Mothers, babies and blood
7th March 2013
South West Regional Transfusion Committee
Obstetric Cell Salvage

Mr John Faulds

Blood Conservation Co-ordinator

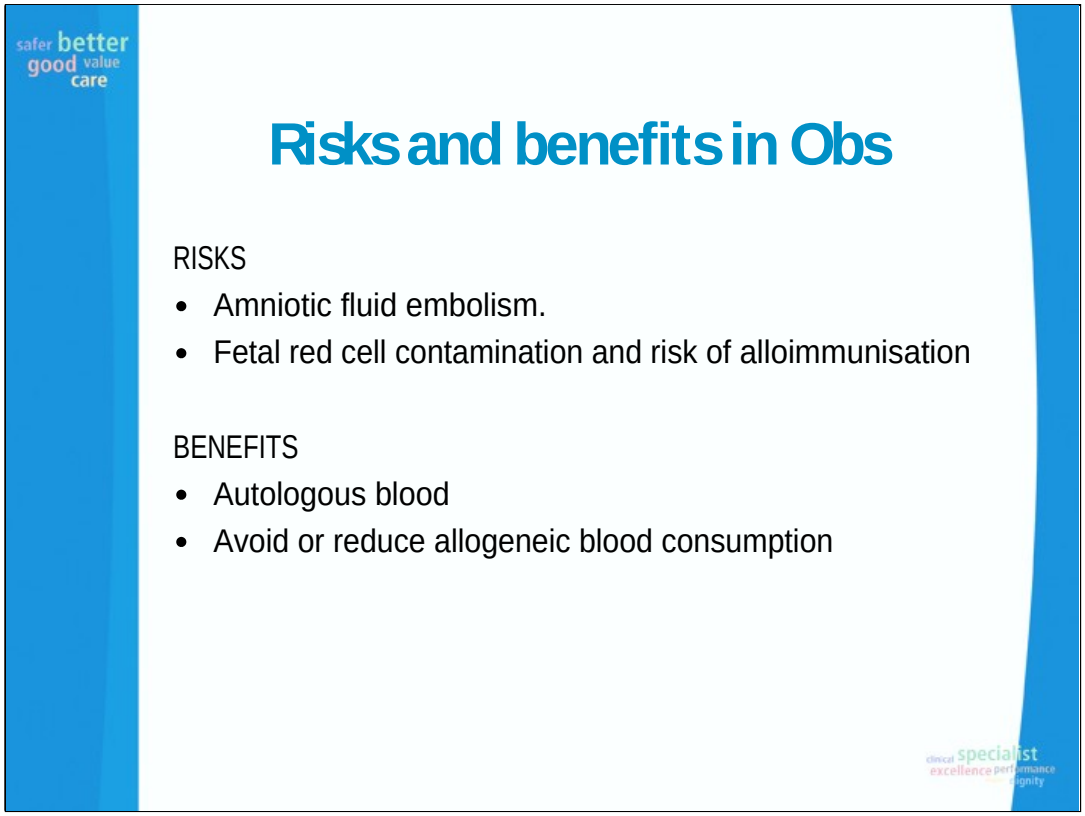
Royal Cornwall Hospital

Six Key Points

- 1. Intra Operative Cell Salvage (ICS) is an efficacious technique for blood replacement.
- 2. Patients should be informed of theoretical issues around ICS prior to surgery.
- 3. ICS should be undertaken regularly in obstetrics, allowing teams to gain ICS experience.
- 4. ICS should be seen as part of a Blood Conservation program.
- 5. Teams should consider following up patients, to evaluate the risk of alloimmunisation.
- 6. Teams should consider implementing a Quality Control program, when offering an ICS service.

ICS setting the scene!

- When used in unfamiliar / emergency situations, cell salvage may lead to a poor outcome! Resulting from lack of knowledge and confidence in the equipment, therefore producing a reduced quality end product?



Perceived risk of AFE

Amniotic fluid is removed through the washing process regardless of use of 1 or 2 suction devices.

Fetal squames are present in post wash samples but almost completely removed post filtration. We use a leucodepletion filter (Pall Leuko Guard RS filter, Pall Europe Europa house Portsmouth.). The significance of fetal squames in the circulation is unknown

No cases have been reported of AFE following ICS

Entirely theoretical

Fetal red cell contamination. Fetal RBC s are present in the re-infusion and may result in red cell antigen incompatabilities between mother and baby – will discuss further

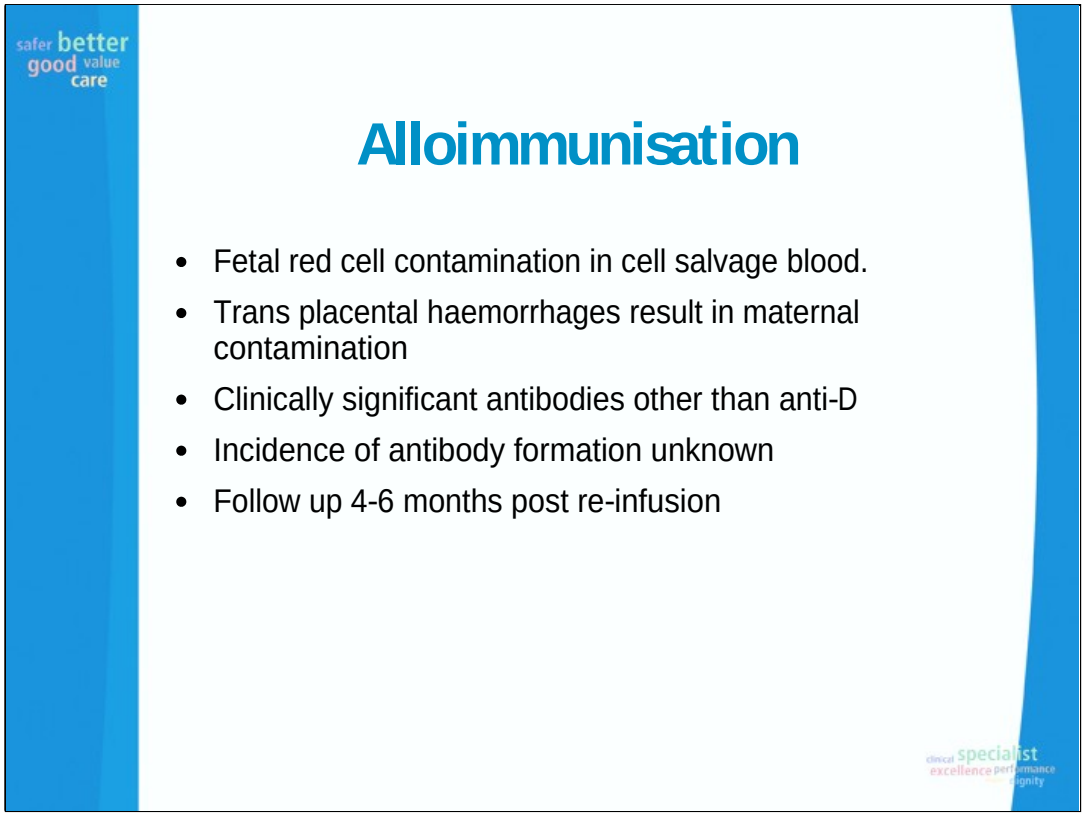
BENEFITS

Autologous blood- No incompatability, warm, maintain 2,3 DPG levels

Avoid allogeneic blood - expensive limited resource.(£140 = $221)Caries potential risk of infection and incompatability reactions and associated with increase in post-op wound infections and LO Hosp stay.

DoH Better blood transfusion health circular suggests to consider use of alternatives- .

salvaged blood is a suitable alternative to allogeneic blood



Fetal red cell contamination. Fetal RBC s are present in the re-infusion in volumes comparable to that found in the maternal circulation after delivery.(0.2mls-12.9mls- our study 2010).

TPH more likely in 3rd trimester and on delivery.

We do not know the critical volume vol required to provoke an Ab response

Rh D negative women routinely receiving AntiD prophylaxis throughout pregnancy which has reduced the formation of anti-D immunization BUT there are other clinically significant. Abs .include anti-K, anti-C c, anti-E , anti-S These too have been implicated in heamolytic disease of the newborn

Data from 2007 at RCHT indicates incidence of other significant Abs in maternal pop =0.4% - origin pregnancy or allogeneic blood Tx

Before women receive a reinfusion we take a sample to test for fetal red cells contamination(using the Kleihaur –Betke technique).

We invite all women for a follow up test of Ab formation to attempt to test for Abs. If antibodies are found in the f/u sample and the pre-infusion sample did not detect fetal cells than we can conclude the cell salvage blood caused the immunisation. As the incidence is low we are currently unable to assess if incidence of Ab formaiton is increased or the same as that which occurs in pregnancy and during delivery.

Obstetrics

- ICS is being increasingly used in the UK in obstetrics for women at risk from massive obstetric Haemorrhage during caesarean section. In the year 2005-2006, 38% of UK maternity units used ICS, and 28% included the use of ICS in their Massive Obstetric Haemorrhage (MOH) protocol.

Allam J, Cox M, Yentis SM. Cell salvage in obstetrics. *International Journal of Obstetric Anesthesia 2008;* ***17:37- 45.***

Teig M, Harkness M, Catling S, Clarke V. *Survey of cell salvage use in obstetrics in the UK. International Journal of Obstetric Anesthesia 2007;* ***16: S30.***

NICE Statement

- Intraoperative blood cell salvage is an efficacious technique for blood replacement and its use is well established in other areas of medicine, but there are theoretical safety concerns when it is used in obstetric practice. Data collection is therefore important and clinicians should report all complications to the Medicines and Healthcare products Regulatory Agency.

National Institute for Clinical Excellence

THEORETICAL RISKS in OBS?

Amniotic Fluid Embolus

- Also known as anaphylactoid syndrome of pregnancy
- Possibly caused by Amniotic Fluid (AF) entering the maternal circulation, and so could be initiated by re-infusing any AF aspirated by the cell salvage machine

Alloimmunisation

- Fetal RBCs cannot be distinguished from maternal RBCs by cell salvage machines.
- Could theoretically cause haemolytic disease of the newborn and fetal hyperbilirubinemia and anaemia

safer better good value care

Saving Mothers' Lives Reviewing maternal deaths to make motherhood safer: 2006–2008

The Eighth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom, March 2011

- **Obstetric haemorrhage: Learning Points**
- Any decision to give women blood should be made carefully, and all clinicians involved in blood transfusion should be aware of the potential adverse effects of transfusion and signs and symptoms of transfusion-related complications. Women known to be at risk of major haemorrhage, e.g. those with placenta accreta and those who decline blood and blood products, should be delivered in maternity units with access to critical care, interventional radiology and cell salvage
- **Amniotic fluid embolism: Learning Points**
- Amniotic fluid embolism (AFE) should no longer be regarded as a condition with near universal maternal mortality. High-quality supportive care can result in good outcomes for both mother and baby depending on the place of collapse.

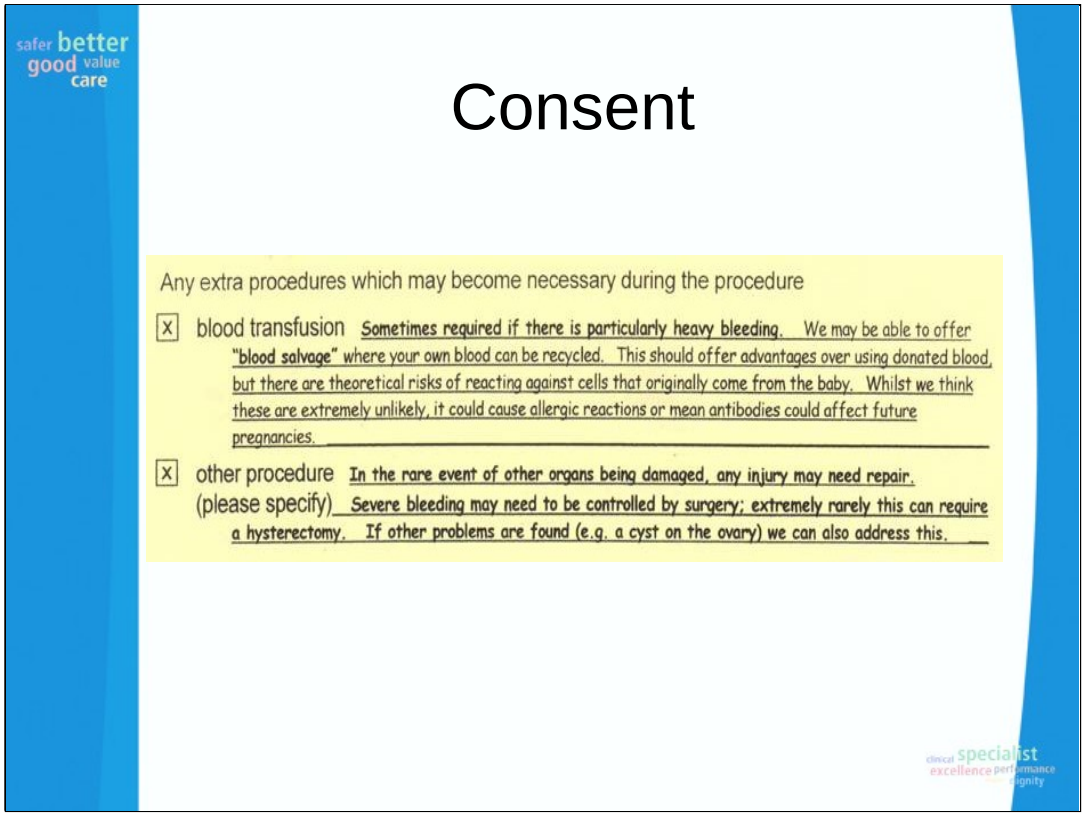
clinical specialist excellence performance dignity

Risks of Red Cell Transfusion

- Acute Haemolytic Reactions 1 in 250,000 to 1 in 1,000,000
- Hepatitis B 1 in 450,000
- Hepatitis C 1 in 32,000,000
- HIV 1 in 5,000,000
- HTLV 1 in 12,500,000

Bacterial Contamination of

- Red Cell Concentrates 1 in 500,000



Within our trust we are working towards making Cell Salvage the norm and not the exception! and hope to introduce it fully into the consent form where patients will have to opt out of not having cell salvage? **CONTRAVERSIAL**

ICS Training

- 80% of maternity units identified lack of training, rather than safety concerns, as the barrier to more frequent use of ICS.

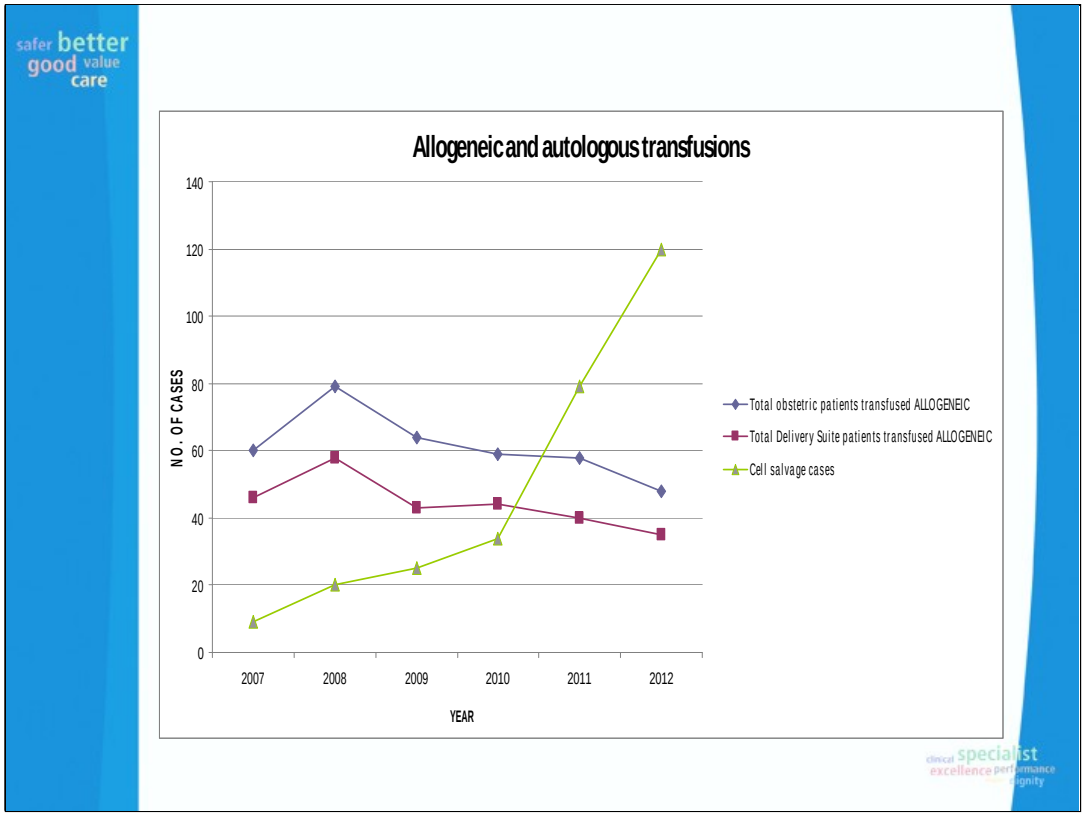
www.aagbi.org/publications/guidelines/docs/cell%20_salvage_2009_amended.pdf

Why Routine?

- Allows the user to become familiar with the machine
- Ability to understand the situation
- Ability to make decisions during the case
- Move from independent IOCS user to integrated user – supporting both anaesthetist and operating the IOCS machine.

RCHT ICS staffing figures

- Current figures show that on average 98% of ELSCS are covered by an appropriately trained anaesthetic practitioner.


Allogeneic and autologous transfusions
NO. OF CASES
140
120
100
80
60
40
20
0
2007
2008
2009
2010
2011
2012
YEAR
Total obstetric patients transfused ALLOGENEIC
Total Delivery Suite patients transfused ALLOGENEIC
Cell salvage cases

Key benefits of Introducing a Blood Conservation service

- Reduced risk for patients and improved patient care
- Reduced demand on blood banks and associated costs
- Reduction in last minute cancelled operations
- Reduced risk of peri-operative operative complications leading to reduce length of stay.

RCHT Blood Conservation Service

- Optimisation – Pre surgery
- Intra Operative Cell Salvage
- Quality assurance
- Point of care testing
- Research
- Advice
- Audit
- Total Cost Service?

Patient Follow up's

- Re infusion data entered into data base
- Letter to GP and patient
- Patient asked to make appointment for follow up bloods.
- Full antibody screen
- Data entered onto database
  - Current data shows approx **50%** follow up!!

QA Samples

- Full Blood Count (Hb/Hct)
  - Marker of quality of blood returned to patient
- Micro-albumin
  - Marker of washing efficiency
- Heparin testing
  - Marker of washing efficiency and to ensure blood returned to patient is not grossly contaminated with heparin
- Plasma free Hb
  - Not compulsory if equipment not available


safer better
good value
care
RCHT
Results to Date
clinical specialist
excellence performance
dignity

Transfusion/ICS rates

	2007	2008	2009	2010	2011	2012
Total obstetric patients – allogeneic tx's	60	79	64	59	58	48
Del Suite patients – allogeneic tx's	46	58	43	44	40	35
ICS cases	9	20	25	34	79	120

Number of allogenic units transfused in Obstetrics

	2007	2008	2009	2010	2011	2012
Total Obstetric units tx'd	173	259	192	155	167	100
Ante-natal units (Wheal Rose)	3	0	2	0	3	0
Post-natal units (Wheal Fortune)	27	45	48	25	30	18
Delivery Suite units	143	214	142	130	134	82

Obstetric transfusion rate per delivery

	2008	2009	2010	2011	2012
No of deliveries in Cornwall	4349	4354	4428	4688	4628
Obstetric patients tx'd per delivery (%)	1.8	1.5	1.3	1.2	1.0
Delivery Suite patients tx'd per delivery (%)	1.3	1.0	1.0	0.9	0.8

ICS Obstetrics at RCHT

- Routinely used for all sections – elective and emergency
- Dedicated machine
- Tx rates decreasing
- Patients have to opt out not in – IOCS built into consent form
- Further research??