

Haemovigilance and Transfusion Safety

**Dr Peter Flanagan
National Medical Director
New Zealand Blood Service**

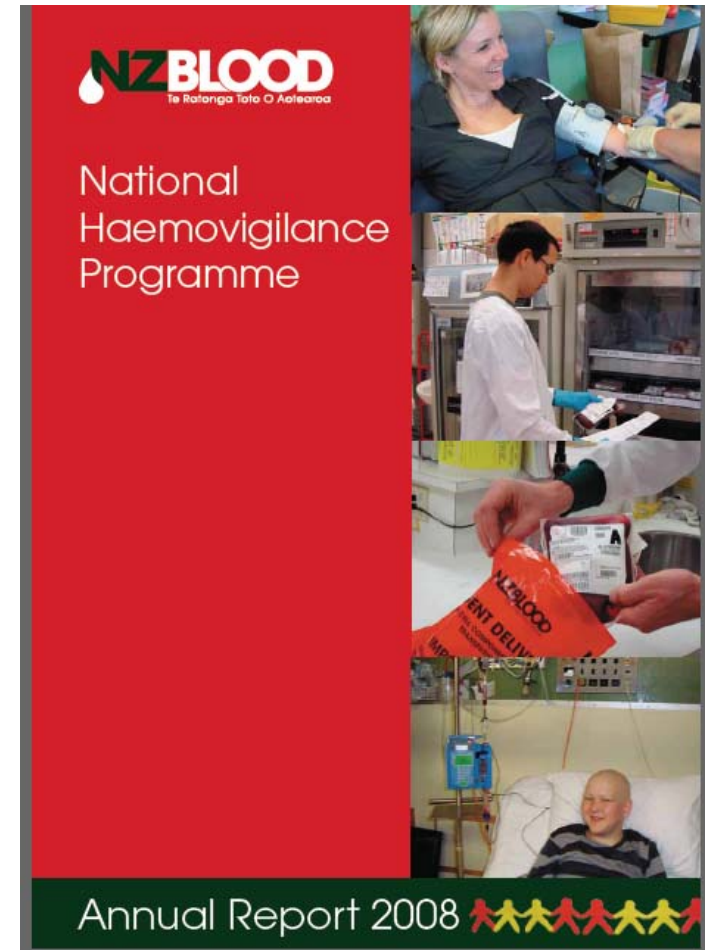
Changing Paradigms

- Focus on products
 - safety, efficacy and availability
- Focus on patients
 - transfusion as part of the overall care package

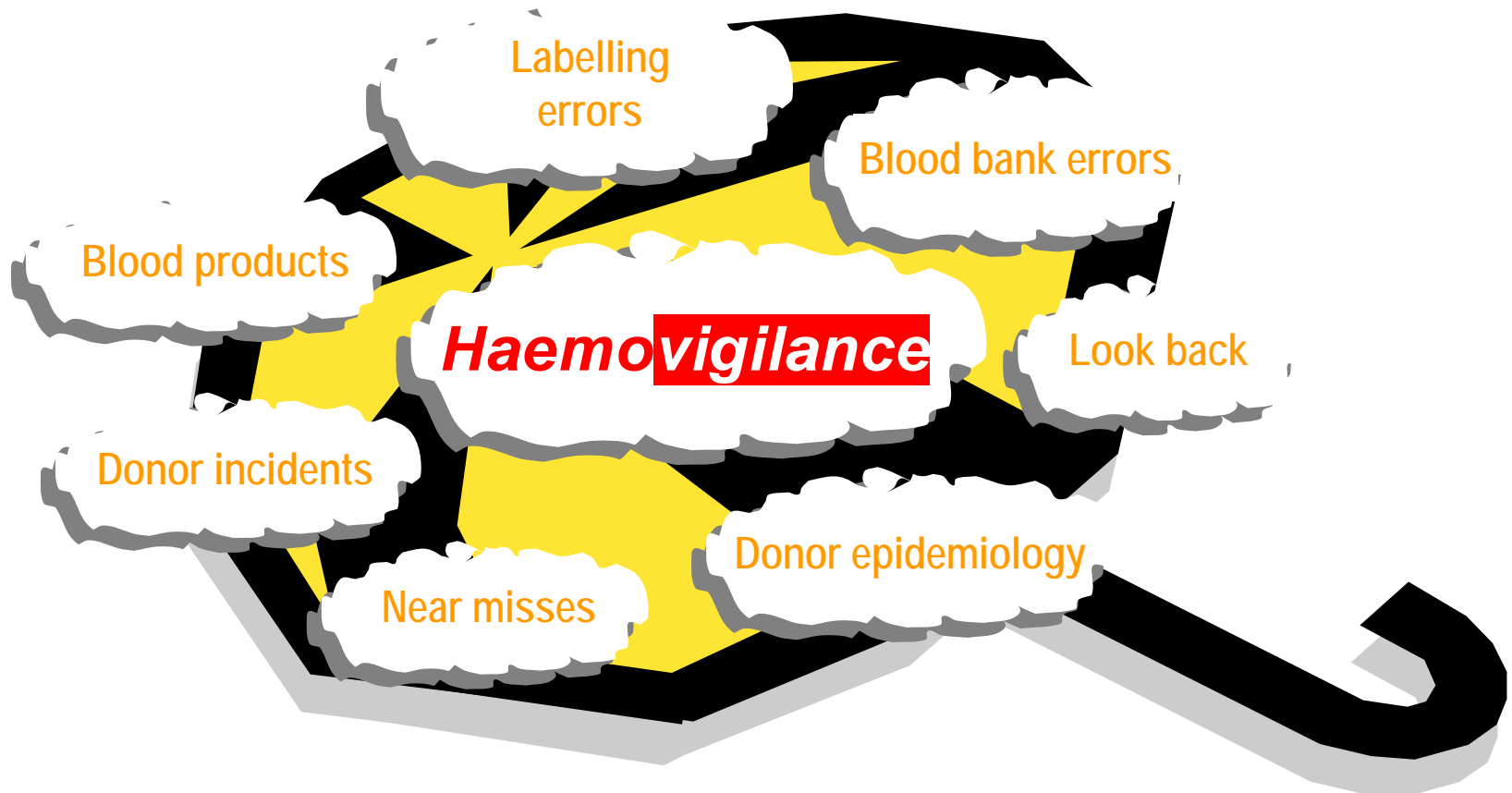
Haemovigilance

Council of Europe Guide Definition

“...the organised surveillance procedures related to serious adverse or unexpected reactions in donors, or recipients and the epidemiological follow up of donors...”



The Haemovigilance Environment



Rationale

- Logical extension of the pharmaceutical model for blood component manufacturing.
- Raises awareness of adverse events.
- Assists our understanding of complications/adverse events of transfusion.
- Identifies priority areas for product and system improvement.
- Increasingly a regulatory requirement:
 - European Union Directives

Haemovigilance - Milestones

YEAR	EVENT
1993	French Haemovigilance system established by Transfusion Safety Act.
1996	United Kingdom SHOT scheme formally established.
2002	EU Directive 2002/98/EC identifies requirement for haemovigilance systems.
2002	European Haemovigilance network established, collaborative professional activities including common definitions.
2005	EU Directive 2005/61 implements formal requirement for haemovigilance schemes in member states.
2008	US Biovigilance initiative announced.

Haemovigilance – Scope

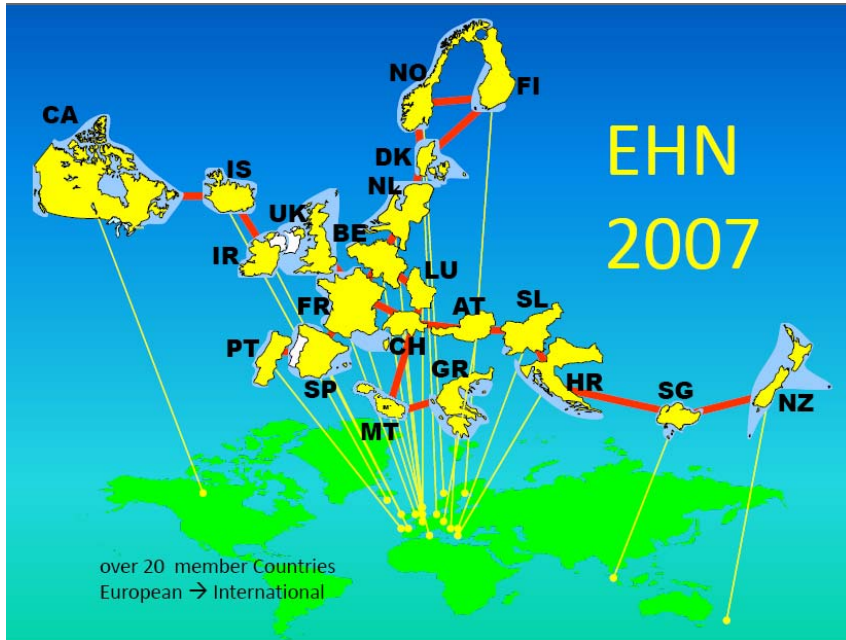
- **The decision to transfuse**
 - Was the decision to transfuse appropriate?
 - Was the ‘right’ product prescribed?
- **The process of delivering the product to the patient**
 - Errors in collection of pre-transfusion sample
 - Errors in transfusion laboratory
 - Administrative errors
 - Testing errors
 - Product release errors
 - Errors in the ward/clinic where transfusion occurs
- **The product**
 - Adverse reactions, mirrors pharmacovigilance reporting to medicines regulatory authorities

International Perspectives

International Haemovigilance Network

- Founded, as European Haemovigilance Network, in 2002 in France.
- Became IHN in 2009.
- Objectives include:
 - Exchange of valid information between members.
 - Increase rapid alert/early warning between members.
 - Encourage educational activities between members.
 - Undertake educational activities in relation to haemovigilance.

International Haemovigilance Network (IHN)



Austria	Luxembourg	Australia
Belgium	Malta	Canada
Croatia	Norway	Japan
Denmark	Portugal	New Zealand
Finland	Slovenia	Singapore
France	Sweden	South Africa
Germany	Spain	USA
Greece	Switzerland	
Iceland	Netherlands	
Italy	UK	
Ireland		

International Society of Blood Transfusion

Working Party on Haemovigilance aims to:

- Develop the different elements to be included in haemovigilance.
- Help standardise data elements.
- Exchange information between countries on the operation of different types of haemovigilance systems, and to exchange data on the results.
- Be a source of information and guidance for countries setting up new haemovigilance systems.



Standard Definitions

- IHN and ISBT working party on haemovigilance are working together to develop standard definitions.
- Donor related definitions agreed and available.
- Status of patient related definitions unclear.
- Minor differences exists with EU Directive definitions.

International Society of Blood Transfusion and European Haemovigilance Network
Version 2007

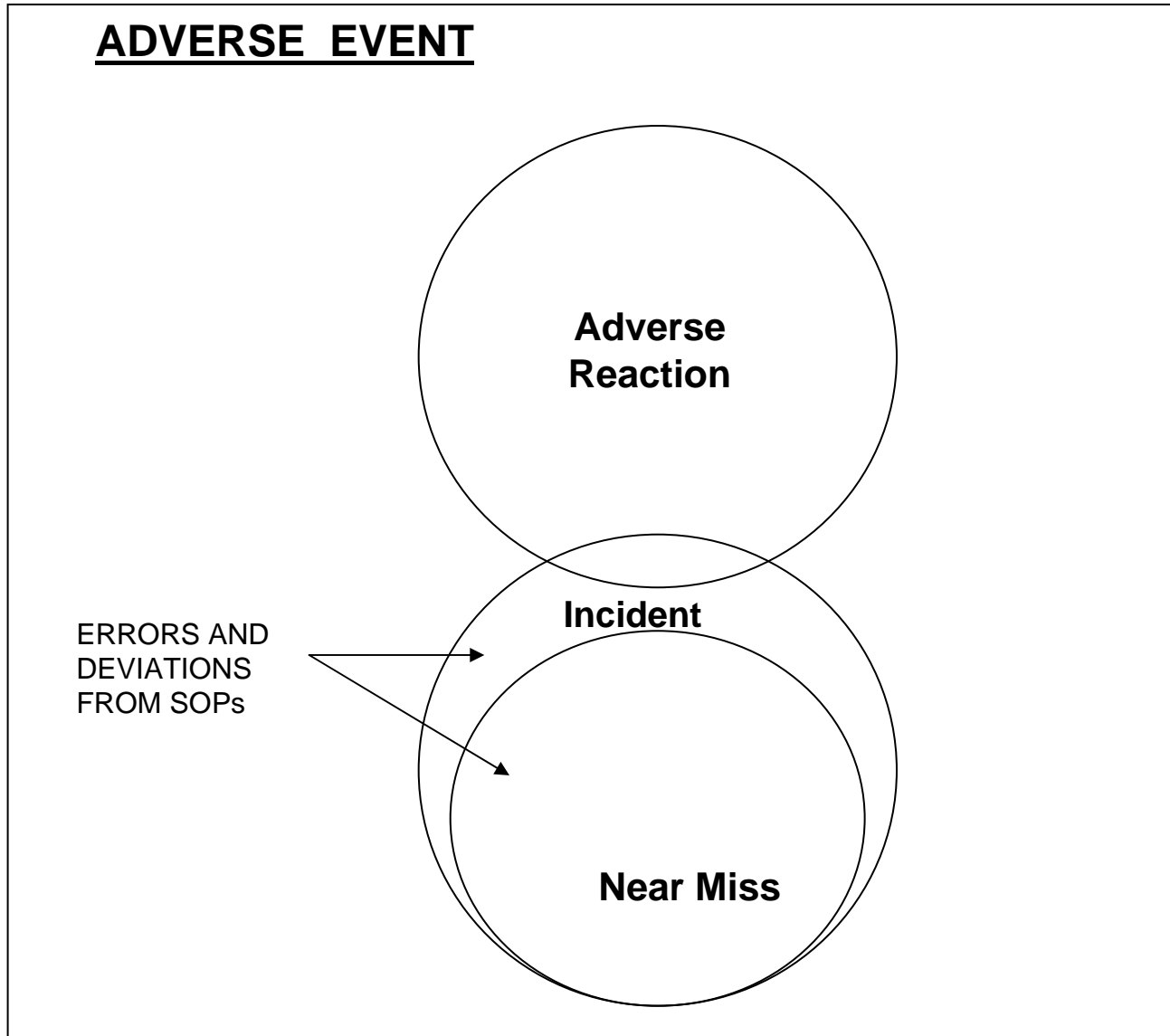
LIST

100 Local Reactions Related to Needle Insertion	
Code	Category
110	Vessel injuries
111	Haematoma
112	Arterial puncture
113	Thrombophlebitis
120	Nerve injuries
121	Injury of a nerve
122	Injury of a nerve by a haematoma
130	Other complications (related to needle insertion)
131	Tendon injury
132	Allergic reaction (local)
133	Infection (local)

Basic Definitions (ISBT/IHN)

ADVERSE EVENT	Undesirable and unintended occurrence associated with transfusion.
INCIDENT	Patient transfused with a blood component which did not meet all of the stated requirements.
NEAR MISS	An adverse event that is discovered before the start of a transfusion.
ADVERSE REACTION	Undesirable response or effect temporally associated with the administration of blood or blood components: <ul style="list-style-type: none">•May be the result of an incident, or•An interaction between a recipient and blood.

Basic Definitions



Reporting of Events

Each event will be assessed for several parameters:

- **Event Type** (nature of the event)
- **Event severity** (impact, if any on the patient)
- **Event imputability** (how strong is the causative link to transfusion)

Consistent classification is essential for comparison over time and between systems

Grading of Severity

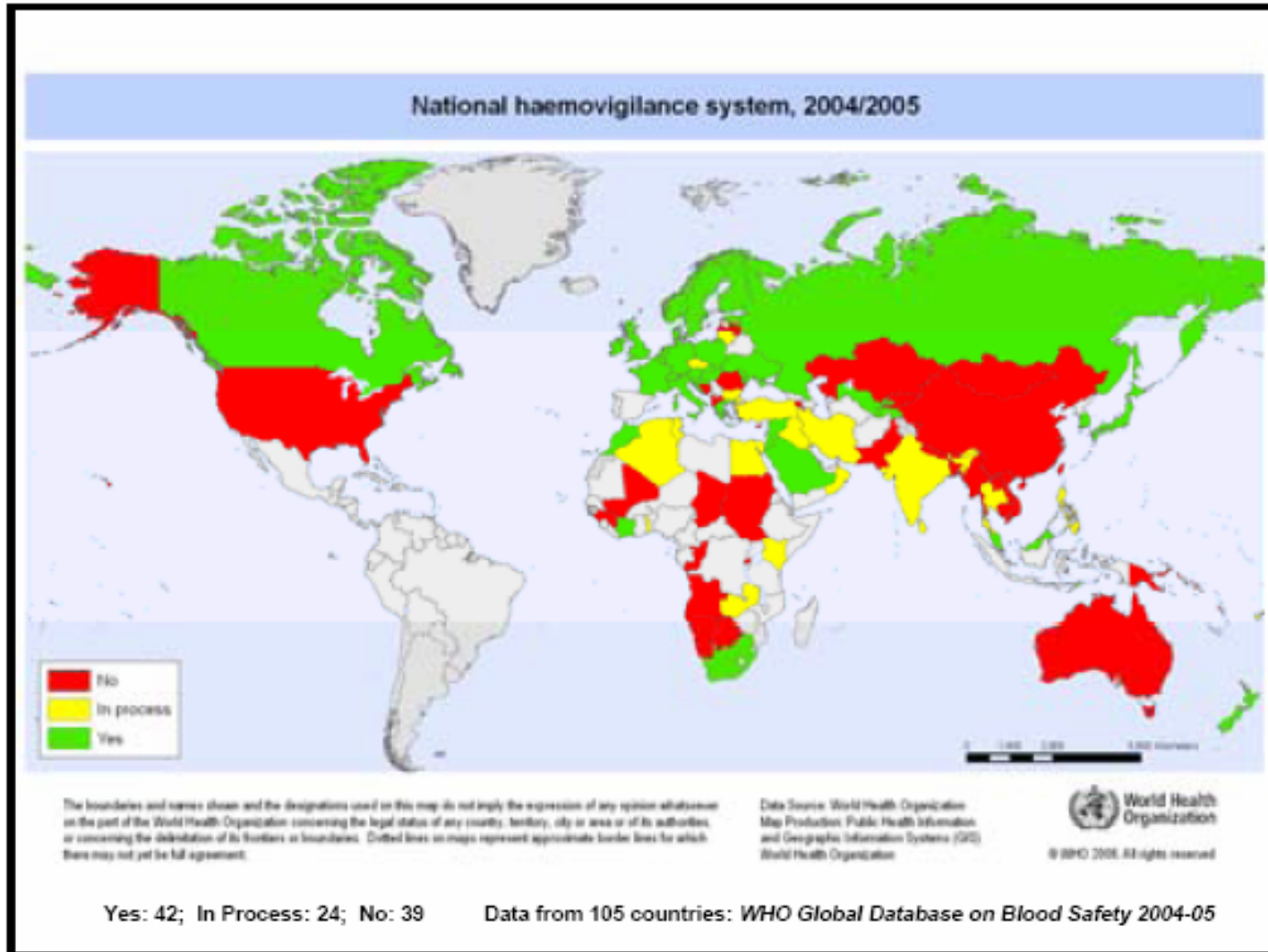
GRADE	DEFINITION
Grade 1 (Non-Severe):	the recipient may have required medical intervention (e.g. symptomatic treatment) but lack of such would not result in permanent damage or impairment of a body function.
Grade 2 (Severe):	<ul style="list-style-type: none"> – the recipient required in-patient hospitalization or prolongation of hospitalization directly attributable to the event; <i>and/or</i> – the adverse event resulted in persistent or significant disability or incapacity; or – the adverse event necessitated medical or surgical intervention to preclude permanent damage or impairment of a body function.
Grade 3 (Life-threatening):	– the recipient required major intervention following the transfusion (vasopressors, intubation, transfer to intensive care) to prevent death.
Grade 4 (Death)	– the recipient died following an adverse transfusion reaction.

Assessment of Imputability

IMPUTABILITY	DEFINITION
DEFINITE (CERTAIN)	Conclusive evidence beyond reasonable doubt that the adverse reaction can be attributed to the transfusion.
PROBABLE (LIKELY)	Evidence clearly in favour of attributing the adverse reaction to the transfusion.
POSSIBLE	Evidence is indeterminate for attributing the adverse reaction to the transfusion or an alternate cause.
UNLIKELY (DOUBTFUL)	Evidence clearly in favour of attributing the adverse reaction to causes other than the transfusion.
EXCLUDED	Conclusive evidence beyond reasonable doubt that the adverse reaction can be attributed to causes other than transfusion.

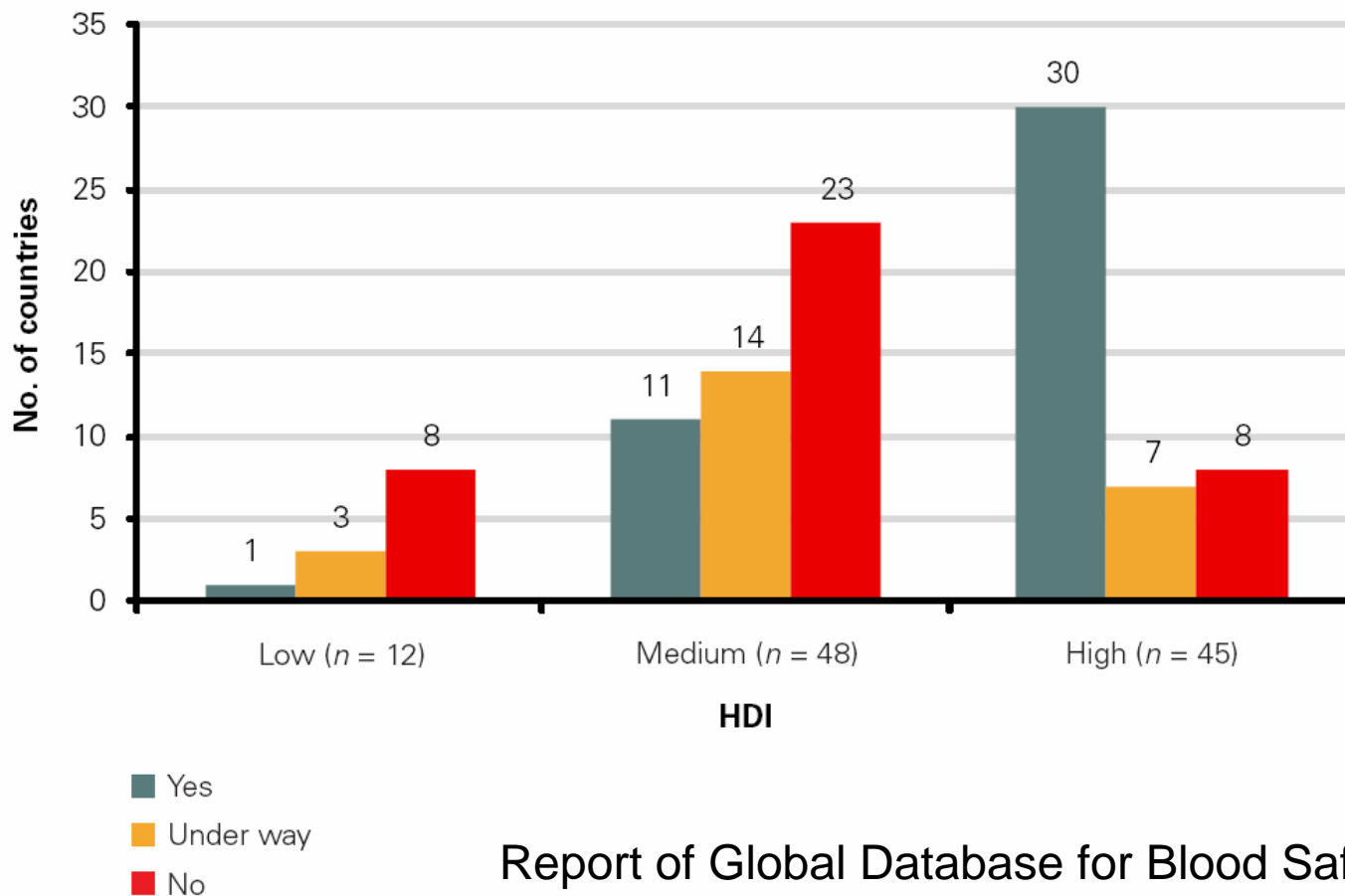
National Systems

Haemovigilance – Global perspective (2004)



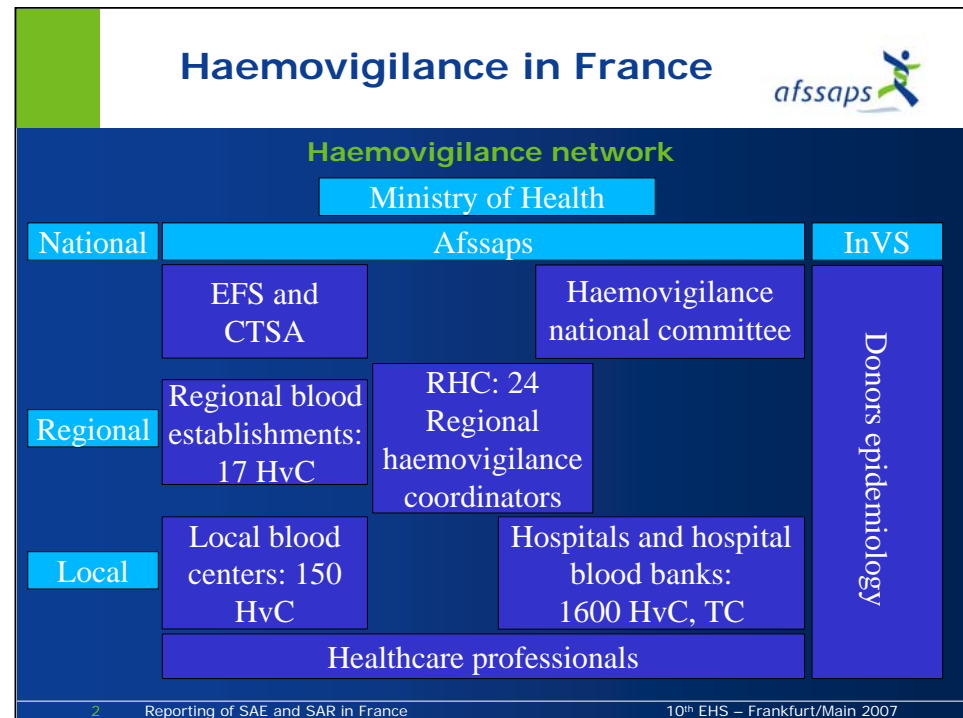
Haemovigilance Systems by HDI

Existence of haemovigilance systems, by HDI



French Haemovigilance System

- Compulsory scheme.
- Elaborate legislated structure overseen by AFSSAPS.
- Highly resourced system.



UK Serious Hazards of Transfusion (SHOT)

- Professional Structure managed and coordinated by SHOT Central Office.
- Close links to Royal Colleges, Specialist Societies and National Blood Services.
- Set up as voluntary scheme but this is changing as a consequence of EU Directive.

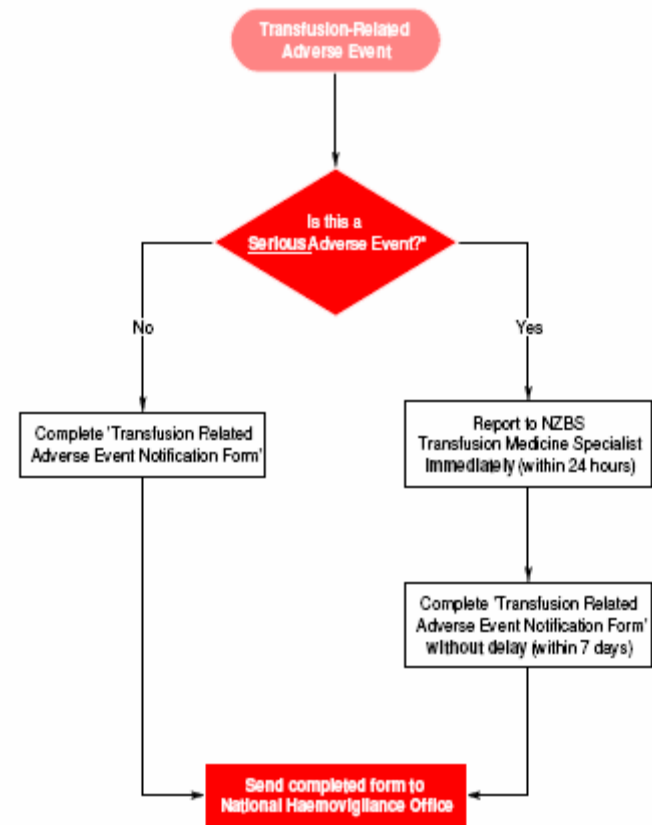
Impact of EU Directive on SHOT Reporting

MHRA	SHOT
All serious adverse reactions	All serious adverse reactions
Serious adverse events that occur in blood establishments and in, or within the broad responsibility of, hospital transfusion laboratories. Includes events where components were transfused as well as Near Miss events	Serious adverse events that occur within the process of blood component transfusion including all clinical areas. Only includes events where components were transfused. Near Miss events are recorded separately.

- SHOT was initially a professional voluntary reporting scheme.
- The heightened awareness of transfusion safety in the UK has progressively linked participation to accreditation with bodies such as CPA.
- The EU Directive requires notification of some but not all adverse events and reactions.

New Zealand Haemovigilance Scheme

- System run by Blood Service.
- Co-ordinated by 'National Haemovigilance office' based in Wellington.
- Utilises Transfusion Nurse Specialists and DHB Charge Scientists as 'Transfusion Safety Officers'.



* Serious adverse events are those indicated by an asterisk (*) on the 'Transfusion-Related Adverse Event Notification Form'.

US Biovigilance Initiative

- Public/private collaboration between CDC and transfusion/transplant communities.
- Biovigilance includes collection of adverse event data to improve outcomes in the use of blood products, organs, tissues and cellular therapies.
- Haemovigilance Module is the first component to be launched and involves partnership between CDC and subject matter experts in AABB.

Biovigilance does not remove the requirement for mandatory reporting of transfusion fatalities to the US FDA

US Biovigilance-Haemovigilance Module

- Standard definitions and criteria for categorising and reporting adverse reactions and incidents have been developed.
- Participating facilities will be able to analyse their own data and, where appropriate, independently compare their data with national aggregate rates in a confidential manner.
- Voluntary system involving monthly reporting including denominator data on component issue/transfusion rates.
- Enrolment launched February 2010.

Haemovigilance Systems

QUESTION	Current situation	Observations
Who should run the scheme?	Highly variable <ul style="list-style-type: none"> • Government (France/Canada) • Professional (UK SHOT) • Blood Service (New Zealand) 	<ul style="list-style-type: none"> • Independence from blood service operator is seen as important in many jurisdictions. • Close links to blood service essential.
Voluntary or compulsory	Different approaches <ul style="list-style-type: none"> • Compulsory (France) • Voluntary (US system) • Evolving (UK SHOT) 	What will be the impact of hospital accreditation? <ul style="list-style-type: none"> • Equip 4 • NATA/IANZ

Haemovigilance Systems

QUESTION	Current situation	Observations
<p>Are standard definitions important?</p>	<ul style="list-style-type: none"> IHN/ISBT initiatives are positive but full standardisation has not yet been achieved 	<ul style="list-style-type: none"> Standardisation is the only way in which meaningful benchmarking and pooling of data can occur
<p>Are denominator rates important ?</p>	<ul style="list-style-type: none"> Few systems can currently provide accurate data on transfusion rates for different components Most rely on issue rates from Blood Centres or provide no rate data at all 	<ul style="list-style-type: none"> These are essential to enable accurate evaluation of adverse event rates

What Has Haemovigilance Achieved?

A Personal Perspective

Haemovigilance

- Is an enabler.
- Provides information to:
 - Identify issues
 - Inform decision making
 - Support priority setting and resource allocation
- Has significantly changed the way that we perceive transfusion.

UK SHOT Scheme

The Serious Hazards of Transfusion (SHOT) Scheme was launched in November 1996, and aims to collect data on serious sequelae of transfusion of blood components as listed below. Through the participating bodies, the information obtained will contribute to :-

- Improving the safety of the transfusion process
- Informing policy within transfusion services
- Improving standards of hospital transfusion practice
- Aiding production of clinical guidelines for the use of blood components

UK SHOT Scheme

- Blood transfusion is a widely used therapy in hospital practice...Nevertheless there has been a growing awareness among UK transfusion specialists, haematologists and other clinicians that there is little information on the current safety of the whole transfusion process from blood component production in a transfusion centre to administration at the bedside.
- Major policy decisions have had to be reached, and clinical guidelines produced, without a sound basis of epidemiological and statistical information.

Hannah Cohen

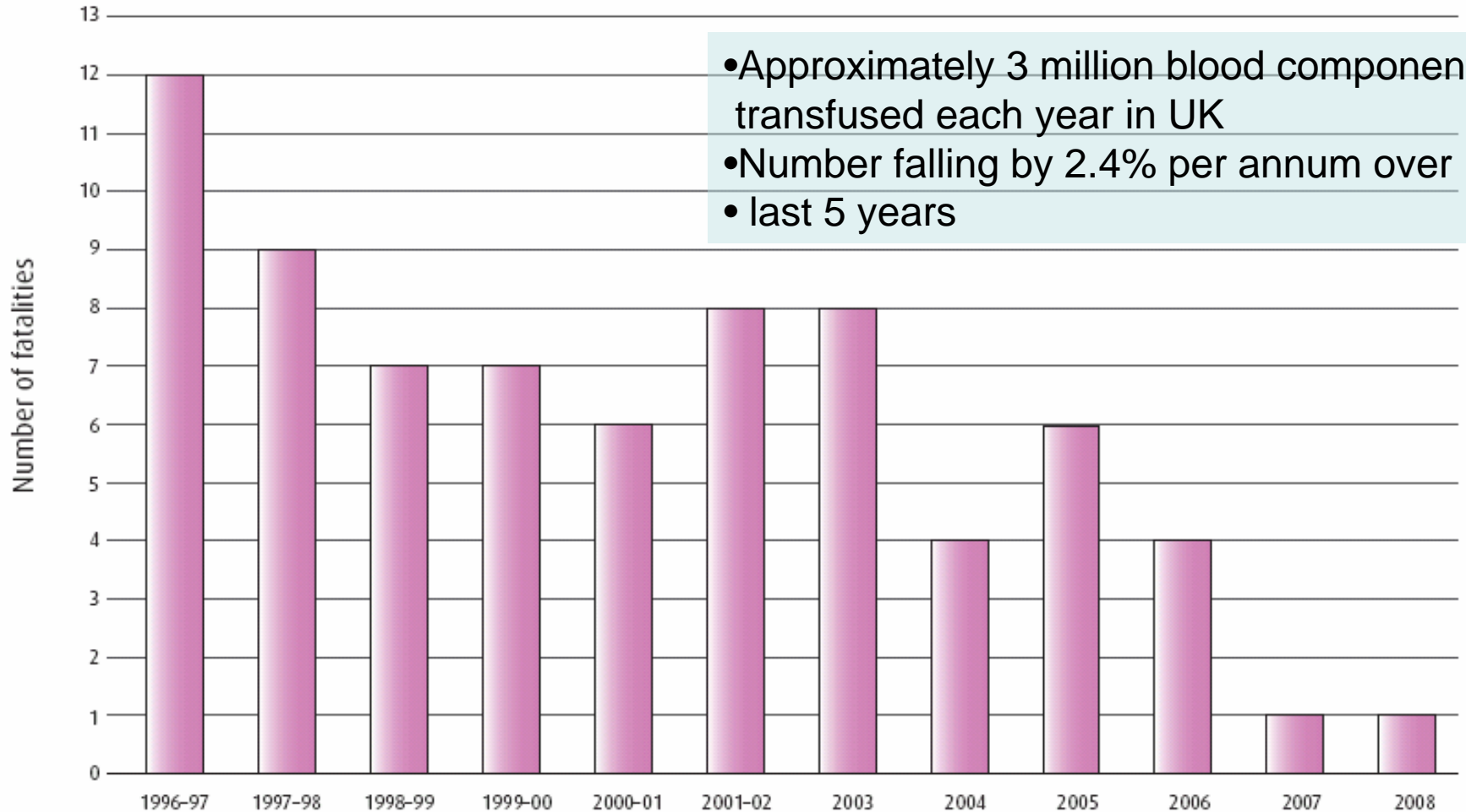
Chair SHOT

Extract from Foreward to the 1st SHOT report 1997

UK Serious Hazards of Transfusion (1996-2008)

	Total	IBCT	I&U*	HSE*	Anti-D	ATR	HTR**	TRALI	PTP	TA-GvHD	TTI	TACO**	TAD**	AUTOLOGOUS**
Death in which transfusion reaction was causal or contributory	125	24	2	0	0	18	11	40	2	13	14	1	0	0
Major morbidity probably or definitely attributed to transfusion reaction (imputability 2/3)	421	112	1	0	24	31	40	147	13	0	46	6	1	0
Minor or no morbidity as a result of transfusion reaction	4806	3164	73	139	176	782	344	49	34	0	6	11	0	28
Outcome unknown	15	11	0	0	0	3	1	0	0	0	0	0	0	0
TOTAL ***	5367	3311	76	139	200	834	396	236	49	13	66	18	1	28

UK Serious Hazards of Transfusion Fatalities by Year 1996-2008



Source UK SHOT report 2008 www.shotuk.org.uk

UK Serious Hazards of Transfusion (1996-2008)

	Total	IBCT	I&U*	HSE*	Anti-D	ATR	HTR*	TRALI	PTP	TA-GvHD	TTI	TACO**	TAD**	AUTOLOGOUS**
Death in which transfusion reaction was causal or contributory	125	24	2	0	0	18	11	40	2	13	14	1	0	0
Major morbidity probably or definitely attributed to transfusion reaction (imputability 2/3)	421	112	1	0	24	31	40	147	13	0	46	6	1	0
Minor or no morbidity as a result of transfusion reaction	4806	3164	73	139	176	782	344	49	34	0	6	11	0	28
Outcome unknown	15	11	0	0	0	3	1	0	0	0	0	0	0	0
TOTAL ***	5367	3311	76	139	200	834	396	236	49	13	66	18	1	28

Source UK SHOT report 2008 www.shotuk.org.uk

Positive Outcomes from Haemovigilance

Transfusion Related Acute Lung Injury

- TRALI now recognised as a major cause of transfusion morbidity and mortality.
- Implementation of ‘male only plasma’ and subsequent implementation of targeted leucocyte antibody screening of donors.
- Effective method to monitor the impact of these interventions on transfusion outcomes.

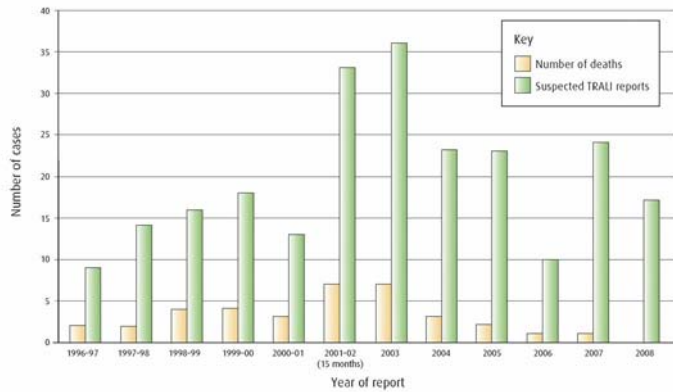
TRALI –Impact of ‘male only FFP’

SERIOUS HAZARDS OF TRANSFUSION

SHOT

TRALI reports by year to SHOT

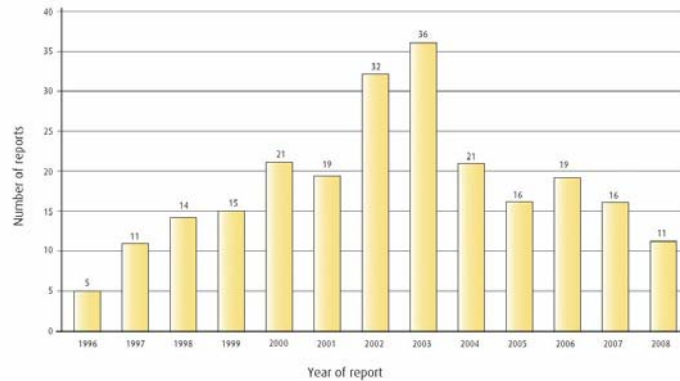
Deaths at least possibly due to TRALI and number of suspected TRALI reports by year



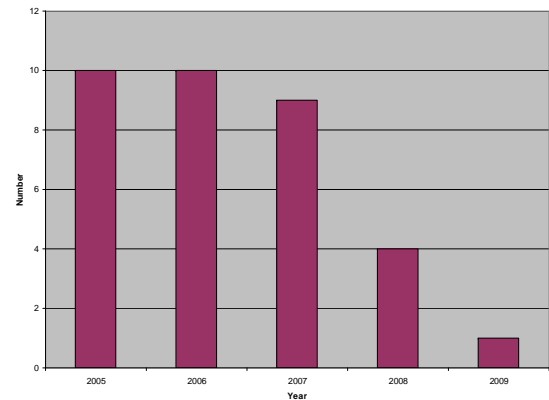
Haemovigilance is an effective tool to monitor the impact of blood safety initiatives

TRALI reports by year of occurrence

TRALI by year of transfusion n = 236



Number TRALI reports by year in NZ



Positive Outcomes from Haemovigilance

Bacterial Sepsis and Transfusion

- Haemovigilance
 - has improved our understanding of the risks associated with platelet transfusion.
 - played a role in the development of bacterial culture systems for platelets.
 - Provides an effective mechanism to monitor the clinical impact of interventions.

UK Serious Hazards of Transfusion (1996-2008)

	Total	IBCT	I&U*	HSE*	Anti-D	ATR	HTR*	TRALI	PTP	TA-GvHD	TTI	TACO**	TAD**	AUTOLOGOUS**
Death in which transfusion reaction was causal or contributory	125	24	2	0	0	18	11	40	2	13	14	1	0	0
Major morbidity probably or definitely attributed to transfusion reaction (imputability 2/3)	421	112	1	0	24	31	40	147	13	0	46	6	1	0
Minor or no morbidity as a result of transfusion reaction	4806	3164	73	139	176	782	344	49	34	0	6	11	0	28
Outcome unknown	15	11	0	0	0	3	1	0	0	0	0	0	0	0
TOTAL ****	5367	3311	76	139	200	834	396	236	49	13	66	18	1	28

Source UK SHOT report 2008 www.shotuk.org.uk

Bacterial Infections

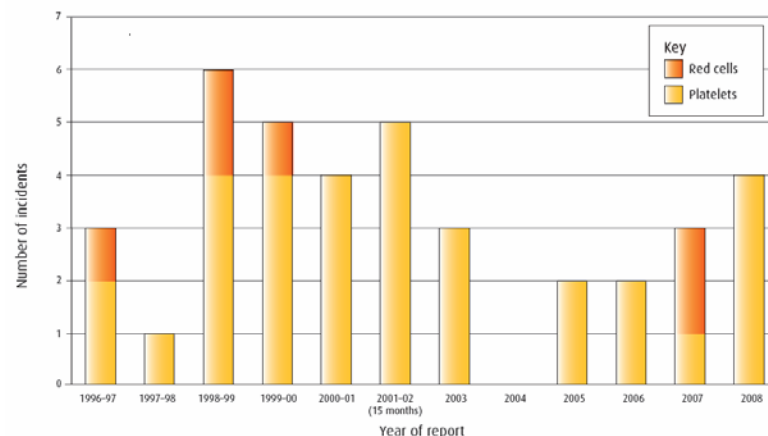
SERIOUS HAZARDS OF TRANSFUSION

SHOT

- Bacterial contamination of platelet components is common due to storage at 20-24 degrees celsius.
- Haemovigilance data from UK and USFDA identifies this as a major cause of transfusion associated morbidity and mortality.
- Bacterial culture of platelet components has been widely implemented to reduce the risk.

Haemovigilance is informing policy decisions made by blood services

Cases of confirmed bacterial sepsis
UK SHOT 1996-2008)



Source UK SHOT report 2008 www.shotuk.org.uk

Positive Outcomes from Haemovigilance

BCSH Guidelines on Administration of Blood Components (2009)

- This guideline updates the previous British Committee for Standards in Haematology (BCSH) guideline for administration of blood and blood components and the management of transfused patients (1999). It takes into account the Blood Safety and Quality Regulations (BSQR (2005) Statutory Instrument 2005/50 as amended), the National Patient Safety Agency (NPSA) Safer Practice Notices, **SHOT recommendations** and the NHS Quality Improvement Scotland (QIS) 2006 Clinical Standards for Blood Transfusion.

UK Serious Hazards of Transfusion (1996-2008)

	Total	IBCT	I&U*	HSE*	Anti-D	ATR	HTR*	TRALI	PTP	TA-GvHD	TTI	TACO**	TAD**	AUTOLOGOUS**
Death in which transfusion reaction was causal or contributory	125	24	2	0	0	18	11	40	2	13	14	1	0	0
Major morbidity probably or definitely attributed to transfusion reaction (imputability 2/3)	421	112	1	0	24	31	40	147	13	0	46	6	1	0
Minor or no morbidity as a result of transfusion reaction	4806	3164	73	139	176	782	344	49	34	0	6	11	0	28
Outcome unknown	15	11	0	0	0	3	1	0	0	0	0	0	0	0
TOTAL ***	5367	3311	76	139	200	834	396	236	49	13	66	18	1	28

Source UK SHOT report 2008 www.shotuk.org.uk

Positive Outcomes from Haemovigilance

Haemovigilance

- Has highlighted the importance of the role of effective education and training to safe transfusion.
- Has contributed to the development of the 'Hospital Transfusion Practitioner' role.
- Has not yet demonstrated significant improvements in overall error rates.
- However SHOT data possibly indicates a reduction in the number of ABO incompatible transfusions.

Working Party on BCSH Guidelines on Administration of Blood Components

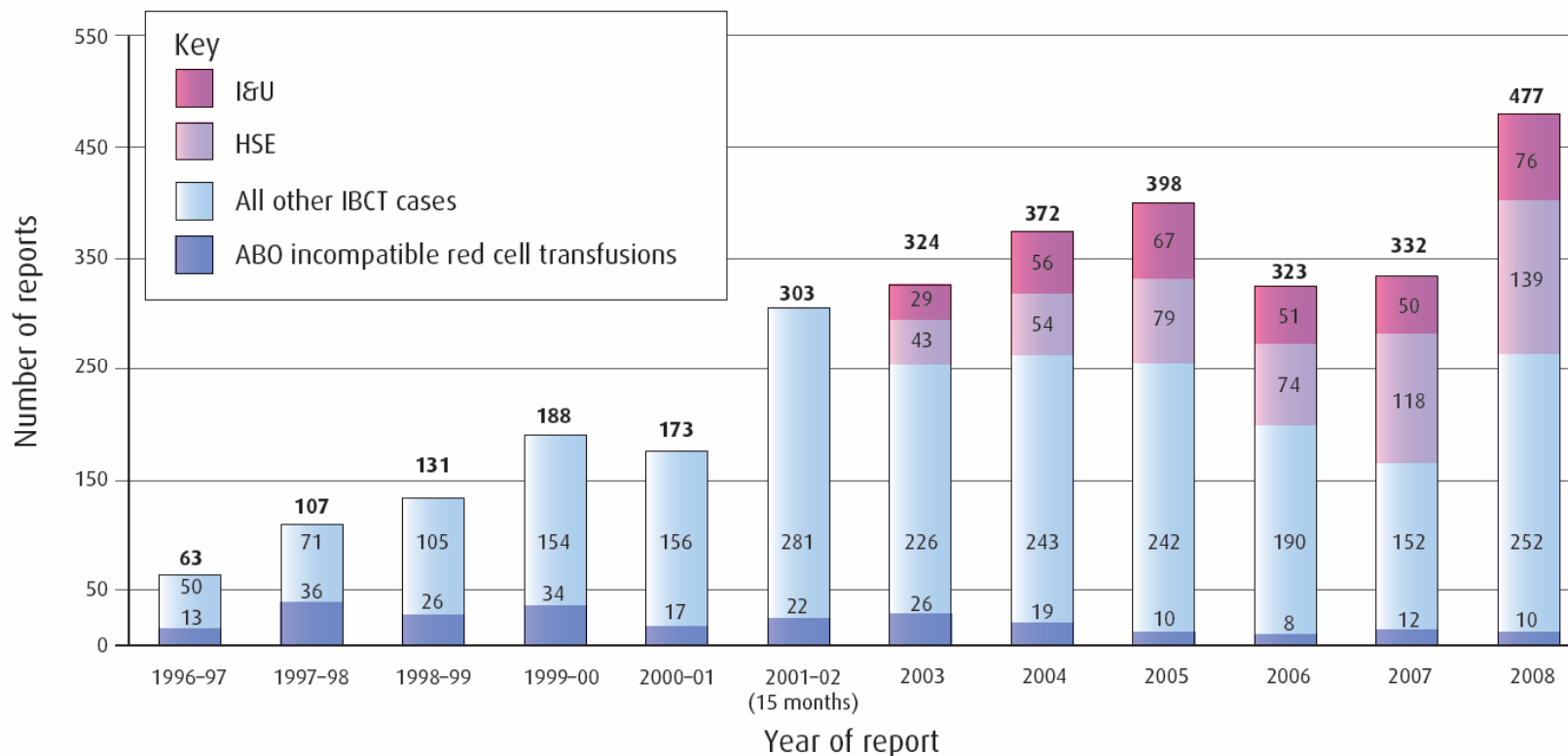
	1999 Guidelines	2009 Guidelines
Doctors	4	3
Scientists		1
Transfusion Practitioners	1	7
Unknown/ Other	2	3

BCSH Guidelines on Administration of Blood Components

- The NPSA Safer Practice Notice 14 (2006) ‘Right patient, right blood’ stipulates three yearly competency assessments for all staff involved in the blood transfusion process in the clinical area.
- The BSQR (SI 2005 No.50 as amended) also requires ‘regular’ competency assessment for the collection and distribution of blood components.
- This guideline reflects these requirements, and also emphasises the need for regular training. We now recommend all staff involved in the blood transfusion process in the clinical area should receive regular (minimum 2 yearly) training and be assessed as competent in accordance with the relevant regulations, standards and notices.

**Haemovigilance data is contributing to the
development of clinical guidelines in hospitals**

IBCT and ABO-incompatible red cell cases 1996–2008



Definition

The category Incorrect Blood Component Transfused (IBCT) comprises all reported episodes where a patient was transfused with a blood component intended for another patient that was incorrect in terms of its specification.

Application of Bar Code Technology at the Bedside: The Oxford Experience

Michael F. Murphy (Transfusion 2007 47:120S-124S)



Computer-controlled blood refrigerator.



Standard method for patient identification before a transfusion.



Elements of an electronic patient identification system.



The electronic process.

Concluding Comments

- Haemovigilance has evolved over the last 15 years to become an integral part of a national blood transfusion system.
- The introduction of standardised terms and definitions provides a real opportunity to allow comparison of data.
- Evidence indicates that haemovigilance data is having a significant impact on blood service safety measures with positive outcomes for patients.
- Data continues to highlight errors in the delivery of blood components to patients. Newer technologies might be needed to address systems errors.