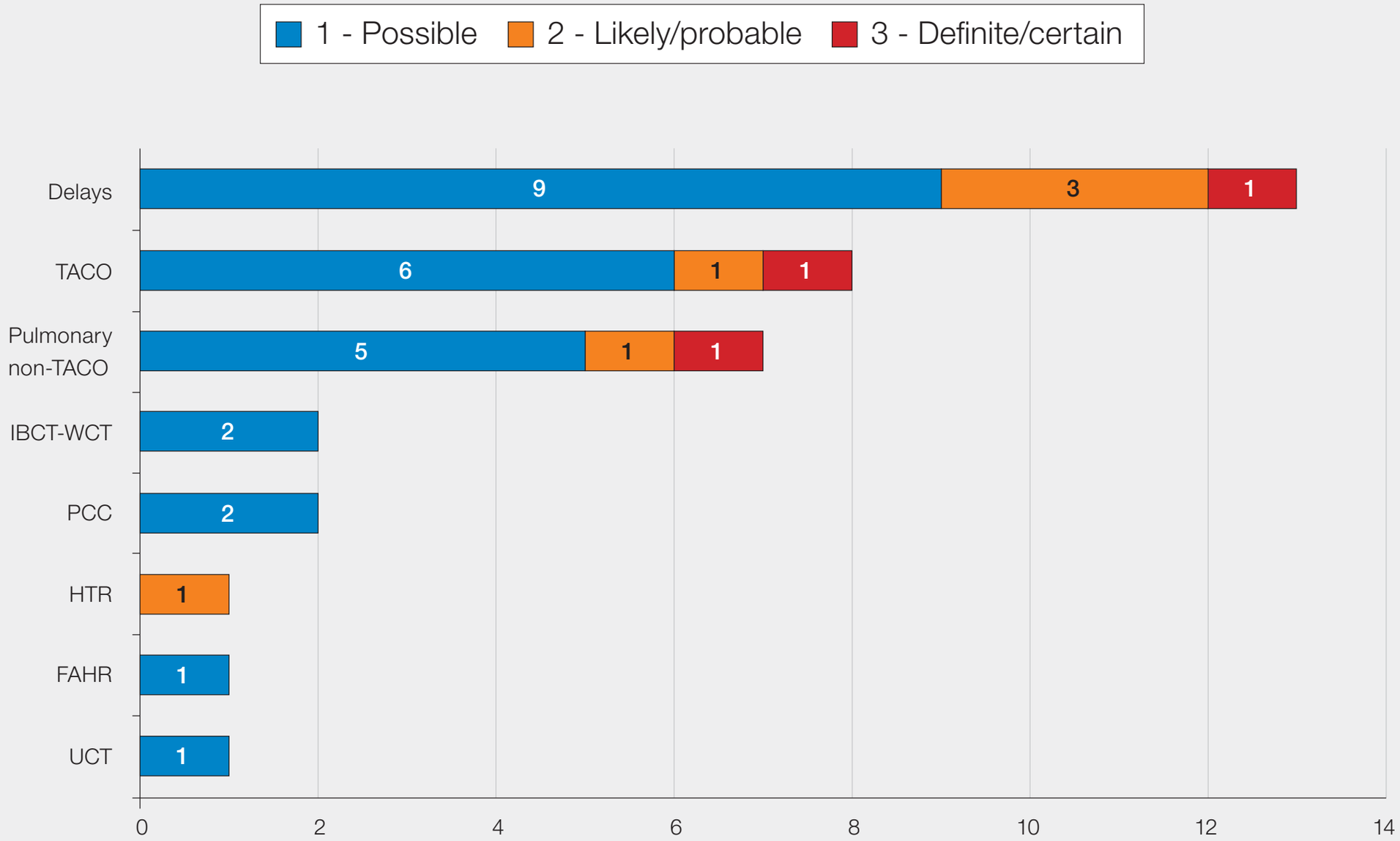


Figure 3.3: No patient-harm and potential patient-harm incidents 2010-2022



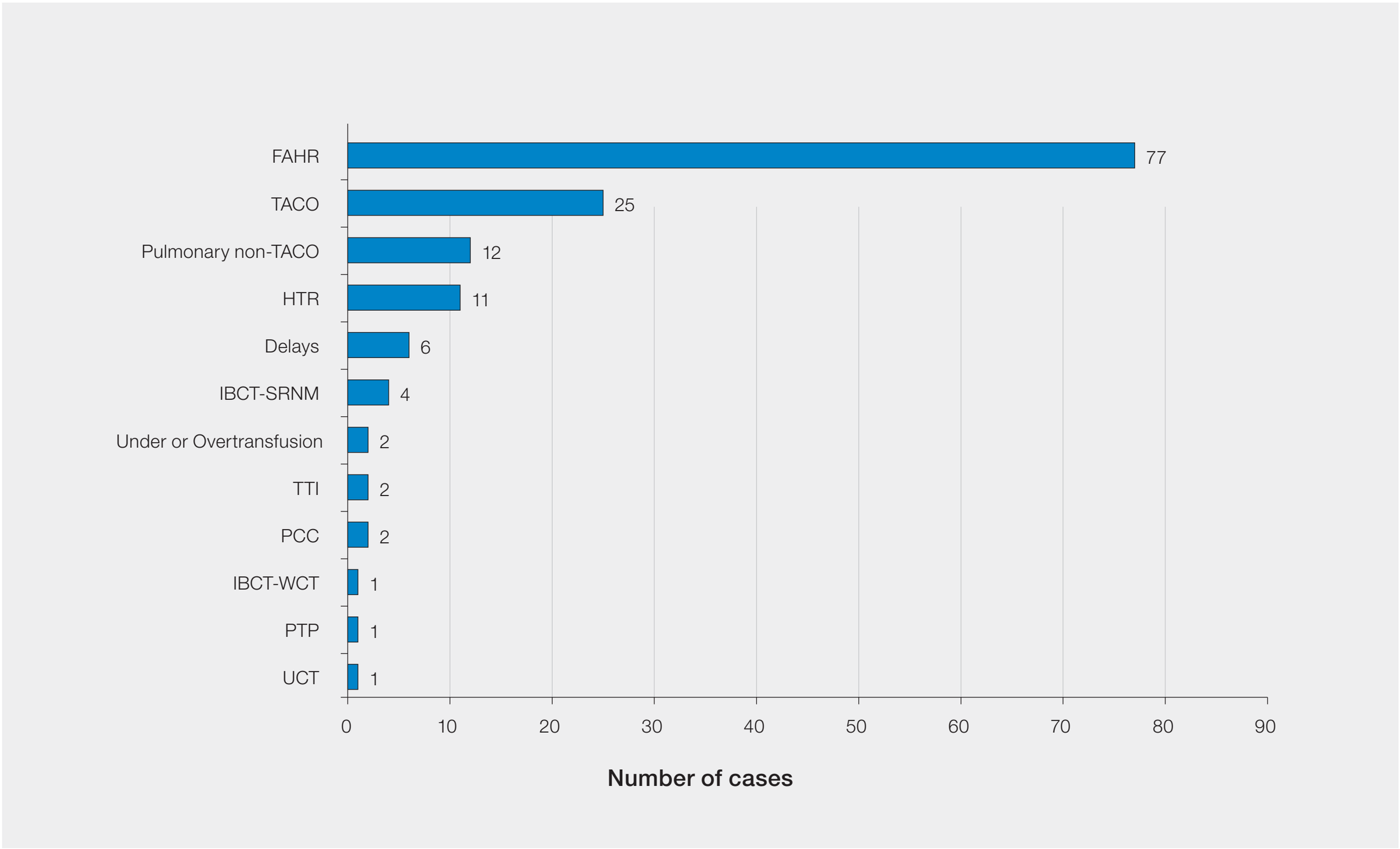
Potential harm incidents include incorrect blood component transfused (IBCT) errors, avoidable, delayed and under/overtransfusion (ADU) errors, handling and storage errors (HSE) and errors related to anti-D immunoglobulin administration

Figure 3.4: Deaths related to transfusion with imputability reported in 2022 (n=35)



HTR=haemolytic transfusion reactions; FAHR=febrile, allergic and hypotensive reactions; UCT=uncommon complications of transfusion; TACO=transfusion-associated circulatory overload; IBCT-WCT=incorrect blood component transfused-wrong component transfused; PCC=prothrombin complex concentrates

Figure 3.5: Ranking of categories to show number of serious reactions in 2022 (n=144)



FAHR=febrile allergic and hypotensive reactions; TACO=transfusion-associated circulatory overload; HTR=haemolytic transfusion reactions; IBCT-SRNM=incorrect blood component transfused-specific requirements not met; TTI=transfusion-transmitted infection; PCC=prothrombin complex concentrate; IBCT-WCT=IBCT-wrong component transfused; PTP=post-transfusion purpura; UCT=uncommon complications of transfusion

Figure 3.6: Summary data for 2022, all categories (includes RBRP and NM) (n=3499)

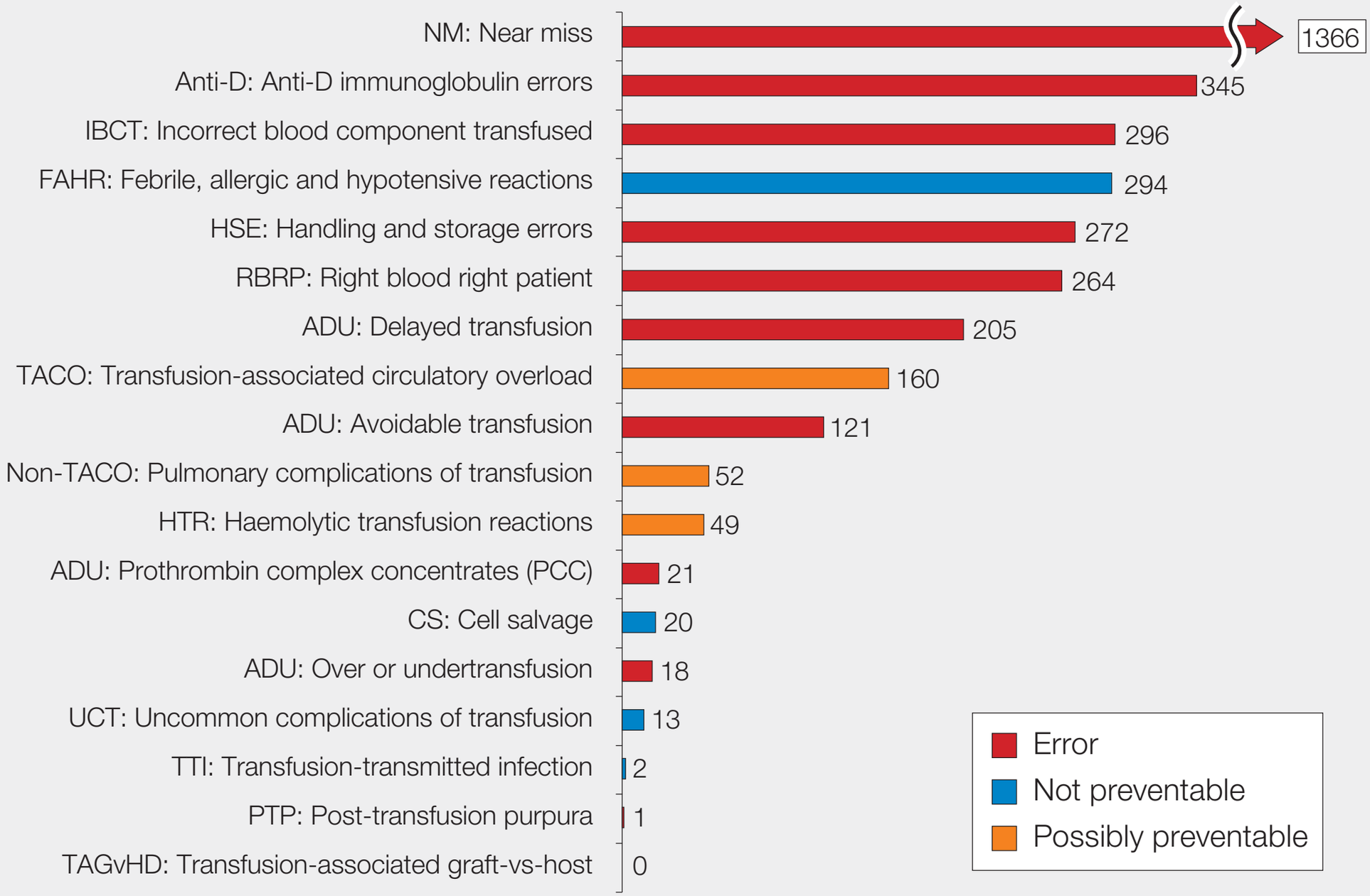
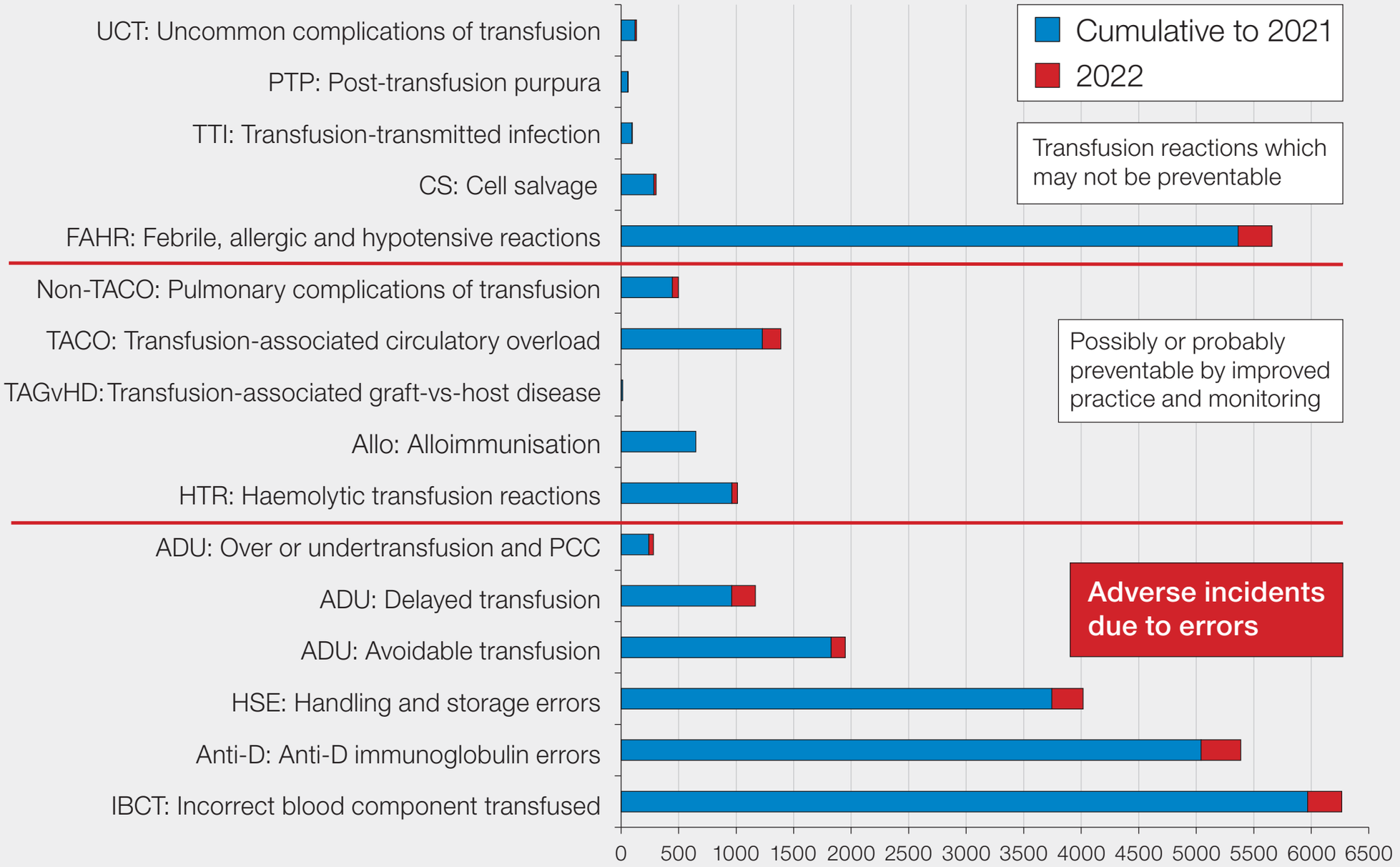
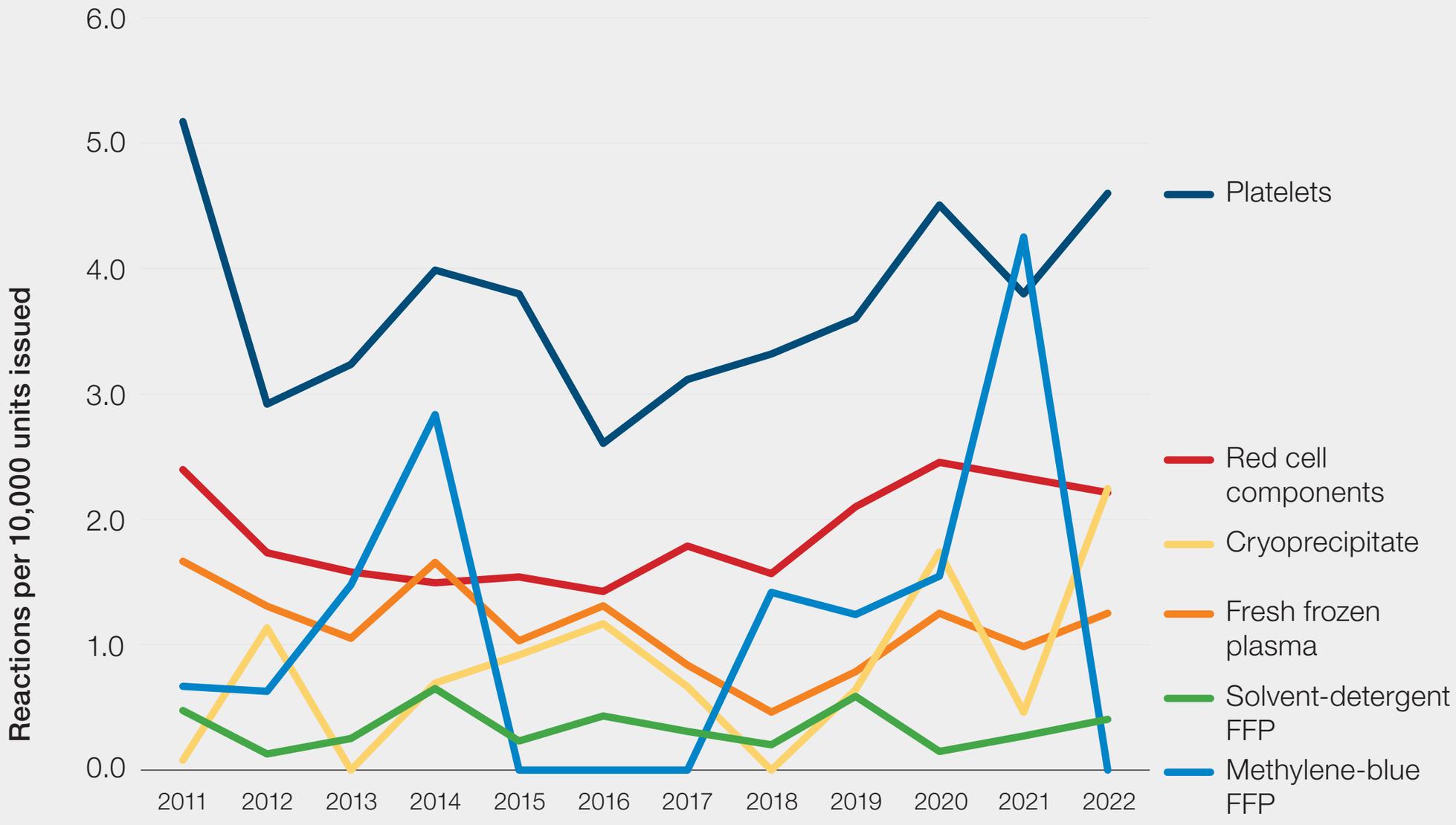


Figure 3.7: Cumulative data for SHOT categories 1996-2022 (n=28877)



**Data on alloimmunisation is no longer collected by SHOT since 2015*

Figure 3.8: Reactions per 10,000 components, by component type 2010-2022



Note: Not including convalescent plasma

**The risks for blood components which are used infrequently such as cryoprecipitate and MB-FFP should be interpreted with caution due to the low numbers involved*

Figure 3.9: Number of ABO-incompatible red cell transfusions 1996-2022

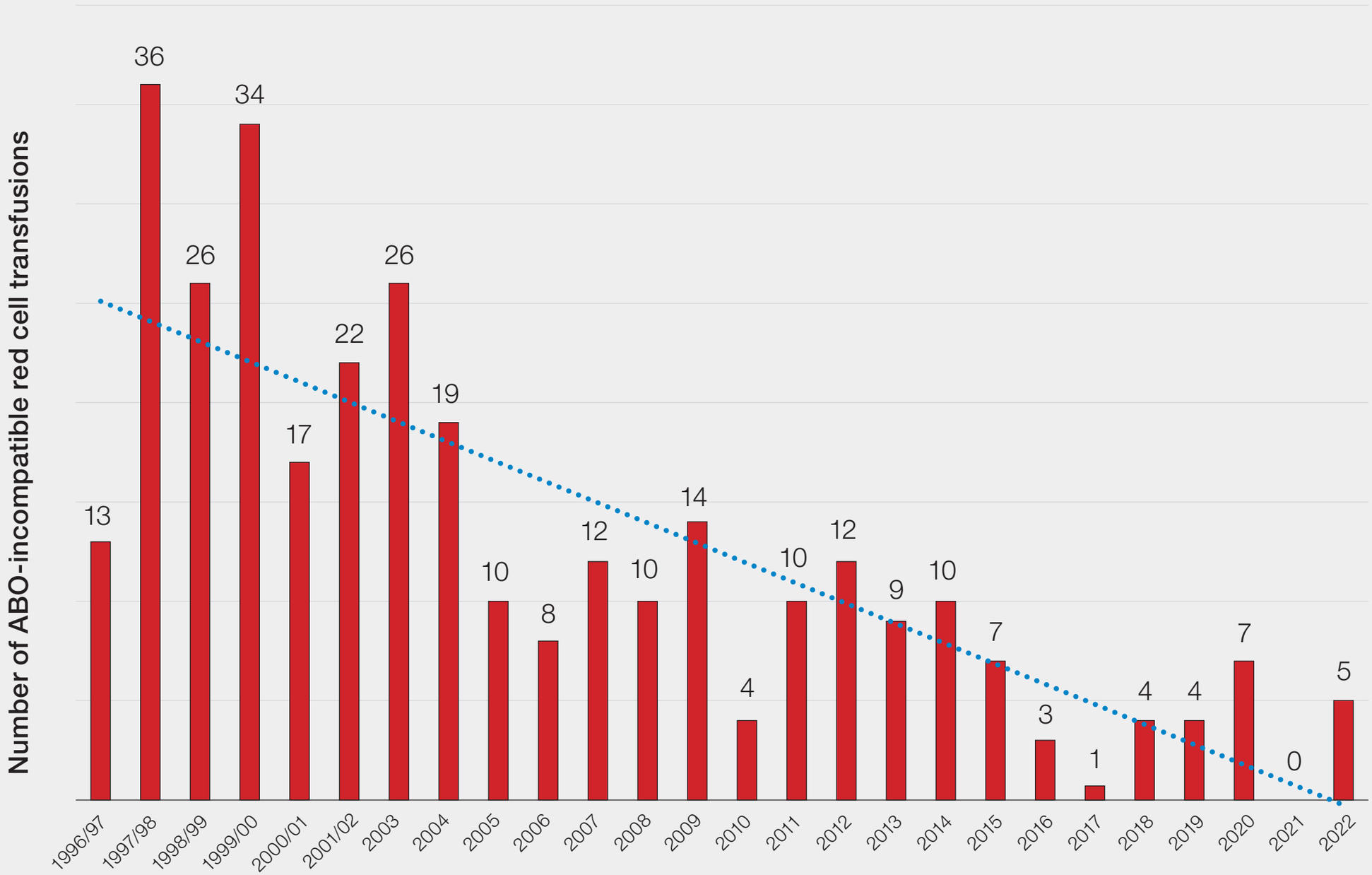


Figure 3.10: Number of ABO-incompatible plasma transfusions 2003-2022

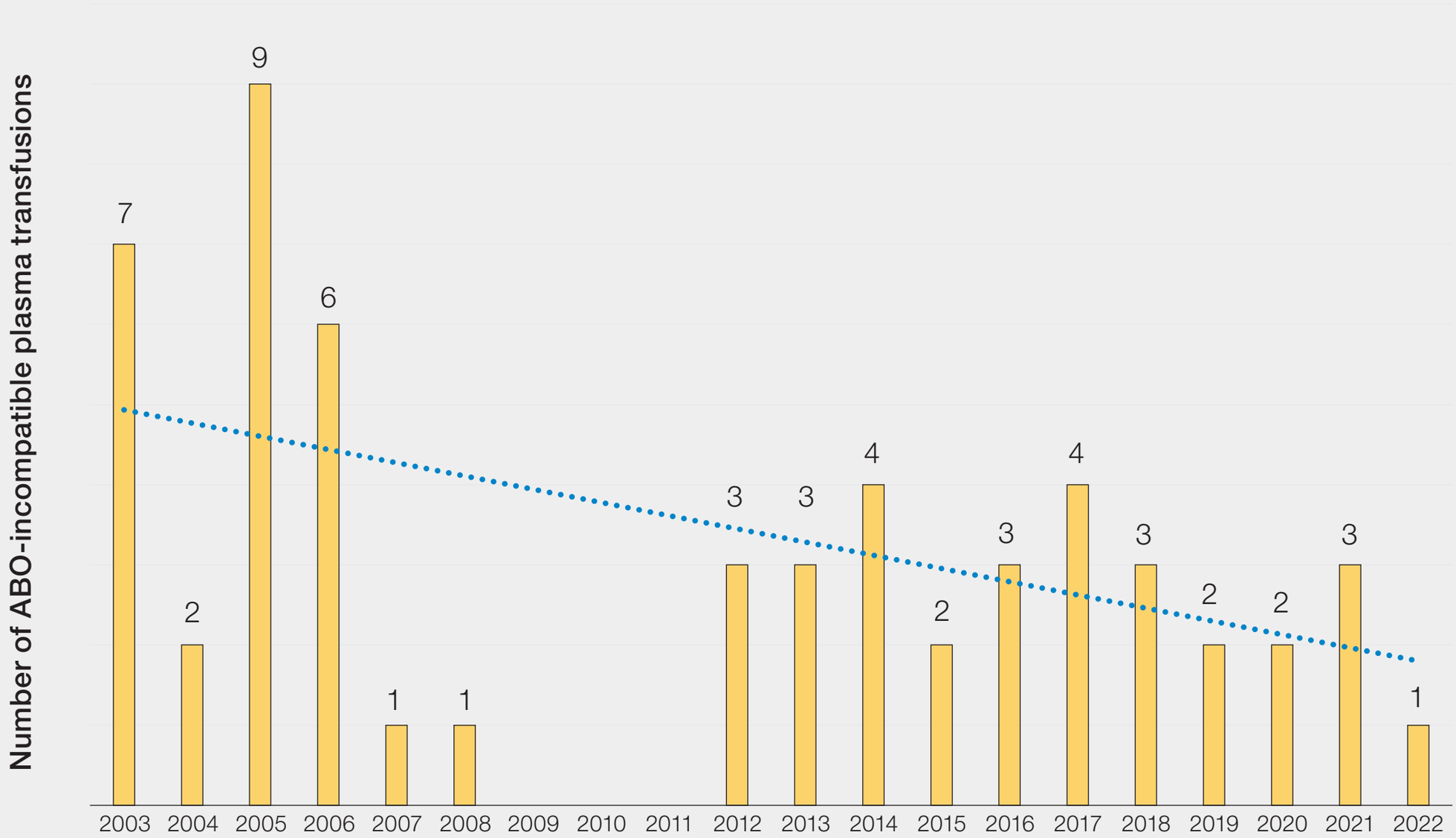
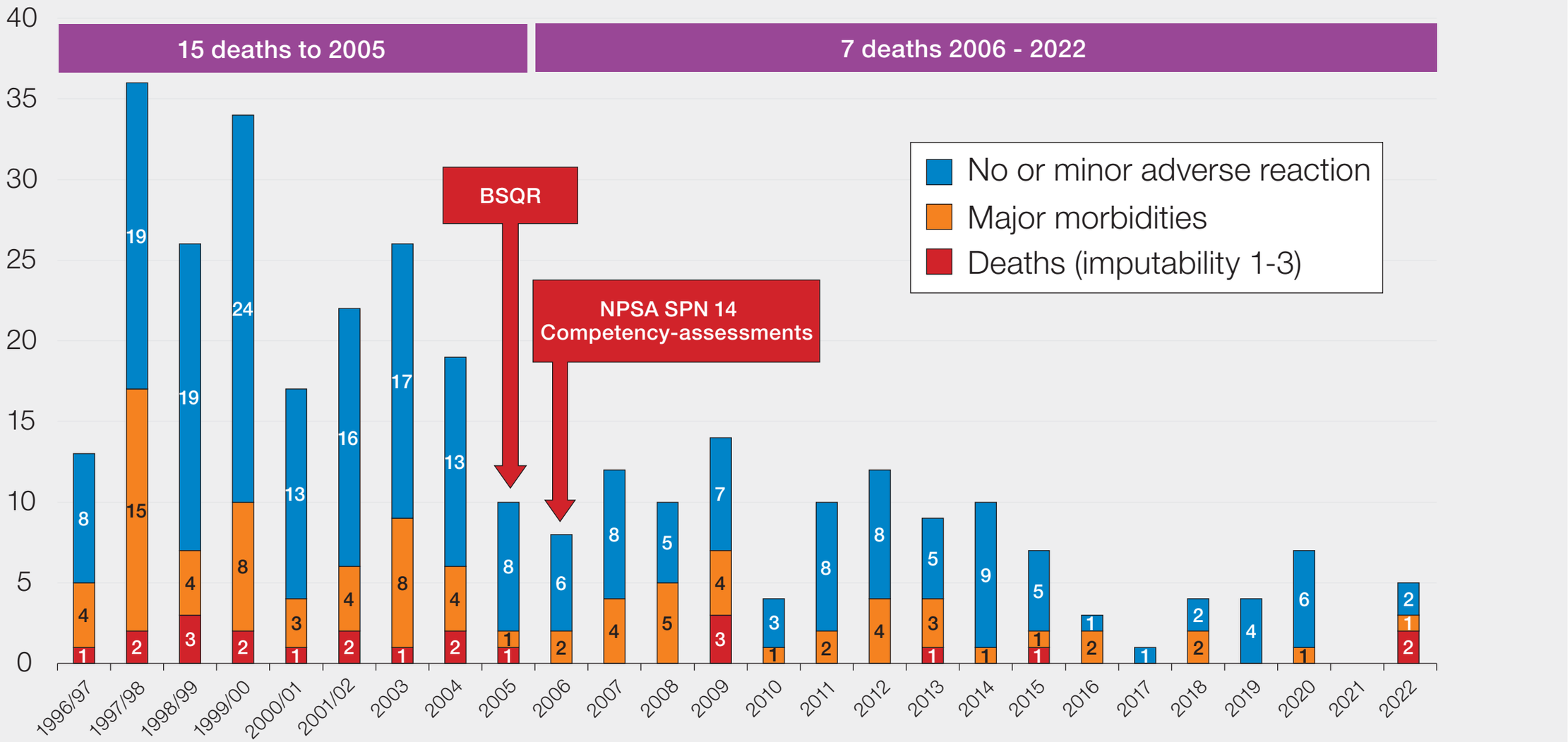


Figure 3.11: Outcome of ABO-incompatible red cell transfusions in 25 years of SHOT reporting



BSQR=Blood Safety and Quality Regulations; NPSA=National Patient Safety Agency; SPN=safer practice notice

Figure 3.12: Combinations of groups in ABO-incompatible red cell transfusions 2010-2022 (n=74)

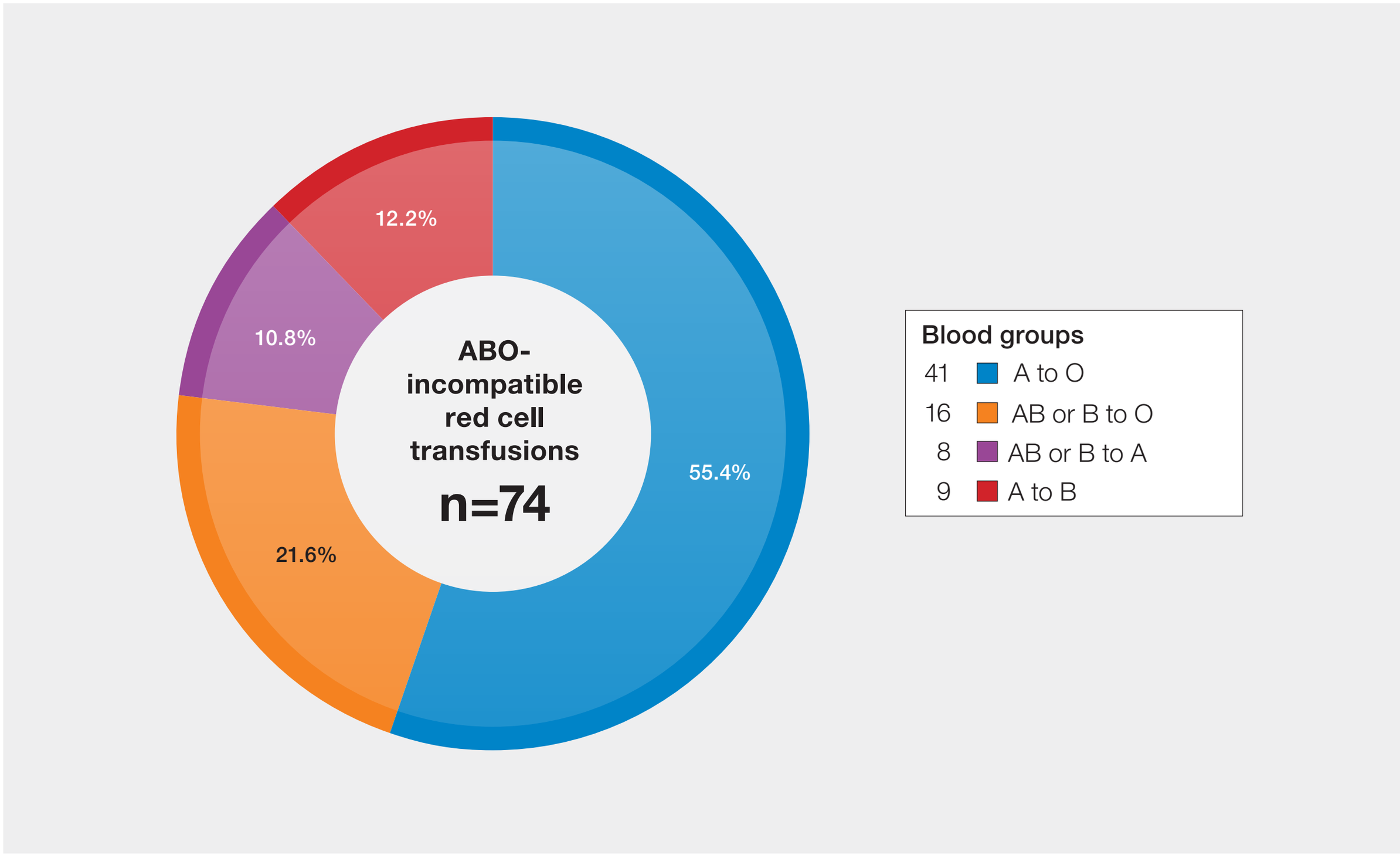


Figure 3.13: ABO-incompatible transfusions and outcome by groups 2010-2022 (n=74)

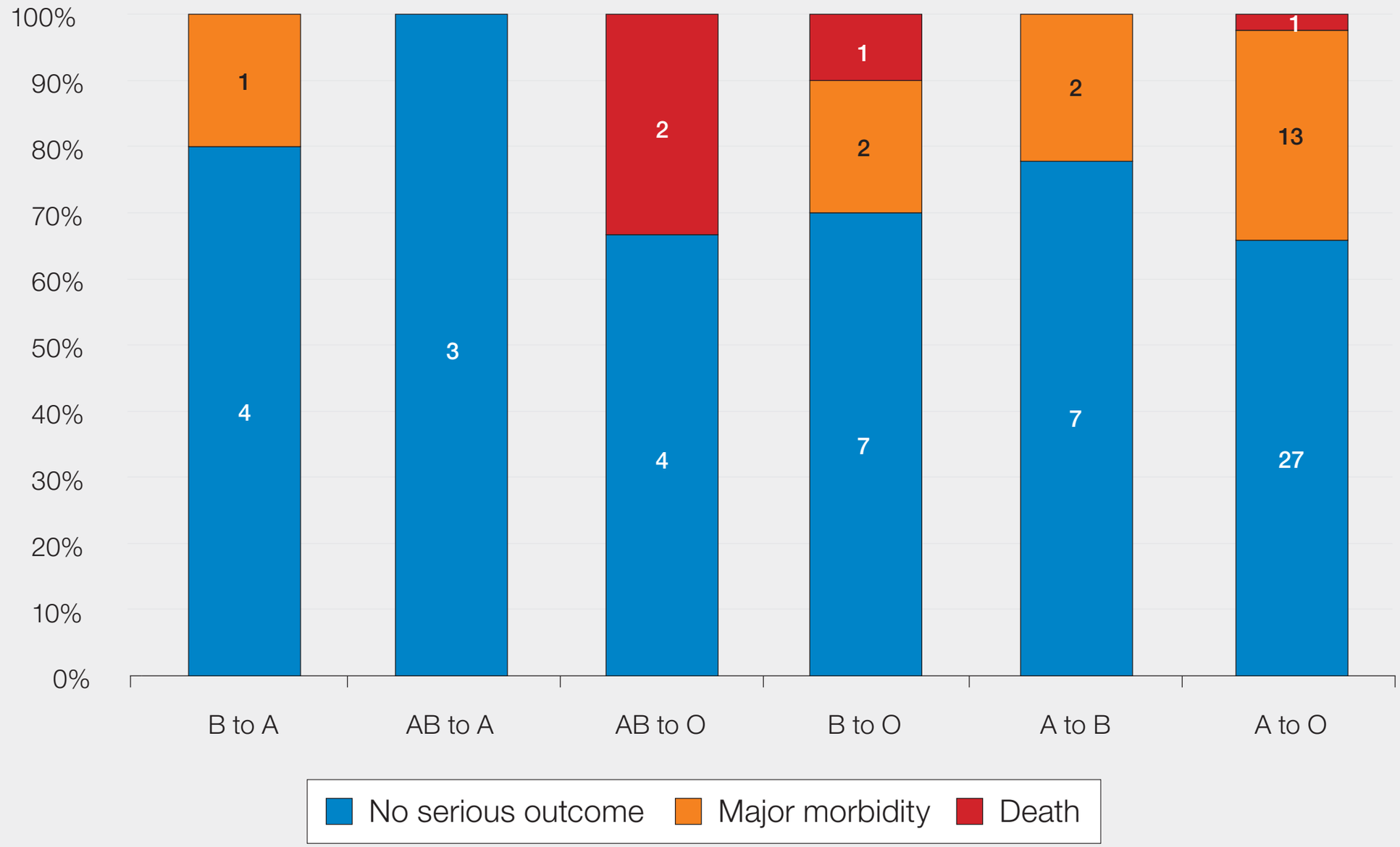


Figure 3.14: ABO-incompatible red cell transfusions 2016-2022: few events (n=24) but many near misses (n=2118)

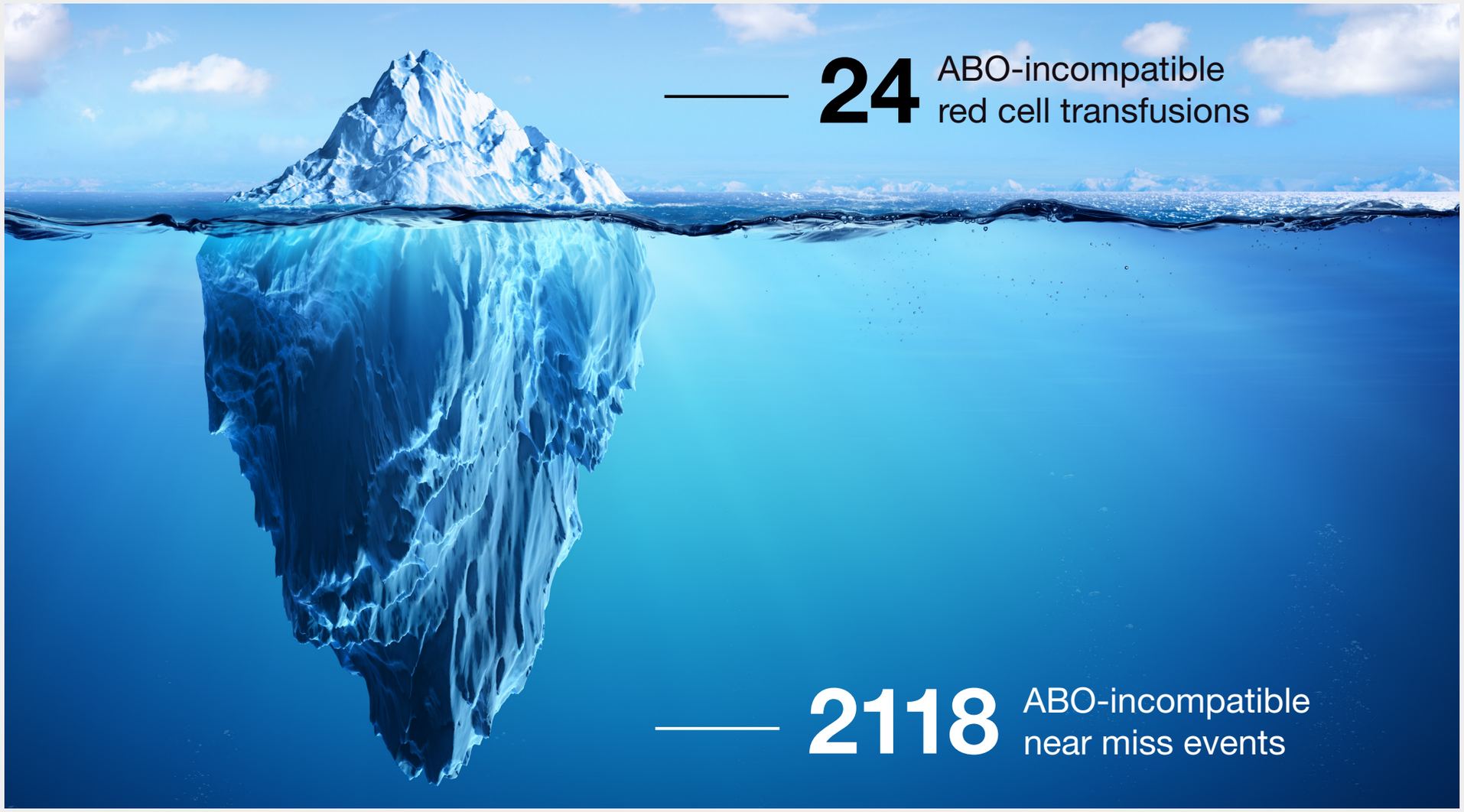


Figure 4.1: Framework for safe transfusions

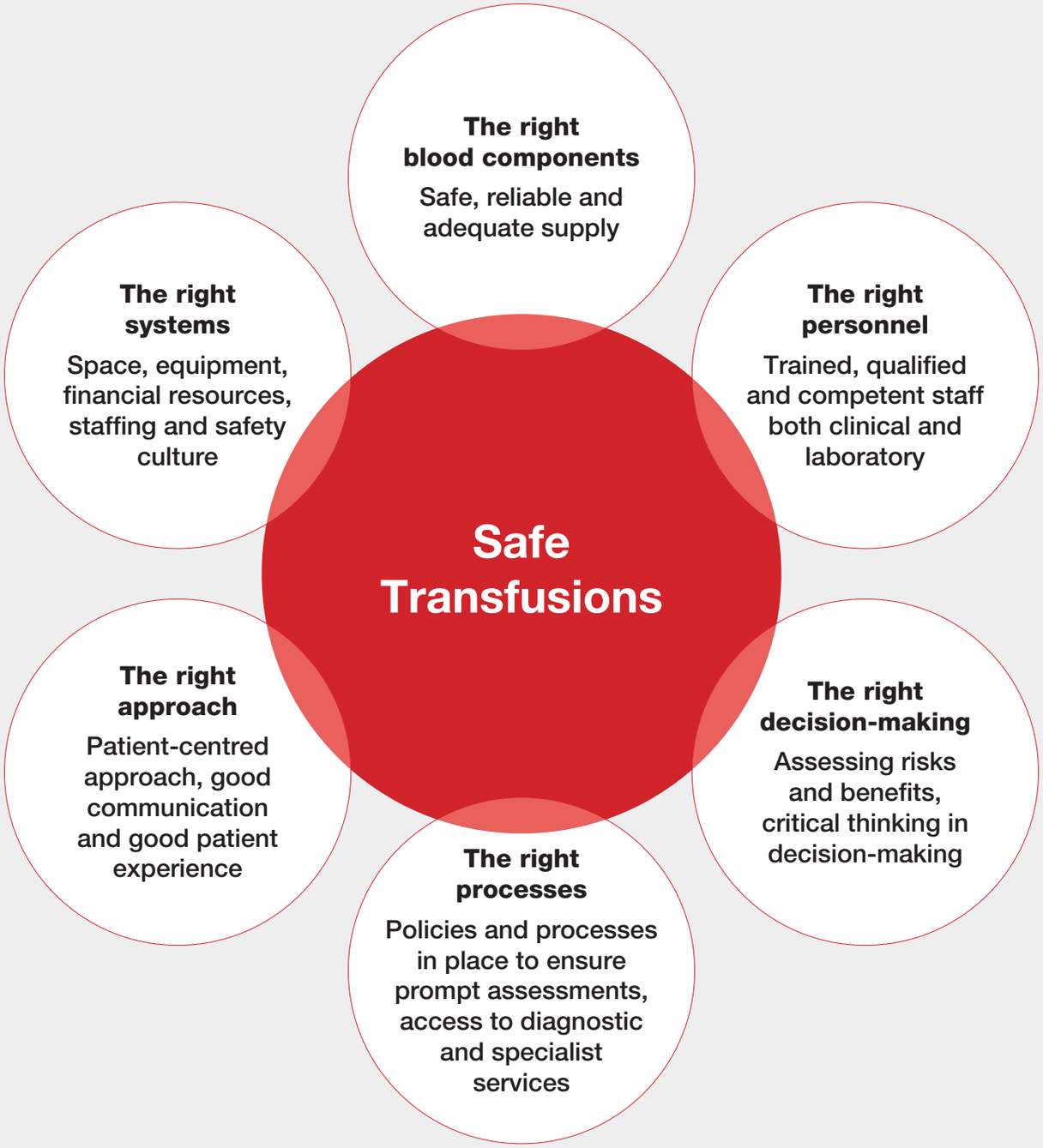


Figure 5.1: PACE model

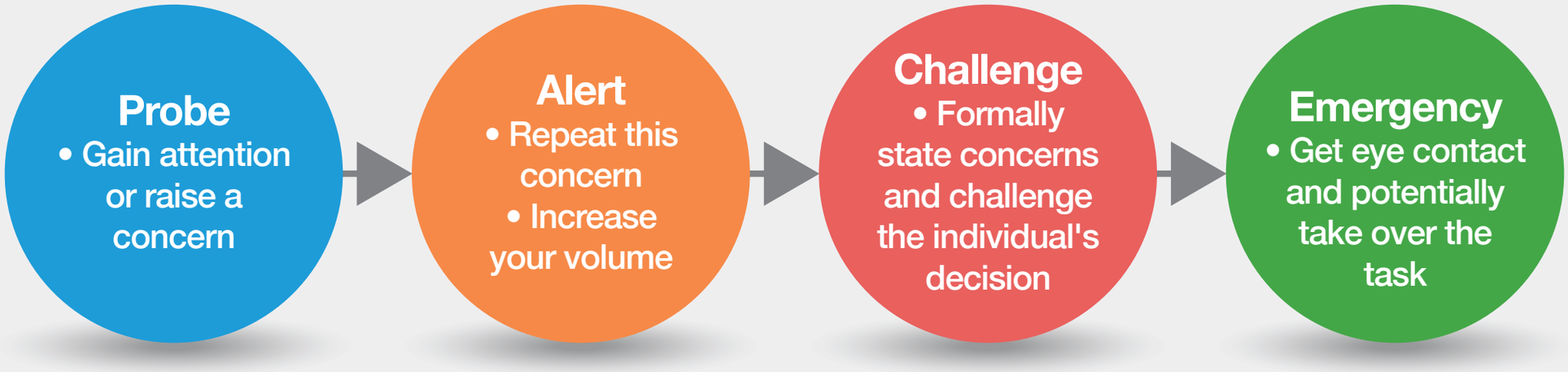
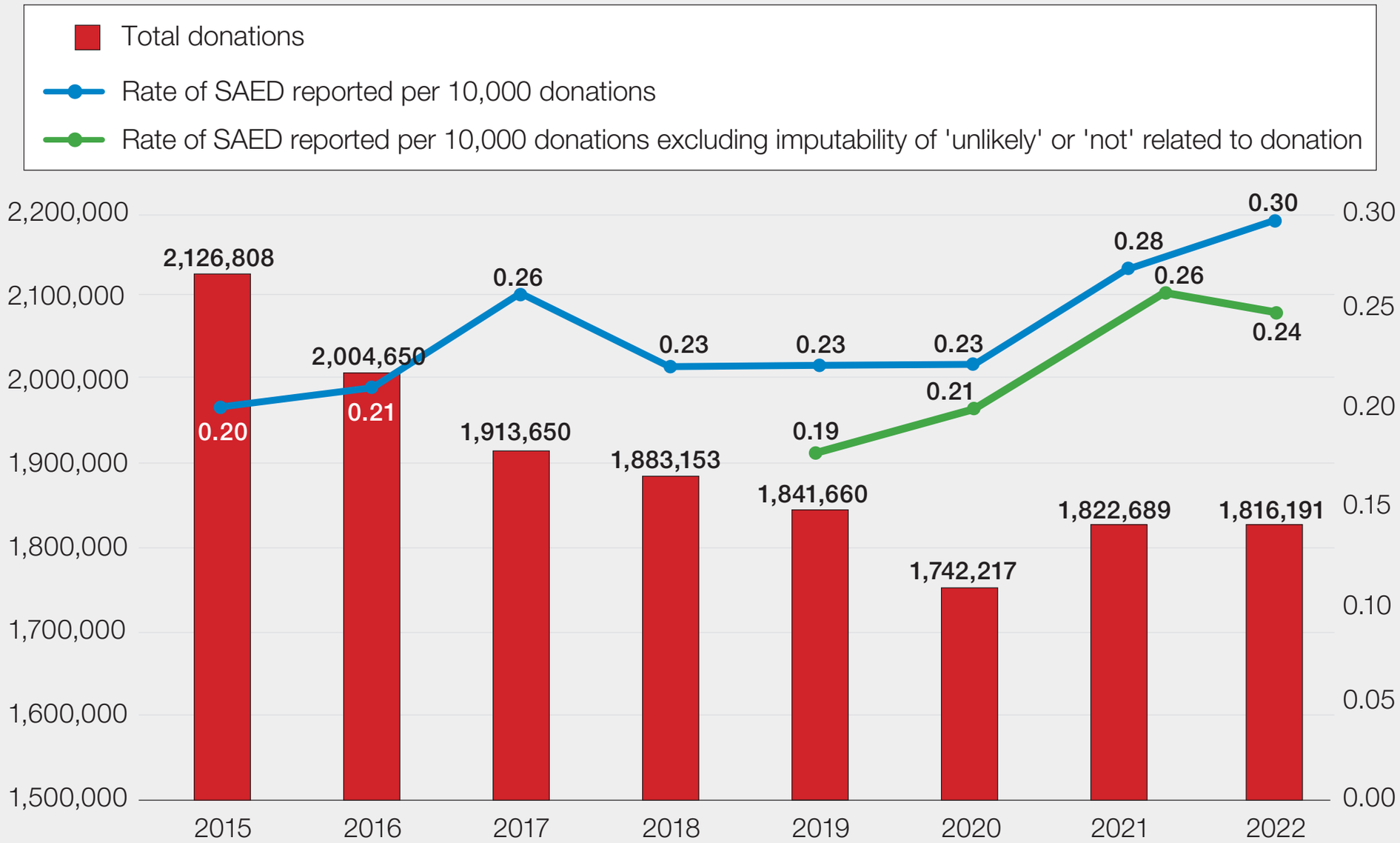


Figure 5.2: Range of ways to acknowledge continuing excellence (ACE) and potential impact

ACE=acknowledging continuing excellence; RTC=Regional transfusion committee

Figure 6.1 Rate of SAED reported per 10,000 donations in the UK from 2015-2022



SAED=serious adverse event of donation

Figure 6.2 Trends in the number of donations collected across the UK 2015-2022

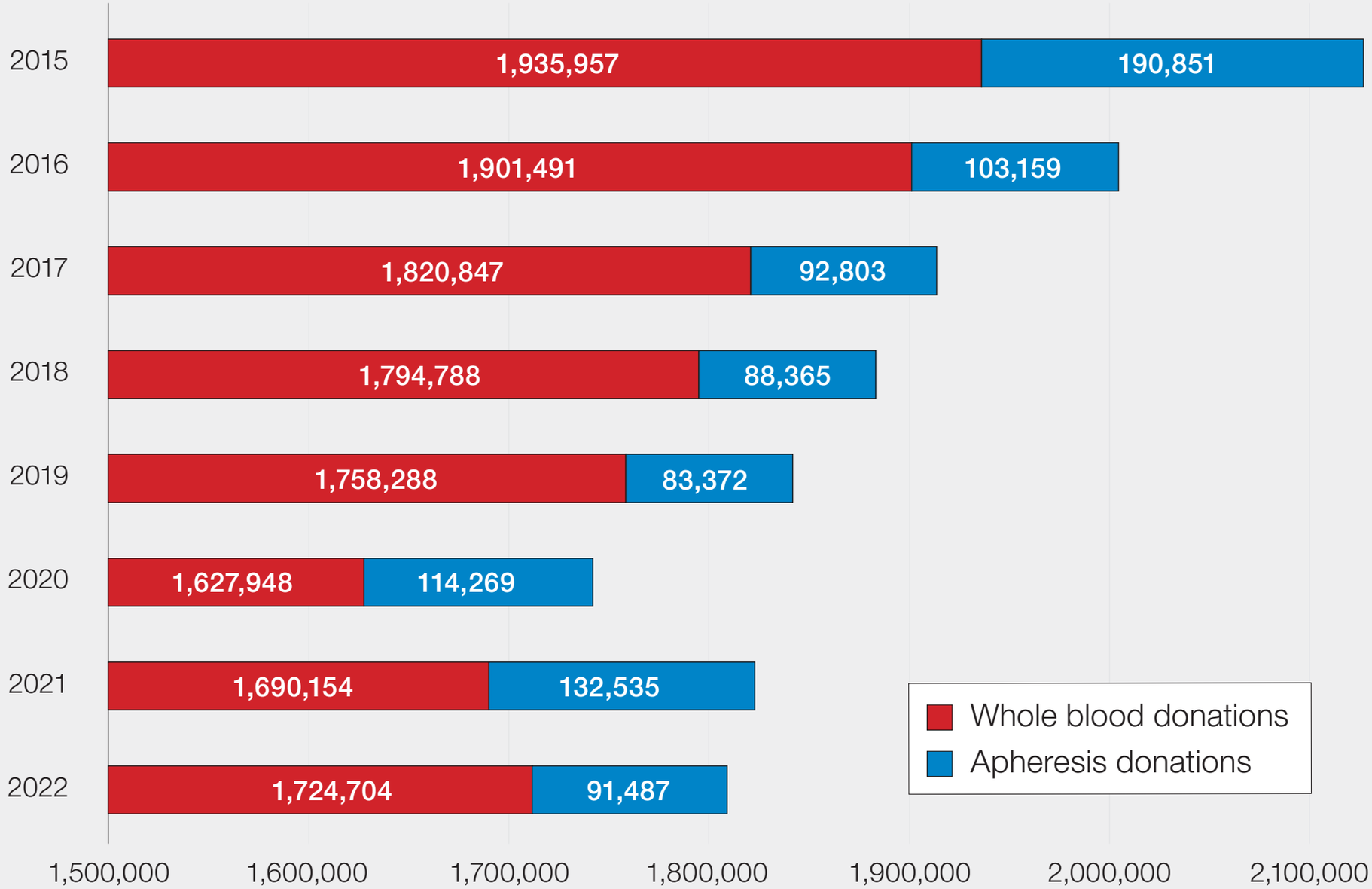


Figure 7.1: Hierarchy of intervention effectiveness

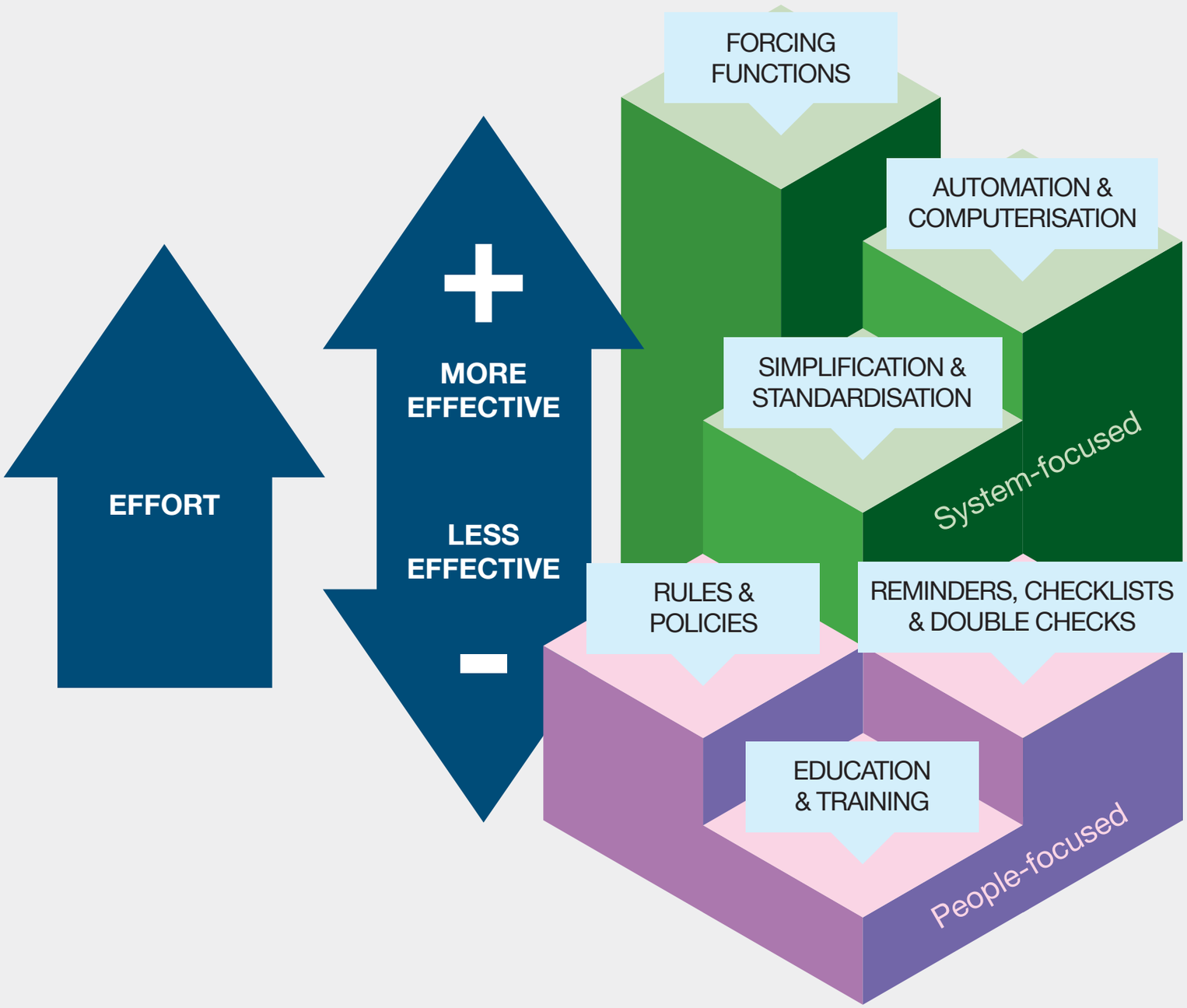
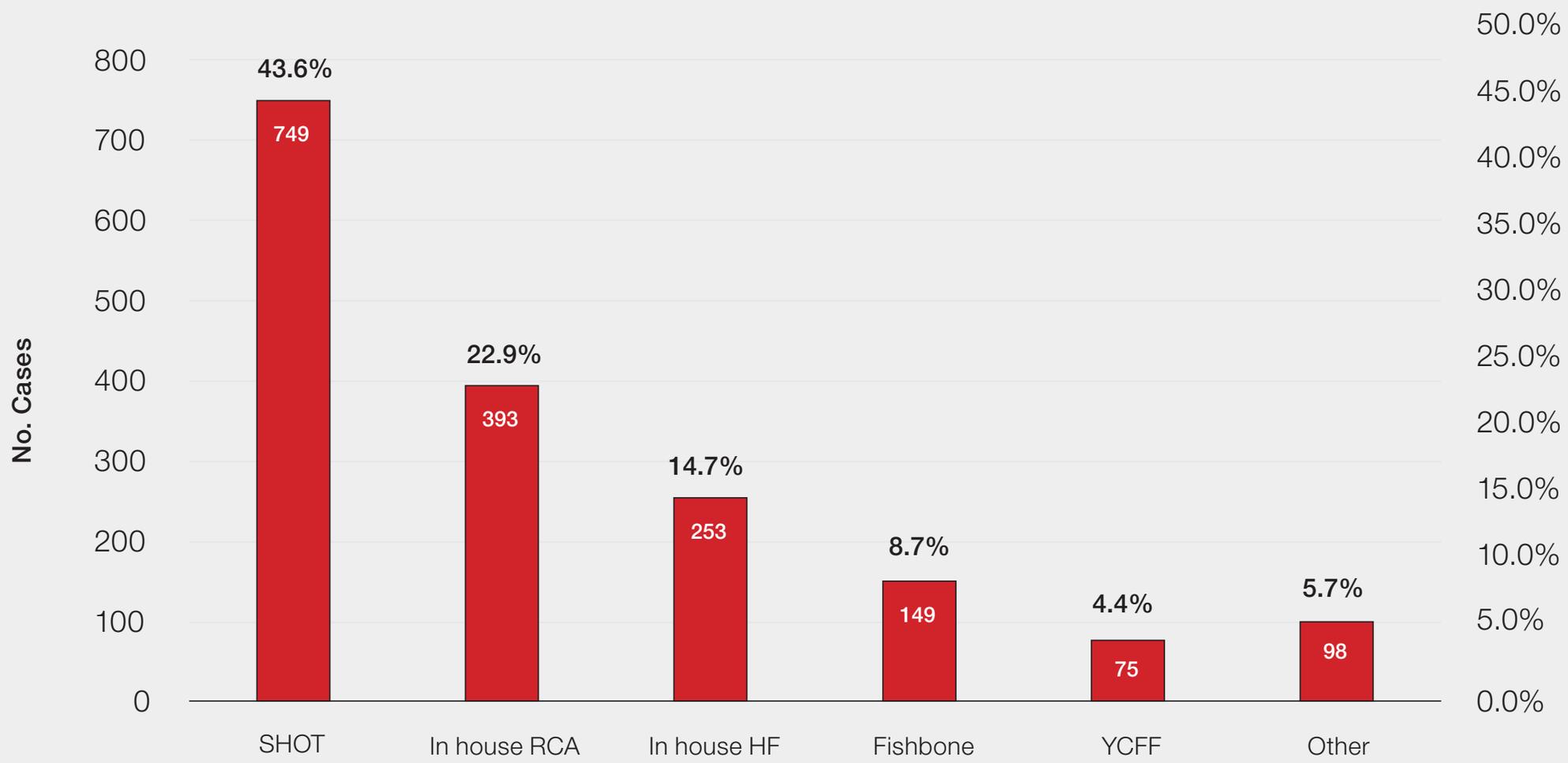


Figure 7.2: Comparative total scores assigned for different system factors

Figure 7.3: Top five human factors frameworks/models used for incident investigation as submitted by SHOT reporters



RCA=root cause analysis; HF=human factors; YCFF=Yorkshire Contributory Factors Framework
Please note that this relates to individual reports and not organisations

Figure 8.1: Distribution of anti-D Ig related error reports in 2022 (n=345)

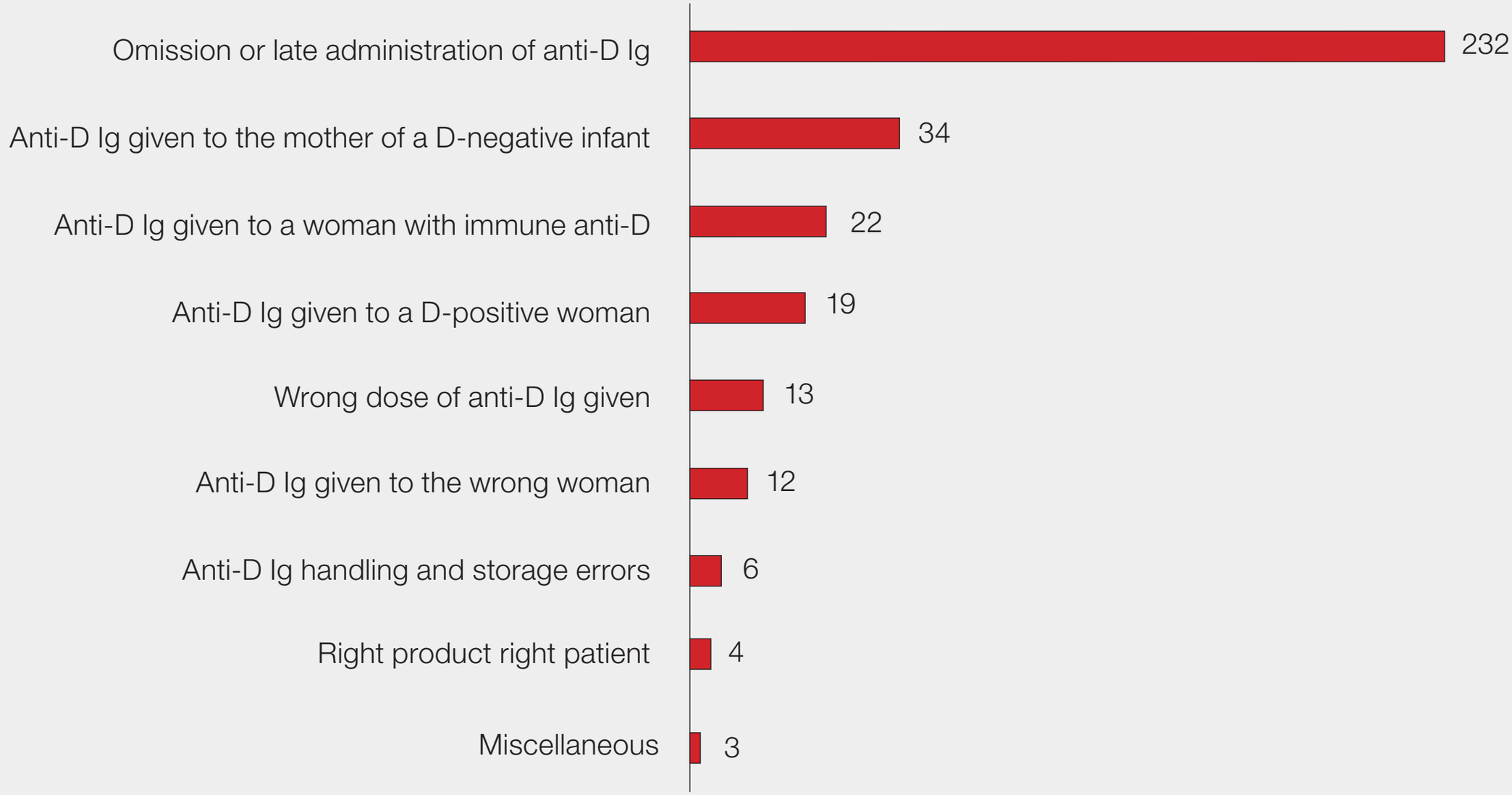


Figure 9.1: Overview of reports where an incorrect blood component was transfused in 2022 (n=296)

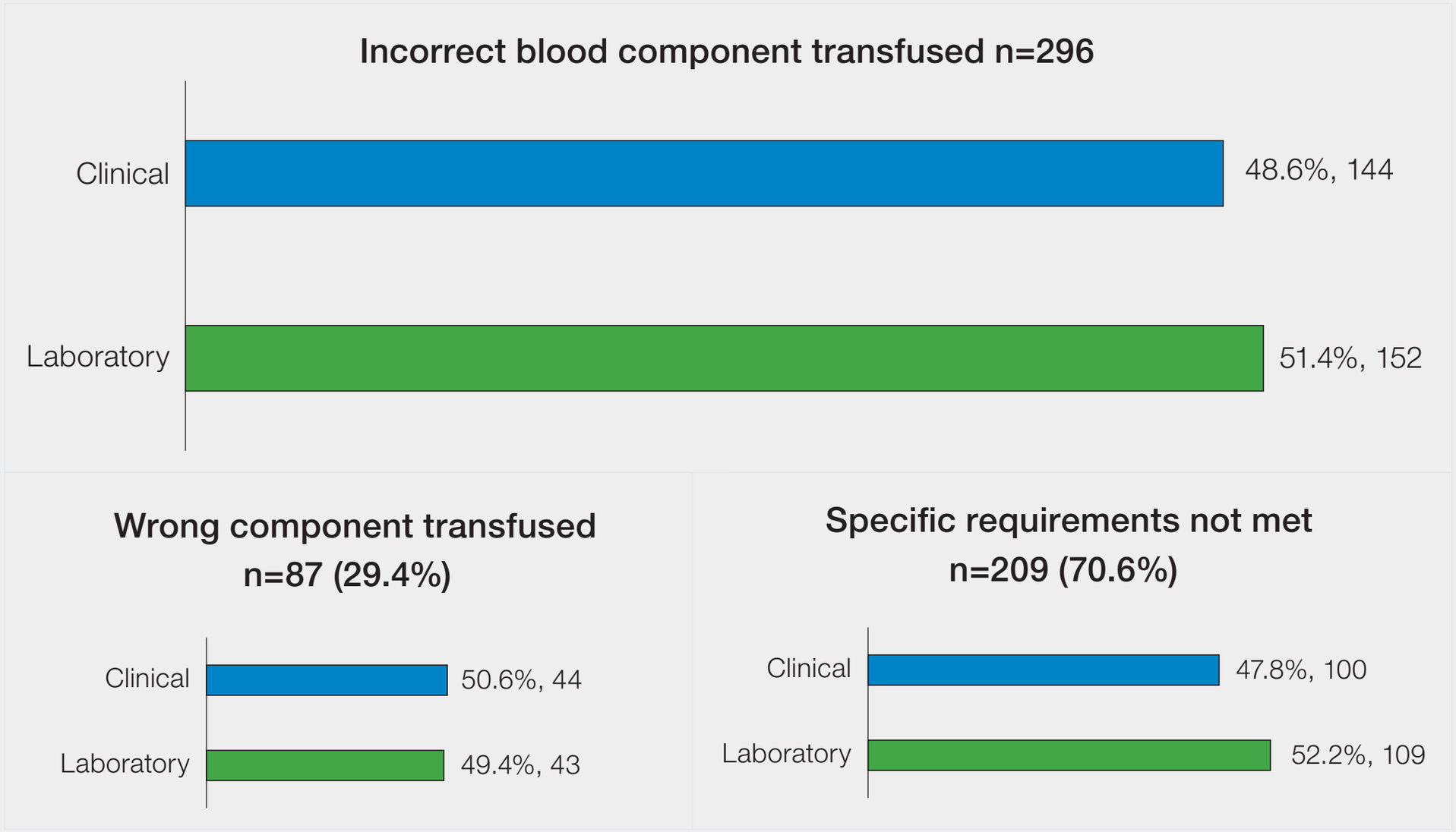
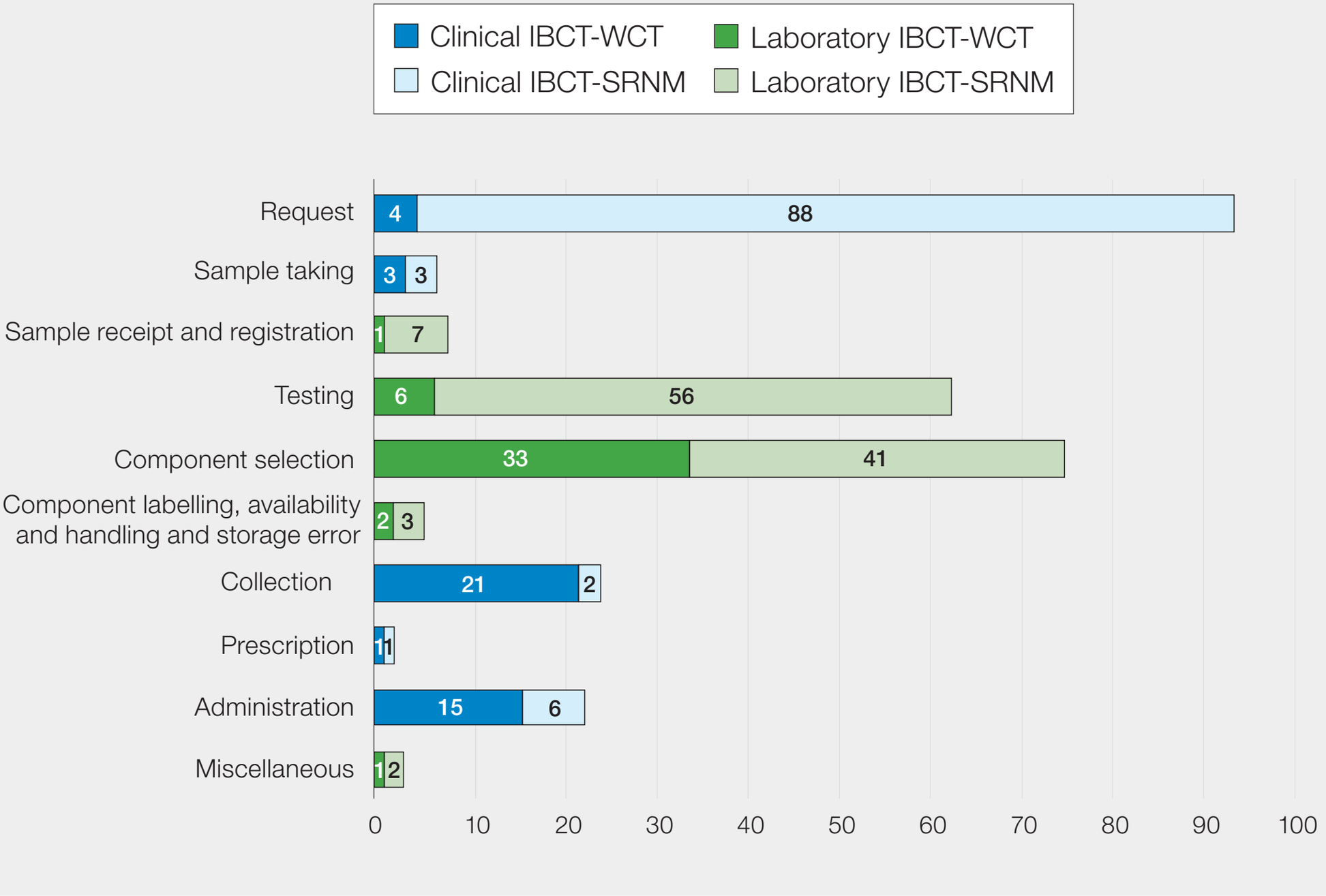
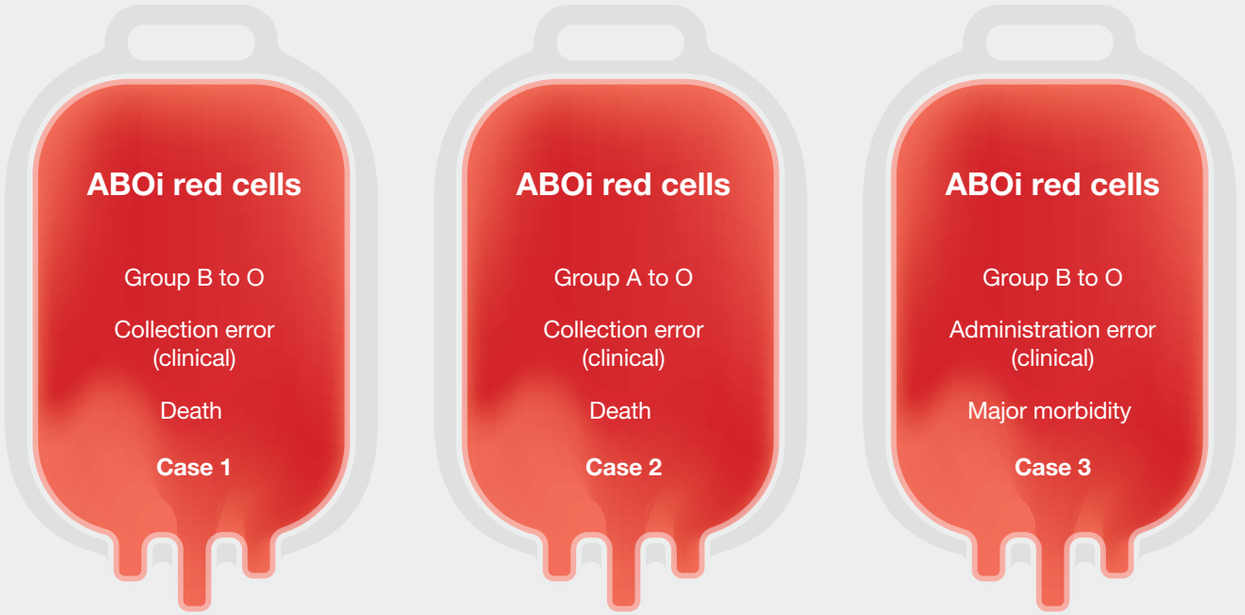


Figure 9.2: Total IBCT errors categorised by the step where the error occurred (n=296)



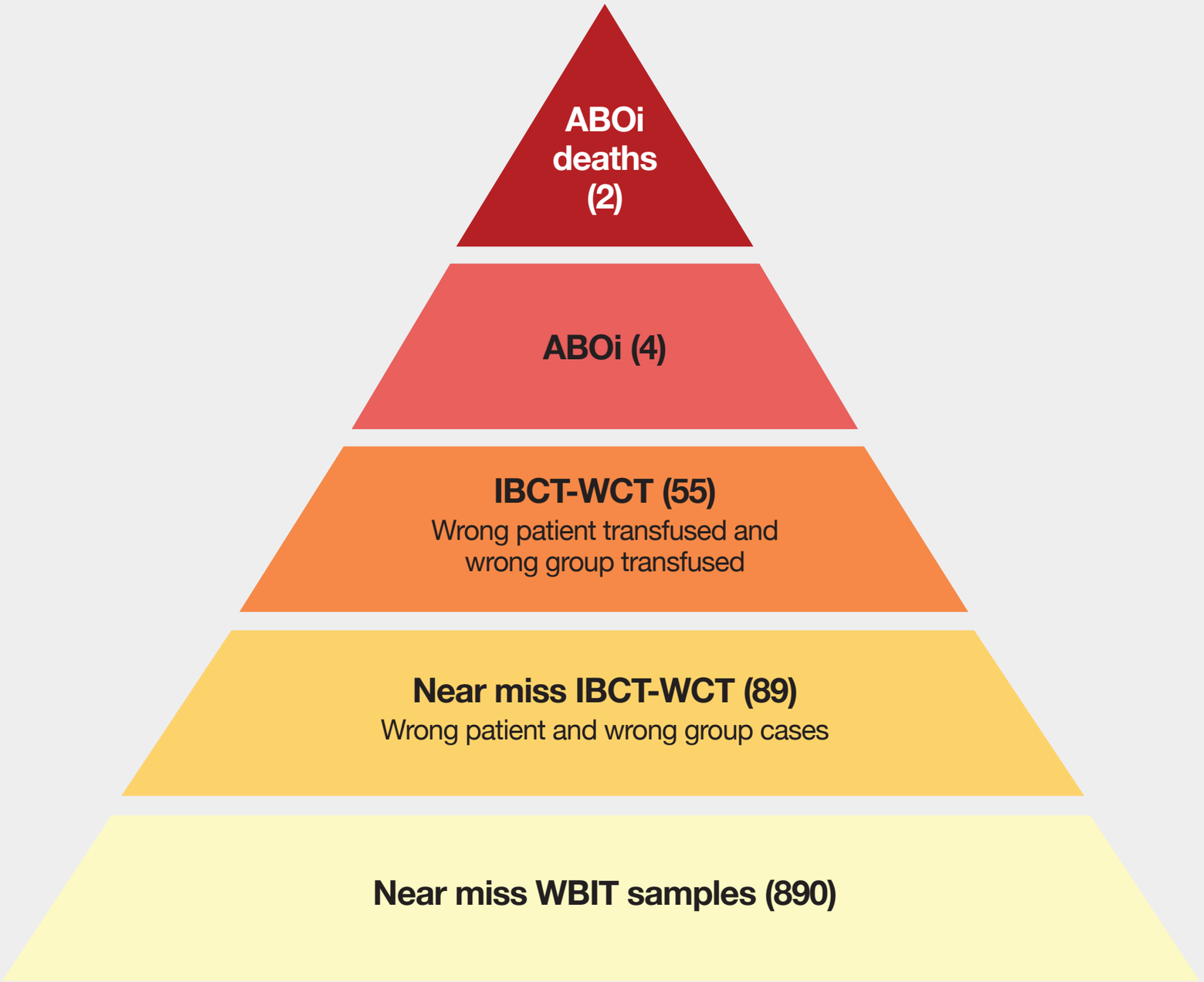
IBCT-SRNM=incorrect blood component transfused-specific requirements not met; IBCT-WCT=IBCT-wrong component transfused

Figure 9.3: ABOi cases reported in 2022 (n=6)



ABOi=ABO-incompatible; FFP=fresh frozen plasma. Note: case numbers refer to the cases in Table 9.1

Figure 9.4: ABO-incompatible (ABOi) transfusions and events that had the potential to lead to ABOi in 2022



ABOi=ABO-incompatible; IBCT-WCT=incorrect blood component transfused-wrong component transfused; WBIT=wrong blood in tube

Figure 9.5: Categorisation of clinical IBCT-WCT errors by transfusion step where the primary error occurred (n=44)

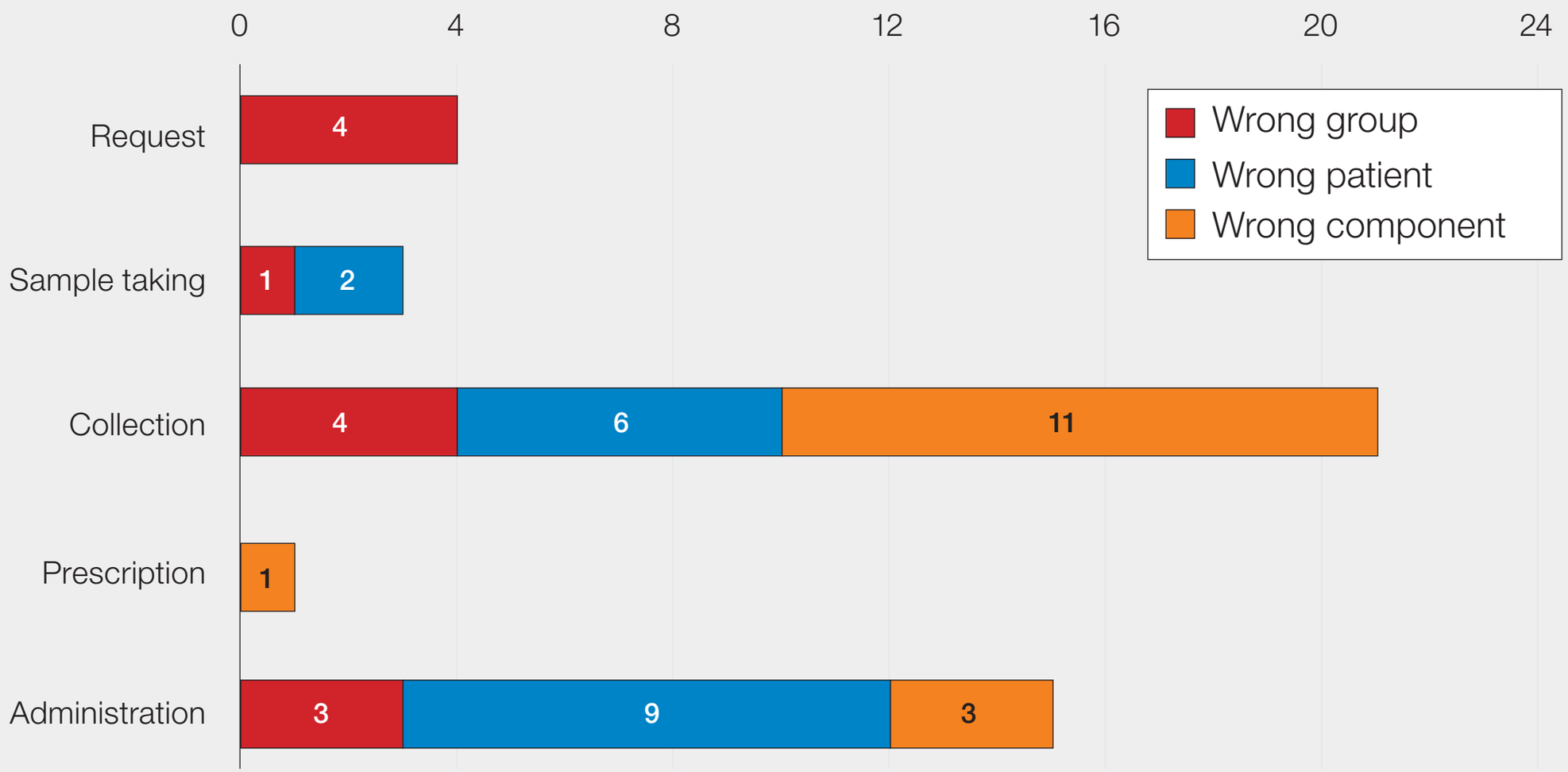
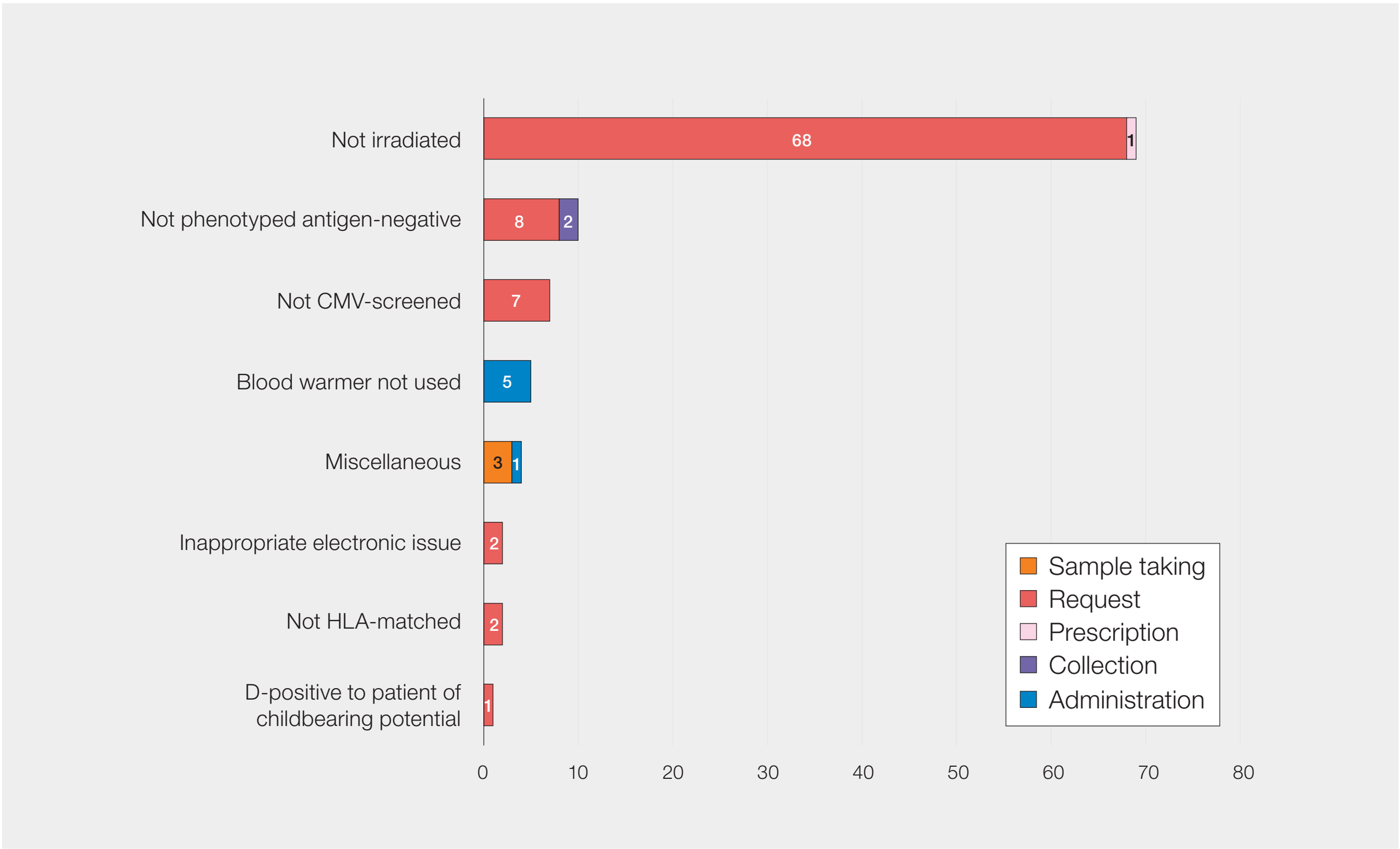


Figure 9.6: Clinical IBCT-SRNM errors and transfusion step where the primary error occurred (n=100)



CMV=cytomegalovirus; HLA=human leucocyte antigen

Figure 9.7: Laboratory IBCT-WCT errors by transfusion step (n=43)

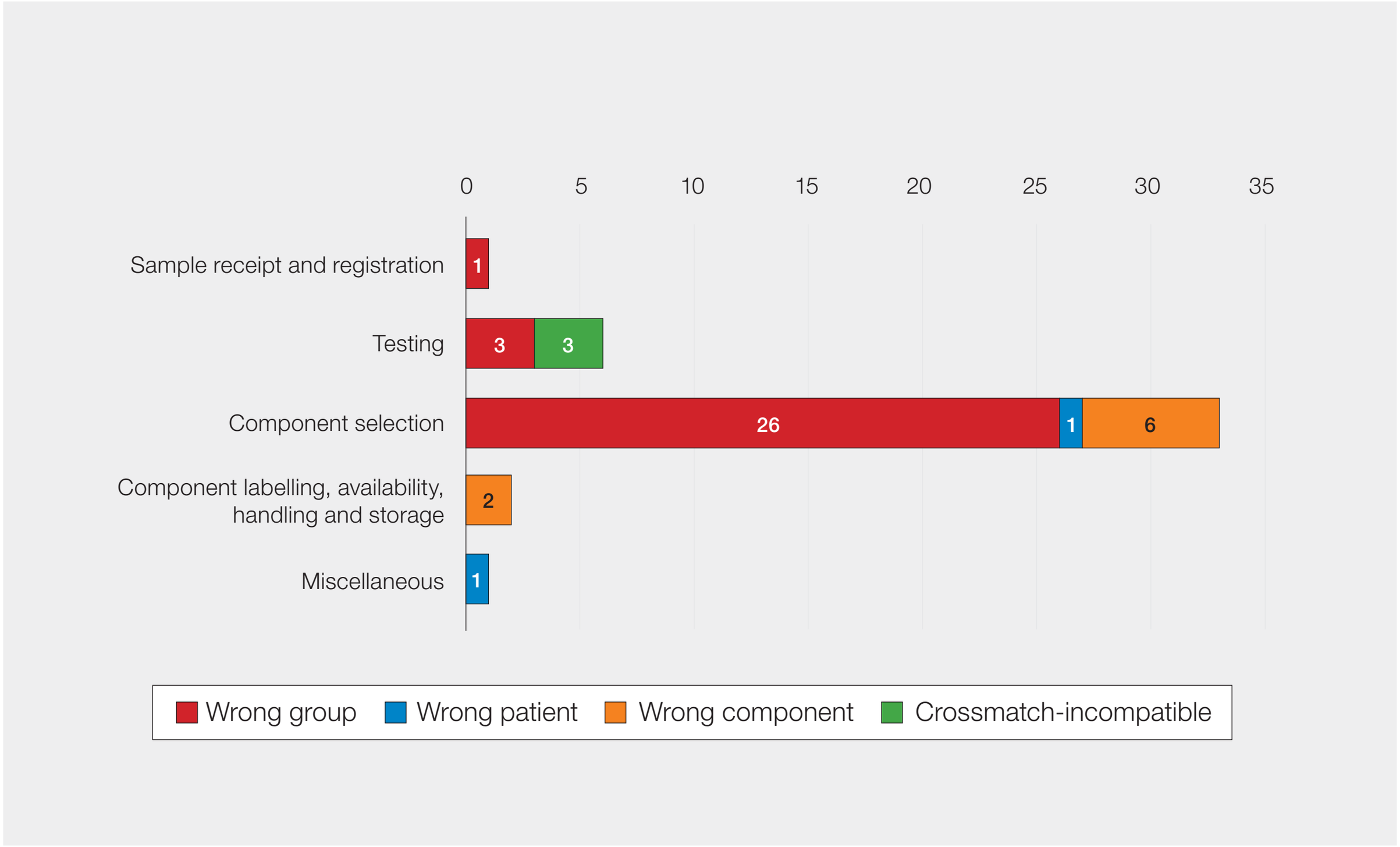


Figure 9.8: Laboratory IBCT-WCT error by category (n=43)

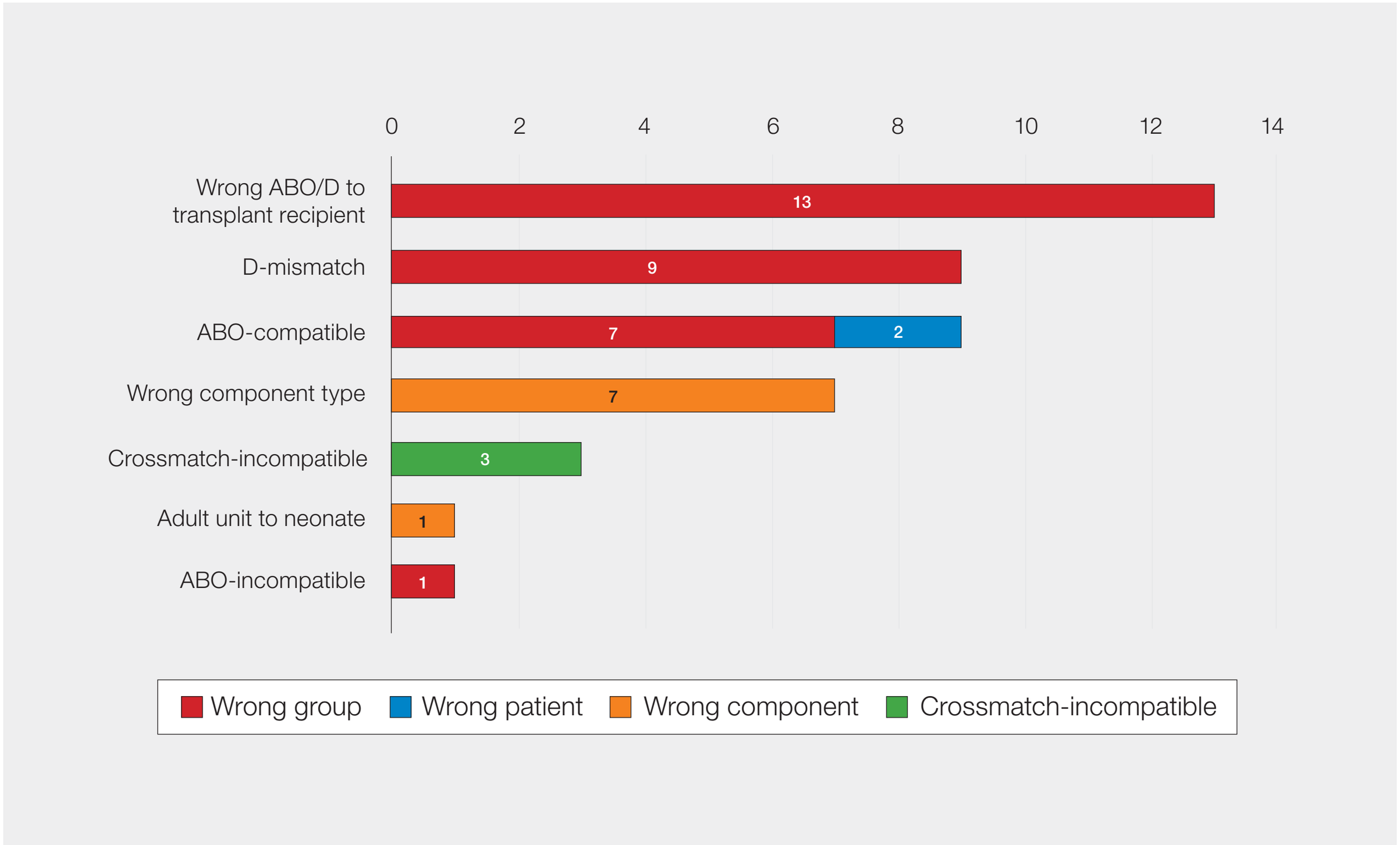
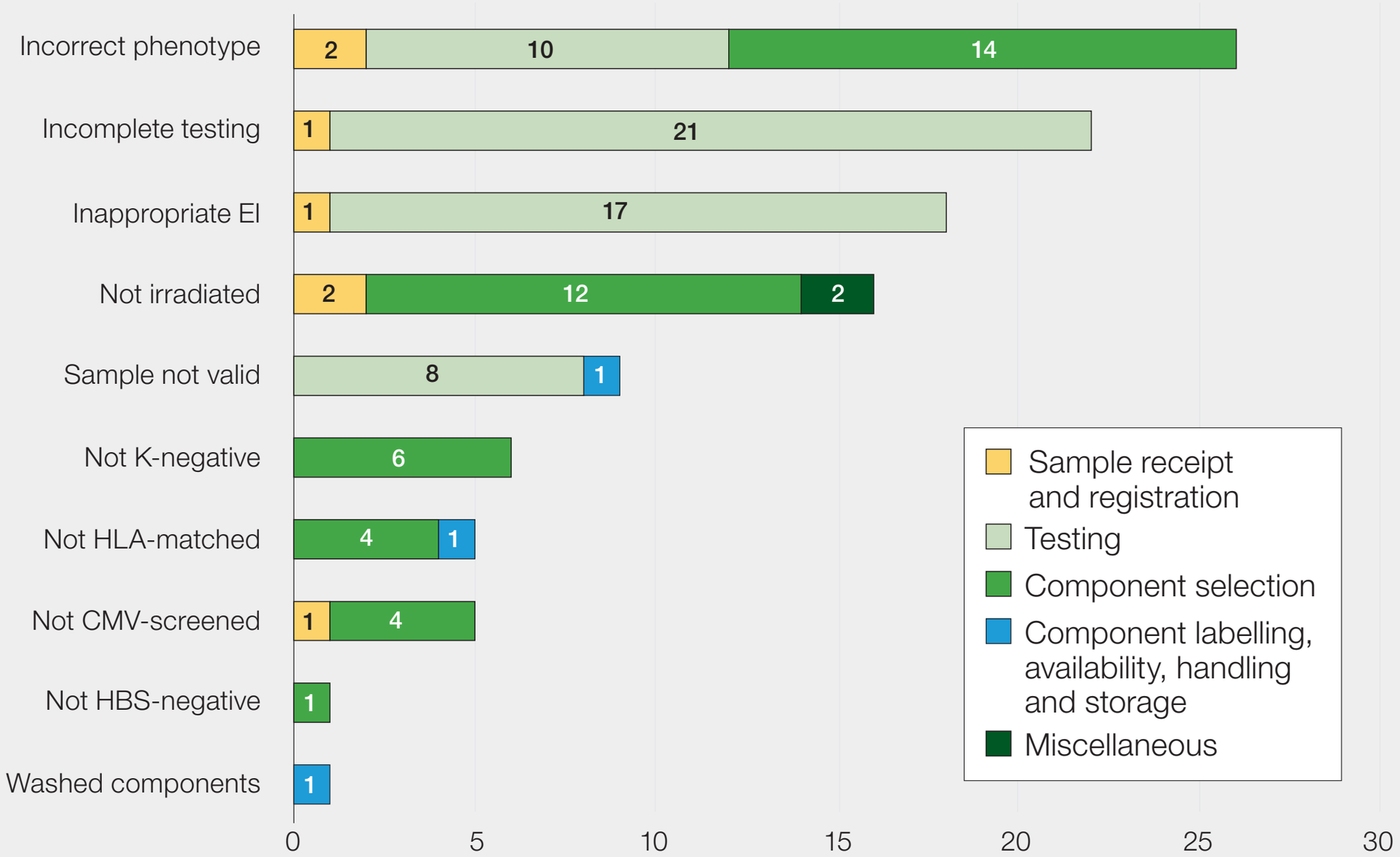
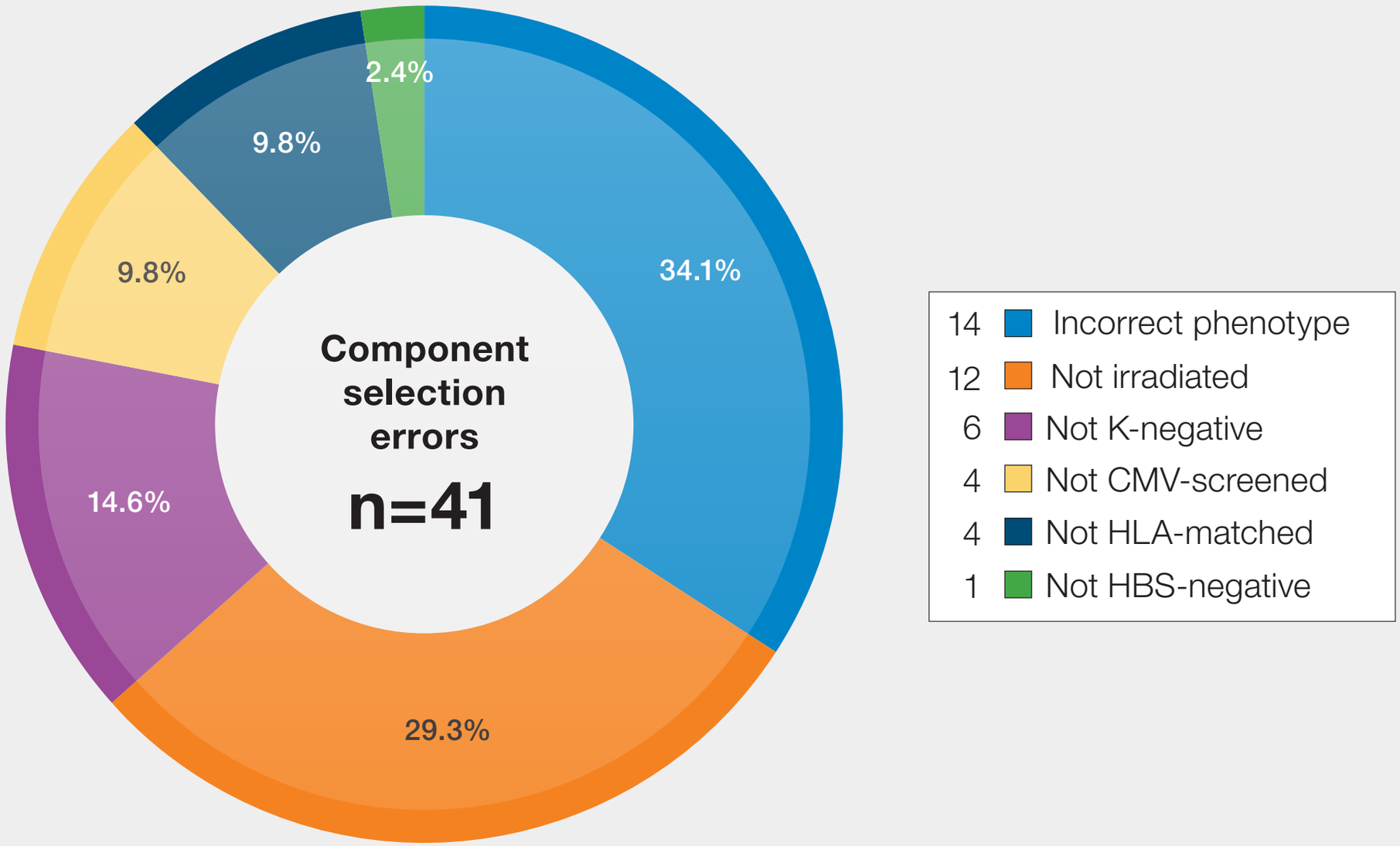


Figure 9.9: Laboratory IBCT-SRNM errors by transfusion step (n=109)



EI=electronic issue; HLA=human leucocyte antigen; CMV=cytomegalovirus

Figure 9.10: Laboratory IBCT-SRNM component selection errors 2022 (n=41)



CMV=cytomegalovirus; HLA=human leucocyte antigen

Figure 9.11: NM IBCT-WCT reported to SHOT in 2022 (n=115)

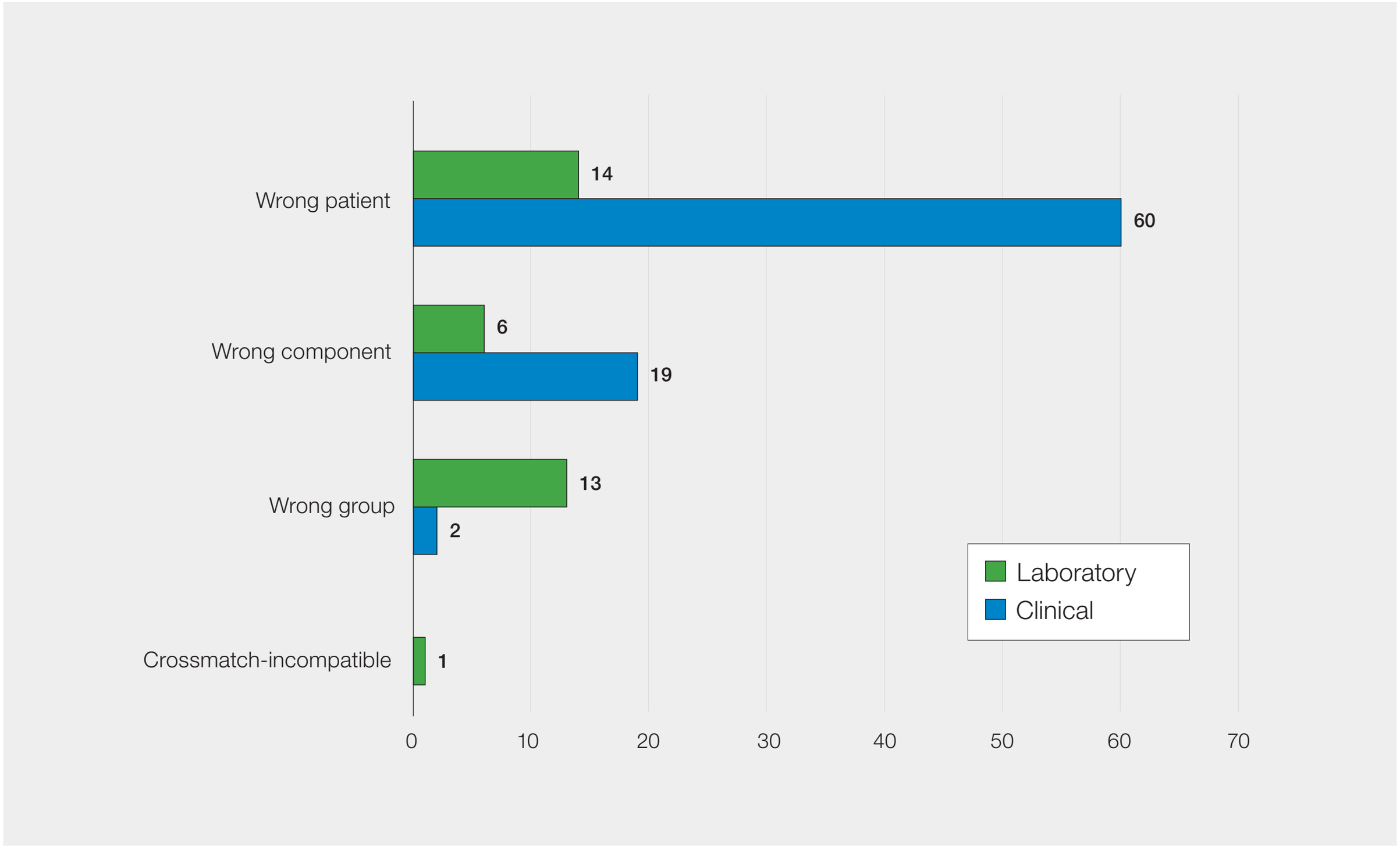


Figure 9.12: NM IBCT-SRNM events in 2022 (n=52)

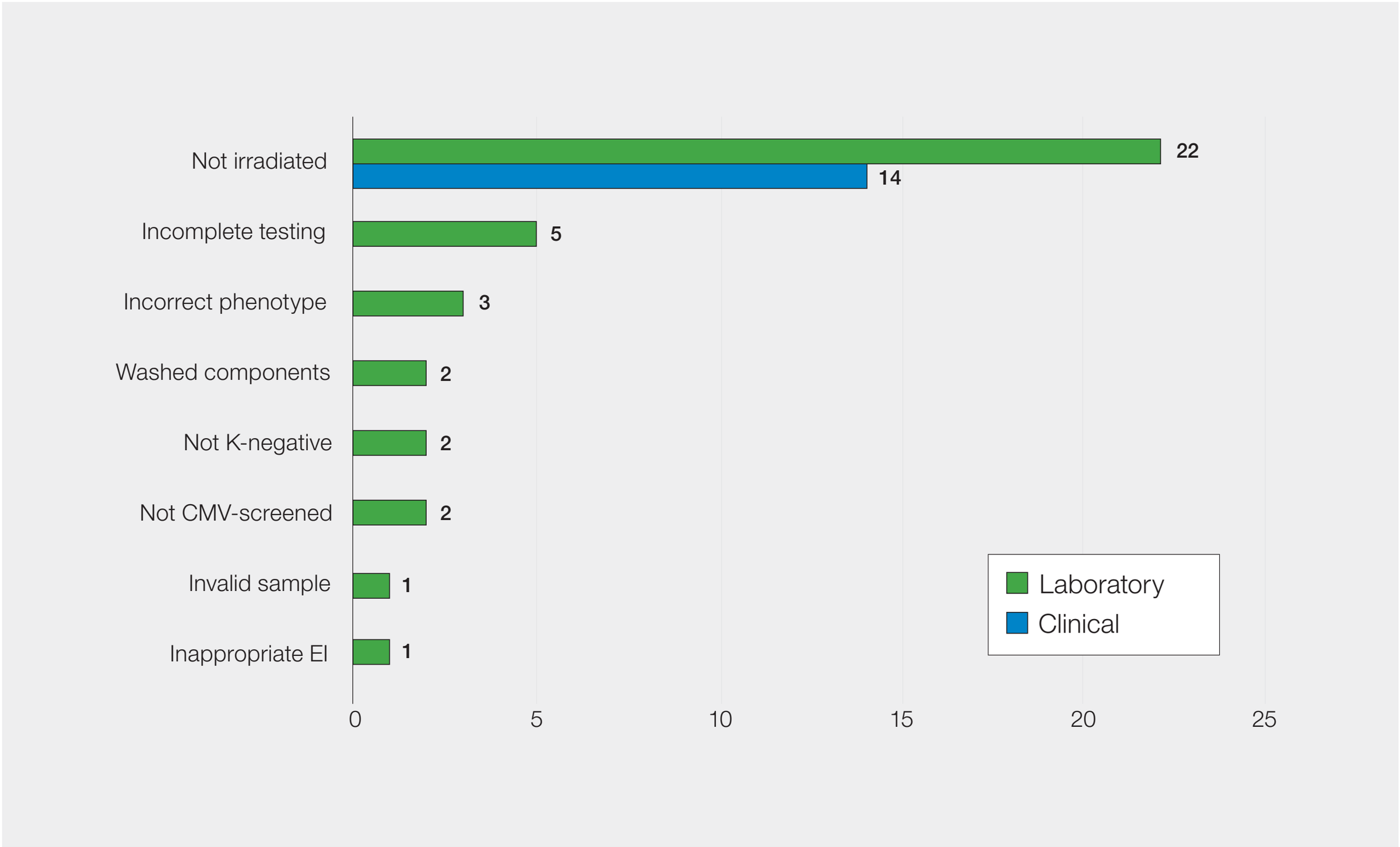


Figure 9.13: Pause and check pre-administration

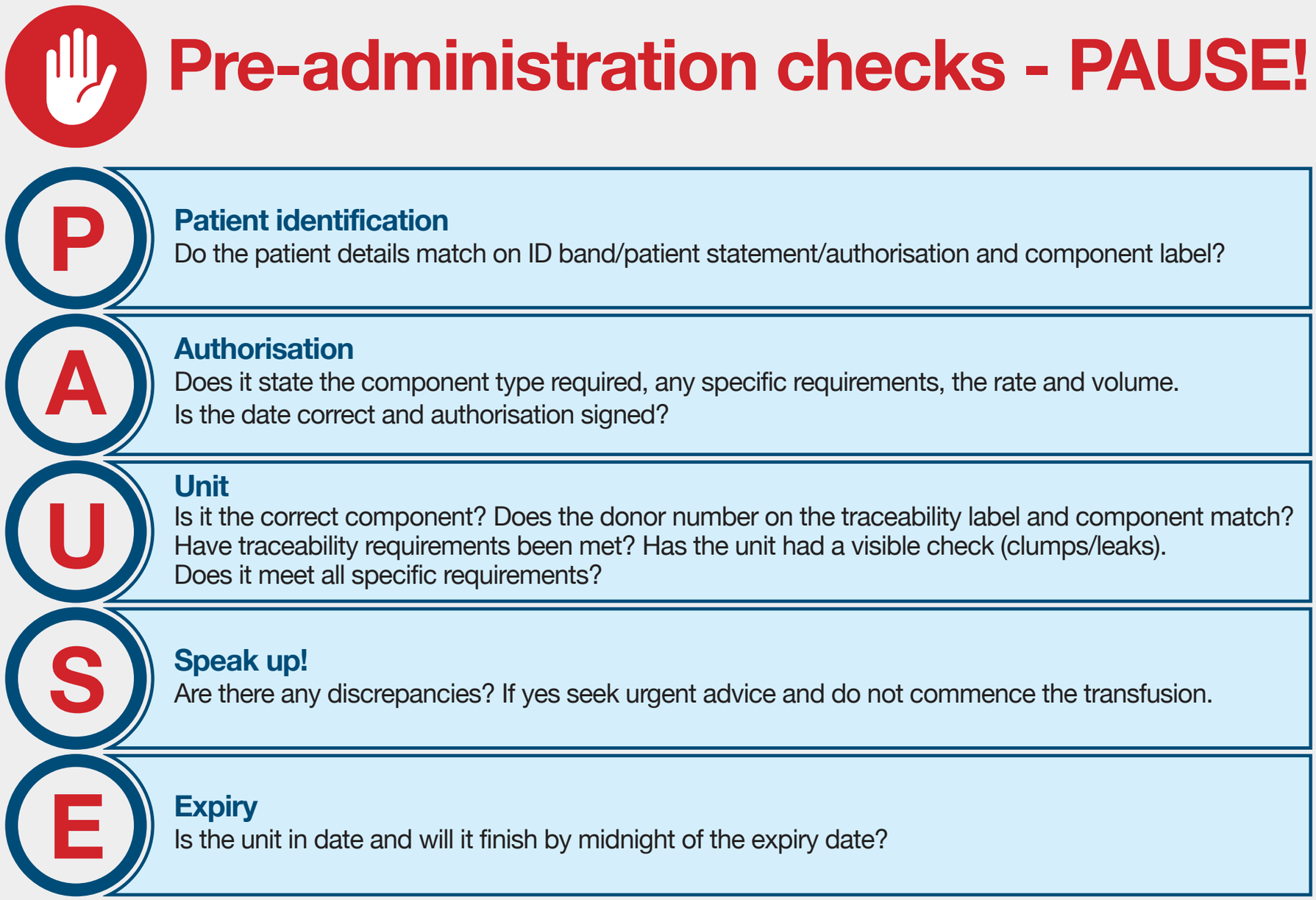


Figure 10.1: Breakdown of 2022 handling and storage error (HSE) reports (n=272)

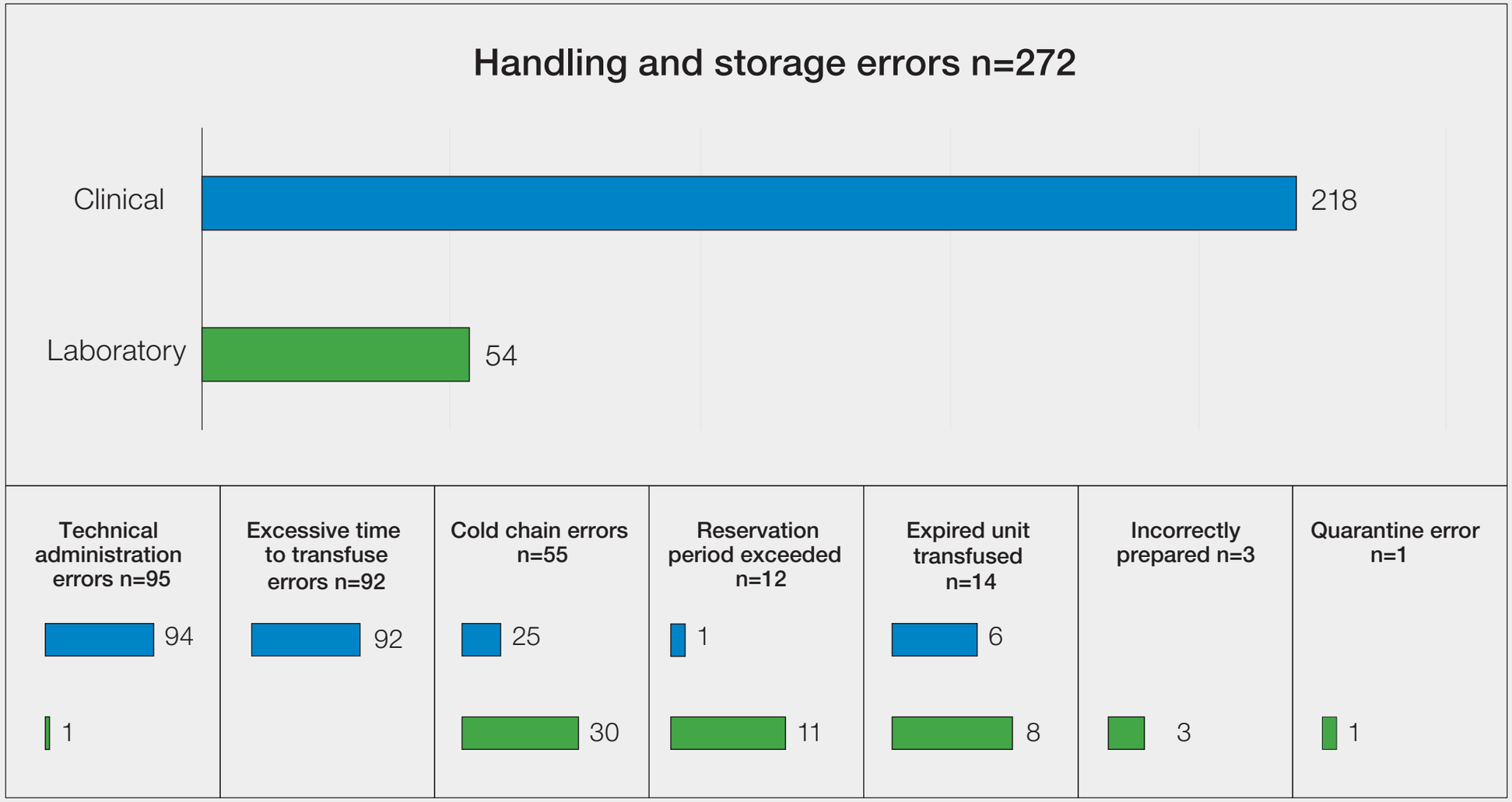


Figure 10.2: Transfusion take-down tag

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Figure 11a.1: Delayed transfusions by year 2011 to 2022

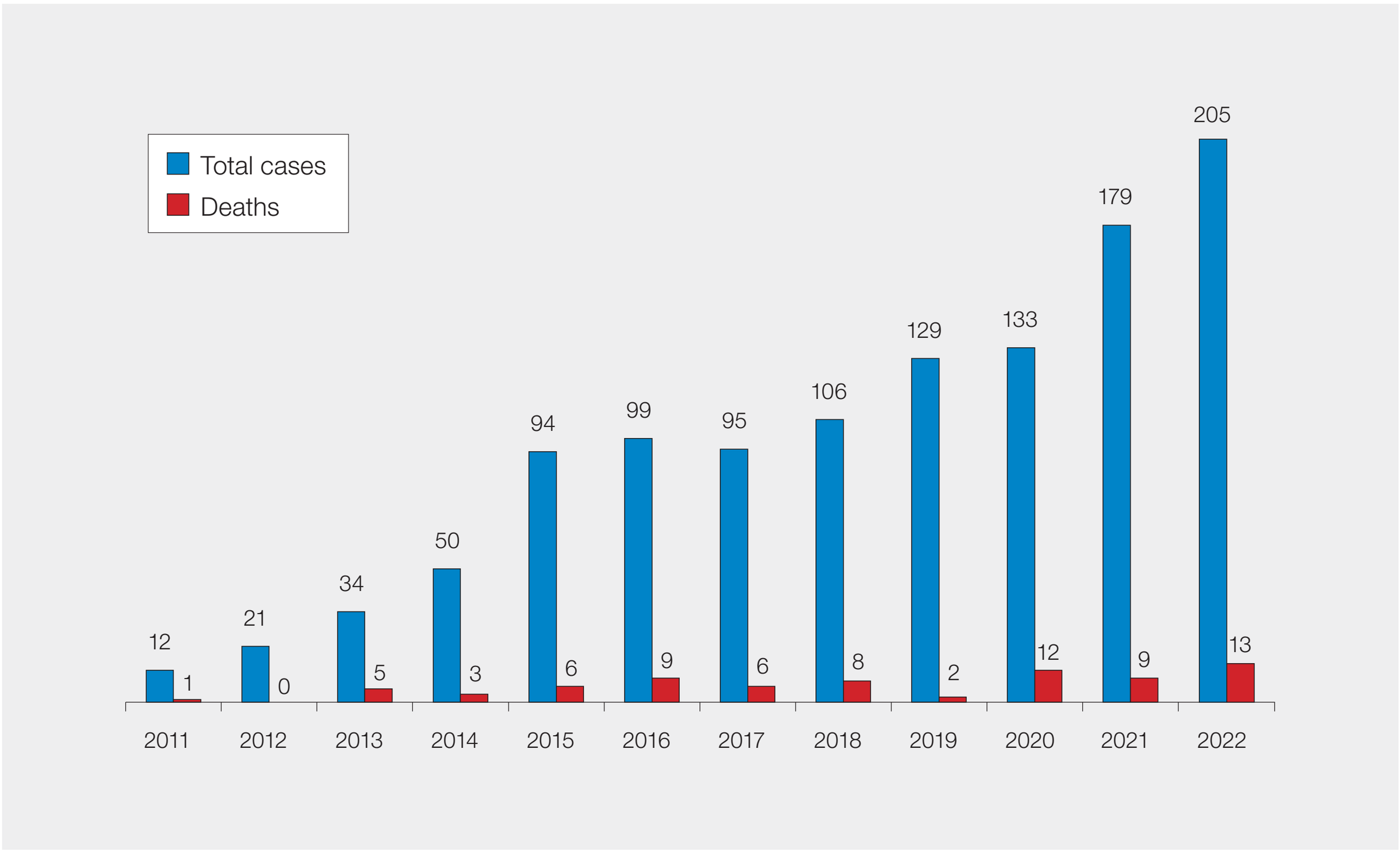


Figure 11a.2: Primary causes of delayed transfusions in 2022 (n=205)

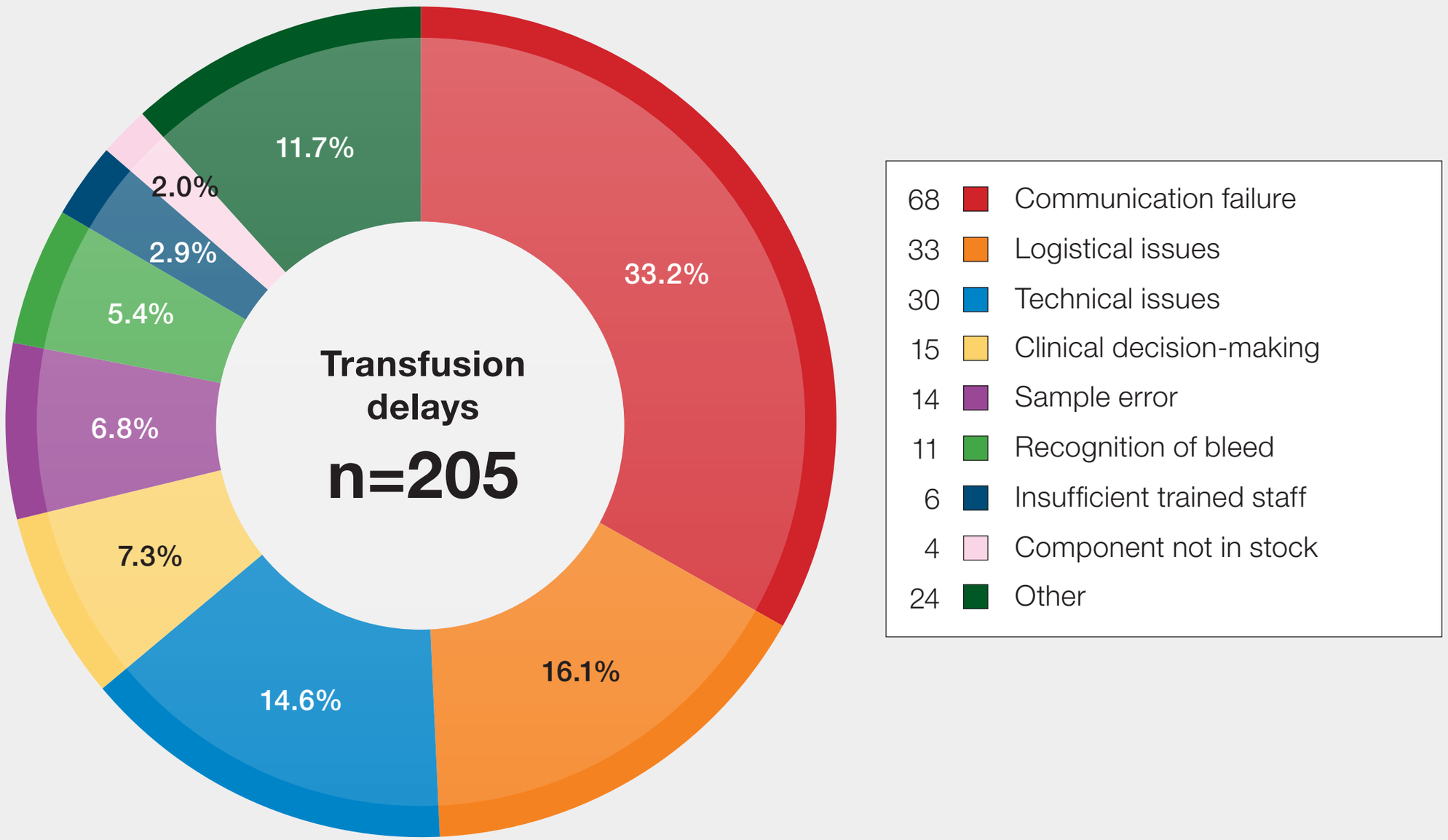
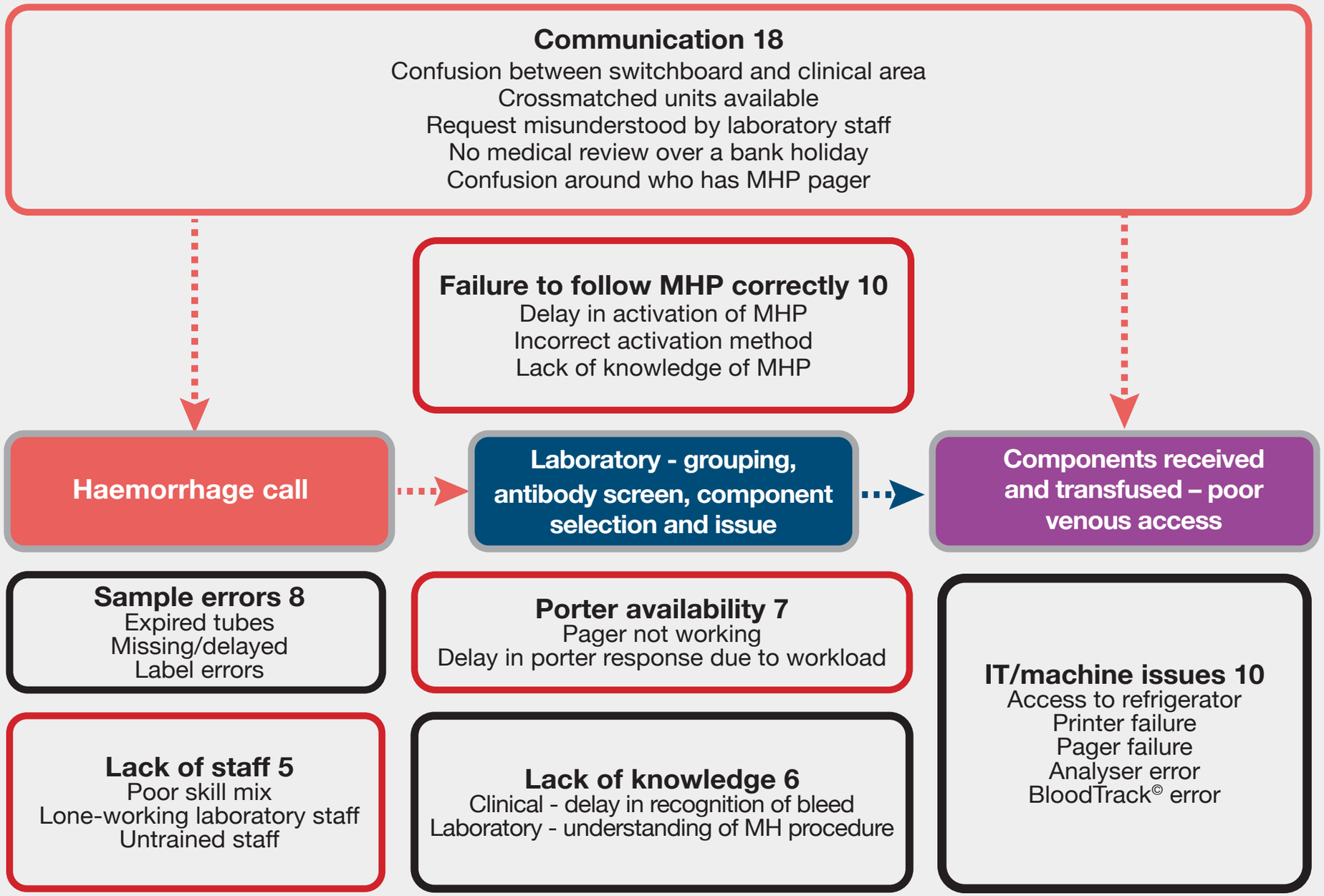


Figure 11a.3: Key factors contributing to delayed transfusions in 41 cases of major haemorrhage



MHP=major haemorrhage protocol; IT=information technology

Figure 11b.1: Step in transfusion process with associated errors

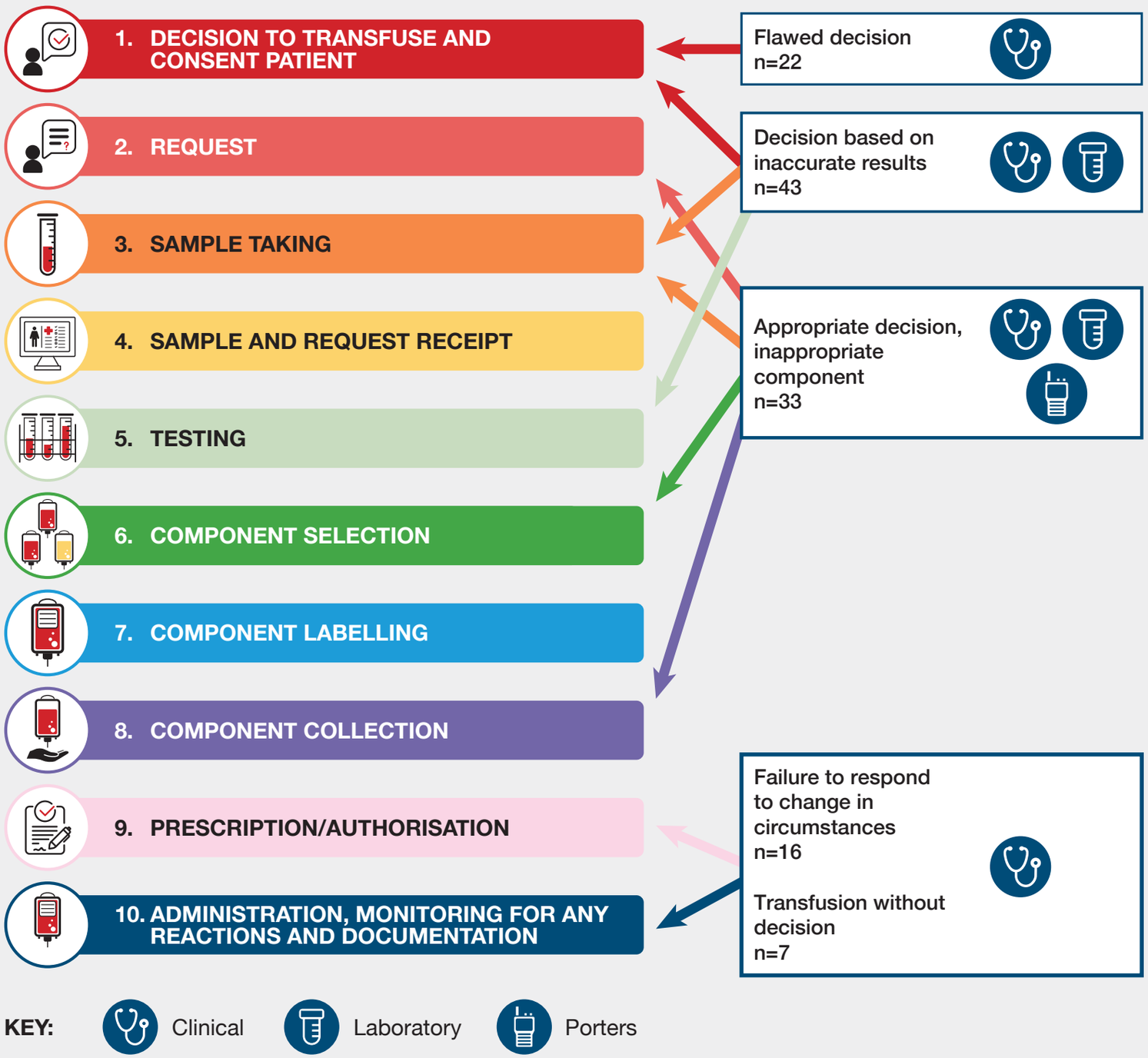
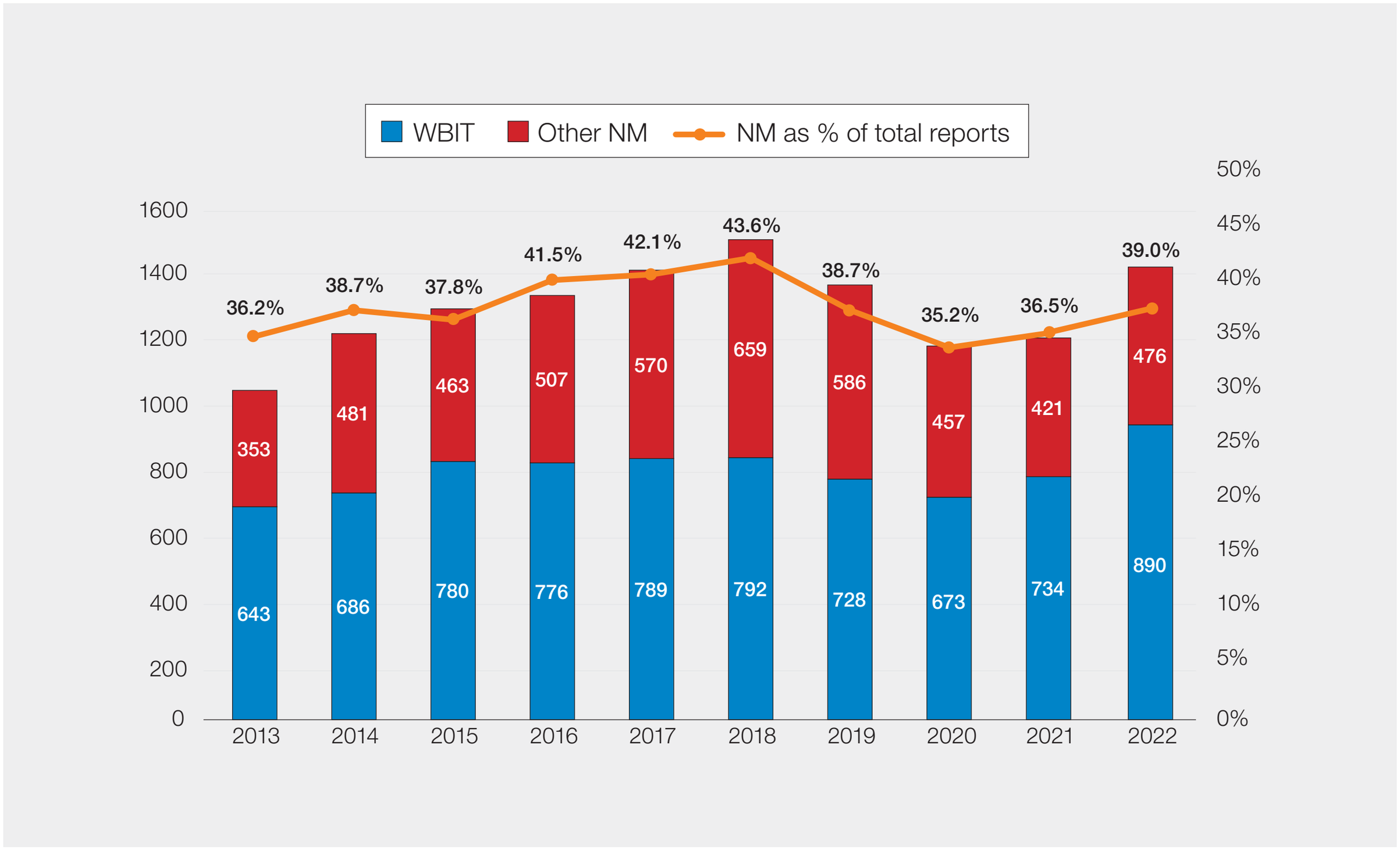


Figure 12.1: A decade of near miss and WBIT reports 2013-2022



WBIT=wrong blood in tube; NM=near miss

Figure 12a.1: Primary errors leading to WBIT (n=890)

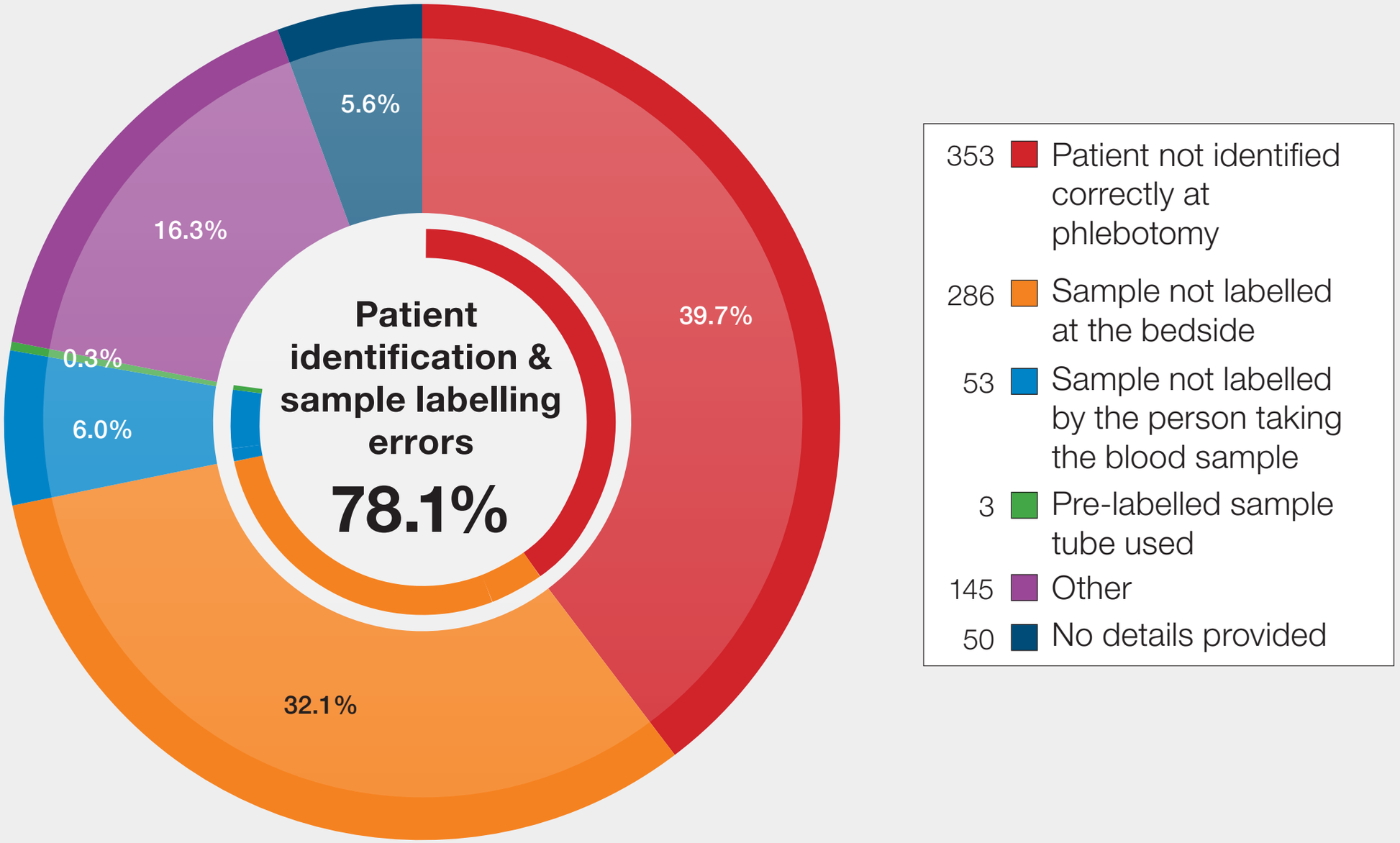


Figure 12a.2: Point in the process where the error was detected (n=890)

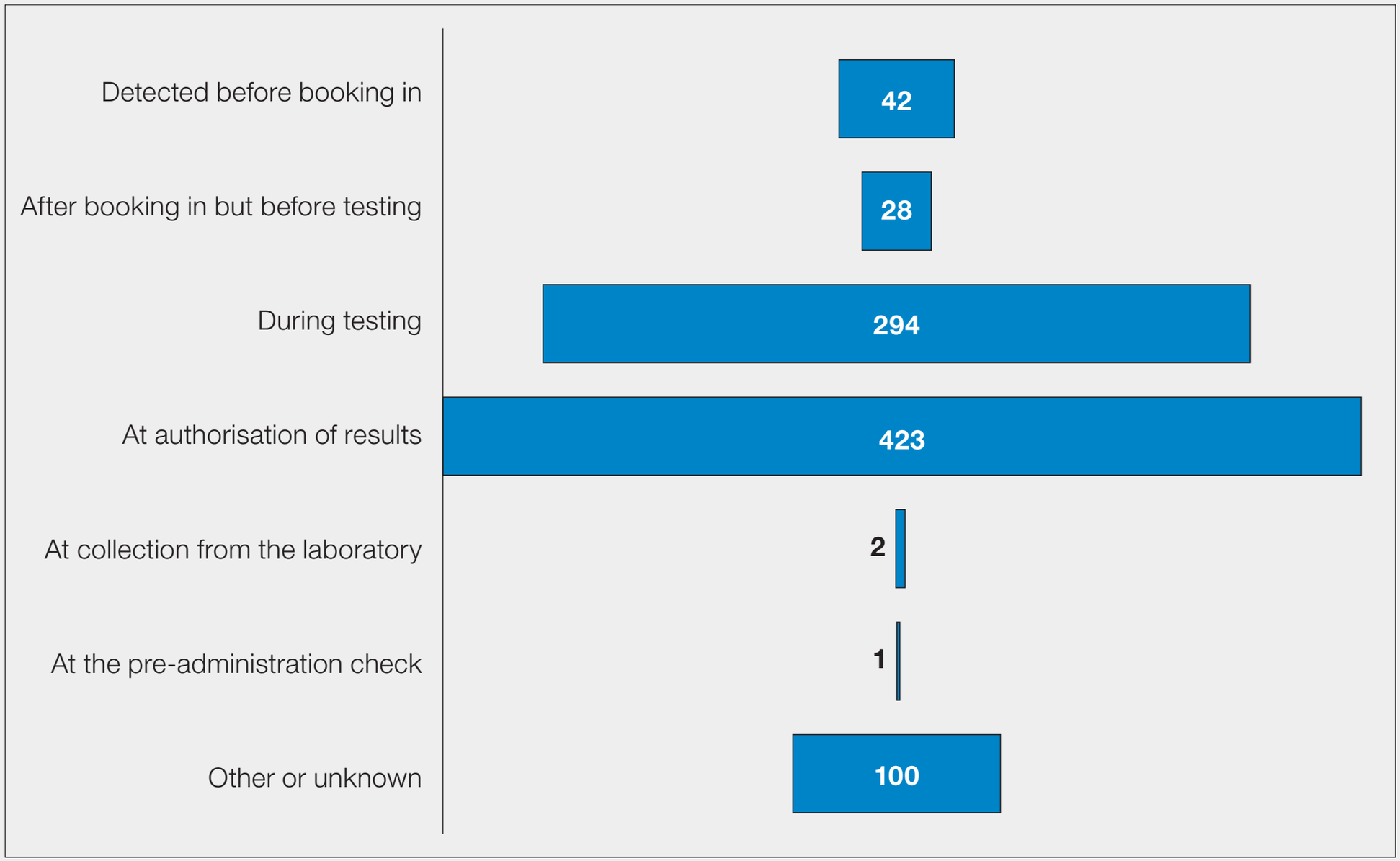


Figure 12a.3: Numbers of different healthcare professionals who took blood samples (n=890)

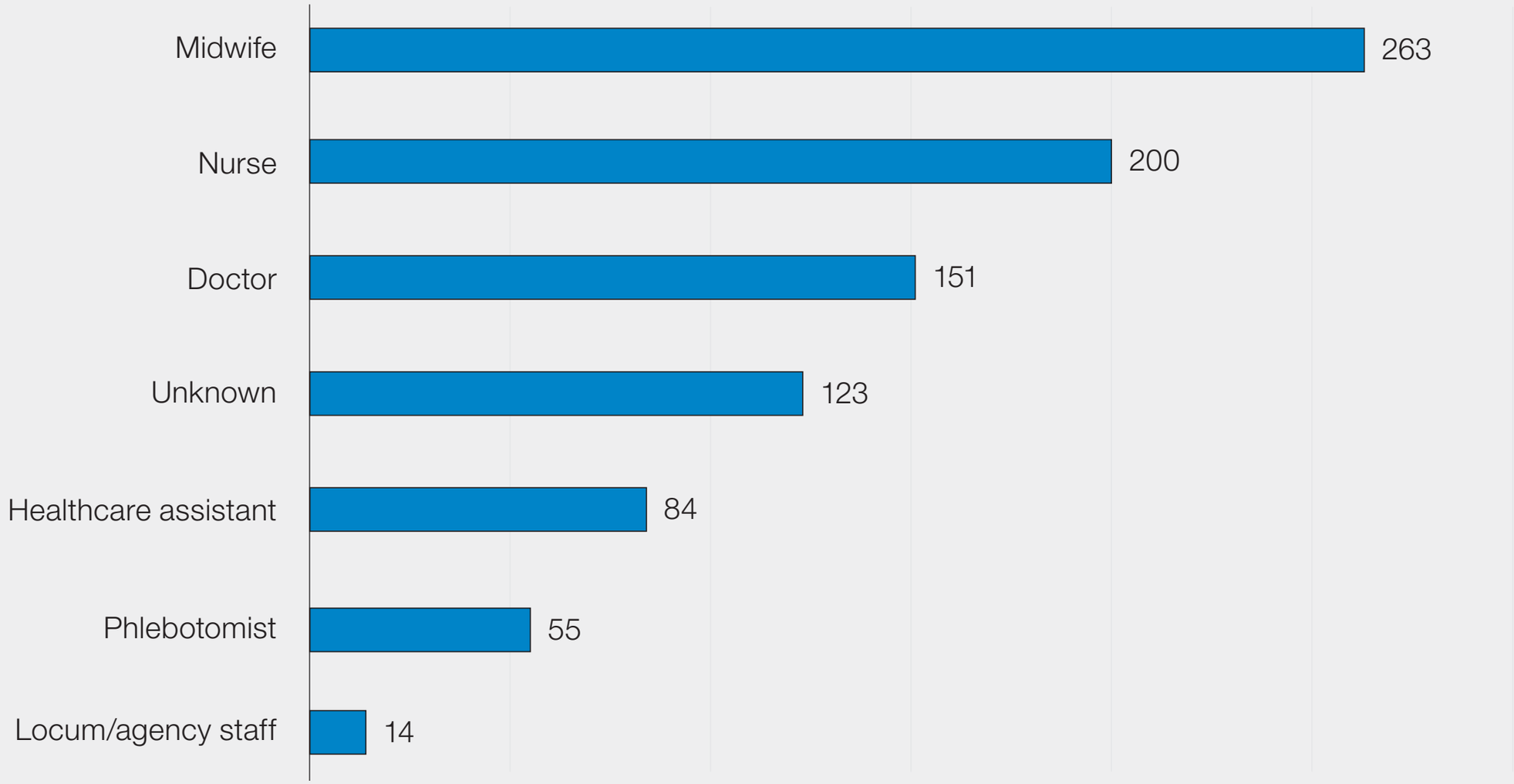


Figure 13.1: Breakdown of 2022 RBRP reports (n=264)

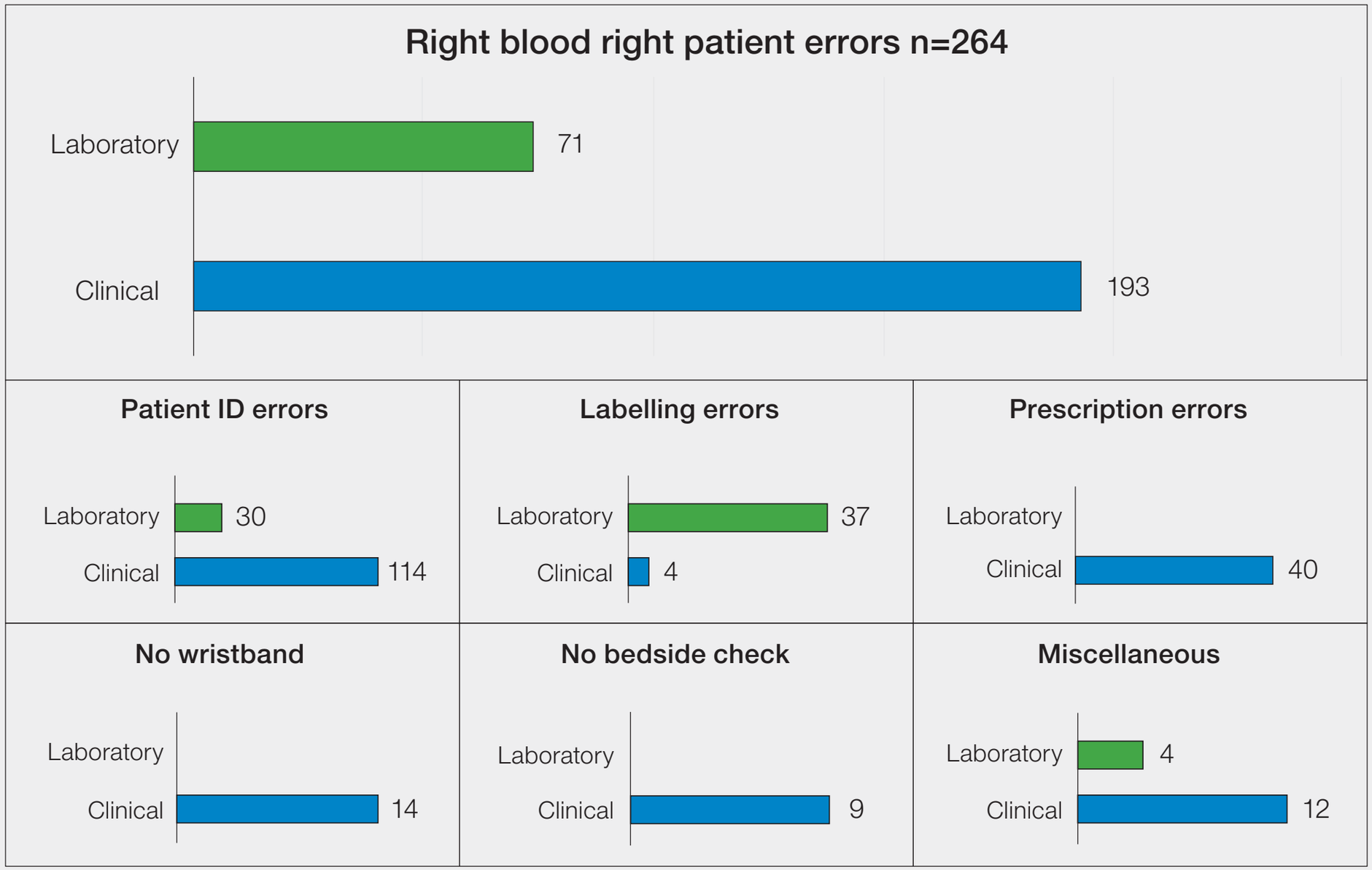
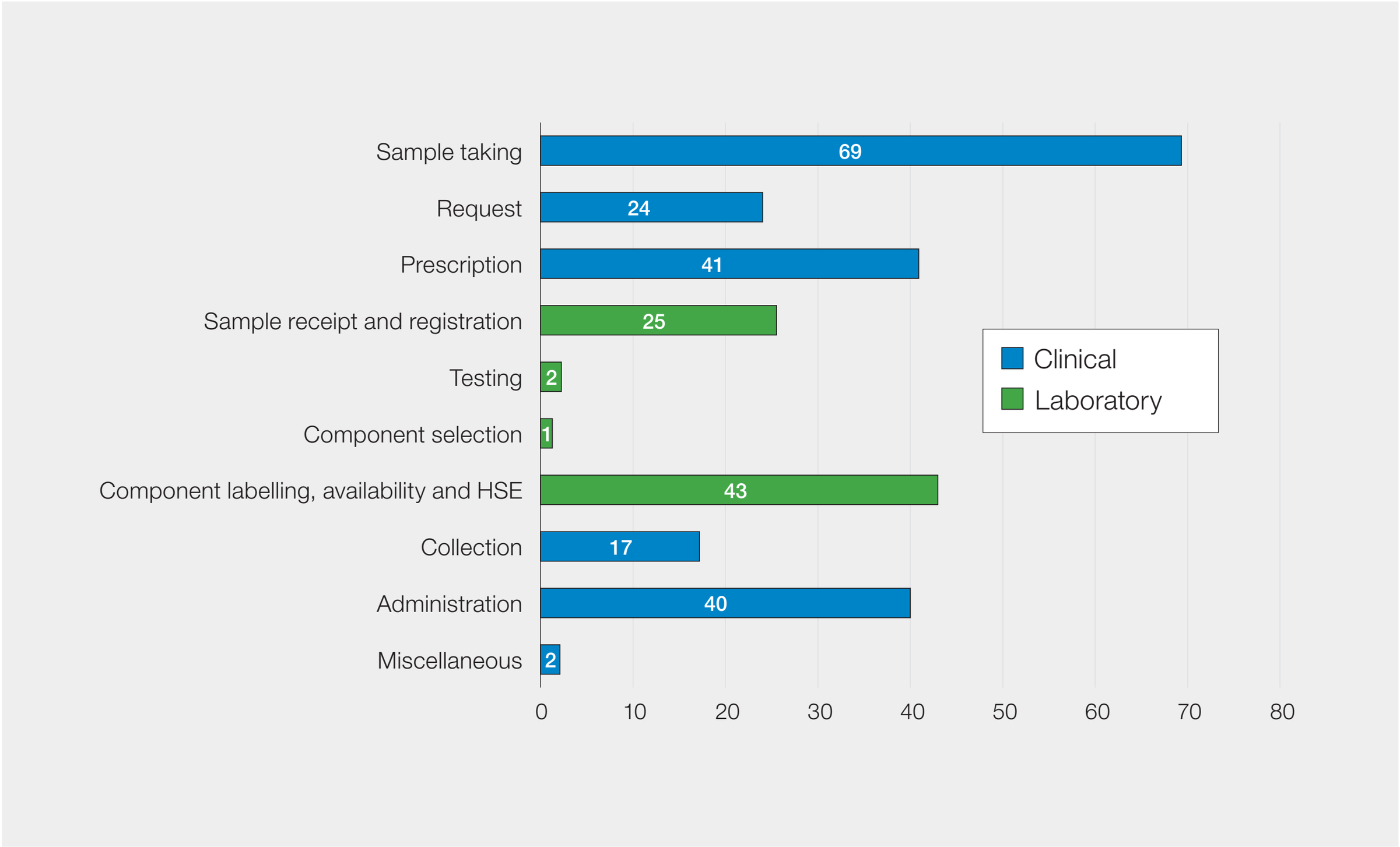


Figure 13.2: RBRP classified by the stage when the primary error occurred in 2022 (n=264)



HSE=handling and storage errors

Figure 13.3: Details of patient identification errors (n=144)

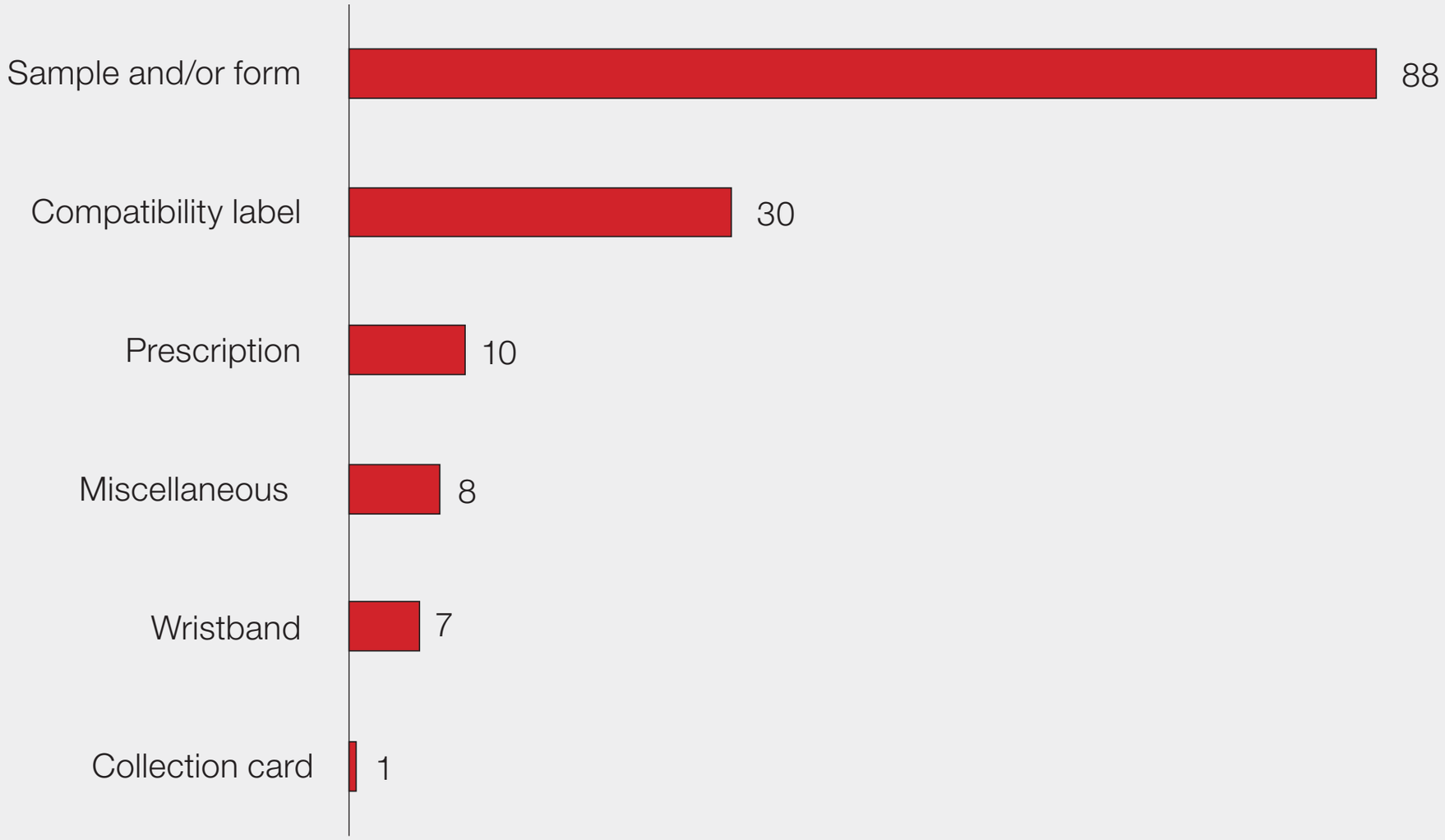


Figure 13.4: The presence and types of pre-administration check in RBRP errors (n=264)

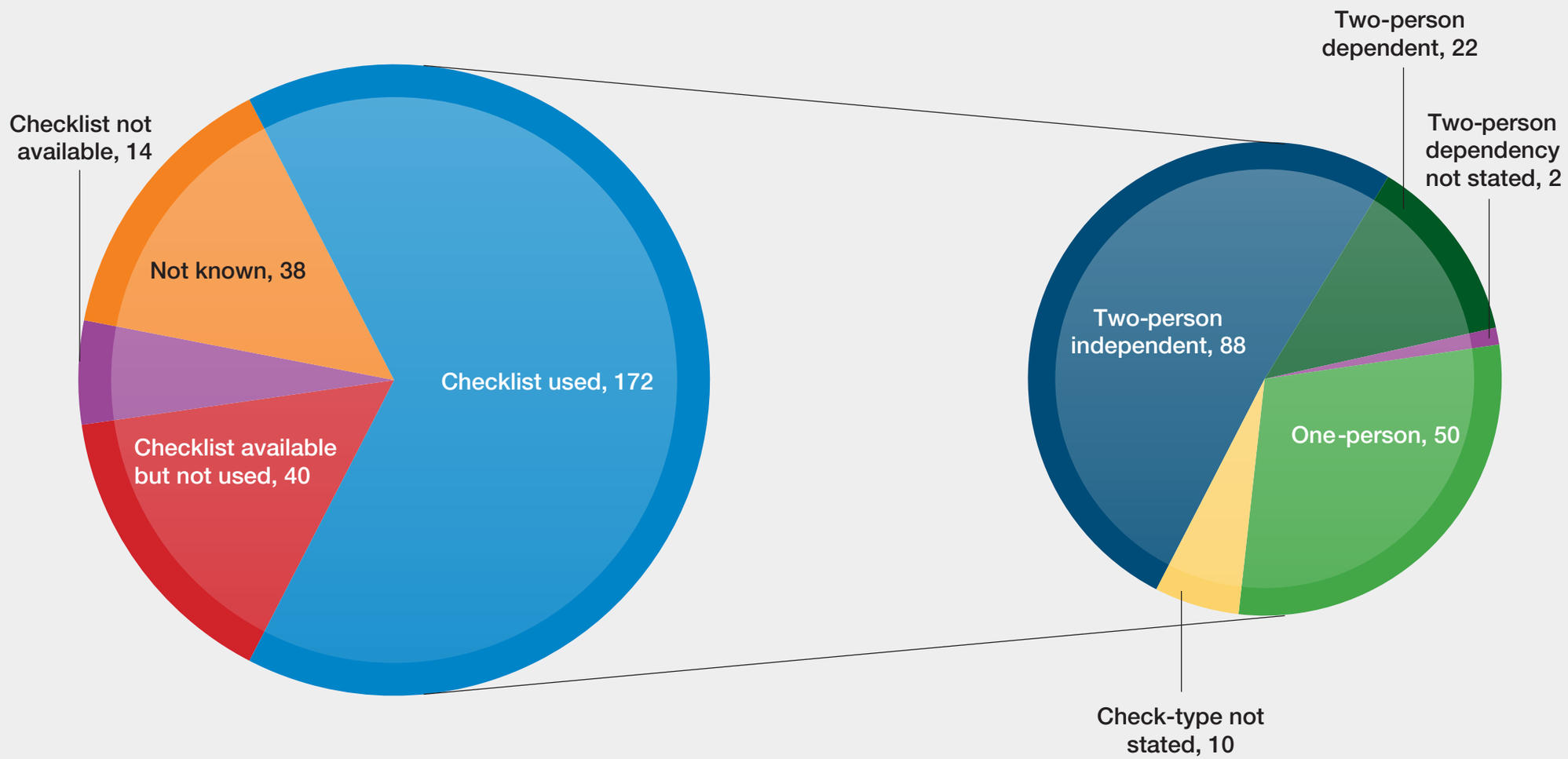
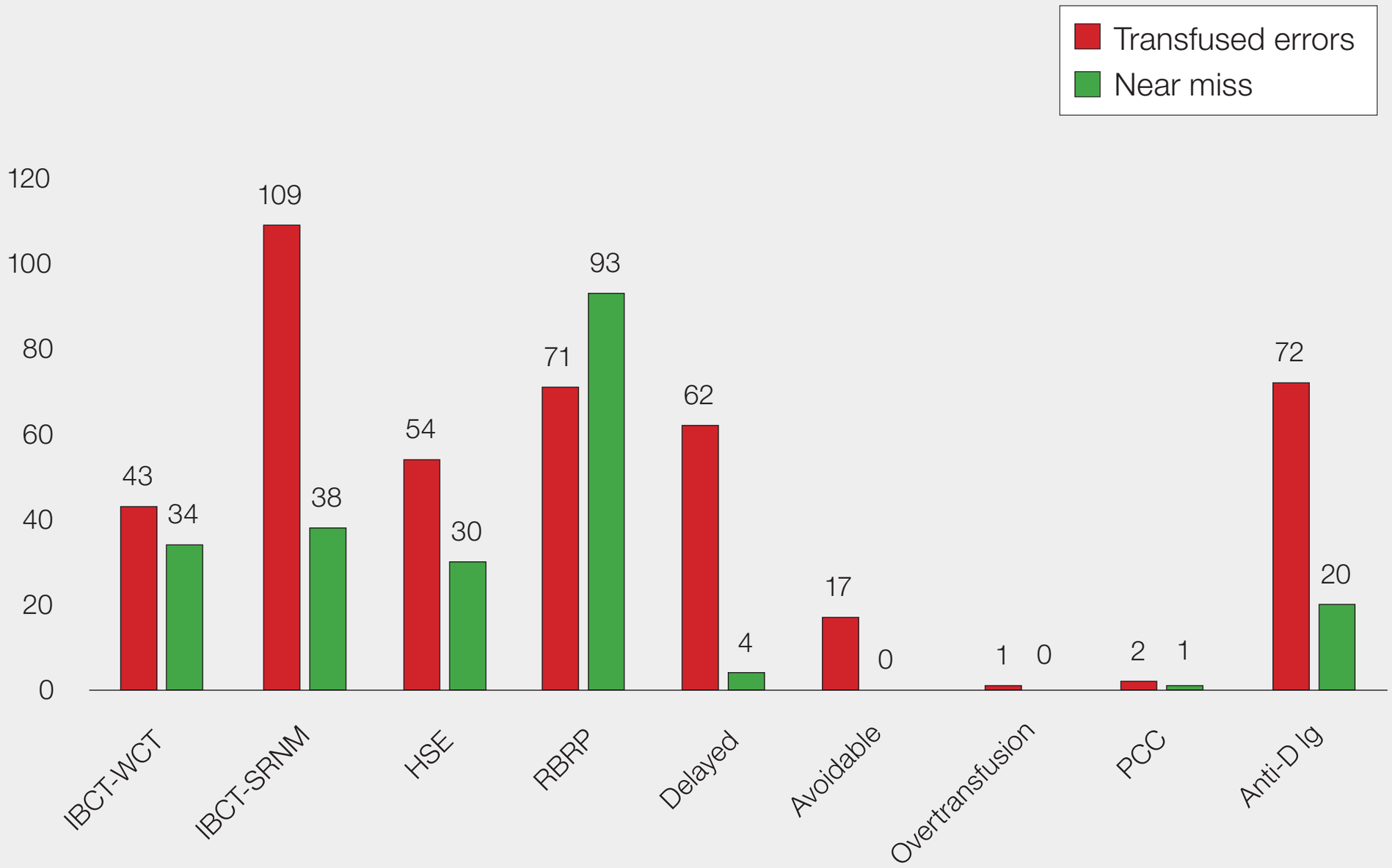
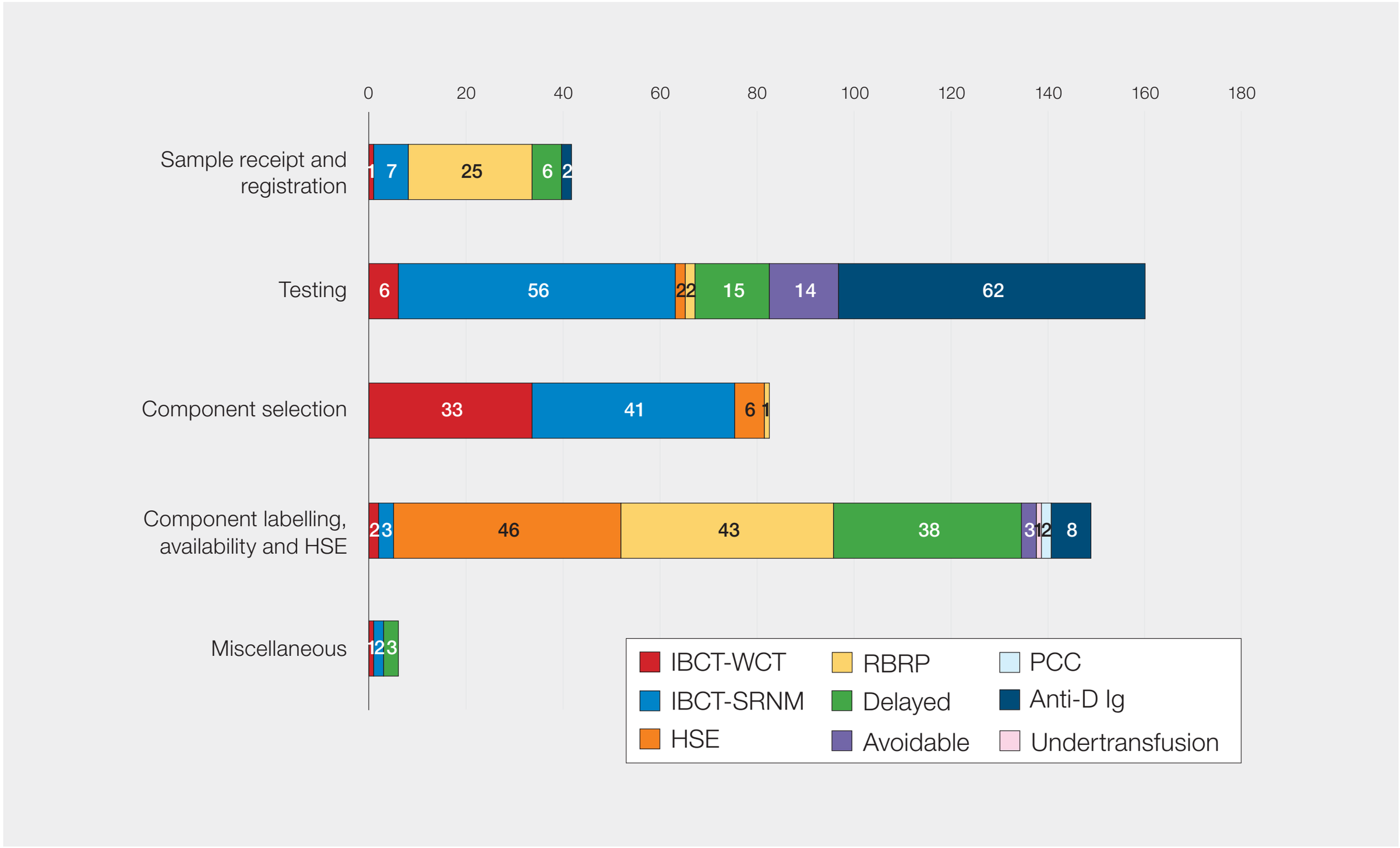


Figure 14.1: Laboratory incidents and near misses by category of outcome (n=651)



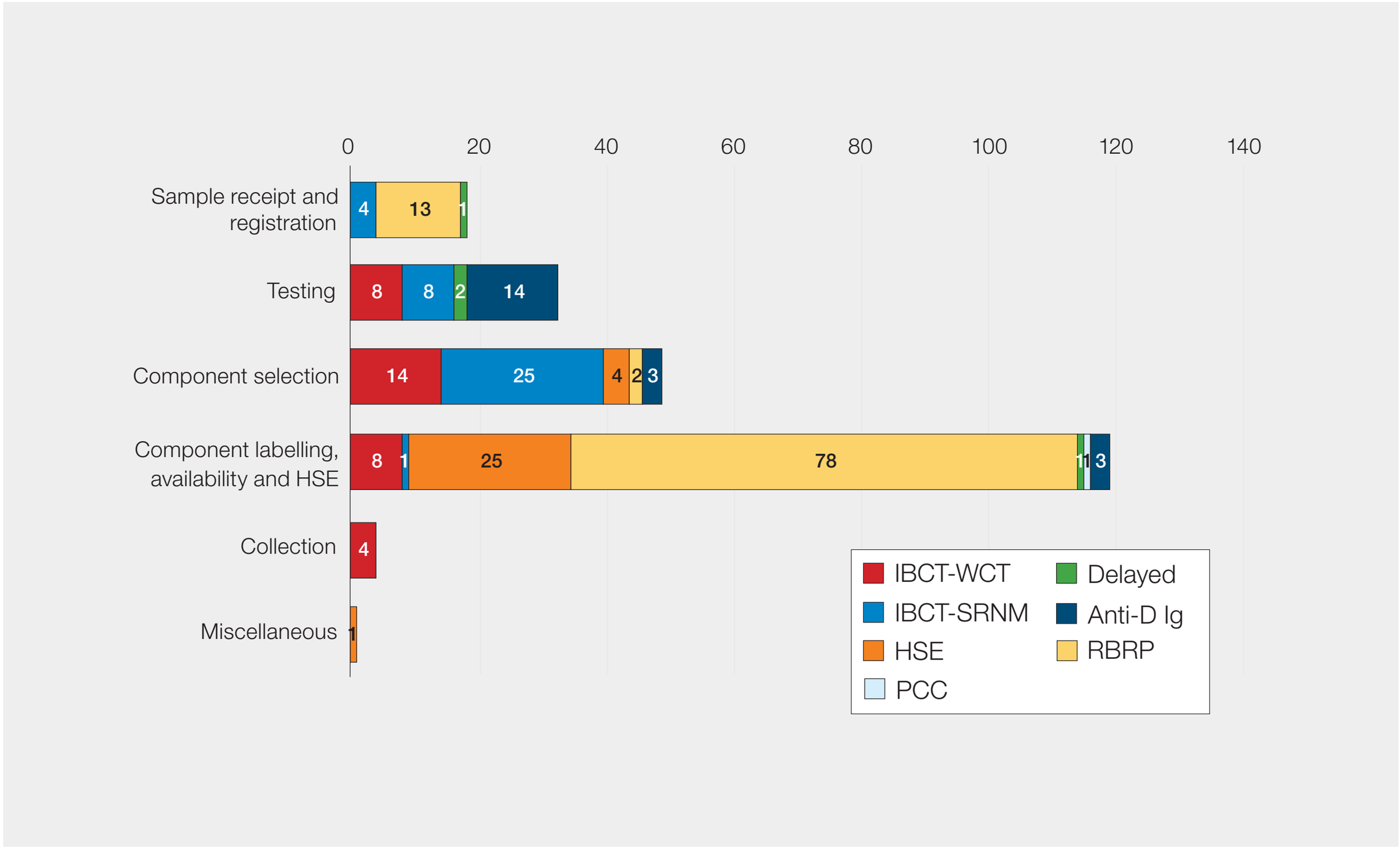
IBCT-WCT=incorrect blood component transfused-wrong component transfused; IBCT-SRNM=IBCT-specific requirements not met; HSE=handling and storage errors; RBRP=right blood right patient; PCC=prothrombin complex concentrate; Ig=immunoglobulin

Figure 14.2: SHOT laboratory data across all categories showing the stage in the transfusion process where the primary error occurred (n=431)



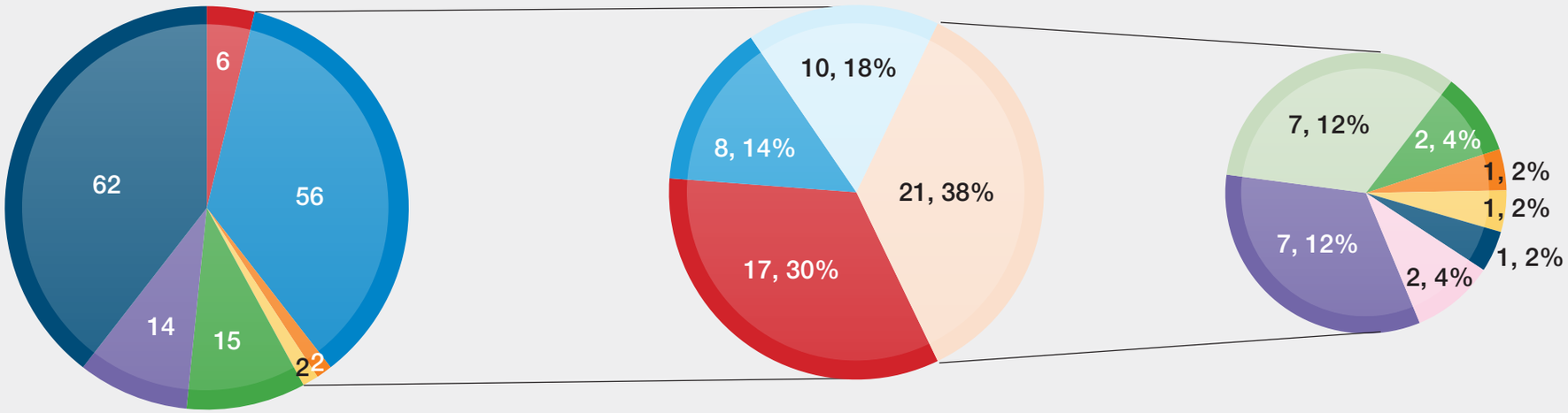
Of the 7 incidents classed as 'miscellaneous', 3 resulted in IBCT-SRNM errors, 3 delayed transfusions and 1 IBCT-WCT

Figure 14.3: SHOT near miss laboratory errors showing at which stage in the transfusion process the primary error occurred with outcome (n=220)



IBCT-WCT=incorrect blood component transfused-wrong component transfused; IBCT-SRNM=IBCT-specific requirements not met; HSE=handling and storage errors; RBRP=right blood right patient; PCC=prothrombin complex concentrate; Ig=immunoglobulin

Figure 14.4: Laboratory testing errors by reporting category (n=157) and SRNM testing errors by subcategory (n=56)



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

Figure 14.5: Cell-free fetal DNA prediction errors reported to SHOT 2019-2022

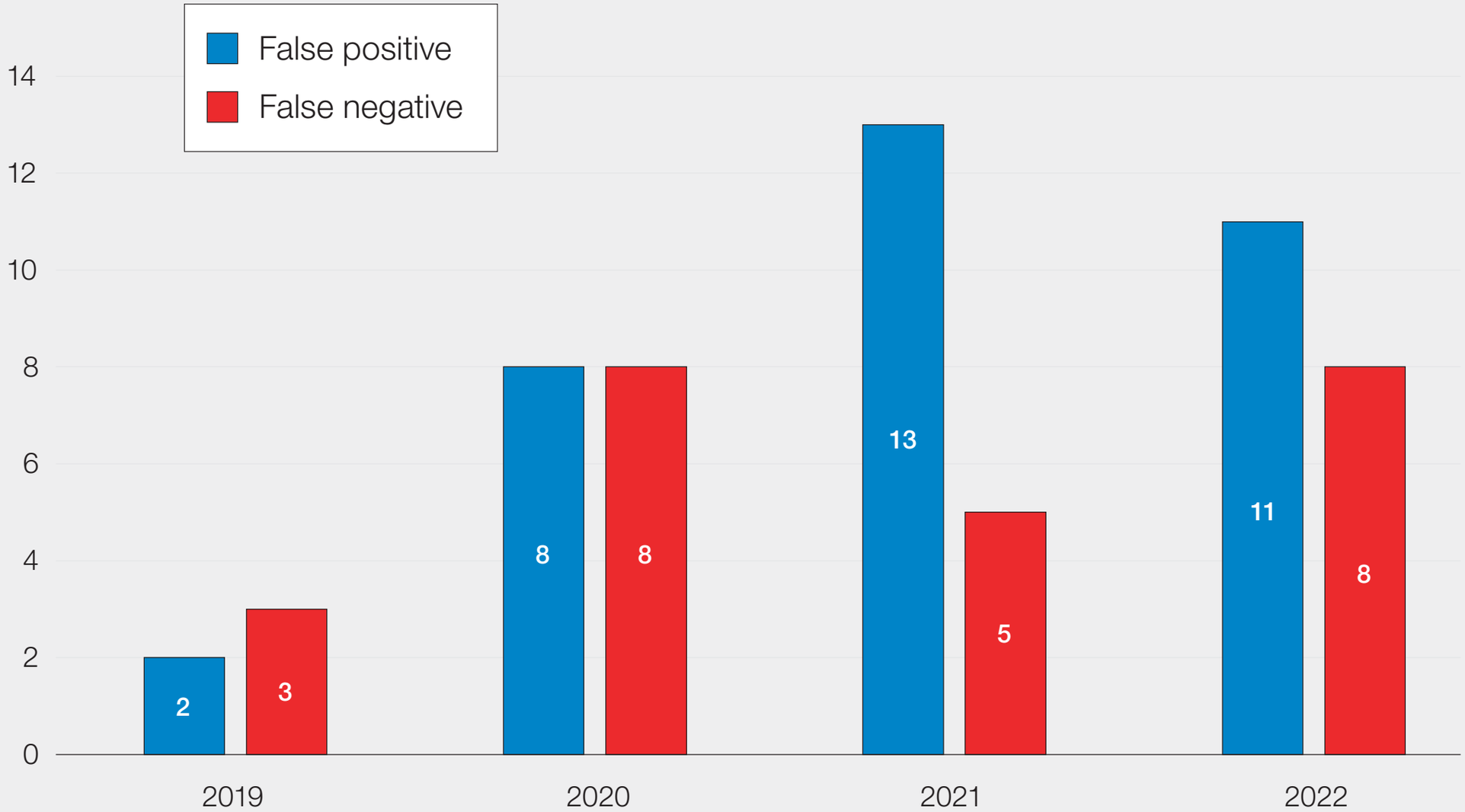
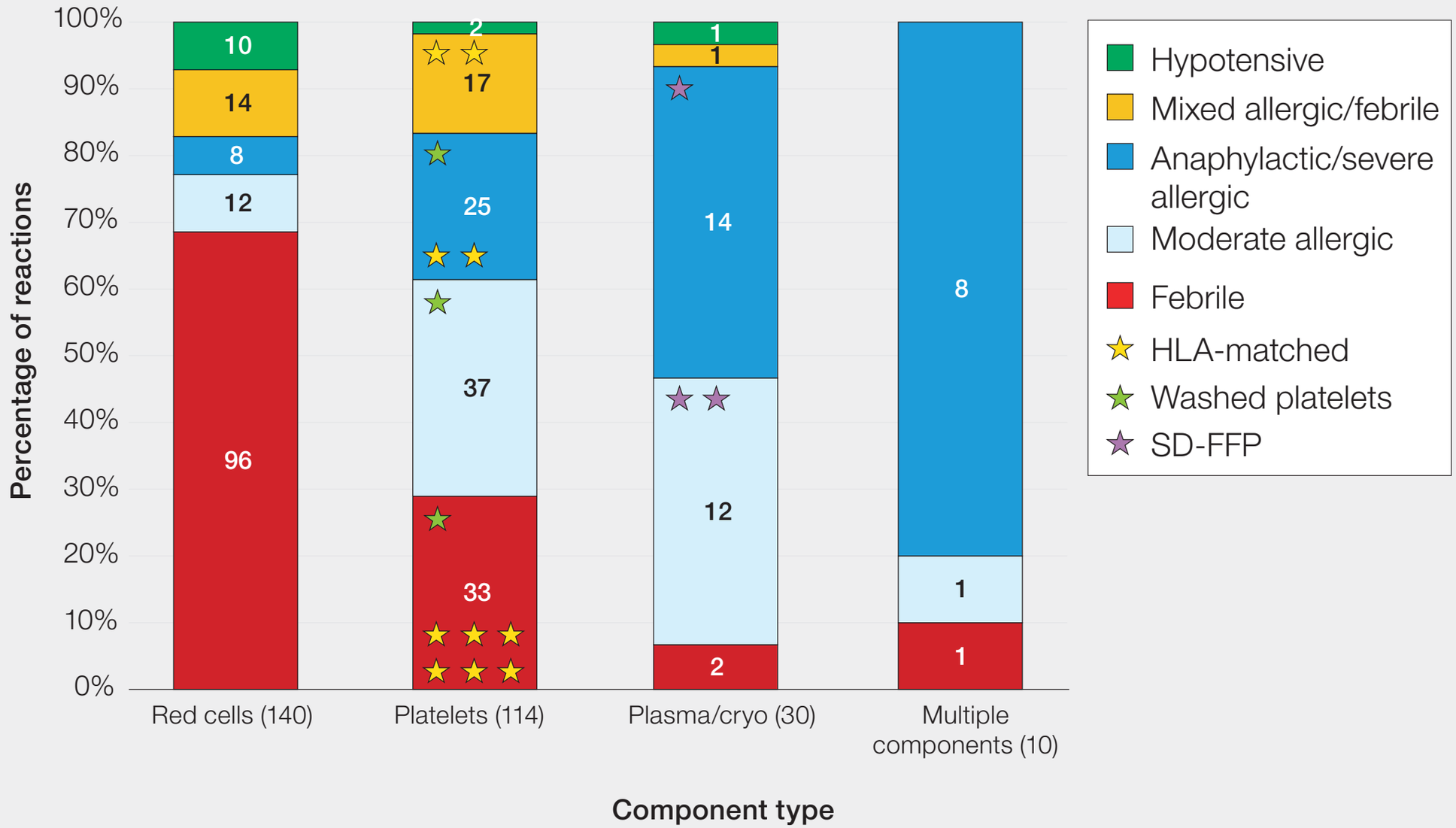


Figure 14.6: Summary of issues contributing to laboratory errors

BMS=biomedical scientist

Figure 16.1: Reactions by component type



HLA=human leucocyte antigen; cryo=cryoprecipitate; SD-FFP=solvent detergent treated fresh frozen plasma

Figure 16.2: Incidence of reactions as a percentage of platelet units issued

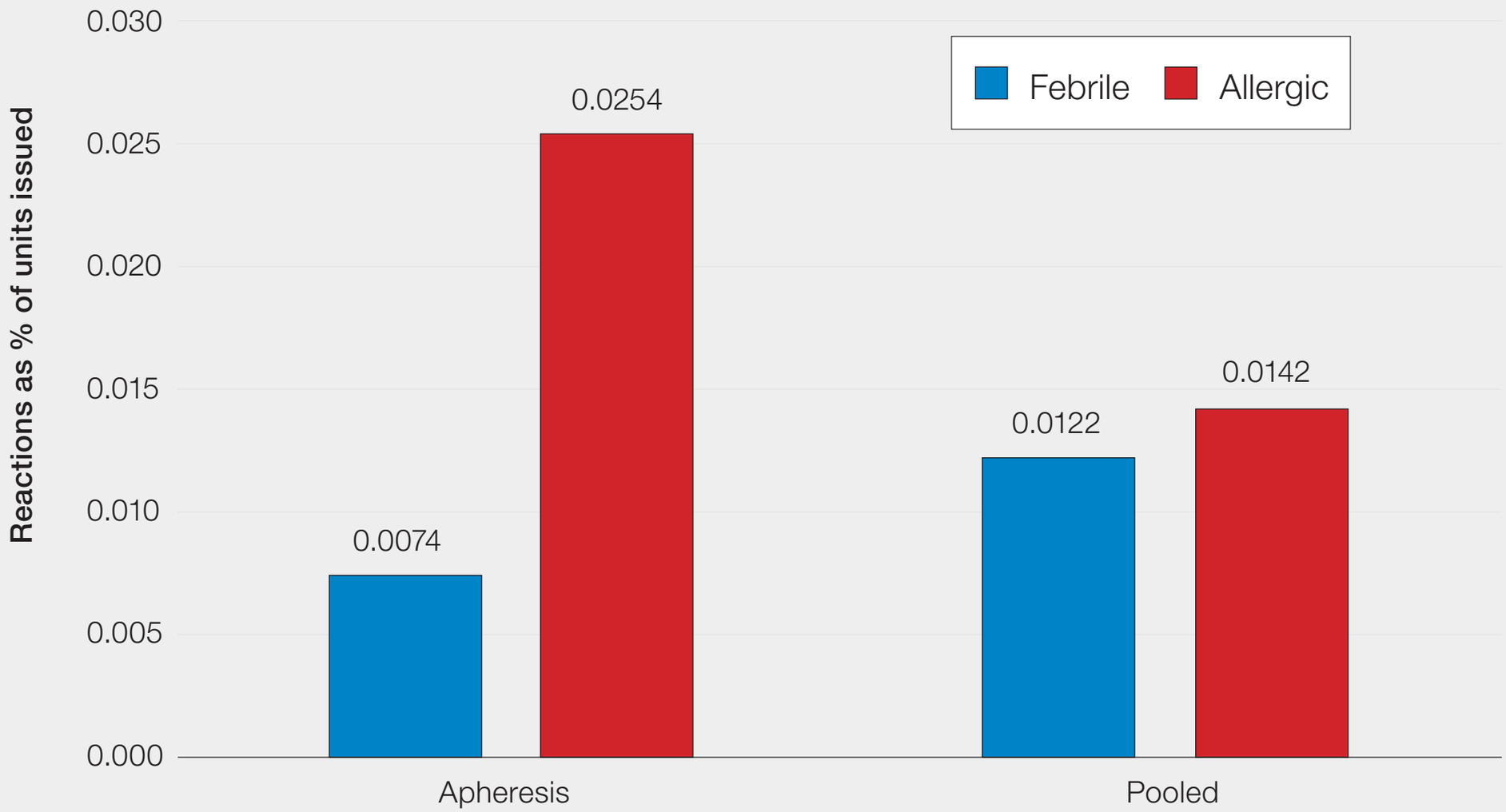
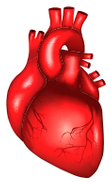


Figure 17a.1: TACO pre-transfusion checklist

TACO Checklist	Patient Risk Assessment	TICK
	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?	
	Does the patient have severe anaemia?	
	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 receiving intravenous fluids (or received them in the previous 24 hours)?	
	Is there any peripheral oedema?	
	Does the patient have hypoalbuminaemia?	
	Does the patient have significant renal impairment?	

If Risks Identified	YES	NO
Review the need for transfusion (do the benefits outweigh the risks)?		
Can the transfusion be safely deferred until the issue can be investigated, treated or resolved?		

If Proceeding with Transfusion: Assign Actions	TICK
Body weight dosing for red cells	
Transfuse a single unit (red cells) and review symptoms	
Measure fluid balance	
Prophylactic diuretic prescribed	
Monitor vital signs closely, including oxygen saturation	

Name (PRINT):	
Role:	
Date:	**Time (24hr):**
Signature:	

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.

TACO=transfusion-associated circulatory overload

TACO=transfusion-associated circulatory overload

Figure 17a.2: Use of the checklist to identify patients at risk of TACO and implementation of mitigating actions

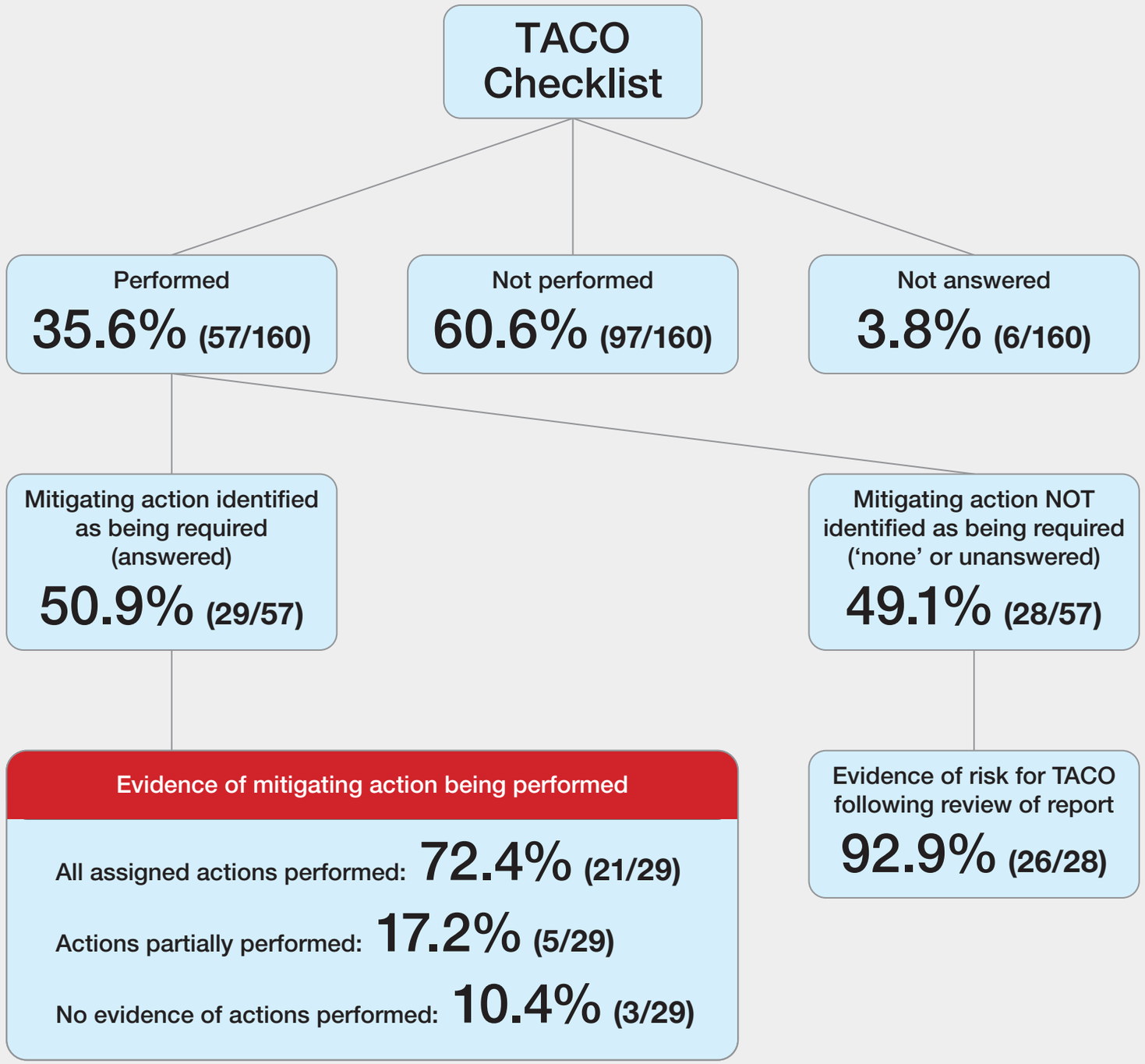
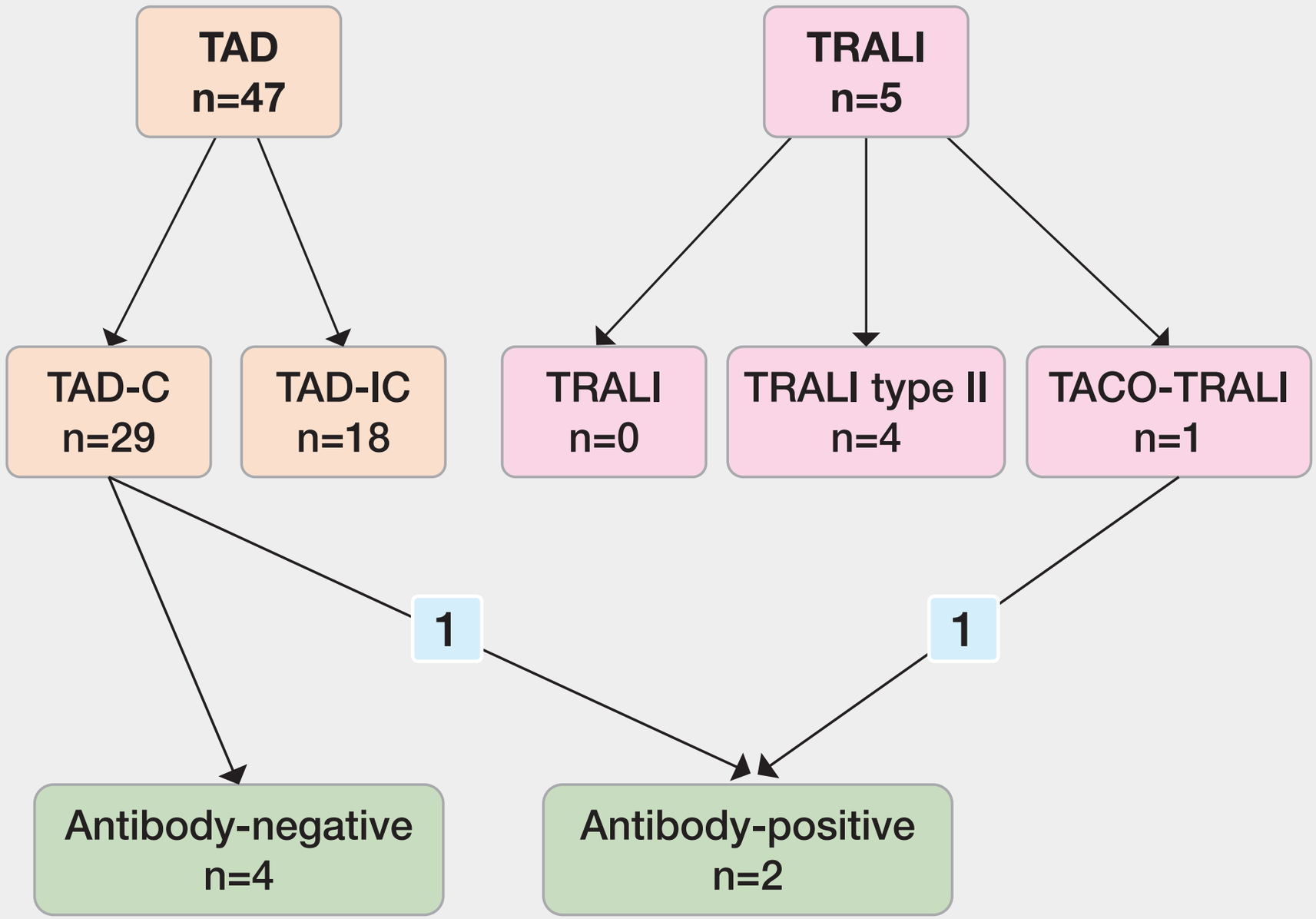


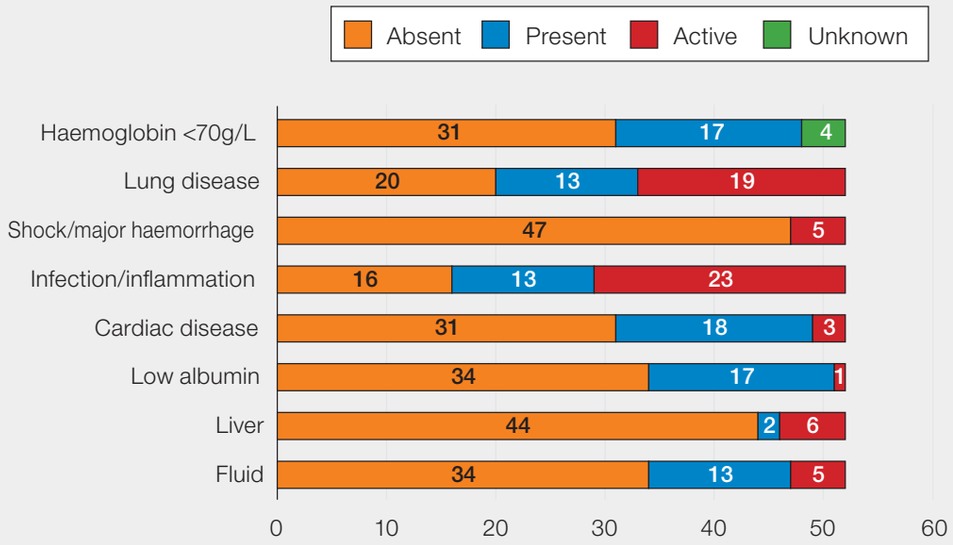
Figure 17b.1: Final classification of non-TACO cases



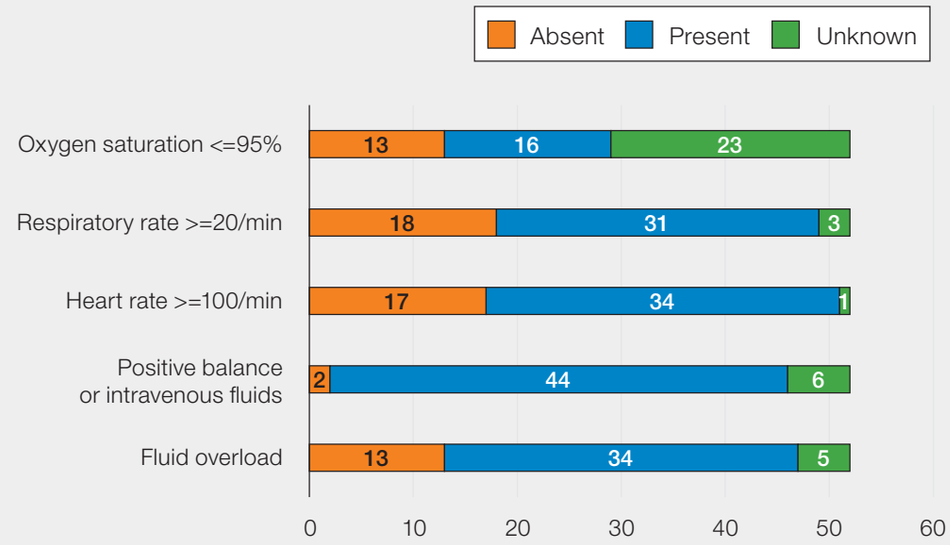
TACO=transfusion-associated circulatory overload; TAD=transfusion-associated dyspnoea; TRALI=transfusion-related acute lung injury

Figure 17b.2: Clinical features of pulmonary cases

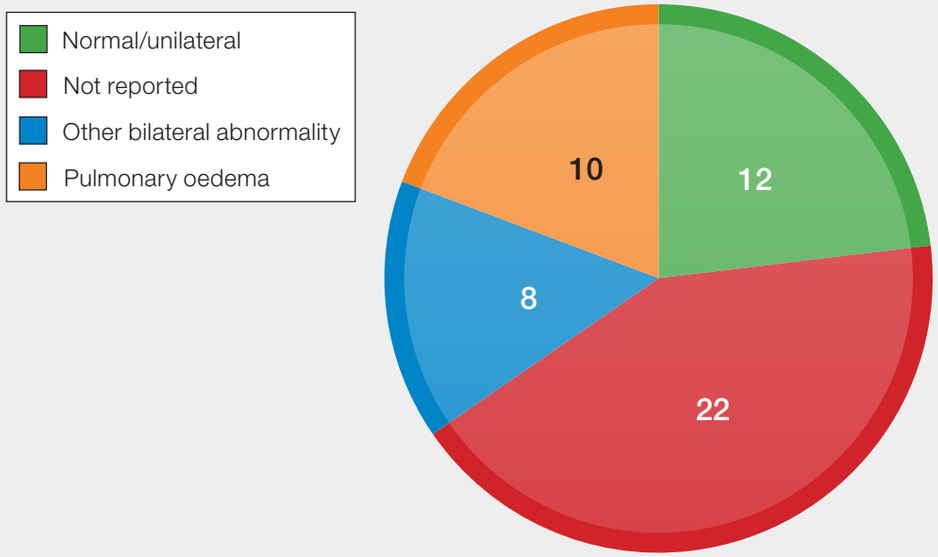
a: Summary of explanatory factors



b: Summary of pre-transfusion state



c: Summary of imaging findings



d: Summary of reaction features

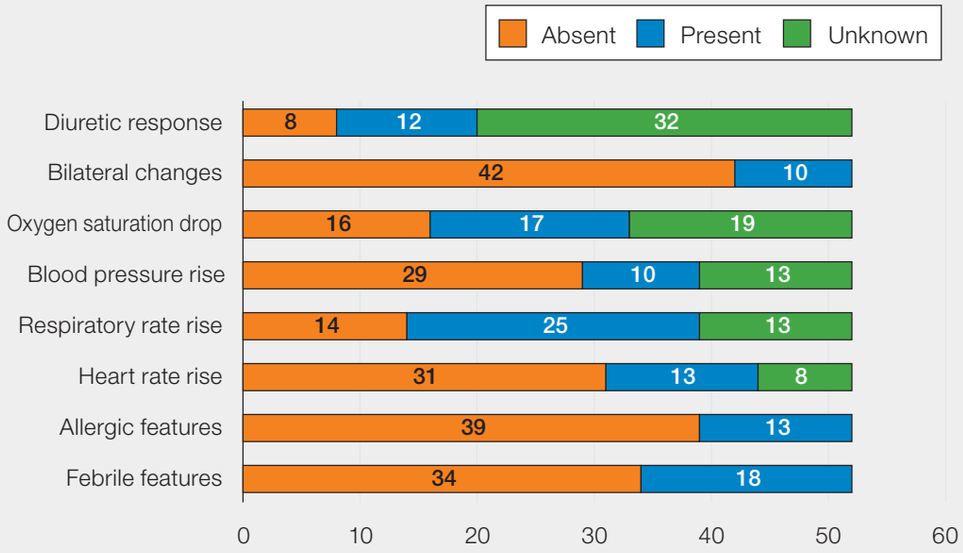


Figure 17b.3: Imputability of pulmonary cases

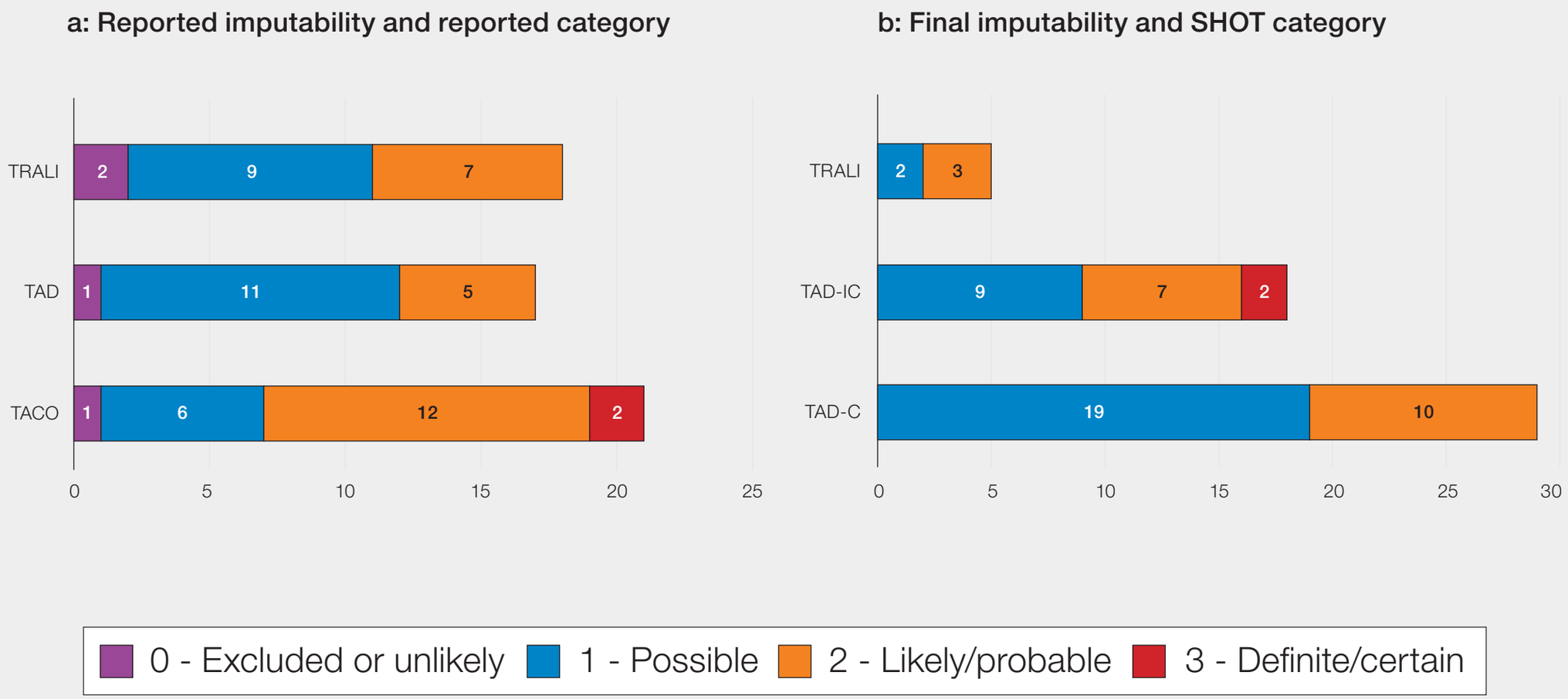


Figure 18.1: Age range in males and females experiencing an HTR

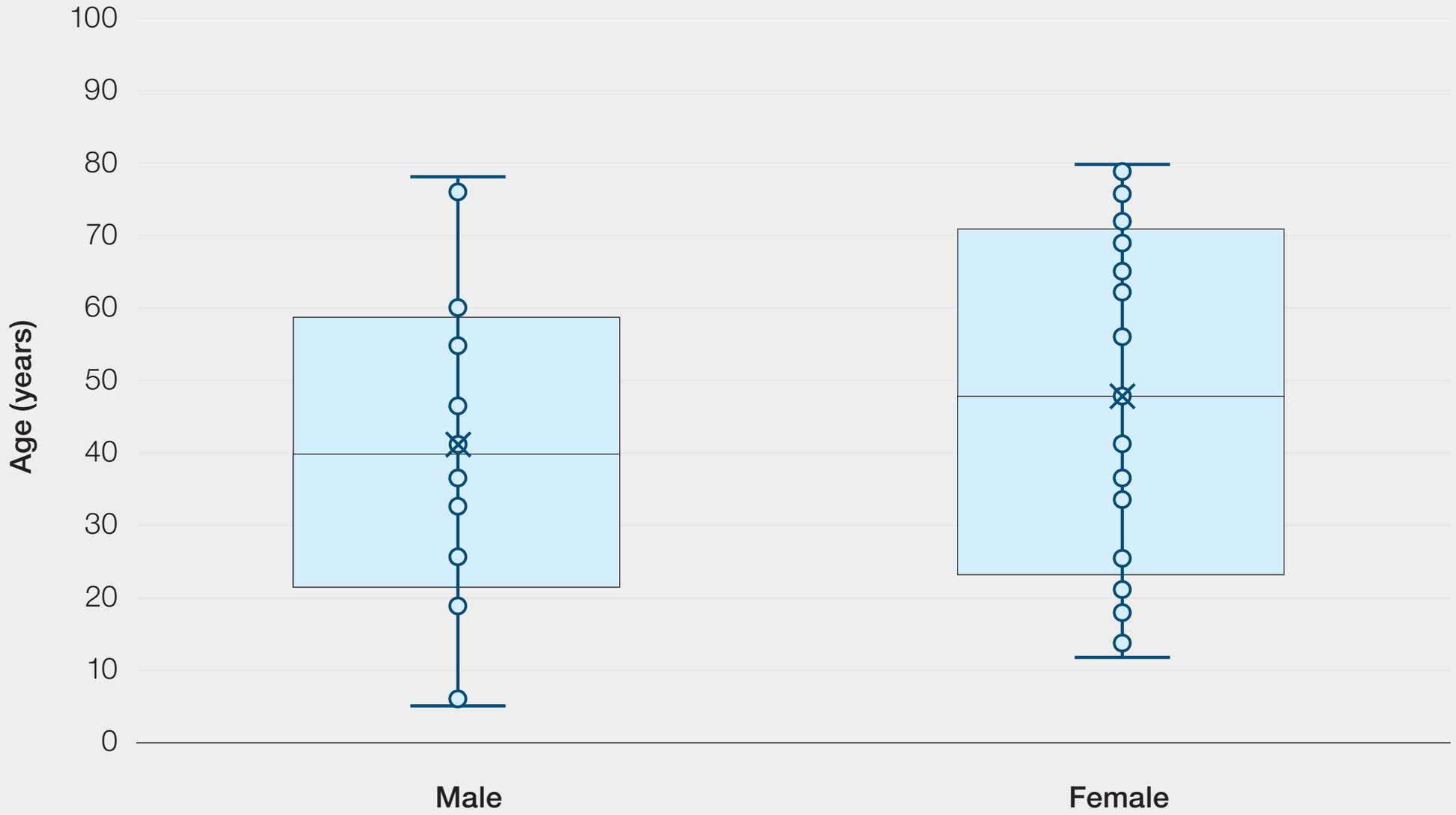


Figure 18.1 is a box and whisker diagram showing the median age and the age range of patients experiencing a HTR reported to SHOT separated by gender. The middle bar in the shaded box indicates the median age, the outer bars of the box represent the upper and lower quartiles. The lines extending from the boxes (whiskers) indicate the lowest and highest values.

Figure 18.2: Alloantibodies reported in AHTR in 2022

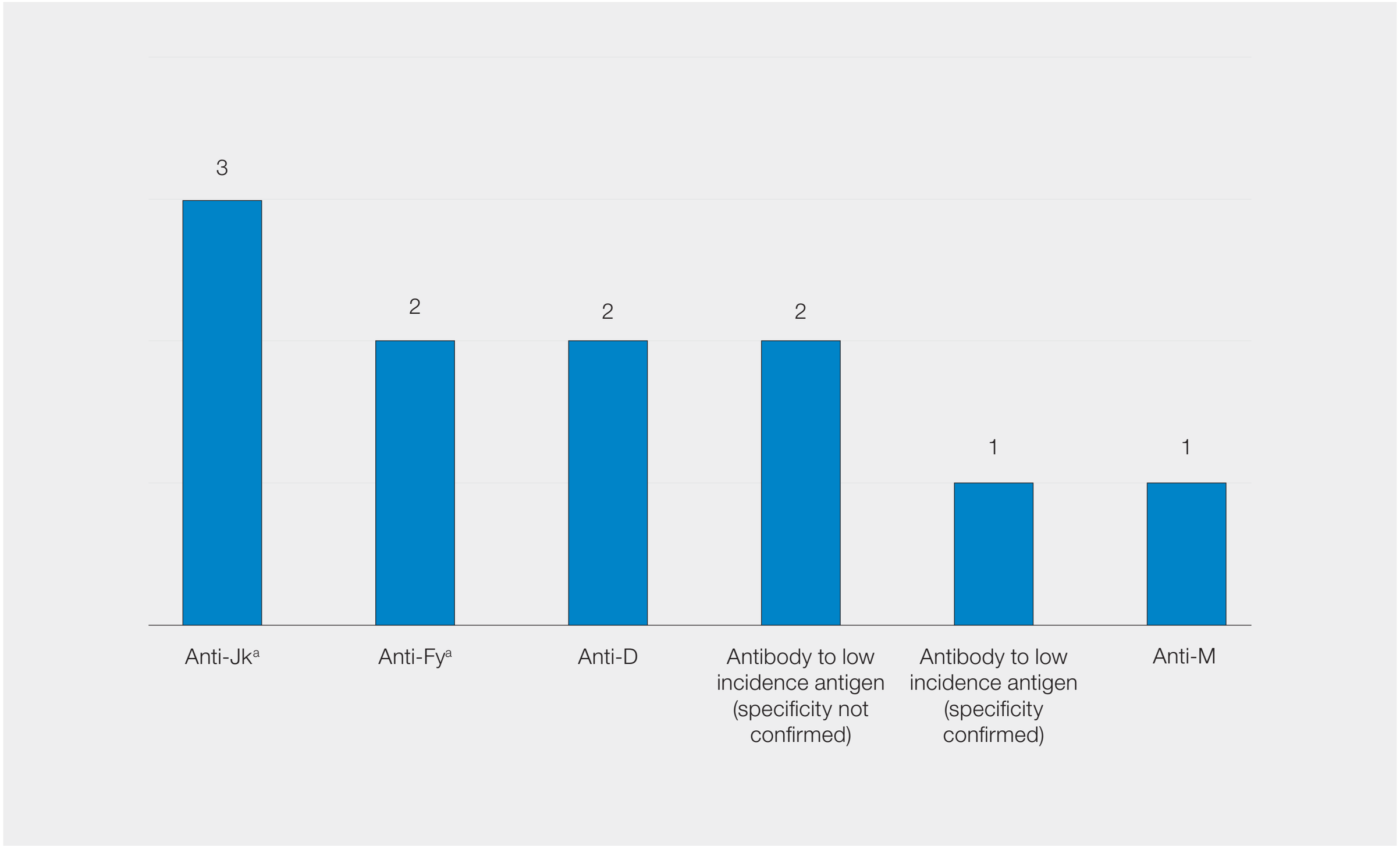


Figure 18.3: Antibody specificities implicated in DHTR

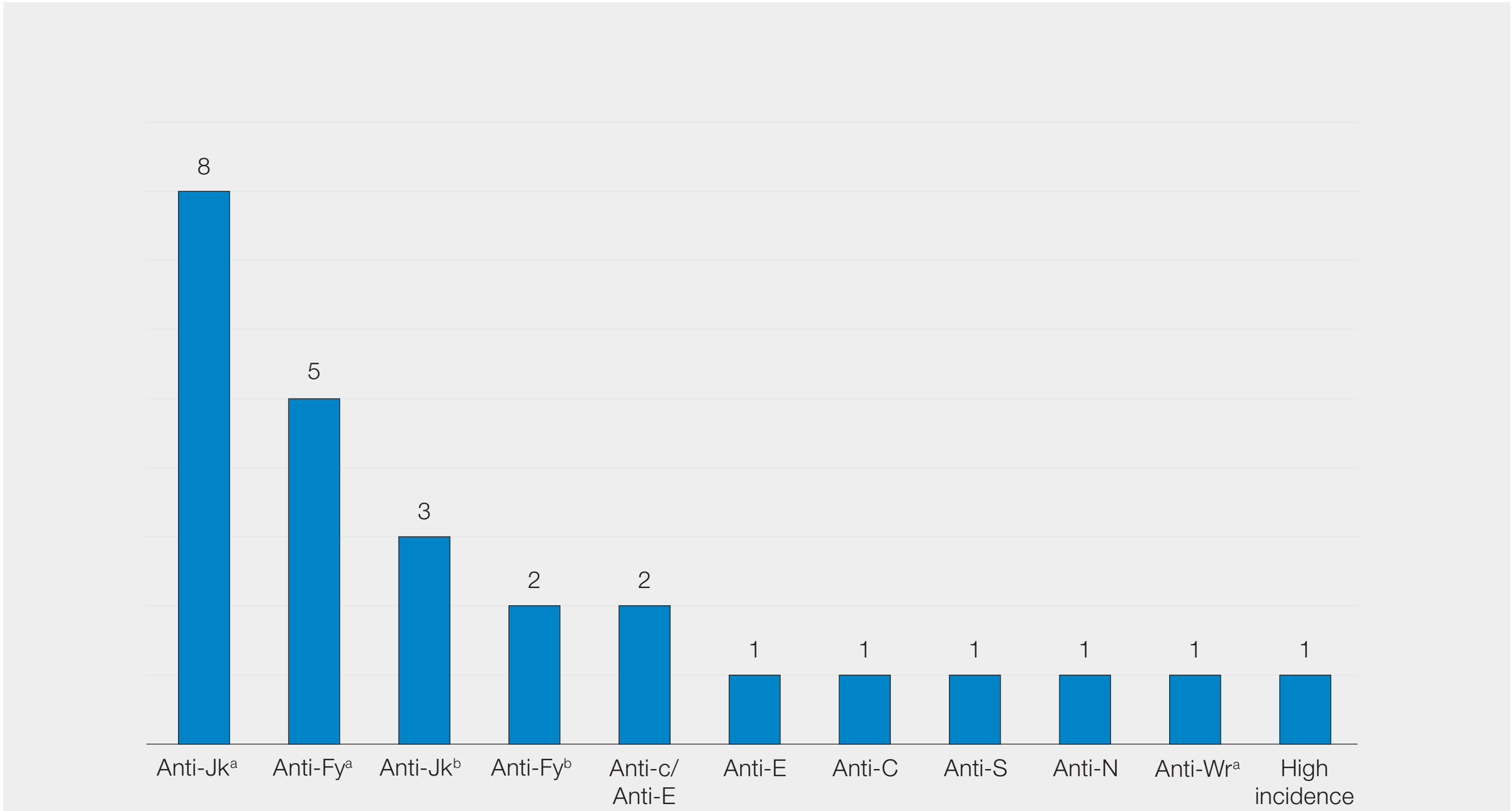
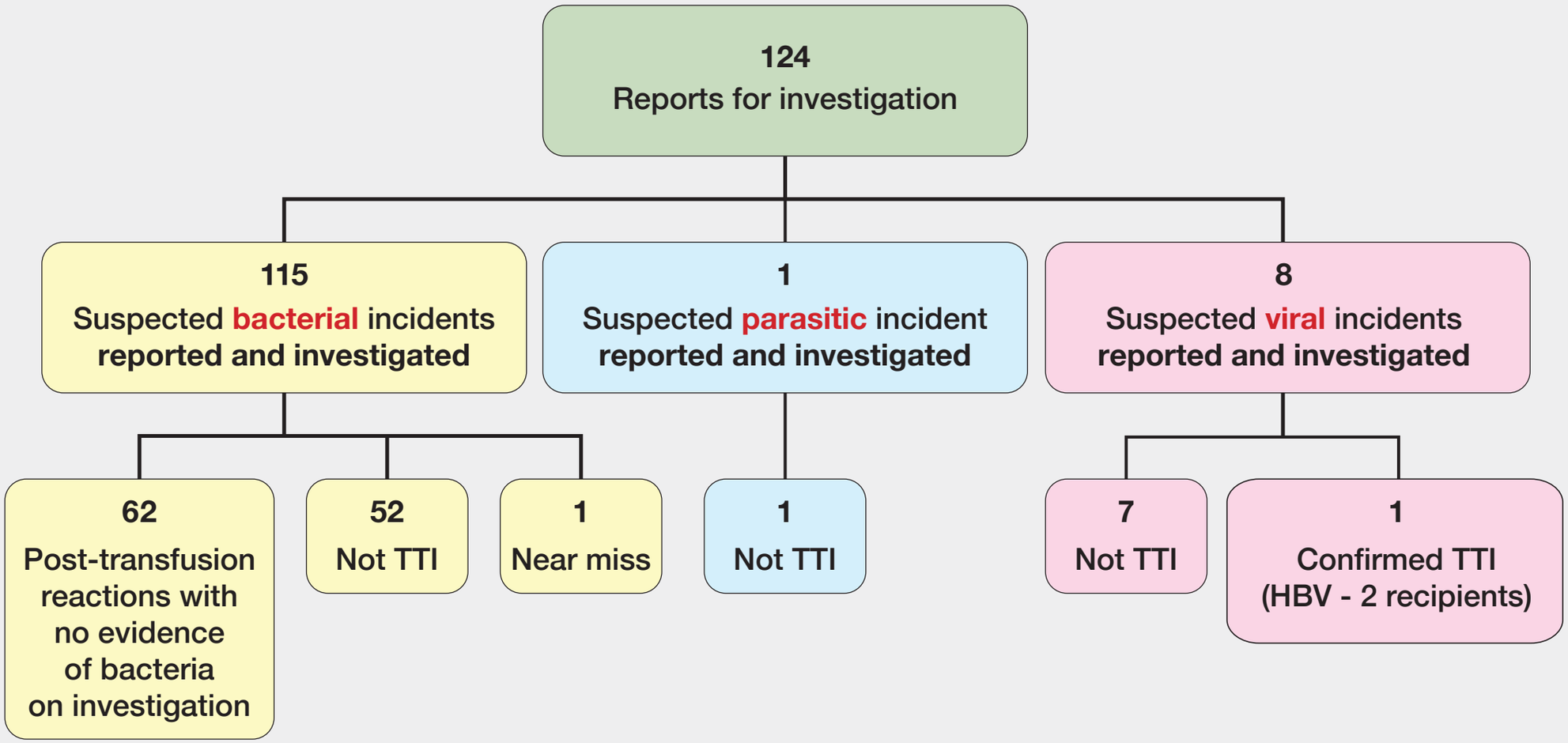


Figure 20.1: Outcome of suspected TTI investigated by the Blood Services in England, Northern Ireland, Scotland and Wales reported to the NHSBT/UKHSA Epidemiology Unit by the end of 2022



TTI=transfusion-transmitted infection; HBV=hepatitis B virus

Figure 23.1: Trends in paediatric reports 2013-2022

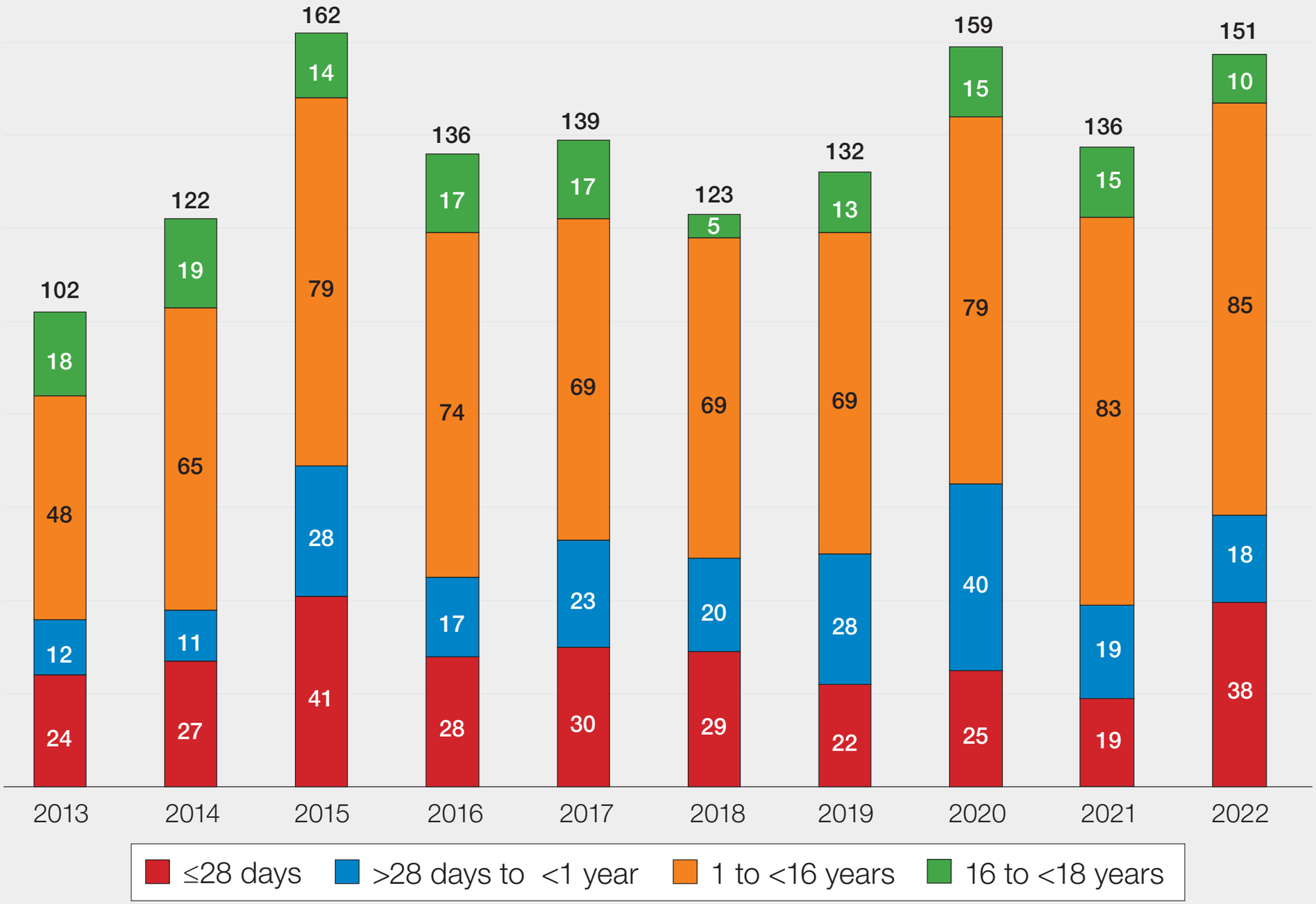


Figure 23.2: Summary of paediatric cases by category and age 2022

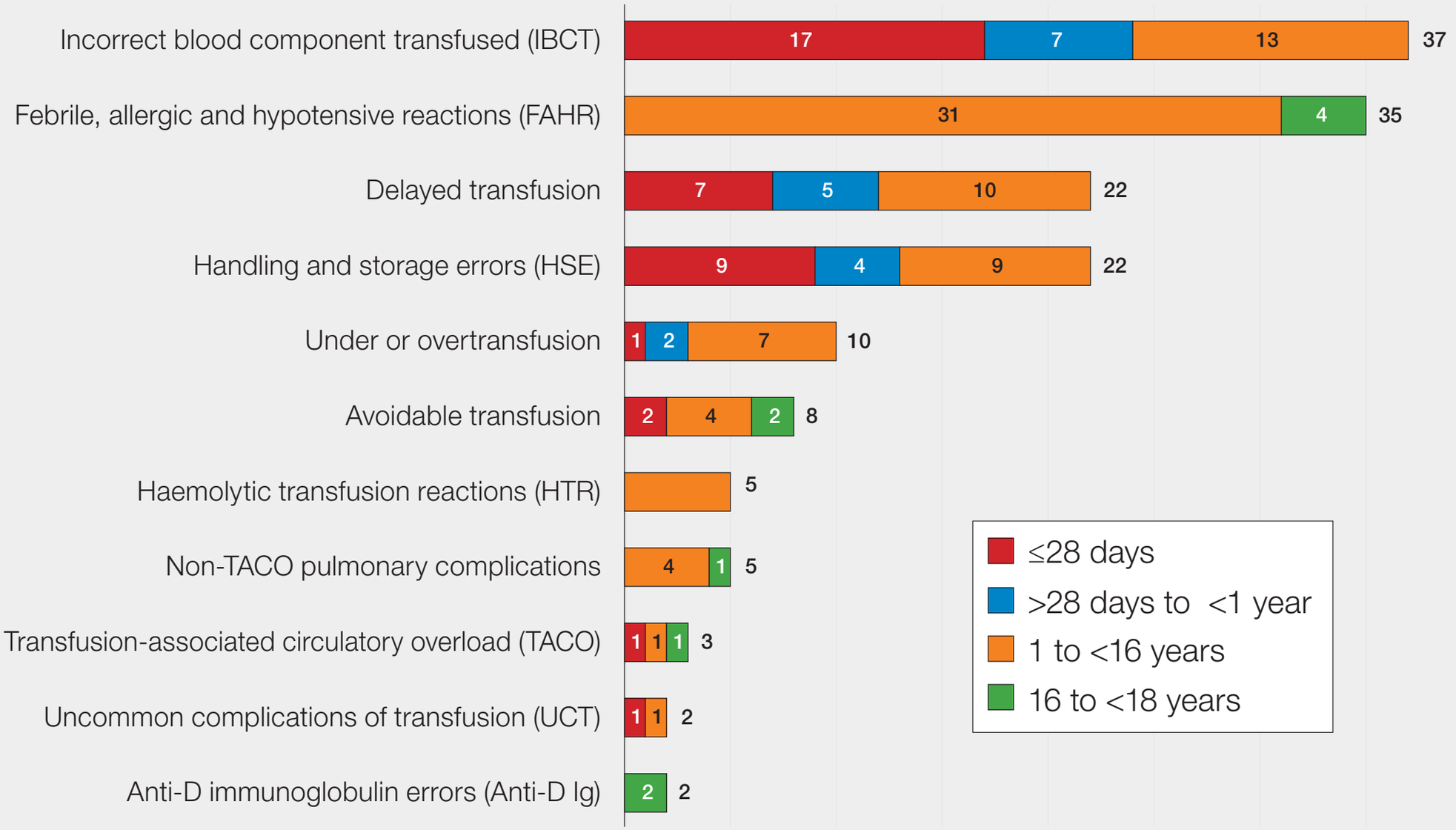
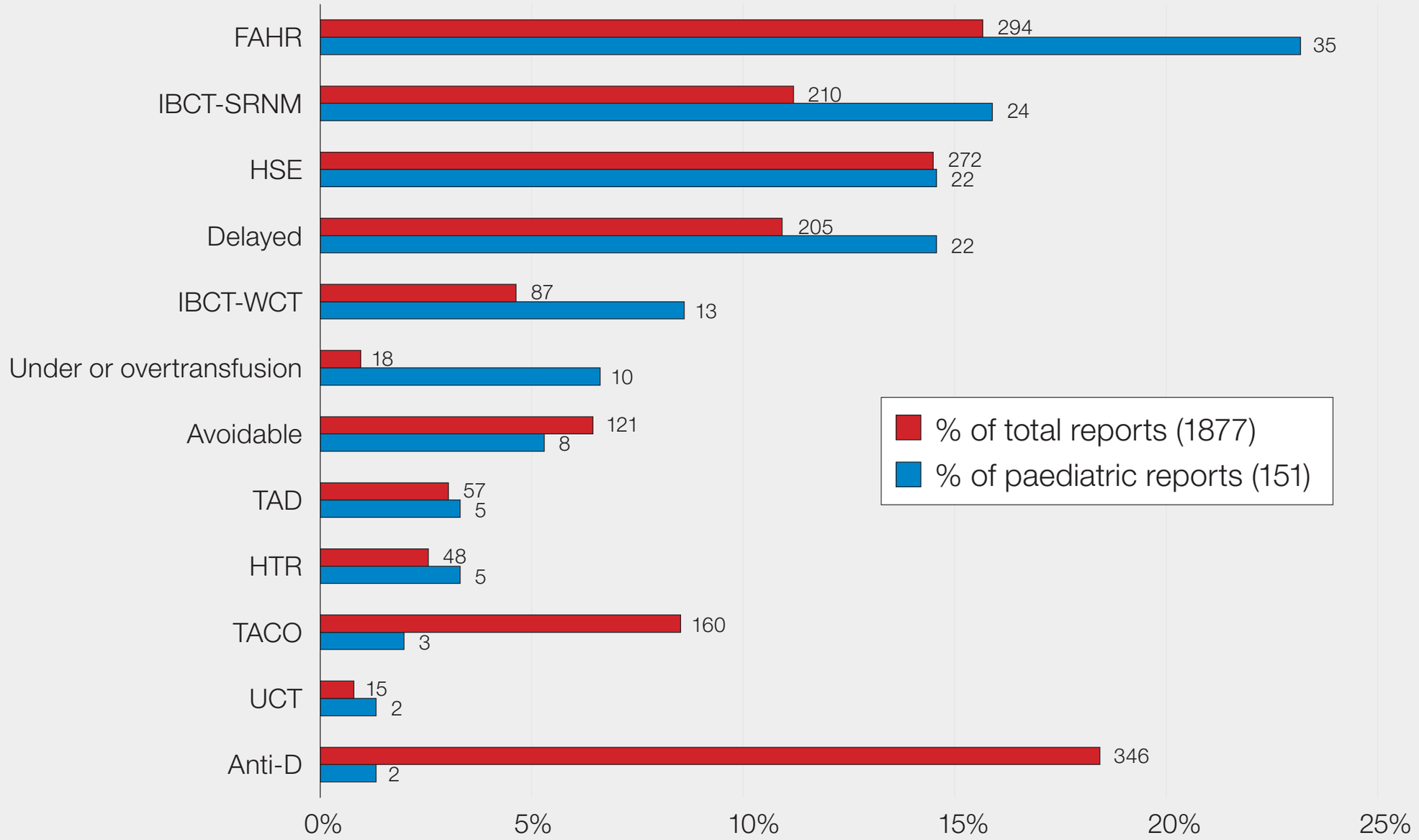
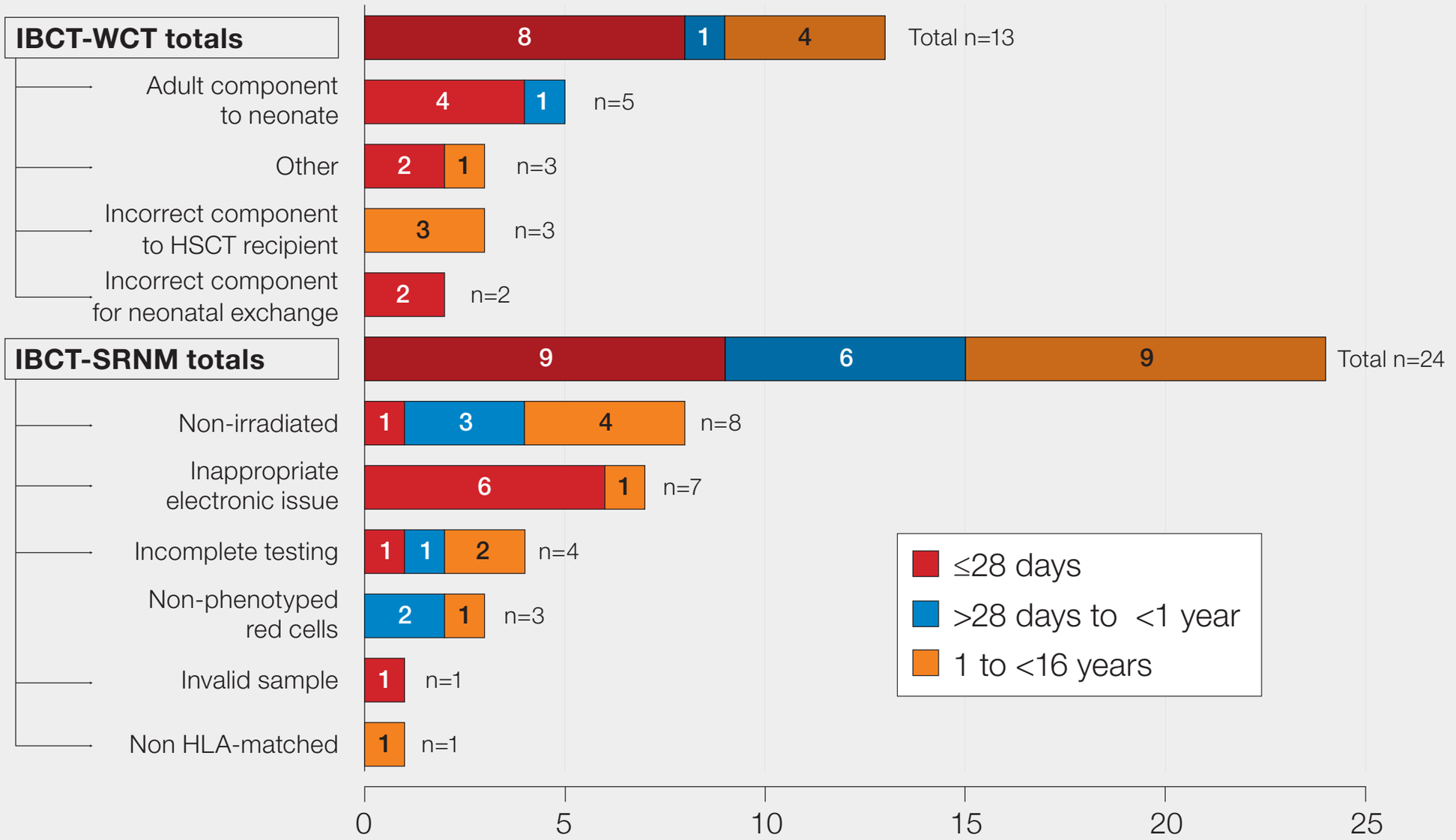


Figure 23.3: Percentages of paediatric and total reports in each category



UCT=uncommon 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; IBCT-SRNM=incorrect blood component transfused-specific requirements not met; IBCT-WCT=IBCT-wrong component transfused

Figure 23.4: Breakdown of incorrect blood component transfused reports



IBCT-WCT=incorrect blood component transfused-wrong component transfused; IBCT-SRNM=IBCT-specific requirements not met; HSCT=haemopoietic stem cell transplant; HLA=human leucocyte antigen

Figure 23.5: Summary of FAHR reports by component type from 2013 to 2022

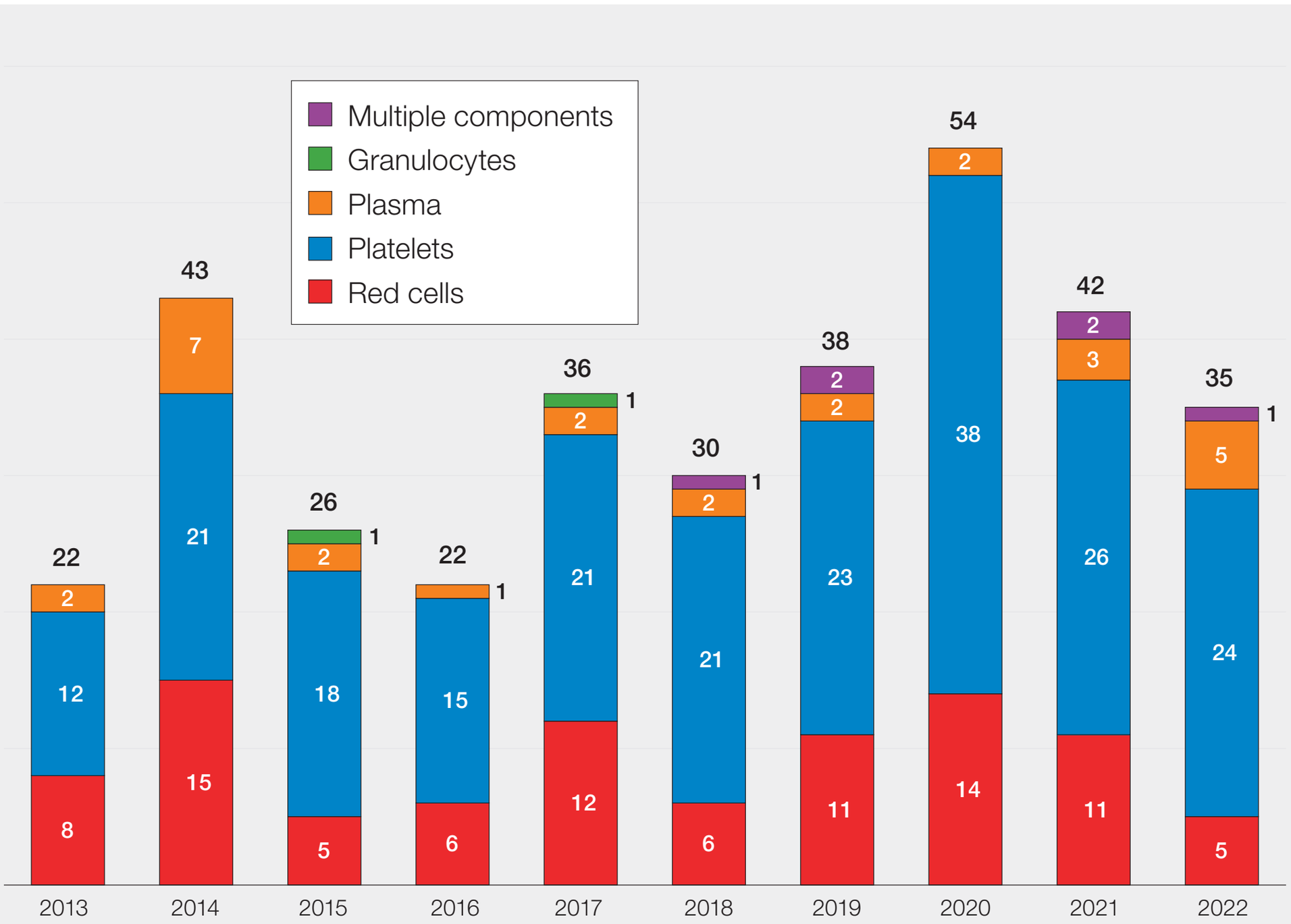


Figure 23.6: Paediatric febrile, allergic, and hypotensive reaction (FAHR) reports
a. Comparison of proportions of adult and paediatric FAHR related to different components

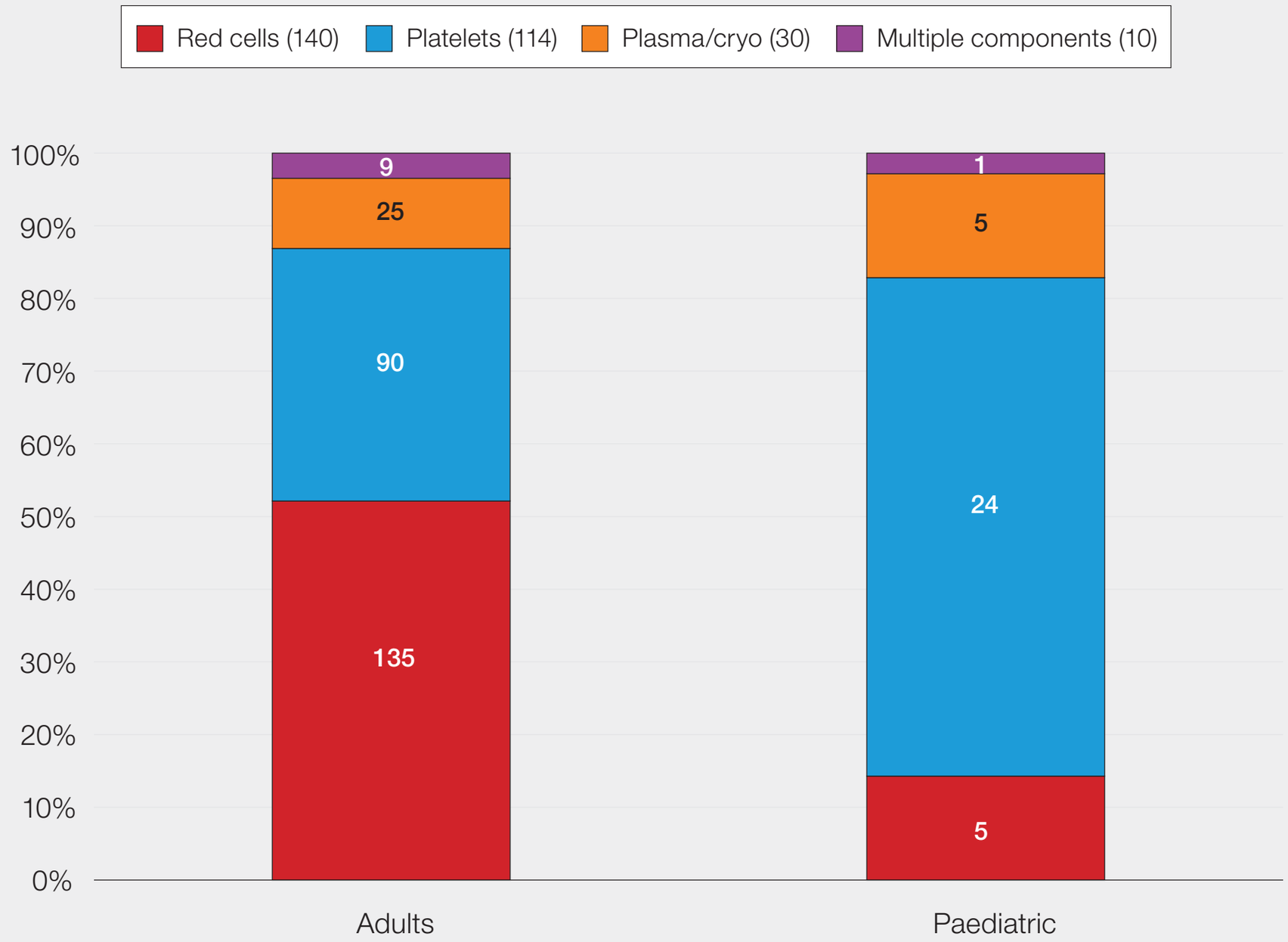


Figure 23.6: Paediatric febrile, allergic, and hypotensive reaction (FAHR) reports
b. Percentages of reaction types of each component for paediatric reports

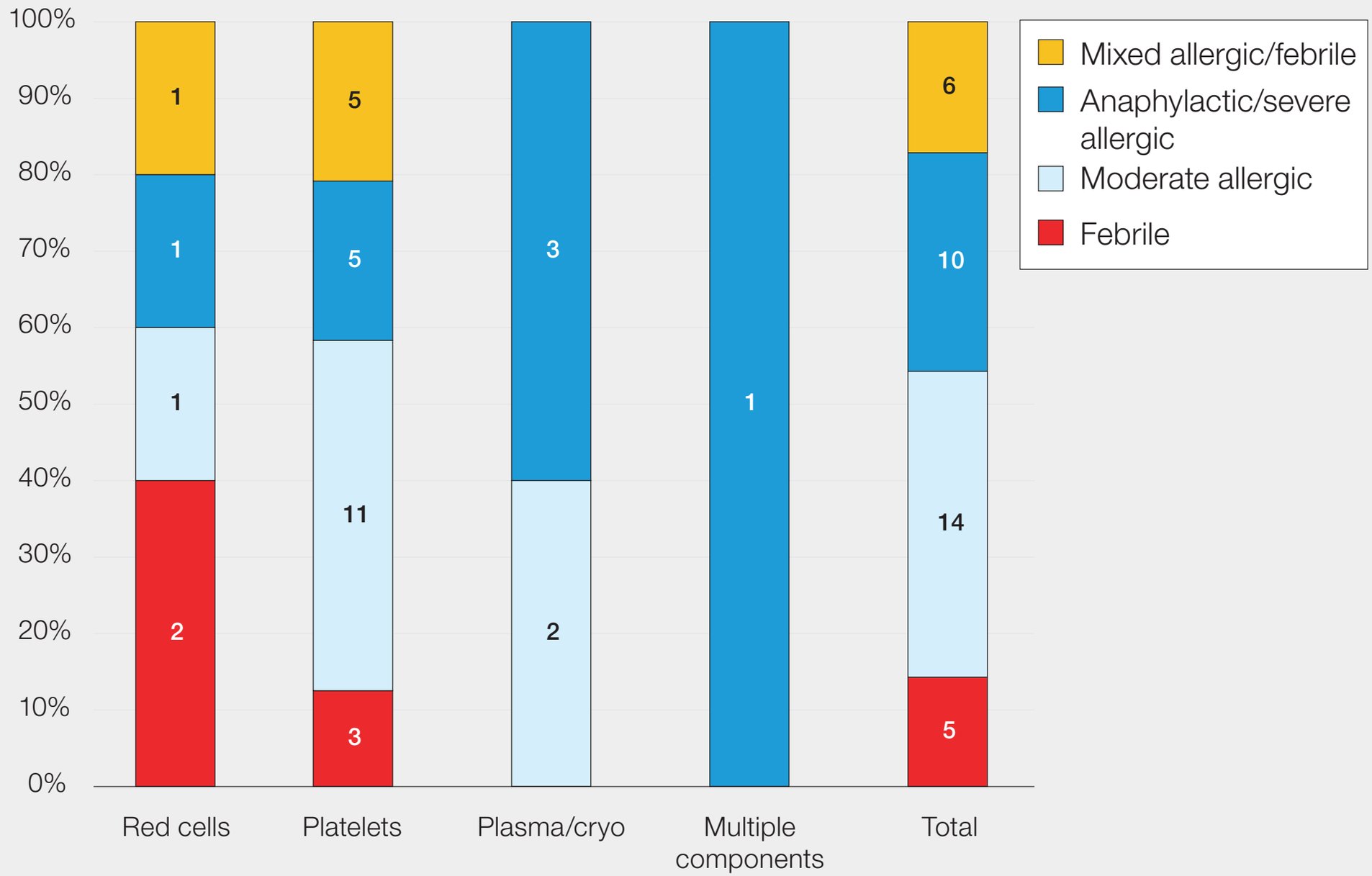
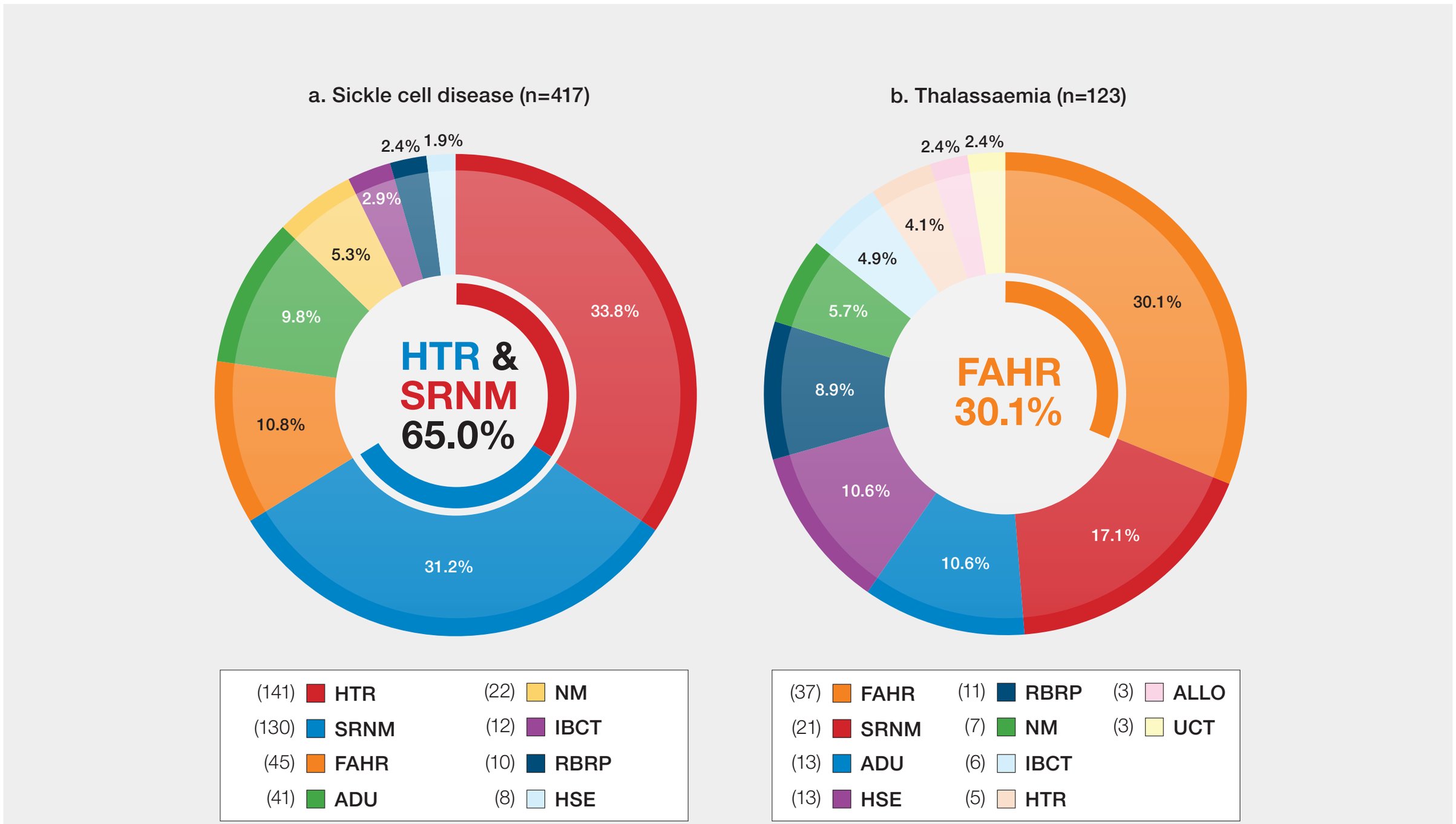
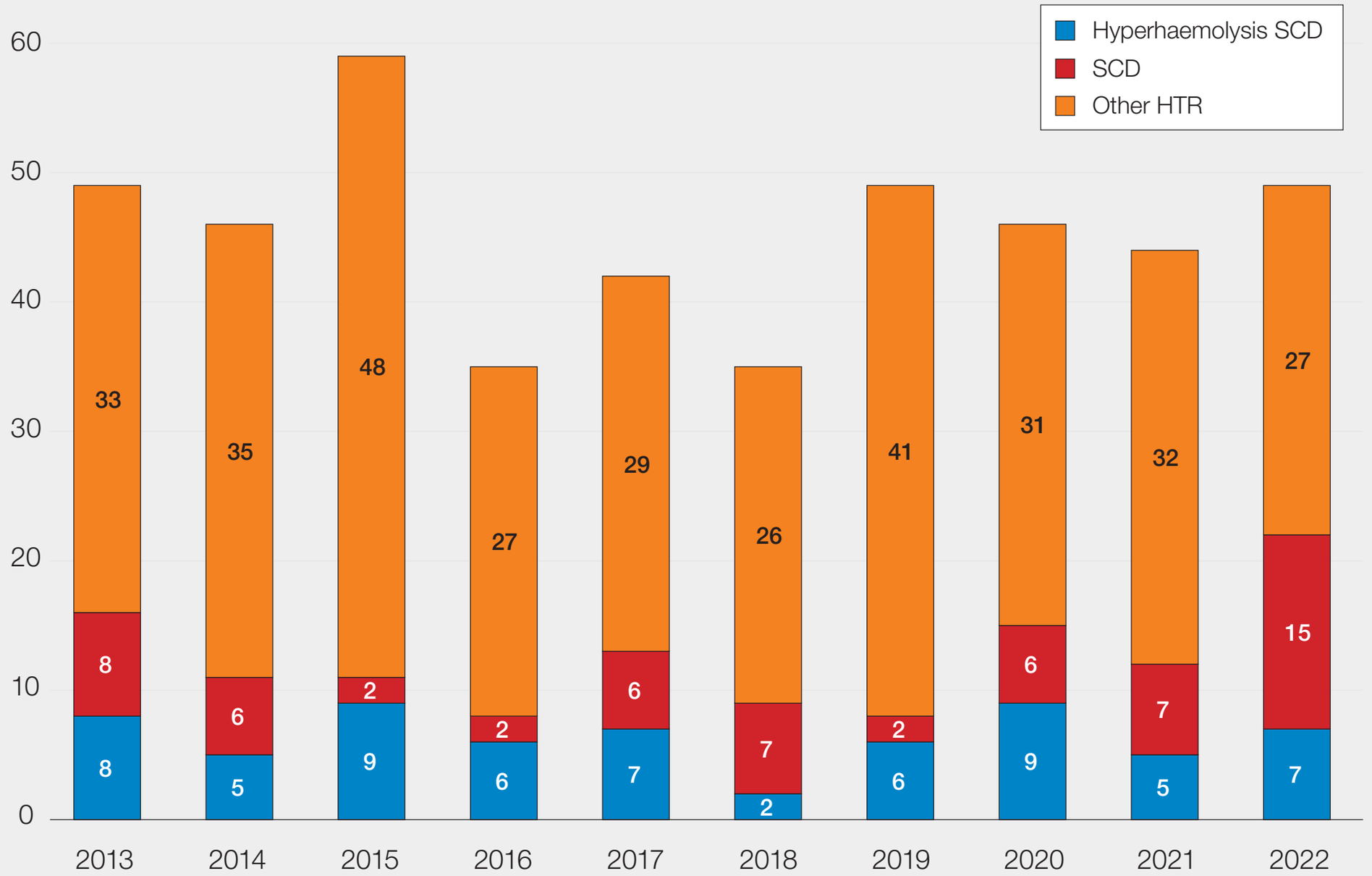


Figure 24.1: Cumulative data for adverse transfusion events in patients with haemoglobin disorders 2010 to 2022



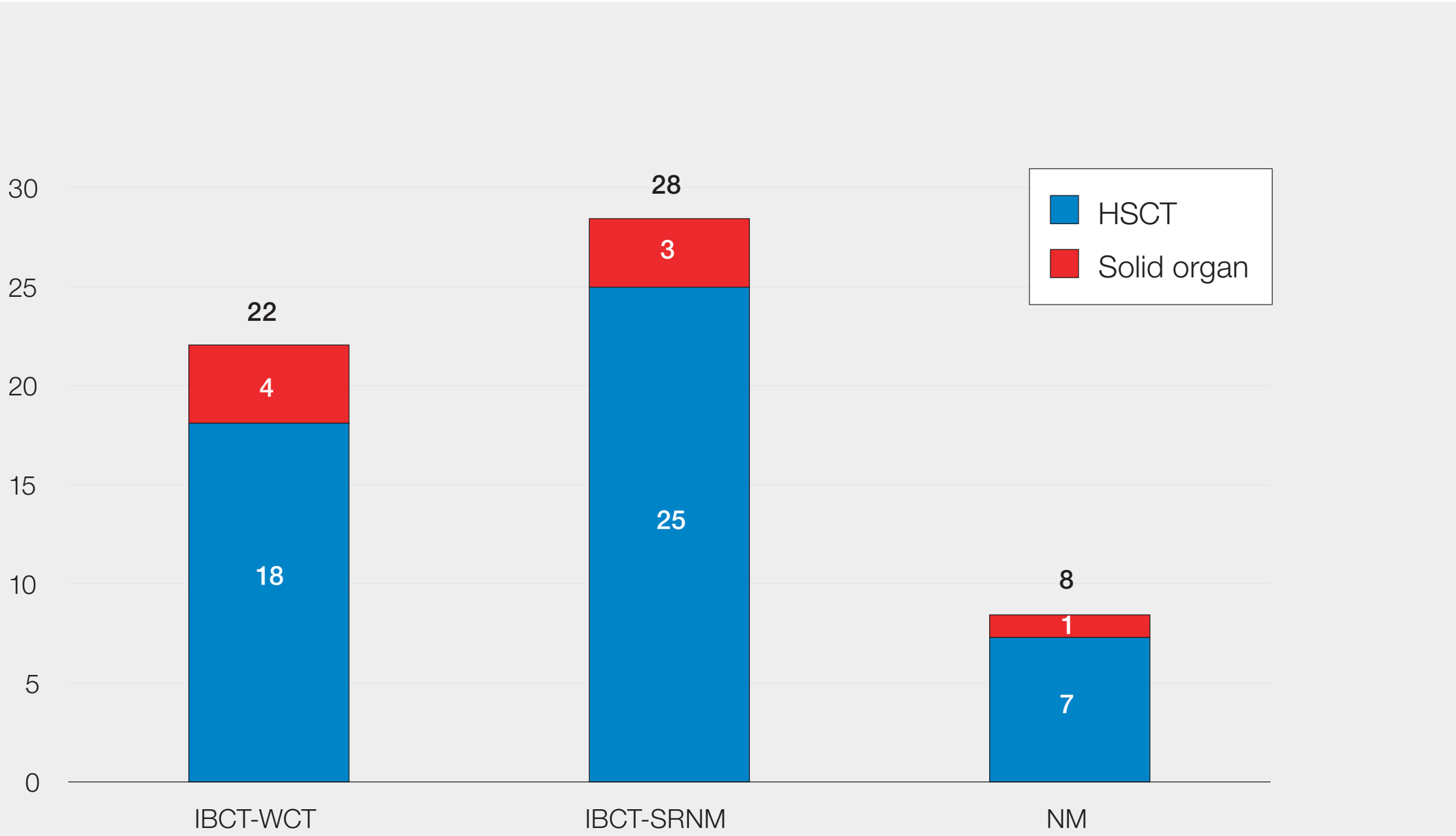
FAHR=febrile, allergic or hypotensive reactions; ADU=avoidable, delayed or under or overtransfusion; IBCT=incorrect blood component transfused; SRNM=specific requirements not met; TACO=transfusion-associated circulatory overload; TAD=transfusion-associated dyspnoea; HTR=haemolytic transfusion reactions; TTI=transfusion-transmitted infection . Categories with 2 or fewer reports are not included in the figures

Figure 24.2: A summary of HTR occurring in SCD 2013-2022 out of a total of 454 HTR reports



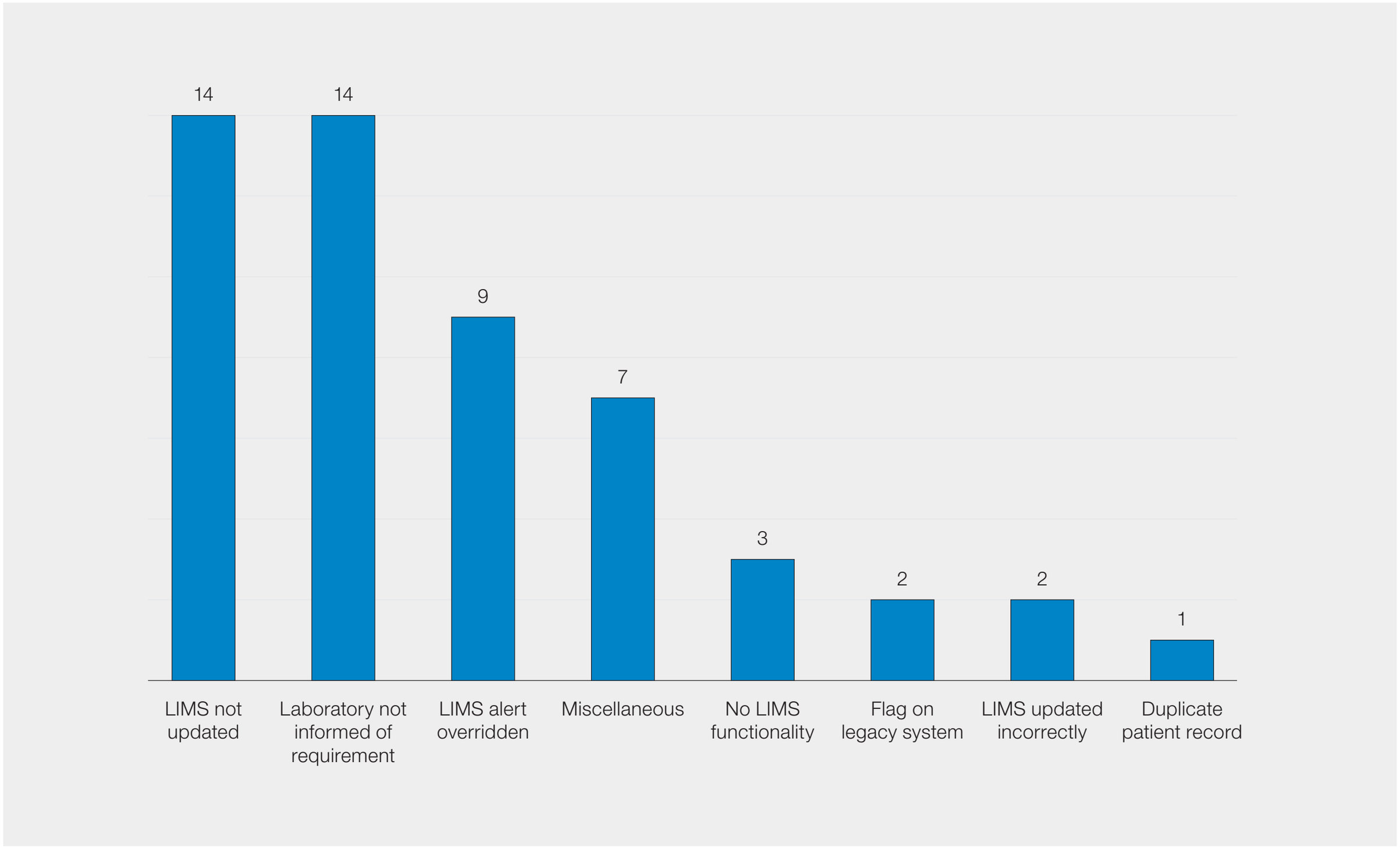
HTR=haemolytic transfusion reactions; SCD=sickle cell disease

Figure 25.1: Total cases of IBCT-WCT, IBCT-SRNM and NM transfusion errors in transplant recipients reported to SHOT in 2022 (n=58)



HSCT=haemopoietic stem cell transplant; IBCT-WCT=incorrect blood component transfused-wrong component transfused; IBCT-SRNM=IBCT-specific requirements not met; NM=near miss

Figure 25.2: Distribution of IT issues in transplant errors (n=52)



LIMS=laboratory information management system

Figure 26.1: Number of reports of anti-D immunisation in pregnancy by year, 2012-2022

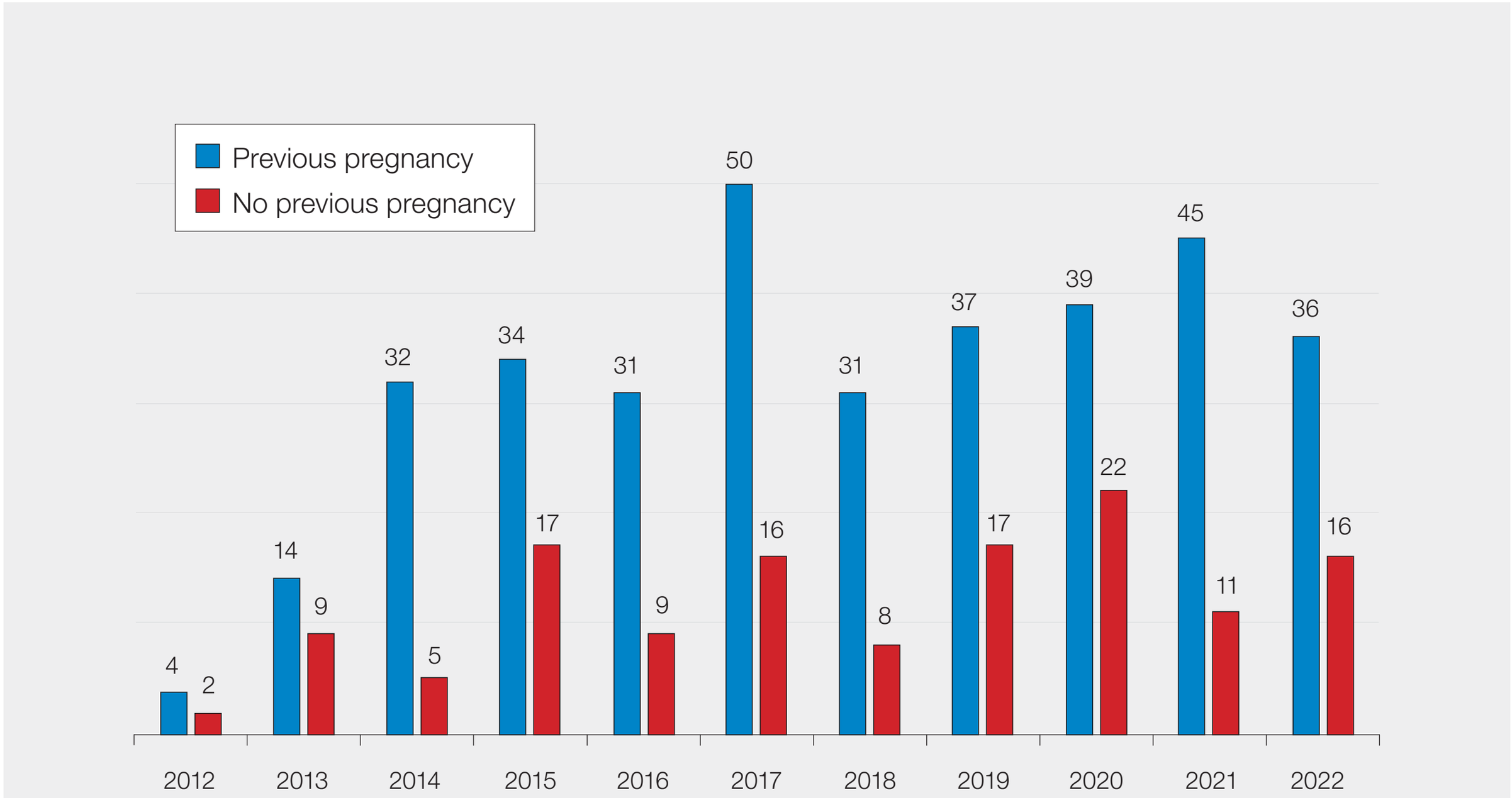
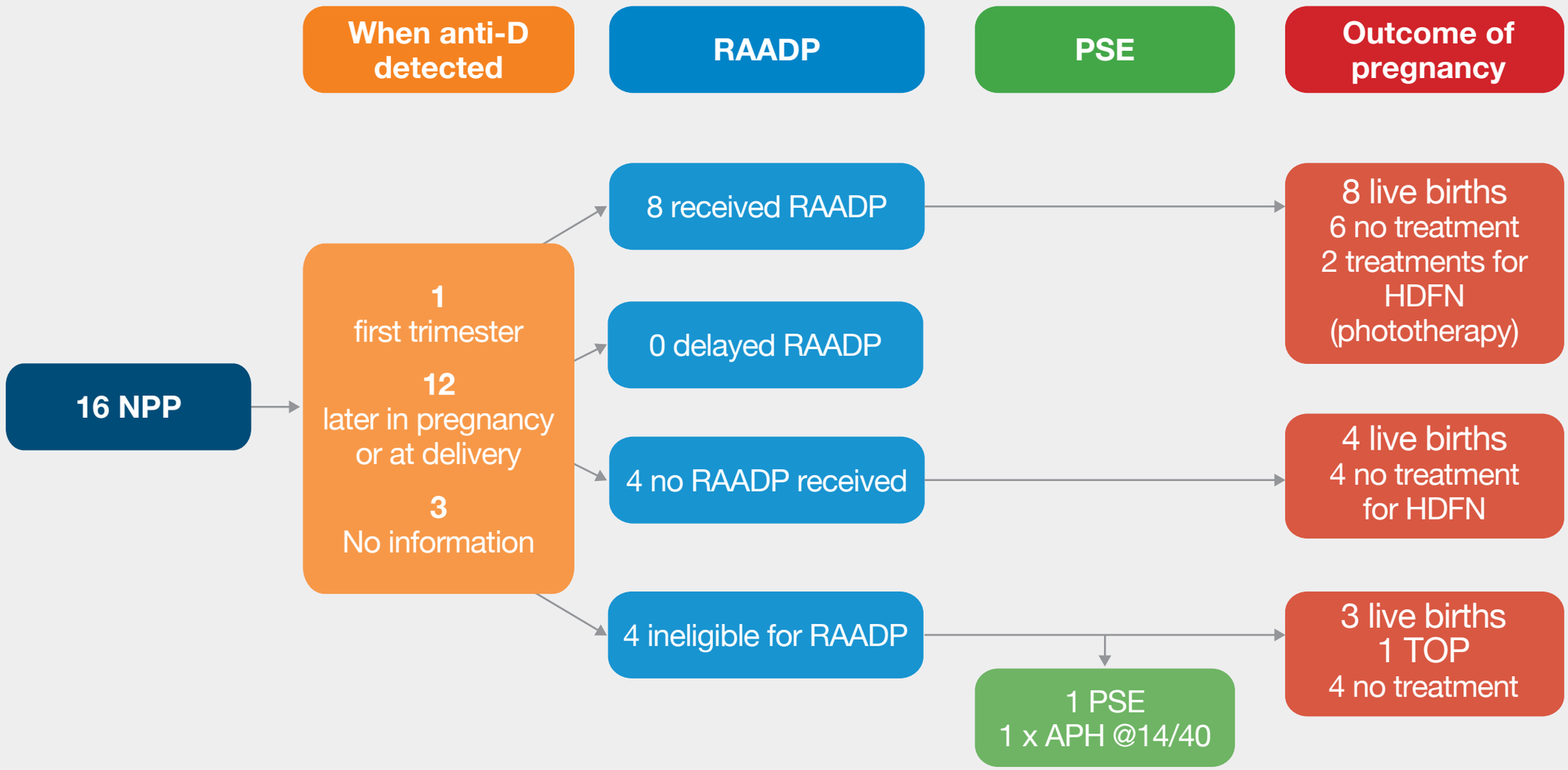
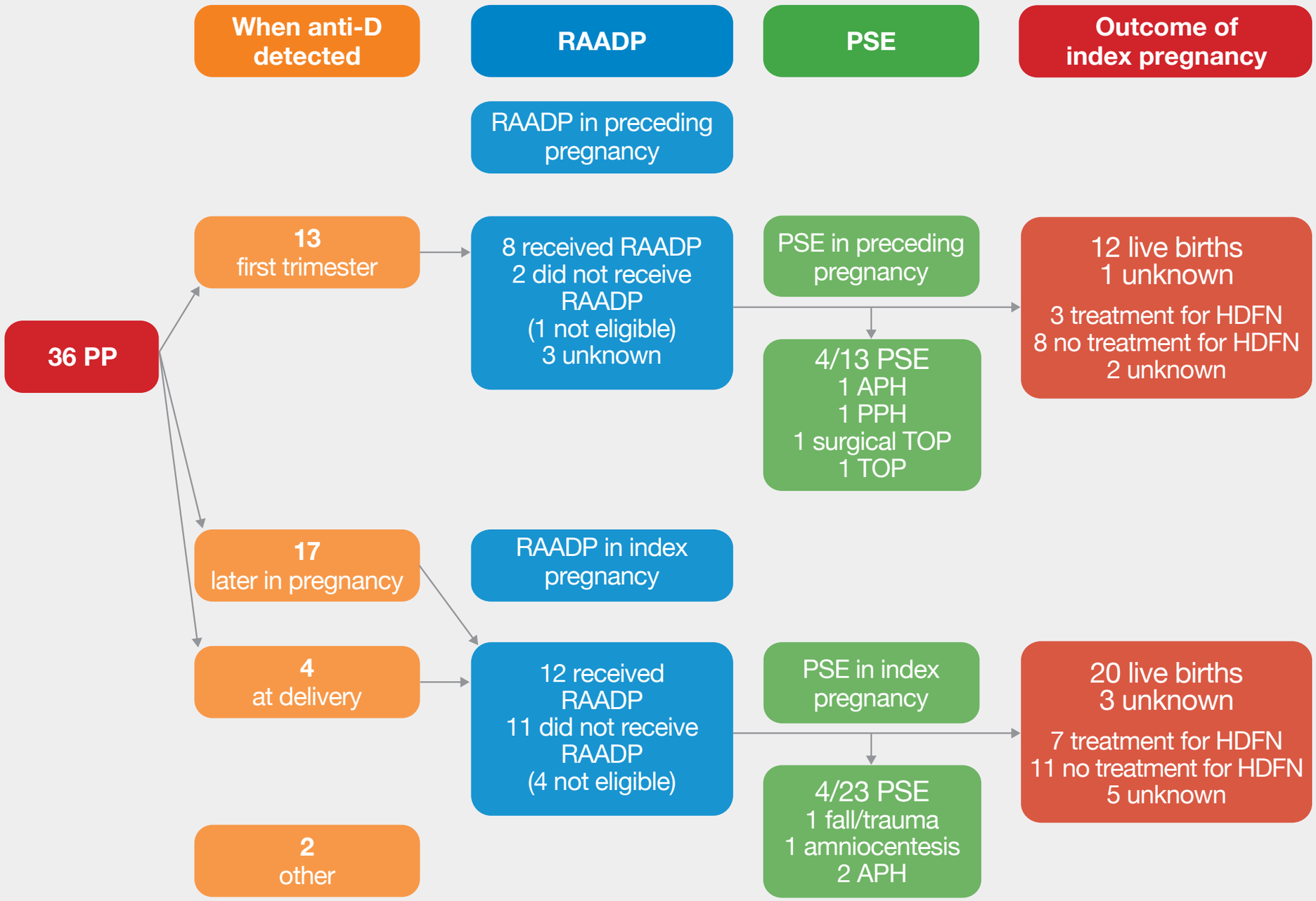


Figure 26.2: Summary of 2022 NPP data (n=16)



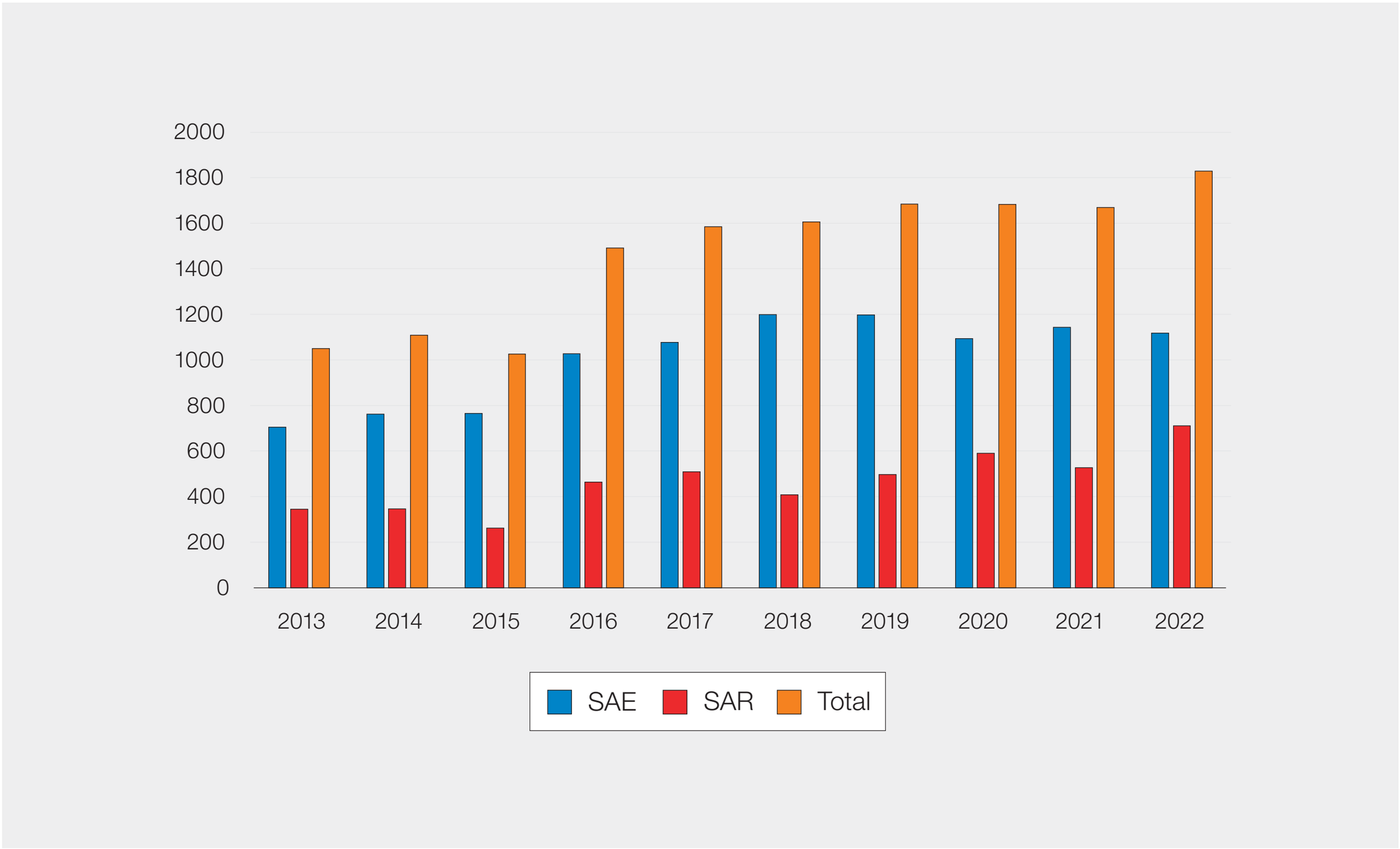
APH=antepartum haemorrhage; HDFN=haemolytic disease of the fetus and newborn; NPP=no previous pregnancy; PSE=potentially sensitising event; RAADP=routine antenatal anti-D Ig prophylaxis; TOP=termination of pregnancy

Figure 26.3: Summary of 2022 PP data (n=36)



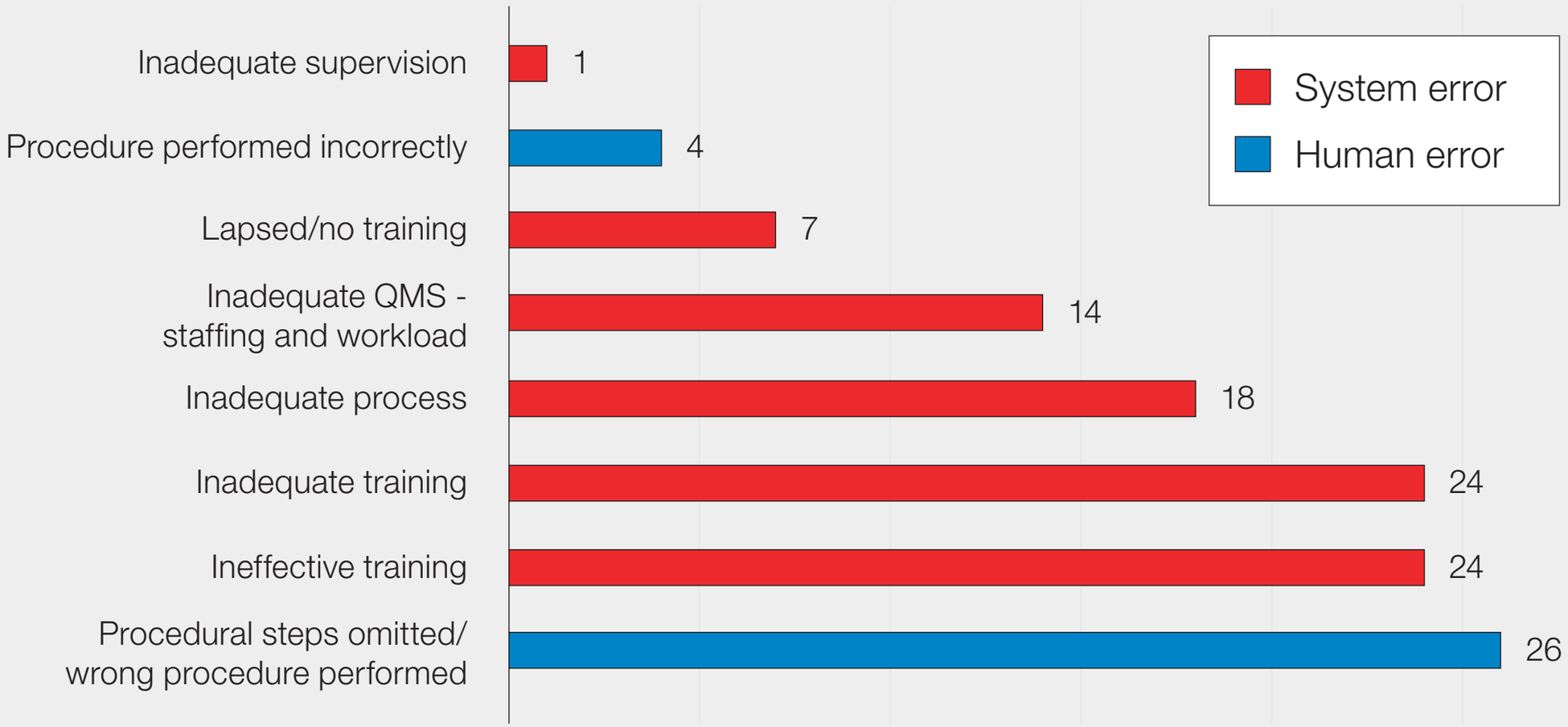
APH=antepartum haemorrhage; HDFN=haemolytic disease of the fetus and newborn; PP=previous pregnancy; PPH=postpartum haemorrhage; PSE=potentially sensitising event; RAADP=routine antenatal anti-D immunoglobulin prophylaxis; TOP=termination of pregnancy

Figure 27.1: Submitted confirmation reports 2013-2022



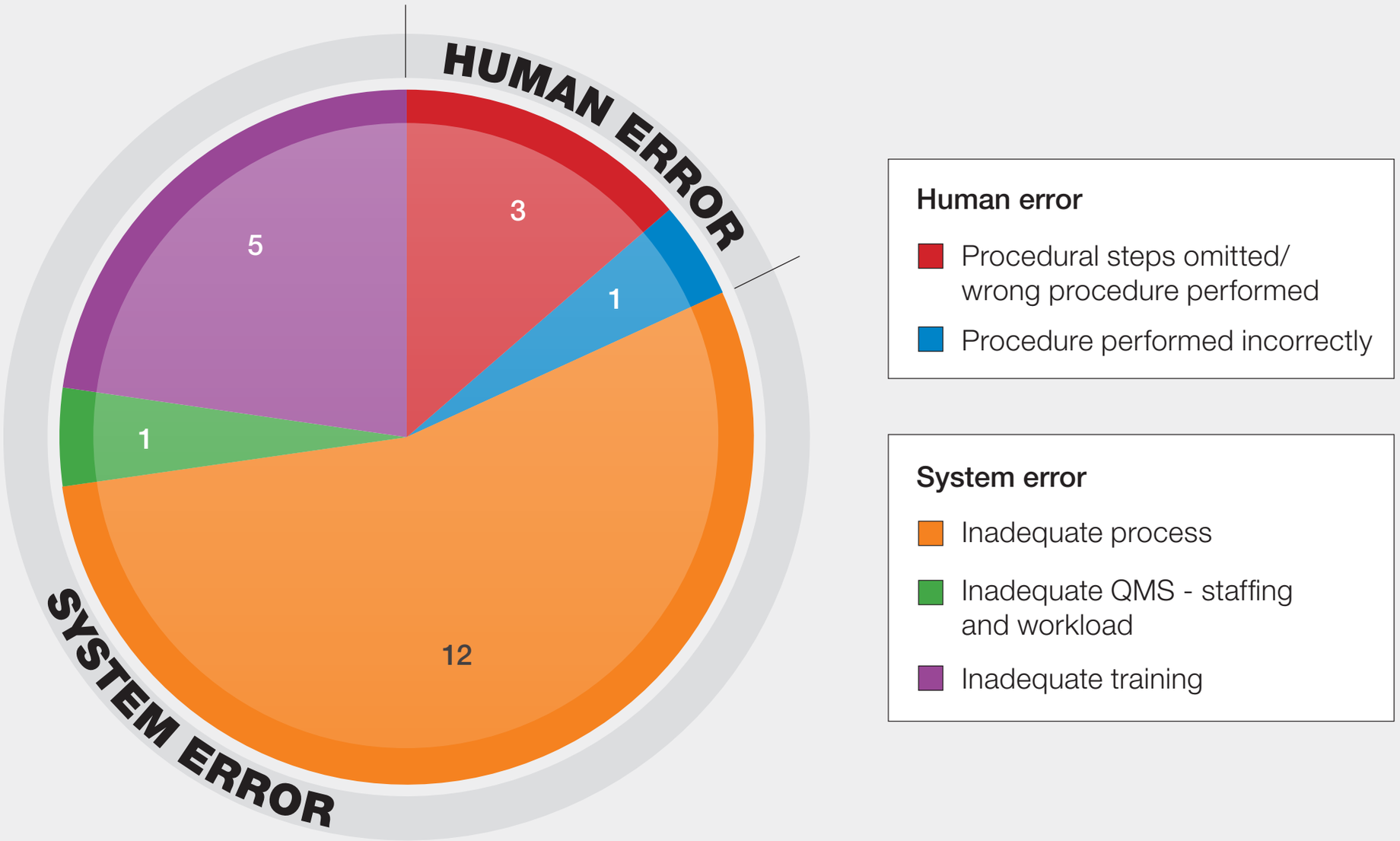
SAE=serious adverse event; SAR=serious adverse reaction

Figure 27.2: Root causes of Incorrect storage of components sub-category



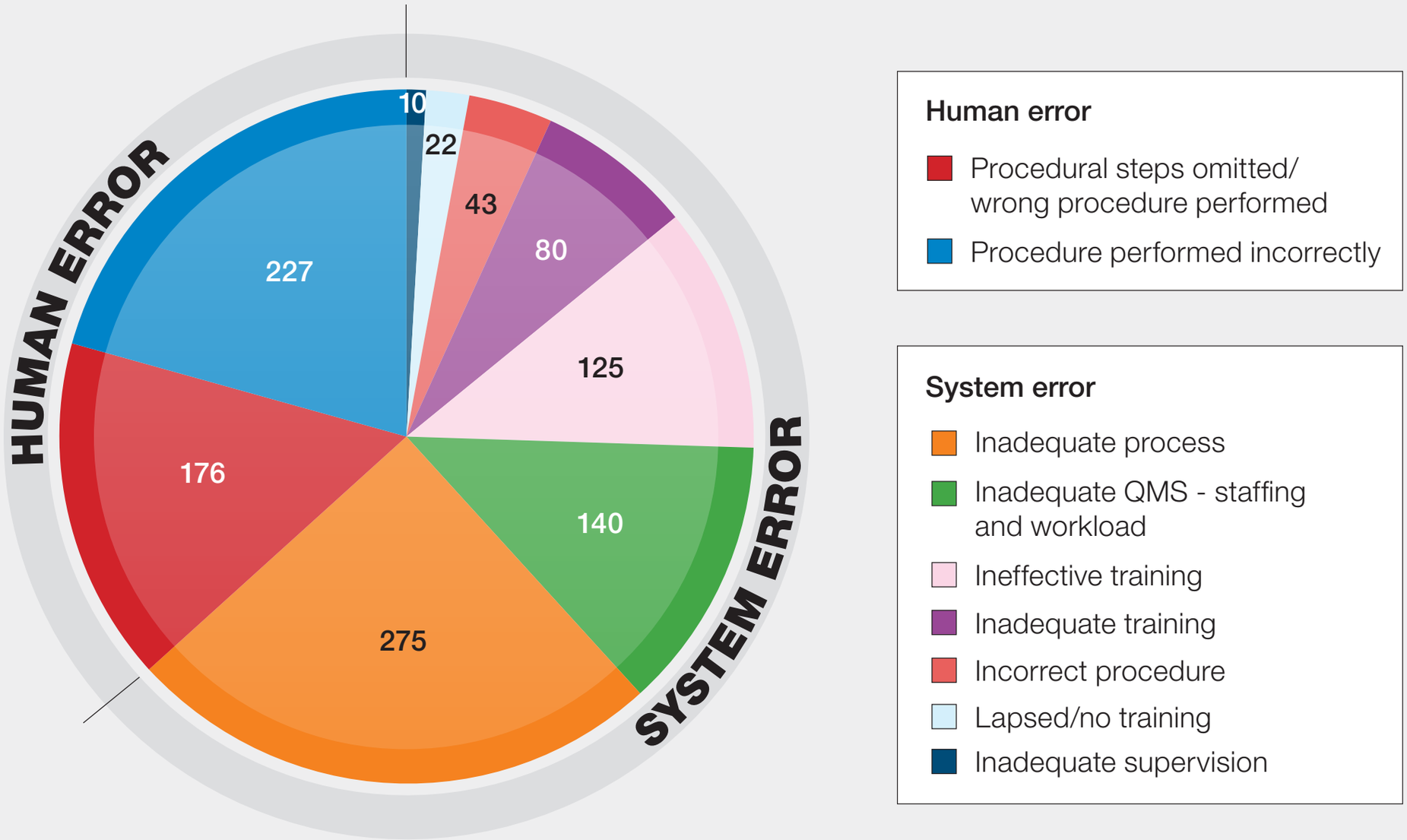
QMS=quality management system

Figure 27.3: Root causes of the return to stock sub-category



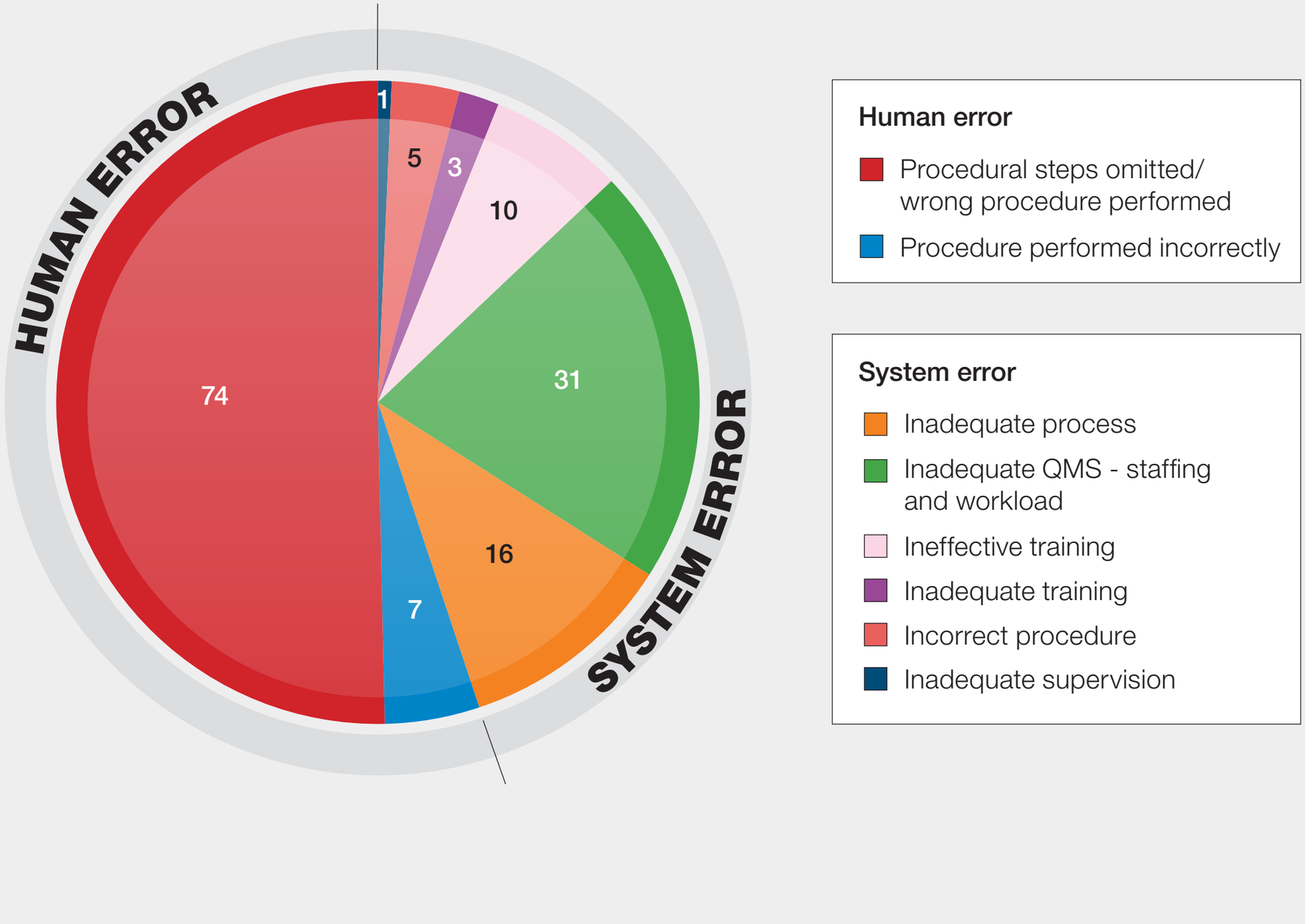
QMS=quality management system

Figure 27.4: Human/system error sub-categories



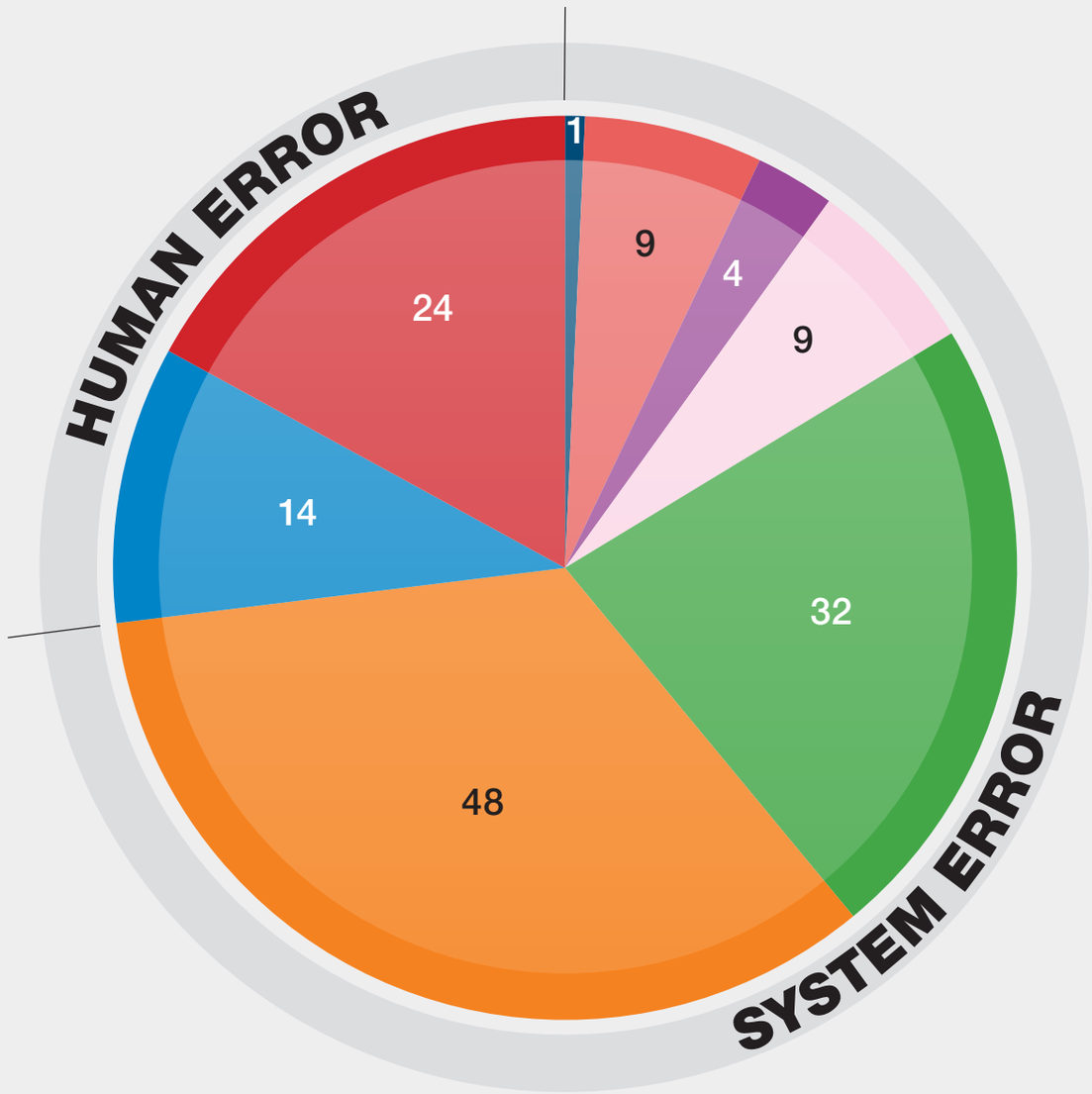
QMS=quality management system

Figure 27.5: Sample processing error (SPE)



QMS=quality management system

Figure 27.6: Incorrect blood component issued (IBCI)



Human error

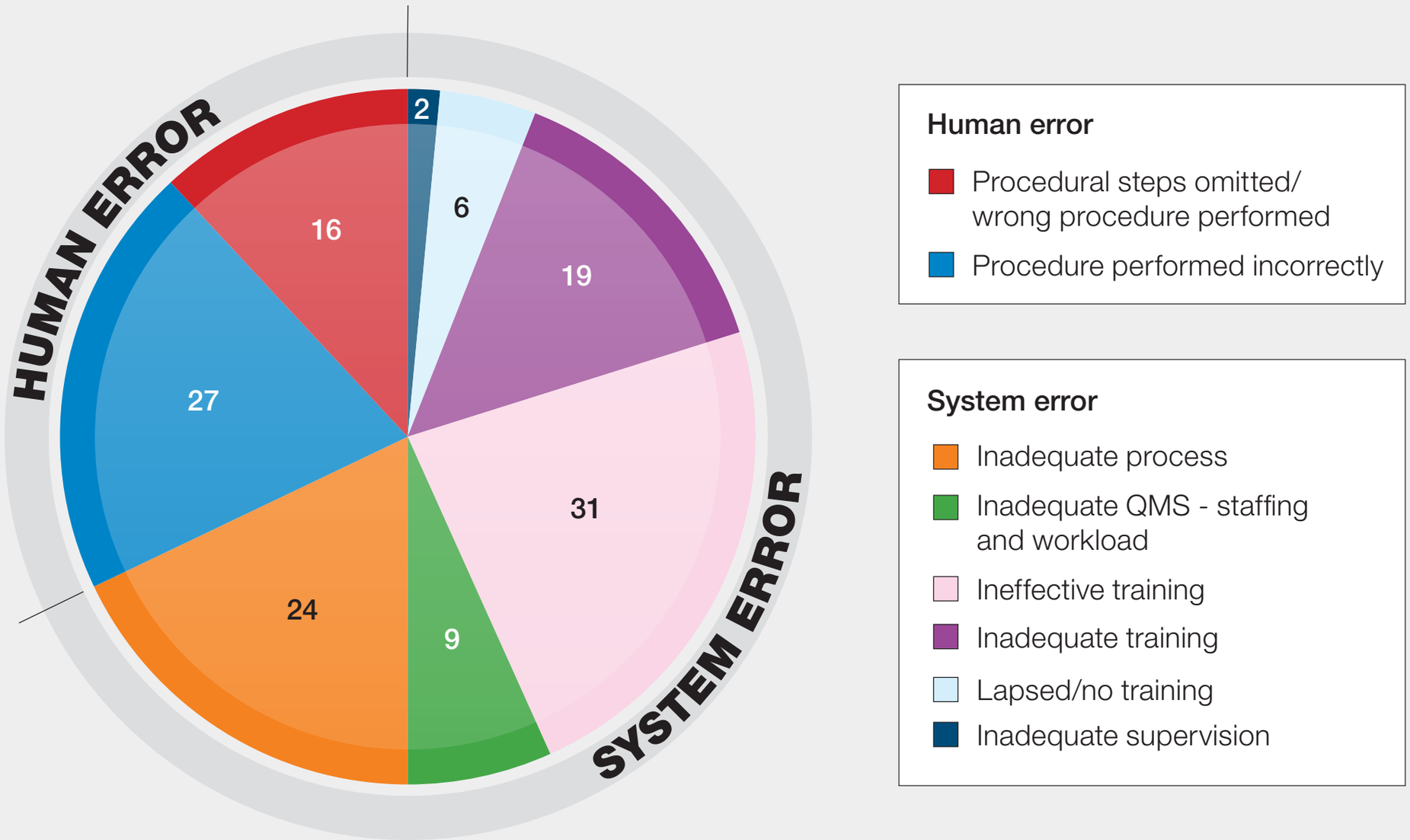
- Procedural steps omitted/ wrong procedure performed
- Procedure performed incorrectly

System error

- Inadequate process
- Inadequate QMS - staffing and workload
- Ineffective training
- Inadequate training
- Incorrect procedure
- Inadequate supervision

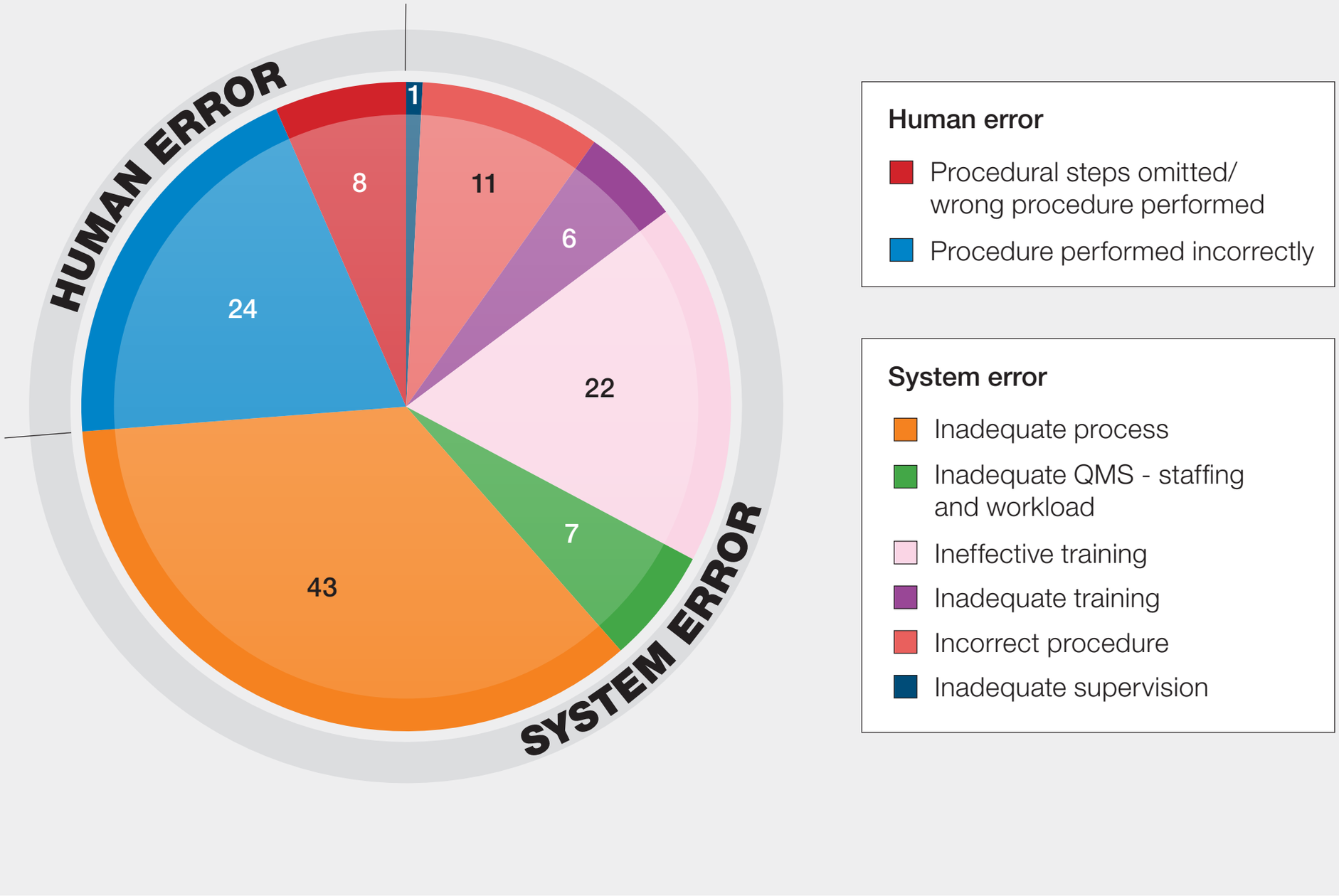
QMS=quality management system

Figure 27.7: Component collection error (CCE)



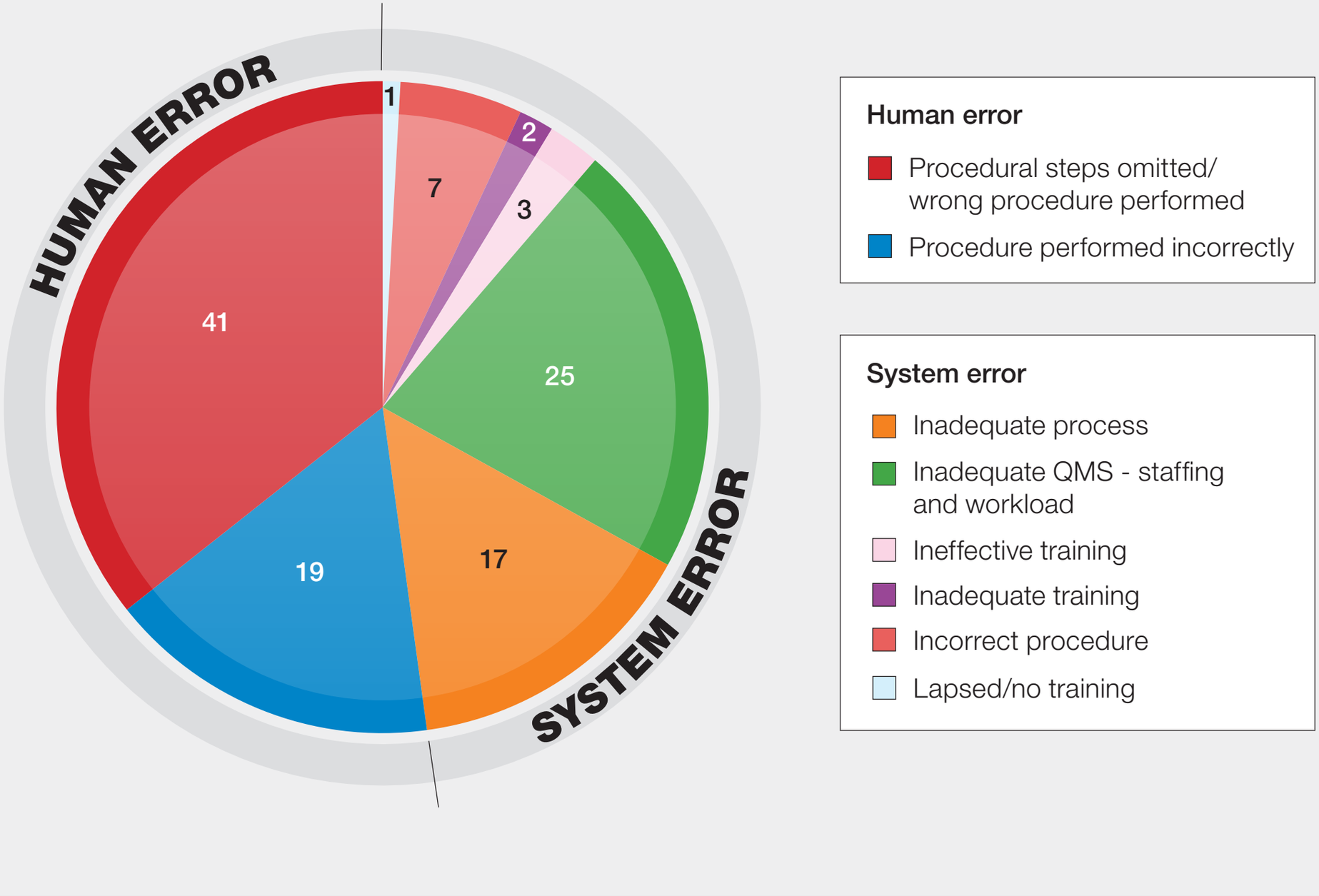
QMS=quality management system. 2 equipment failures are not included in the figure

Figure 27.8: Pre-transfusion testing error (PTTE)



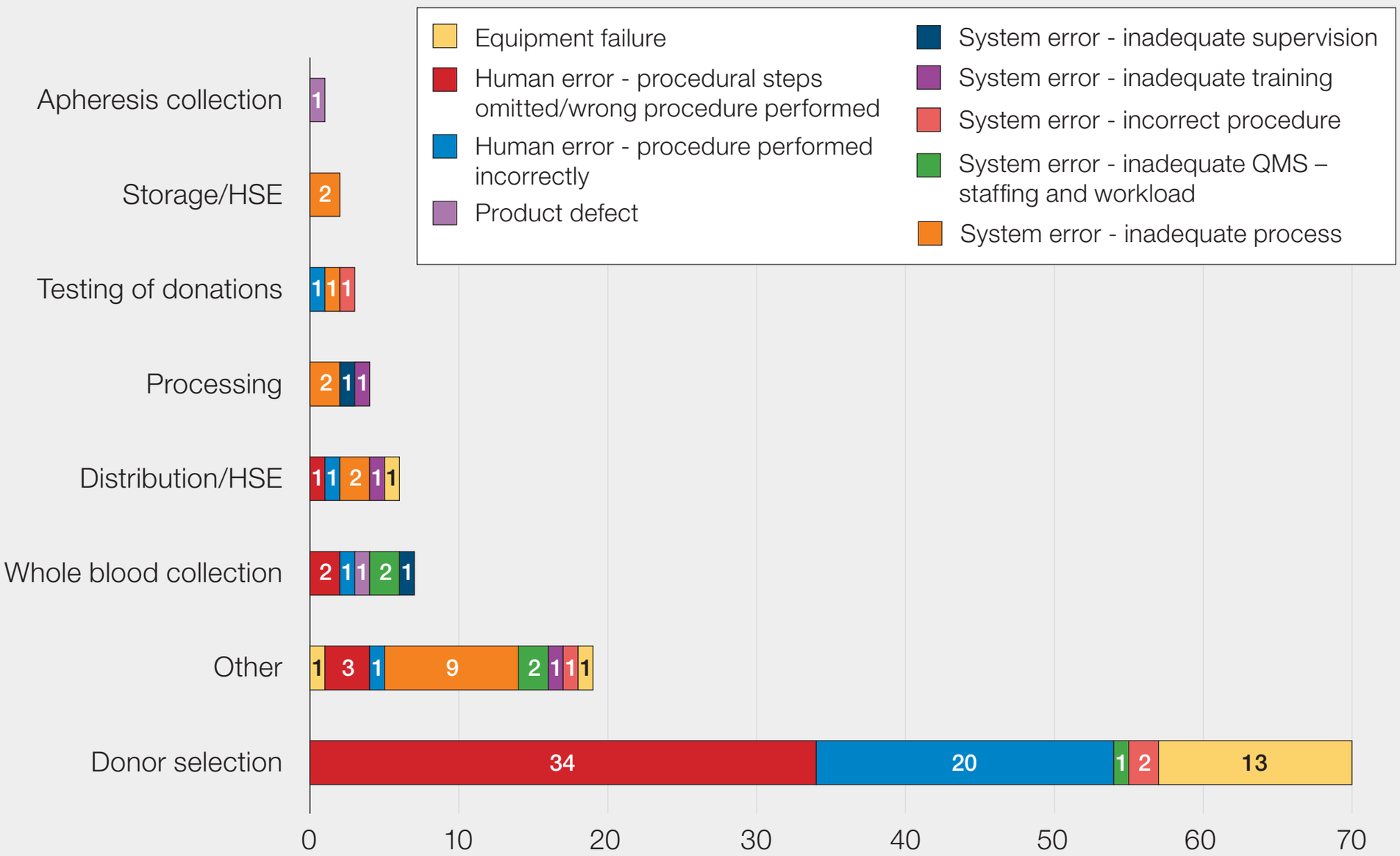
QMS=quality management system. 2 equipment failures are not included in the figure

Figure 27.9: Component labelling error (CLE)



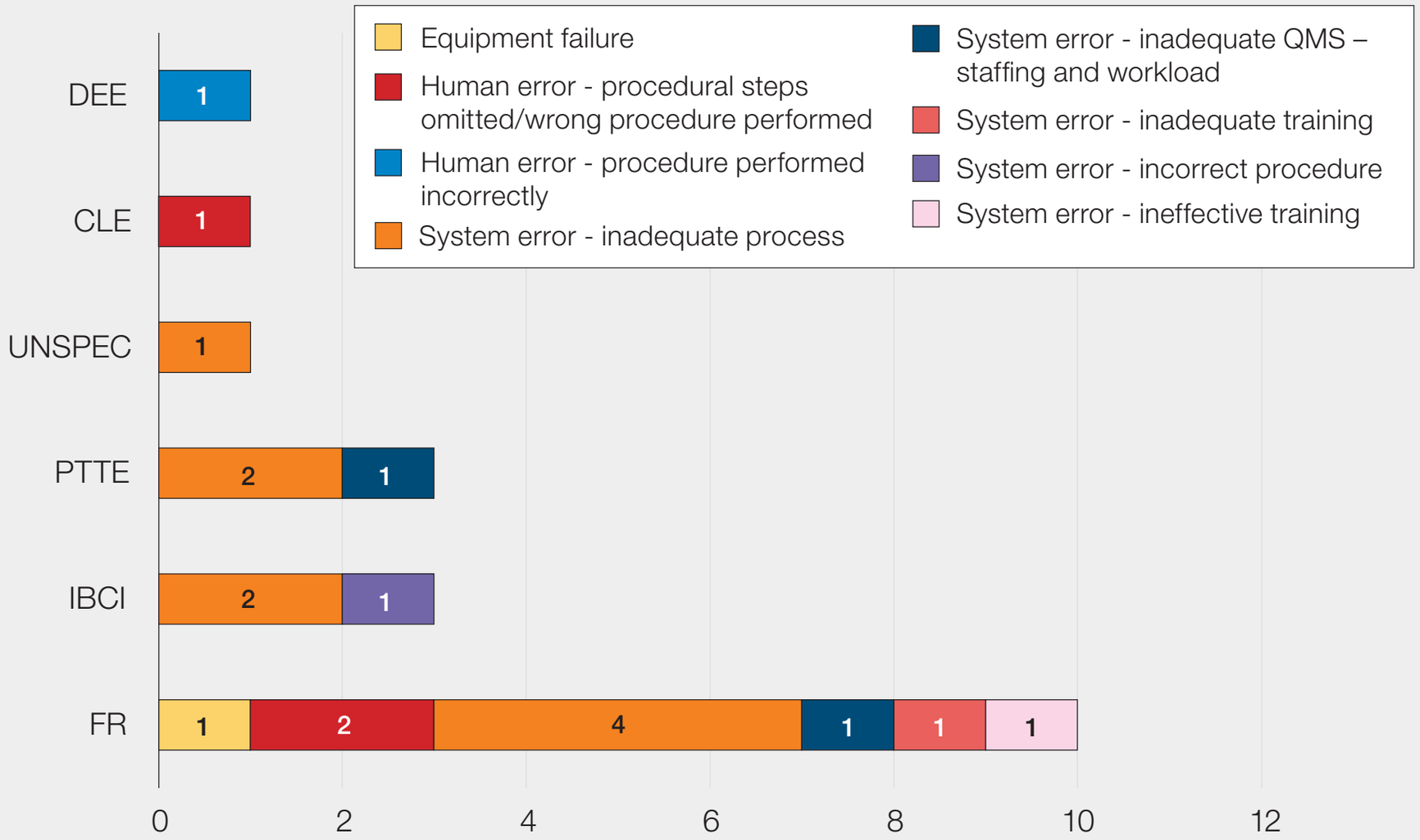
QMS=quality management system

Figure 27.10: Blood establishment SAE event category by specification



QMS=quality management system; HSE=handling and storage errors

Figure 27.11: BE reports in ‘other’ category



See Appendix 2 for key to category abbreviations; QMS=quality management system

Figure 27.12: SAR reports, by imputability, reported to SABRE in 2021