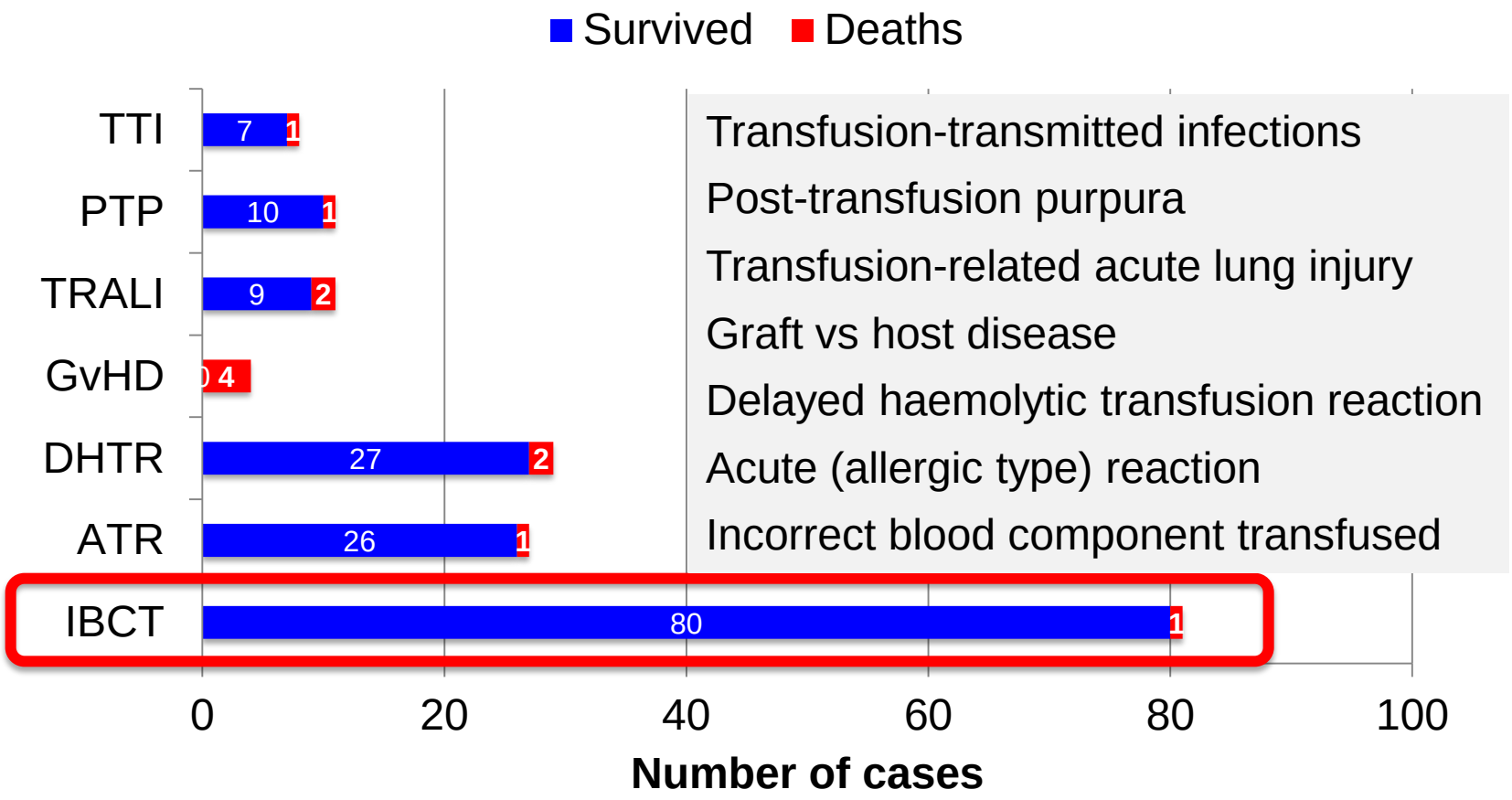
Human Factors and Transfusion Errors

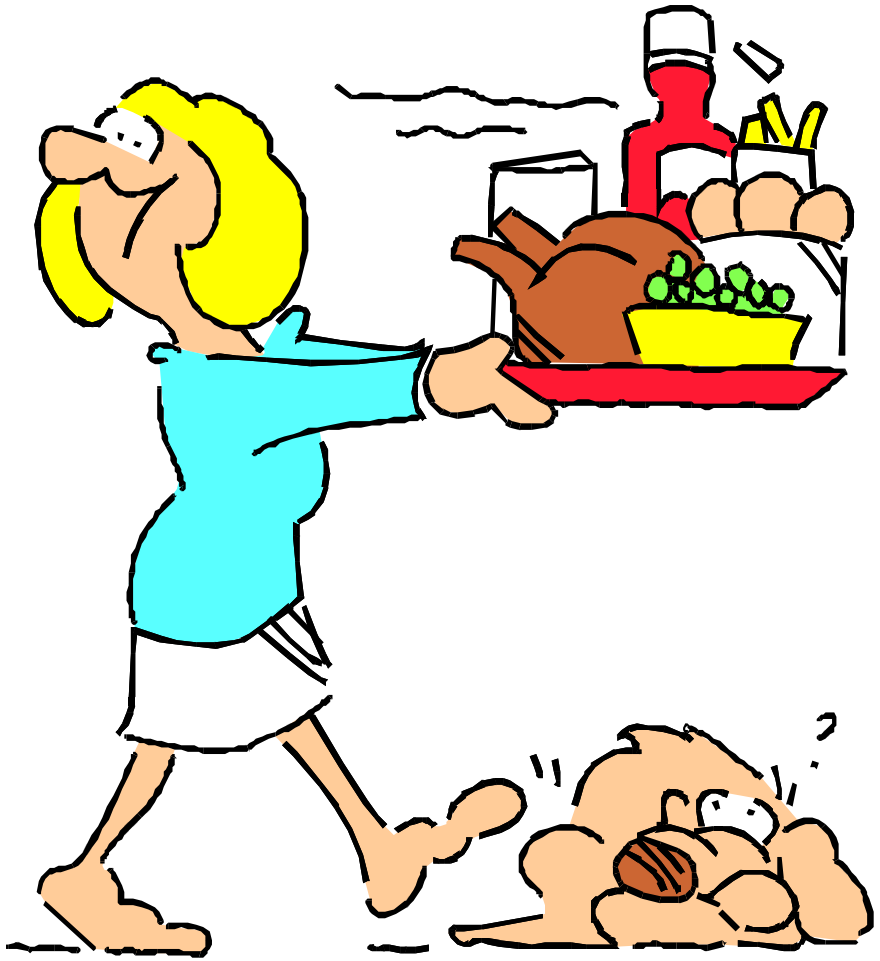
Serious Hazards of Transfusion
The UK haemovigilance scheme

Paula Bolton-Maggs
Medical Director, SHOT

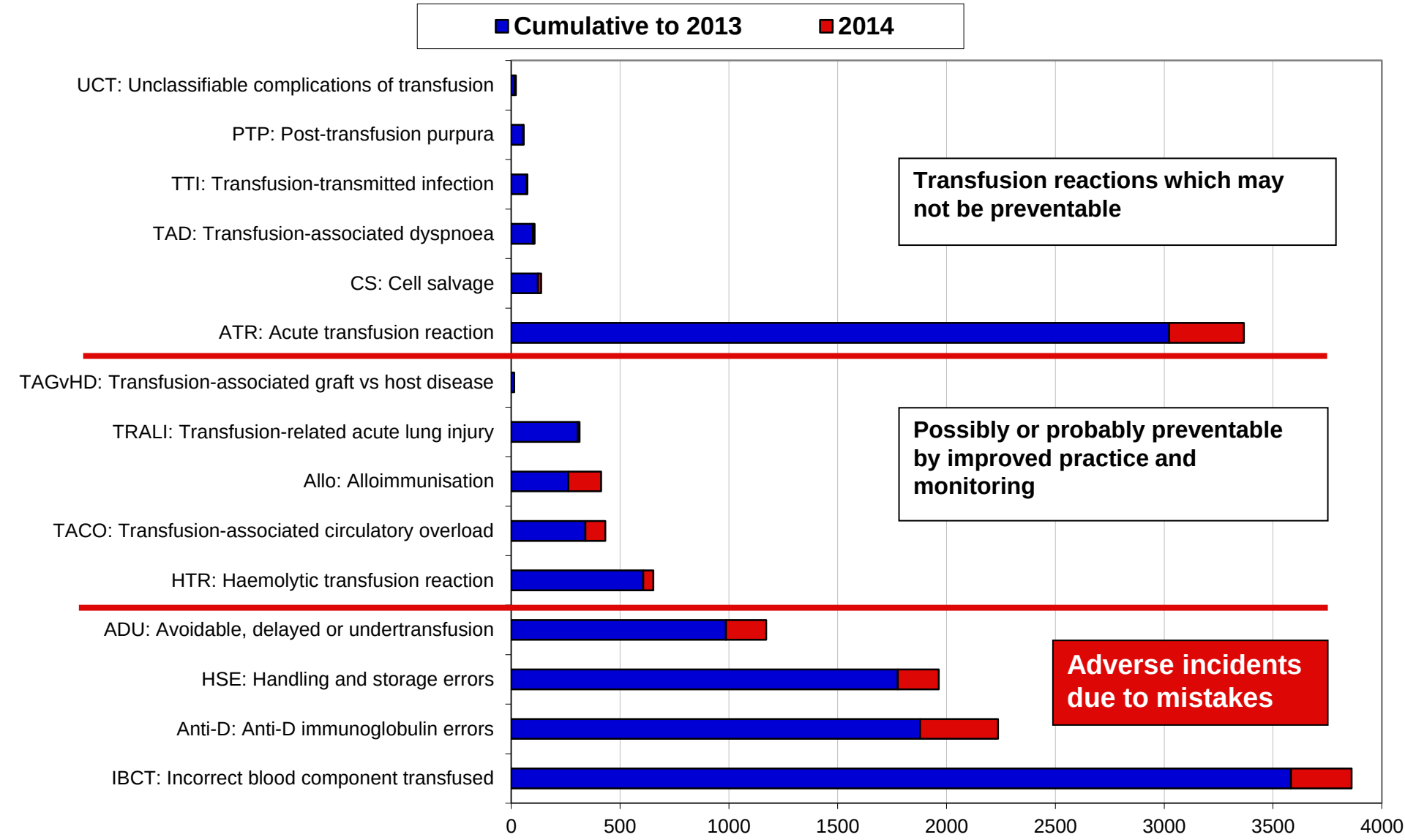
Data from 1st SHOT Report (1997)



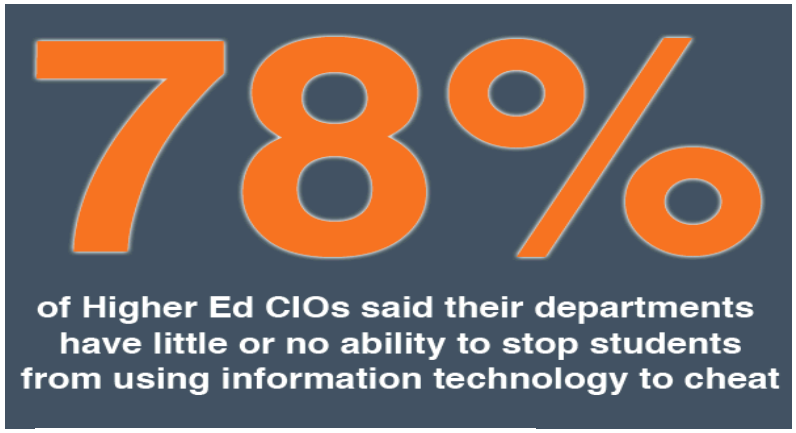
The greatest risk from transfusion is that somebody will make a mistake



SHOT Cumulative data: 18 years n=14822



In 2013 & 2014 SHOT found 78%...?



78% Dutch do not know the traffic rules

78% SHOT reports result from human error

“Learn from the mistakes of others.

You can’t live long enough to make them all yourself."

Eleanor Roosevelt

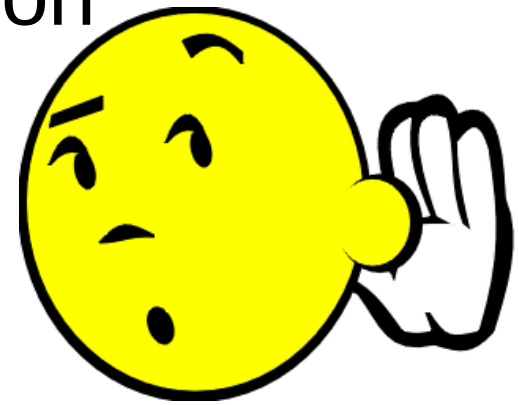
United Airlines Flight 173

- 28 December 1978, UA173 flight crash-landed due to lack of fuel, while circling to resolve a problem with the landing gear
- Captain's perception of elapsed-time failed while trying to fix the landing gear problem
- Flight Engineer tried to intervene, but failed, partly due to issues of flight deck hierarchy
- Investigation led to introduction of airline Crew Resource Management from 1981

Transfusion safety – 3 critical factors in patient safety

- Identification
- Documentation
- Communication

But these apply in all areas of medical practice



Not just in transfusion practice:

1GM Wednesday December 24 2014 | THE TIMES

Thousands of patients killed by drug and equipment errors

Safe as Planes

The NHS has a lot to learn from airlines about avoiding unnecessary risk

'Official figures show that at least 8000 patients a year are killed or severely harmed needlessly by drug errors' - a report by Jane Reid

'We should design errors out of the system by making them much harder or impossible to commit' - Leading article

Boy's leukaemia was missed 35 times

Tom Whipple

A toddler died of leukaemia after medical staff repeatedly failed to diagnose the condition over 35 separate visits to doctors and hospitals.

A coroner has said that he will be writing to the Wolverhampton GP practice of Ryan Bhogal to ask how the his condition went undiagnosed for so long, despite numerous "red flags" indicating the disease.

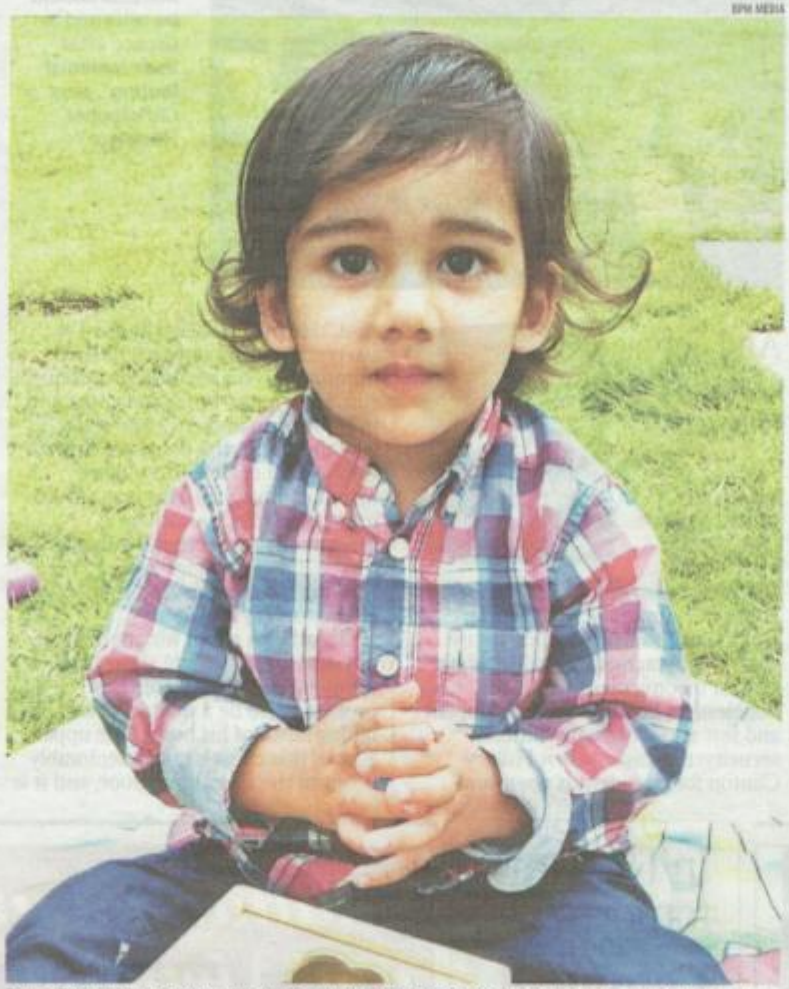
Ryan died at Birmingham children's hospital on September 11 last year, days after being admitted. He was 20 months old. Between December 2014 and September last year he had 12 trips to his GP, six to New Cross hospital in Wolverhampton and 17 to walk-in centres. The inquest heard that on all those occasions doctors failed to link key symptoms, such as bruising, a rash, bleeding gums, a lump on his head and a tendency to fall over.

Zafar Siddique, the coroner, said he was particularly concerned that the hospital did not have access to Ryan's GP records, possibly prolonging the time taken to link the symptoms to leukaemia and order a blood test that could have saved his life.

Dr Indira Wariyar, from the Raynor Road medical centre, saw the boy four times and said that a lack of medical continuity could be to blame for the missed opportunities to help him.

Dr Prashant Hiwarkar, from Birmingham children's hospital, said a blood test in August, when he presented at New Cross hospital, would have detected leukaemia.

"If Ryan's gums were bleeding on August 9 and still red and bleeding on August 18 this would be a red flag for me," he said. "I would have asked for a blood test. I believe you would have seen signs of an abnormal blood count."



Ryan Bhogal had several "red flag" symptoms, including a rash and bleeding gums

Although Ryan suffered from an aggressive form of leukaemia, those who have it diagnosed early still have about a 50 per cent chance of survival.

Recording a death from natural causes, Mr Siddique said: "I will write to the GP practice to discuss the care of Ryan and, in particular continuity, as he was seen by a number of different doctors. I will also write to New Cross hospital.

"I have concerns about lack of access to GP medical records for patients, which was certainly so in Ryan's case. I want improvements to be made."

Gurpal Bhogal, the boy's aunt, said in a statement after the inquest: "Raynor Road medical centre and New Cross hospital failed Ryan time and time again. There was also a failure in that medical records at New Cross hospital were not available. A simple blood test should have been carried out and there were many missed opportunities to do this. But this was never done. Lessons have to be learnt from this.

"However, we would like to thank the doctors and nurses at Birmingham children's hospital for the care Ryan received during his two days there."

Speaking during the inquest his father, Kulvinder Bhogal, described watching his son die. "Seeing him lying there attached to a machine was heartbreaking. I walked away from the ward with tears in my eyes. He was my world."

Multiple errors

Monday December 28 2015 | THE TIMES

1,000 deaths blamed on errors by A&E staff

More than 1,000 hospital patients have died after mistakes by over-stretched A&E staff in the past five years. A further 2,539 suffered "serious harm" from poor care. People have been told to stay away from A&E unless "absolutely necessary". The NHS National Patient Safety Agency found that 1,089 patients have died after errors linked to poor care since 2010. Last year there were 247 deaths, up from 218 the year before. In 2012-13 there were 201, compared with 206 in 2011-12 and 217 in 2010-11. Critics said that the loss of dozens of A&E departments had increased the strain on the remaining 164 units.

16 blunders in his care

THE report into William's death identifies 16 major mistakes in his care after he started coughing and repeatedly vomiting in September 2014. The GPs involved were identified only by letters.

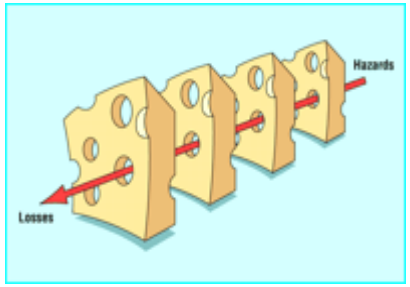
- A 'general failure' to 'listen to parents' during GP appointments.
- **All the GPs who examined William on a total of six occasions should have realised his repeated attendances were a sign of serious illness.**
- At a GP appointment on November 12, GP X – not his regular doctor – diagnosed infection with possible asthma. William did not have asthma, and treatment was 'inappropriate'.
- **Follow-up checks were never made on whether a prescribed inhaler was helping William's cough.**
- GP Z failed to spot a key sign of infection – green phlegm in William's vomit – at an appointment on November 21. This was one of 'a number of opportunities to treat the infection' which ultimately caused William's death.
- **On December 12 GP Z failed to take William's heart rate – which could have alerted him to a sepsis diagnosis.**
- GP Z failed to record his temperature, which was 40C.
- **GP Z should have referred William to hospital, based on his history.**
- GP Z should have given William antibiotics. 'National pressure' on GPs not to prescribe may have affected his and other GPs' 'decision making'.
- **Advice to parents about bringing him back to the surgery if his symptoms grew worse was 'vague' and unhelpful.**
- A 111 call handler failed to ask key questions when mother called on December 13 as William sickened further. His temperature had fallen significantly.
- **Call handler failed to refer 'complex call' to a clinically trained staff member.**
- A clinically trained employee, the report said, would have responded to William's loud crying in the background.
- **111 system itself 'not sensitive enough' to detect the signs of serious illness of this type in a young child.**
- Out-of-hours doctor called at 6.52pm on the 13th but failed to realise a big drop in temperature indicates serious illness.
- **Doctor did not get access to William's records... another missed opportunity to spot he was seriously ill. William dies during the night.**

Having fun: William Mead (top) and with his father Paul (above)

Death from septicaemia

Lethal intrathecal vincristine 2001

Drugs sent together



- 18 yr old in CR from ALL died 4 weeks after the event
- 14 separate factors
- Swiss cheese model
- Communication and hierarchy

- Assumptions and ‘newcomer syndrome’
- Physician *and* pharmacy error in 69% of 55 cases 1968-2006

An unexpected death

- 29 March 2005, Elaine Bromiley, a 37-year-old mother of two had routine minor surgery
- Anaesthetist's perception of elapsed-time failed while trying to intubate
- Nurse tried to intervene, but failed, partly due to issues of theatre hierarchy
- This contributed to the introduction of the WHO Surgical Safety Checklist, 2009

  (28 years after air industry's Crew Resource Management in 1981)

Quotation from Independent Report into death of Elaine Bromiley

“So that others may learn, and even more may live."

Martin Bromiley, husband of Elaine, airline pilot and founder of Clinical Human Factors Group (CHFG)

To err is human (Pope)

- ‘Human Factors is using what we know about people to design safe, effective and efficient systems.’ Beverley Norris, Human Factors Lead, NPSA
- ‘Every system, process, machine, tool or act that a human devises, uses or does is prone to error and failure. The study of and the learning from this simple truth is the basis of Human Factors.’ Chris Seal, Airline and Military Pilot and Human Factors Consultant

Human factors

- The science of optimising human performance through better understanding of human behaviour and interactions
- Clinical Human Factors Group (www.chfg.org)
- The Human Factors Concordat - National Quality Board, NHS England
- ‘Sign up to safety’ – NHS campaign

Learning from what goes wrong

- Concept of a ‘just culture’
- Incident reporting more likely if non-punitive – trust is critical
  - Avoid ‘omerta’ the code of silence
- Accountability
  - Looking backwards for a scapegoat to blame
  - Looking forwards to see what can be learned and changed to avoid recurrence

Just culture: Sidney Dekker 2nd ed. Ashgate 2012

Thursday May 29th 2014

Local newspaper Front page headline:

What message does this give to hospital staff?

H[illegible]FF
SA[illegible]
BLOOD BLUNDER

Two workers dismissed for putting patient's life at risk

Sign up to Safety

Harnessing the commitment of staff across the NHS in England to make care safer

Sign up to SAFETY

(http://www.england.nhs.uk/signuptosafety/wp-content/uploads/sites/16/2015/06/homepage-image.jpg)

Sign up to Safety is harnessing the commitment of staff across the NHS in England to make care safer. A patient safety campaign, it is one of a set of national initiatives (http://www.england.nhs.uk/ourwork/patientsafety/) to help the NHS improve the safety of patient care. Collectively and cumulatively these initiatives aim to reduce avoidable harm by 50% and support the ambition to save 6,000.

The five Sign up to Safety pledges

Putting safety first. Commit to reduce avoidable harm in the NHS by half and make public our locally developed goals and plans

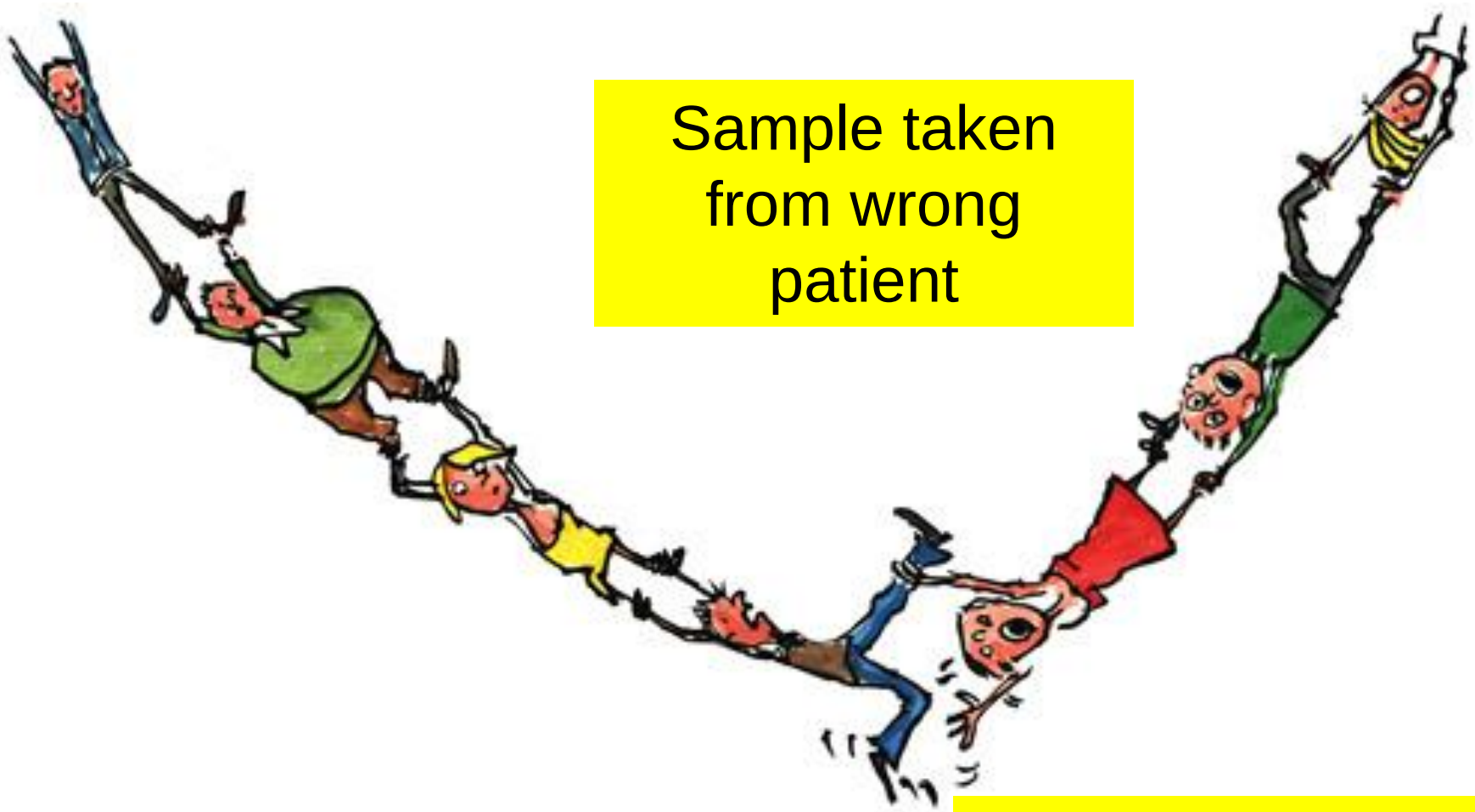
Continually learn. Make our organisation more resilient to risks, by acting on the feedback from patients and staff and by constantly measuring and monitoring how safe our services are

Being honest. Be transparent with people about our progress to tackle patient safety issues and support staff to be candid with patients and their families if something goes wrong

Collaborating. Take a lead role in supporting local collaborative learning, so that improvements are made across all of the local services that patients use

Being supportive. Help people understand why things go wrong and how to put them right. Give staff the time and support to improve and celebrate progress.

Human factors

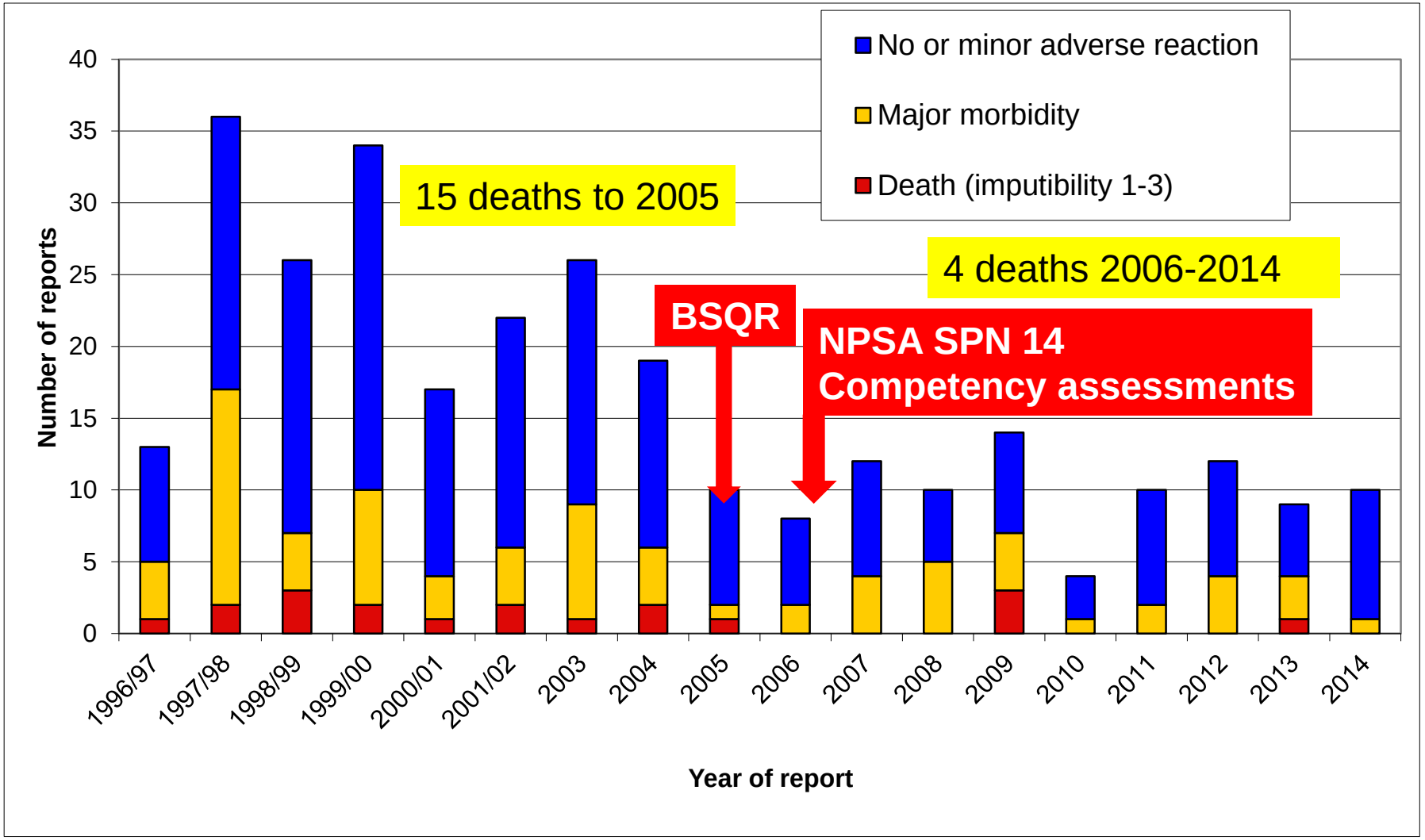


More near misses ⟶ fewer actual incidents of patient harm

- Giving a patient the wrong blood is the most dangerous transfusion error

Outcome of ABO incompatible red cell transfusions

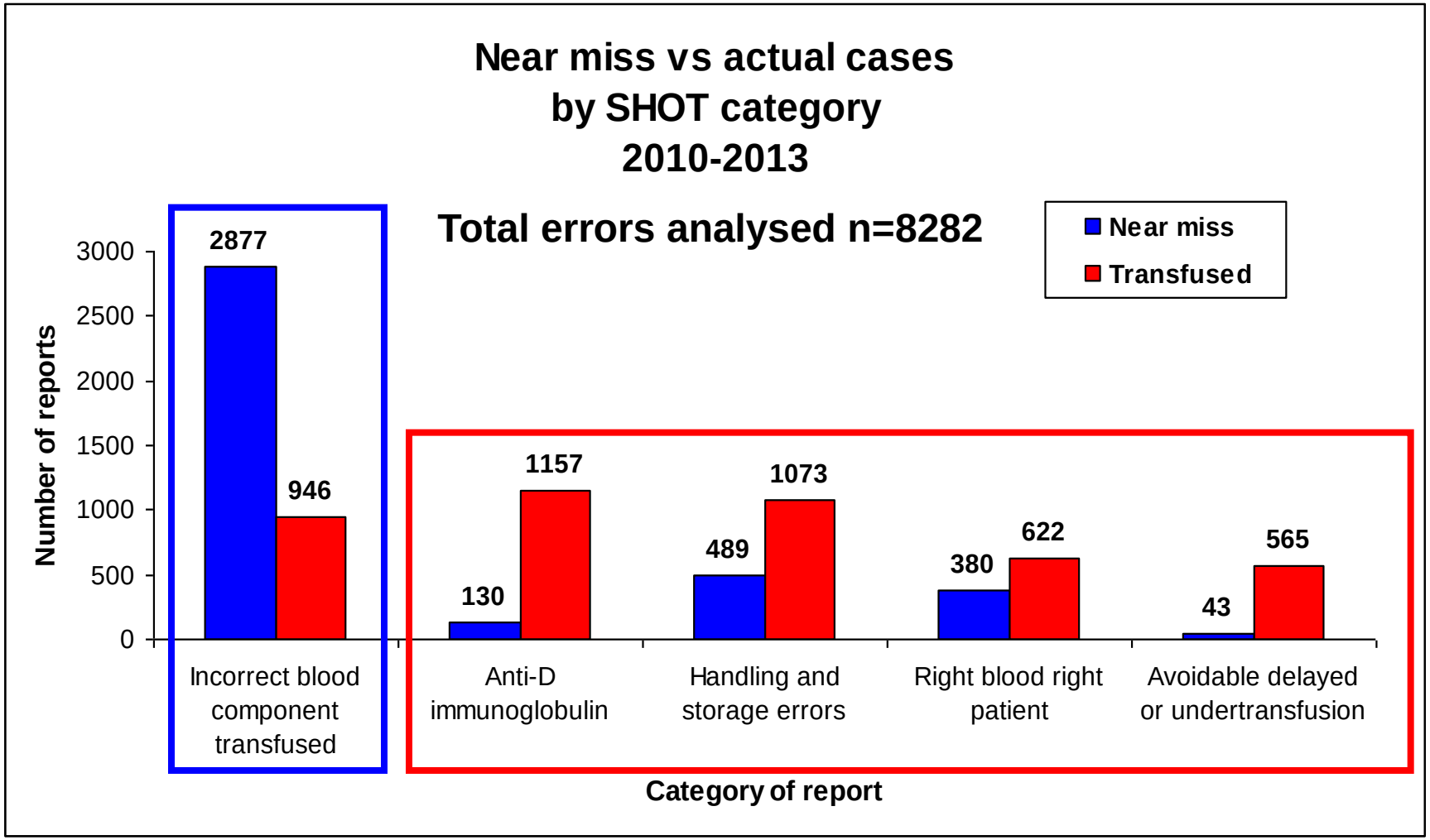
66% have no adverse effect



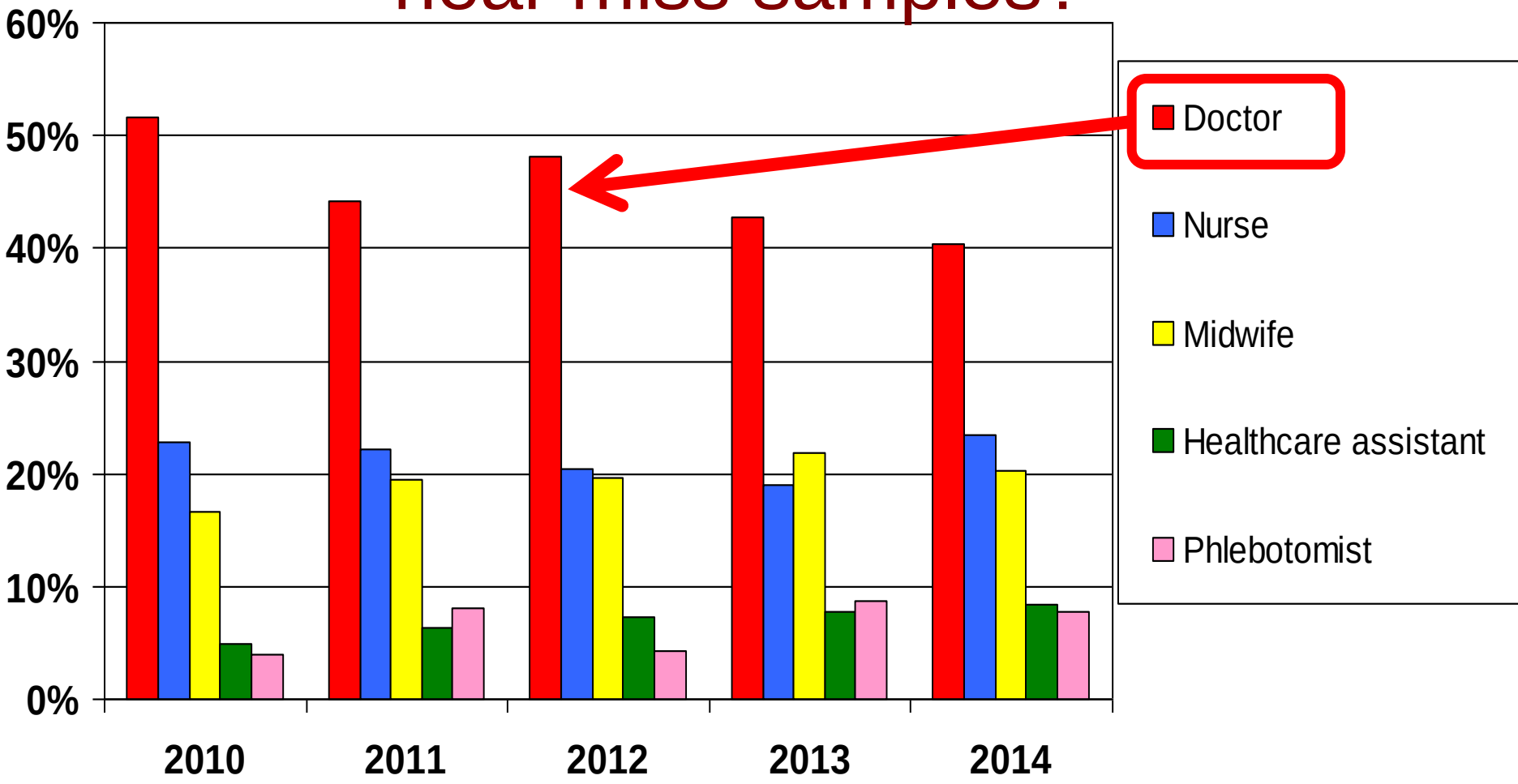
SHOT Near Misses

- Data collected since 1999 on near miss errors
- Fully analysed since 2010 when electronic SHOT database began

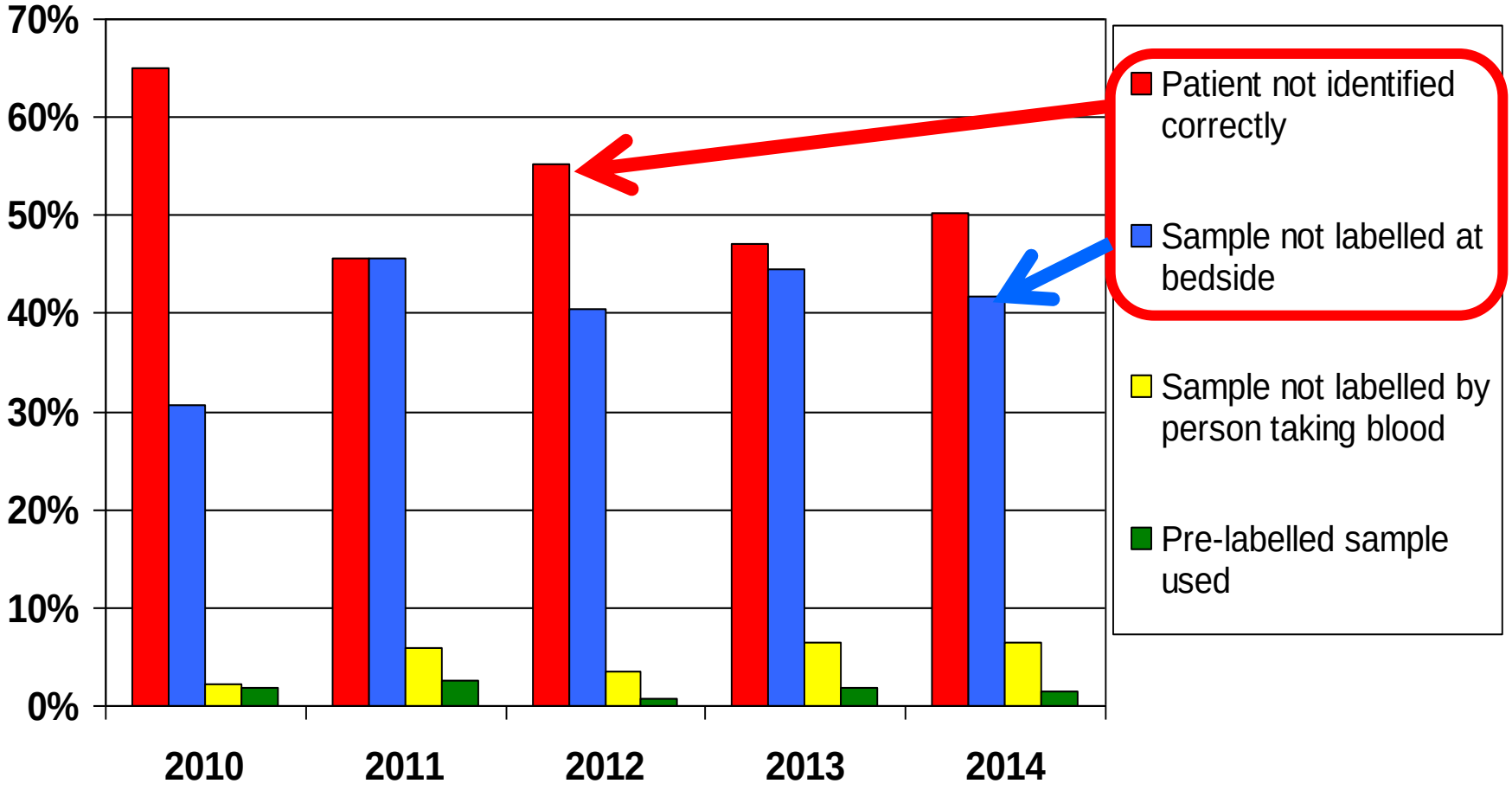
Detection of incorrect transfusions and other error categories



Who was responsible for near miss samples?

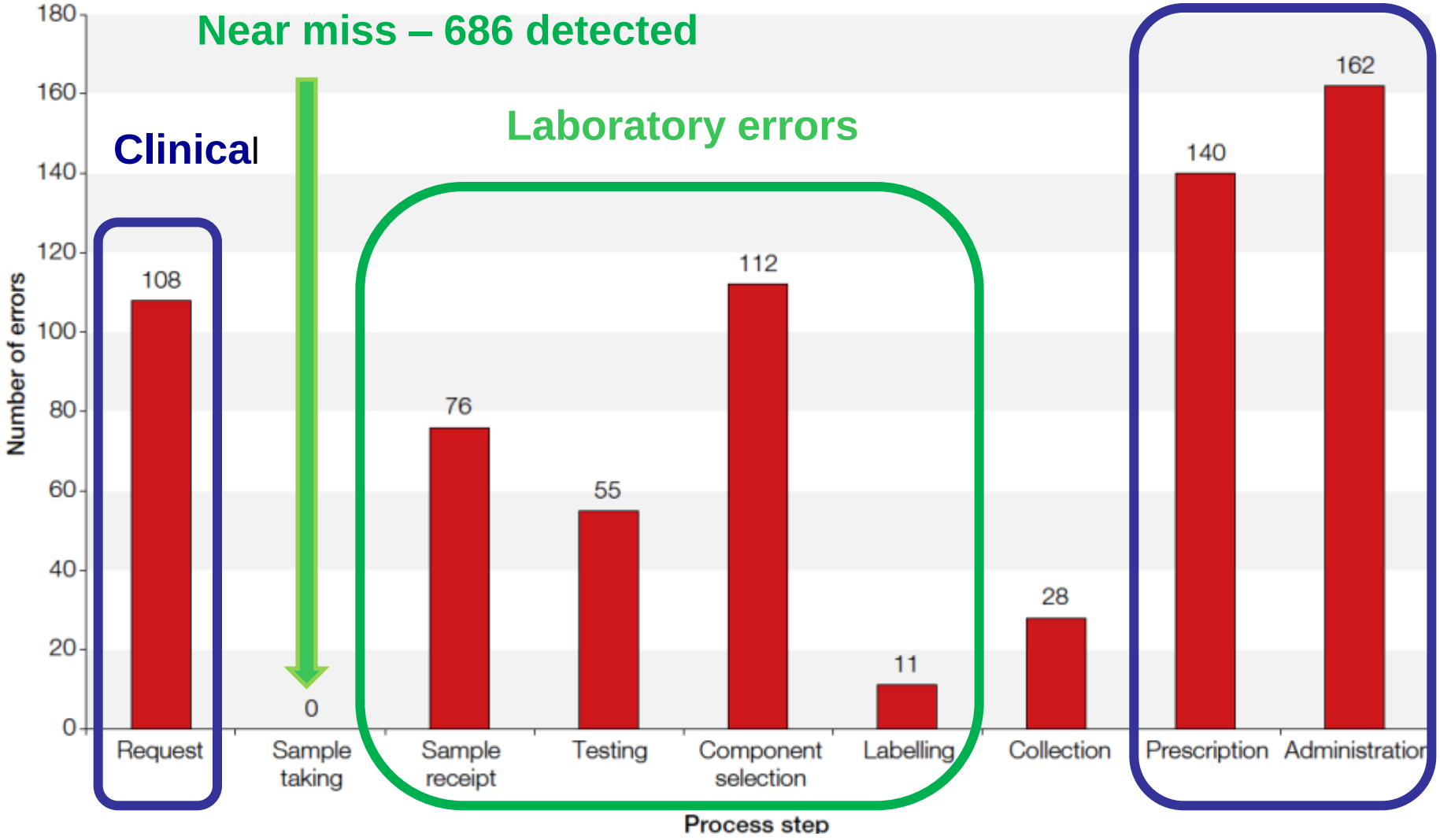


Reasons for wrong samples



Wrong transfusions, where are the mistakes made?

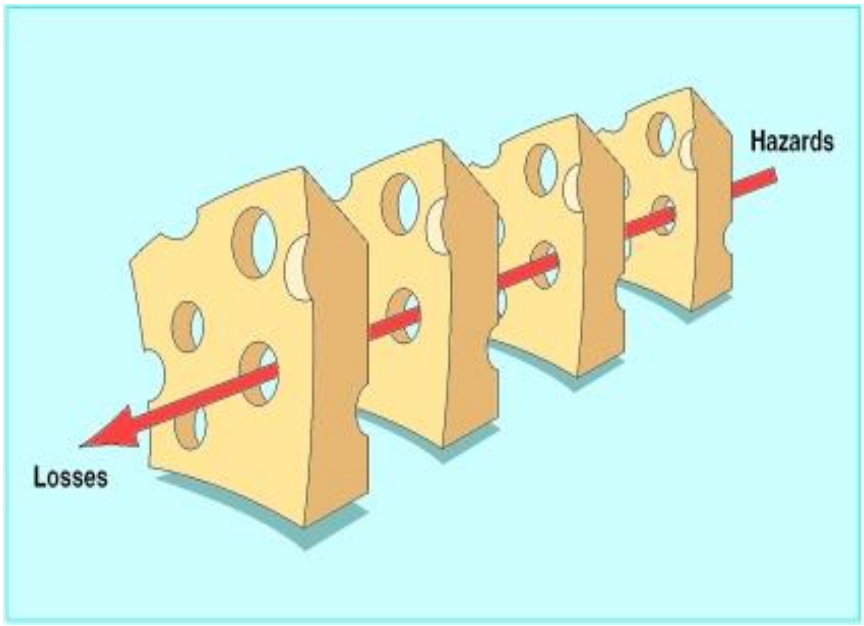
Data for 2014



Near miss 2015

- 1240 reports (about a third of the total)
- Wrong component transfusions 887 (71.5%)
- Wrong blood in tube 780
- **ABO-incompatible transfusions would have resulted in 289 (37.1%) cases**
- Actual ABO incompatible red cells
- These are serious incidents but the solution is not to dismiss 289 staff, it is to understand why and change the process

Free Lessons

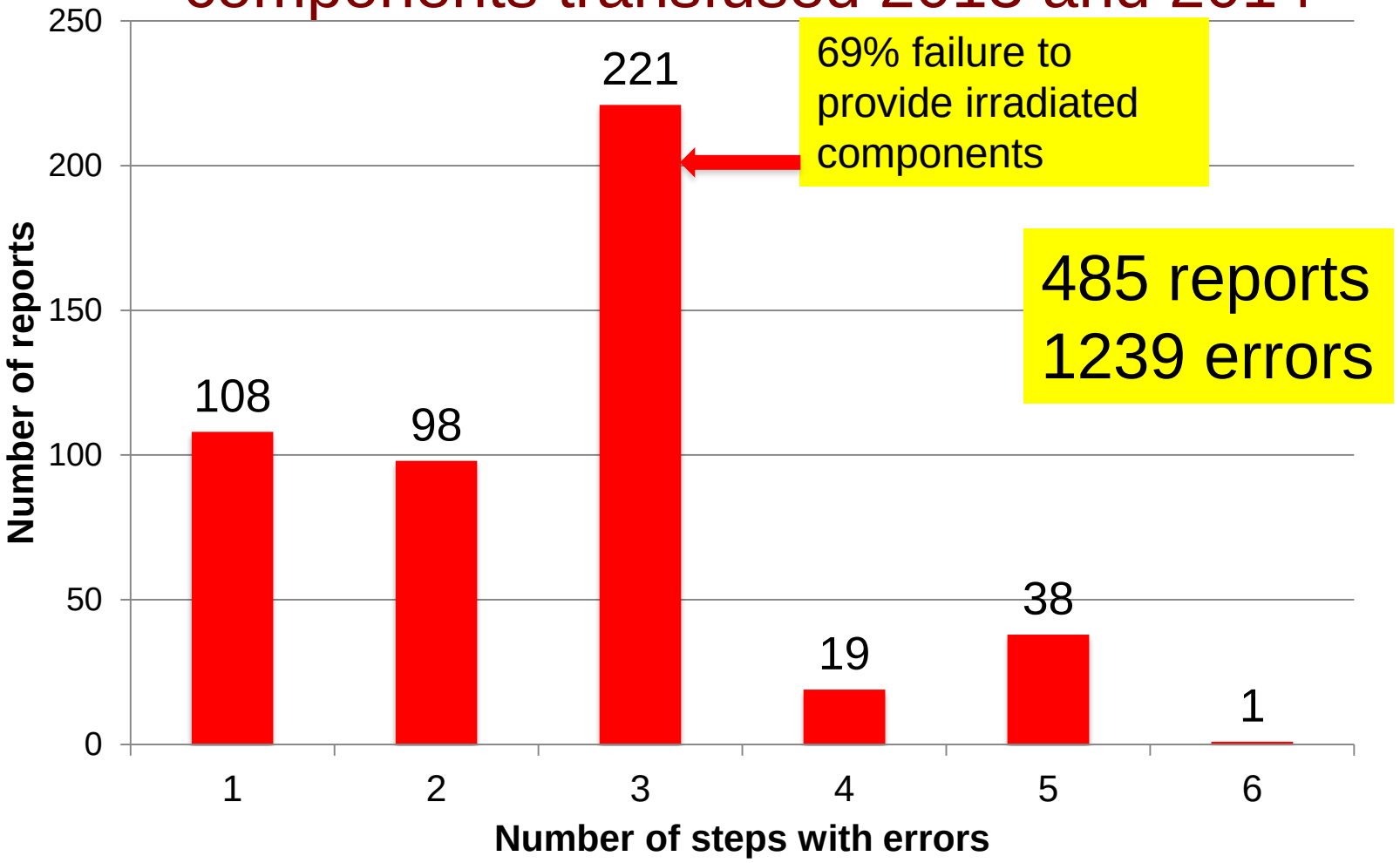


- Reason's Swiss cheese model
  (James Reason, 2000[1])
- When the holes in the barriers all line up, an accident/incident occurs

- Near miss incidents, where errors are caught by a barrier before harm is done, can be described as "free lessons" (James Reason, 2008[2])

1. James Reason: **Human error: models and management** *BMJ* 2000;320:768–70
2. James Reason: **The Human Contribution**. Farnham, Surrey: Ashgate; 2008.

Multiple errors are common – incorrect blood components transfused 2013 and 2014



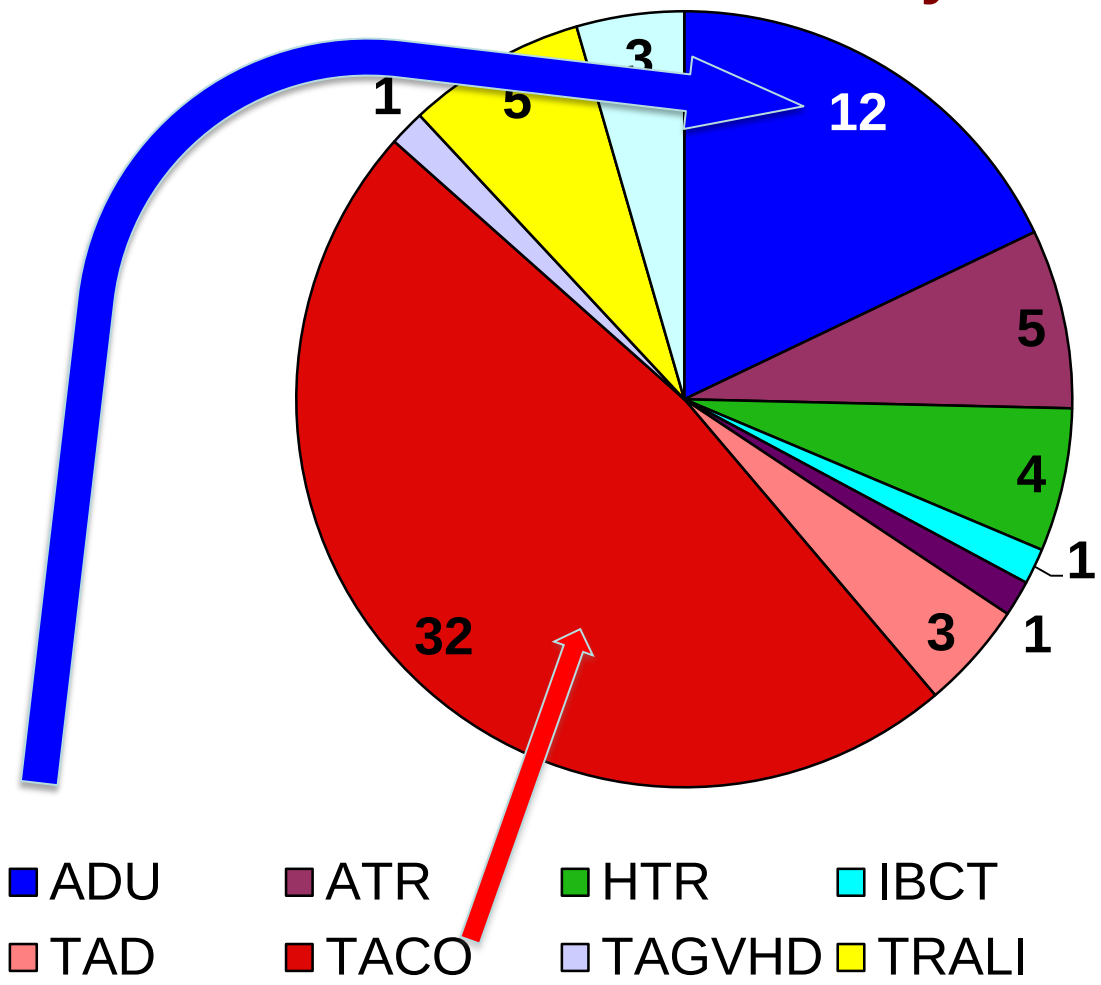
Mortality from over-transfusion 2000-2011

Year	Number	Error	Outcome	Underlying diagnosis
2000/1	2	Unsuitable sample	Cardiac arrest	IHD
		Unsuitable sample	TACO	GI Bleed
2001/2	2	Unsuitable sample	TACO	GI Bleed
		Unsuitable sample	TACO	GI Bleed
2004	1	WBIT	TACO	Unknown
2005	1	Misdiagnosis haemorrhage	TACO	Acute abdomen
2006	2	Paediatric prescription	Cardiac arrest	Premature infant
		Unsuitable sample	TACO	Fractured femur
2008	1	XS red cells	Polycythaemia	GI bleed
2009	2	WBIT	TACO	Carcinoma
		Unsuitable sample	TACO	Fractured femur
2010	1	XS red cells	TACO	GI bleed
2011	1	XS red cells	TACO	GI bleed
Total	**13**			

Delayed transfusions

Total deaths by category 5 years - 2010-2014

n=67
Imputability 1-3



A different approach

- **Safety-I** Situations where nothing goes wrong and responses are **reactive** – responding to adverse events when they happen: fire-fighting
- **Safety-II** Working environment where things go right. It is **proactive** – adjustments to performance so that risky situations do not occur

Resilience

- The intrinsic ability of a system to adjust its functioning before, during or after changes and disturbances, so that it can sustain required operations under both expected and unexpected conditions
- Requires the abilities to anticipate, to monitor and respond, and to learn

Emergencies happen….

‘Pull out! Pull out, you’ve hit an artery!’

Reality

- Standard operating procedures (SOPs) and protocols may work well in the lab and for the bedside check

- They do not work so well in the busy complex clinical environment
  - Multitasking is common
  - Distraction is everywhere
  - Assumptions…

Resilience
Managing the unexpected

Hudson river plane crash, 2009. Pilot Chesley Sullenberger saved all 155 lives

Red Devils parachutists collided at 1,800ft

- Both ended up hanging from a single canopy
- Too low to deploy an emergency parachute
- Crash-landed in a nearby marina

I KNEW HE WOULDN'T LET ME DOWN

Wayne Shorthouse, left, and a relieved Mike French yesterday after the pair survived a scare in Cumbria when Shorthouse became entangled in French's parachute

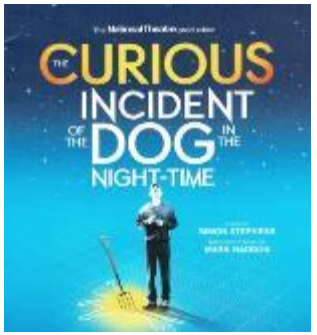
We were both laughing, says hero

‘Remarkably, both men, who have completed more than 2800 jumps between them, were unhurt and within 10 minutes were enjoying a pie and a pint together’

Sunday Times, 21 June, 2015

Situational awareness - Noticing

- Sherlock Holmes - The curious incident of the dog in the night time ... it didn't bark
- Noticing when things do not go as anticipated
- Learning from what works



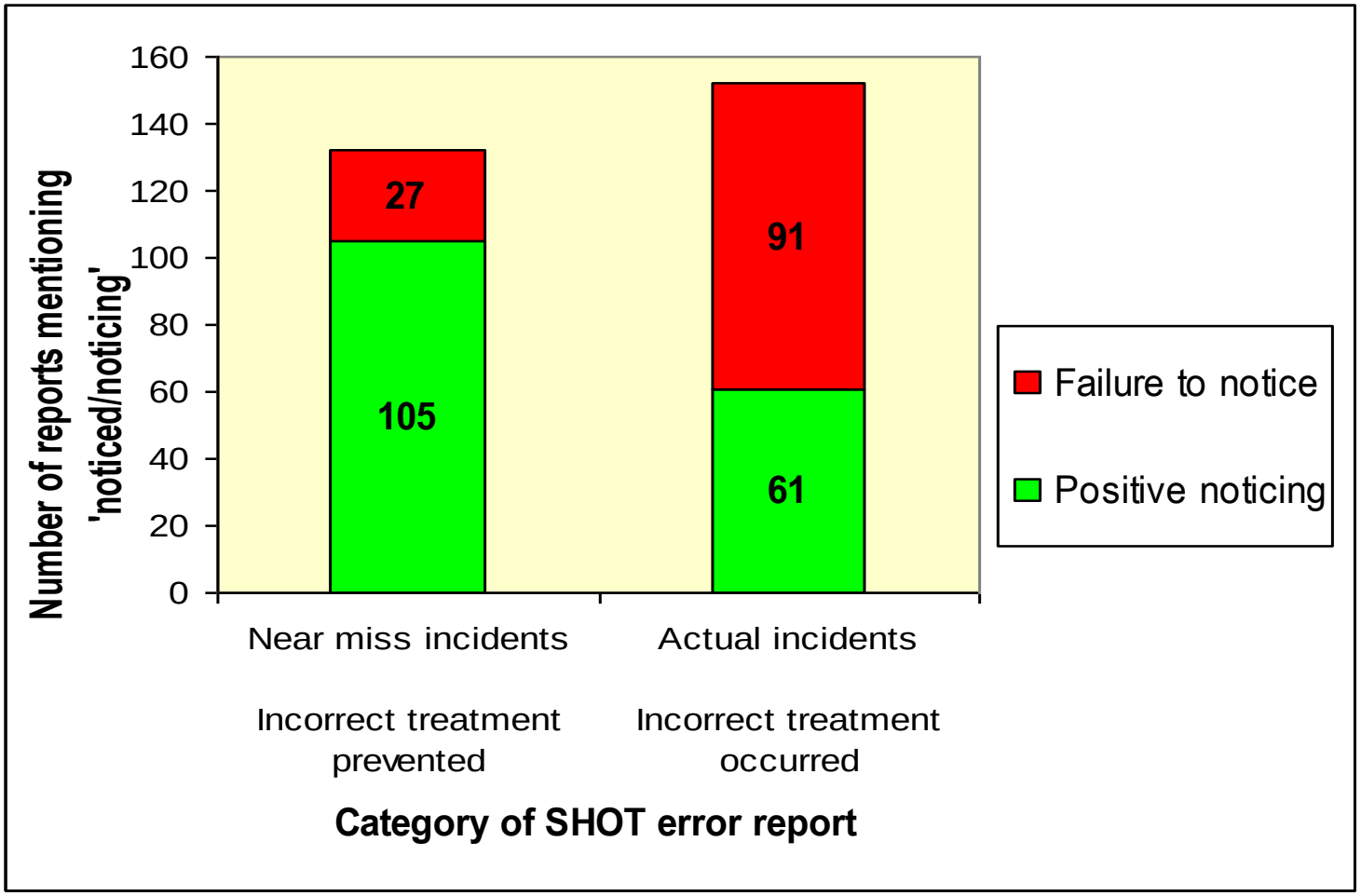
Situational awareness - Noticing

- Level 1 of situational awareness is perception, or ‘noticing’
- Error reports from calendar year 2014 (n=2346) were searched for use of the words ‘noticed/noticing’
- Did ‘noticed/noticing’ link with prevention of patient harm, or were failures to notice the error associated with inappropriate patient management?

Case Study: Nurse notices an unusual irradiation sticker

- A unit of irradiated platelets was taken to the ward. A nurse noticed the irradiation sticker on the component was still red and the word **NOT** was still visible
- Although the component had been signed and dated as having been irradiated, the nurse contacted the laboratory to double-check
- The nurse was advised to return the unit as it had not been irradiated and thus prevented the patient receiving an incorrect unit

‘Noticing’ is more likely in Near Miss cases Analysis of SHOT reports in 2014 n=284/2346



Are we looking from the wrong end?

- Most of the time, it goes right
- 2.7 million blood components issued in the UK in 2014
  - Risk of major morbidity - 1 in 16,000 (n=169 in 2014)
- Risk of transfusion death - 1 in 180,000 (n=15 in 2014)
  - Death from error (human factors) - 1 in a million
  - Death from TACO - 1 in 450,000 (Transfusion-associated circulatory overload)
- Comparison non-transfusion risks
  - Risk of death in a road traffic accident (UK) in any one year – 1 in 20,000 (on a population basis)
  - Medical complications in next year - 1 in 100,000


SHOT Symposium 2016
The Lowry Centre, Salford, Manchester,
Thursday 7th July 2016
Keynote speaker: Erik Hollnagel
Resilience in Healthcare
Registration deadline: Wednesday 29th June 2016
Abstract deadline: Friday 29th April 2016
SERIOUS HAZARDS OF TRANSFUSION
SHOT

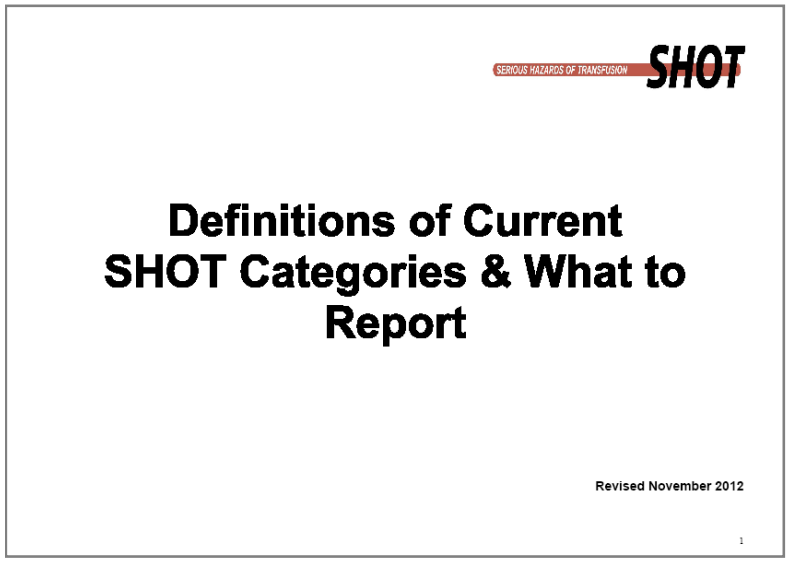
Acknowledgements

- SHOT Team in Manchester
- SHOT Working and Writing Expert Group
- SHOT Steering Group
- UK healthcare organisations for reporting

Additional Information

Documents available on website : www.shotuk.org

- SHOT reporting definitions
- Clinical Lessons
- Laboratory Lessons
- SHOT Bites



Also available:

- Annual SHOT reports
- Annual SHOT summaries
- Supplemental data