

Using GS1 Barcodes and an Electronic Patient Record to deliver Patient Safety



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GS1 GSMP Event 9th October
Dublin

Agenda

- **Background** to NCHCD and Haemophilia
- Combining an EPR, Cold Chain Delivery service and GS1 barcodes **to improve patient safety and increase efficiency**
- Exploiting **smartphone technology** - allowing patients to scan their medication within the home
- **Outcomes/ROI**
- **Conclusion**



What is Haemophilia and why is Medication traceability important?

- Haemophilia is a **Chronic Disease**, it is a bleeding disorder caused by a deficiency of a clotting factor
- Incidence of 1:5,000 – 1:10,000 live male births
- The **treatment** of haemophilia involves the **replacement of the clotting factor** (previously prepared from pooled plasma) using a concentrated preparation “Clotting Factor Concentrate” (CFC)
- *Patients required to self treat at home*
- **Lack of prompt response can lead to prolonged hospitalisation**, decreased quality of life and misuse or wastage of expensive plasma and recombinant products





National Centre for Hereditary Coagulation Disorders (NCHCD)

- Located at St James's Hospital, Dublin, Ireland
- Manages patients with inherited and acquired bleeding disorders
- Approximately 2000 patients with Haemophilia
- **Approximately 200 patients with severe haemophilia (require intensive care/treatment)**
- **Over 75% Patients with severe Haemophilia self medicate at home**



Business Case

Catastrophic Event

*Failure of Supply Chain-
Infection of patients with Hepatitis C and HIV
due to contaminated blood products.
**Infected medication remained in the
supply chain after recall - leading to
subsequent infection and over 80
deaths***



Issues



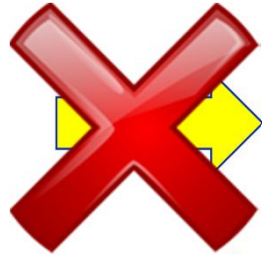
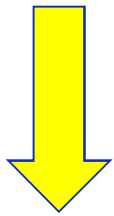
No Product barcode



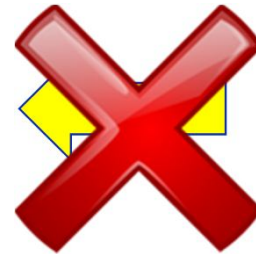
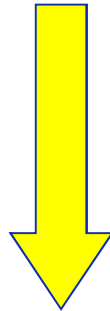
Non Availability



Non validated delivery



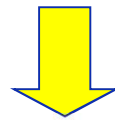
Incomplete/retrospective
treatment information



Incomplete data



Wastage/
ineffective
Medication



Increased Risk



Lindsay Report 2001

Main Recommendations

- **Improve communication** between treatment centres
- Accurate **product tracing**
- Enact a **validated product recall**



The solutions



Unique GS1 barcoding

Encrypted Messaging

validation



Home/Hospital tracking



Comprehensive integrated care



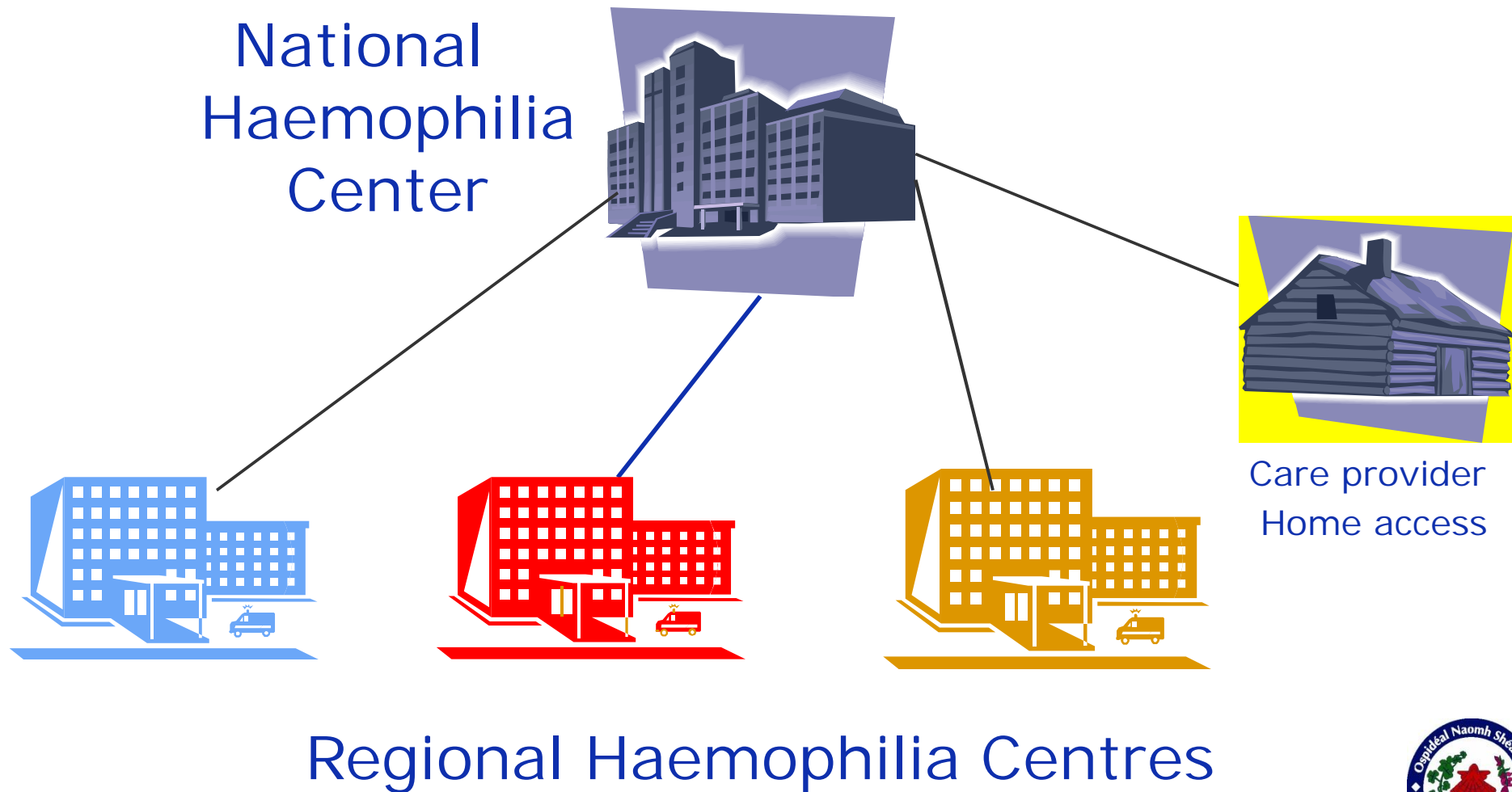
Haemophilia EPR



Validated cold chain delivery



Multi location EPR (Electronic Patient Record) deployment

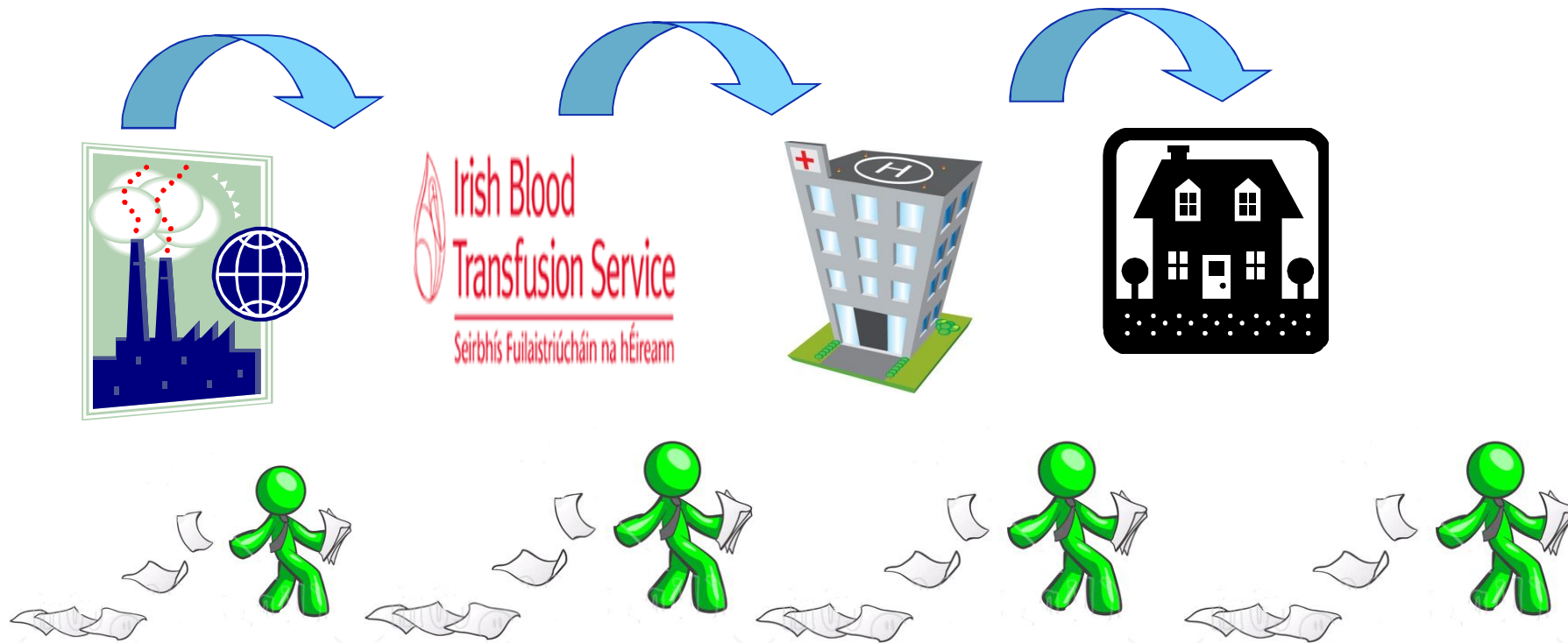


Key Features of Haemophilia EPR

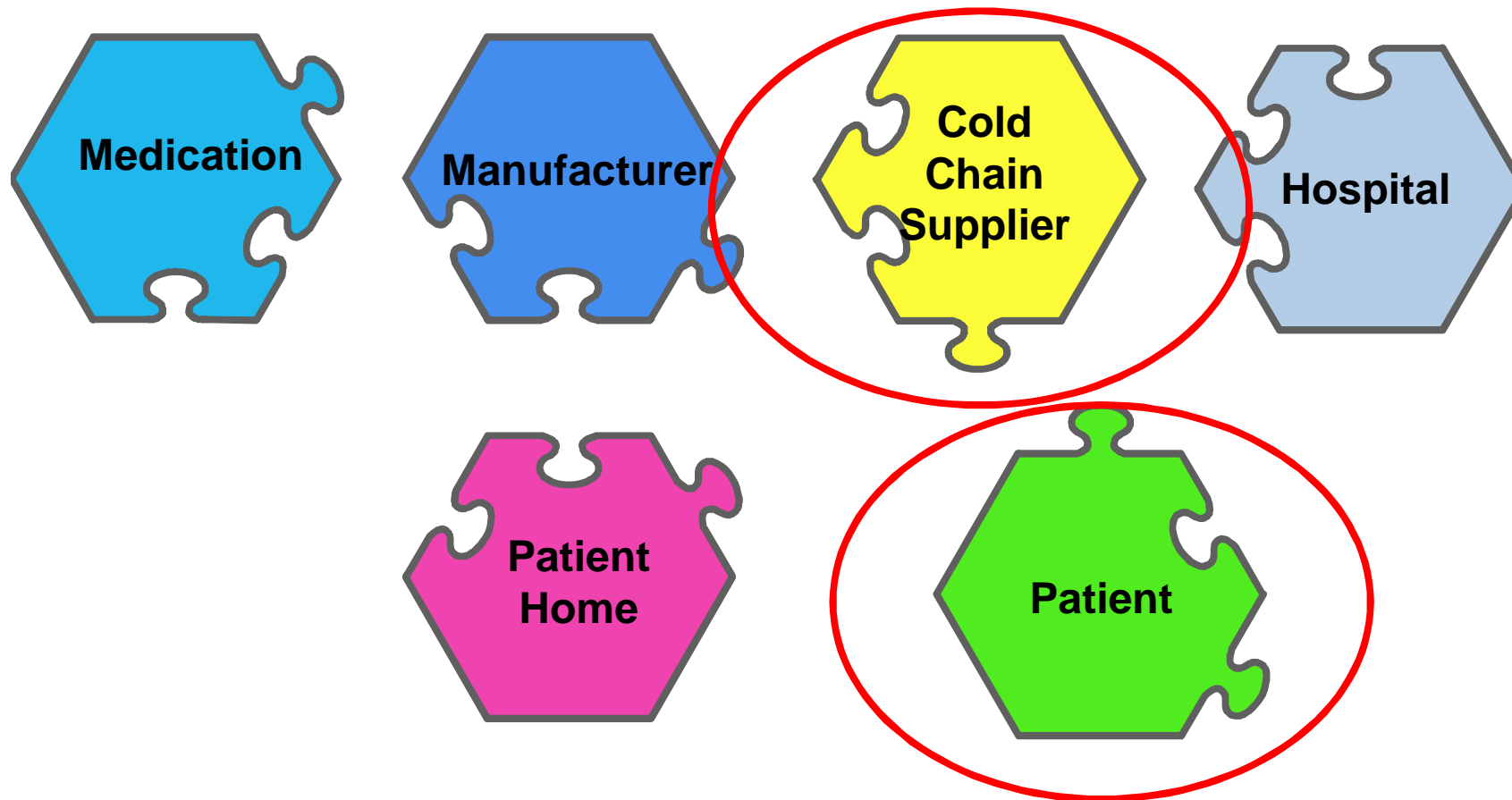
- Appointment scheduling
- Haemophilia specific information capture and display
- Electronic patient Chart
- Patient visit tracking by event
- International standards support (ICD 10)
- Interface with hospital and laboratory systems
- **GS1 Number generation embedded in the software**
- Referral letter scanning
- Link to patient ID card printing system

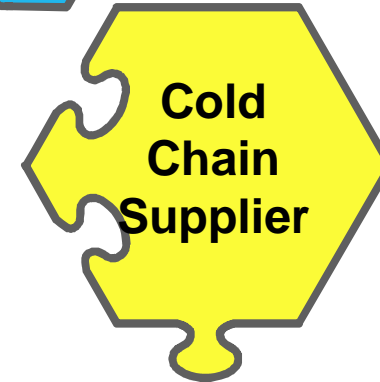
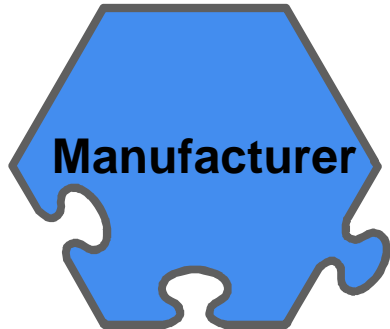


Medication delivery -Where we were

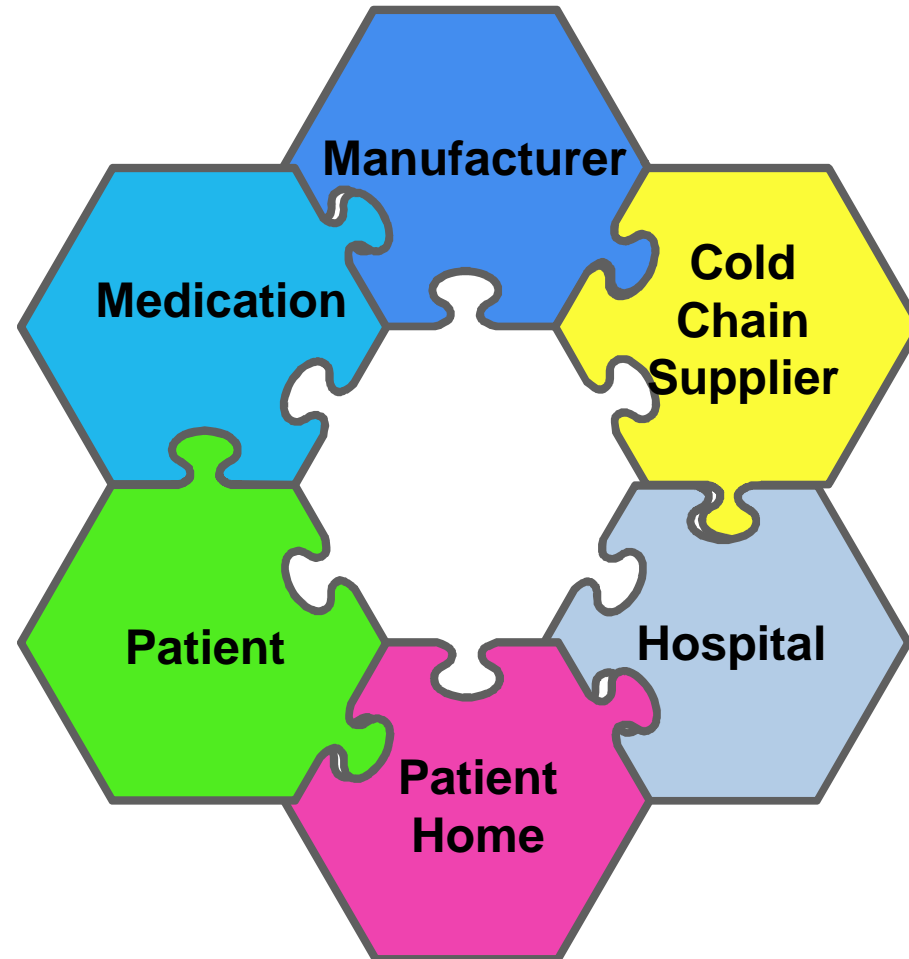


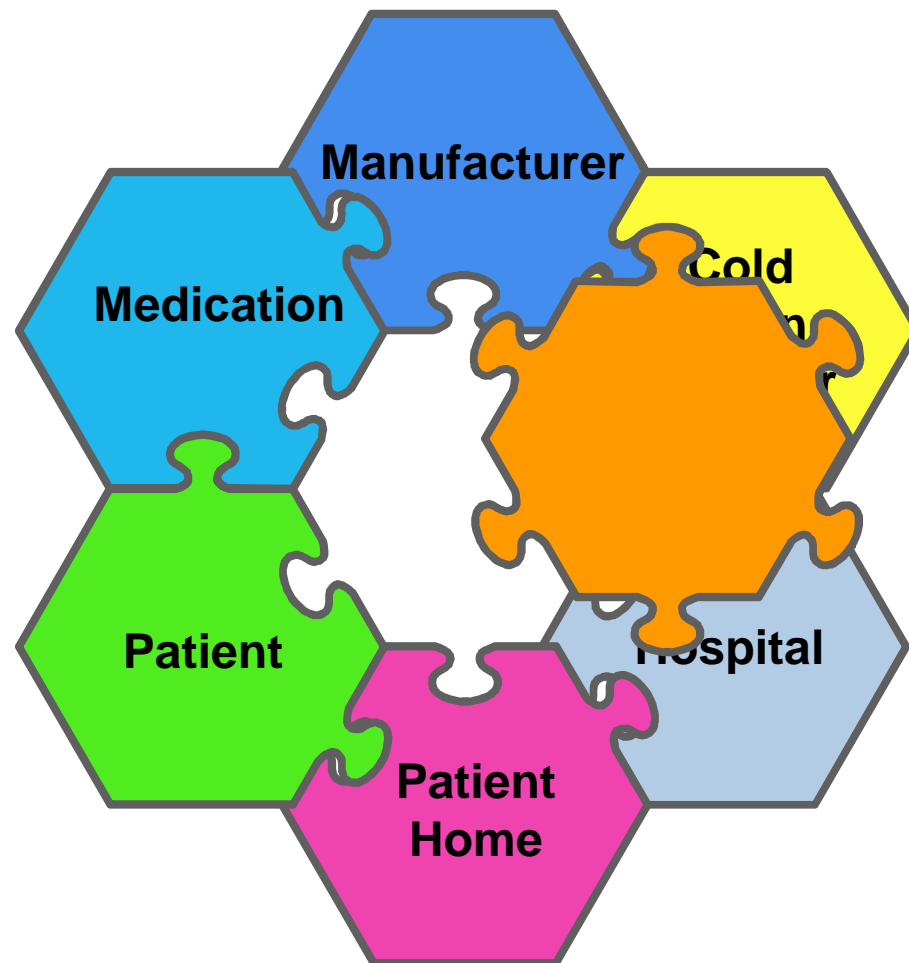
Redesign the Supply Chain

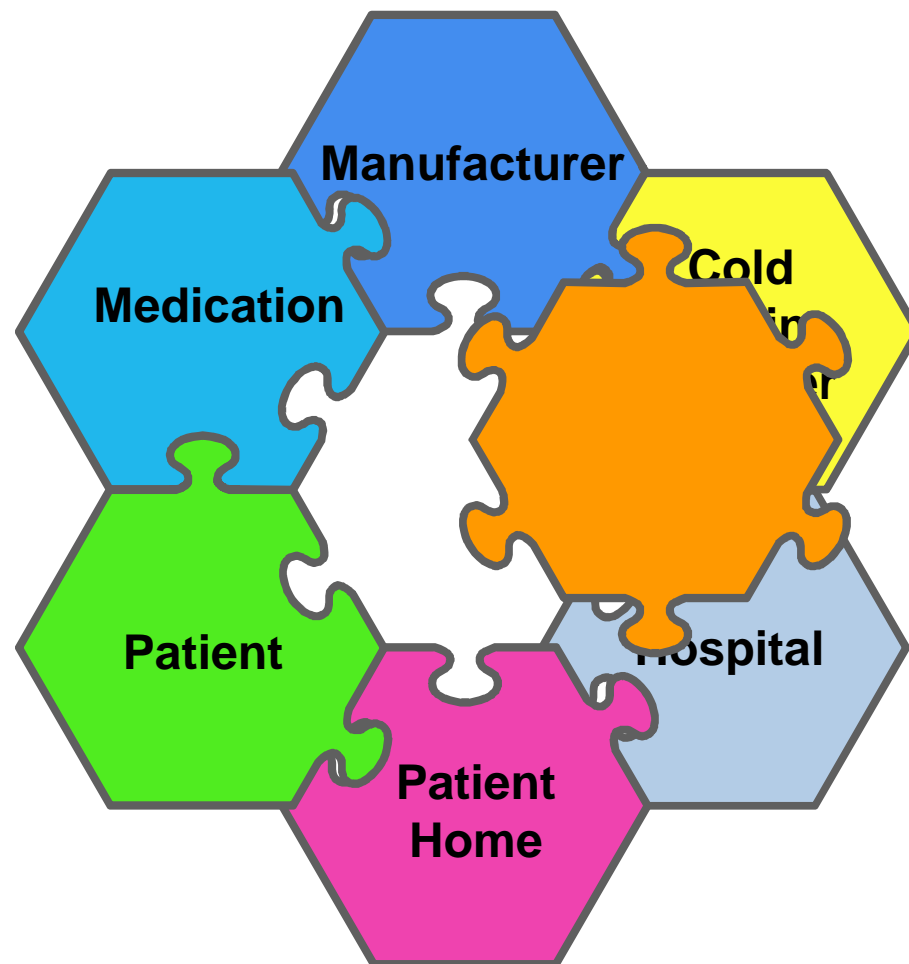




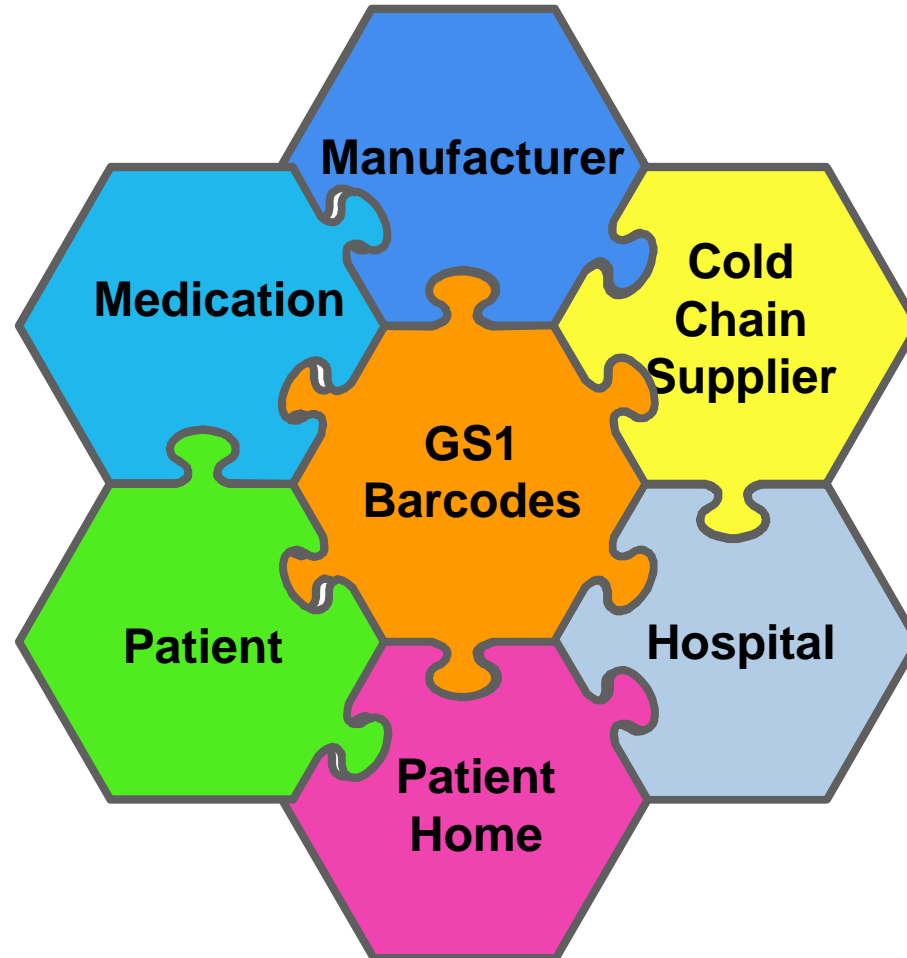
Piece missing!







The Final Piece!



Solution – Adopt the Retail Track and Trace Model based on GS1 Standards

- Unique identification (barcode) of patient -
PMGSRN
- Unique identification (barcode) of medication -
Serialised GTIN (+Lot + Expiry)
- Unique identification (barcode) of locations
(Hospital/Home/Pharmacy/Transport) –
GLN



ID Formats

Previous Barcode (2 Linear)



Hospital allocated Datamatrix barcodes



Manufacturer allocated barcode



Product Name

(GTIN)

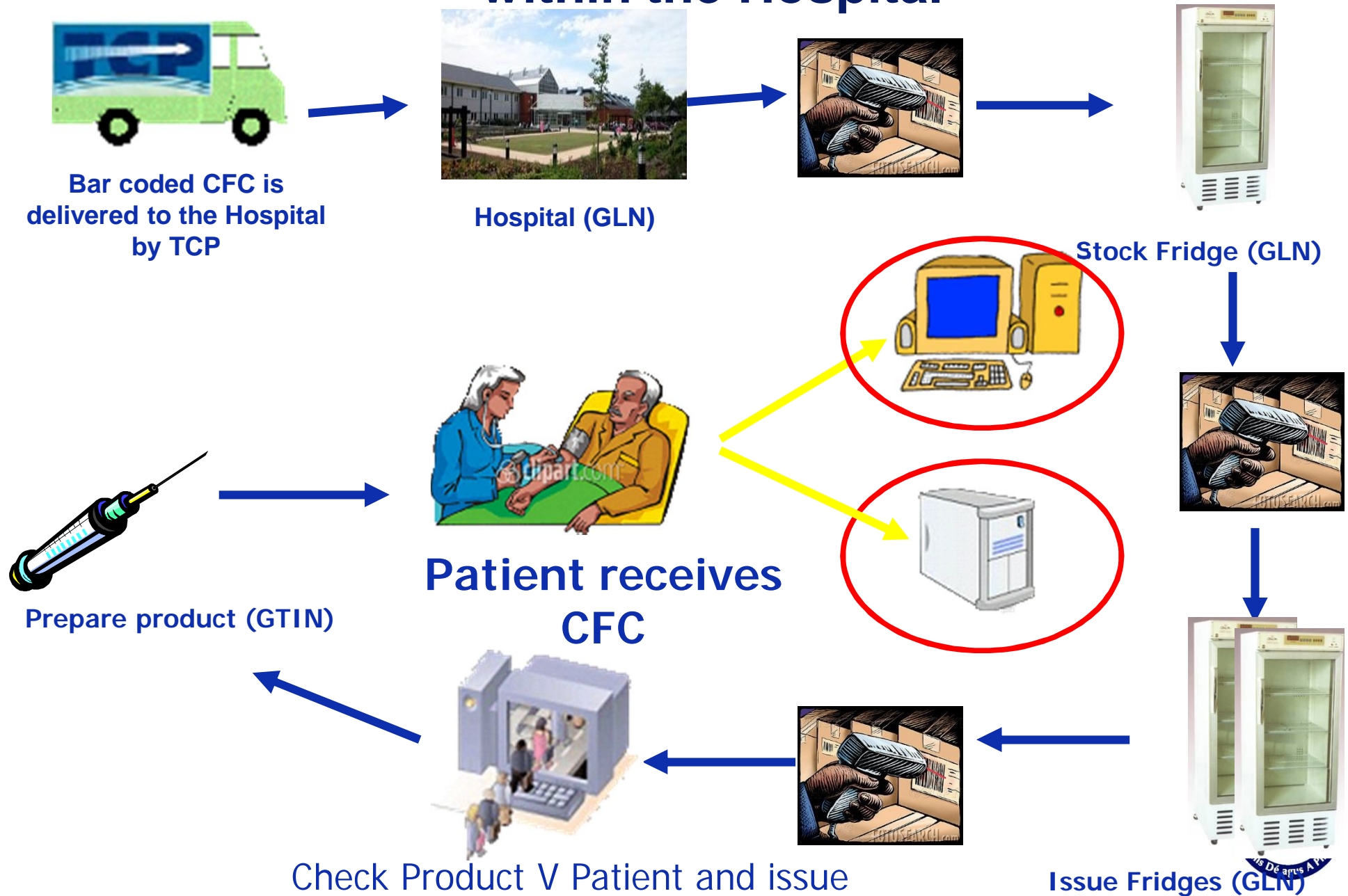
Batch Number

Expiry Date

Serial Number



Solution for tracking and tracing products within the Hospital





BLOOD PRODUCTS
OUT-PATIENT / IN-PATIENT TREATMENT FORM

PATIENT'S FULL NAME: _____

DATE: _____

CLINIC: _____

STREET: _____

POST: _____

ENGL: _____

DATE	Patient's Full Name	Number of Vials	Vial Size	PRODUCT NAME	BATCH NUMBERS	Signature
2/12/06	[Redacted]	1	1000	Kogenate	K55L474	[Signature]
24/2/06	[Redacted]	3	500	Helixate	HN5A005	[Signature]
	[Redacted]	1	500	Kogenate	K55G433	[Signature]
	[Redacted]	4	500	Helixate	HN5A005	[Signature]
27/2/06	[Redacted]	9	1000	Benefix	LE07E0524A	[Signature]
28/2/06	[Redacted]			checked + correct		[Signature]
24/3/06	[Redacted]			checked + correct		[Signature]
1/3/6	[Redacted]	3	500	Helixate	HN5A005	[Signature]
	[Redacted]	1	4.8mg	MNO	A600089	[Signature]
11/3/6	[Redacted]	3	500	Helixate	HN5A005	[Signature]
	[Redacted]			stock correct	06/03/06	[Signature]
	[Redacted]			stock correct	07/03/06	[Signature]
27/3/06	[Redacted]	6	500	Helixate	HN5A005	[Signature]
28/3/06	[Redacted]	4	500	Helixate	HN5A005	[Signature]
	[Redacted]			stock correct	03/03/06	[Signature]
	[Redacted]	3	500	Helixate	HN5A005	[Signature]
	[Redacted]			New Stock Added and Taken	09/03/06	[Signature]
	[Redacted]	7	1000	Kogenate	K55L474	[Signature]
	[Redacted]	4	500	Helixate	HN5A005	[Signature]
	[Redacted]	6				[Signature]
	[Redacted]	1	500	Helixate	HN5A005	[Signature]
	[Redacted]			stock correct	10/03/06	[Signature]

Patient's Full Name	Number of Vials	Vial Size	PRODUCT NAME	BATCH NUMBERS	Signature
[Redacted]	2	1000	Helixate	HN5A005	[Signature]
[Redacted]	1	500	Helixate	HN5A005	[Signature]
			Stock correct	13/03/06	[Signature]
			Stock transferred to [Redacted] - new terms [Redacted]		[Signature]
			Stock correct - 17/03/06		[Signature]
			stock correct	15/03/06	[Signature]
			stock correct	16/03/06	[Signature]
			stock correct	20/03/06	[Signature]
			stock correct	20/03/06	[Signature]
[Redacted]	4	1000	Benefix	LE07E0446	[Signature]
[Redacted]	6	1000iu	Benefix	LE07E0524A	[Signature]
[Redacted]	3	1000iu	Benefix	LE07E0524A	[Signature]
[Redacted]	1	500iu	Benefix	LE07E03740	[Signature]
[Redacted]	2	1000	Helixate	HN5A005	[Signature]
			stock correct	21/3/06	[Signature]
			Stock correct	23/03/06	[Signature]
[Redacted]	3	1000iu	Kogenate	K55L474	[Signature]
[Redacted]	1	500iu	Kogenate	K55G433	[Signature]
[Redacted]	1	1000iu	Helixate	HN5A005	[Signature]
[Redacted]			500iu	Helixate	HN5A005
			New Stock Added and Taken	26/03/06	[Signature]
			Stock correct	26/03/06	[Signature]
[Redacted]	2	1000iu	Helixate	HN5A005	[Signature]

Issue Item To Patient

Patient Details

PMGSRN	Name	Address Line 1
123456789012345678	Mr Joe Bloggs	23 Happy Lane

VBSN Part 1:

VBSN Part 2:

Issue Items ->

No	Vial Box Serial	Product	Description
1	(01)05010605857126(17)061231(21)000134(10)KS5GA31	BC	Kogenate 1000 IU
2	(01)05010605857126(17)061231(21)000135(10)KS5GA31	BC	Kogenate 1000 IU
▶ 3	(01)05010605857126(17)061231(21)000136(10)KS5GA31	BC	Kogenate 1000 IU



Company: **St. James Hospital**Source: **PharmaTrack**Criteria: **(GLN = NCHCD)****Stock Report By Location**Owner: **Feargal**Date: **02/05/07 16:28****NCHCD**

ProductName	Batch No	Received On	Expiry Date	Quantity
Advate 1.1 1000iu Baxject II Ireland	LE01F515AC	23/03/2007	30/08/2008 23:59	10
Advate 1.1 1500iu Baxject II Ireland	LE01F042AS	26/02/2007	31/08/2008 23:59	6
Advate 1.1 500iu Baxject II Ireland	LE01E127CH	20/10/2006	30/11/2007 23:59	5
Benefix 1000 IU	LE07F021AA	11/04/2007	31/07/2009 23:59	17
Benefix 500 IU	LE07F046AA	09/03/2007	31/03/2009 23:59	9
Fandhi 500 IU	IBVB6MRNT1	23/03/2007	28/02/2008 23:59	4
Novo Seven 2.4mg (120 KIU)	SU60351	05/09/2006	30/06/2008 23:59	1
	SU61573	08/03/2007	31/03/2009 23:59	3
Novo Seven 4.8mg (240 KIU)	SU60724	16/03/2007	30/09/2008 23:59	3
Novo Seven 1.2 mg (60 KIU)	SU60350	16/03/2007	31/03/2008 23:59	2
	SU60785	19/09/2006	28/02/2008 23:59	3
Prothromplex 600 IU	VNP2F001	11/10/2006	31/12/2007 23:59	2
	VNP2F002	02/11/2006	31/05/2008 23:59	4



Batch Recall

[Close](#)

1. **Select Product & Batch**

Product: [...](#)
 Batch Number: [Go](#)

Batch No	Expiry Date	Received	Awaiting Supply	Issued	Allocated	On Van	In Stock	Used
LC8208Y	13/02/2012	140	30	70	10	5	60	21

2. **Select Recall Level**

- Batch Allocation & Order Packing Process
- Batch Processing in Goods Receiving Process
- Patient Home Usage
- Order Delivery By Driver
- Hospital Usage
- Include / Exclude Certain Patients & Hospitals

[Generate Recall Report](#)

[Include / Exclude Patients & Hospitals >>](#)

Recall Reports

[Patients](#)
[Journeys](#)
[Enquiries](#)
[Batch Tracking](#)
[Reports](#)

[Product List](#)
[Product Batches](#)
[Batch Items](#)
[Batch Purchase Orders](#)
[Batch Invoices](#)
[Batch Recall](#)

Batch Recall Close

5. **Batch Recall Report** [Print Report](#) [Generate Pivot](#)

Product: Advate 1000 IU Batch: **LE07E056** Expiry Date: 13/02/2012
 Patients: 56 Hospital: 21 Total: 77
 Recalled By: Hilary Mooney Recall Date & Time: 22 May 2011 1200

Patient / Hospital	Issued	Used	Mobile	Phone	Address Line 1	Address Line 2	Address Line 3	County
St James's Hospital	9	7	086 3235812	01 410 3000	[REDACTED]			Dublin 8
[REDACTED]	4	2	086 3235812		[REDACTED]	Tallaght		Dublin 24
[REDACTED]	7	0	087 2235865	01 412 3421	[REDACTED]	Ballyfermot		Dublin 8
[REDACTED]	3	0	087 5235776		[REDACTED]	Virginia		Cavan
[REDACTED]	5	1	086 3235815	01 412 4211	[REDACTED]	Ballyfeard	Carrigaline	Co. Cork
[REDACTED]	1	0	087 6325833		[REDACTED]	Lisnagry		Co. Limerick
[REDACTED]	6	2	087 7235821		[REDACTED]	Grange	Ballyneety	Co. Limerick
[REDACTED]	3	0	086 2235876		[REDACTED]	Ballyclough		Co. Limerick
[REDACTED]	4	3	086 2235813	01 410 2424	[REDACTED]	Abbeystown		Co. Kerry

← 1,2,3,4 →

6. **Confirm & Execute Batch Recall Process**

Recall Type: **Simulation Only** Live Recall

Re enter Batch Number: Enter Password:

Execute Batch Recall Process



Recall Reports

PharmaTrack Batch Recall Report

Company: **St. James Hospital**
 Batch Recall Report
 Source: **PharmaTrack**
 Criteria: **(Batch No = LE07E055AA)**

Batch No : LE07E055AA **Benefix 1000 IU**
Serial No **Transaction Type** **Transaction Date**
000035 **Issued** 31/10/2006 15:22
 Patient Name: XX XXXXXXXX



Reference : Prophylaxis

000260

In Stock

Transferred In

29/02/2006 12:24

GLN: NCHCD

Reference :

Reason: NCHCD Stock Top Up

000046

Issued

03/10/2006 13:02

Patient Name XXXXX XXXXXXXX



Reference :

000120

Issued

13/09/2006 10:34

Patient Name XXXXX XXXXXXXX



Reference : surgical site bleed

000121

Issued

14/09/2006 11:51

Patient Name XXXXX XXXXXXXX



000378

In Stock

Transferred In

12/03/2008 12:02

GLN: WALTER STEVENSON WARD

Reference :

Reason: WSW Stock Top Up

Reference :

000122

Issued

03/10/2006 15:26

Patient: XXXXX XXXXXXXX



Reference : right thigh bleed

000123

Issued

14/09/2006 11:51

Patient: XXXXX XXXXXXXX



Reference :

000134

Issued

02/10/2006 15:31

Patient: XXXXX XXXXXXXX



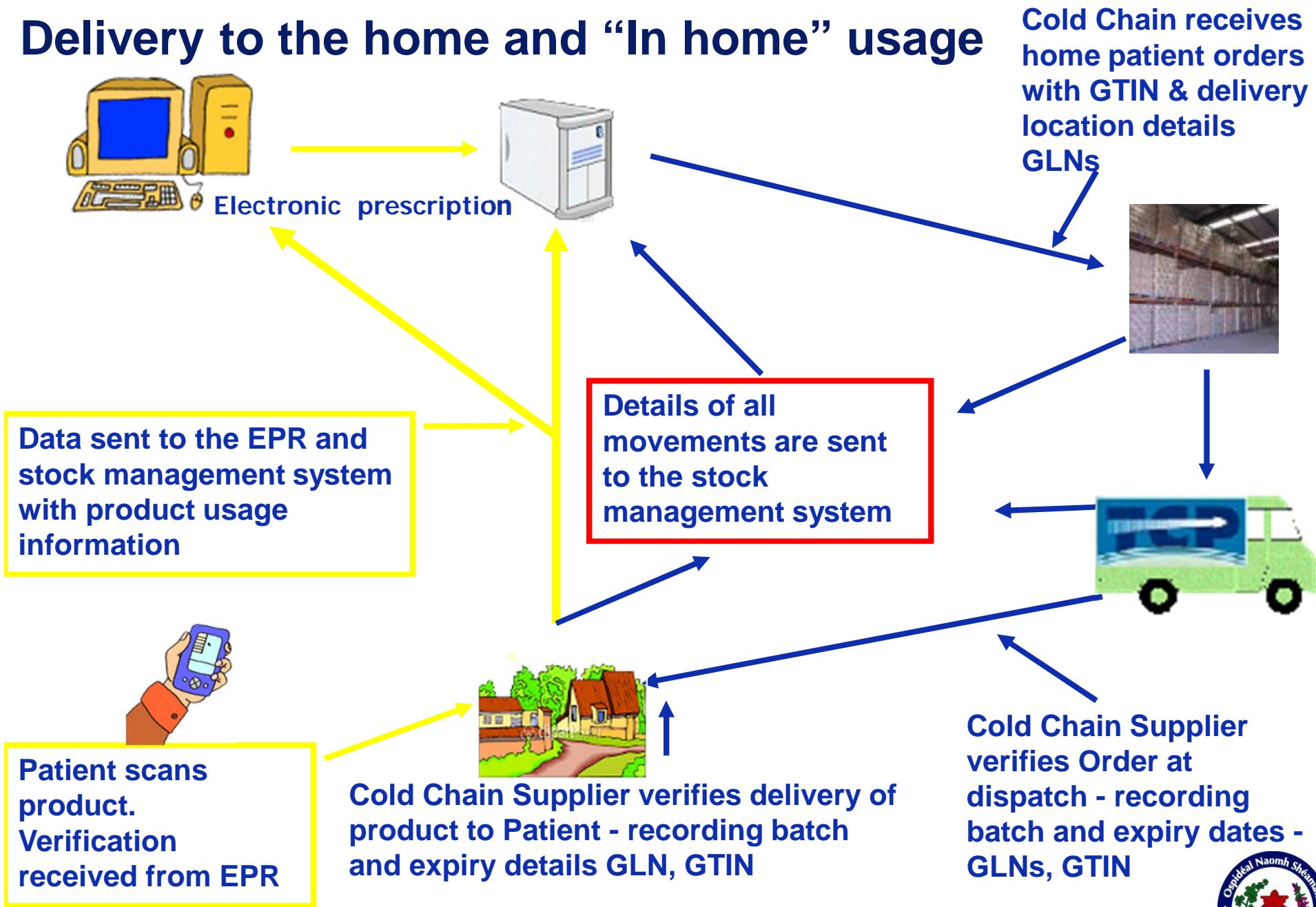
Reference : Right thigh bleed

BATCH SUMMARY

Total Booked In :	9
Issued to patients :	7
Stock in GLN(s) :	2



Delivery to the home and "In home" usage



Cold Chain receives home patient orders with GTIN & delivery location details
GLNs

Data sent to the EPR and stock management system with product usage information

Details of all movements are sent to the stock management system

Patient scans product. Verification received from EPR

Cold Chain Supplier verifies delivery of product to Patient - recording batch and expiry details GLN, GTIN

Cold Chain Supplier verifies Order at dispatch - recording batch and expiry dates - GLNs, GTIN

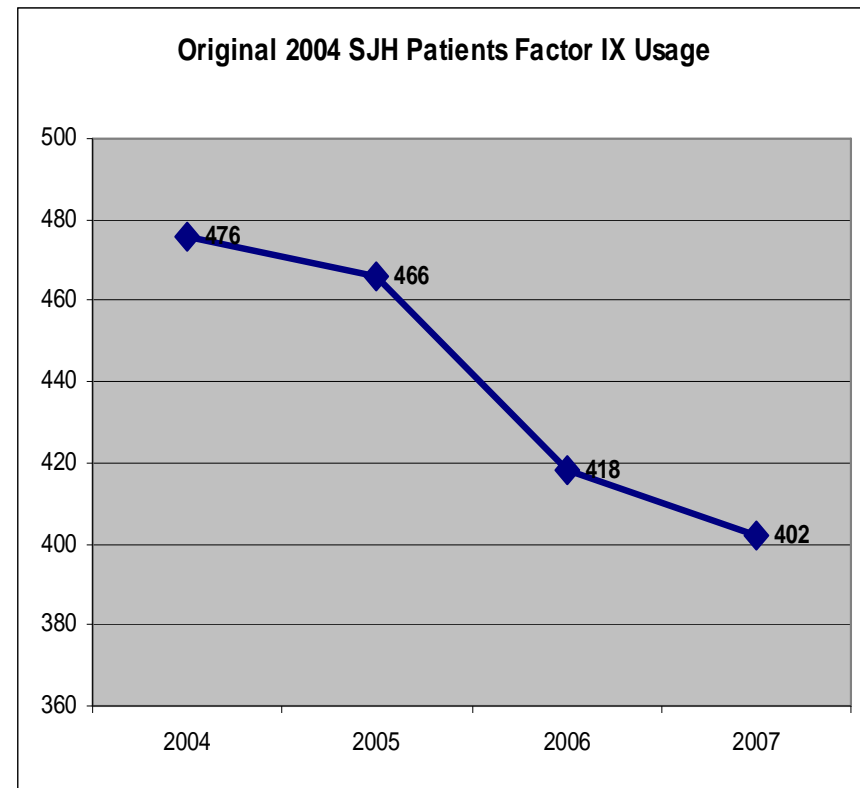
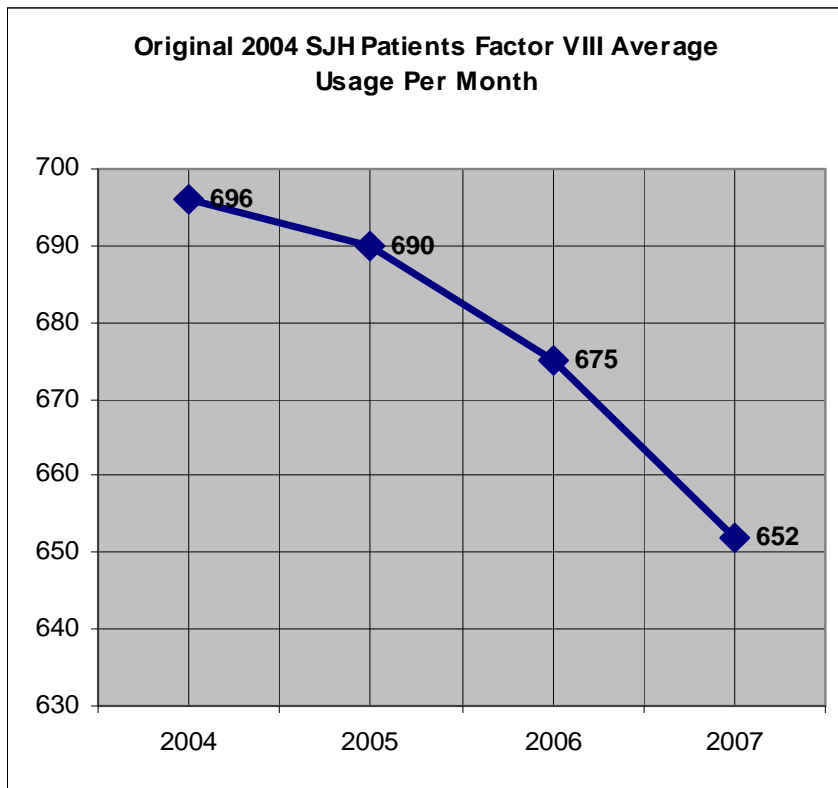


Outcomes (ROI) for validated Cold Chain delivery system

- Since Cold Chain delivery started all products **verifiably delivered** between 2^o-8^o Celsius
- Documentation errors reduced from **12** to **zero** in the year post service implementation
- Over **€5 Million** worth of medication stock has been removed from the supply chain
- In 2010 **€600,000** worth of stock rotated between Hospitals and NCHCD
- Mock Recall identified location of all **(100%)** Medication within **10 minutes**



Patient usage trends



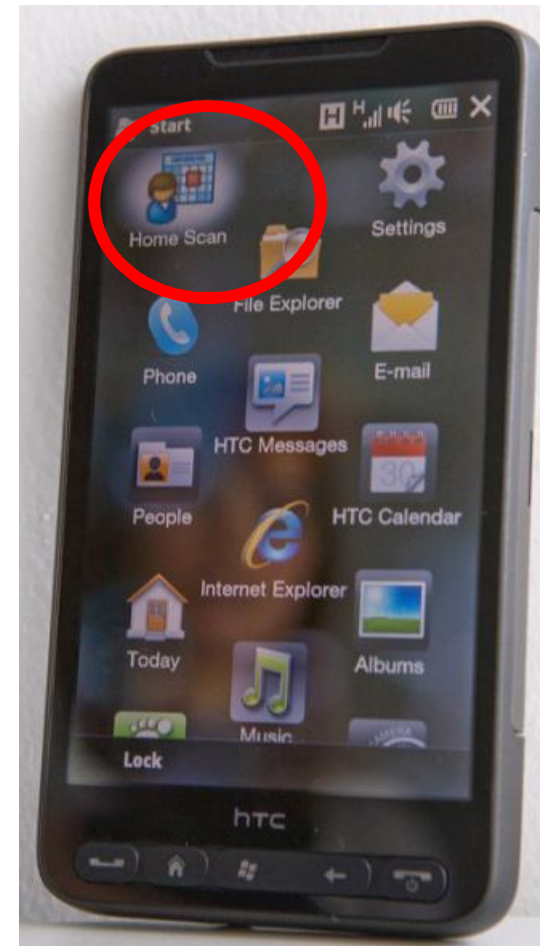
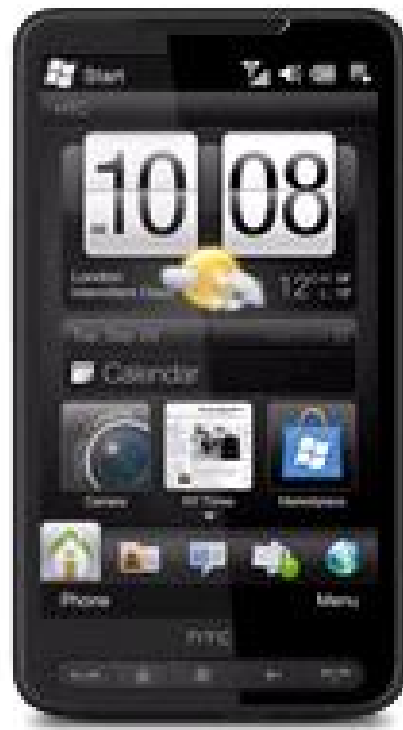
Linking the Patient

- to the Clinical record (EPR)
- to the Supply chain

Through the use of Mobile
Technology and GS1 Standards



Smartphones with scanning App



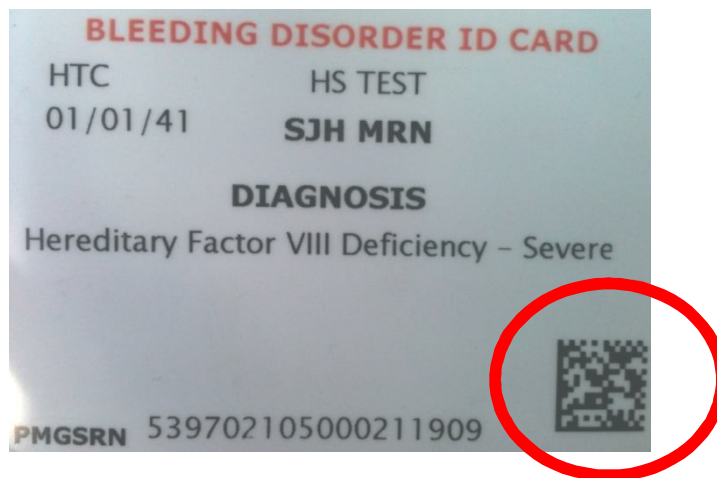
How it works

The system is designed to be simple to use but comprehensive – designed in consultation with patient focus group



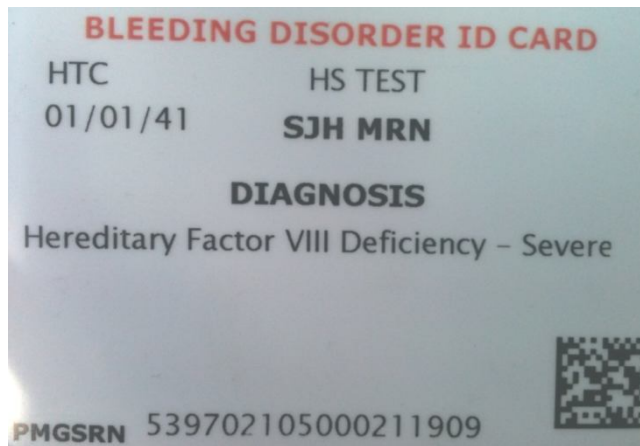
Log-in

Secure Login by Username,
Password or Scanning unique
GS1 ID on Card Card

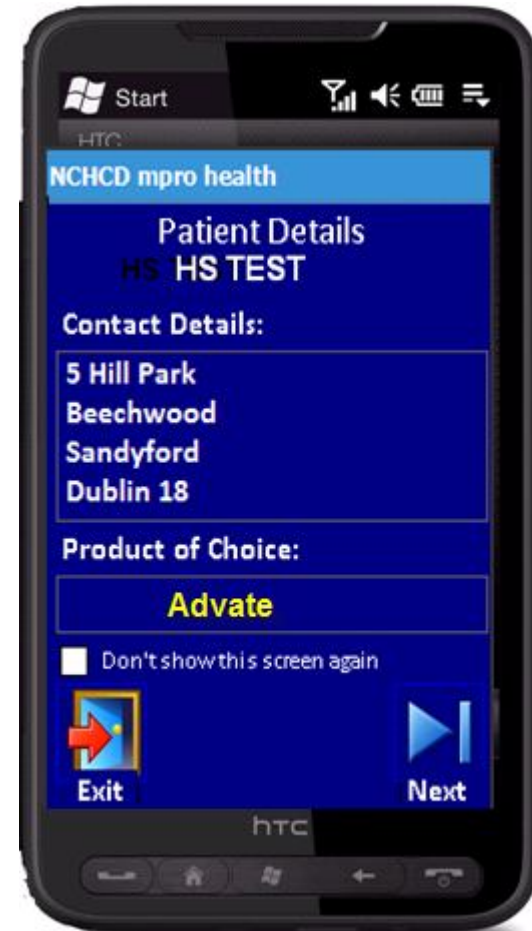


Patient Details

Patient detail confirmation includes product of choice



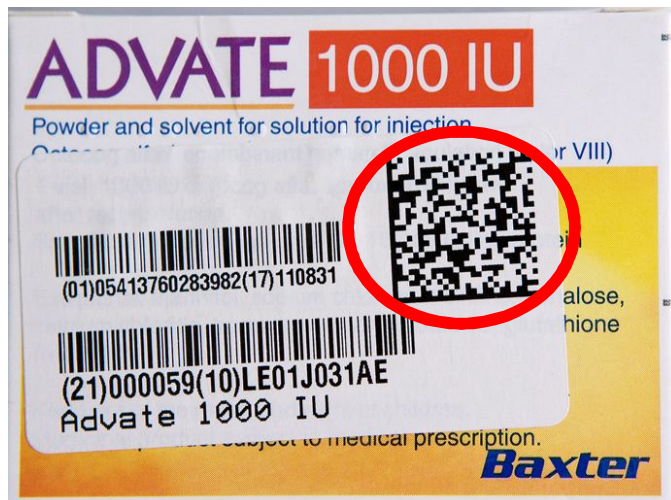
The product of choice will eventually be taken from the EPR



Scan Product

Barcode on Vial box is scanned to confirm

- product detail
- expiry date
- Recall status



Validation – FAIL!

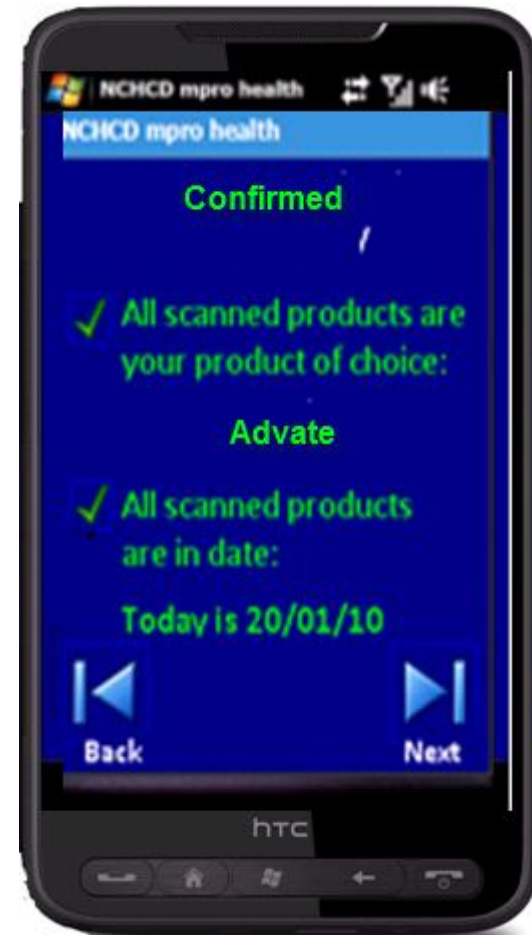
If incorrect product or product out of date or RECALLED, system will display a visible and audible alarm

A re-scan is required or exit is forced.



Validation – OK !

If the Product passes the validation checks then the user is prompted to continue.

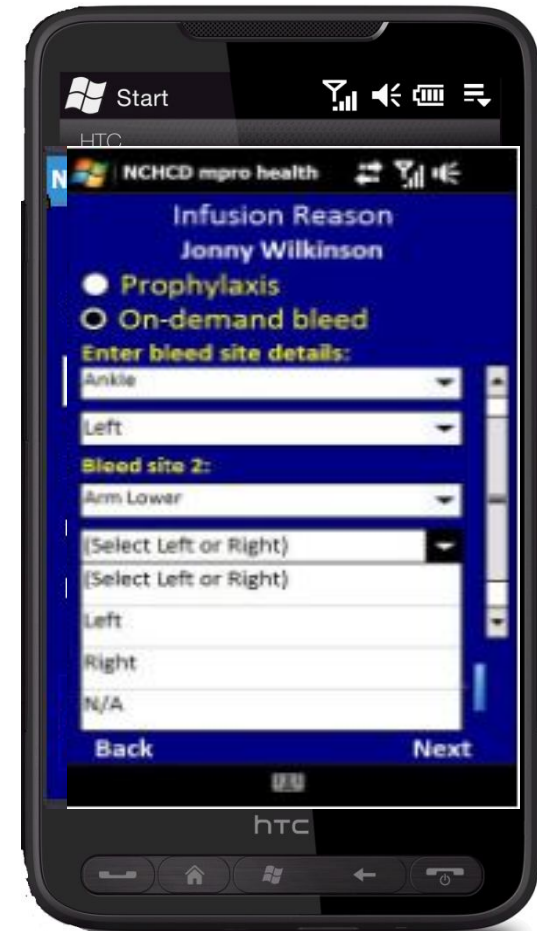


Infusion Detail

User records reason for infusion

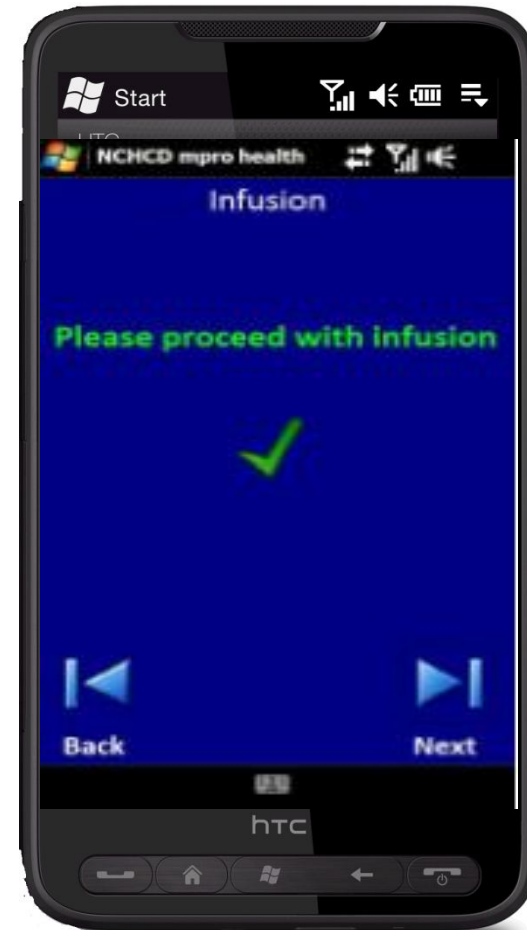
Specific bleed sites can be used to trigger e-mail alerts to the treatment centre

- Head Injury
- Ileopsoas Bleed
- Haematuria
- Haemoptysis
- Haematemesis
- PR Bleed



Infusion Authorisation

Again, the app prompts the patient to proceed.



Process Complete

Process concludes, system synchronises data wirelessly to **web application**

Eventually data will be transmitted to

- Warehouse Management system
- EPR



Web Application – log on



Patient infusion logs

https://homescan.mobileprofessional.co.uk/Default.aspx - Microsoft Internet Explorer provided by St. James's Hospital

https://homescan.mobileprofessional.co.uk/Default.aspx

File Edit View Favorites Tools Help

https://homescan.mobileprofessional.co.uk/Default.a...

mpro^{3hx} Welcome, 11839306 (Logout) **mpro^{3hx}**

Patients Drugs Recall Lists **Patient Drug Treatment Sessions** Reports Admin

Last refreshed: 29/06/2010 10:15:48

Drag a column header and drop it here to group by that column

Refresh

Patient	Treatment Date	Infusion Reason	Infusion Taken	Infusion Not Taken Reasons	Total Vials	Bleed Sites Details	Total Units	Treatment Status
Test			<input type="checkbox"/>					
Seven Test	01/05/2010 15:58:24	Prophylaxis	<input checked="" type="checkbox"/>		3		2500	CompletedInfusionTaken
Seven Test	01/05/2010 18:51:26		<input type="checkbox"/>		0			NotCompleted
Seven Test	01/05/2010 19:04:55		<input type="checkbox"/>		0			NotCompleted
Seven Test	04/05/2010 10:49:08	On-demand	<input checked="" type="checkbox"/>		1	Other-other/N/A	1000	CompletedInfusionTaken
Seven Test	04/05/2010 13:00:48	On-demand	<input type="checkbox"/>	Other	2	Blood in bowel motion (PR bleed)/N/A	4000	CompletedInfusionNotTaken
Seven Test	04/05/2010 13:08:50	On-demand	<input checked="" type="checkbox"/>		1	Arm Lower/Left	2000	CompletedInfusionTaken
Seven Test	05/05/2010 09:59:52	Prophylaxis	<input checked="" type="checkbox"/>		1		1000	CompletedInfusionTaken

Start 4 Microsoft Offi... 5 Adobe Reade... Inbox - Microsoft... 2 Internet Ex... 5 Microsoft Offi... untitled - Paint 10:16

Patient self treatment report

Report Viewer - Microsoft Internet Explorer provided by St. James's Hospital

https://mpro3xr.mobileprofessional.co.uk/ReportServer/Pages/ReportViewer.aspx?%2fHomeScan%2fPinkFormReport&rs%3d

File Edit View Favorites Tools Help

Report Viewer

From Date: 23/06/2010 To Date: 23/06/2010 Patient Name: Test, Seven View Report

1 of 2 ? 100% Find | Next Select a format Export

Home Scan System **Bleed Report** 23/06/2010 - 23/06/2010

Surname: Test DOB: 01/01/1940
First Name: Seven WEIGHT:

Treatment Date	Prophylaxis	Bleed Site Details	Products Name	Batch No.(s)	Units	Vials
23/06/2010	Yes		Advate	LE01H546AB	1000	1
23/06/2010	Yes		Advate	LE01H546AB	1000	1
23/06/2010	No	Blood in bowel motion (PR bleed)/N/A	Advate	LE01J025AY	1500	1
23/06/2010	Yes		Advate	LE01H546AB	1000	1
23/06/2010	Yes		Advate	LE01J025AY	1500	1
23/06/2010	Yes		Advate	LE01J025AY	1500	1
23/06/2010	Yes		Advate	LE01J025AY	1500	1
23/06/2010	Yes		Advate	LE01J025AY	1500	1
23/06/2010	Yes		Advate	LE01J025AY	1500	1
23/06/2010	Yes		Advate	LE01J025AY	1500	1
23/06/2010	Yes		Advate	LE01J025AY	1500	1
23/06/2010	Yes		Advate	LE01J025AY	1500	1
23/06/2010	Yes		Advate	LE01J025AY	1500	1
23/06/2010	Yes		Advate	LE01J025AY	1500	1
TOTAL :					16500	12

Done Internet 100%

Start 4 Microsoft Offi... 5 Adobe Reade... In Home device ... 3 Internet Ex... 5 Microsoft Offi... untitled - Paint 10:38

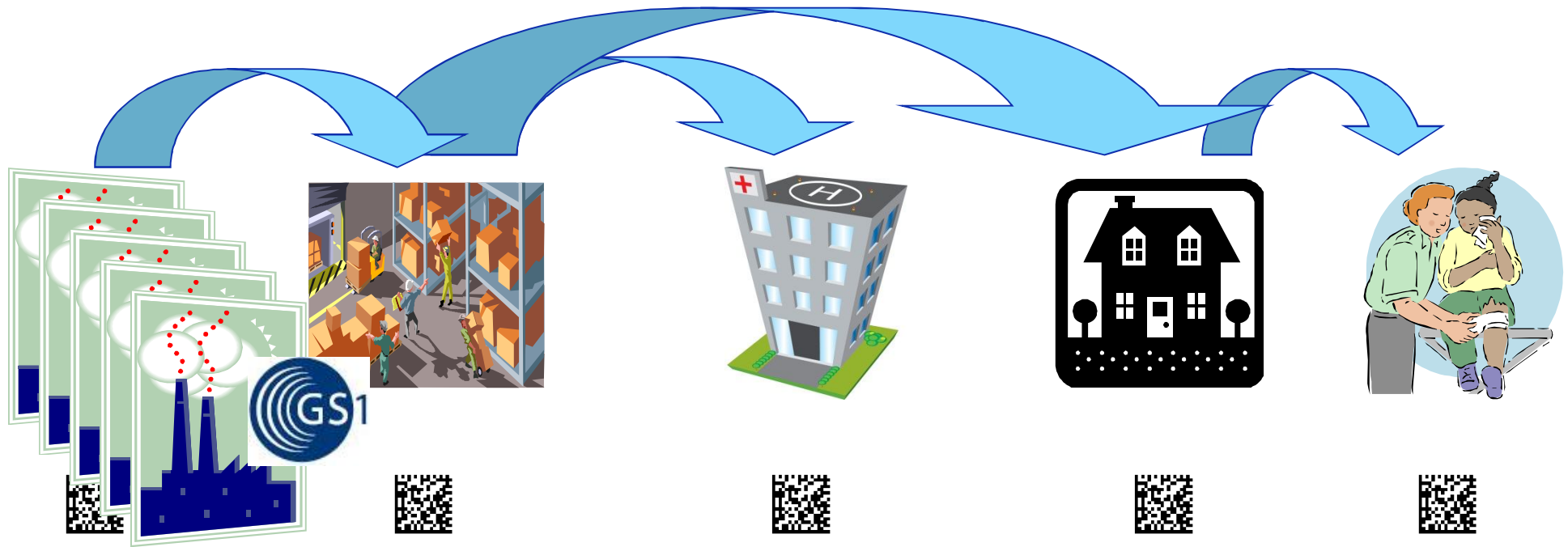


Initial Outcomes from smartphones

- Realtime recall alert
- Timeliness of infusion
- Prescription compliance (2000iu instead of recommended 1750iu)
- Automatic compliance (no manual record keeping)
- Electronic diary
- Realtime Alerts for specific bleeds
- Patient empowerment



Where we are



Conclusions

- Healthcare must do more with less
- Inefficient practices are no longer financially or morally acceptable
- Linking Supply Chain and Clinical systems can improve patient safety and reduce cost of healthcare delivery
- The hardware, software and standards exist
- **Standards are the key enabler**







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esingleton@stjames.ie

