

# Why does Scotland need a vascular access network?

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# Give you the answers first

- Its too complex
- Its too hazardous for patients
- Its too hazardous for HCWs
- Its not easy to do the right thing
- Its not joined up
- However....the seeds of sustained improvement are starting to bear up

# 1 - Its too complex

- Types of catheter
  - peripheral, midline, PICC, CVC
- Too many different connections, short arm extensions , with clamp without clamp, etc., etc.
- Too many dressing variations
- Too many variations in procedure:
  - If <this> catheter <that> diluent
  - If <this> drug then <that> infusion time – except if it follows <this> infusion
  - If <this> procedure then <that> antiseptic
- Reducing the risk of one complication can increase the risk of another
  - Increase hang times to reduce errors in infusion – increasing the risk of CR-BSI – time to multiply
  - Reducing the risk of needlestick injury increased the risk of a blood stream infections (multiple different devices)

# Probability of success in a process

	<b>0.95</b>	<b>0.99</b>	<b>0.999</b>	<b>0.99999</b>
<b>1</b>	0.95	0.99	0.999	0.99999
<b>25</b>	0.28	0.78	0.98	0.998
<b>50</b>	0.06	0.61	0.95	0.995
<b>100</b>	0.006	0.37	0.9	0.99

Spath Error reduction in healthcare

# Number of steps advocated in the procedure to prepare and administer an IV drug - 52

- Hand hygiene – “as per local procedure”

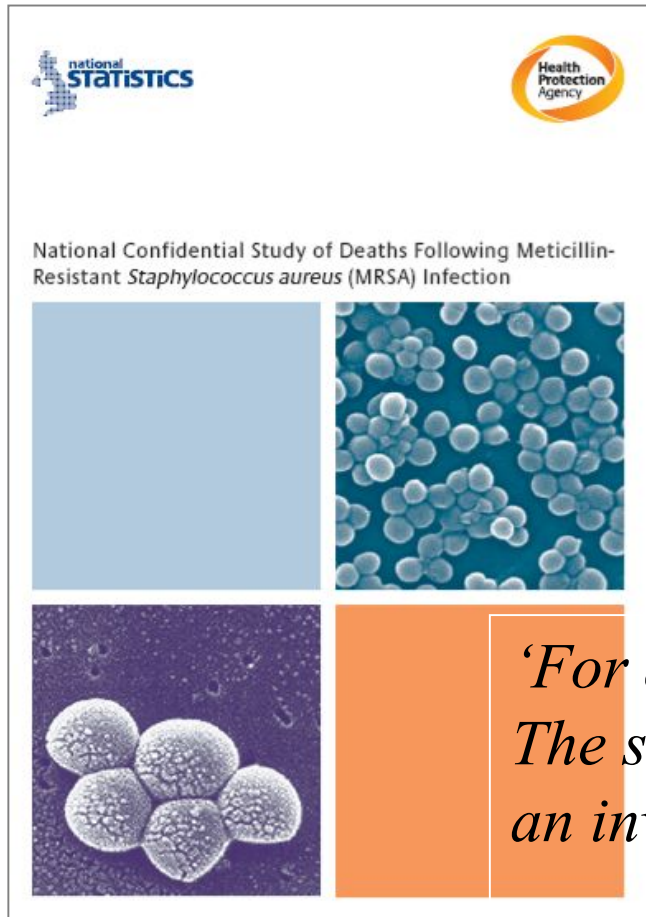
Greater the complexity  
> error rate

2 - Its too dangerous

# How many possible complications

- Drug – wrong drug, dose, route, speed
- Infusion – air, contamination, wrong diluent, foreign bodies
- Catheter break - dislodgement
- Infection – insertion site, CR-BSI,
- Chemical reaction - insertion site
- Insertion site – wrong place pneumothorax

# Extracts from a study into deaths following MRSA infections



*'Six days post-operatively the patient was noted to have pus coming from a cannula site.'* Case study 6

*'After 8 days the PVC inserted on admission showed signs of infection with a purulent discharge.'* Case study 4

*'For almost half of the cases reviewed, The source of the MRSA infection was an invasive device, particularly PVC and CVC.'*

# Vonberg & Gastomier 2007 JHI

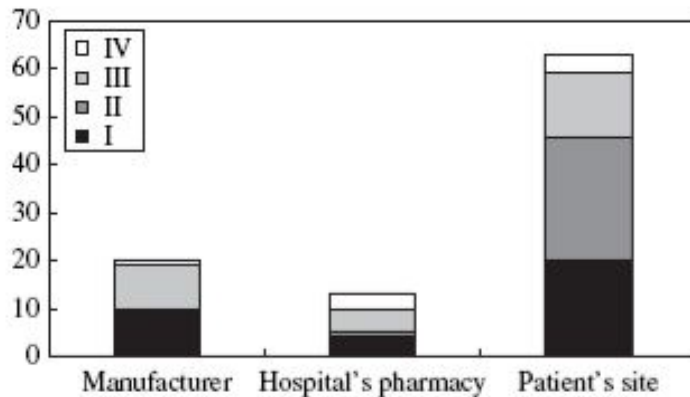


Figure 2 Distribution and graded evidence of the location where substances other than blood products became contaminated ( $N = 128$ ).

- Outbreaks reported in the literature on healthcare contaminated substances
- 128 outbreaks 1990 - 2006

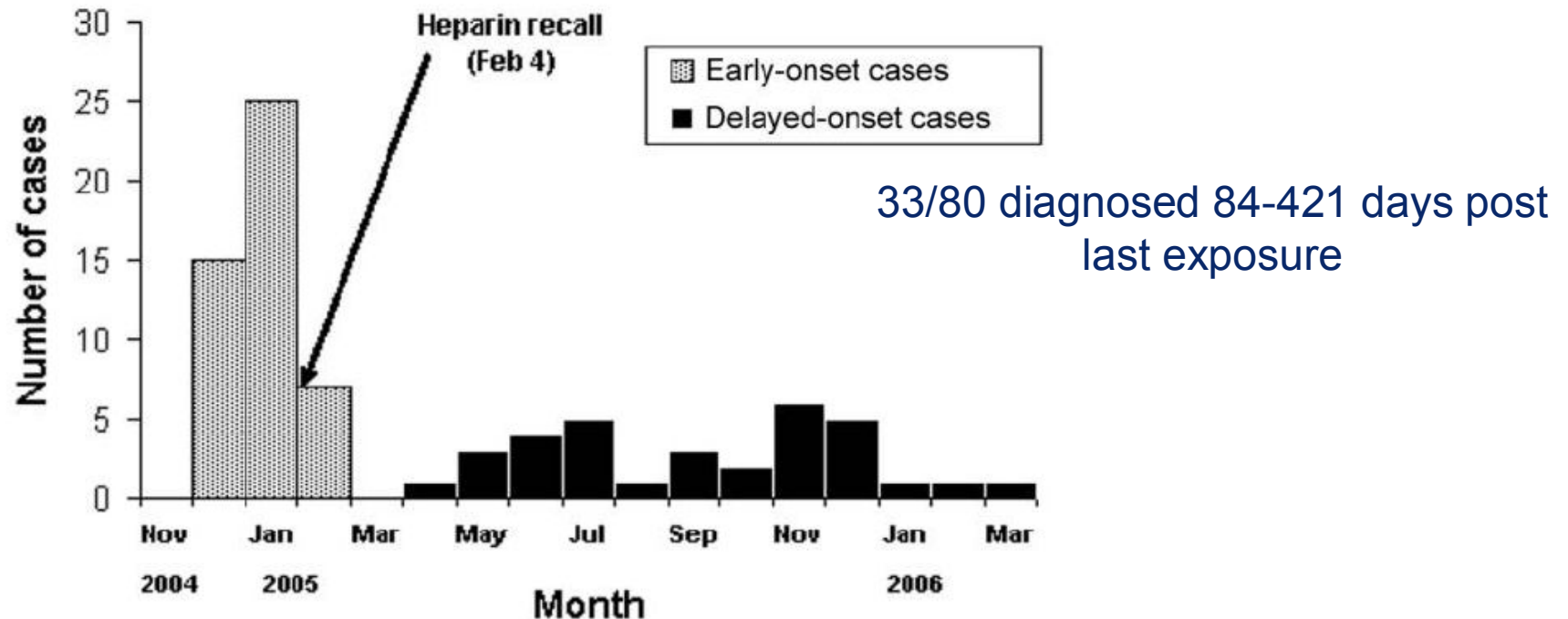
# Alarm bells have to ring....

- Bacteraemia was found associated only with heparin infusion
- Review – 4 years' notes
- 6% (96 patients) had a bacteraemia for which the only identified risk factor was an intravenous catheter (Siegman-Igra et al., 2005).

# Its more common than we think!

- 1093 ward prepared infusates found a contamination rate of 0.9%; and two cases of infusate–related bacteraemia (Macias et al., 2008).
- ‘endemic infusate contamination may be a present danger’

## The importance of aseptic technique in preventing even low level contamination



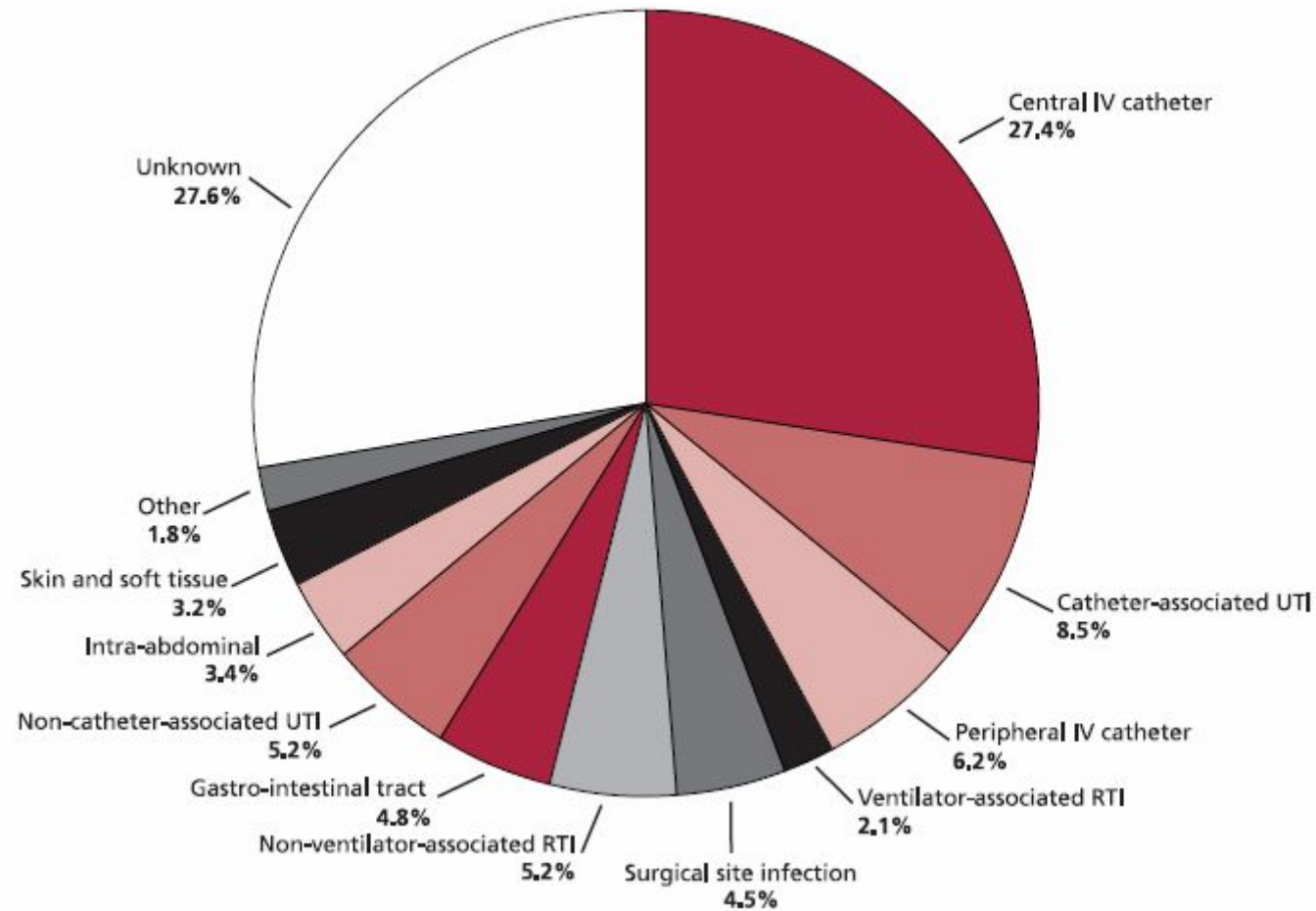
**Figure 1.** Epidemic curve of early- and delayed-onset cases ( $n = 80$ ) of *Pseudomonas fluorescens*, by month of diagnosis.

Device related infections play a significant part in all hospital associated bacteraemias (HAB)!

	N = 2091	N = 4865		N = 1095	N = 2103
All HAB %	Teaching	Non Teaching	Device Related %	Teaching	Non Teaching
Haematology	18.9	6.5	Haematology	24	6.9
General medicine	14.8	25.2	General medicine	12.1	26.2
Gen ICU	13	13.6	Gen ICU	14.6	16.3
Gen surgery	12	21.8	Gen surgery	7.7	18.4
Nephrology	7	1.6	Nephrology	9.4	2.4
SCBU	4.5	3.7	SCBU	4.7	3.5
Oncology	4.3	1.5	Oncology	4.2	2.6
Geriatric Medicine	4.3	12.3	Geriatric Medicine	2.9	10.9
Oncology	3.5	3.9	Oncology	3.2	5.1
Gasgroenterology	3	0.3	Gasgroenterology	2.9	0.1
CT surgery	2.9	0.3	CT surgery	2	0.2
Paediatrics	2.5	0.9	Paediatrics	3.3	1.4
Neurosurgery	2.4	0.2	Neurosurgery	3.1	0.2
Trauma / Ortho	2.1	3.7	Trauma / Ortho	0.6	2.4
Cardiology	1.4	1.3	Cardiology	1.7	1.9
Gynaecology	0.5	1.2	Gynaecology	0.3	0.5

Source: Coello et al JHI 2003 (17 teaching 56 non-teaching)

# CVC : the source of 1/3<sup>rd</sup> of BSI



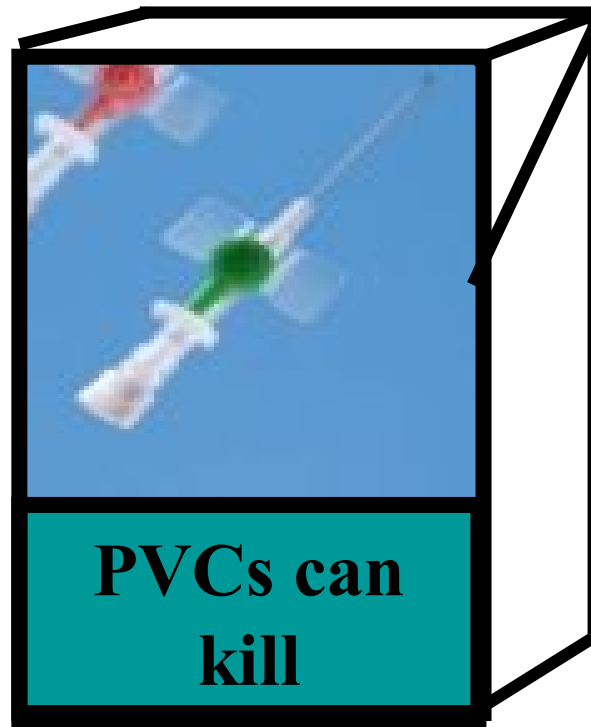
Source: Coello et al JHI 2003 (17 teaching 56 non-teaching)

# One study of Peripheral Vascular Catheters found the following

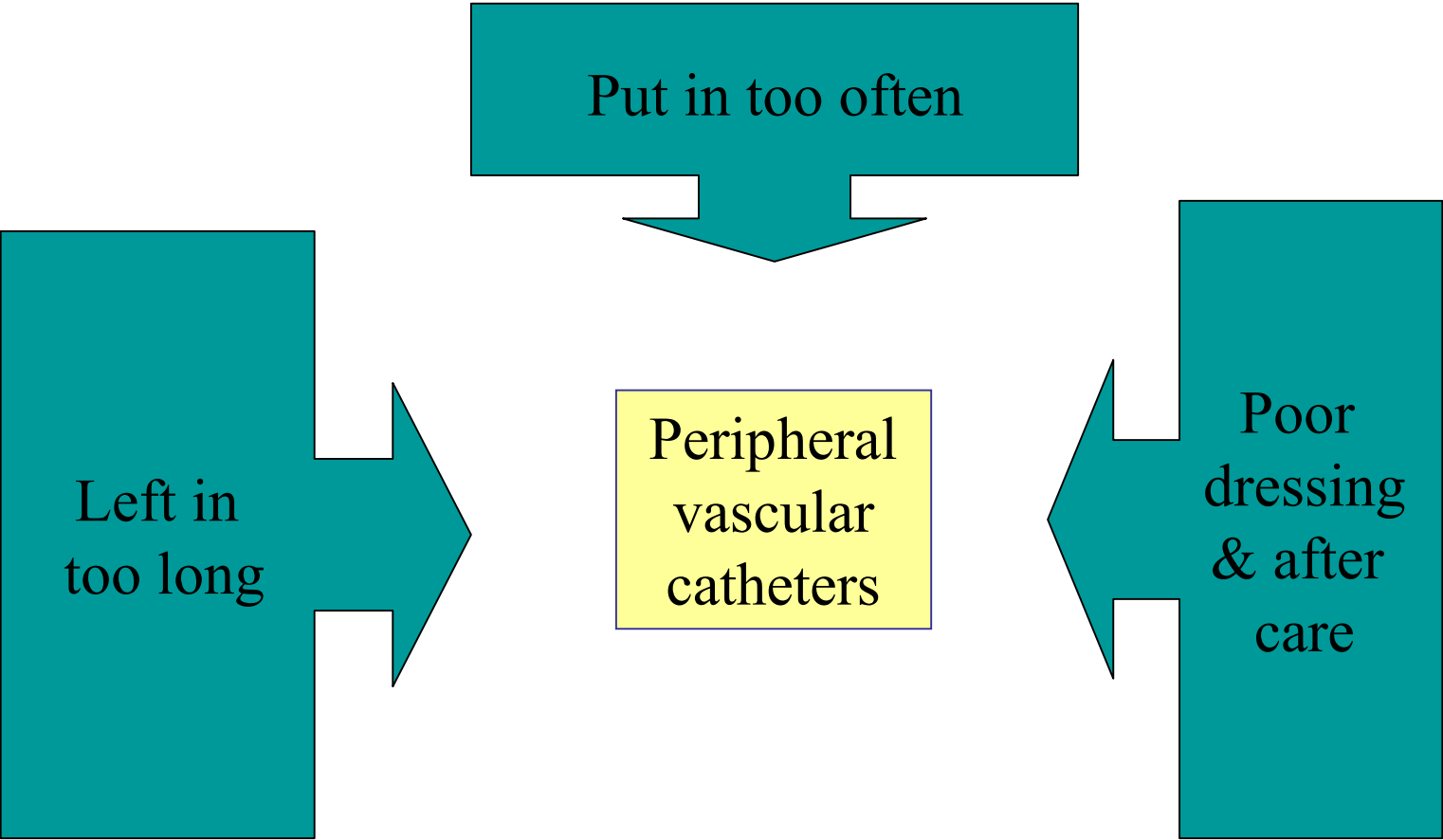
- 52% Of patients had a PVC
- 33% Of PVCs were incorrectly dressed
- 52% Of PVCs were incorrectly positioned
- 46% Of PVCs were unused for 24 hours
- 23% Of PVCs had never been used
- 23% Of PVCs had no documented purpose
- 12% Of PVCs had visible phlebitis
- 6% Of PVCs had infiltration

Thomas et al JHI 2006

This device can seriously  
damage your patient's health



1:3 pts have a PVC



Left in too long

Put in too often

Peripheral vascular catheters

Poor dressing & after care

**3 – Its hazardous for  
HCWs**

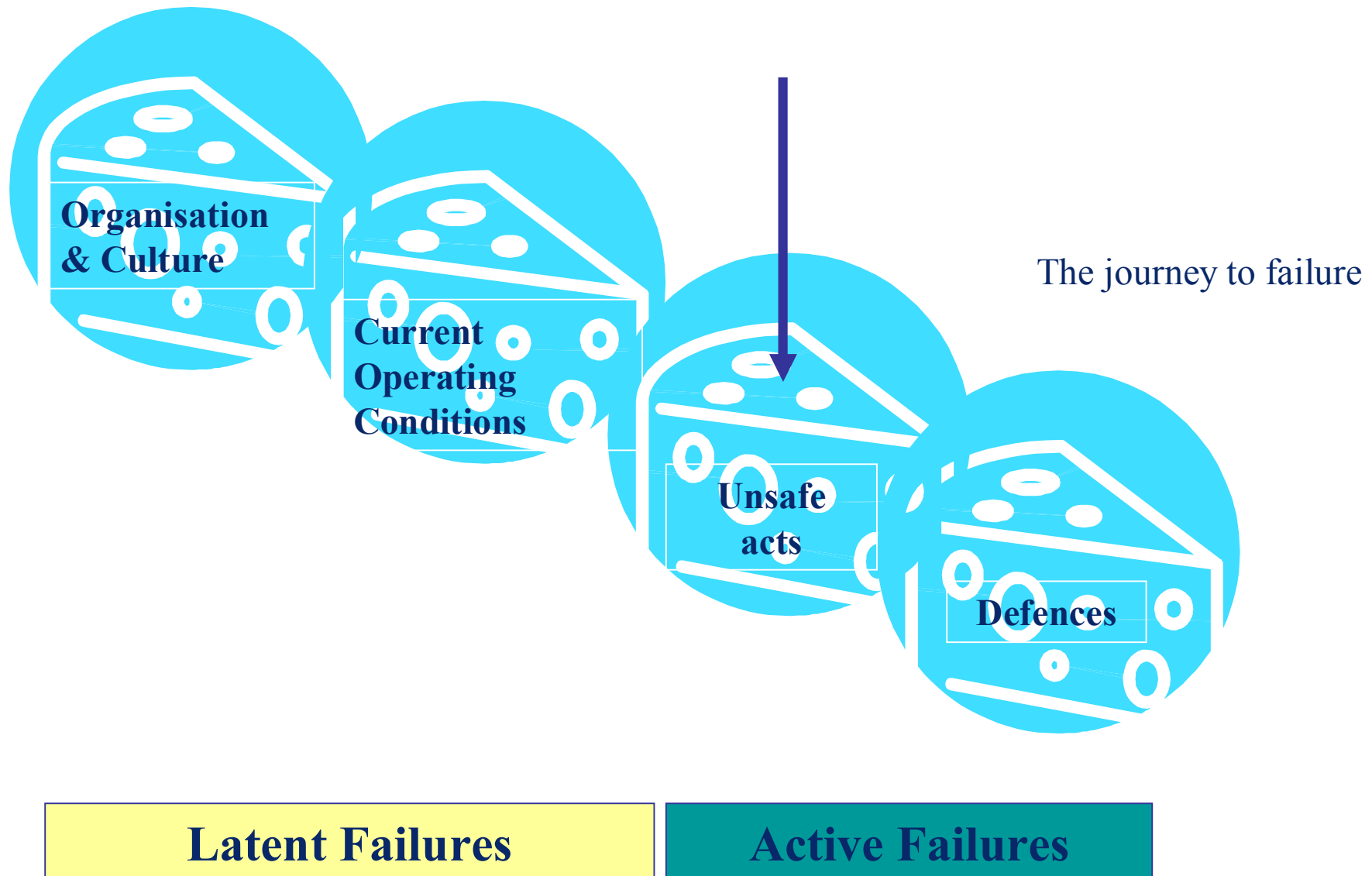
**We still blame the individual  
rather than the system.**

# Vulnerable system syndrome (VSS)

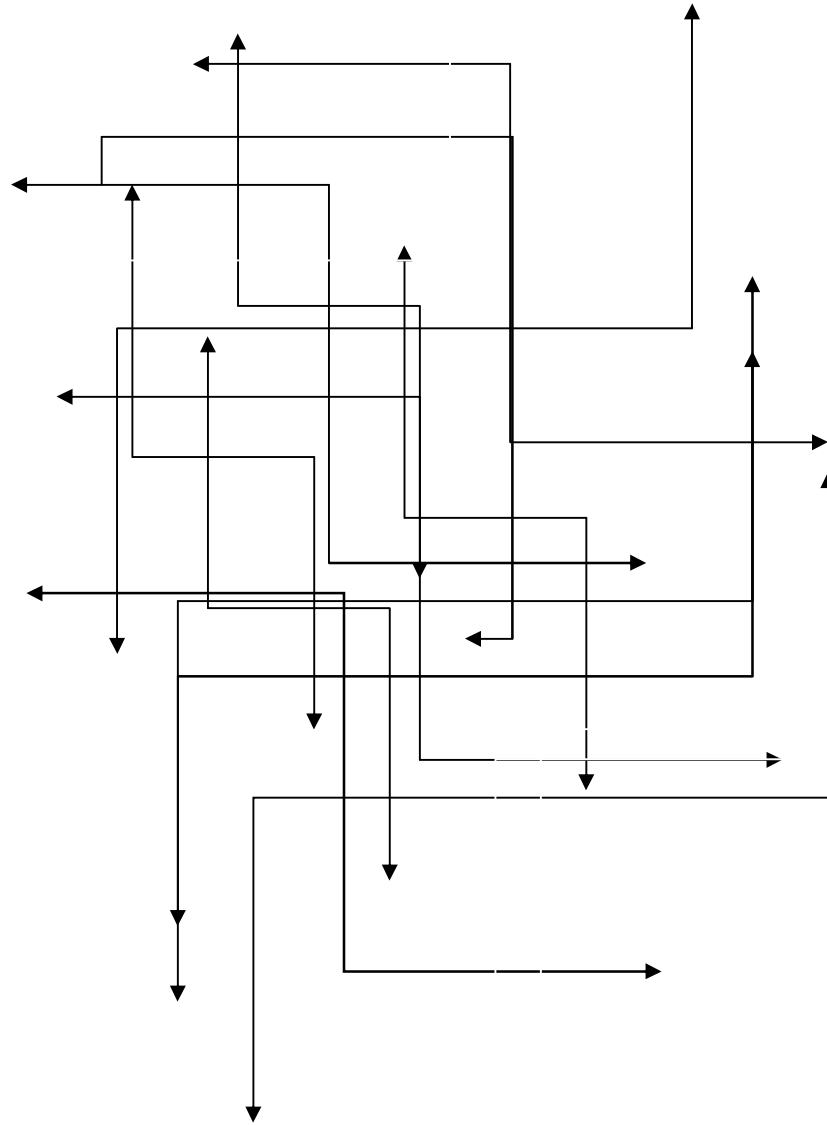
- Three interacting and self-perpetuating elements are in place, namely:
  - the blaming of front line individuals when things go wrong,
  - denying the existence of systemic error provoking weaknesses, and
  - the blinkered pursuit of productive financial indicators.
- VSS is the combination of three **latent failures** that make the staff who directly deliver patient care doomed to fail – and ironically take the blame for the system's failures.

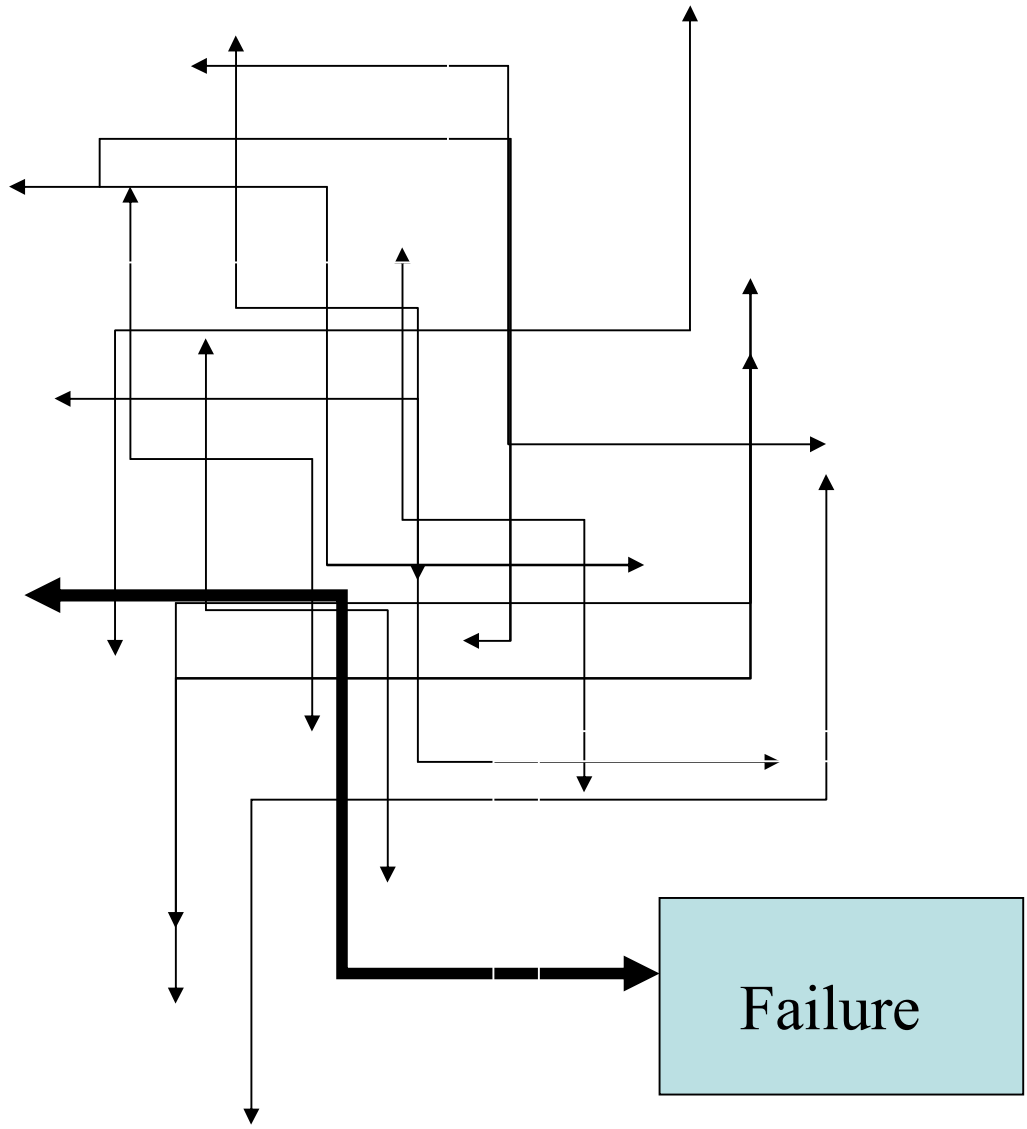
Reason, et al., (2005)

# Work of Reason and Vincent



How could failure occur





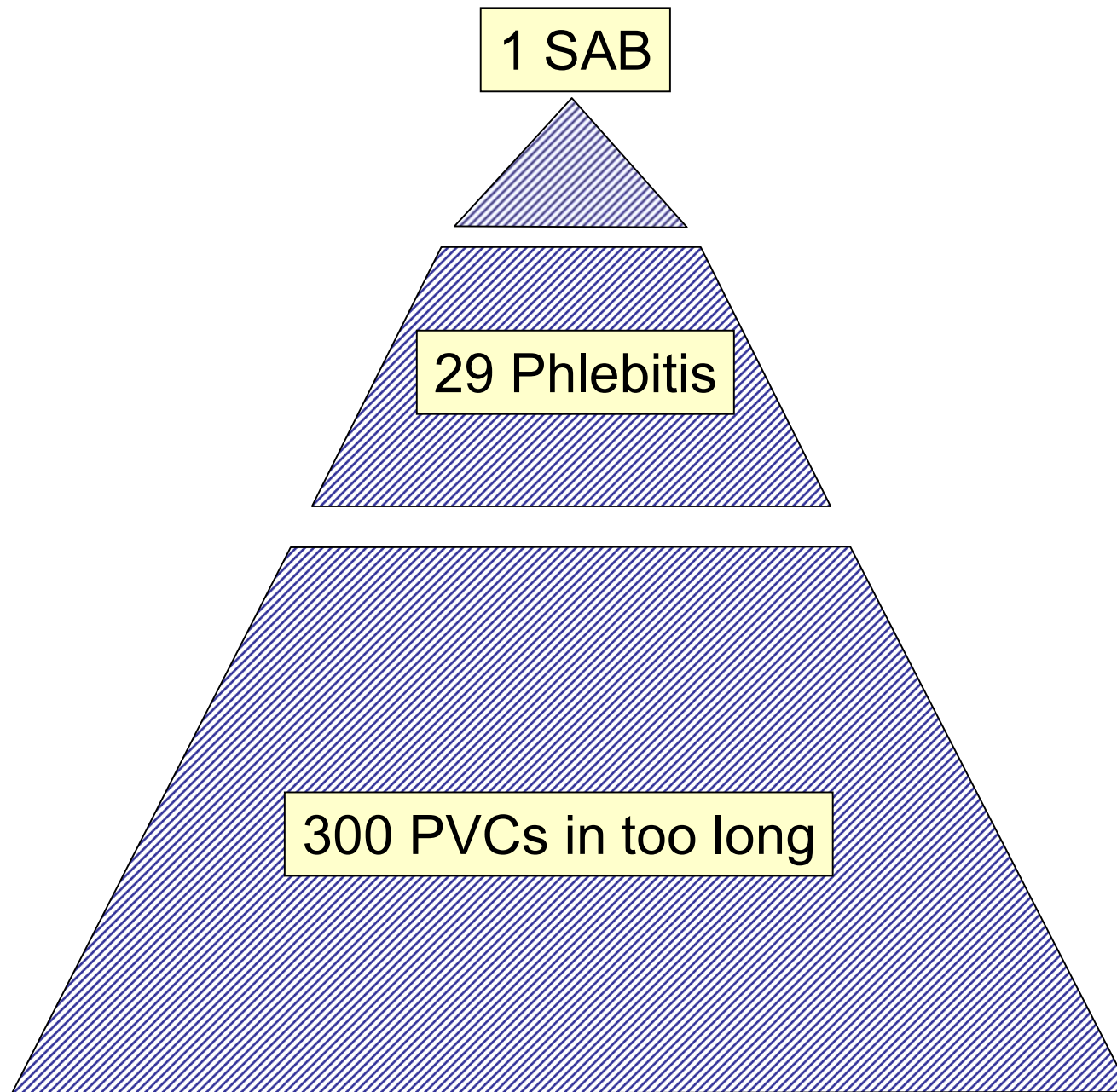
Hindsight Bias

# The importance of aseptic technique in drug preparation

- The ward ran out of pre made up infusions of hepsal.
- 2 nurses made up infusions in batches
- 12 – patients received the infusions
- 5/12 got a blood stream infection *A xylosoidans* and or *S. marscens*
- 0/6 patients whose infusate was made up by nurse 1 got infection
- 5/6 patients whose infusate was made up by nurse 2 got infection
- Of the 5 who were infected
  - 4 who had the infusion in the pm got infected immediately
  - 1 who had infusion in the morning got became symptomatic days later
- NB Organisms can grow from ‘insignificant’ levels to significant levels over the lifetime of the infusion, ergo long term (>12hrs) infusions pose a greater risk.

# The nurse.....

- The outbreak organism was cultured from a nurse's artificial fingernail, which the nurse used to open a vial of heparin that was mixed to make the flush solution



Source: H.W. Heinrich Industrial Accident Prevention 1950

# When things go wrong...

- Its not the system that has to answer to the court (professional or legal) it's the individual

4 – Its not easy to do the right thing (but a lot of people are working on it)

# Errors

- **Skill based errors**
  - Failure in execution
  - **Precede** the detection of a problem
  - **Inattention** or **over attention**
- **Rule based errors**
  - failure of expertise
- Knowledge based errors
  - lack of expertise

# Skill based error - External distraction

- **Wind down** procedure in progress
- Interruption
- After interruption started **wind up** procedure instead of wind down.



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## Nurses see red to cut drug errors

Staff at a Scottish hospital are testing out a simple idea to reduce the number of mistakes made when making up patients' drugs.



The tabards warn staff and patients not to distract the nurses

Nurses in charge of the drugs round at Gartnavel hospital in Glasgow wear red tabards when dispensing drugs.

Staff and patients on two wards at the hospital are told not to speak to them when they have got the garments on.

Nurses said the idea stopped constant interruptions and has proved a success with staff.

Studies have suggested that as many as one in 10 patients experience some kind of drugs mix up.

The NHS in Scotland does not record how many result in fatalities, but a report in England and Wales found there were 1,200 deaths in one year alone.

### VIDEO AND AUDIO NEWS

See further details of the scheme

Watch

### SEE ALSO

- Robots to dispense hospital drugs 22 Feb 06 | Northamptonshire
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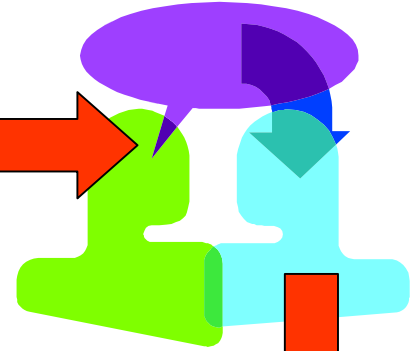
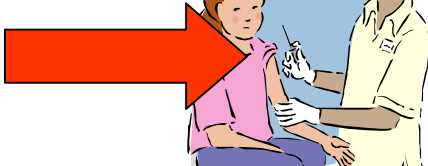
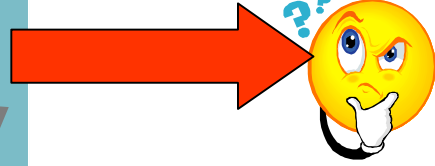
News feeds

# Guidance

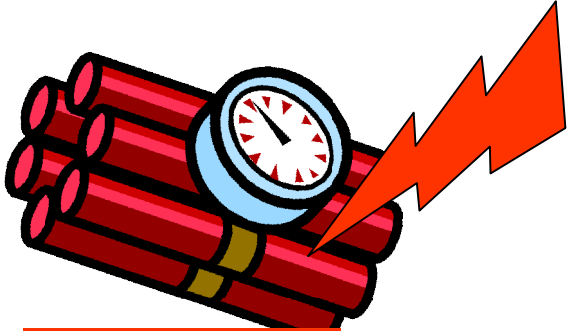
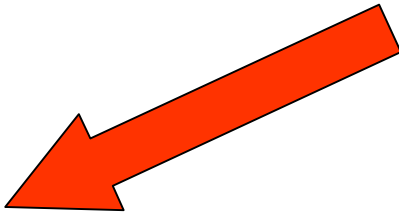
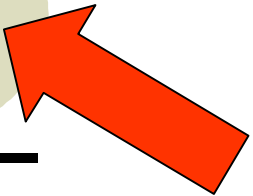
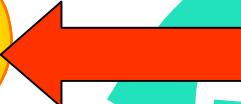
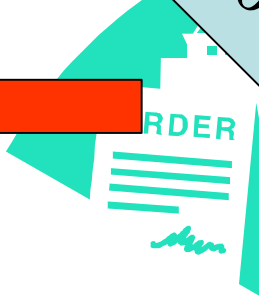
There is a problem with the amount of guidance and fitting all the recommendations into existing systems



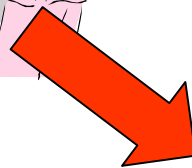
Guidance – this is what to do,  
but no how to get it done



Keep IV in /  
No instruction



SAB Time Bomb



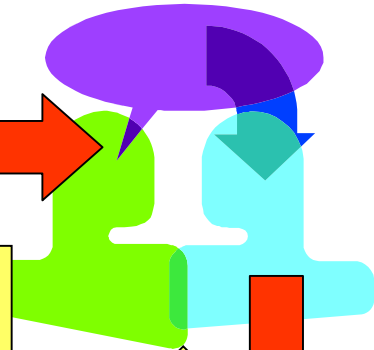
Other organism  
Contaminant



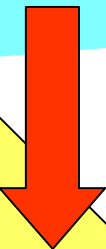
Clear,  
accessible  
decision aid



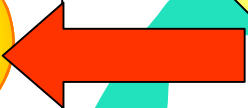
Insertion checklist  
Defined use only - QC



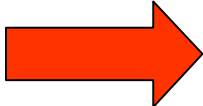
Consider removal  
in 24 hrs



PVC bundle  
Involve patients  
ACTIVE – PLAN TO  
REMOVE



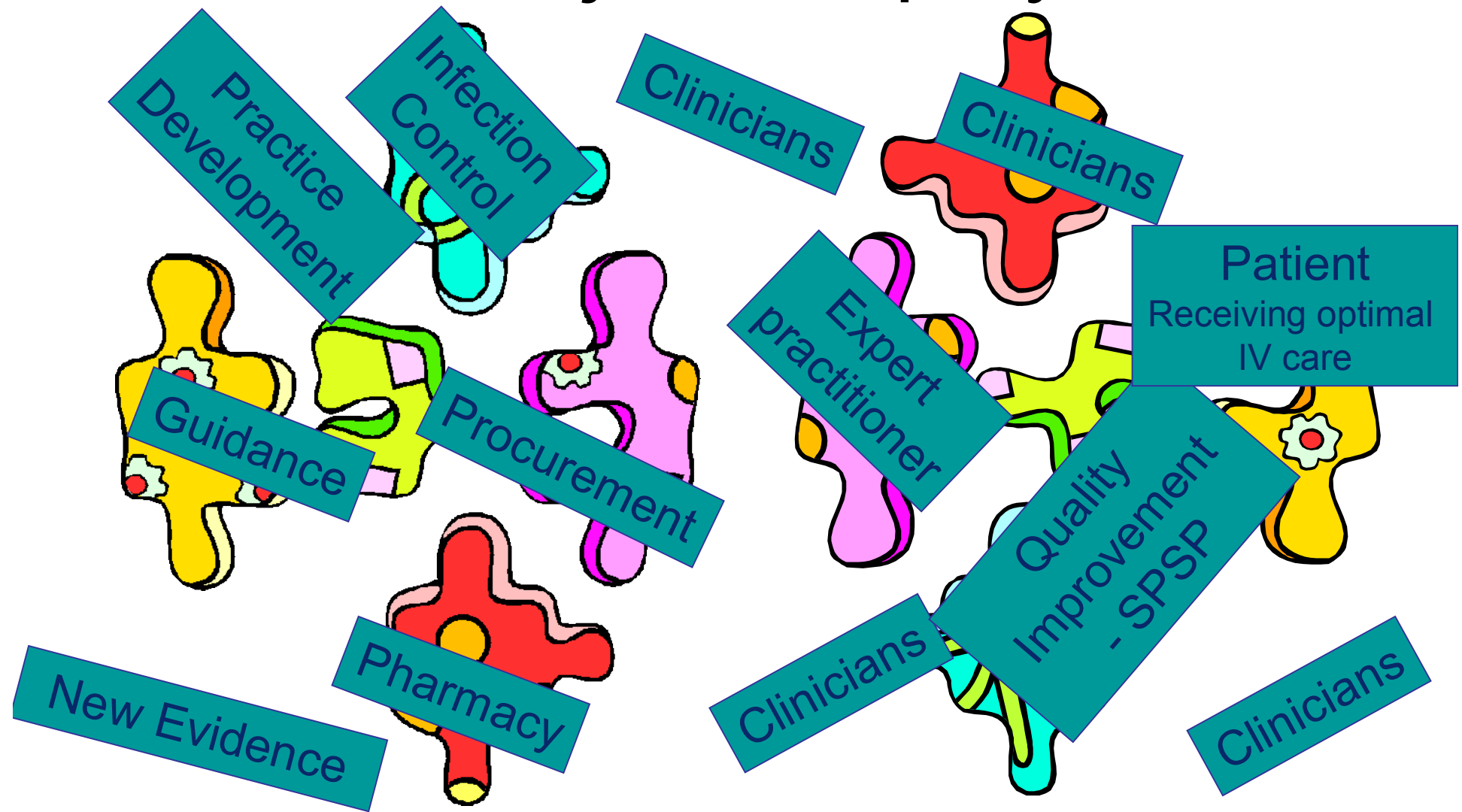
QC to reduce  
contaminants



5 - Its not joined up

New Equipment

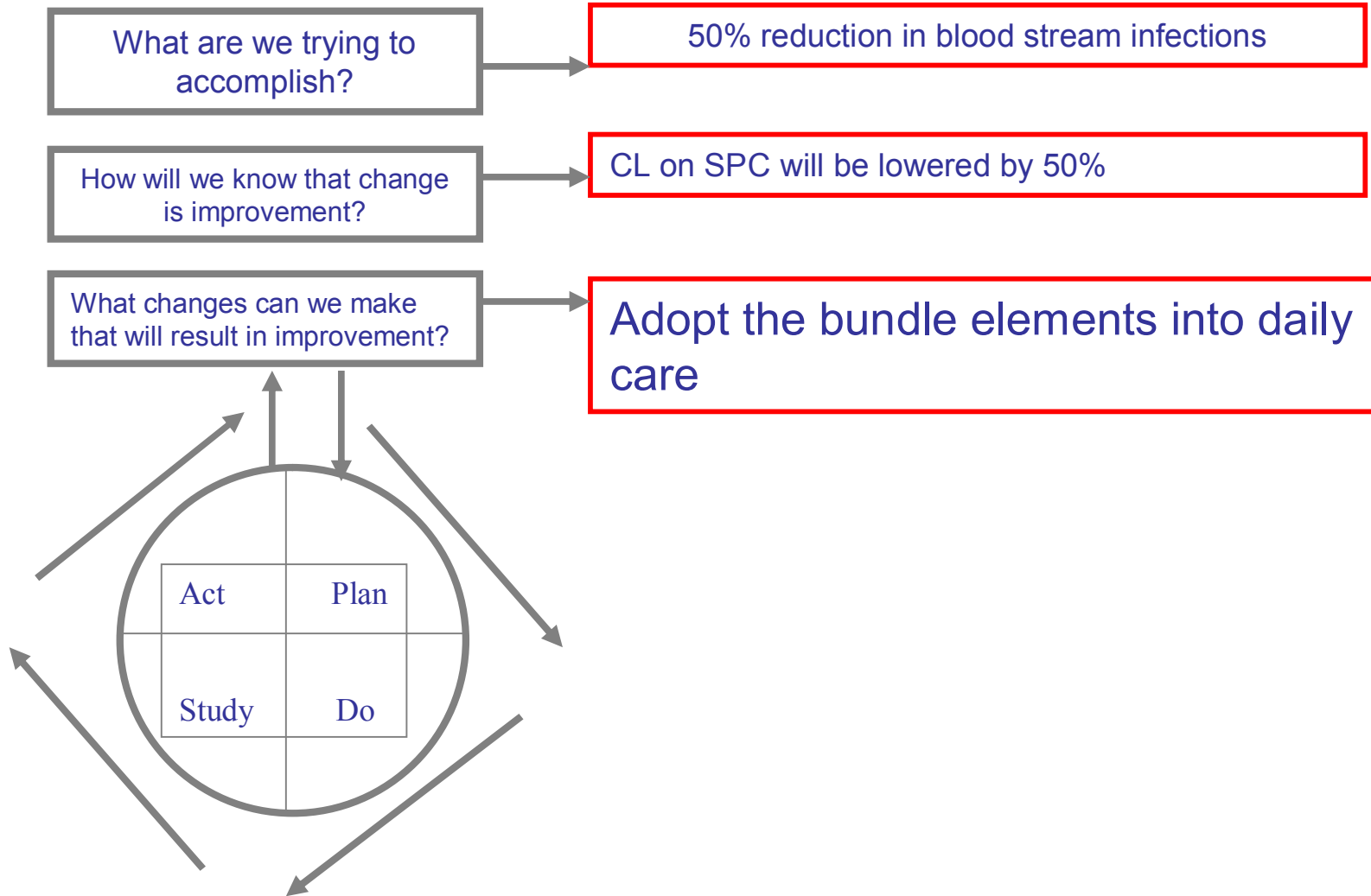
# Its not joined up - yet



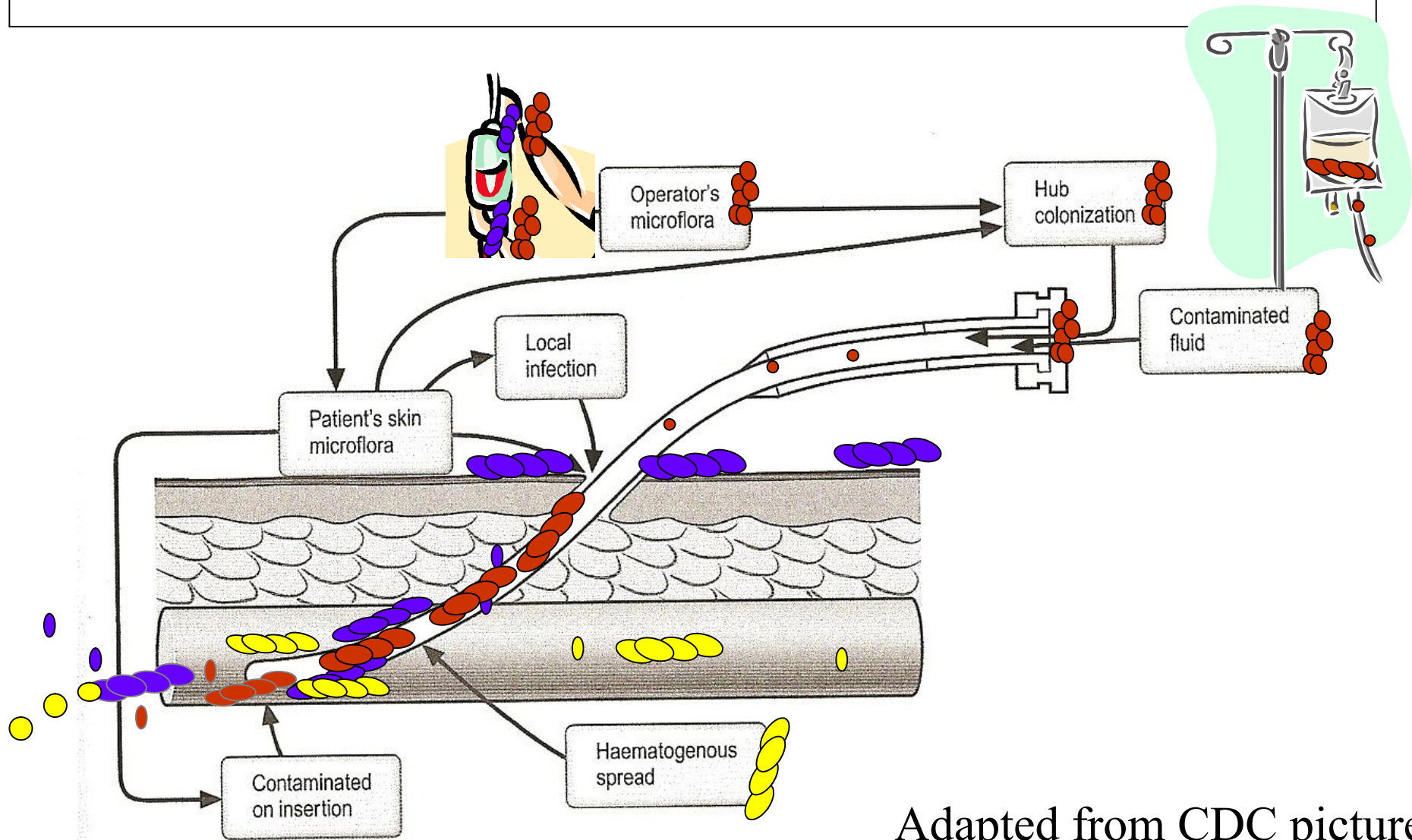


6 - It is getting better – but there is  
more to do

# SPSP methodology

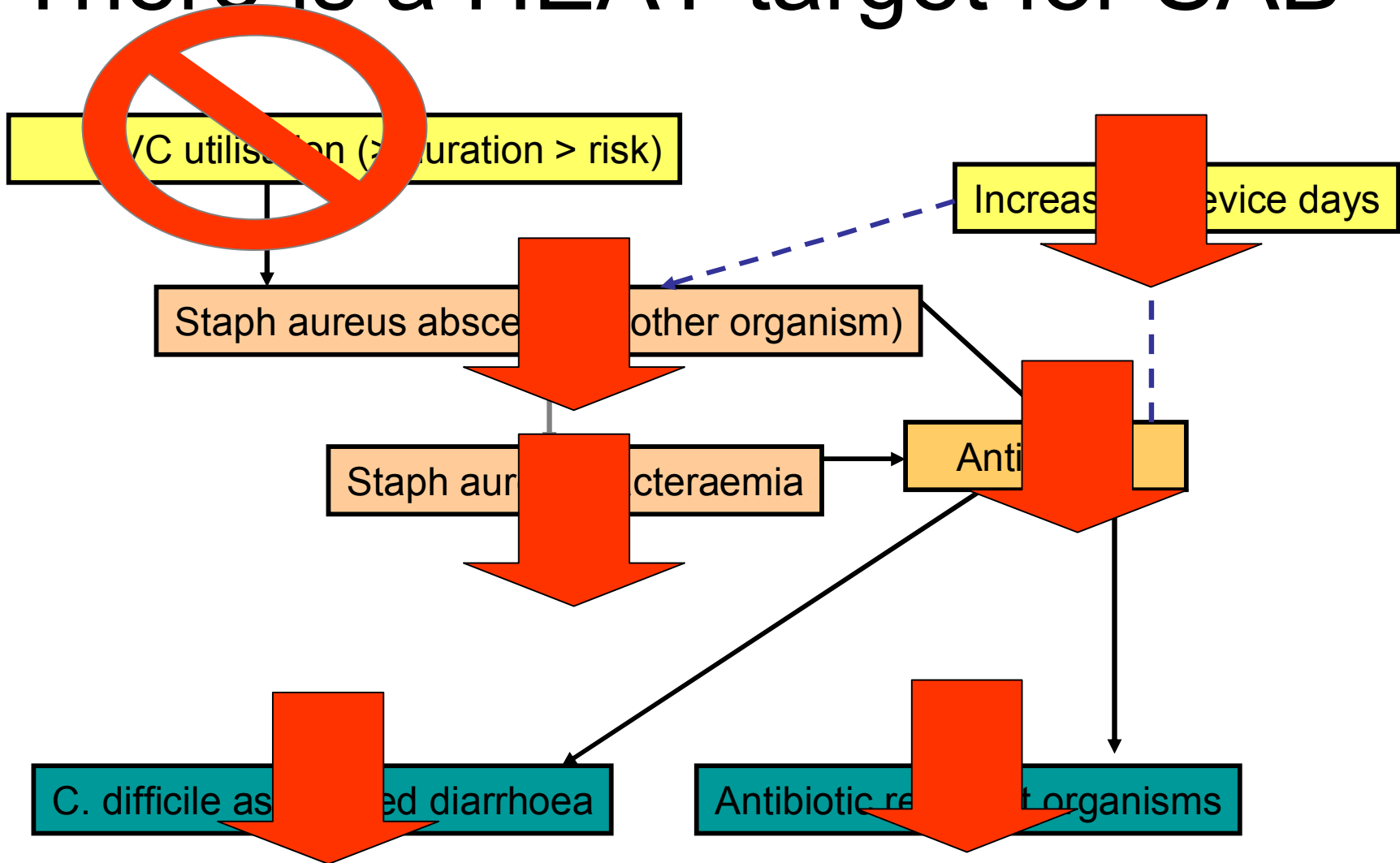


# Sources of infection: IV catheters



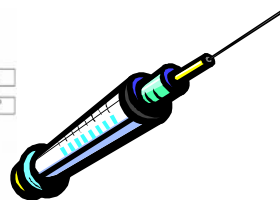
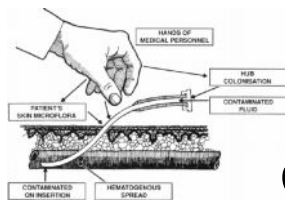
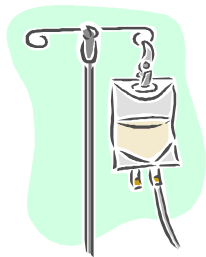
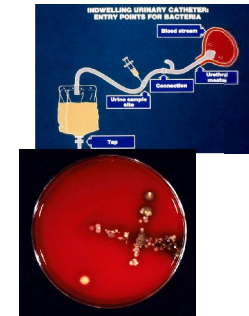
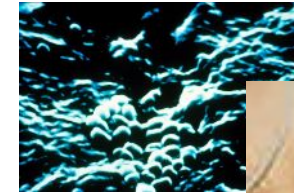
Adapted from CDC picture

# There is a HEAT target for SAB





Healthcare interventions, like surgery, or the use of catheters, make patients extremely vulnerable to infection



To Reduce Device Days  
& Optimise Care

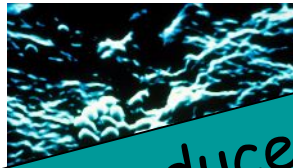
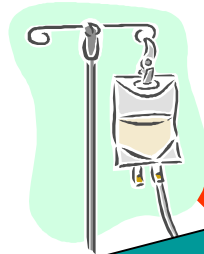
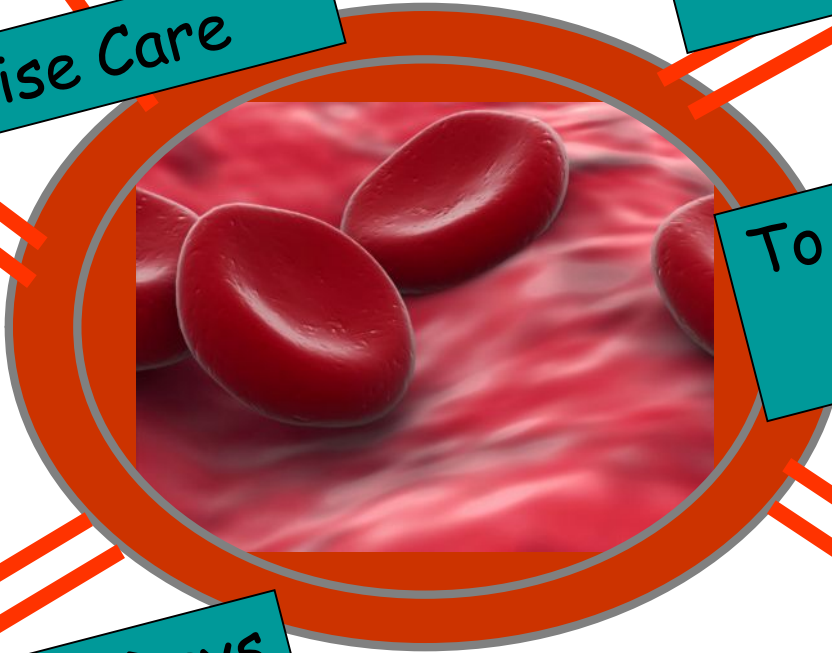
To Reduce Device Days  
& Optimise Care

To Optimise Care

To Reduce Device Days  
& Optimise Care

To Reduce Device Days  
& Optimise Care

To Optimise general  
care

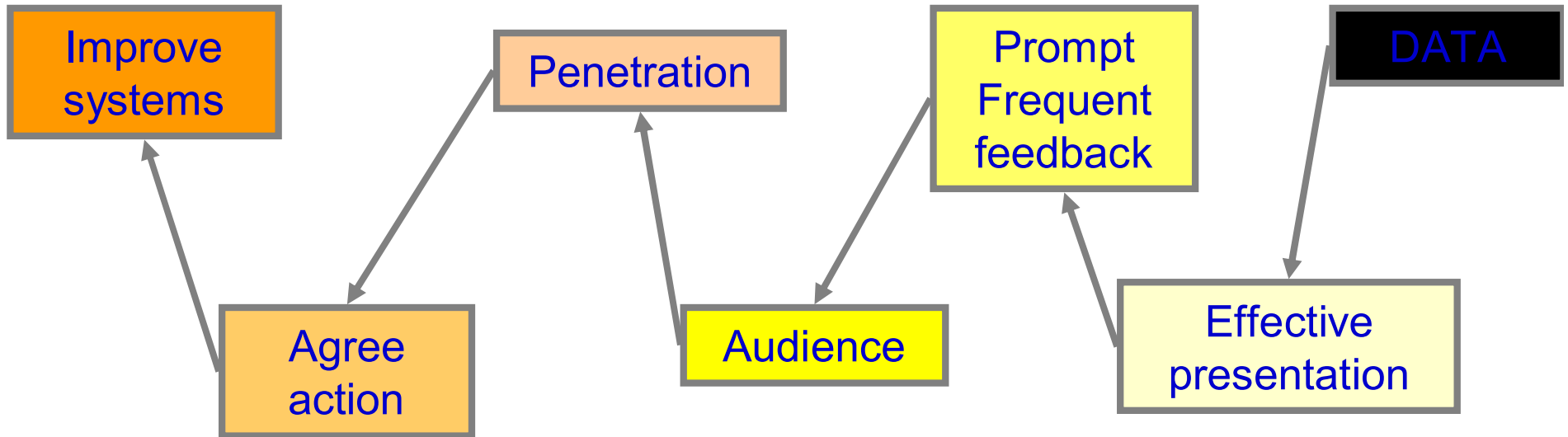
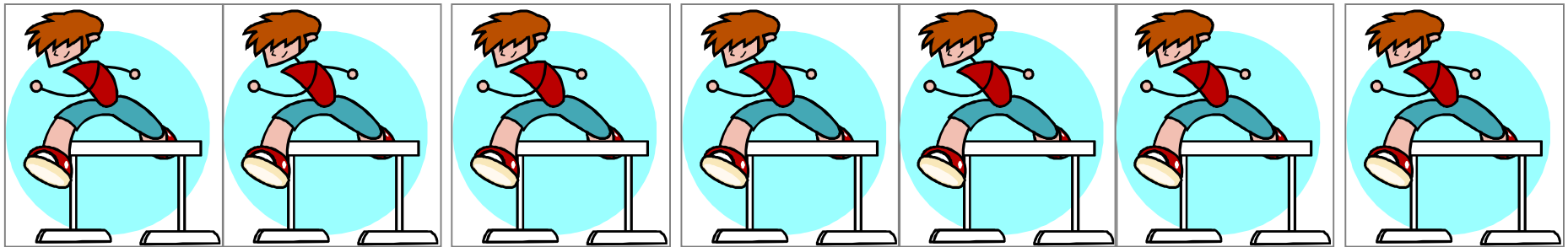


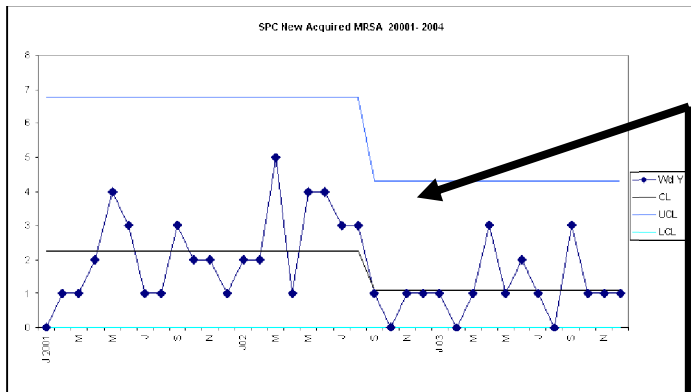
# Bundles - CVC, PVC

- The bundles are based on the best available evidence
- **All or nothing** assessment
  - Each bundle criteria is critical to achieving the bundle and improving care, so the bundle is scored only if **all** the criteria are achieved.
  - See [www.hps.scot.nhs.uk](http://www.hps.scot.nhs.uk)

# A [patient] checklist is

- A list of steps to be performed in routine task
- Purpose: to reduce the risk of the omission error or the procedure being performed incorrectly and potentially causing the patient harm

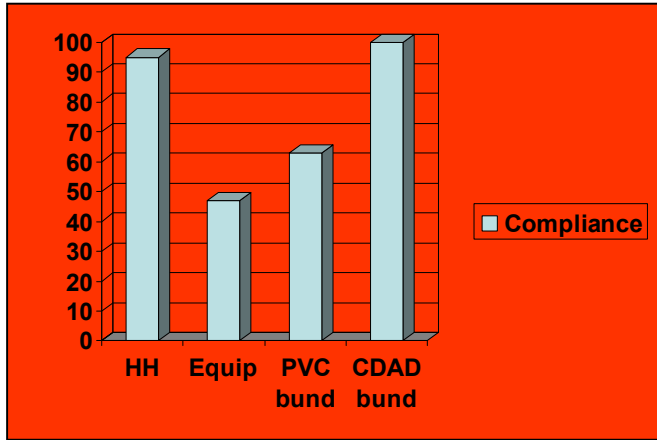




How often do we harm patients?

# Quality Improvement Story Board – the Pronovost questions

How often do we do what we are supposed to do?



New way to improve antibiotic use started here

What have we changed as a result of identified errors?

Permission to say stop – the patient is always in the room



# National Procurement

- Pick and Pack CVC insertion pack going for contract

# Vascular access care

- Trying harder wont do
- Need fundamental and sustained system improvements
- To get there we need the voices of multiple experts to advise on practice, purchase, performance monitoring

We need a Scot-VAN – to  
make it safe for patients every  
time