The Group Check

Jeannie Callum, BA, MD, FRCPC, CTBS

Outline

- Our perception of the health care employees that make sample collection errors
- Brief review of the medical literature on sample collection errors
- Our dual protection strategy to detect and prevent sample collection errors to prevent patient harm:
  - The barrier/detection: The Group Check
  - The solution: Positive Patient Identification
- Sunnybrook sample collection error statistics

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Batting Average 307/1000

Roberto Alomar

Great player

Batting Average 393/1000

Babe Ruth

A Legend

How high a batting (bleeding) average do you think a nurse or physician should have to meet your standard for patient safety?

Is1000/1000 impossible and unrealistic?

What do we call the nurse who makes a mistake 1 in 134* times when collecting a sample?

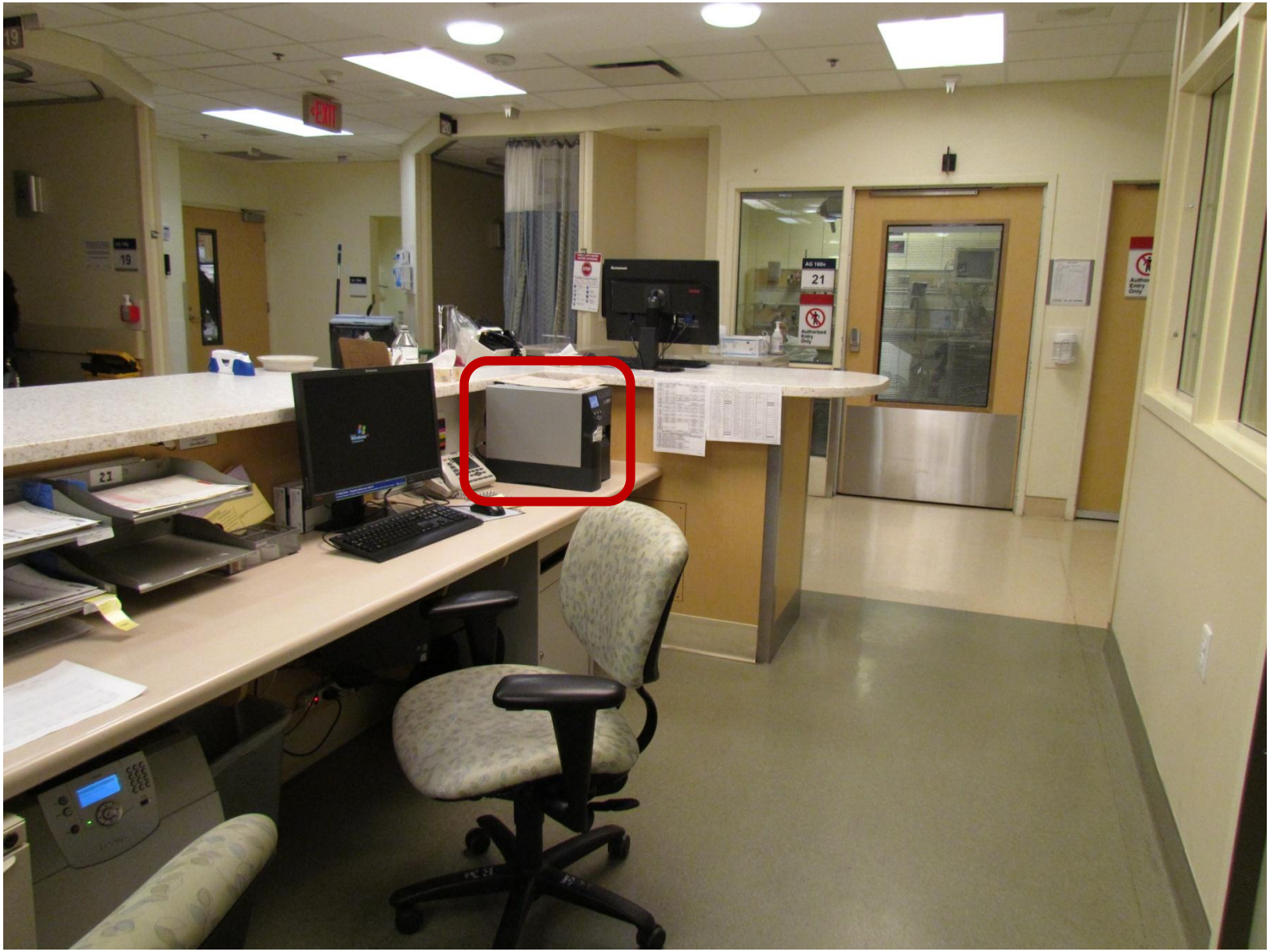
Sloppy

Bleeding Average 992/1000

*Dzik, et al. Vox Sang 2003; 85: 40-7.

Often in chaos


Addressograph
ICNN


EXIT
21
Authorized Entry Only

ER – acute area
Nurse assigned to care for 3 patients

BED 15

BED 16

BED 17

Patient on list to go
To the operating room
For hip fracture

ER – acute area
Nurse assigned to care for 3 patients

BED 15

BED 16

BED 17

On arrival Group and Screen sent
Diagnosis: Chest pain
B POS

ER – acute area
Nurse assigned to care for 3 patients

BED 15 **BED 16** **BED 17**

6 hours later
Group and Screen sent
Diagnosis: Hip fracture
Order: 2 units CM

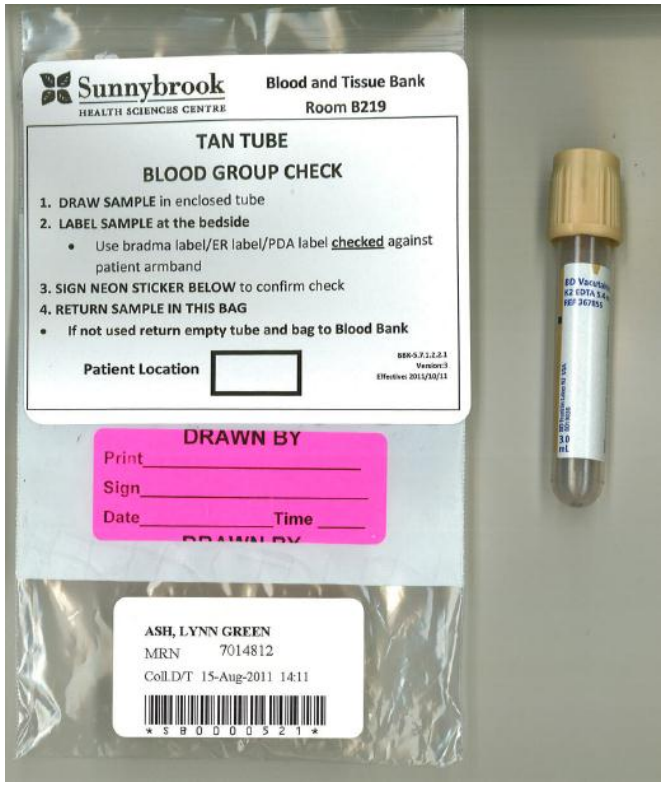
ER – acute area
Nurse assigned to care for 3 patients

BED 15 **BED 16** **BED 17**

Technologists: calls down to RN to let her know we need a 'tan tube' to allow us to prepare blood [last sample less than 24 hours and new patient]
RN: There are no transfusion orders for Bed 16
Technologist: Requisition states patient is in Bed 15

- **RN: Oh dear! I drew a G&S from Bed 15 and put Bed 16 name on it!**

Tan tube
Group check



So we can be assured that a sample on a new patient was independently drawn and labelled

ER – acute area
Nurse assigned to care for 3 patients

BED 15 **BED 16** **BED 17**

Still no sample from this patient – OR delayed

But no ABO-incompatible transfusions!

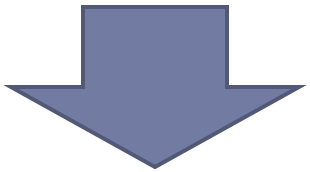
Focus on the system

- **Culture of safety**
  - **Focus on the system problems – 'latent errors'**
    - Organizational infrastructure:
      - hardware, software, policies, procedures, human resources policies (workload per person), and patient factors
    - Superficial look at errors focuses on the people rather than on the systems
  - **Not** the individual compliance with existing systems
    - "blame and shame" and "blame and train"
    - Inherently error prone people are rare

Improvements in healthcare will come from improving the system, not from individual performance

Punitive unsafe culture:

-Individual (not organizational) responsibility
-High workload despite known risk
-Tolerance of variability of care
-Pride in workarounds
-Casual communication



High reliability organization:

-Leadership committed to safety
-Reporting system
-Adequate resources
-Standardization around best practice
-Extensive team training
-Structured communication

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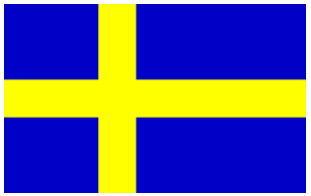
These errors happen in all countries

- 62 institutions in 10 countries
  - Including Canada, UK, Finland, France, Japan, Sweden, US
- 692,505 samples in the data set
- 5161 rejected samples (1 in 134)
  - Interquartile range 1 in 800 to 1 in 60
- WBIT – 1 in 1986 samples (detected)



- Dzik, et al. Vox Sang 2003; 85: 40-7.

Rejection rate in 110 UK hospitals

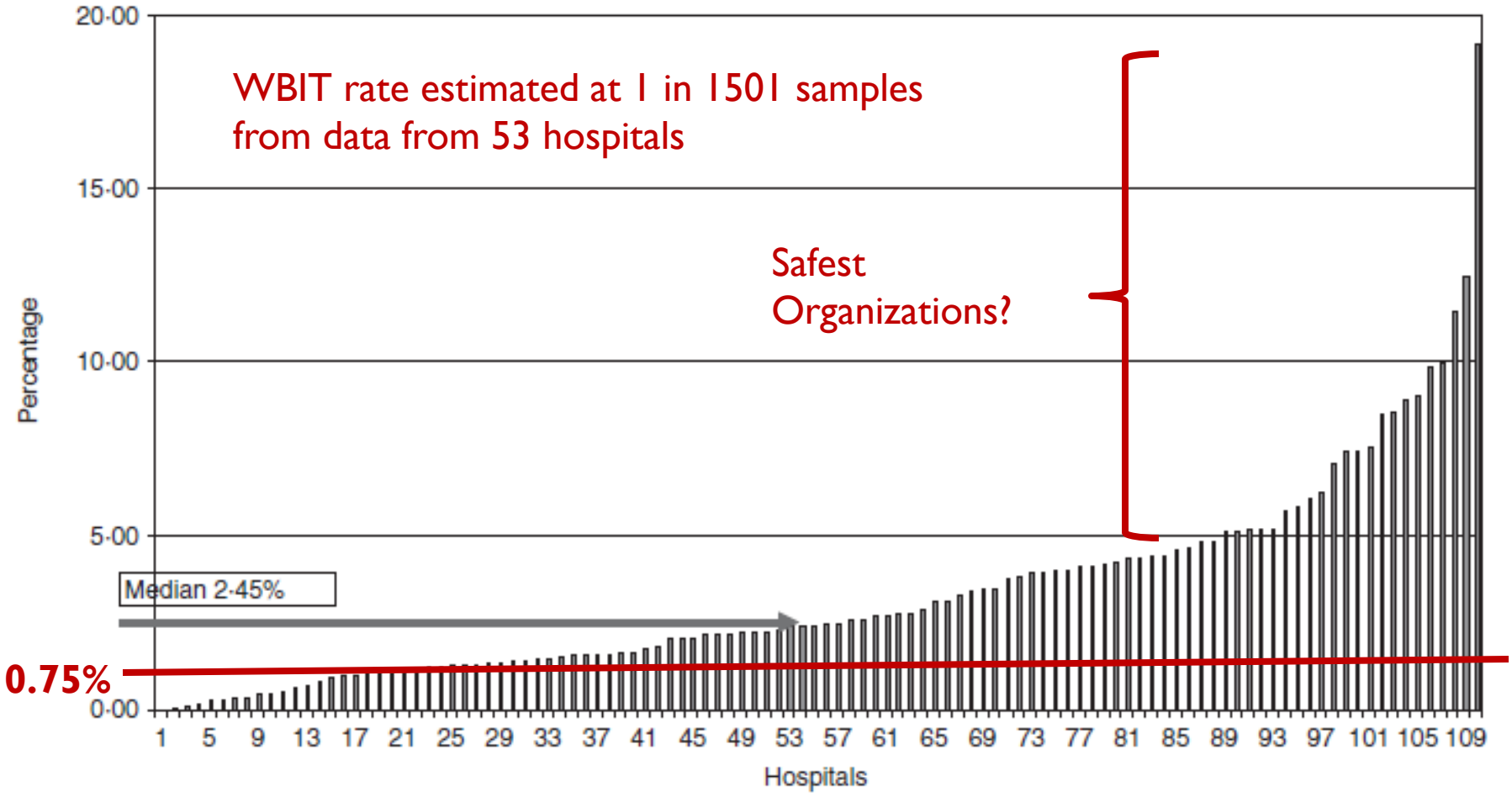


Fig. 2. Percentage of samples rejected in 110 hospitals, identifying the median as a benchmark.

- Murphy, et al. Transfusion Med 2004; 14: 113-121

Huge variability

- Q-probes study from 2008 including 3.3 million specimens (mostly USA)
- Error rate 0.92 per 1000
  - 30% mislabeled
  - Rest: partly labeled, unlabeled, illegible

	10th	25th	50th	75th	90th
Rate per 1000	52	7	1.3	0.4	0.2

1 in 19 **1 in 769** **1 in 5000**

- Wagar et al. Arch Pathol Lab Med 2008; 132: 1617-22.

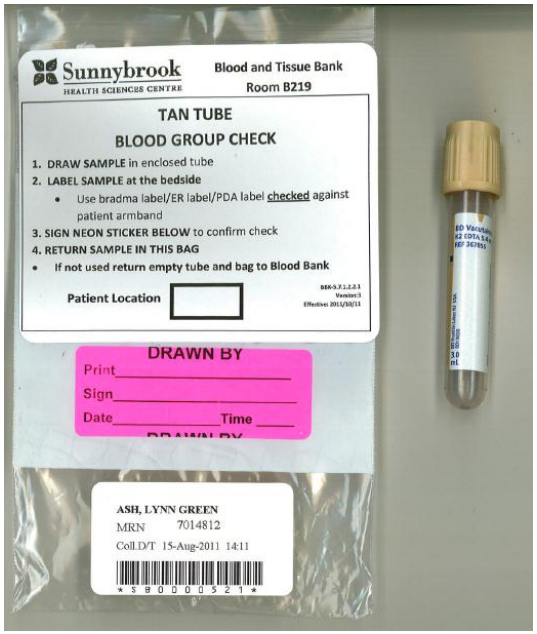
The other labs have to be on your side

- Implementation of a strict labeling policy requiring collection date, 2 unique identifiers, and phlebotomist's identification for **all labs** (not just blood bank lab)
- Incidence of WBIT decreased by 74%
- Incidence of mislabeled decreased by 85%
- Simple
- Free

- O'Neill, et al. Am J Clin Path 2009; 132: 164-8.

Check-type or Group-check

- For all new patients, a confirmatory group is done before non-group O blood is issued
- In the US, 26-31% of hospitals have implemented this from survey data
  - Mintz P, et al. Transfusion 2009; 49:1282–1285
  - Grimm E, et al. Arch Pathol Lab Med 2010; 134:1108–1115
- Yield for 1 year at 1 hospital:
  - 1.6 ABO-incompatible transfusions
  - 0.4 Rh-incompatible transfusions
  - Figueroa PI, et al. Am J Clin Pathol 2006; 126:422–426



12-month evaluation of the group check

- Issues:
  1. Increase in ABO/Rh testing volumes – 2 automated instruments – 5200 additional STAT group checks
  2. Personnel – 2 technologists and 2 technicians
  3. Group O blood use – 3 patients, 22 units of O-negative
  4. Turn-around times – 80% completed within 1 hour
- Improvements:
  - 7 WBIT detected in 6 months
  - 2 ABO incompatible transfusions averted

Goodnough et al. Transfusion 2009; 49: 1321-8.

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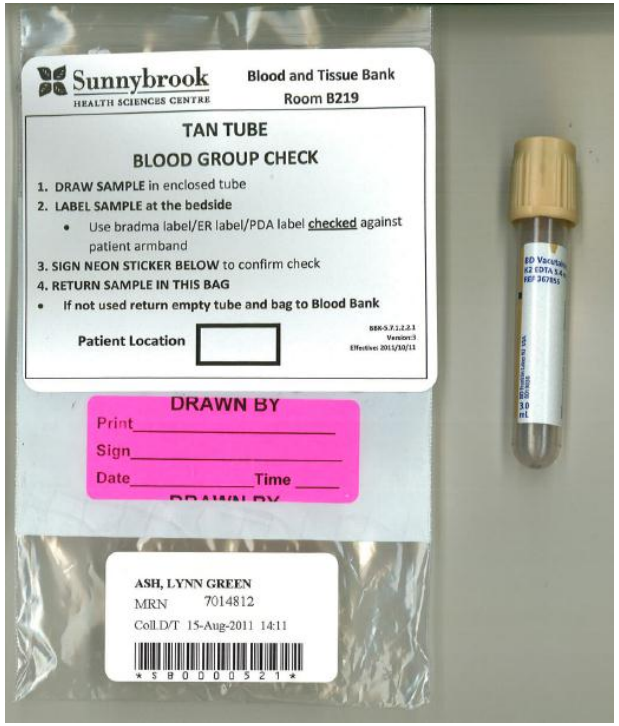
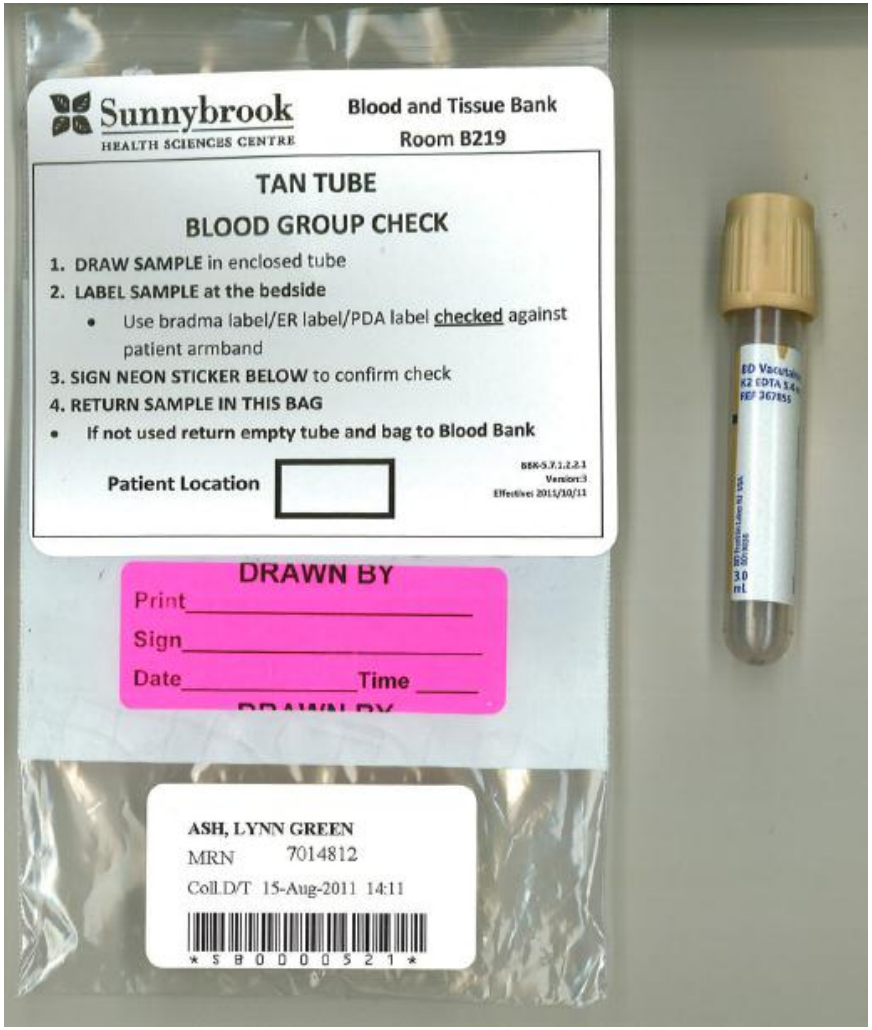
Our approach

The Barrier Strategy
Universal

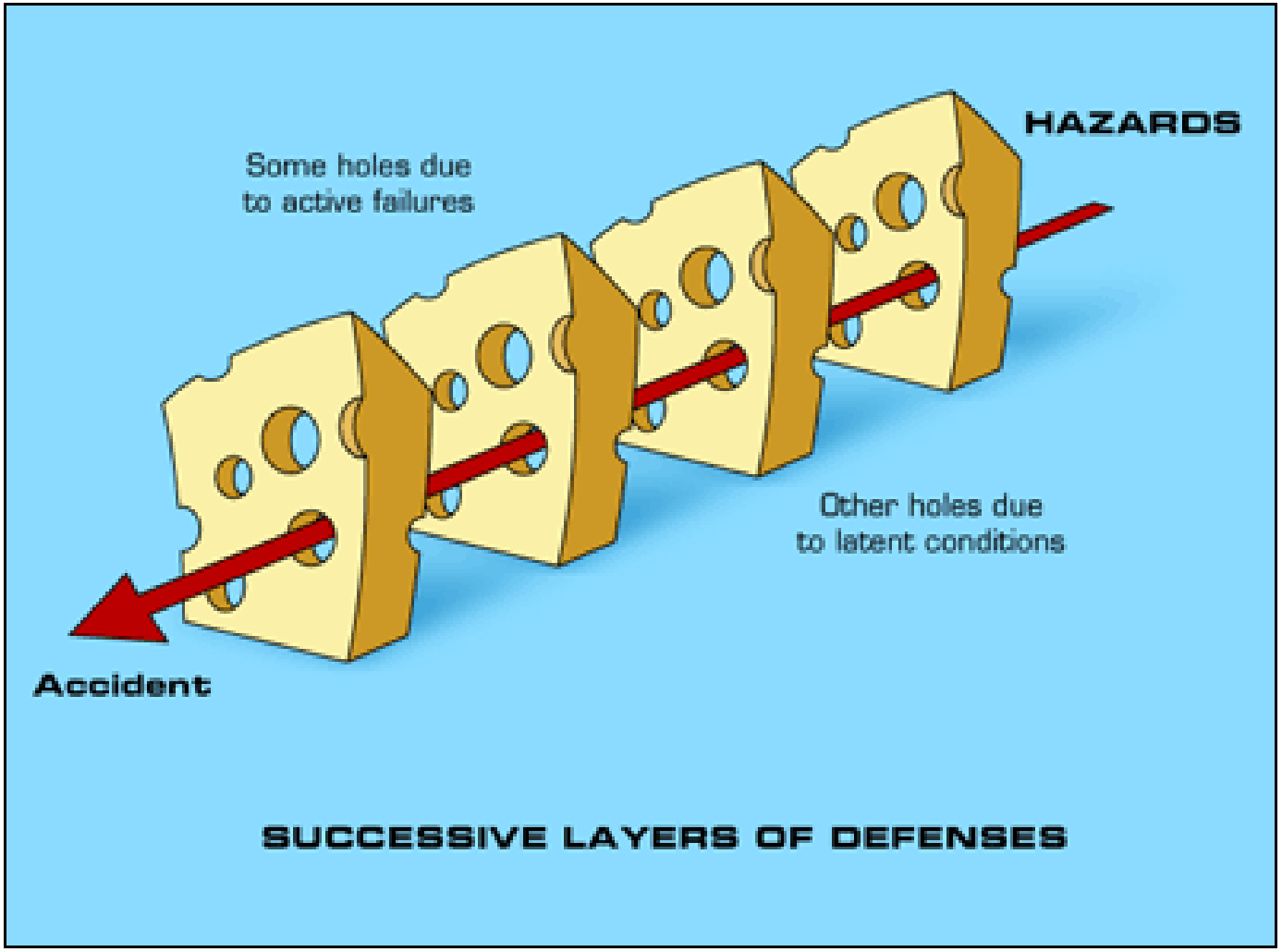


The Prevention Strategy
Incremental & Targeted

The Barrier Strategy
Universal

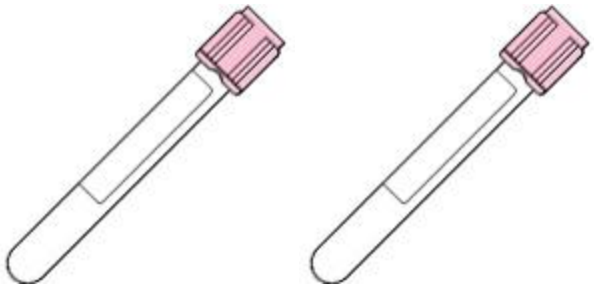


This strategy does not **prevent** the error, it just **detects** the error



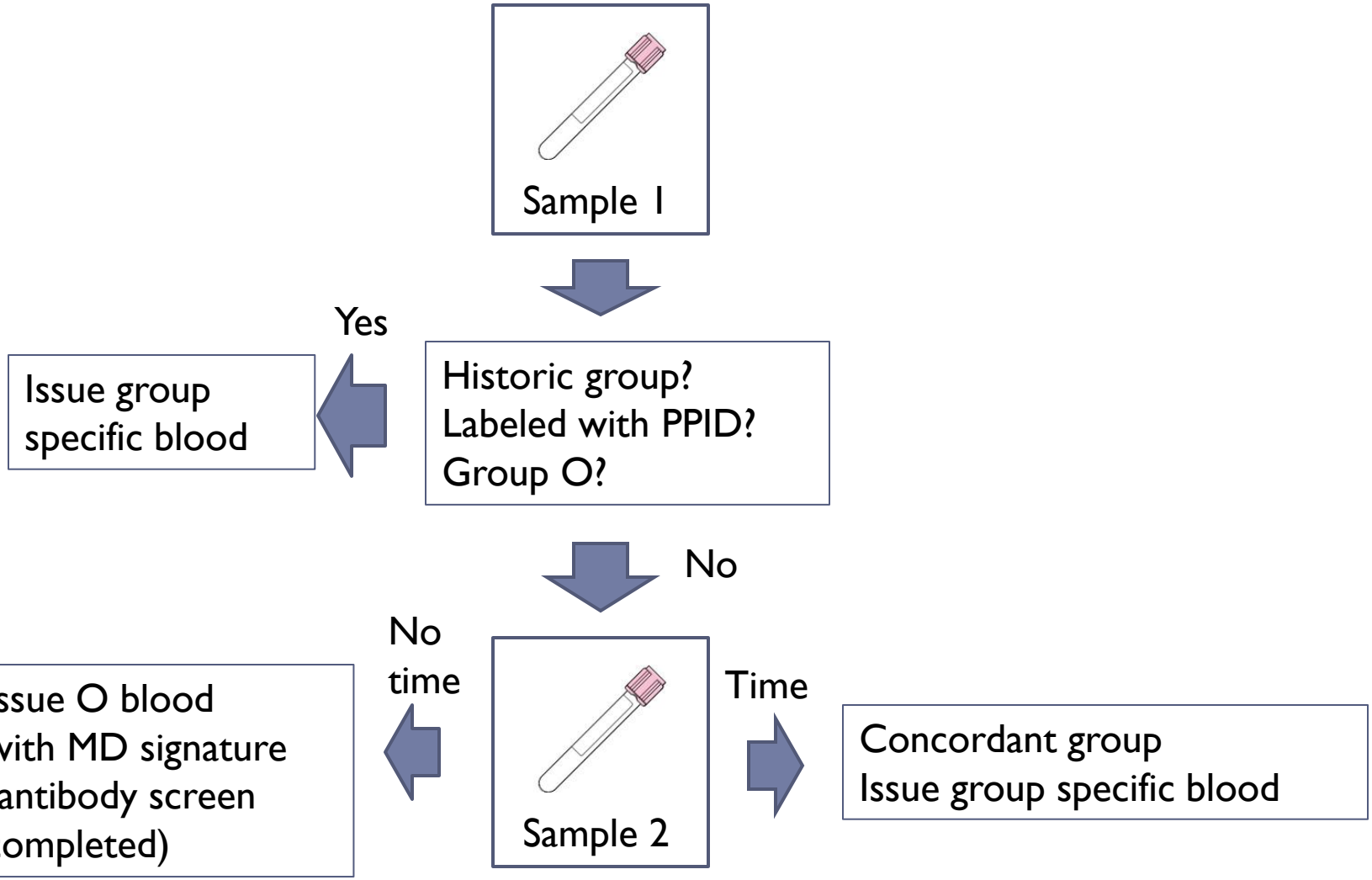
Step 1

- Q4-2005: Series of 7 mislabeled blood samples in 2 weeks from the emergency department. Manual process only for sample collection in this location. Chief of the ED orders all ED patients must have 2 blood groups on file before transfusion of non-group O blood.
  - It's a Friday afternoon
  - No ABO incompatible transfusions EVER but lots of near misses
  - We can't have a separate policy for one location
  - Implement whole hospital: 2 samples or group O unmatched if first sample is not a group O patient & PPID not used (1 ward)
    - O blood issued with signature required



2 samples collected "independently"

Process 1


Sample 1
Yes
Issue group specific blood
Historic group?
Labeled with PPID?
Group O?
No
No time
Issue O blood with MD signature (antibody screen completed)
Sample 2
Time
Concordant group
Issue group specific blood

Step 1 Good news

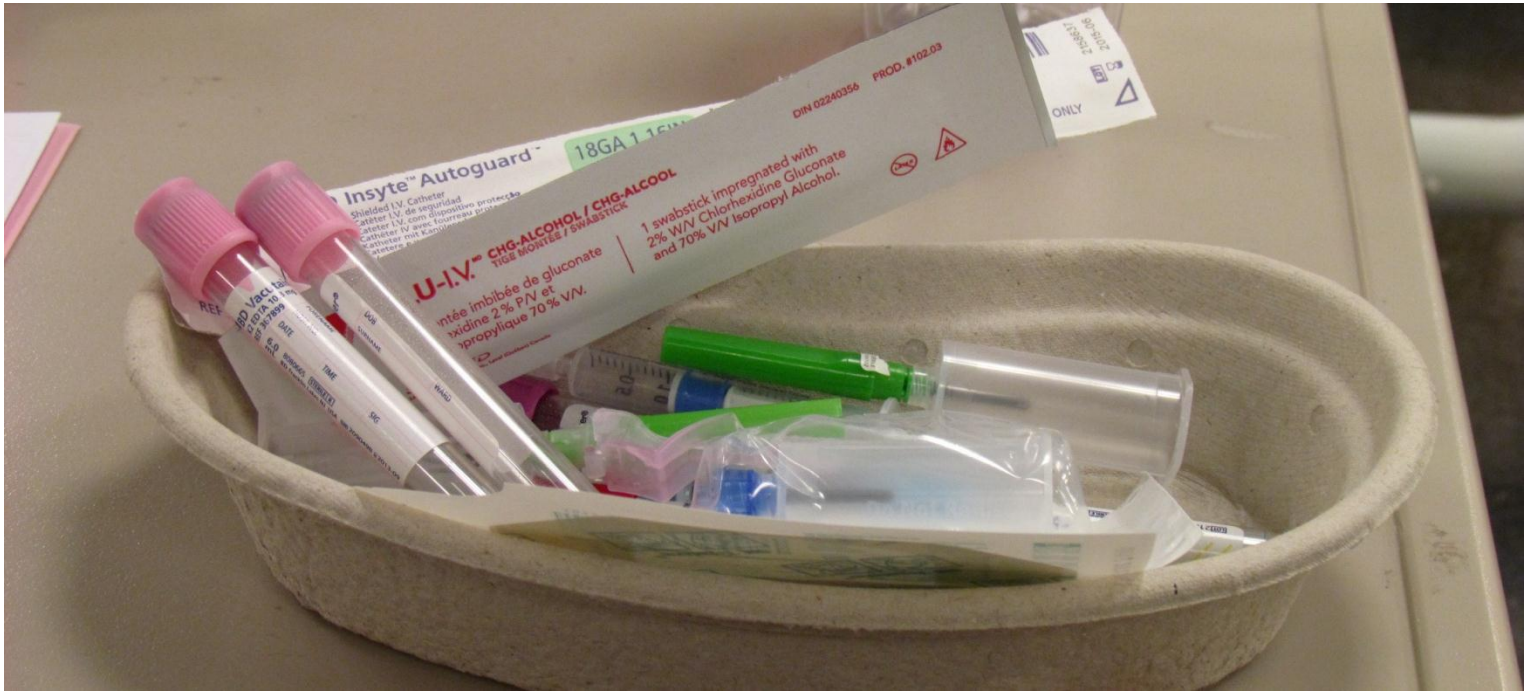
- Managed without additional staff
  - Although, tightened up DAT requirements at the same time to restrict to only patients with hemolysis
  - Dropped G&S for angiograms and at OB delivery
  - One staff member on nights only (biggest trauma center in Canada)
- Managed without additional equipment
  - 2 ProVue already in place
- First 'find' was at 10 days
  - Patient with acute coronary syndrome admitted through the ED, group A+; second sample in the CCU pre-bypass surgery O+

Step 1 problems

"The second sample"

Step 1 problems

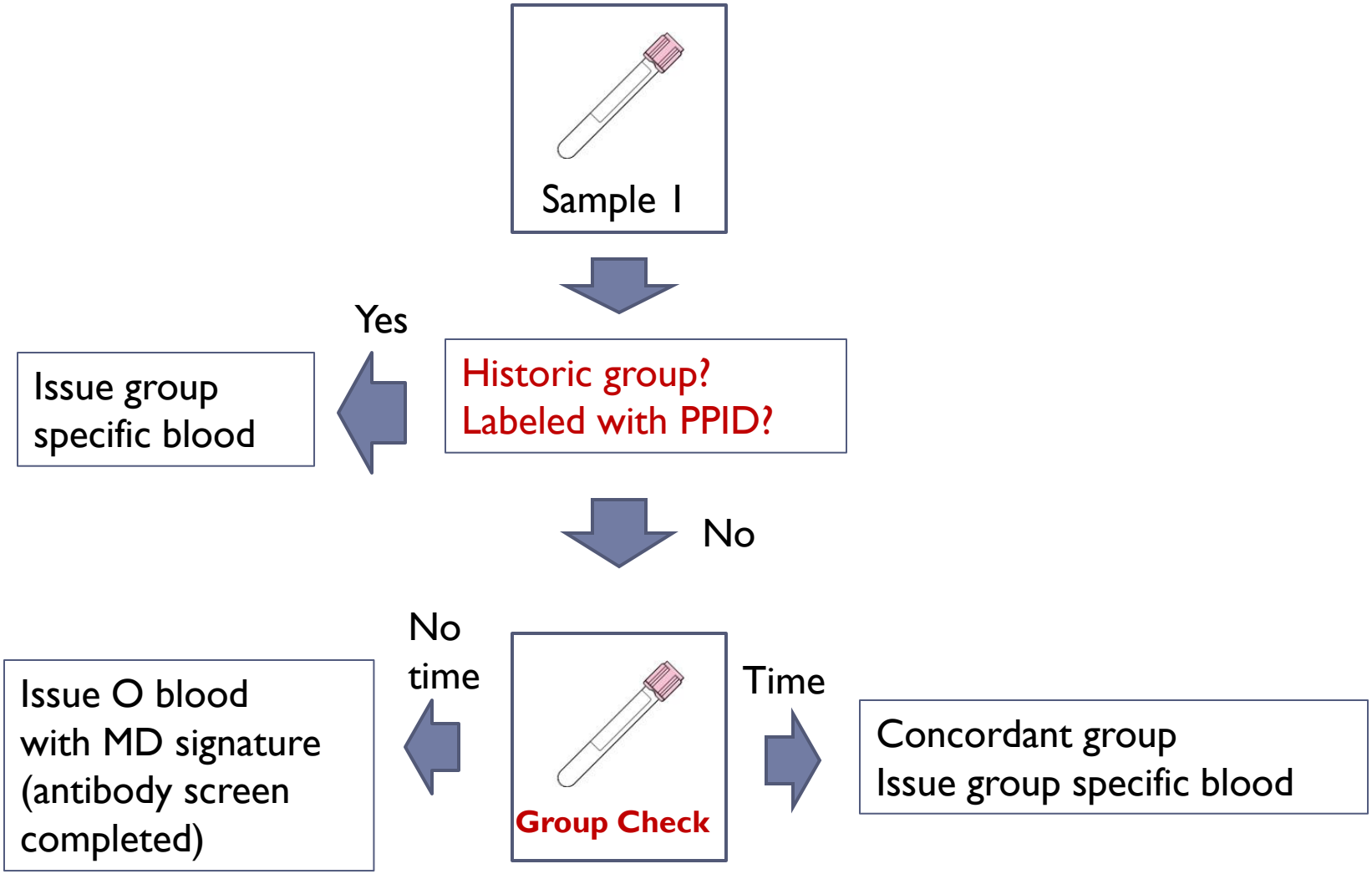
- Duplicate antibody screen is time consuming, expensive and may cause a transfusion delay resulting in more group O blood use
- Acute hemolytic reaction from giving group O plasma to AB patient due to grouping error at another hospital in Toronto
- 'Routine' collection of two samples for all patients – put one in the pocket waiting for the call from blood bank for second sample
  - Trauma room – 2 pink tubes in each sample bin


Insyte™ Autoguard
18GA
DIN 02240356
PROD. #102.03
CHG-ALCOHOL / CHG-ALCOOL
1 swabstick impregnated with
2% W/V Chlorhexidine Gluconate
and 70% V/V Isopropyl Alcohol.

Step 2 – Q1-2008

- The "group check"
  - Dropped the duplicate antibody screen
  - Required an IT change to allow for electronic crossmatch on 2 groups and only 1 antibody screen & for a new test code
  - Processed usually before the screen is complete
- Group O patients
  - Implemented group check for ALL patients to prevent harm from transfusing incompatible plasma

Process 2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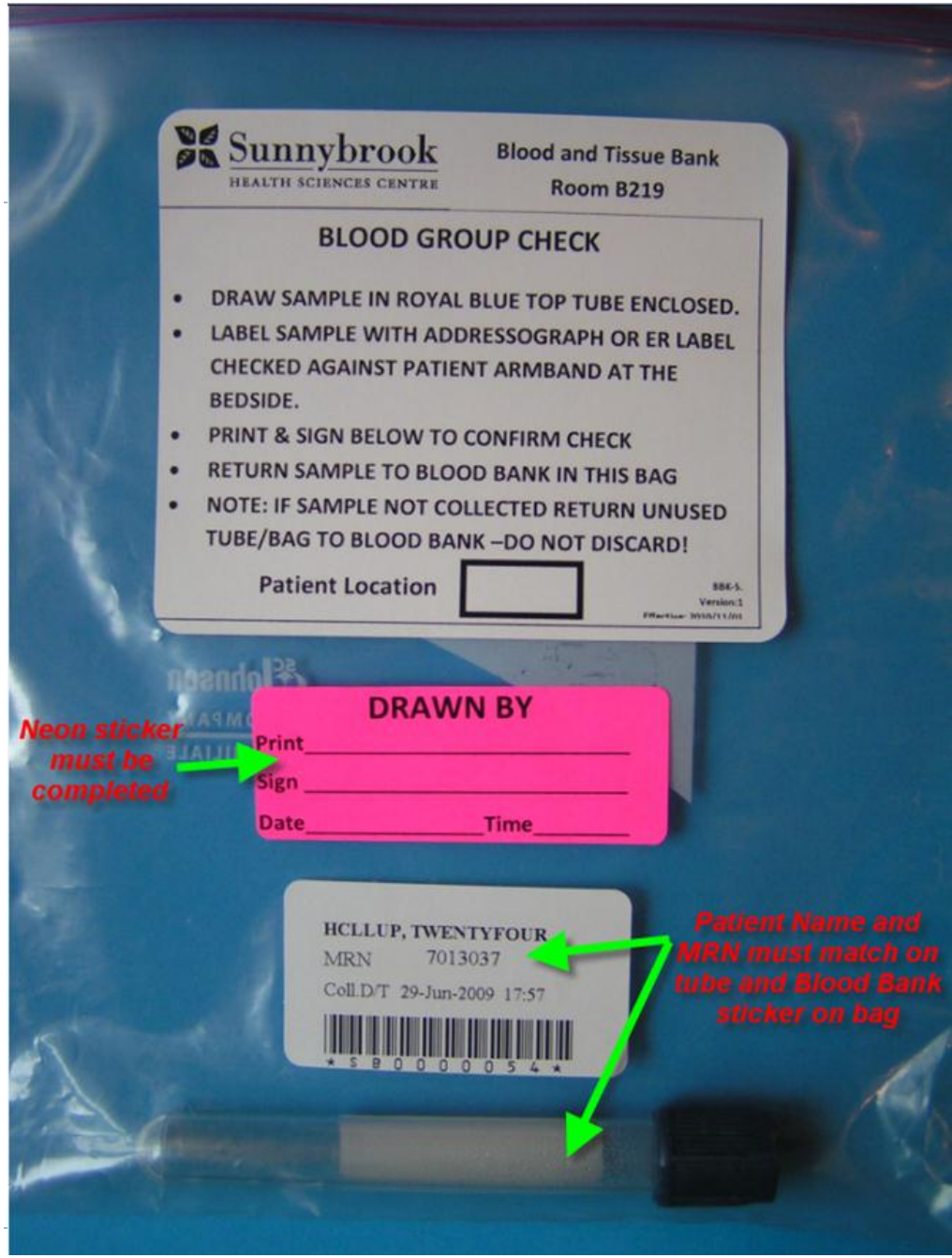
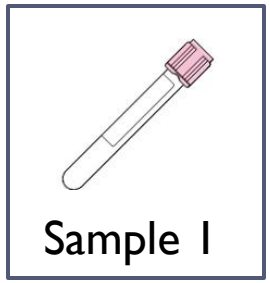
Labeled with PPID?
Issue group
specific blood
No
No
time
Group Check
Time
Issue O blood
with MD signature
(antibody screen
completed)
Concordant group
Issue group specific blood

Step 3

- Blue top tube
  - Q1-2011
  - Special tube only available through blood bank (unavailable through hospital stores)
  - We issue for a specific patient after the pink group and screen sample is received in the blood bank
  - Only required if 1st G&S within 24 hours
- Special bag



Process 3



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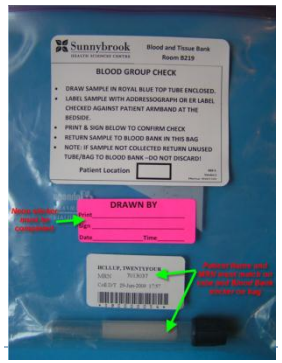
Labeled with PPID?

Yes

Issue group
specific blood

No

No
time



Time

Issue O blood
with MD signature
(antibody screen
completed)

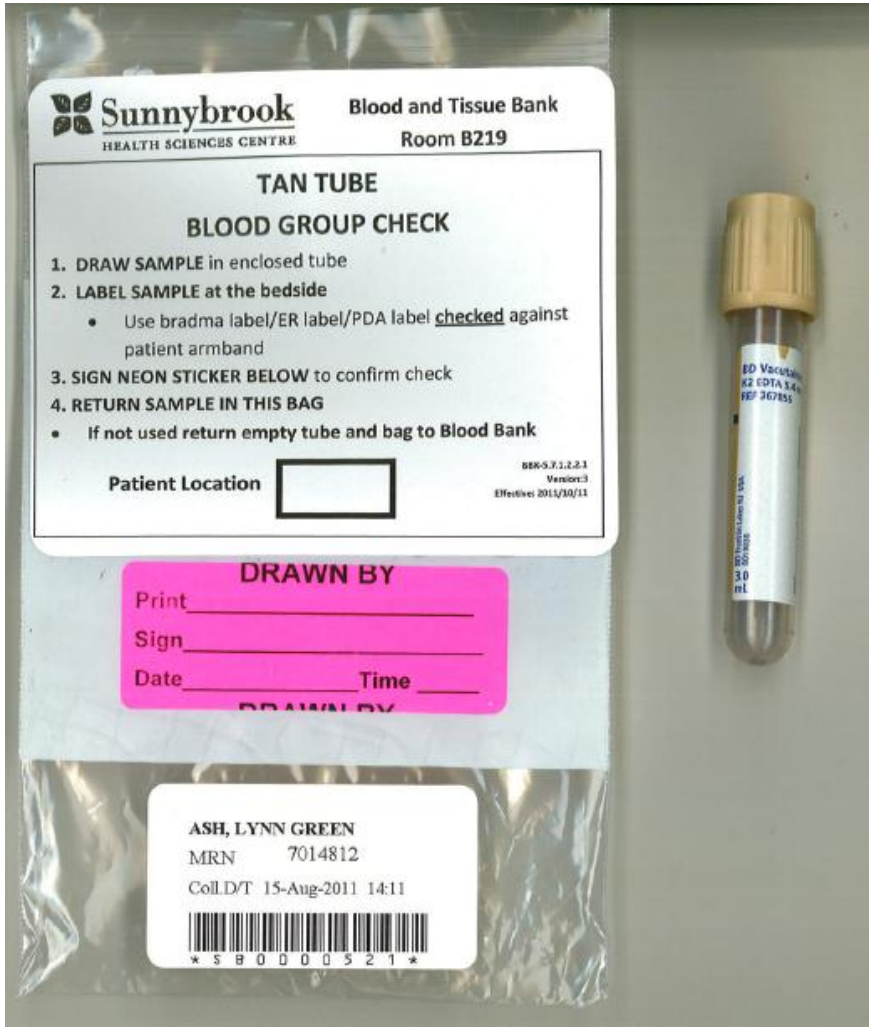
Concordant group
Issue group specific blood

Step 3 Problems

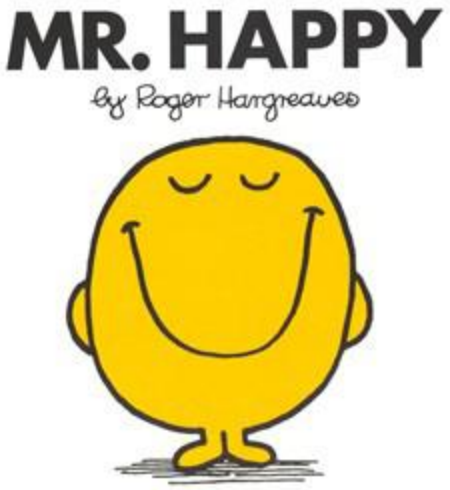
- Unused bags not returned (Transfusion Safety RN has to chase them down)
- Samples not labeled as bag 'labeled'
- One ward called supply/stores to get a stock of these tubes so they did not have to wait for blood bank to send them 2 days (!!) after go-live date
- Large volume (7 mL)
- Then…it became the only tube available for the measurement of precious metals…and needed to be stocked in certain locations

Step 4

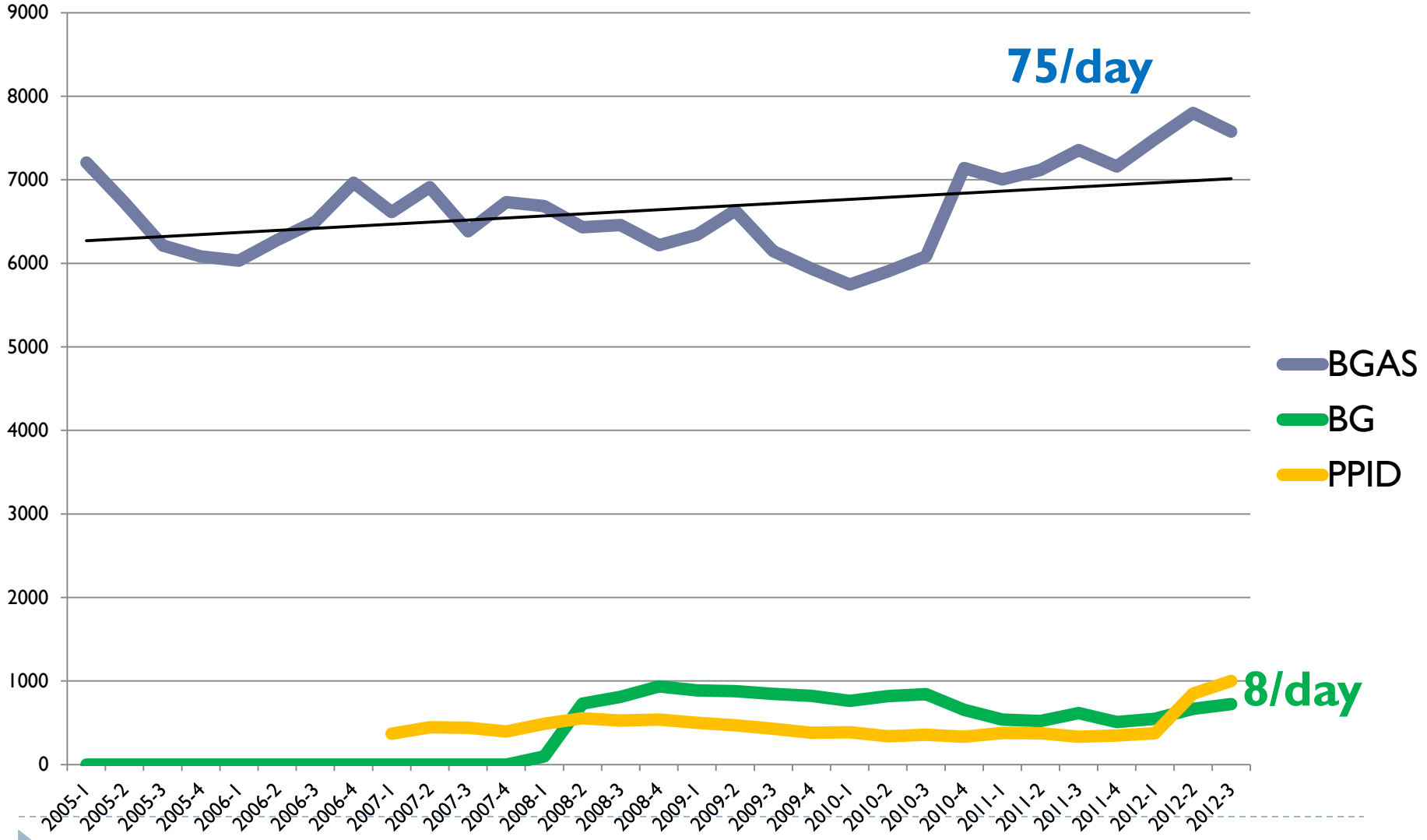
- The tan tube
  - Q4-2011
  - Smaller volume – 3 mL
  - Not required for any other tests
  - Shorter 4 step instructions



So far…stable with no issues!



Impact on testing volumes



Majority of samples are pink G&S

The Prevention Strategy
Incremental & Targeted

Wireless devices for sample collection and the bedside check

Askeland et al, Transfusion 2008; 48: 1308-17 (U of Iowa)

Measure	Before	After
Incident reports	41.5/mth	7.2/mth
Sample rejection	1.82%	0.17%

Estimated that a mis-transfusion risk 1 per 100 months
1 in 8.3 years [1 in 282,200 components]

15-20-fold safer

Not that outrageous a cost!

Pagliaro P, et al. Blood Transfus 2009; 7:313–318

Pre-transfusion check
1/10th the cost
12 mistransfusions averted

NAT HBV
10-fold cost
1 HBV exposure

Step 1 – Money – August 2003

- Money

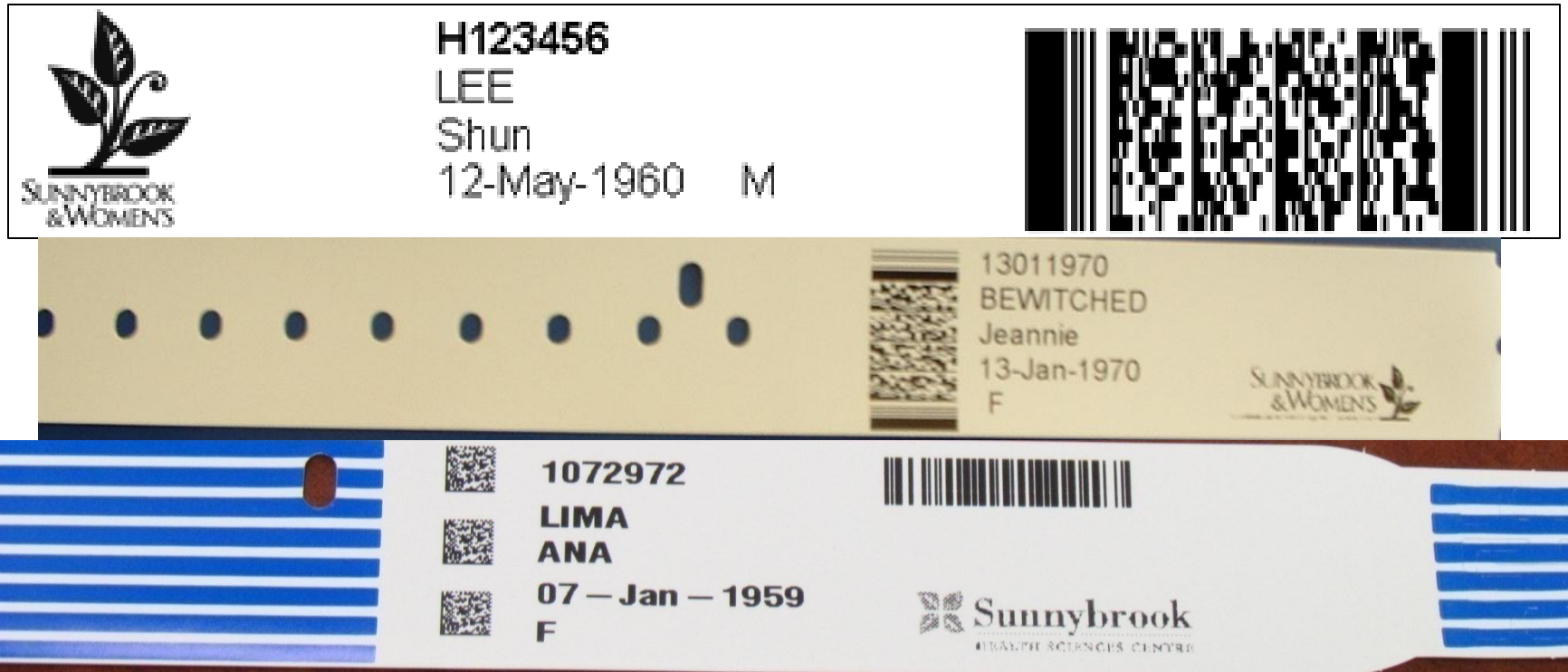
$25,000 from the hospital annual Foundation baseball game

Step 2

- Motivated unit with lots of transfusions
- Lots of samples collected and lots of transfusions!
- 3 device sets plus 1 back up
- 10 month trial: 30-Nov-2004 to 20-Sept-2005

Step 2 Problems

- Software problems – freezing – required multiple patches
- Barcodes destroyed by 'fluids', especially chlorhexidine – required the armband manufacturers to add additional coats of stuff to the arm bands
- Barcode needed rotation to allow for one handed scan

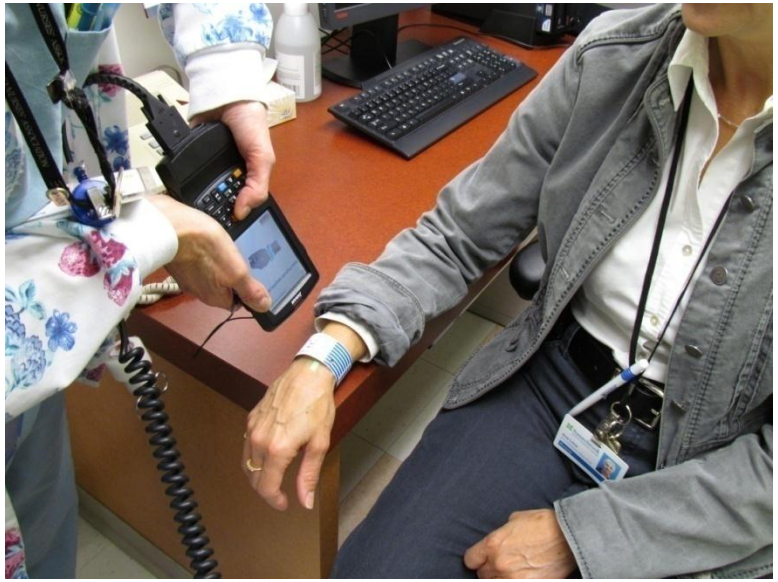


Step 3

- Out patient transfusion clinic – Q4- 2006

Step 4

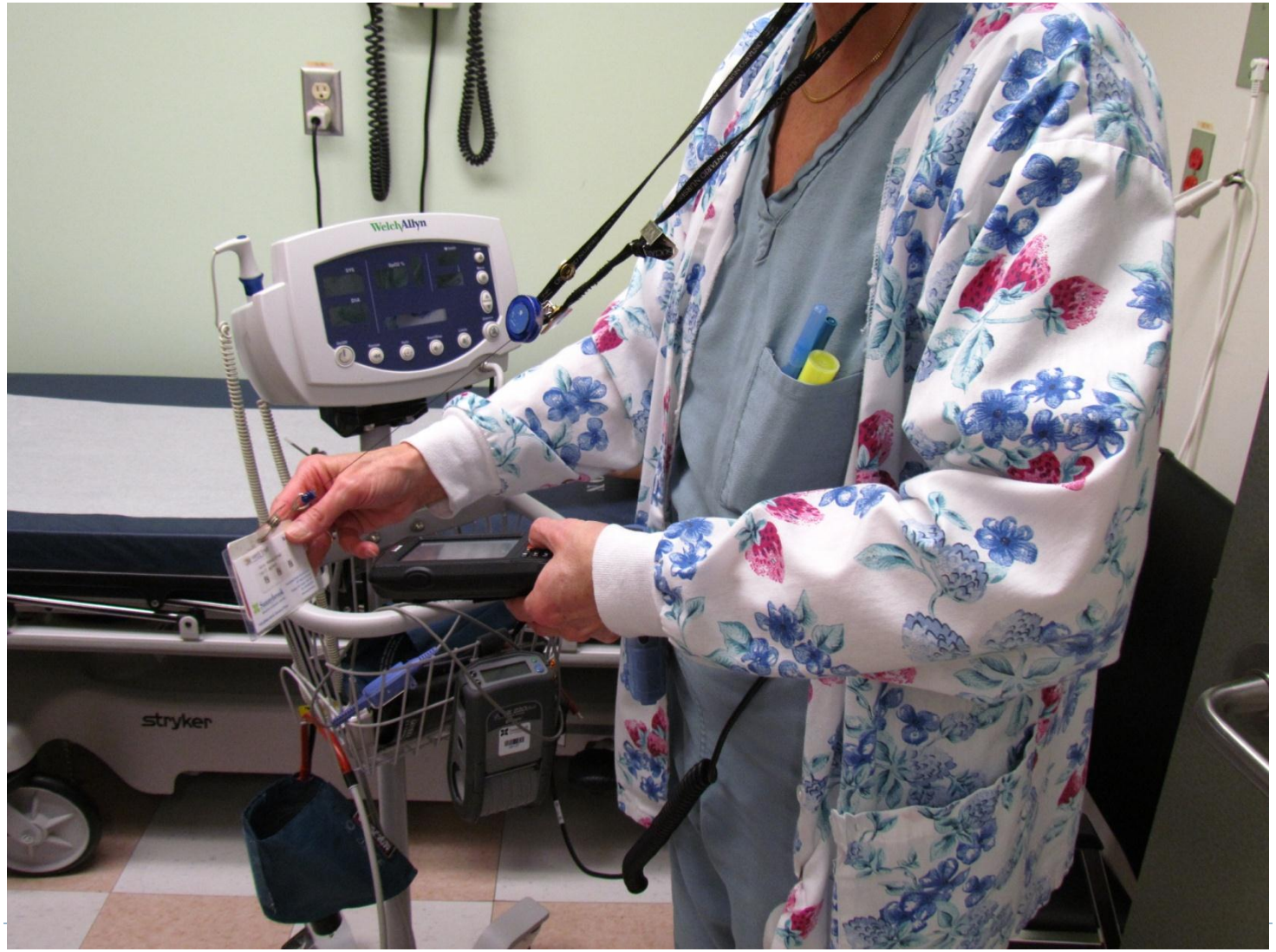
- Preadmission clinic – Q2-2012
  - No issues



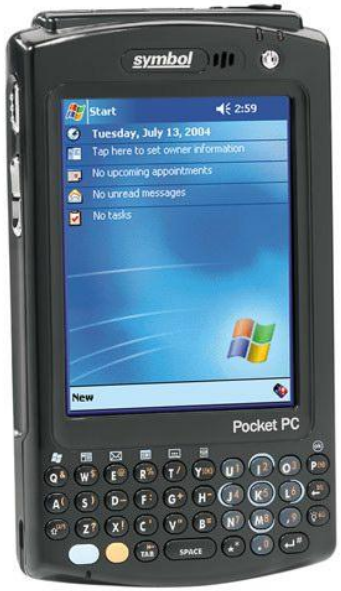
Step 5 – Now!

- Cardiovascular operating rooms
  - Huge issues with connectivity to wireless network
    - Vocera communication system interference
  - Hardware no longer available
    - Motorola MC50 to Janam vendor change required

Handheld and printer with BP device



In just 9 years!



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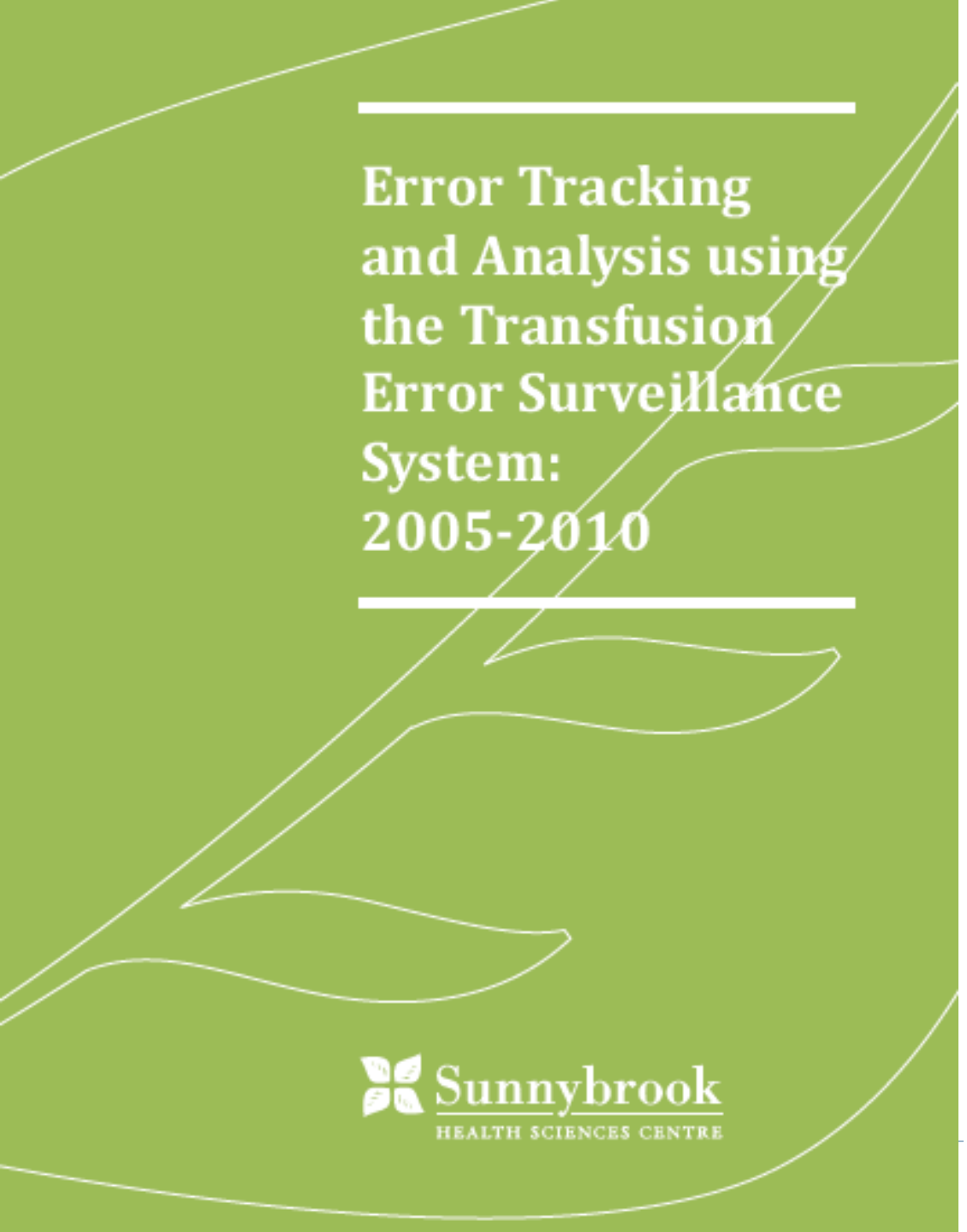


6051 Clinical Errors

9083 Laboratory Errors

15134 Errors over 6 years

Data on sample collection errors
Whole hospital

Table 4:
Errors in sample collection

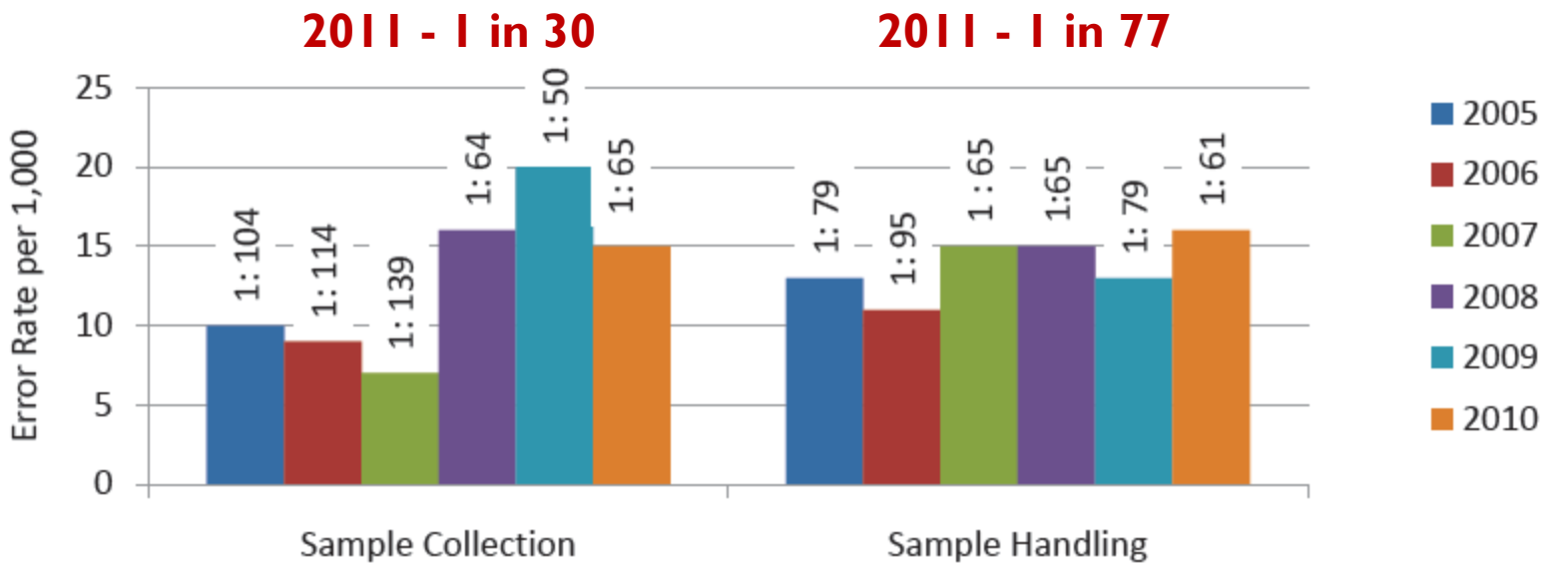
Sample Collection	2005	2006	2007	2008	2009	2010	Total	%
01 Sample labelled with wrong ID	41	28	11	15	25	30	**150**	**8.1**
02 Not labelled	44	48	34	54	27	47	**254**	**13.7**
03 Wrong Patient collected	3	2	4	1	1	3	**14**	**0.8**
04 Collected in wrong tube	24	15	15	25	26	10	**115**	**6.2**
05 Sample NSQ (not sufficient quantity)	8	3	2	22	27	16	**78**	**4.2**
06 Sample hemolyzed	20	9	5	135	295	189	**653**	**35.3**
07 Label incomplete/illegible key patient identifiers	36	38	46	46	83	57	**306**	**16.5**
08 Sample collected unnecessarily	2	16	14	15	8	18	**73**	**3.9**
09 Requisition arrives without sample	21	17	17	48	35	7	**145**	**7.8**
10 Armband incorrect/not available	1	1	0	0	0	1	**3**	**0.2**
11 Sample contaminated	0	1	0	0	0	0	**1**	**0.1**
99 Other	5	7	3	2	4	36	**57**	**3.1**
Total	**205**	**185**	**151**	**363**	**531**	**414**	**1849**	**100.0**

One every 2 weeks; 17 in 2011

One every 3-6 months; 4 in 2011

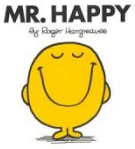
No Change in rate over time

Figure 3: Hospital error rates from 2005-2010 per 1,000 blood samples collected



Mislabeled 2011 = 1 in 1827

WBIT 2011 = 1 in 7764 (with good detection!)

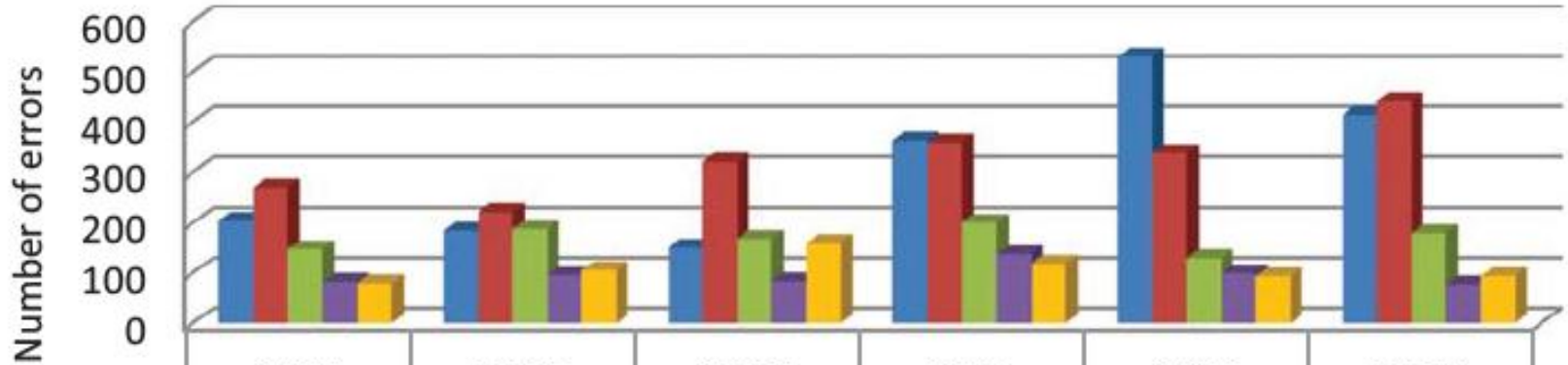


You need to find out where the highest risk area is at your hospital

a. Sample collection ranking

Sample Collection	Error rate per 1,000 samples collected from 2005-2010
1.Holland Centre	1
2. Outpatient Clinics	3
3. Medical/Surgical	5
4. Obstetrics	9
5. Intensive Care Unit	15
6. Emergency Department	23

At Sunnybrook sample collection and sample handling errors are #1 and #2



	2005	2006	2007	2008	2009	2010
Sample Collection	205	185	151	363	531	414
Sample Handling	271	222	321	359	338	442
Product Request	148	188	169	201	130	180
Request for Pick-up	83	96	84	138	100	78
Unit Transfusion	80	106	161	119	94	94

In Canada, these errors are #1

- Rejected rate
  - 1 in 8 to 1 in 3519 (!)
- Mislabeled errors for 2010:
  - 1 in 1053 to 1 in 10558
- WBIT errors for 2010:
  - 0 for 5 sites
  - Rest: 1 in 1039 to 1 in 14430

These errors cost a lot of money too

- Recollection of samples $31.85 per re-collection
- Cost per year of 2,200 recollections per year at TESS pilot sites (12 hospitals) is $70,700 per year
- Estimate for Canada for recollection of only blood bank samples = $0.7 million
- 70% costs at rejection; 30% at recollection (assumes 1st sample is not run)

No WBITs at all! Zero in 2011 despite 2222 samples

Haematology Ward

Sample Collection	2005	2006	2007	2008	2009	2010	Total	%
01 Sample labelled with wrong ID	0	3	1	0	0	0	4	12
02 Not labelled	0	1	3	1	0	3	8	23
04 Collected in wrong tube	2	0	0	1	1	0	4	12
05 Sample NSQ (not sufficient quantity)	0	0	0	1	0	0	1	3
06 Sample hemolyzed	0	0	0	0	1	0	1	3
07 Label incomplete/illegible key patient identifiers	2	1	1	0	5	2	11	32
09 Requisition arrives without sample	1	0	1	1	2	0	5	15
Total	**5**	**5**	**6**	**4**	**9**	**5**	**34**	**100**

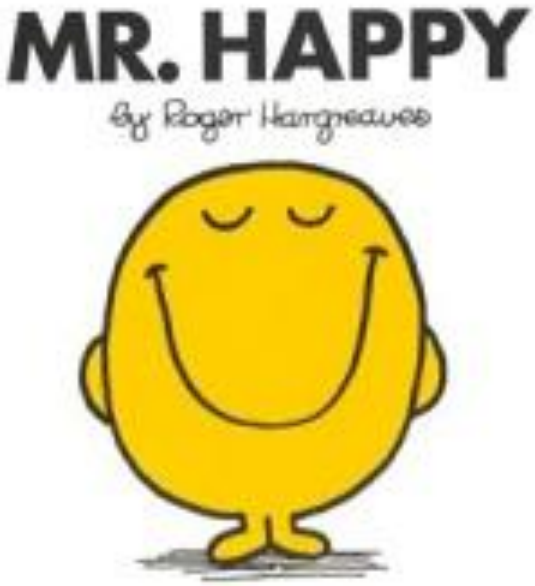
Transfusion Medicine Clinic

Sample Collection	2005	2006	2007	2008	2009	2010	Total	%
01 Sample labelled with wrong ID	1	0	0	0	0	0	1	1
02 Not labelled	0	1	0	1	0	0	2	3
04 Collected in wrong tube	0	0	1	0	1	0	2	3
05 Sample NSQ (not sufficient quantity)	0	0	0	0	1	0	1	1
06 Sample hemolyzed	0	0	0	10	47	15	72	90
07 Label incomplete/illegible key patient identifiers	0	0	0	0	0	1	1	1
09 Requisition arrives without sample	1	0	0	0	0	0	1	1
Total	**2**	**1**	**1**	**11**	**49**	**16**	**80**	**100**

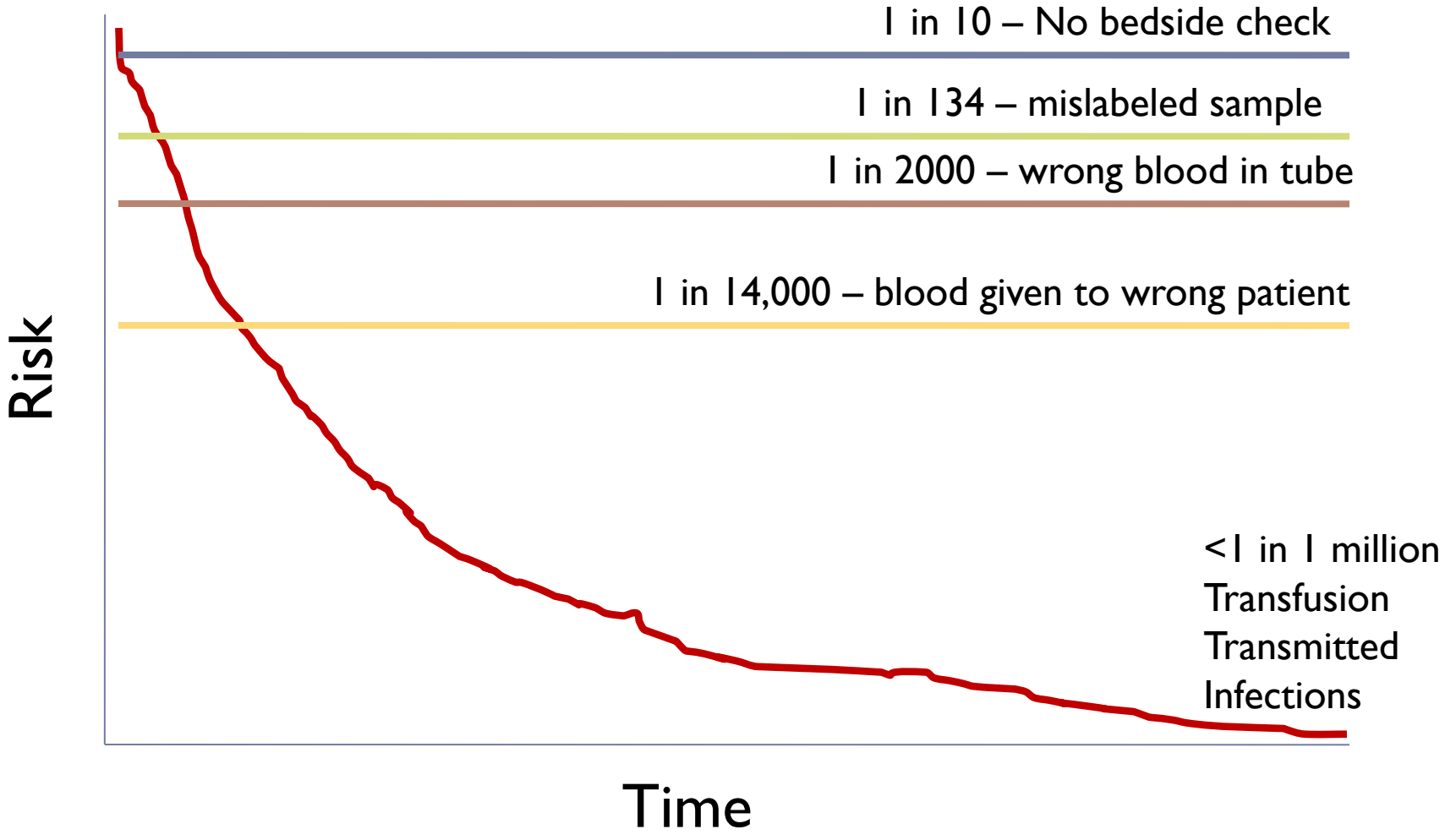
Bleeding average with PPID for 2011

2222/2222

Our data resulted in $ for hospital wide PPID for transfusion – **NINE** years later



Transfusion Risks



Grimm E, et al. Arch Path Lab Med 2010; 134: 1108-15
Linden et al. Transfusion 2000; 40: 1207-13

Summary

- Sample collection errors are not caused by sloppy people – you have systems problems you must fix
- Sample collection errors happen everywhere – you are in good company…right now…but everyone is working to get better
- A dual protection strategy to detect and prevent sample collection errors to prevent patient harm is safer
  - The 'Group Check' is feasible
  - PPID is a slow implementation unless your hospital has a lot of money and people to throw at the problem