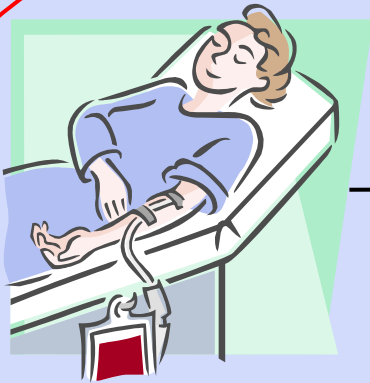


# Recommendations for Effective Blood Supply Management

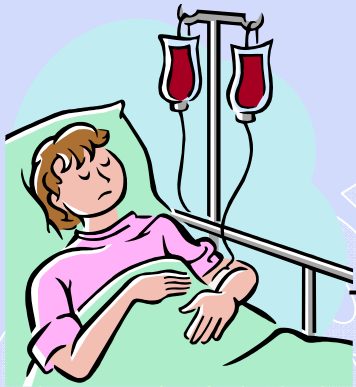
Judith Chapman

Blood Stocks Management Scheme

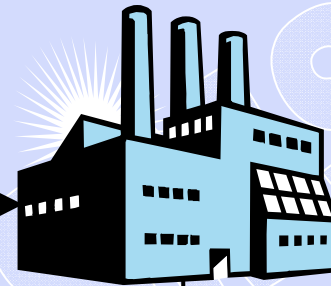
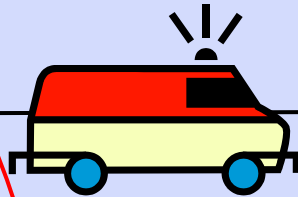
London



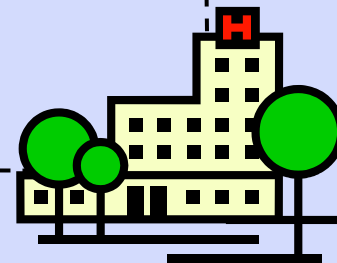
BLOOD DONOR



TRANSFUSED  
PATIENT



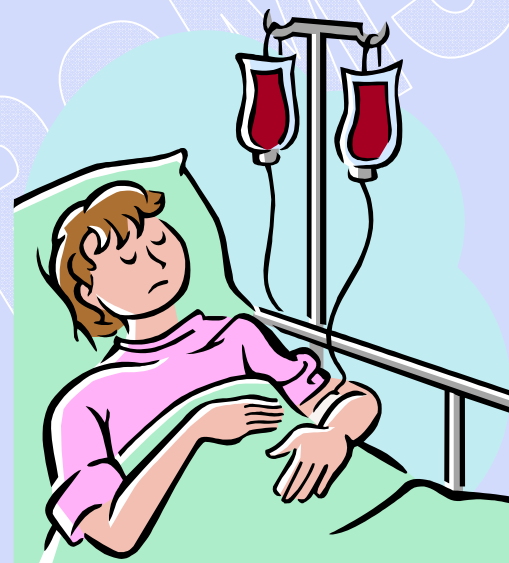
BLOOD SERVICE



HOSPITAL  
BLOOD BANK



**Supply  
may not  
meet  
demand**



**Effective blood inventory management  
can help to meet the shortfall**

- [Home](#)
- [Reports and Surveys](#)
- [Publications](#)
- [Useful Resources](#)
- [Training Courses](#)
- [Open Meetings](#)
- [About the Scheme](#)
- [Contact Us](#)

#### Search Site

 [Go](#)

Go to



Go to



## Welcome to BSMS

The Blood Stocks Management Scheme was established in 2001 to understand and improve blood inventory management across the blood supply chain. Hospitals and Blood Centres from England, Wales, and Northern Ireland are currently participating in the scheme.

Central to our work is VANESA, a data management system, where hospital and blood service data is collected. In return participants can view real time data and charts.

## What's New?

### BSMS Newswire 21 Available

Newswire 21 is available to view and download within the publications section of the website.

### Fate of Donation Project

The FOD project was closed on July 31. An end of project closure paper and report have been posted as pdf documents within the FOD section.

[Visit: Fate of Donation Section](#)

## Latest Publications

**16 April 2007**

The aim of the 2006 survey ...

[IPS 2006: Stock Control & Training](#)

## Training Courses

Title	Location	Date
<a href="#">VANESA 4 DUMMIES</a>	NBS Colindale	24/10/07
<a href="#">VANESA 4 VIP's</a>	NBS Colindale	31/10/07
<a href="#">VANESA 4 DUMMIES</a>	NBS Colindale	08/11/07

## BSMS Open Meeting 2007

Another successful BSMS Open Meeting was held on 10th May in Birmingham. A big thank you to everybody who came along and made it such a success.

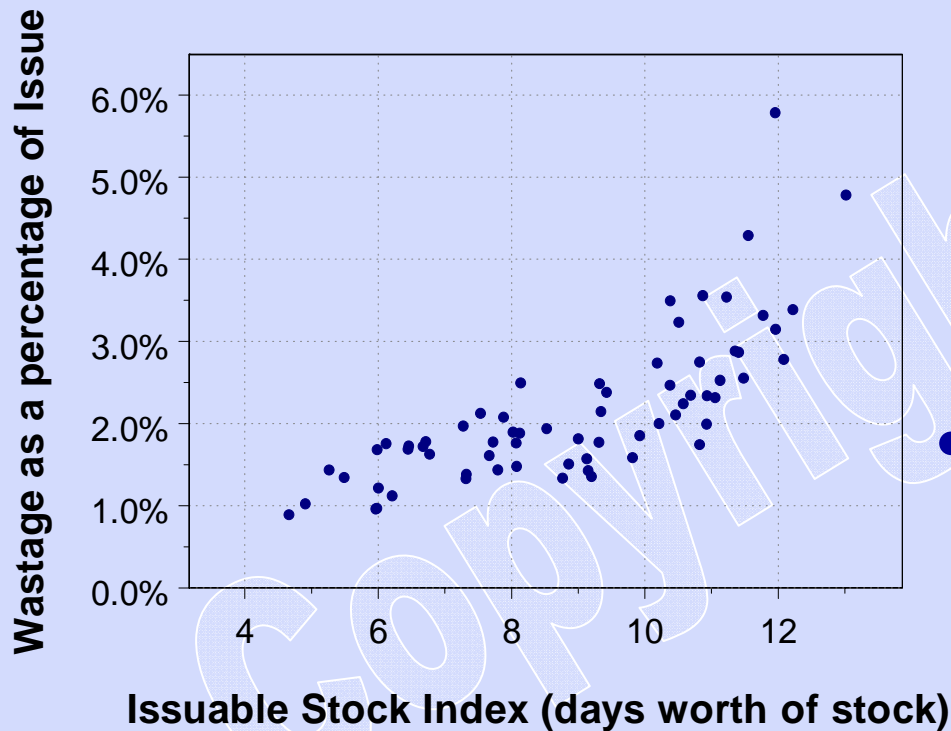
[Visit: Open Meeting 2007](#)

**The Blood Stocks Management Scheme collects data from Blood Services and Hospitals and gives feedback with the aim of increasing knowledge of blood inventory management**

# Recommendations for Effective Blood Inventory Management

Copyright © BSMS

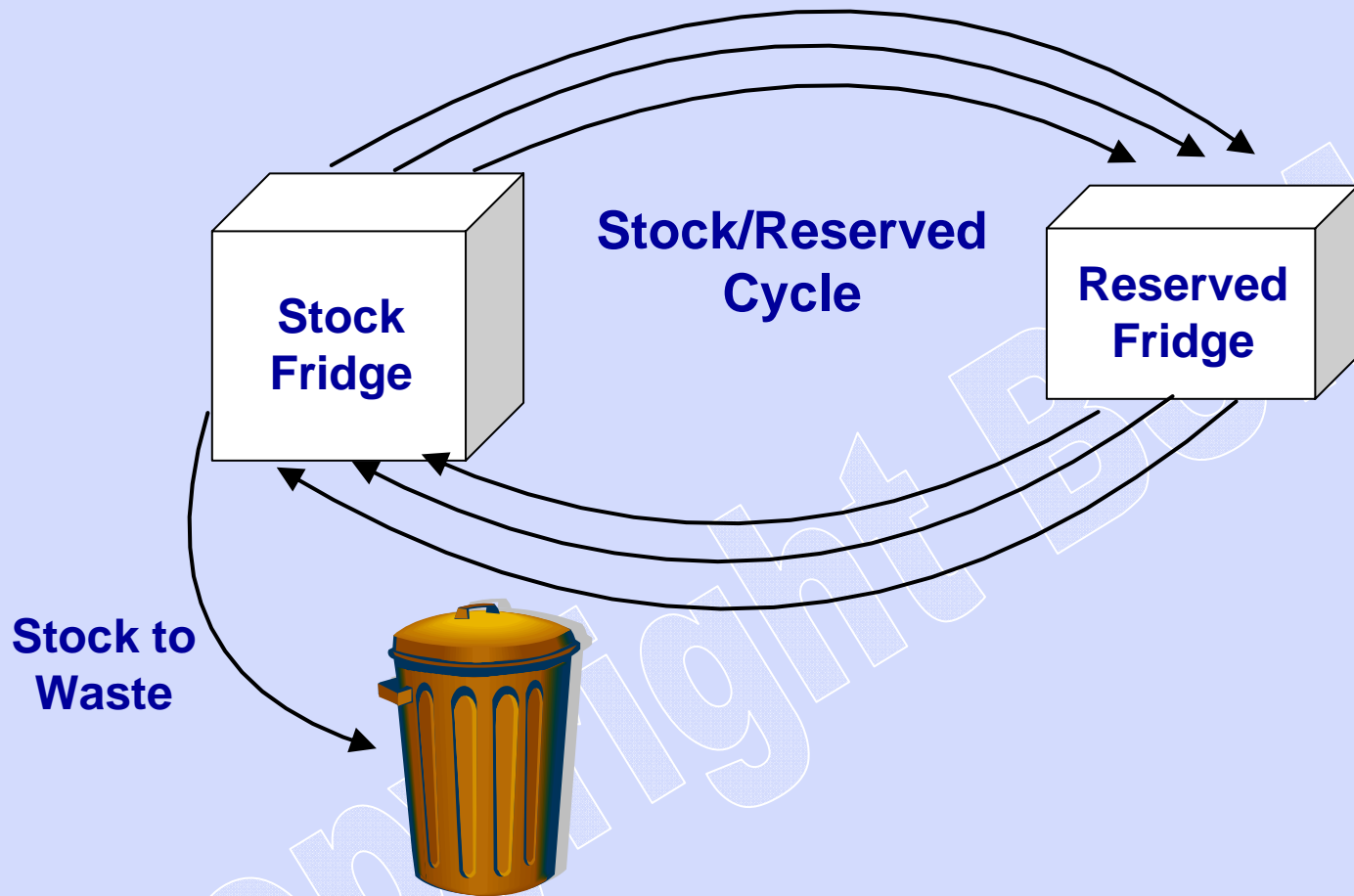
# Relationship between Blood Centre Inventory Level and Wastage



- As the blood service inventory level increases the amount of time expiry wastage increases
- This is particularly apparent when the blood service inventory is significantly higher than the normal range.

WHY?

COPYRIGHT © BSMS



Most units will be crossmatched multiple times during their life (the stock/reserve cycle).

# Time Expiry Wastage

- The number of times a unit can be crossmatched before it expires is determined by the age of the unit at time of issue
- When the blood service inventory is high, the age of units at issue declines.
- Time expiry wastage is therefore implicitly linked to blood service inventory.

# Methodology

- 68 months worth of BSMS data were used for detailed analysis
- Variables were constructed and analysed by standard statistical techniques available in Excel, STATA and SPlus

# Constructed Variables

- Two variables were constructed for blood service inventory
  - **STOCK** = Mean daily inventory
  - **ISI** = Mean daily issuable stock index  
(The ISI is equivalent to the number of days worth of stock)
- Two variables were constructed for hospital time expiry wastage (TIMEX)
  - **TOTT** = Total monthly TIMEX
  - **TAPI** = TIMEX as a % of issue

# Statistics for Each Variable

Variable	Minimum	Maximum	Mean
TOTT	823	8,457	2,864
TAPI	0.8%	5.8%	2.1%
STOCK	27,622	71,857	50,942
ISI	4.7	13	9

**TOTT – Total monthly TIMEX**

**STOCK – Mean daily inventory**

**TAPI – TIMEX as a % of Issue**

**ISI – Mean Daily Issuable Stock Index**

## The Final Model

$$TAPI = a(ISI_{t-1}) + b(ISI_{t-1} - ISI_{t-2})$$

Where

$ISI_{t-1}$  = ISI from previous month

$ISI_{t-2}$  = ISI from two months previous

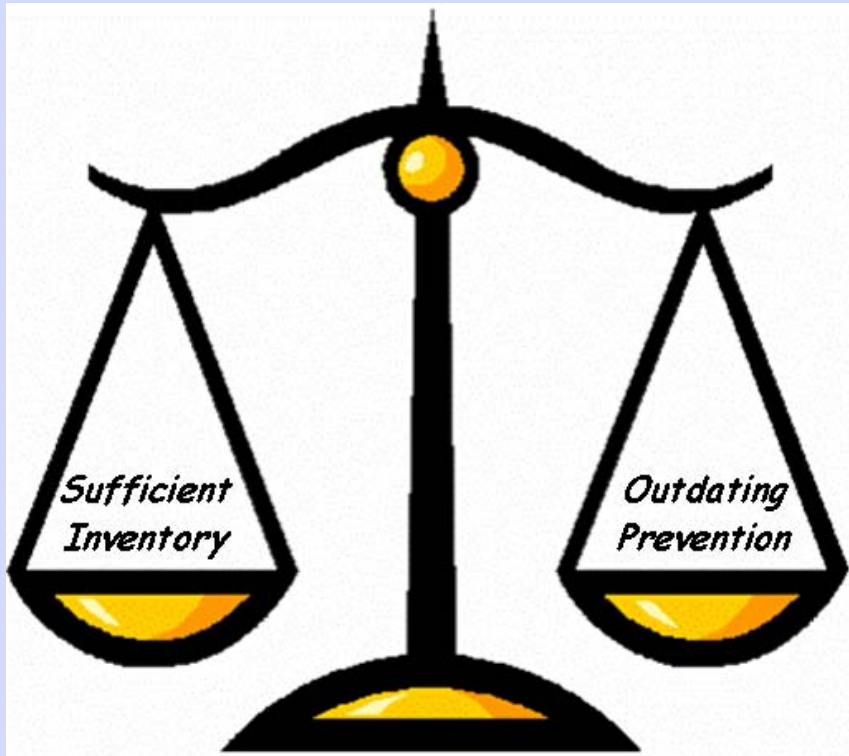
*The model explains 80% of the variation in TIMEX*

# Features affecting Time Expiry Wastage

- The current inventory
- The **change** in inventory from the previous month.

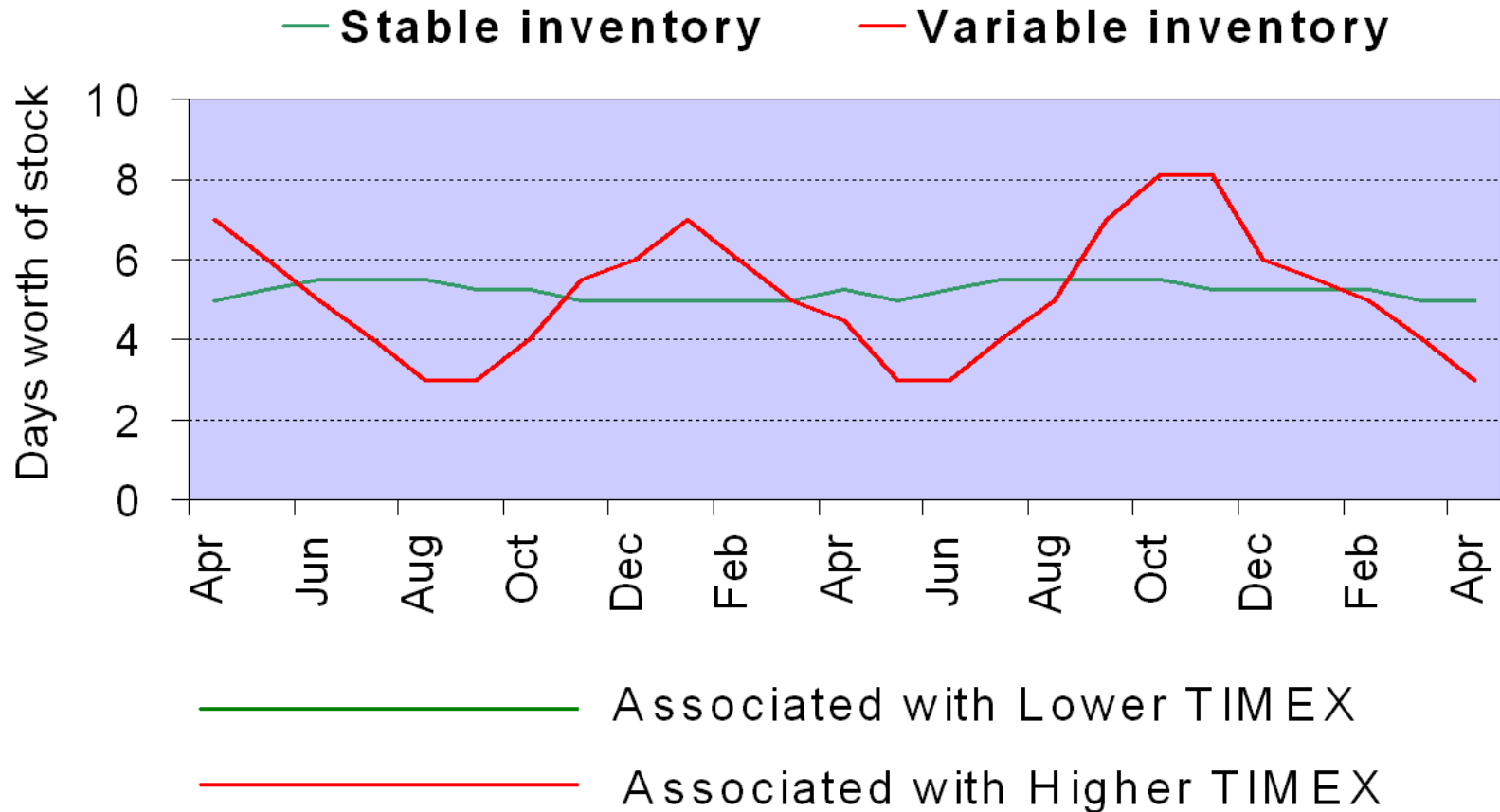
*The influence is split approximately equally across both features.*

# Recommendation for Blood Services



- Maintaining a stable inventory is as important as increasing the available age of units.
- A stable blood inventory allows hospitals to implement procedures to accommodate any older units

# Summary



# Hospitals

- BSMS data and results from its 2006 Inventory Practice Survey were used to analyse factors influencing best practice in blood inventory management.
- The survey included questions on:
  - *Stock control*
  - *Blood ordering*
  - *Stock sharing*
  - *Blood Conservation*

# Methods

- The survey results were used in conjunction with BSMS data from participating hospitals.
- BSMS data used:
  - **ISI (day's worth of stock)**  
*The average ISI for each hospital during 2006 was calculated.*
  - **WAPI (Wastage as a % of Issue)**  
*The average WAPI for each hospital during 2006 was calculated .*
- Each survey question was analysed using statistical methods and null hypothesis

# Statistical tests

- The student t-test was used with the following assumptions: -
  - *Data were normally distributed*
  - *Each hospital data set are independent of each other*
  - *Equal variance in data distribution*
- The significance level was obtained using the p value (*<0.05 value suggested the two samples were significantly different*)

# ISI & WAPI in Survey Hospitals

263 hospitals responded to the survey

Statistics	Issuable stock Index (in days)	Wastage as a percentage of Issues
Minimum	2.99	0.42%
Maximum	13.68	16.49%
Mean	6.88	4.17%
Median	6.67	3.78%

# Crossmatch Reservation period – 24 hours or 48 hours?

- Null hypothesis- There is no difference in ISI or WAPI between hospitals that have a 24 hour reservation period (n=79) and 48 hour reservation period (n=178).

Copyright BMS

## Crossmatch Reservation period – 24 hours or 48 hours?

Measure	Mean difference	p value
ISI	1.01 days higher in 48 hours	0.02
WAPI	1.32 % higher in 48 hours	0.04

**Both p values are < 0.05**

Mean difference in ISI and WAPI for hospitals that have a 24 hour reservation period is significantly lower compared to hospitals with a 48 hour reservation period

# Method of calculating quantity of blood for blood ordering

- Null hypothesis- there is no difference in mean ISI and mean WAPI between hospitals that use computer calculation and those that use visual review

Copyright © NHS

# Method of calculating quantity of blood for blood ordering

Measurement	Sample Size	Mean Difference	P value
ISI	Calculations n=68 Visual Review n= 34	-1.7 days	0.02
WAPI	Calculations n=68 Visual Review n= 34	-3.72%	p<0.001

$P < 0.05$  for both ISI and WAPI.

Mean ISI and WAPI was significantly lower for hospitals that used computer calculation for blood ordering compared to hospitals that used visual review

# Blood Transfusion session in the Medical Induction

- Null hypothesis- there is no difference in ISI between hospitals that had a blood transfusion session in the medical induction programme and those that did not.

Copyright © BSM

# Blood Transfusion session in the Medical Induction

Measure	Sample Size	Mean Difference	P value
ISI	Session present= 217 No session=37	-1.86	0.01

P value is  $< 0.05$

Hospitals that had a blood transfusion session in the medical induction programme had a significantly lower ISI compared with those that do not.

# Does the Use of Cell Salvage Make a Difference in ISI?

- Null Hypothesis- there is no significant difference in mean ISI between hospitals that use cell salvage (post-operative and intra-operative) and those hospitals that do not.

Copyright © BSM

# Does the Use of Cell Salvage Make a Difference in ISI?

Measure	Sample Size	Mean Difference	P value
ISI	Both types= 88 No Cell Salvage= 35	0.98 days	0.02

P value is  $< 0.05$ .

ISI is significantly lower in hospitals that use both types of cell salvage compared with hospitals that do not use cell salvage.

# Recommendations for Hospitals

- Use a 24 hour crossmatch reservation period
- Use computer calculation for assessing the blood order
- Use cell salvage (post op and intra operative) compared with no cell salvage
- Include blood transfusion in the medical induction programme

# Acknowledgments

Many thanks to the Blood Stocks Management Scheme team;

Clive Hyam

Rob Hick

Gayan Perera

All the hospital participants