UK CELL SALVAGE ACTION GROUP

Intra-operative Cell Salvage: 2014

A Survey of Equipment and Practice across the UK

UK CELL SALVAGE ACTION GROUP

Acknowledgements

Karen Shreeve
Manager: Better Blood Transfusion Team
Welsh Blood Service

Rebecca Gerrard
National Lead: Patient Blood Management Team
NHS Blood and Transplant

Hannah Grainger
Cell Salvage Coordinator: Better Blood Transfusion Team
Welsh Blood Service

Brian Hockley
Data Analyst and Audit Manager
NHSBT

Members of the UKCSAG who contributed to the design of the survey and commented on the draft report.

All participating sites who submitted data

Contents

Glossary

Abbreviation	Meaning
ACD	Acid Citrate Dextrose
ICS	Intra-operative Cell Salvage
M1-M4	Coded Manufacturers
NHSBT	NHS Blood and Transplant
ODP	Operating Department Practitioner
PCS	Postoperative cell salvage
RBCs	Red Blood Cells
SHOT	Serious Hazards of Transfusion
UKCSAG	UK Cell Salvage Action Group

Summary of Main Findings

- The 2010 and 2014 surveys were distributed differently. Accounting for this there has been little change in the number of machines in use
- 16% of respondents said they outsourced cell salvage services
- M3 was the most frequently used machine, and was viewed as providing good support, service and manufacturer based training
- Surgery in obstetrics and gynaecology is the most frequent user of ICS with an increase in use in 2014
- 21% said they did not operate outside normal working hours. This has not changed since 2010
- Staffing and lack of trained operators are cited as reasons for no out of hours service provision
- Operating Department Practitioners (ODP) are the main users of ICS equipment
- There has been a slight increase in the use of ACD (Acid Citrate Dextrose) as an anticoagulant
- 63% did not suction amniotic fluid (i.e. it went into waste suction)
- All ICS operators who *actively* use equipment now appear to receive training in a variety of different formats
- ODPs, ICS Coordinators and manufacturers provide the bulk of the training
- 59% of anaesthetic trainees said they did not receive theory or practical training (no change since 2010)
- 15% said they did not know about the UKCSAG workbook
- 9% said they did not know about the *Learnbloodtransfusion* e-learning module
- 16% said they had no policy for ICS in their organisation
- 11% were not aware of the UKCSAG competency template
- Theatres fund the bulk of the cost of ICS
- Local blood transfusion departments/laboratories funded the cost of the blood
- Between 40 and 50% of respondents said they quality control the machines and the operators. This represents a slight improvement since 2010.

Introduction

The United Kingdom Cell Salvage Action Group (UKCSAG) was established in 2006 to help support the wider implementation of cell salvage as an alternative to donor blood and to facilitate a UK approach to its use. The group reports to the Patient Blood Management Steering Group in England and the equivalent groups in the devolved countries. The group, consisting of UK leaders in cell salvage, makes recommendations considered to be best practice and publishes resources to support the implementation and development of cell salvage services in hospitals. The outputs of the group are freely available to all Cell Salvage users via the Transfusion Practice pages of the Joint United Kingdom (UK) Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee (JPAC) web site (2014)

In 2007 the UKCSAG identified the need to conduct a baseline survey of intra-operative cell salvage (ICS) activity as part of its work plan. The survey was circulated across all NHS UK organisations where possible.

In 2010, a repeat survey was conducted (Jones & Howell, 2011). By contrast, circulation of this survey was restricted to those organisations where a cell salvage lead had been identified. To allow comparison of data, the questionnaire was (where possible) based on the 2007 survey, with some additional questions included to gain feedback on the supporting materials that had been developed by the UKCSAG. The aims of this repeat survey were to:

- Evaluate progress with implementation of ICS
- Identify remaining obstacles to the implementation and provision of an ICS service
- Measure the success of the UKCSAG Toolkit
- Gain an overview of how training for ICS was being delivered and by whom
- Compare the clinical specialties where ICS is being used in 2014 to use in 2010
- Help focus future work priorities of the UKCSAG

In 2014 a further survey was carried out. UKCSAG members identified key contacts in their respective countries to respond themselves, and also to circulate the survey through their wider ICS networks.

Results and comparative data where available, are reported here.

Methods

A survey group was established from members of UKCSAG. Questions were formulated by an iterative process and also based on previous surveys carried out by UKCSAG. The survey was conducted as an online exercise using SnapSurveys© software, a paper option was also available.

Answers to each question have been analysed proportionately (n, %) and comparisons made to 2010 data where possible. The survey was piloted with a small number of staff prior to the main mail out. Response rates were monitored on a regular basis and further contact made to improve the return rate.

Results

The 2010 survey received 53 replies. However, since distribution approaches were different for these two surveys, caution should be taken when interpreting comparisons of the 2010 and 2014 datasets.

In the 2014 survey, 137 valid replies were received. Denominators are mainly defined by the total number of valid responses to each question. Seventeen of the respondents did not use cell salvage, and hospitals who said they outsourced services (22) did not answer any questions after question 4 in the survey so both categories have largely been excluded from the analysis. In determining numbers and percentages of machines and disposables, the denominator is therefore 98 in most cases (137 - 39 = 98).

Section 1: Staff and Locations

What is your job title?

137 (100%) respondents answered this question. Table 1 is a synthesis of the main categories of staff completing the questionnaire. These may not be the same people operating or managing the equipment however. There were 49 categories of staff who completed this question. A full list is given as Appendix 1.

Table 1

Job Title – Principle Categories	No of Entries (%)
Transfusion Practitioner	32 (23)
Anaesthetist	28 (20)
Operating Department Practitioner	23 (17)
Theatre Nurse	12 (9)
Perfusionist	10 (7)
Biomedical Scientist	2 (1)
Practice Development Facilitator	2 (1)
Senior Theatre Practitioner	6 (4)
Other*	22 (16)
Total	**137**

*Usually whoever was available who had been trained in the use of the machine

What type of hospital do you work in and location?

Hospitals from all 4 countries responded to the survey. 7 hospitals indicated as "other" were all NHS hospitals. 4 were "specialist" (2 cardiothoracic, 1 cancer, 1 orthopaedic).
There were some difficulties with access to the survey in Scotland due to localised IT problems and the survey organisers were notified that this accounted for the low data return. A breakdown by hospital type is given in table 2.

Table 2

Hospital Type	Totals (%)
	137
District General Hospital	80 (58)
Teaching Hospital	44 (32)
Private	6 (4)
Other	7 (5)

Section 2: About the machines you use

Respondents were asked to provide information about the type of ICS machines they currently used, their views on performance and maintenance contracts and amount of disposables used. Appendix 2 lists machines and the perceived attributes by maker and type as submitted by survey responders. These comments are presented verbatim.

Outsourcing

22/135 (16%) of respondents to this question said they outsourced cell salvage to an external provider. 2 did not answer this question. A further 17/137 (12%) indicated they did not use ICS in their hospital.

Type of Cell Salvage Machine Used and Disposables

ICS devices are designed for use in the intra-operative setting only. A combined ICS/PCS (Postoperative cell salvage) device is designed to be used both intra-operatively and postoperatively (where blood can be collected from wound drainage). Combined ICS/PCS devices can be used for the intra-operative or postoperative period alone, or can follow a patient through both settings.

Table 3 indicates the total number of cell salvage machines currently in use in the 4 countries from the submitted responses. All sites who held non outsourced equipment submitted data for washed intra-operative machines. There were 96 responses to this question. 14 sites also indicated that cell salvage may continue into the post operative period with a combined machine. The number of ICS machines held at contributing sites varied from 1 to 16.

Table 3

Country	Total Washed Intra-operative Cell Salvage Machines (n = 96 sites)	Total Combined Washed Intra-operative/Post Operative Cell Salvage Machines (n = 14 sites)
England	296	58
Northern Ireland	11	10
Scotland	11	7
Wales	26	1
Totals	**344**	**76**

Because of the differences in the number of responses received in the 2010 and 2014 surveys, data analysis suggests that proportionately, there were 3.8 vs. 3.5 machines in use per site in the 2010 and 2014 surveys respectively. This may suggest there has been little change in the overall number of machines in use.

Similarly, when comparing the number of disposables used it is difficult to draw any conclusions because of the reporting differences between surveys. However, it appears that activity has increased as the number of disposables has increased while the number of machines remains static. Caution is urged in making any assumptions though.

Filtered Intra-operative Cell Salvage Devices

It is difficult to ascertain accurate figures for this question as responses suggest the question may have been misinterpreted. No data is given for this question

What devices do you use?

There were 4 makes of ICS Machine in use. The number of sites using each type of machine is shown in table 4. Some sites used more than one type of machine.

Table 4

Make	No of Sites
M1	22
M2	38
M3	42
M4	2

As with the 2010 survey, M3 equipment was used most frequently by respondents, followed by M2 and M1. The use of M4 machines remains small and has decreased slightly since 2010 but this may be due to respondents rather than actual use.

Best features

A full list of machine attributes is given as Appendix 2. Key features are indicated in table 5.

Table 5

M1	M2	M3	M4
Ease of Use	Ease of Use	Ease of Use	Ease of Use
Good support	Safe	Reliable	
Emergency programme for major bleeds	Works well on automatic mode	Portable	
Continuous processing	Can use both intra and post op collection	Cost of disposables	
	Large volume processing (some models)		
		Choice of wash sets	

Technical Problems and Resolution

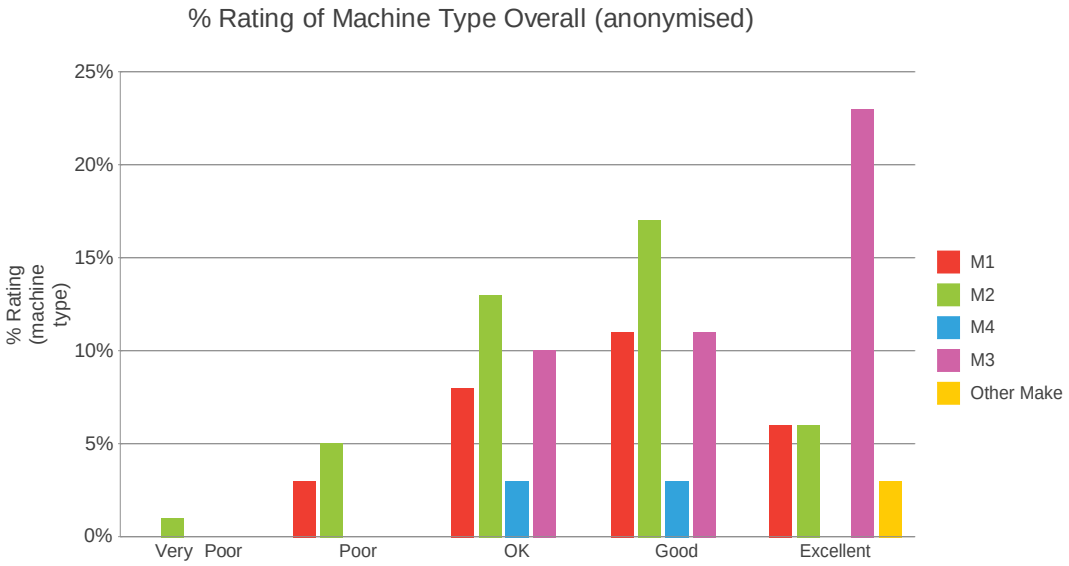
Of the 98 organisations that responded to this question, 34 (35%) said they had experienced some problems with their ICS equipment.

Problems appear non catastrophic and include human error, software problems, suction problems and broken doors and latches. A full list of reported problems by make of machine is given as Appendix 3.

How do you rate the support offered by the manufacturers?

Figure 5 shows the perceived level of the quality of support offered by the manufacturers. M3 scores well, followed by M2 and M1 although all makes have their advocates as indicated by the comments (appendix 2). M4 scores are based only 2 sites who use this device.

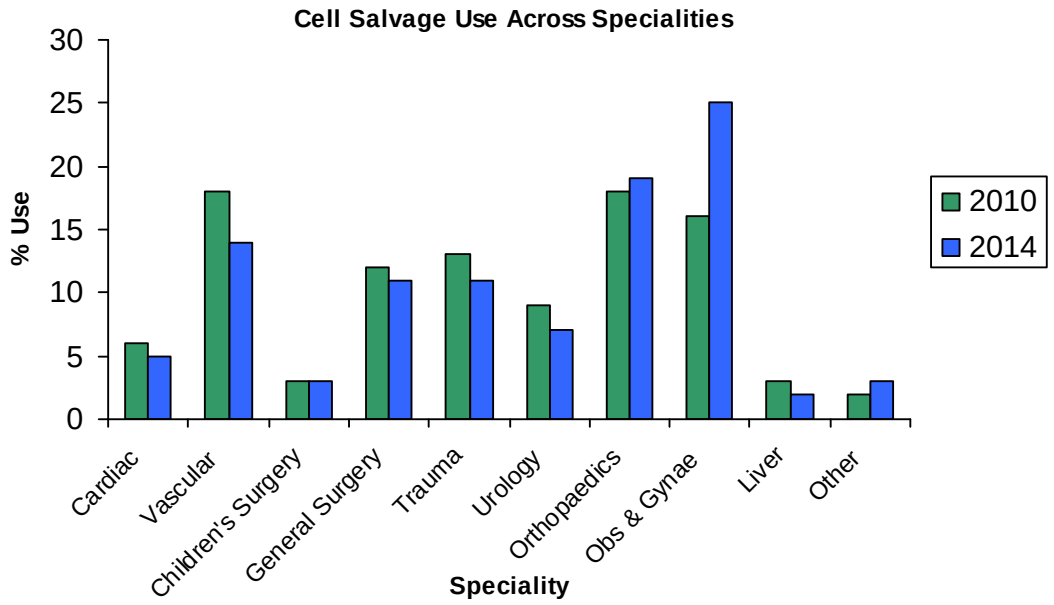
Fig 5



Use of Cell Salvage by Speciality

Figure 6 is a breakdown of ICS use by speciality from the 2010 and the current survey. These data indicate those specialities that appear to use ICS most frequently.

Fig 6



Apart from the increase in use across Obstetrics and Gynaecology specialities, there have been small percentage variations in cell salvage use.

Summary Box 1

- The two surveys were distributed differently. Accounting for this there has been little change in the number of machines in use
- 16% of respondents said they outsourced cell salvage services
- M3 is the most frequently indicated machine make and viewed by respondents as providing good support and service
- Obstetrics and gynaecology are the main user of ICS in 2014

Section 3: ICS Operation

Is Intra-operative Cell Salvage used both in and out of core (normal) working hours?
The survey did not specify the hours that are considered 'normal' as this will vary across organisations. Responses are therefore made according to local definitions of 'normal' and 'out of hours'.

98 replied to this question of which 77 (78%) said their cell salvage provision operated outside of 'normal' working hours. 21% said it did not. The response in the 2010 survey was 23% who did not use out of hours.
Where an 'out of hours' service did operate, it was provided by 'on duty' Theatre Staff (53/77 = 68%) and 'on call' Theatre Staff (28/77 = 36%).

9% said the service was provided by 'on call' dedicated cell salvage operators and a further 10% provided by a range of staff that included perfusionists, anaesthetists and other personnel if they had been trained in the use of the machine.

If it is not provided out of hours, why is this?

28 respondents provided answers to this question although 21 said they did not provide an 'out of hours' service. The principle reasons given for not providing this service were:

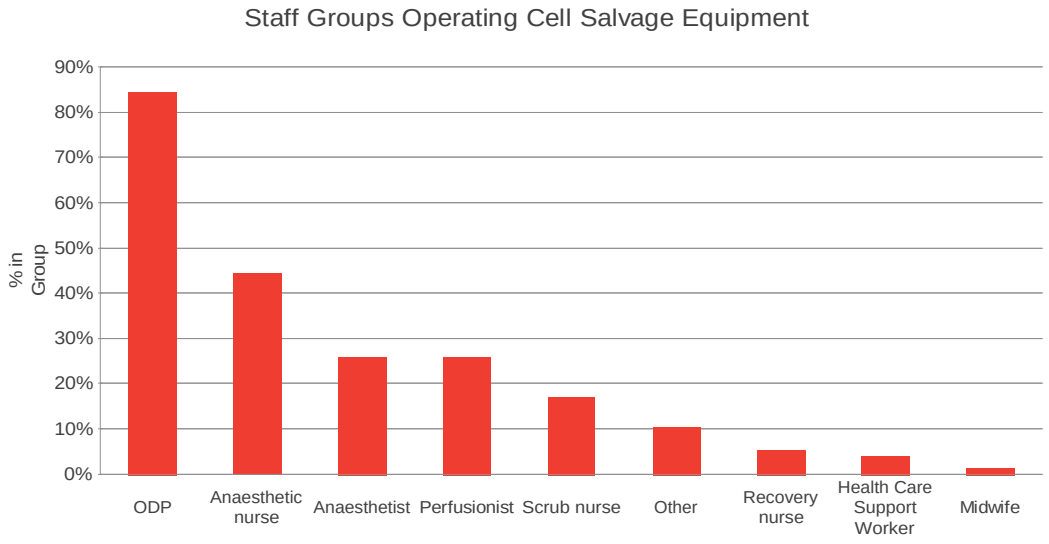
- Lack of need (8)
- Lack of trained operators (9)
- Insufficient staff available out-of-hours to run equipment (9)
- No emergency or trauma work (1)
- Only used for elective surgery (1)

The same number (9) indicated a lack of trained operators in the 2010 survey. A small number also said a lack of need in the 2014 survey but the majority did not reply to the question.

If used, what staff group operated the Cell Salvage equipment?

Figure 7 indicates the principle staff groups operating cell salvage equipment.

Fig 7



Operating department practitioners (ODPs) are the staff most frequently operating ICS equipment. 'Other' staff included Transfusion Practitioners (3), trained cell salvage operators (2), Intensive Therapy Unit nursing staff (1), a 'floor nurse' (1) and a 'circulating nurse' (1).

The data are not directly comparable to the 2010 results as the units of analysis are different. ODPs were however, poorly represented in the 2010 survey but this has increased in the current survey.

What anticoagulant is used?

98 responses were given for this question 43/98 (44%) used heparinised saline and 66/120 (67%) used Acid Citrate Dextrose (ACD). 10/98 (10%) of these sites indicated they used both. 10/98 (10%) were not stated.

The 2010 survey indicated an equal split in anticoagulant type use. There has been a 17% increase in the use of ACD from this year's survey.

Use of ICS leucodepletion filters (LDF)

In cancer surgery (98 responses)

Table 6

Use of LDF for ICS in Cancer Surgery

Always	Sometimes	Never	Do Not Use in cancer
46/98 (47%)	14/98 (14%)	11/98 (11%)	27/98 (28%)

In Obstetrics (86 responses)

Table 7

Use of LDF for ICS in Obstetrics

Always	Sometimes	Never	Do Not Use in obs
48/86 (40%)	16/86 (13%)	9/86 (8%)	13/86 (11%)

Suction of Amniotic Fluid (98 responses)

Table 8

Do you suction amniotic fluid into the ICS Machine?

Yes (amniotic fluid is suctioned into the ICS machine)	No (amniotic fluid is suctioned into a "waste" suction)	Do not use ICS in obstetrics
12/98	57/98	20/98
12%	58%	20%

A further 9 provided other details and 4 said they did not have obstetric services. 1 said they did (suction) if the obstetric event was in the main theatres, 1 was operator preference, 1 was unsure and another "sucked everything". One did so in the event of a massive haemorrhage, 1 could not comment. There was no comparable question in the 2010 survey.

Labelling

The 'green autologous label' was developed by the UKCSAG and is provided to hospitals free of charge by the ICS manufacturers. While some use the manufacturer's kit label or locally developed alternatives, 13 respondees stated that they use a standard, adhesive, patient address label (addressograph) and 3 do not label the salvaged blood at all.

Table 9

What type of label do you place on the ICS Reinfusion Bag?

Green autologous label (supplied by manufacturer)	41 42%
Manufacturer's kit label (supplied with disposable kit)	34 35%
Locally developed label	7 7%
Patient addressograph	13 13%
None	3 3%

Summary Box 2

- 21% said they did not operate outside working hours. This has not changed since 2010
- Staffing, lack of trained operators are cited as reasons
- ODPs are the main users of CS equipment
- There has been a 17% increase in the use of ACD as an anticoagulant
- 63% did not suction amniotic fluid (went into 'waste' suction)
- 13% are using "addressographs" with their associated risks
- 7% used "own brand" labels with a further 3% not labelling the blood at all

Are Intra-operative Cell Salvage Machine Operators Trained?

Responses to this question are not mutually exclusive. There is improvement on this question since the 2010 survey where there was a suggestion that some organisations did not provide training. Organisations appear to provide a variety of training approaches using "in house" and external trainers either on or off site.

Table 10

Are ICS Machine Operators Trained

Yes, by "in house" trainers on site	Yes, by external trainers on site	Yes, by external trainers off site	No training provided	Other
84	48	19	-	7
86%	49%	19%	-	7%

A number of other approaches were listed under 'other'. These included:

- Train the trainers off site who then train "in house"
- Theoretical component through 'Learn cell salvage' e-learning module
- Online intra-operative cell salvage course
- With manufacturer representatives
- From colleagues

Who Provides training?

These data are not directly comparable to the 2010 survey where staff grouping is different. In 2014 there appears to be a clear professionalisation of dedicated cell salvage staff and operating department practitioners with responsibility for cell salvage. It is these groups that provide the bulk of the training.

Table 11

	Training Provider					
No training provided	Cell salvage Co-ordinator	ODP	Perfusionist	Transfusion practitioner	Machine manufacturer	Other
-	44	52	15	8	53	10
-	46%	55%	16%	8%	56%	11%

Other training options listed:

- Professional development nurses for theatre
- Manufacturer's representative, +/- consultant anaesthetist (lead for cell salvage)
- Minimal training provided by a Senior ODP and [respondent]
- Cell salvage lead operator
- Clinical Perfusionists
- ICS lead practitioner
- Theatre practice development nurse
- Dedicated local trained trainers. Haemovigilance can provide theory training when necessary
- In house trainers

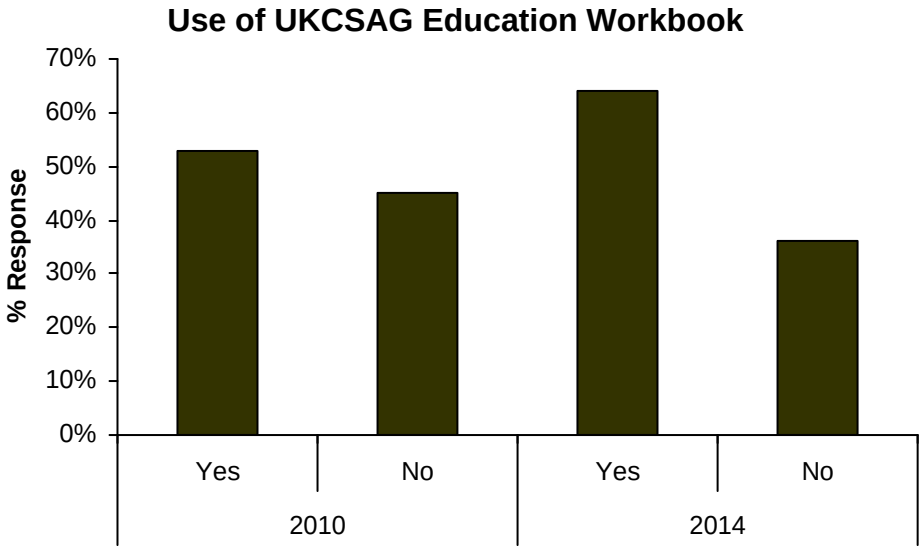
Anaesthetic Training

40 (41%) of respondents said their anaesthetic trainees received theory and practical training in cell salvage as part of their education. This figure has reduced by 12% since the 2010 survey.

Use of UKCSAG Education Workbook

63 (64%) said they used the UKCSAG Education Workbook. 35 (36%) said they did not (Figure 8).

Fig 8



There may be some greater uptake in the use of this resource based on the results from this year's survey.

Why do you not use this workbook?

Of the 34 who said they did not use the education workbook, 8 said they used a hospital developed workbook, 11 used the manufacturer's workbook and 15 said they were not aware of the UKCSAG workbook. This is 12% of the overall figure of 120 who use cell salvage. In the 2010 survey, this figure was 13%. Other responses included:

- In house presentation, formal quiz and practical training for competencies
- LearnPro
- Experience of using it only

Is the training competency assessed?

Of the 98 who responded to this question, 80 (82%) said the training was competency assessed (2011, 77%).

Use of UKCSAG Competency Assessment Workbook

80 responded to this question of which 48 (60%) said they used the competency workbook. Of those that did not, 17 used their own assessment tool, 8 provided by the manufacturers and 8 were not aware of the UKCSAG competency assessment workbook. In the 2010 survey, 5% were not aware of the workbook. In 2014 this figure was 8/120 (7%) of the 120 who used cell salvage. One respondent suggested:

"We do [use the workbook]. It is not comprehensive enough. Completion of the workbook does not render the [operator] competent."

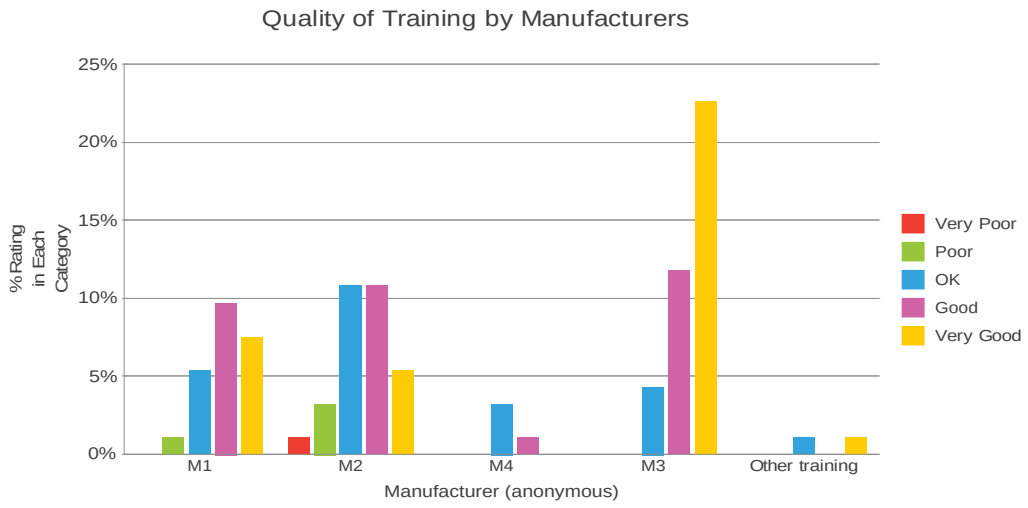
Another comment:

"The work book is good and makes very good points but I suggest that practitioners gauge competency".

Do you use the Cell Salvage module on the *Learnbloodtransfusion* e-learning?
98 responded to this question. 72 (74%) said they used this module. 26 (26%) did not. 14 said they used an in house hospital package. 9 were not aware of the *Learnbloodtransfusion* module. 1 said this module had not been accessed in their organisation and another said they were unable to access it via their NHS hospital IT systems.

Manufacturers' Training
74% said the manufacturers provided theory training while 24% of respondents said they did not. 90% of manufacturers provided practical training and 72% said they felt this training covered all aspects of the UKCSAG competency assessment. Figure 9 indicates the quality of training provided by manufacturers of cell salvage equipment as assessed by the respondents.

Fig 9



Multiple staff changes at one company did lead to a perceived deterioration in training provision.

Summary Box 3

- All ICS operators now appear to receive training in different formats
- Respondents gave a variety of responses to the quality of training they received from manufacturers'.
- ODPs, Cell Salvage co-ordinators and manufacturers provide the bulk of the training
- 59% of anaesthetic trainees however did not receive training (no change since 2010)
- 15% said they did not know about the UKCSAG workbook
- 9% said they did not know about the *Learnbloodtransfusion* module

Section 4: Implementation

Policy and Guidelines

84% said there was a policy and guideline on the use of cell salvage in their hospital, including contra-indications. There is little change from the 2010 survey which indicated that 83% had a policy or guideline.

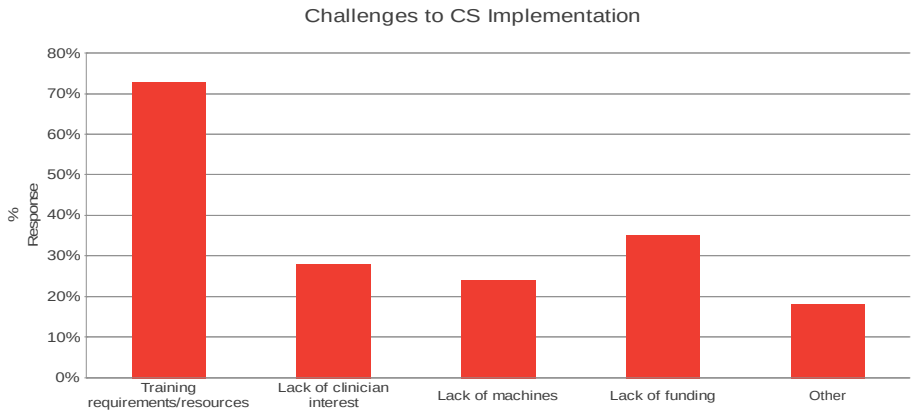
Policy Based on UKCSAG Template

Of those that responded to the question, 67% said it was based on the UKCSAG policy template while 22% said they wanted to develop their own. A further 11% said they were not aware of the UKCSAG template.

Challenges in implementing Cell Salvage

Figure 10 indicates the main reasons given as to why it was difficult to implement Cell Salvage in some hospitals.

Fig 10



Other reasons were given as lack of training, lack of dedicated staff and overall staff shortages as contributing to the difficulties in implementing cell salvage.

Funding

The 2010 survey used different parameters but Theatres were included and at that time met 47% of the cost. There appears to have been an increase in this area of funding based on the current survey. Some sites from the 2014 survey had "speciality budgets" funding individual machines. 1 machine was purchased by the Jehovah's Witness organisation. Another site had its own blood conservation budget.

Table 12

Who in your hospital funds the cost of the Intra-operative Cell Salvage

Theatre	Local blood transfusion department	Individual clinical speciality	Central budget	Don't know	Other
71	6	6	5	4	6
72%	6%	6%	5%	4%	6%

Table 13

Funding the Cost of Donor Blood from the Transfusion Laboratory

Theatre	Local blood transfusion department	Individual clinical speciality	Central budget	Don't know	Other
5	38	13	10	29	3
5%	39%	13%	10%	30%	3%

Maintenance Contracts

96% of Cell Salvage Machine users had service and maintenance contracts with their manufacturers. 4% did not. When asked for further explanation, one respondent said the machines were maintained internally, one said it was too expensive, another said it was not necessary and one said 'they' (the hospital) called the company in as required.

Quality Control

Table 14 summarises responses from the 98 organisations who answered this question.

Table 14

Quality Control

	Yes	No
Do you have quality control measures for Cell Salvage in your hospital?	50 (51%)	48 (49%)
Do you regularly quality control your machine(s)	44 (45%)	54 (55%)
Do you regularly quality control your individual operators	38 (39%)	60 (61%)

The 2010 survey indicated a 58% 'no' response for machine quality control and 68% for machine operators.

Summary Box 4

- 16% said they had no policy for Cell Salvage in their organisation
- 11% were not aware of the UKCSAG competency template
- Theatres fund the bulk of the cost of Intra operative CS
- Local blood transfusion depts/labs funded the cost of the blood
- Quality control is variable. Between 40% and 50% of respondents said they quality control the machines or the operators; a slight improvement since 2010

Mode of Operation

93% operated their machines in automatic mode. For the few that run in manual mode (6), 3 said there was no automatic mode option, one said they used experienced operators who did not require automatic features, another said it gave more control and one used a "quality wash mode". 71% never interrogate the machine to monitor automatic mode use.

Reporting

25% said they had reported an ICS incident to SHOT (Serious Hazards of Transfusion). This is slightly contradicted by the fact that 92% said that no serious events had ever occurred. One respondent said they did not know about SHOT reporting and, 2 respondents said "operational errors", machine errors were not able to be categorised in SHOT reporting mechanisms.

A full list of submitted comments is given as Appendix 4.

Discussion

This is the third survey of intra-operative cell salvage (ICS) across the UK. The first survey in 2007 provided the UK Cell Salvage Action Group (UKCSAG) with baseline information on the use of ICS in the UK. This helped inform the ongoing work plan for the UKCSAG. The following survey, conducted in 2010 (Jones & Howell, 2011) specifically targeted organisations known to provide an ICS service. It sought to establish progress against recommendations from the first report and to identify continuing challenges to provision of a cell salvage service. The 2014 on-line survey was distributed widely through existing networks and therefore yielded a greater number of responses than 2010, which has made direct comparisons difficult although some aspects can be compared. The targeted distribution method used in 2010 however, did offer benefits over the 2014 approach in that accurate participation rates could be calculated in relation to the number of organisations invited to complete the on-line form.

The survey covered five principle areas of investigation that will be dealt with in turn through this section of the report.

- Designation of staff completing the survey, their organisation and the clinical specialties where ICS is used
- The ICS equipment used, its performance and associated customer support
- Operating the ICS equipment
- Training and assessment of operators
- Implementing an ICS service

Staff, locations and specialties

The persons completing the survey are not necessarily the same persons as those operating the ICS but most responses to the survey are from the various personnel working in an operating department environment and should therefore be considered reliable. As one might expect, District General Hospitals (58%) and Teaching Hospitals (32%) contribute the majority of the data. The breadth of response from all countries of the UK should also validate the results as representative of practice but it should be borne in mind that because of its very size and the number of hospitals, English hospitals submitted more results than Scotland, Ireland and Wales. Additionally, due to local problems with Information Technology (IT), Scottish hospitals had difficulties in accessing the survey thereby reducing the number of responses. The precise problem is unknown but this is something to be kept in mind for future surveys, with the data collection method being thoroughly piloted in each country to ensure access.

Overall, it appears that since the 2010 survey, the level of ICS use within each specialty is relatively unchanged other than obstetrics and gynaecology and while we cannot give a clear reason for this, it may be related to the recruitment of cases to a study of cell salvage in obstetrics (SALVO trial). This randomised controlled trial opened in April 2013 and recruited its first case in June 2013 (Khan, 2013) so is likely to be a factor.

Equipment, performance and support

Based on data analysis there seems to be little change in the number of machines used per site. In the 2014 survey, we see the same four main suppliers for washed ICS as in 2010 and a relative newcomer to the market offering a filtered ICS system. The latter is not included in this discussion as the responses in the survey lead us to believe that the questions were misinterpreted by users so we are unable to provide any meaningful interpretation. A minority of users also continue ICS into the postoperative period (PCS) with the same equipment, but the survey did not explore specific aspects of PCS. The discussion is therefore, largely based on washed ICS systems.

The names of the ICS suppliers are not shown in this report and are indicated by codes M1 – M4. Identity is protected as some of the questions relate to the perception of users on machine performance and company support. Additionally, as one supplier of washed ICS is represented in a very small number of responses, it makes comparisons difficult and potentially unfair.

It is a measure of continued progress in the development of ICS equipment that 'ease of use' is given as a positive feature of every system identified and provides a good example of 'making the right thing, the easy thing'. It is inevitable that users will experience some technical difficulties with equipment but those reported were not serious and mostly related to wear and tear, software errors and user problems.

Fundamental to users then, will be the level and quality of support by the supplier. It is pleasing to see that most users rated the level of support as good or better, but a sizeable number of responses (34%) rated suppliers as 'OK' or lower. There will of course be an element of subjectivity that influences the response to this question but one supplier (M3) does receive more ratings of 'excellent' than any other. Incidentally, M3 is also the machine most frequently used in this survey.

Outsourcing of ICS services is an interesting finding but the survey does not offer any specific detail with regard to who or where it is outsourced, the reason why, or the frequency. This is something that could be followed up with those hospitals by members of the UKCSAG to gain a better understanding of the rationale, and potential benefits or disadvantages of utilising an external provider. It may in future prove an alternative solution for those hospitals that use ICS infrequently and as consequence find that their operators become deskilled.

Operating ICS

As expected, Operating Department Professionals (ODP) are still the main users of ICS having supported implementation of the technique with their anaesthetic colleagues since it was first introduced. In the 2007 survey, ICS was covered by 'on call' staff (35%) or there were 'varied' methods of support (51%). By 2010 this had shifted to around a third of procedures being covered by 'on duty' staff and only 4% on call. The percentage of dedicated operators had fallen during this time from 14% to 2%, suggesting a shift to ICS becoming mainstream practice. In the 2014 survey the growth of ICS as a routine practice appears to have continued. Where an ICS service operates outside core hours it is provided by 'on duty'

theatre staff in 68% of responses and by 'on call' staff in 36% of responses[1]. Responses also show that the percentage of dedicated operators has risen.

Just over a third of the sites that do not operate ICS 'out of hours' state a lack of need as the reason. The others indicate that they have a lack of trained operators or too few staff available out of hours to run the equipment. Although ODPs are most likely to be the person responsible for running ICS, anecdotal reports suggest that they likely to perform a dual role during surgery when ICS is used, i.e. their usual anaesthetic assistant role and that of the ICS operator, which may impact upon the ability of the organisation to deliver a comprehensive 24 hour service.
In addition to ODPs there are other theatre based staff who operate ICS. Those named in the survey range from anaesthetists to healthcare support workers demonstrating that ICS operator is not their main role. The survey appears to support this with only 9% of responses stating that the out-of-hours service is covered by dedicated ICS operators.
On the one hand there are benefits in retaining a dedicated team of experienced ICS operators who can provide a 24 hour service, but financial restraints or limited surgical activity may render this impractical. On the other hand there will be advantages to having a wide range of multi-skilled personnel who can operate ICS in addition to their usual tasks at no extra cost. The potential downside of this is that ICS might be seen as an 'optional extra' when staff are deployed on other tasks.

However the service is managed, there needs to be an awareness of the risks of becoming deskilled through lack of use. This is of particular importance in surgical cases where ICS may be contraindicated for part or all of the procedure, or special precautions are needed. Of note then is the finding that leucodepletion filters (LDF) were not used for reinfusion in 11% of cases for cancer surgery and 8% of obstetric cases, contrary to recommendations. We cannot offer any explanation as to why the LDF was not used and there could be various reasons. It is possible that the operator had either made a conscious decision not to use the LDF or was not aware of the need. This question might be worthy of consideration in future surveys.

An area of practice that divides opinion is the suction of amniotic fluid during caesarean section with some centres routinely using only one sucker (12% of responses). The SALVO study (Khan, 2013) aims to evaluate the benefits of routine ICS in obstetrics but an additional measure will be to examine the effects of using a single sucker throughout the procedure as opposed to a separate sucker to remove amniotic fluid.

Labeling of autologous blood with the patient's identifiers is essential to safe practice and helps minimise the risk of the blood being given to another patient. The UKCSAG 'green' autologous blood label was developed by the UKCSAG and is supplied by the manufacturers with the ICS consumables. It is disappointing to see that only 42% of respondees use the green label. The manufacturer's own label is used by 35% and a small number use their own

[1] Some selected multiple responses where they offer a combined service, hence >100%.

locally developed label. A worrying finding is that in 13% of responses patient 'addressograph' labels are used. These are known to be a source of error in wider blood transfusion practice as evidenced by successive reports from the Serious Hazards of Blood Transfusion (SHOT, 2014). Of greater concern is the 3% who do not label the blood at all. It is uncertain why the green label is not used although anecdotal reports suggest that some ICS operators do not know of its existence. This offers a further opportunity for targeted intervention by the UKCSAG to understand why it is not used and promote its wider use.

Training and assessment

An organised ICS training programme is essential. It is encouraging to note that in the 2014 survey responses indicate that 100% of active ICS operators are trained. It is apparent that diverse training methods and providers are used. The cell salvage module (Learn Cell Salvage) from the UK-resourced e-learning package, *Learnbloodtransfusion*, is a relatively recent addition to its suite of programmes so it is encouraging to see the level of uptake (74%) shown in the survey. With regard to competency assessment, there is an increase from the 2010 survey when 77% had been assessed, but there is still potential to improve from the current 82% deemed competent.

It is of some concern that responses to the survey indicate that only 41% of anaesthetic trainees receive theoretical and practical training in cell salvage and that this figure has reduced from the 2010 survey by 12%. As a key individual in monitoring the patient's condition during surgery there are marked benefits in the anaesthetist having an understanding and a working knowledge of ICS. Inclusion of ICS as an integral part of the education programmes for anaesthetists and ODPs is therefore recommended.

Following the 2007 survey the UKCSAG developed resources to support training, competency assessment and governance of ICS. These were an education work book, a competency workbook and policy templates. One might expect a greater uptake that 64% and 60% for use the education workbook and competency workbook, especially as the latter is based on National Occupational Standards from Skills for Health (2011). The most common reasons for not using the UKCSAG resources are that hospitals use their own educational material and competency tools, but there are still some ICS users who are not aware of the UKCSAG workbooks.

Implementing an ICS service

When an ICS service is implemented it is essential to have a local policy in place supported by clear guidelines for practice. It is surprising then that there is little change from the 2010 survey with some hospitals having none in place. Of those with a policy around two thirds based it on the UKCSAG template but of those without a policy, some were unaware of the resource, despite it being readily available for download. Absence of a policy is not cited as a barrier to implementation however.

The greatest barrier to implementation appears to be related to training requirements and resources, which seems to contradict the earlier finding that 100% of operators are trained. It appears then that while a great many hospitals seem to be able to manage this, others do

find it a challenge. The lack of awareness of available resources may be a key factor in this. It must also be remembered that UKCSAG resources were unavailable for approximately 6 months in 2014 while the hosting website went through a major update. There is an opportunity now to re-advertise the range of available resources to encourage ICS implementation.

Lack of funding is also given a barrier to implementation with the costs being met by already stretched theatre departments in the main. On the other hand, the cost of allogeneic blood is funded mainly by hospital transfusion departments and may act as a disincentive to implementing ICS. It is difficult to propose solutions in the current financial climate but it may be worth exploring negotiation of a central contract between procurement services and the ICS manufacturers as is currently in place in Wales so that all users benefit from economy of scale.

Quality monitoring in ICS is also a challenge to users with around half undertaking quality control (QC) checks. The majority of hospitals responding to the survey have a maintenance contract for ICS machines with the supplier. QC checks enable users to demonstrate that the machine continues to function as expected and is recommended as best practice.

If problems do occur, either with the machine, end product or patient, these should be reported to the relevant organisations, e.g. the manufacturer, the Medicines and Healthcare Products Regulatory Agency (MHRA) 'Yellow card' system, and/or SHOT as appropriate. SHOT has been gathering data on patient adverse reactions to ICS since 2007 but the level of reporting is fairly low and there is still some misunderstanding about what should be reported and to whom. The UKCSAG can further encourage reporting through its publications.

Conclusion

Whilst allogeneic (donated) blood is an essential adjunct to health care, it is an expensive and limited resource and can present a source of risk for patients, in particular the risk of "wrong blood" incidents as reported by the Serious Hazards of Transfusion (SHOT, 2014). The Health Service Circular (HSC, 2007), "Better Blood Transfusion: Safe and Appropriate Use of Blood" (2007) and subsequent National Blood Transfusion Committee publication, "Patient Blood Management: An evidence-based approach to patient care" (2014, England only) recommend that effective alternatives to allogeneic blood transfusion be explored and this includes ICS. However, its use in the UK is still not widespread and more needs to be done to ensure this simple, safe and cost-effective method of reducing allogeneic transfusion is offered to all patients that would benefit from it.

Recommendations

For Hospitals

- The requirement for and provision of, CS should be reviewed/audited by every HTC/PBM committee and be part of the programme for Patient Blood Management/Better Blood Transfusion to be fully integrated into patient care.
- Every hospital providing CS must have an up to date policy for its use.
- The recording of autologous transfusion should have the same stringent standards as seen in allogeneic transfusion. The green ICS label (that is available free from manufacturers), or hospitals own equivalent, should be used by all hospitals carrying out ICS. The use of addressograph labels should be discouraged.
- Every CS machine in use should have a service and maintenance contract with the manufacturer, or internal service provider, along with an agreed and documented programme for internal quality control.
- All incidents relating to CS should be reported to the Serious Hazards of Transfusion (SHOT) scheme. Machine faults should be reported as per the local hospital policy and reported to the manufacturer at the appropriate stage of this process and via the 'Yellow card' system to the Medicines and Healthcare Products Regulatory Agency (MHRA). Guidance on reporting to SHOT is available at: http://www.shotuk.org/wp-content/uploads/SHOT-Cell-Salvage.pdf and guidance on reporting to the MHRA is at: https://yellowcard.mhra.gov.uk/the-yellow-card-scheme/
- All CS training received should be competency assessed.

For the UKCSAG

- UKCSAG need to raise their profile and do more to advertise the resources available on the Toolkit; it is recommended that they review their terms of reference including governance and create an annual action plan with time frames and responsibilities.
- All documentation on the CS Toolkit should be systematically reviewed by the UKCSAG at least once every 2 years and updated if necessary.
- Further research on ICS is required and should be encouraged and supported by the UKCSAG.
- Review the content of the UKCSAG green autologous blood label and promote wider use.

For Blood Services

- Each of the blood service PBM/BBT teams should ensure they have a named contact for cell salvage lead at every relevant hospital in their country and ensure they are provided with regular updates etc.
- Blood services not currently doing so, should consider bulk buying cell salvage equipment and providing it 'at cost' or free to hospitals.

For College of ODPs and Royal College of Anaesthetists

- Education and training on ICS should be an integral part of all programmes for ODPs and Anaesthetists.
- All CS training received should be competency assessed.

For CS manufacturers

- Review the feedback in the survey and consider how they can improve the machines, service and support they provide to hospitals.

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For copies of this report or any queries concerning this audit please contact:

Brian Hockley, Data Analyst and Audit Manager
Sheffield Blood Centre
Longley Lane
Sheffield
S5 7JN
Brian.Hockley@nhsbt.nhs.uk
Tel: 01143 584 836 Mob: 07764 280 404

Appendix 1: Job Titles

Job Title	No of Entries
Transfusion Practitioner	30
Anaesthetist	28
ODP	22
Perfusionist	8
BMS2	2
Practice Development Facilitator	2
Senior Theatre Practitioner	2
Team Leader	2
Theatre Practitioner - Cell Saver Trainer	2
Advanced Scrub Practitioner	1
Anaesthetic support blood conservation coordinator	1
Autologous Transfusion Lead Scientist	1
Band 6 RGN anaesthetic/recovery practitioner	1
Blood Conservation Coordinator	1
Cell Salvage Lead	1
Cell Salvage Practitioner	1
Cell Salvage Training Co-ordinator	1
Charge Nurse	1
Chief Clinical Perfusion Scientist and Surgical Development Manager	1
Clinical Leader - Orthopaedic & Trauma Theatre	1
Clinical Nurse Specialist Intravascular Fluid Management	1
Clinical Perfusion Manager	1
Clinical Practice Facilitator/ Senior Anaesthetic Nurse	1
Clinical Procurement & Medical Devices lead for Theatres	1
Coordinator for Cell salvage Theatres/ Theatre Nurse Anaesthetics	1
Consultant Haematologist	1
Deputy Sister - Operating Theatres	1
Deputy Team Leader - Vascular	1
Haemostasis Practitioner	1
Head of Perfusion Services	1
Lead Nurse Anaesthetics	1
Lead Practitioner, Anaesthetics	1
Lead Transfusion Practitioner	1
Matron	1

Physicians Assistant (Anaesthesia)	1
Professional Development Advisor	1
Senior Operating Department Practitioner	1
Senior Perfusionist	1
Senior Theatre Practitioner Cell Salvage Lead	1
Sister	1
Specialist Practitioner	1
Specialist Practitioner of Transfusion	1
Theatre Charge Nurse	1
Theatre Nurse	1
Theatre Nurse and Co-ordinator for Cell Salvage in Theatres	1
Theatre Practitioner Team Manager	1
Theatre Support Manager (Anaesthetics & PACU)	1
Theatre/ITU Technician	1
Total	137

Appendix 2: Machine Attributes

Name of Cell Salvage Machine	What do you see as the best features of each machine?
M1	Ease of use. Simple visual and worded instructions. Low volumes of collected blood can be utilised.
M1	fairly easy to set-up good support from M1
M1	You can stop and start cleaning the blood whenever you like and it's easy to use.
M1	Quick and good quality blood
M1	Can process a small amount Removes Fat Continuous processing
M1	One size bowl fits all Can be used in Paeds
M1	Ease of set up
M1	The ability to continuously process blood, unlike the bowl systems. Very easy to set up, therefore very easy to train people to use it.
M1	Continuous processing
M2	Easy to use
M2	Ease of use and because the same machine is used across the sites there is no confusion
M2	Integrated suction, light weight and easy to move. Easy to operated. Connect to our transfusion systems.
M2	Ease of use. Tendency to prefer machine most practised at using.
M3	It is the only one we have at this site and it is q old therefore q basic, but works to preserve blood.
M2/M3t	Quality of red cell product. I did the only national evaluation comparing systems 15 years ago. ****** is safe, easy to use and has an excellent product quality.
M3	Ease of use
M3	Simplicity, familiarity
M3	Good to be able to collect without the need for processing set. Easy to set up Good Quality of red cells if used correctly
M1	Cheap disposable as compare to PRBC (blood)
M1	Ease of set up. Clarity of information given. Lack of spilled blood when unloading.
M1	Pictures on the display help with setting up the machine
M1	Ease of use, Works well, Gives good return,
M1	Easy to fit disposables
M1	Continuous system
M1	Easy to use. Good education/resource support from company.
M1	One disposable set for all volumes.
M1	It is acceptable to patients who refuse blood and blood products
M1	Can set up collection reservoir separately. Only process and wash if

	adequate volume collected. No need to have a separate operator, can be run by anaesthetic team. Cont
M1/4x M3	Consistent product quality. Continuous wash function makes use easy when also running a heart lung machine. Built in suction
M1	Emergency programme for major bleeds
M1	Ease of use.
M1	Quite easy to use
M1	The continuous use
M2	Easy to use, has separate collection and processing circuits so you can collect but not process
M2	Familiarity reliability
M2	Easy to use reliable over ride function
M2	Staff familiarity
M2	Easy to use Safe
M2	They have collection only facility and they are straight forward to use.
M2	New machine replacement, unable to comment at present.
M2	Staff trained on the specific machine (but they do have generic training for any washing ICS machine). Split collecting/processing disposables Ease of use
M2	Works well on auto mode
M2	None
M2	Ease of use
M2	They do the job
M2	M2 Can be set up as Collect only, therefore wastage reduced. Simple and straight forward to use. High Hct Levels produced by this machine
M2	Patients receive their own blood back quickly resulting in less chance of ITU admission for wrong product admin
M2	Straight forward set up, simple to operate.
M2	Ease of use. Simplicity. Reliability.
M2	Not too complicated to operate
M2	Cost is improved by a Managed Service Contract encompassing [*other products*].
M2	I do not actually use the machine so not able to comment
M2	Integrated vacuum pump bar code scanning of consumables (although not all consumables included) case by case data management
M2	Easy to Operate Partial Bowl Wash
M2	New to us ,easy to use
M2	Easy to use and set up
M2/M3	M2 - suction M3 - small Latham bowls
M2	Ease of use
M2	Ease of use
M4	Easy to use
M4	Small bowl size. internal suction

M2	Easy to set up and run
M2	The ability to be used for both intra and postoperative collection and transfusion. The ability to process large volumes of blood quickly and efficiently
M3	Ease of use, portability and reliability
M3	Efficient Ease of Use
M3	Easy to set up Easy to use Very few machine malfunctions
M3	recently updated to newer M3 machine Good step by step screen guides More accurate blood volumes
M3	Automatic
M3	HCT reader in and out FPH indicator Multiple bowl sizes
M3	Reliable Easy to use
M3	User friendly.
M3/M2	M3, great touch screen, easy to use and separate suction unit
M3	17 years old and is two generations behind latest tech and no longer has any good features. M3 is latest tech is fast reliable and produces a better end
M3	Efficient and relatively easy to use
M3	On board vacuum pump on both machines. Easy to trouble shoot. Copes well with high blood loss scenarios. Surgeons like the quiet running noise in comparison to other cell
M3	Ease of use, Versatile, Integrated vacuum system, reasonable cost of disposables, good range of bowl sizes
M3	Easy to use
M3	Able to choose between different size wash sets depending on expected blood loss and choice of collection only if there is doubt thus saving money.
M3	Autologous transfusion Familiarity - within the Trust we only have 1 type of machine so staff can rotate to alternative sites to maintain skills Good company support with
M3	Easy to learn Easy to set up Modular disposables
M3/M2	Efficient good support from manufacturers and simple to use
M3	The ****** is a much easier Machine to load and use Disposables simple to set up The ***** is good in emergency Blood loss situations Emergency mode
M3	******* is easier
M3	Compact Ease of use Quick set up
M3	Simplicity
M3	Simplicity
M3	Auto setup
M3	Easy & intuitive to use Confidence in the product Good operator machine interface Reliable
M3	Relatively Small Simple to set up
M3	Ease of use

M3	Ease of set up
M3	Easy to set up
M3	Ease of operation
M3	Easy to use, Easy to set just follow instructions on screen and pre-loaded programs for each bowl size.
M3	Quality Product measured by Plasma free HB <1.0 and High HB >200g/dl as audited in monthly Cell Salvage Q/A. Quiet internal vacuum, ease of use. Price
M3	Good wash, high HCT, Rapid transfusion, and easy to use.
M3	The footprint and technology of the M3 very, very good ******** good basic machine but now old hat ****** is over engineered
M3	Ease of set up, quality of consumables and end product blood of good quality

Appendix 3: Problems associated with ICS machines

M2 - low haematocrit of processed blood.
Human error generally, occasional valves falling off.
User error- part of transfusion set inserted upside down. Error not identified by staff involved for some time.
Once the machine was repeated by theatre to have 'failed' but it was difficult to exclude the fact that it may have been set up incorrectly.
Screen failure unable to use emergency function our machines are very old.
A software problem with one machine.
Broken bowl sensor; Lids cracked; Arm holding bowl became loose; Blown fuse
I have M3 machines out of action, one with faulty electronics on with a centrifuge problem.
Many from problems with the inbuilt suction device and the gate clamp that holds the tubing in place
Calibration errors Emptying problems Centrifugal bowl lid coming off.
M3 - Door latches failing to close, pump failures.
M3 - broken lid (age related) and blood spill sensor.
Minor problems solved in house by theatre technicians.
Occasional incorrect seating of centrifuge.
Sensor failure at start-up.
M2 - Valves sticking, sensor reading incorrectly.
Says washing when isn't! Volume counter still escalating when not actually washing. No alarms.
We have had issues with suction, leaking effluent, noisy 125ml bowls, defective sensors.
M2 - Centrifuge stalled.
Usually user error.
M3 had an error message which was not included in the user manual.
Overfilling of bowl (M2).
Mechanical faults with drip stands, suction holders.
Fatal error.
Older machine worn parts.
Leaking from processing set.
Tubes shut in to plastic cover. User error.
Suction broke.
No power but suction still working no suction possibly due to overheating valve error, not processing.
Vacuum pump issues and external filter. Buffy coat sensors needed replaced. Bowl door lock temperamental.
Tubing guide loose.
Buffy Sensor failure – M3.

Appendix 4: Comments

- We do not undertake planned surgery where ICS may be necessary.
- I also explore all available technology to reduce bleeding and monitor coagulation in surgery. We have a theatre based laboratory to facilitate this.
- I think that the workbooks are too long winded for our theatre staff. I think ICS should be treated like any other piece of equipment in theatre to de mystify it, but that clinicians should be more involved.
- Clinicians need to update themselves with the latest information on the contraindications to cell salvage. This would increase its usage benefiting all involved.
- Development of the service is work (slow!) in progress - no current resource or time. Competency based assessments have been designed but not always followed; overall coordination of different areas is difficult without a dedicated coordinator with time for the role.
- We use machines and supplies from M2. We have 4 machines in the trust used in two sites. 3 in one and one in the other.
- Machine is quite an old model so little available in the nature of QC. Guidelines in the process of being updated from the generic ones available from Cell Salvage Action Group.
- We have developed a unique cell saver 3 day training course with a clinical activity record, we incorporate the manufacturer and information from the UK cell saver action group and the NICE guidelines.
- The training and maintenance of skills and audit of service is a great problem. Ideally it would be great to have a team of people where one was always in the Trust available to do cell salvage and staff also to audit the system but this is costly. There is one enthusiast-me, lots of resistance by surgeons who don't like the low level suction. However patients love it and see it as a quality service. ****** non-machine system is a worry from a debris point of view and return of haemolysed red cells to the patient. How do you cell salvage from laparoscopic work?
- Insufficient blood used during surgery to make cell salvage a viable option
- I think that this survey has a very limited design and does not allow users to give robust answers due to the responses allowed. You should really award the opportunity for comments to key/leading questions.
- We do not undertake vascular surgery or any other major blood loss surgery and transfer any difficult obstetric cases to bigger units.
- If the service (primarily disposables) were funded other than from individual departmental budgets there would be far greater utilisation of the technology, which is currently employed predominately for cardiac surgery and obstetrics.
- We have purchased 2 x C.A.T.S machines to bring IOCS provision in house. We are currently writing a Trust Policy prior to implementation.
- Training is provided by lead Consultant for cell salvage to junior anaesthetists. I provide training to all other staff but find it a challenge to keep competence maintained due to minimal usage of cell salvage equipment. I use the company manual to aid me in training individuals with quick reference set up guide and on line competency booklet from UK cell salvage action group website. M2 machine is in automatic mode once bowl set is loaded and procedure started.
- Apologies for limited responses in some areas, I do not operate the machines so some data entered may be incorrect
- Time for training can be an issue.

- We are working together to improve our cell salvage service
- We still feel that we do not do enough routine cases involving significant blood loss where cell salvage would be useful. Therefore we would not be able to maintain skills for emergencies.
- ICS is not regulated and there is no statutory qualification. There is no regulation as to how blood is collected, processed, quality assured or labelled. What is deemed safe practise in one institution cannot be directly transferred to another hospital and local staffing, policies and staff responsibilities differ. A National standard for training is necessary, with a national qualification. Hospitals should be required to demonstrate that their ICS service is compliant with national standards. ICS practise should become statutory requirements in operating theatre depts. where ICS is used, such that anaesthetists and surgeons must be competent to use the technology safely. The recording of ICS should have the same stringent standards as seen in allogeneic transfusion.
- We use Intra-operative Cell Salvage on all primary total hip replacements as well as revision hip replacements.
- Cell salvage is very much on the increase. We are auditing usage and have figures for the last three years. The transfusion team are now involved and are reporting to transfusion committee.
- Still trying to train more ODPs in cell salvage as we don't have a 24/7 service. We have devised a job description for a cell salvage practitioner to be responsible for providing cell salvage and training other staff but we are having problems getting the Trust to fund for this post.
- Main problem is theatre staff being released for 1 day classroom training.
- Originally trained in 1989. Current hospital just introduced ICS. Working through the blood transfusion e training for personal update and validation of training. Is this all I need to do?
- We have one M4 Cell Salvage machine which we have had for approx 7 years and get our equipment supplies from them. Our machine is serviced annually. We use our machine anything from five days a week to once a month, mainly for Abdominal Aortic Aneurysms.
- I have answered 'yes' to maintenance contracts - we do not pay for maintenance as the machines are leased from the company and are maintained by them with equivalent engineer support as on contract.
- We are currently expanding the service into A&E & looking at introducing platelet sequestration for wound healing & reinfusion.
- We only use trained dedicated trained individuals to operate machines as part of a whole haemostasis management process
- We do not have this facility in our hospital.
- Regarding consumables 30 would be approximately for the complete process. Far more 60+ would be used for collection.
- Have had no adverse cell salvage events.
- Insufficient surgery to use cell salvage.
- We would like more company support for training, especially when DGH like us who do not have vascular speciality so use is very limited, company training will make staff comfortable to use more.
- We are a small Trust as such it is difficult to justify the provision of an ICS service although it is something we are looking at.
- We would really like support in getting service 24/7 and funding in organisation

- Since the loss of our vascular surgery, staff are no longer able to maintain their competence and therefore cell salvage is no longer offered at our Trust.
- We use M2 machines with saline and heparin to wash.
- This is a new in-house service developed over the last 18 months. We plan to implement out of hours service soon.
- We currently use CATS machine for vascular / trauma procedures. Occasionally hip revision where cement or infection are not present. We also use autologous transfusion drains for immediate post op following knee surgery.
- Lack of awareness and training of cell salvage.
- We do not participate in post op cell salvage. Quality control - no formal testing of pre transfusion/ post wash samples to the labs, although awaiting commencement of same.
- We use some post op cell salvage for hips.
- We don't use it as much as we used to and it is difficult to keep up everyone's skills. We are supposed to be using it 6 times per year per user and this does not often happen.
- M1 Machine. Uses approx. 20/year.
- Policy/guidelines are in the process of being completed.
- The machine is not used frequently in theatre.
- It would be great if nationally all the cell salvage users could get together annually to share ideas and standardise the way everyone is trained and assessed. And for regular updates, the last meeting a few years ago was fantastic and I would welcome something like this again.