Patient Safety and Risk Management Strategies in the ED

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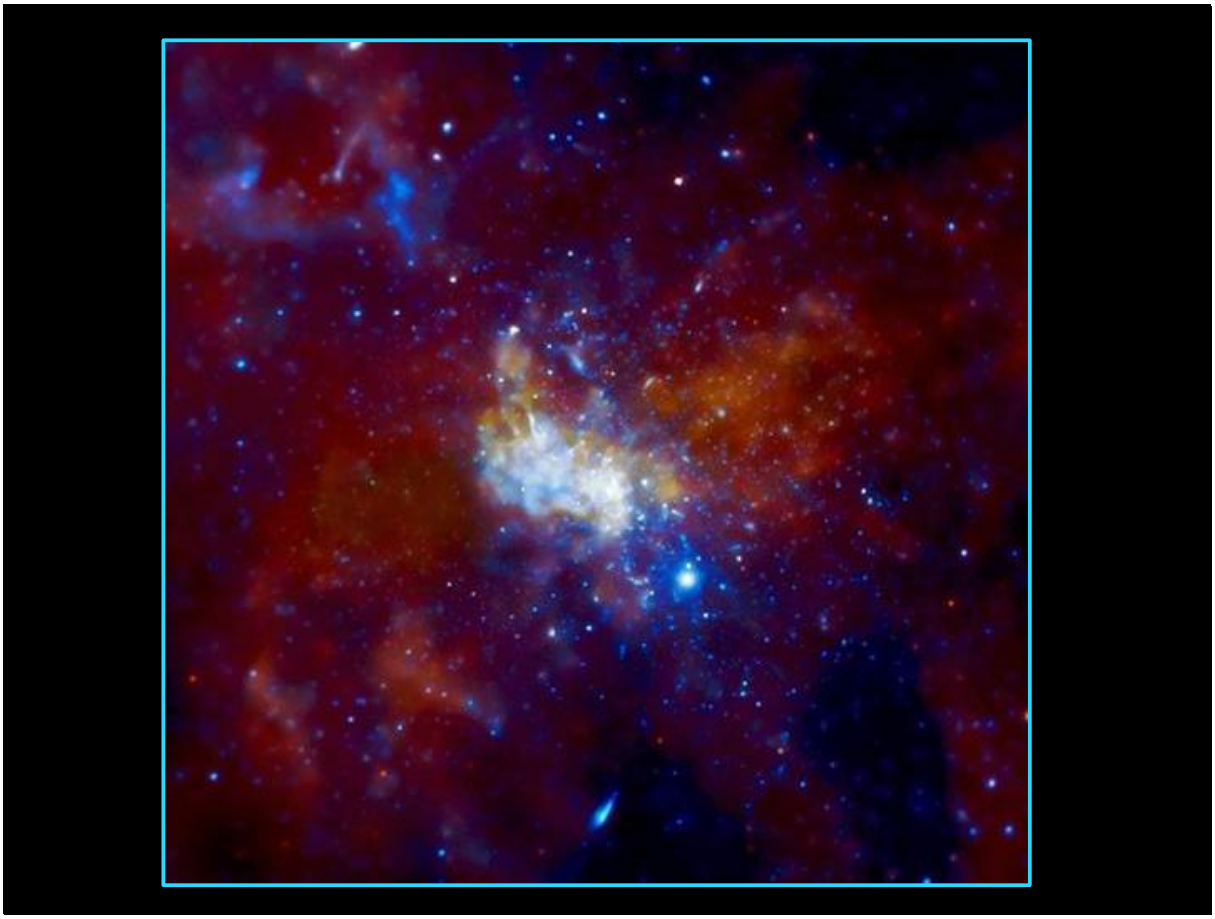
ICEM Dublin

1 Introduction

In choosing the areas to discuss this morning I am going to limit myself to those areas where evidence does exist and have made a conscious effort to avoid those areas being discussed elsewhere in the conference this week for instance – crowding.



2 Black Hole

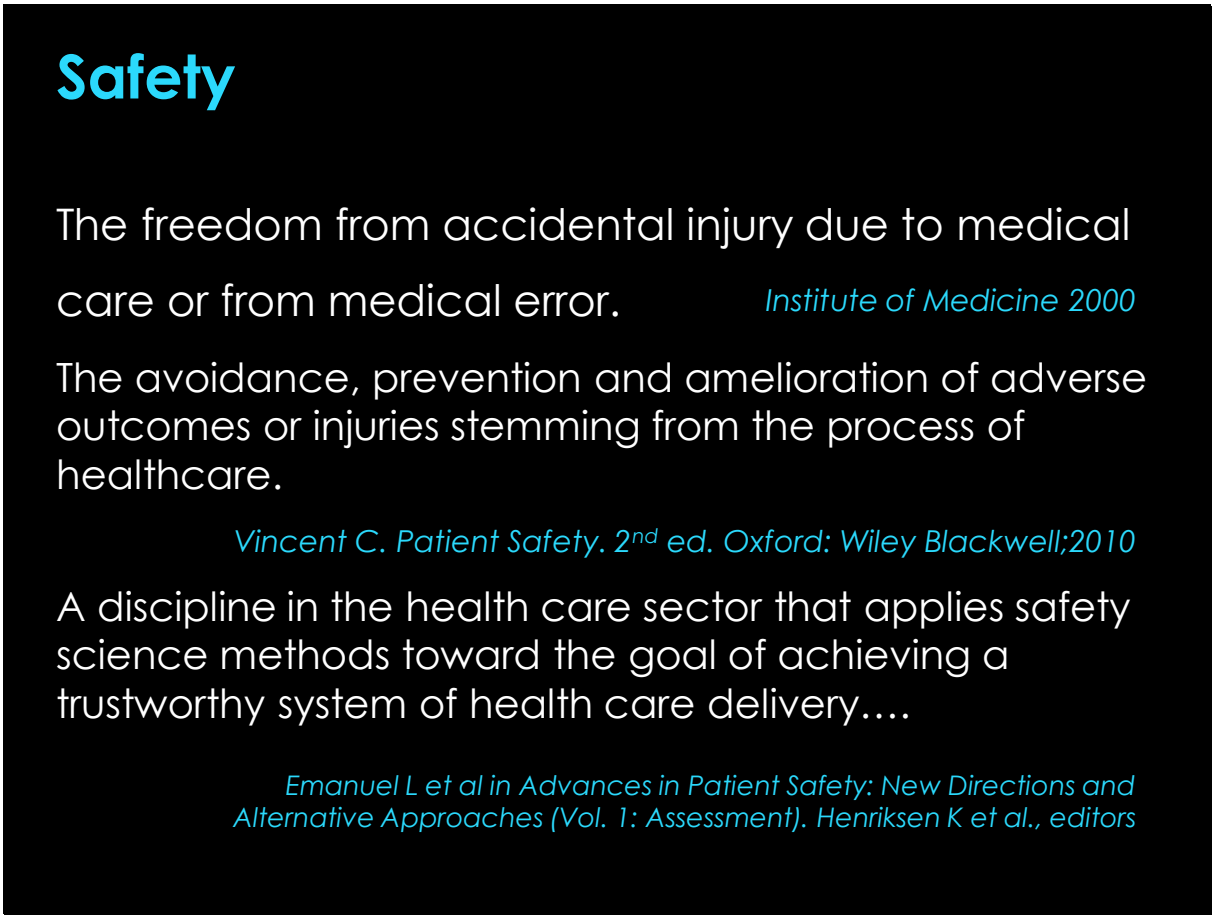
A black hole is a useful analogy for the current absence of strong scientific evidence to support improvements in patient safety particularly within the ED. So why is that?

There are two opposing views on the matter of research and implementation; some arguing traditional evidence standards should not be relaxed for the evaluation of safety interventions, whilst others argue they are inappropriate for areas as complex as patient safety. This debate I suspect has had some effect on the availability of good safety related research.

3 Measurement

Another challenge lies in the ability to measure progress in safety and therefore assess the effectiveness of various strategies.

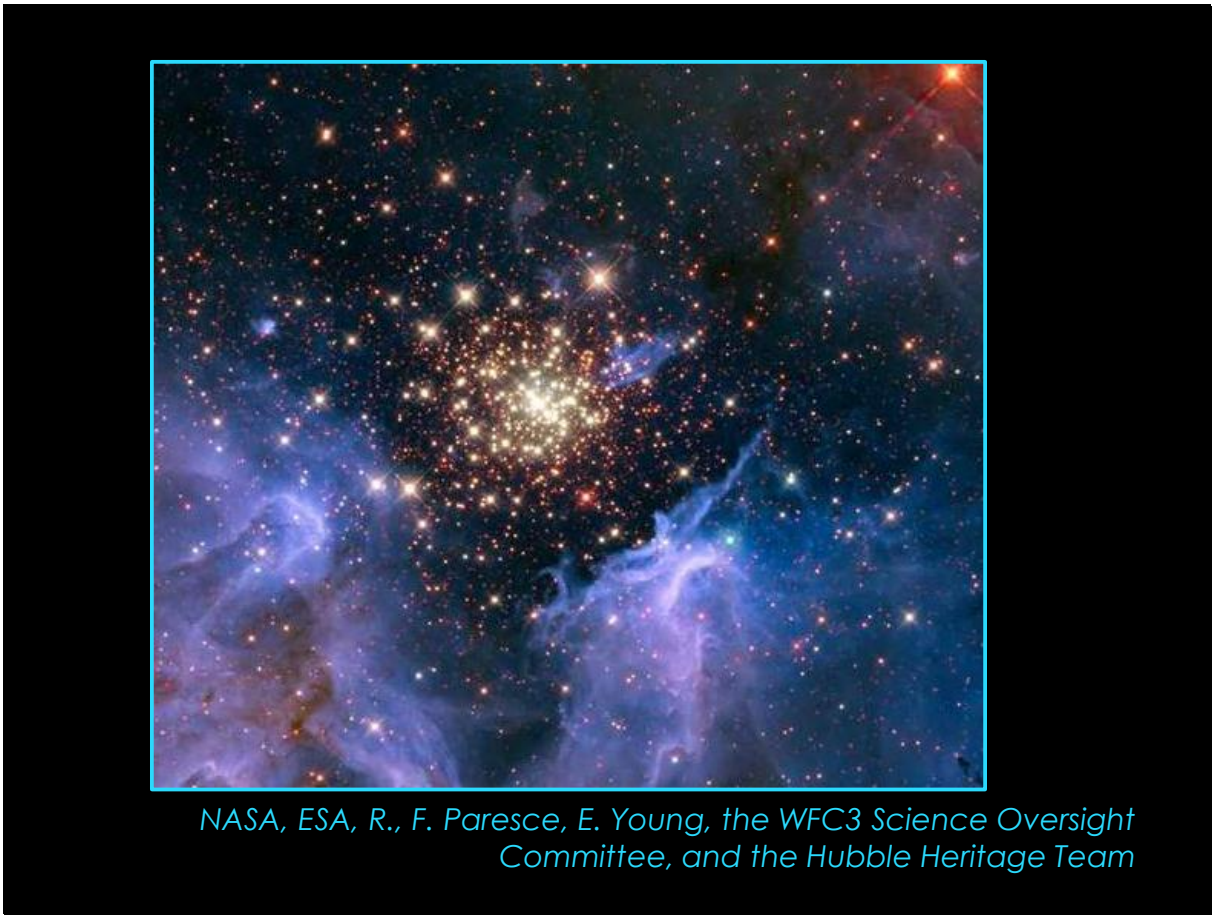
Most safety parameters are difficult to capture in the form of valid rates for the reasons outlined on this slide. All of these may introduce bias; creating measurement systems that are relatively free of such bias would be costly and very complex. Despite these issues measures of patient safety are often inappropriately presented as valid rates.



4 Definition

And then there is the problem that it is difficult to measure something that does not have a unified definition. Numerous definitions are in use, some of which are incomprehensible and somewhat baffling.

These widely disparate definitions in circulation result in considerable difficulties not only in delivering improvements but also in measuring effects causing many a patient safety journey may stall.

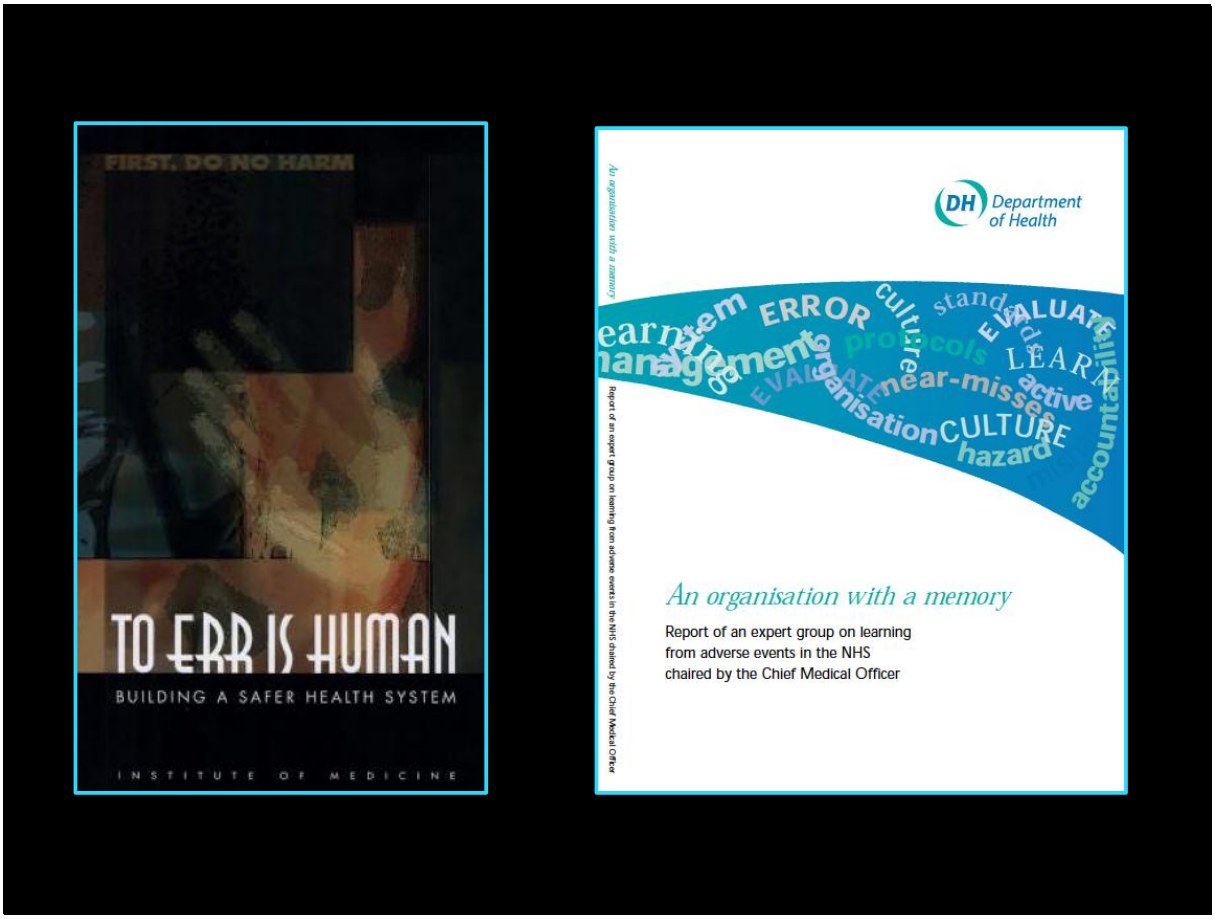


NASA, ESA, R., F. Paresce, E. Young, the WFC3 Science Oversight Committee, and the Hubble Heritage Team

5 Stars

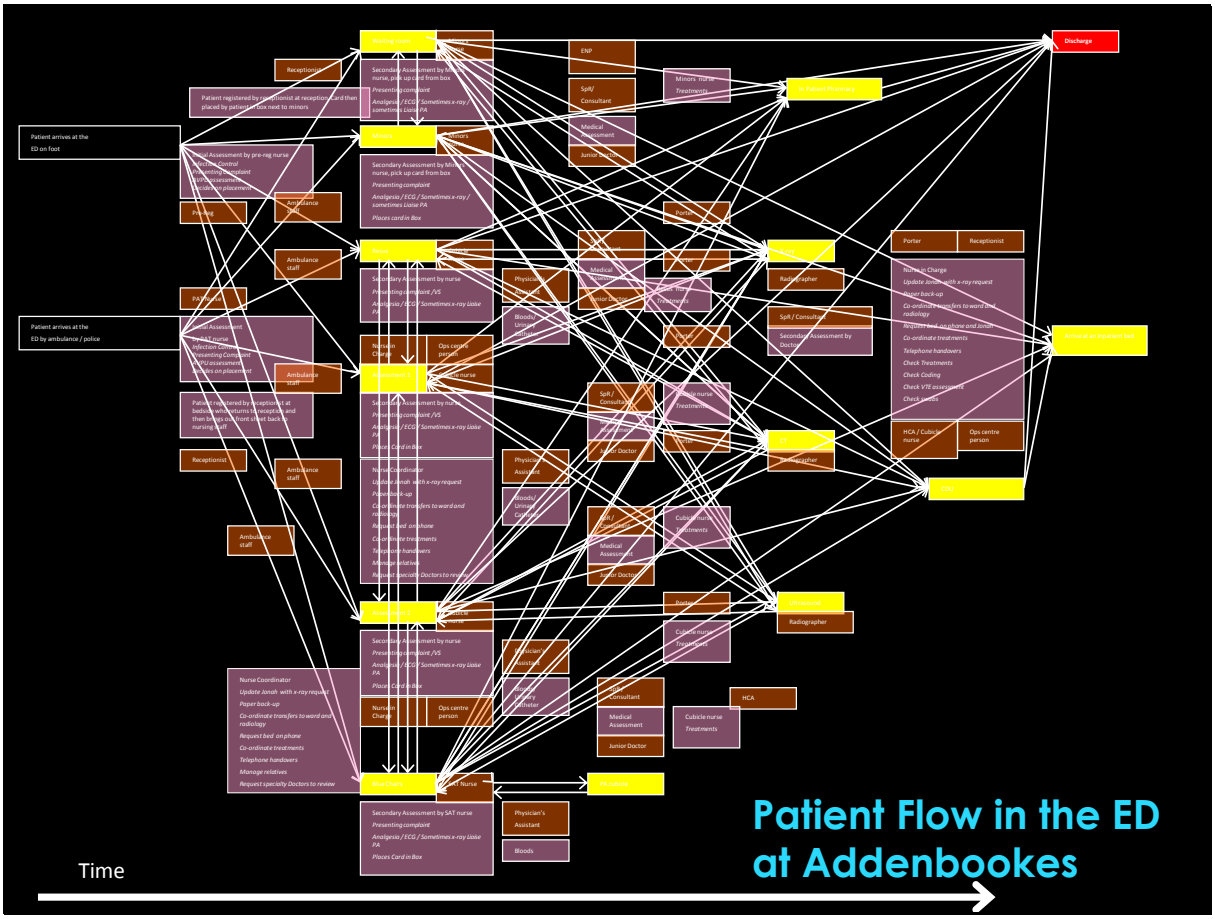
However, whilst I have talked about a black hole in terms of the availability of good quality evidence to support effective interventions to improve safety I think there are a few stars out there that are worth highlighting.

I want to start by discussing some of the generic approaches to improving safety before moving on to present some interventions that have been shown to improve some very specific safety problems.



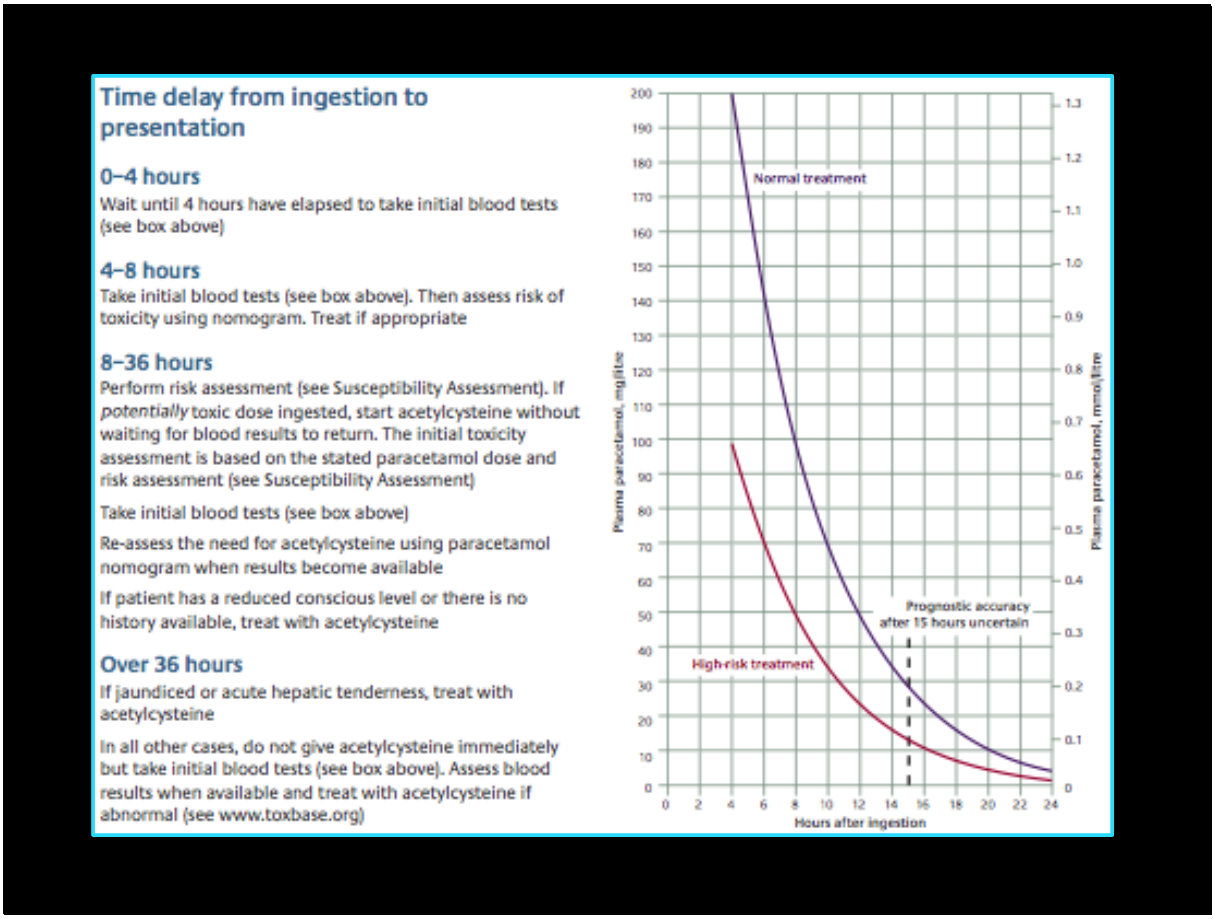
6 To Err is Human (1999) Org with Memory (2000)

Both these reports emphasised the most effective way to reduce error and harm was to target underlying system failures. Sadly to date there is little evidence, certainly within the UK, that any truly system wide changes focusing on safety have been implemented.



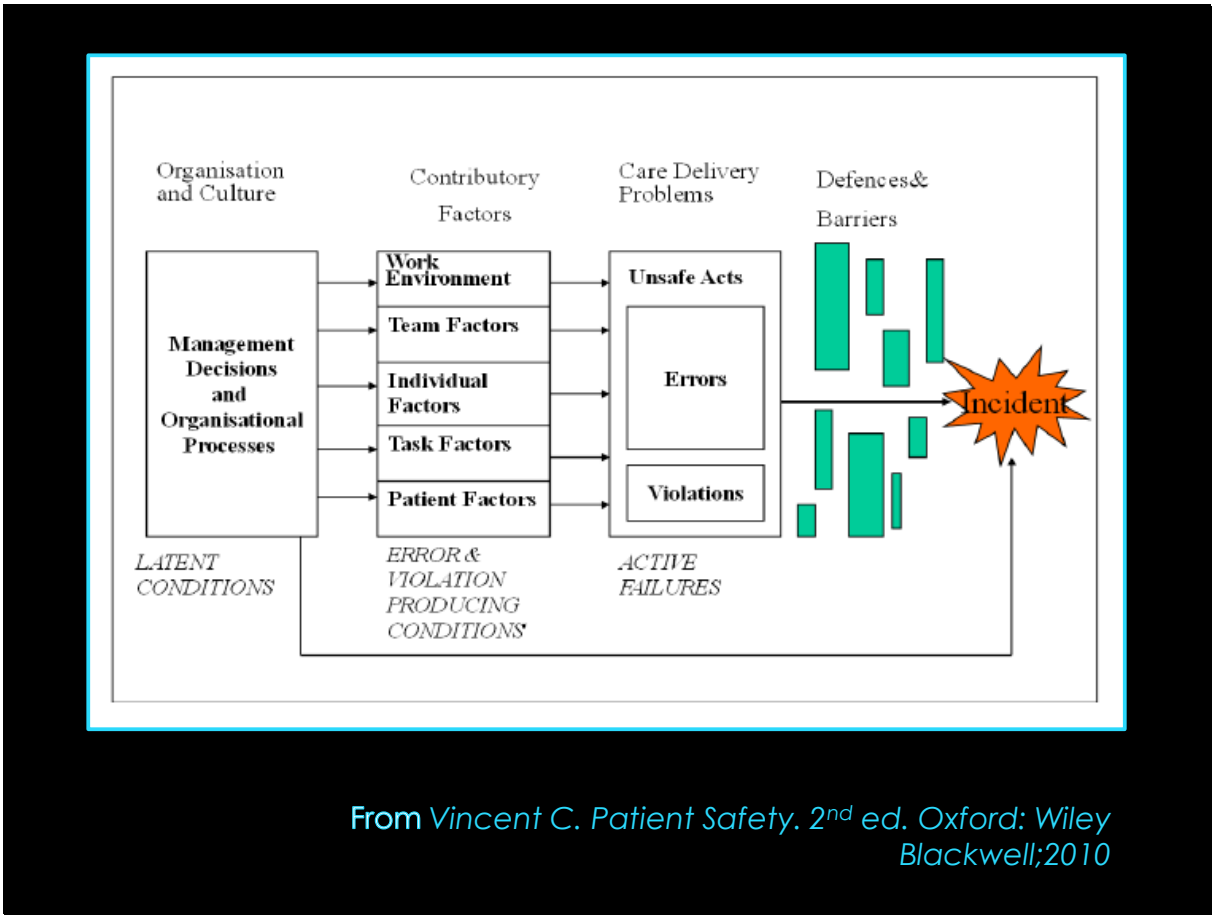
7 Patient Flow in ED

Healthcare systems are cumbersome, unwieldy, and unfriendly. This slide depicts just a single process in the ED; that of patient flow. Is it really any surprise anything goes wrong?



8 Paracetamol Nomogram

In contrast the pathway for managing paracetamol poisoning clearly depicts how decisions are reached based on a specific time and clear well delineated drug levels. The only area left for any discretion is whether the patient is at high or low risk of paracetamol poisoning. Good systems make the right thing to do the easiest thing to do.



From *Vincent C. Patient Safety. 2nd ed. Oxford: Wiley Blackwell;2010*

9 Seven levels of safety

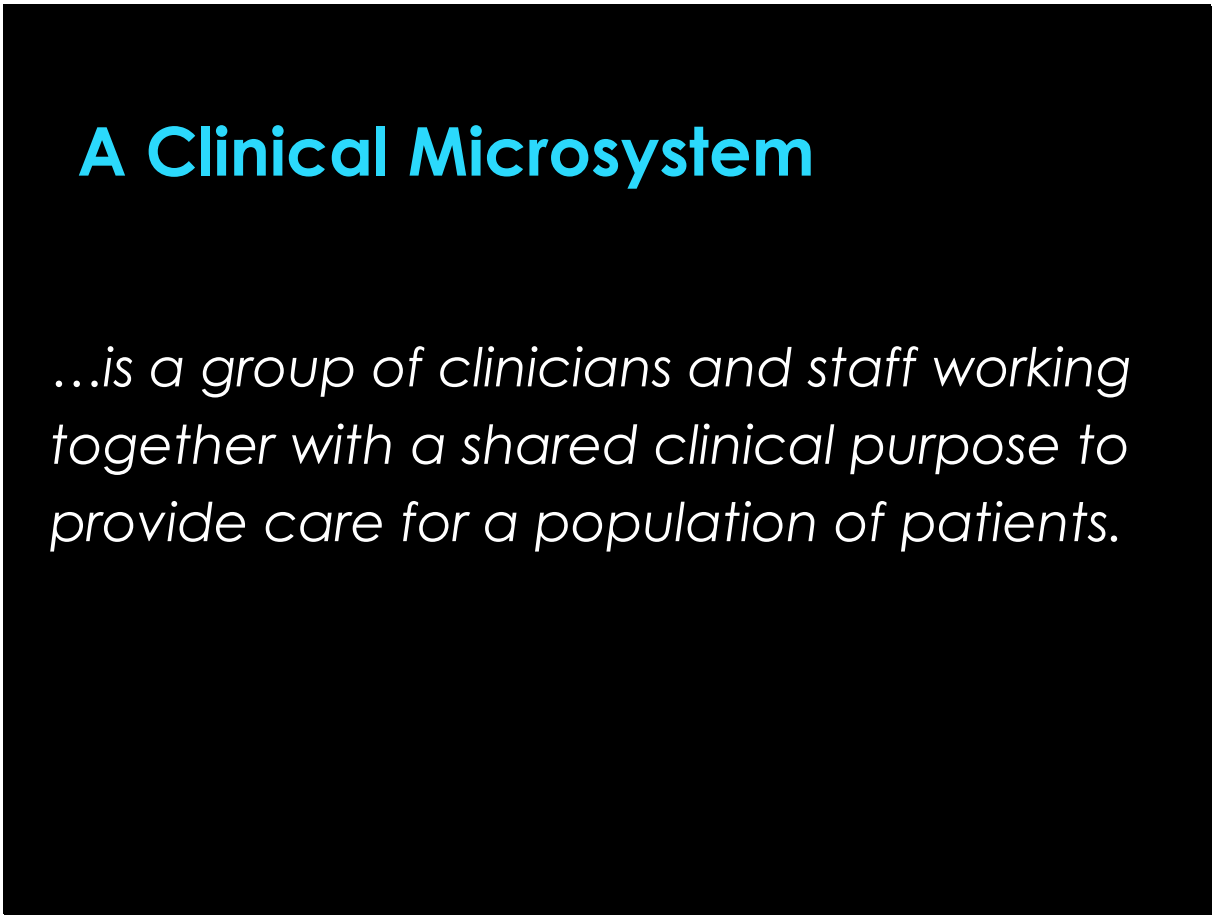
Whilst the actions and failures of individuals may play a central role in the causation of harm, their thinking and behaviour is strongly influenced and constrained by the working environment and wider organisational processes.

This framework, taken from Vincent's work, depicts those factors affecting clinical practice. An example of an organisational process could be a lack of capacity within the hospital resulting in ED crowding, along with the decision that boarding will not be tolerated, nor will any breaches be permitted.

Most of our departments were not built to support the delivery of modern emergency medicine

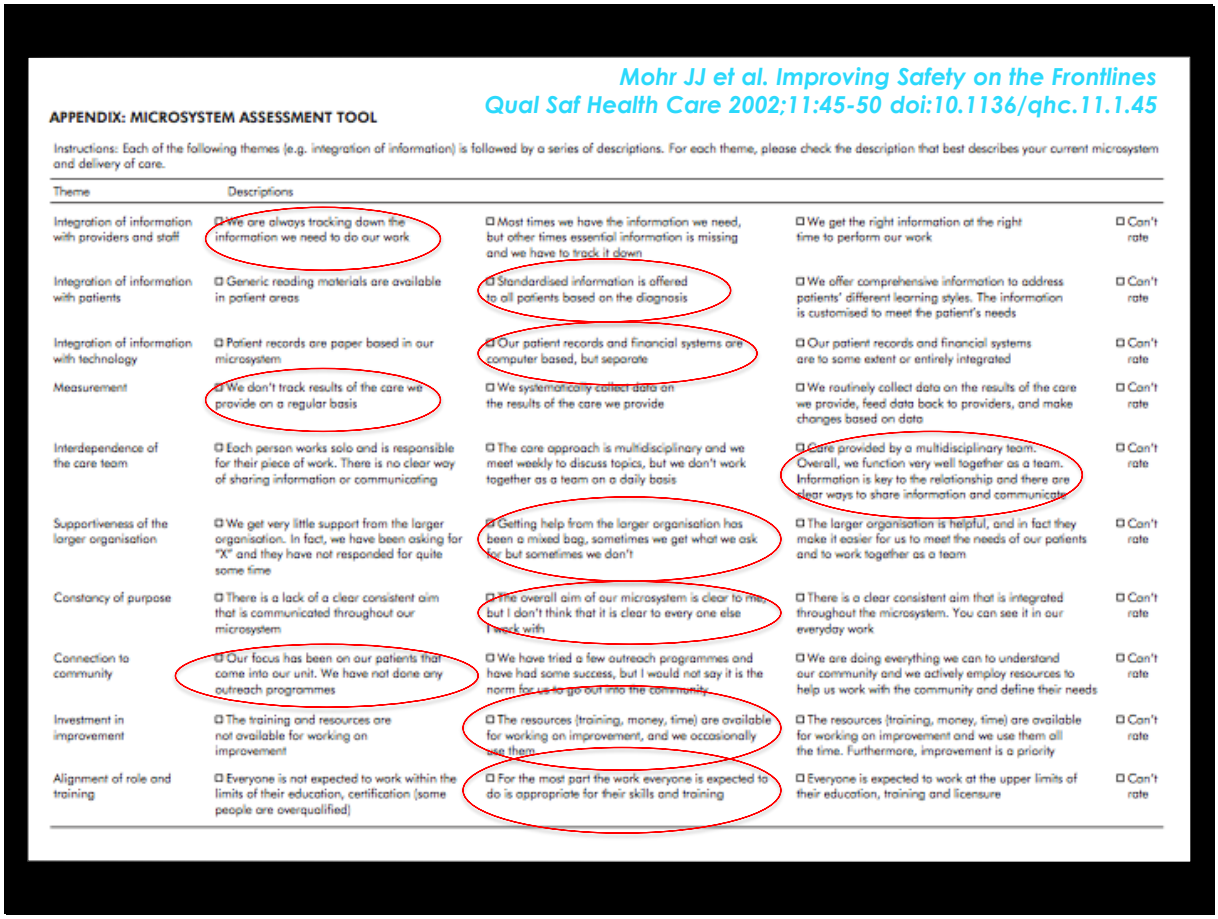
We work with large teams, which change frequently, can be inexperienced or locums and the majority of which never train together.

Our patients have diverse and undifferentiated presentations and often present in large volumes. Whilst working through this framework makes it explicit why we have a problem with safety within the ED it also demonstrates patient safety can only be improved through the systematic application of change to process, equipment, organisation, supervision, training, teamwork and culture. An outstanding system can only be built from outstanding elements. What we struggle with is how we do that.



10 Microsystem

The concept of a microsystem is one that has evolved from systems theory coupled with the theory of a smallest replicable unit. It might sound like management babble but an understanding of some of the work examining this model may help in articulating a mechanism for introducing changes to improve safety.



Mohr JJ et al. Improving Safety on the Frontlines
Qual Saf Health Care 2002;11:45-50 doi:10.1136/qhc.11.1.45

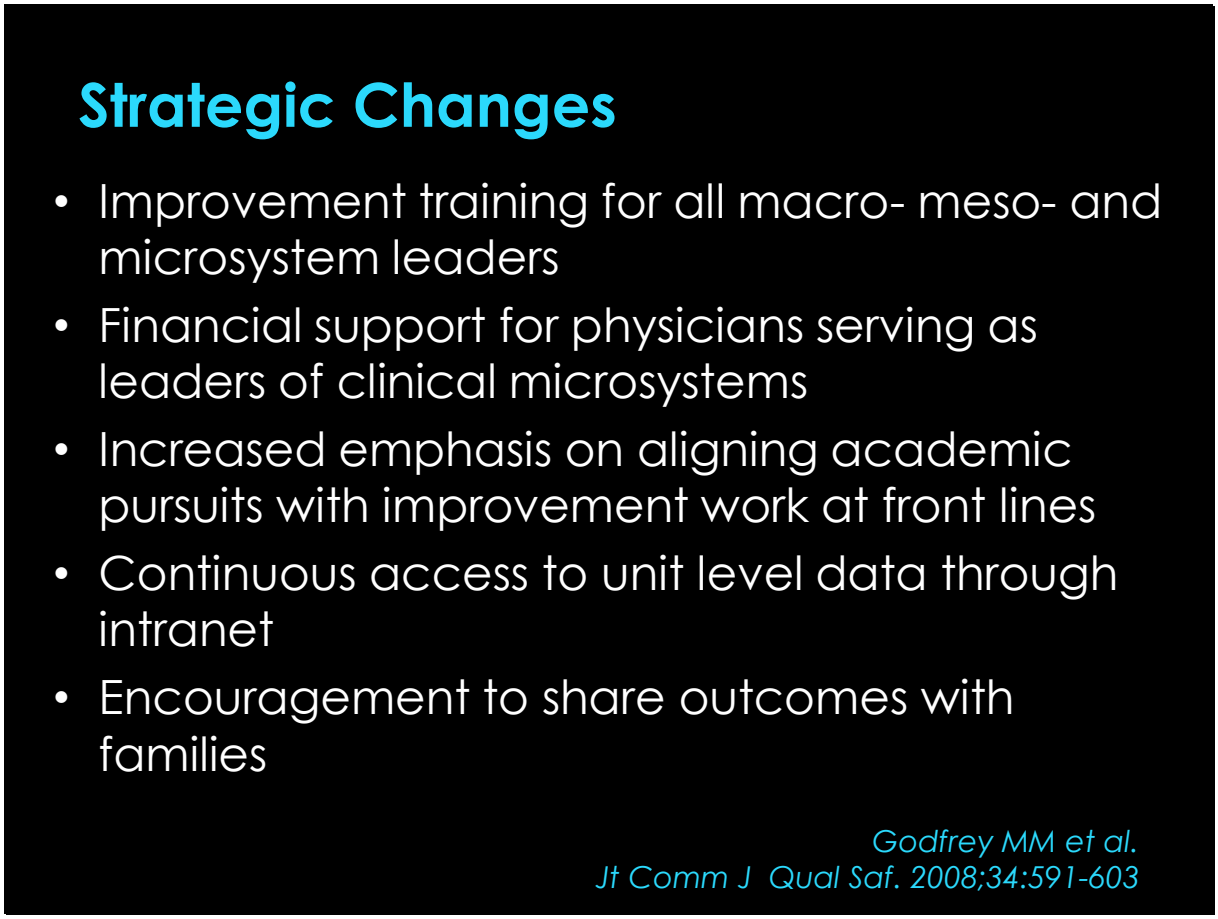
APPENDIX: MICROSYSTEM ASSESSMENT TOOL

Instructions: Each of the following themes (e.g. integration of information) is followed by a series of descriptions. For each theme, please check the description that best describes your current microsystem and delivery of care.

Theme	Descriptions			
Integration of information with providers and staff	☐ We are always tracking down the information we need to do our work	☐ Most times we have the information we need, but other times essential information is missing and we have to track it down	☐ We get the right information at the right time to perform our work	☐ Can't rate
Integration of information with patients	☐ Generic reading materials are available in patient areas	☐ Standardised information is offered to all patients based on the diagnosis	☐ We offer comprehensive information to address patients' different learning styles. The information is customised to meet the patient's needs	☐ Can't rate
Integration of information with technology	☐ Patient records are paper based in our microsystem	☐ Our patient records and financial systems are computer based, but separate	☐ Our patient records and financial systems are to some extent or entirely integrated	☐ Can't rate
Measurement	☐ We don't track results of the care we provide on a regular basis	☐ We systematically collect data on the results of the care we provide	☐ We routinely collect data on the results of the care we provide, feed data back to providers, and make changes based on data	☐ Can't rate
Interdependence of the care team	☐ Each person works solo and is responsible for their piece of work. There is no clear way of sharing information or communicating	☐ The care approach is multidisciplinary and we meet weekly to discuss topics, but we don't work together as a team on a daily basis	☐ Care provided by a multidisciplinary team. Overall, we function very well together as a team. Information is key to the relationship and there are clear ways to share information and communicate	☐ Can't rate
Supportiveness of the larger organisation	☐ We get very little support from the larger organisation. In fact, we have been asking for "X" and they have not responded for quite some time	☐ Getting help from the larger organisation has been a mixed bag, sometimes we get what we ask for but sometimes we don't	☐ The larger organisation is helpful, and in fact they make it easier for us to meet the needs of our patients and to work together as a team	☐ Can't rate
Constancy of purpose	☐ There is a lack of a clear consistent aim that is communicated throughout our microsystem	☐ The overall aim of our microsystem is clear to me, but I don't think that it is clear to every one else I work with	☐ There is a clear consistent aim that is integrated throughout the microsystem. You can see it in our everyday work	☐ Can't rate
Connection to community	☐ Our focus has been on our patients that come into our unit. We have not done any outreach programmes	☐ We have tried a few outreach programmes and have had some success, but I would not say it is the norm for us to go out into the community	☐ We are doing everything we can to understand our community and we actively employ resources to help us work with the community and define their needs	☐ Can't rate
Investment in improvement	☐ The training and resources are not available for working on improvement	☐ The resources (training, money, time) are available for working on improvement, and we occasionally use them	☐ The resources (training, money, time) are available for working on improvement and we use them all the time. Furthermore, improvement is a priority	☐ Can't rate
Alignment of role and training	☐ Everyone is not expected to work within the limits of their education, certification (some people are overqualified)	☐ For the most part the work everyone is expected to do is appropriate for their skills and training	☐ Everyone is expected to work at the upper limits of their education, training and licensure	☐ Can't rate

11 Improving safety on the frontlines

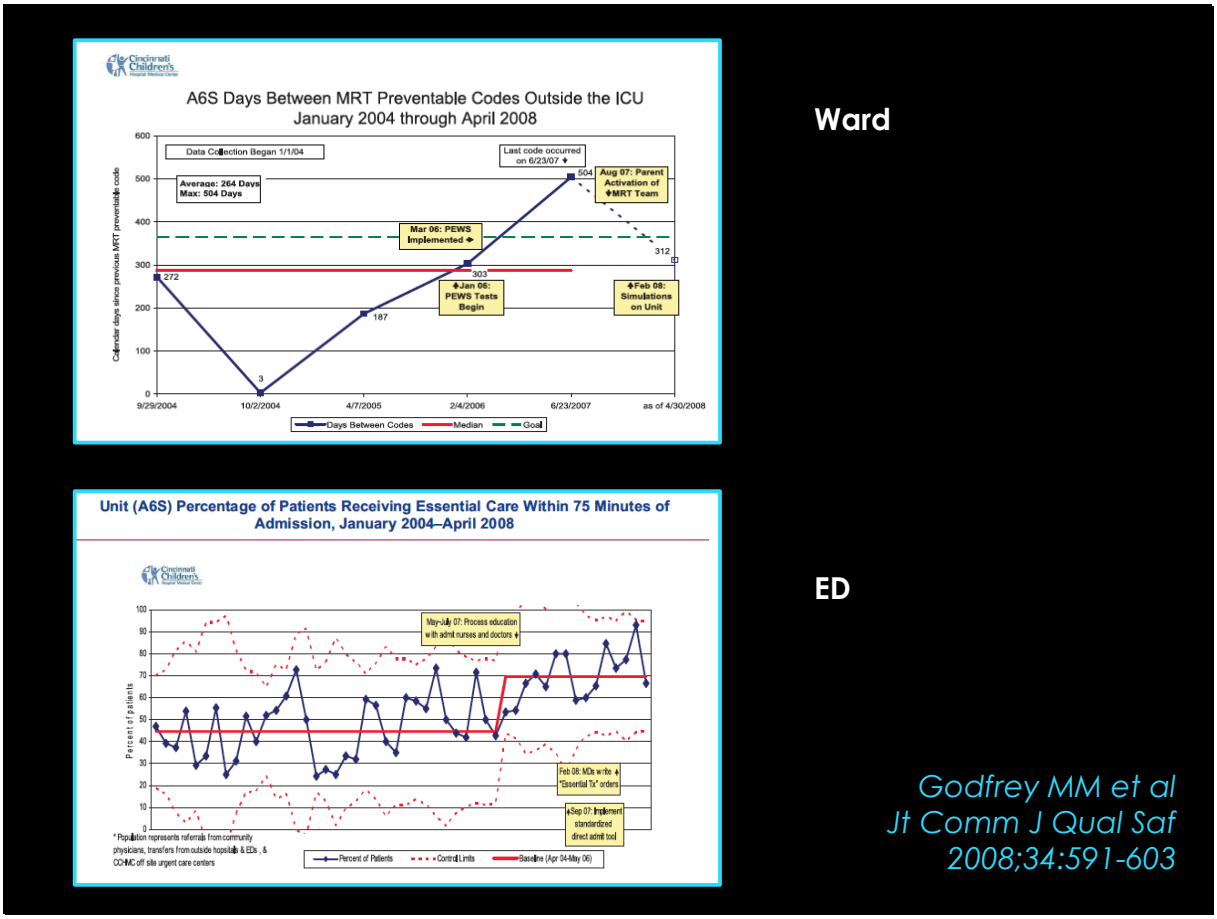
In the late 1990s Mohr and Donaldson investigated high performing clinical microsystems; the results suggest 8 dimensions were associated with high quality care. The same authors then developed an assessment tool clinicians can use to assess the level of functioning within their own microsystem so enabling them to prioritise the work required to improve safety. The top 3 equate to the original single criteria of integration of IT into workflows.



12 Microsystems in practice

The application of these system strategies, as outlined on the slide, in a number of hospitals has resulted in significant improvements in safety. Some might feel slightly baffled by the language but it is easy to translate into English…What I think it also means is that this type of improvement does not come cheap, although few if any authors to date have costed their programmes.

One of the safest hospitals in the world is said to be Cincinnati Children's Hospital Medical Centre who took this approach when attempting to improve safety across their organisation.



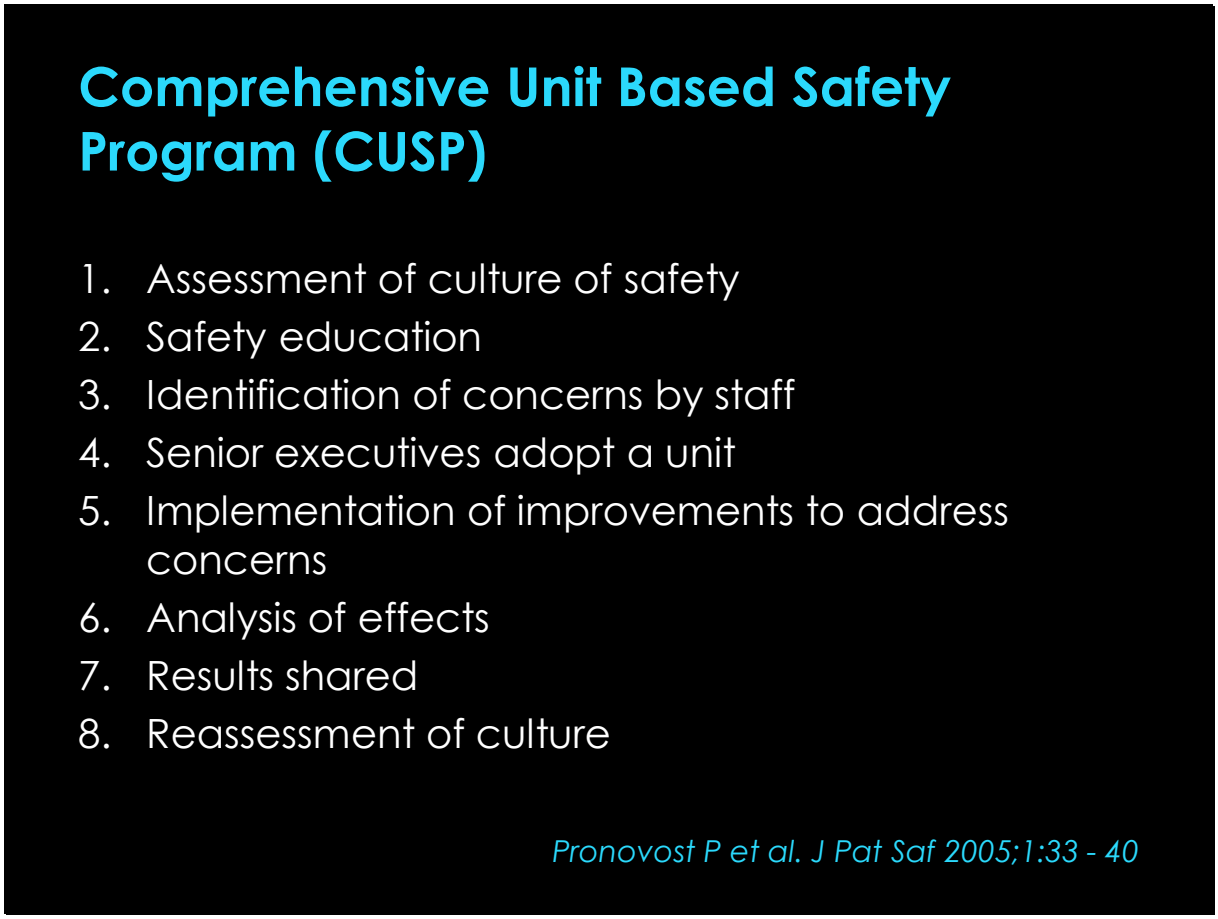
13 Results

These two graphs look at two different areas and present the data in different ways but it is worth closer examination.

Interventions such as the use of PEWS to detect deterioration in conjunction with decision algorithms and expectation of escalation, parental activation of the response team and team training using simulations resulted in no codes for 312 days on one ward at the end of the study period.

The ED chose to focus on improving the transfer of patient to in patient units so decreasing the LOS to under 2 hrs. Provision of essential care, which I think equates to the admission within 75mins of attendance, increased from 40 to 70% within the ED by the team instituting a variety of processes. They did this by working with the wards, using faxes for handovers and writing essential orders prior to the patient arriving. Although the details of what exactly was meant by that is lacking

I suspect some of this is happening within all our hospitals, certainly at a macrosystem or organisational level. What is not happening is the systematic, integrated and resourced roll out to the frontlines or clinical microsystems.

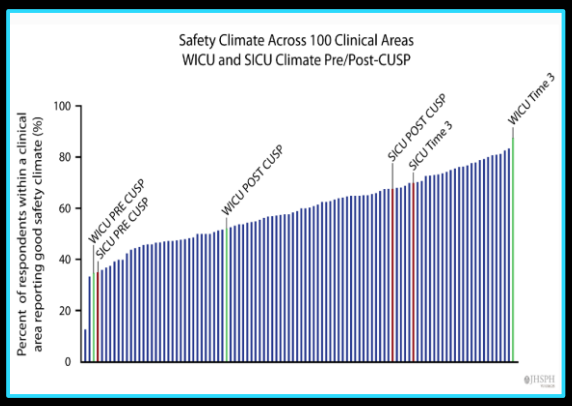


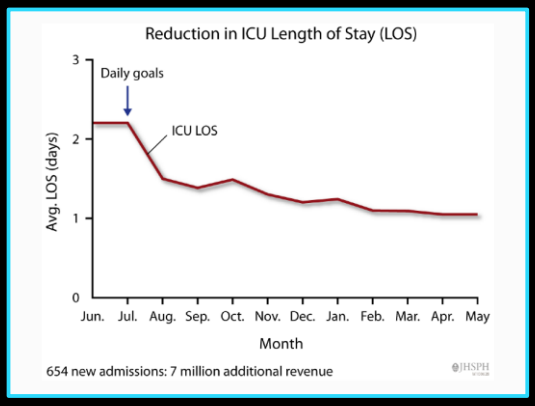
14 Culture

Evidence from aviation supports an association between a culture of safety and better error management.

However there appears to be limited evidence regarding interventions that improve culture within healthcare. One addition that has been shown to improve culture is the Comprehensive Unit based Safety Program, initially an 8-step programme. The CUSPs unit based focus rather than an organisation wide change is to some extent a more realistic approach when you want to initiate cultural change locally, but it is easily cascaded throughout the whole organisation provided there is by in at an executive level.

Implementing and Validating a Comprehensive Unit Based Safety Program





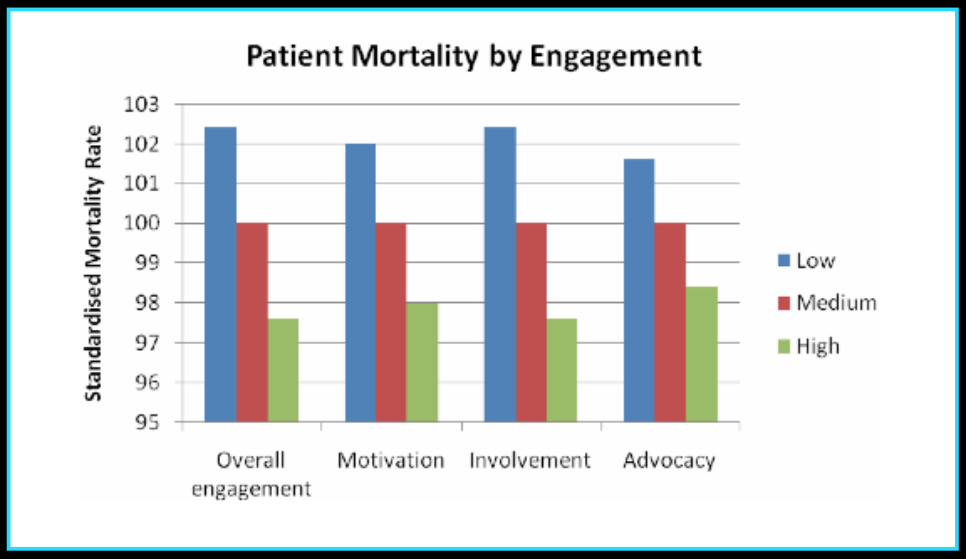
Pronovost P et al. J Pat Saf 2005;1:33 - 40

15 Results of CUSP~

This intervention over 6 months resulted in an improved culture as measured by the Safety Attitudes Questionnaire but also resulted in some tangible improvements in safety - a reduction in LOS by 1 day, medication errors were almost virtually eliminated and there was a non-significant decrease of 7% in turnover of nursing staff.

The group has subsequently produced a 6 step CUSP that in conjunction with the web based project management tool appears to have the same impact.

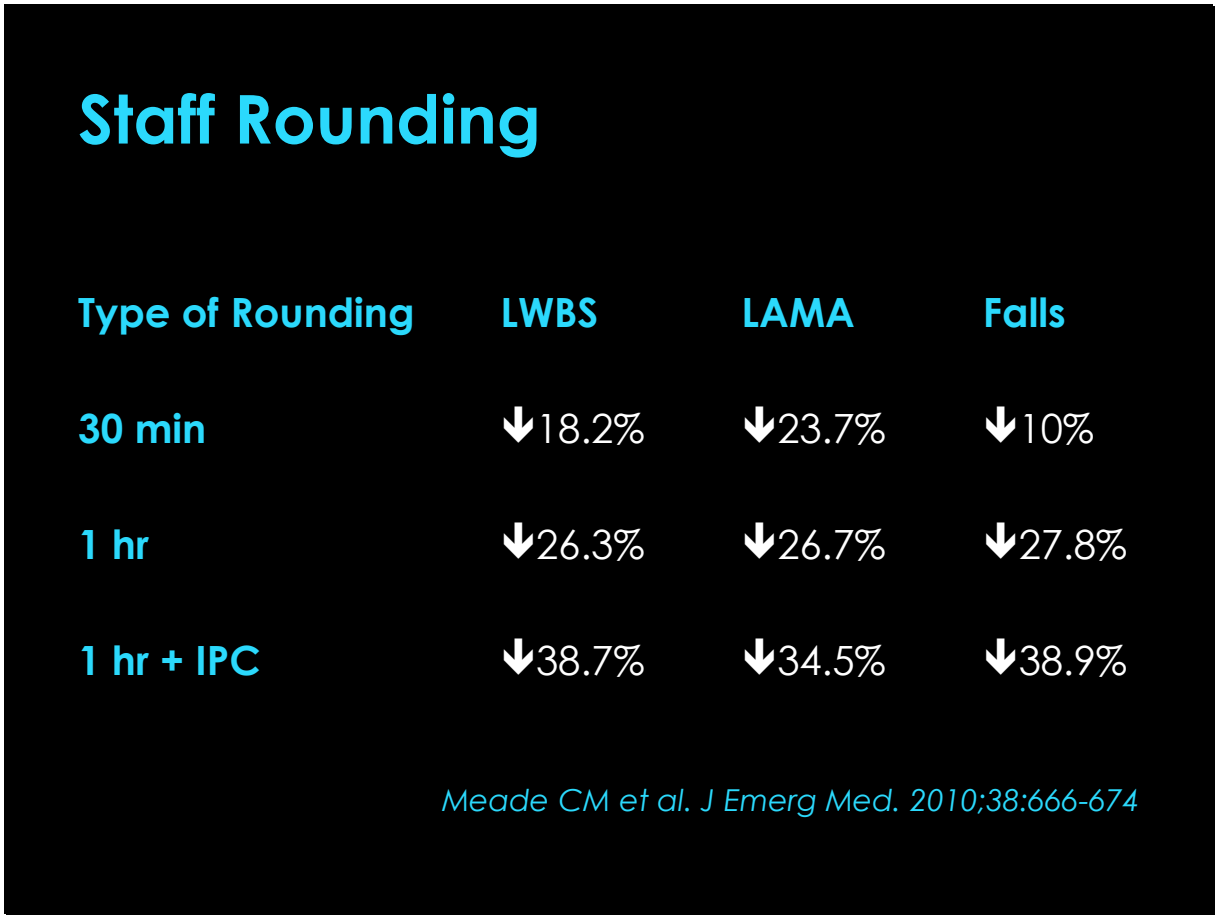
Staff Experience



NHS Staff Management & Health Service Quality. West M et al. Sept 2011. Department of Health.

16 Staff

Organisational reputation is not about a principled mission statement, it is about the promises kept by staff at the point of delivering care. But the evidence regarding the impact of staff satisfaction on safety proved difficult to find although it does seem intuitive that is so. These results are based on self reporting and come from the NHS staff survey and clearly demonstrate the more engaged staff are the lower the mortality. It is now recognized that an engaged, motivated staff are key to delivering quality care. Good staff management in terms of well structured appraisals, well structured teams, appropriate staff numbers and training are all likely to improve patient mortality and satisfaction.



17 Rounding

A number of in patient studies have demonstrated regular rounding by nurses improves safety as well as satisfaction. In this 8 week study the effects of rounding within 28 EDs was examined. 3 protocols were examined 1. Every 30 mins 2. Rounds every hour and rounds every hour plus individualised patient care tactic i.e. they were asked to name their most important expectation for the ED visit. All also checked on the patients pain, updated them as to the plan of care and gave information regarding the expected duration of care. The combined protocols resulted in significant reduced number of LWBS of 23.4%, leaving AMA by 22.6%, falls by 58.8%, call light use by 34.7% and approaches to the nurses' station fell by 39.5%. The protocol that included the IPC tactic produced the most significantly improved outcomes. If you need to take a nurse out of resus to do this it may have an impact on safety elsewhere in the ED so there is an assumption your Ed is staff appropriately but this systematic approach to rounding does allow you to identify problems and trouble shoot before the incident occurs and in the long run looks as though it saves nursing time.

18 Design Quote

The physical environment has a significant impact on safety, however EDs continue to be designed without the use of any safety driven recommendations.

The Physical Environment

- Visibility
- Minimise patient movement
- Communications
- Adequate space for important tasks
- Infection Control
- Interruption free zones
- Lighting
- Noise

Ulrich R, Zimring C.
Report to The Center for Health Design,
for the Designing for the 21st Century Hospital Project, 2004:3

19 The Physical Environment

Ulrich and Zimring reviewed more than 600 articles and identified rigorous studies that linked the physical environment to patient and staff outcomes in these 4 areas.

There are a number of design features that support safety but I will discuss one in a little more detail, because I suspect it is still a little controversial with staff in the ED. From the current state of evidence base in terms of patient safety the argument for 100% single patient rooms is overwhelming. When designed in conjunction with decentralised nurse and other work stations and decentralized supplies there is no compelling evidence that single patient rooms prevent observation of patients, increase travel distances or result in patients feeling isolated.

Effect of Acuity Adaptable, Single Rooms on Medication Errors and Falls

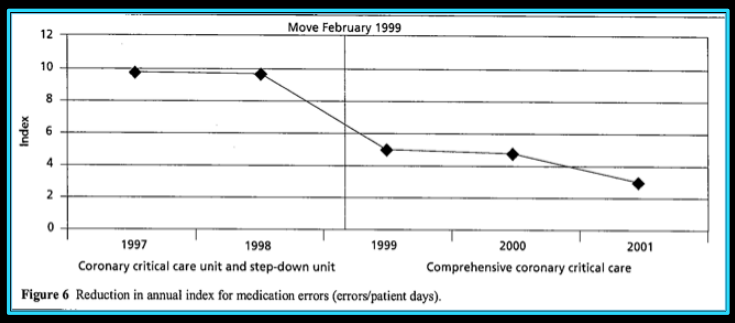


Figure 6 Reduction in annual index for medication errors (errors/patient days).

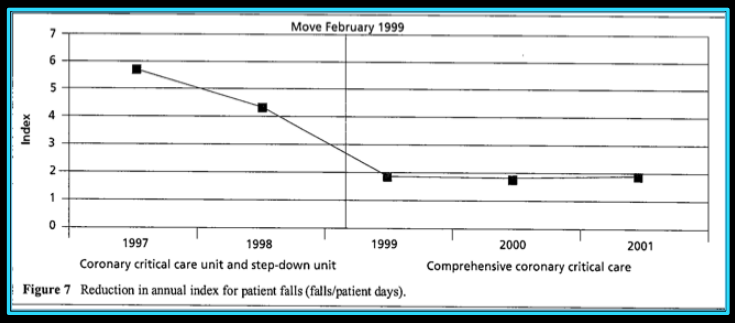


Figure 7 Reduction in annual index for patient falls (falls/patient days).

Hendrich A et al
Am J Crit Care 2004;13:535-45

20 Acuity Adaptable

The risk of incident or injury is increased whenever a patient is moved. Rooms should be built to a high specification so making them acuity adaptable, there is then, no reason to move a patient should they deteriorate. The development of acuity adaptable rooms for all types of patients reduced transfers by 90% and medication errors by 67% in one critical care environment. It also saved staff time, shortened LOS and reduced cost.

Summary of Key Themes in Studies about Prescribing Errors

Training	Education sessions for professionals have reduced prescribing errors
Roles	Pharmacists checking medication errors can identify prescribing errors but not all positive
	Medicine reconciliation by pharmacists has mixed findings but some positive trends
Tools	E-prescribing systems found to decrease prescribing errors though not all studies positive

Evidence Scan. Reducing prescribing Errors. April 2012. Health Foundation

21 Medication

Medication incidents are the 2nd commonest reason for patients being harmed in the NHS. It is the cause of 7% of all incidents reported to the NPSA. It is the 3rd highest cause of incidents in our department - crowded work spaces, a pressure of time, interruptions and inadequate information regarding patients medication have all contributed to incidents over the years.

There is quite a lot of evidence regarding medication safety in general but there are mixed messages. There is limited published research from the emergency environment.

Medication Safety

Medication error	Baseline	Period 3
Non missed dose medication error (n)	242	50
Non missed dose medication error rate/1000pt days	142	26.6
	P = 0.0001	
Serious medication errors (n) §	13	2
serious medication error rate/1000pt days§	7.6	1.1
		P= 0.0003

§Non intercepted

Bates DW et al. JAMIA 1999;6:313-321

22 Bates

In this prospective time series analysis the impact of computerized physician order entry in conjunction with decision support on medication errors was evaluated. During the study non-missed dose medication error rate fell by 81% from the baseline period. Serious medication errors fell by 86%. Large differences were seen for all types of errors including those related to allergy.

Prescribing Errors

	Pre-int^{v} Dr (ED) n=3	Pre-int^{v} Dr (Ward) n=47	Post Int^{v} Pharmacist (ED) n=50	Post Int^{v} Dr (Ward) n=7
Total no of events	3	156	2	24
Error rate per patient	1	3.3	0.04	3.4

Mills PR et al. Emerg Med J. 2010;27:911-915

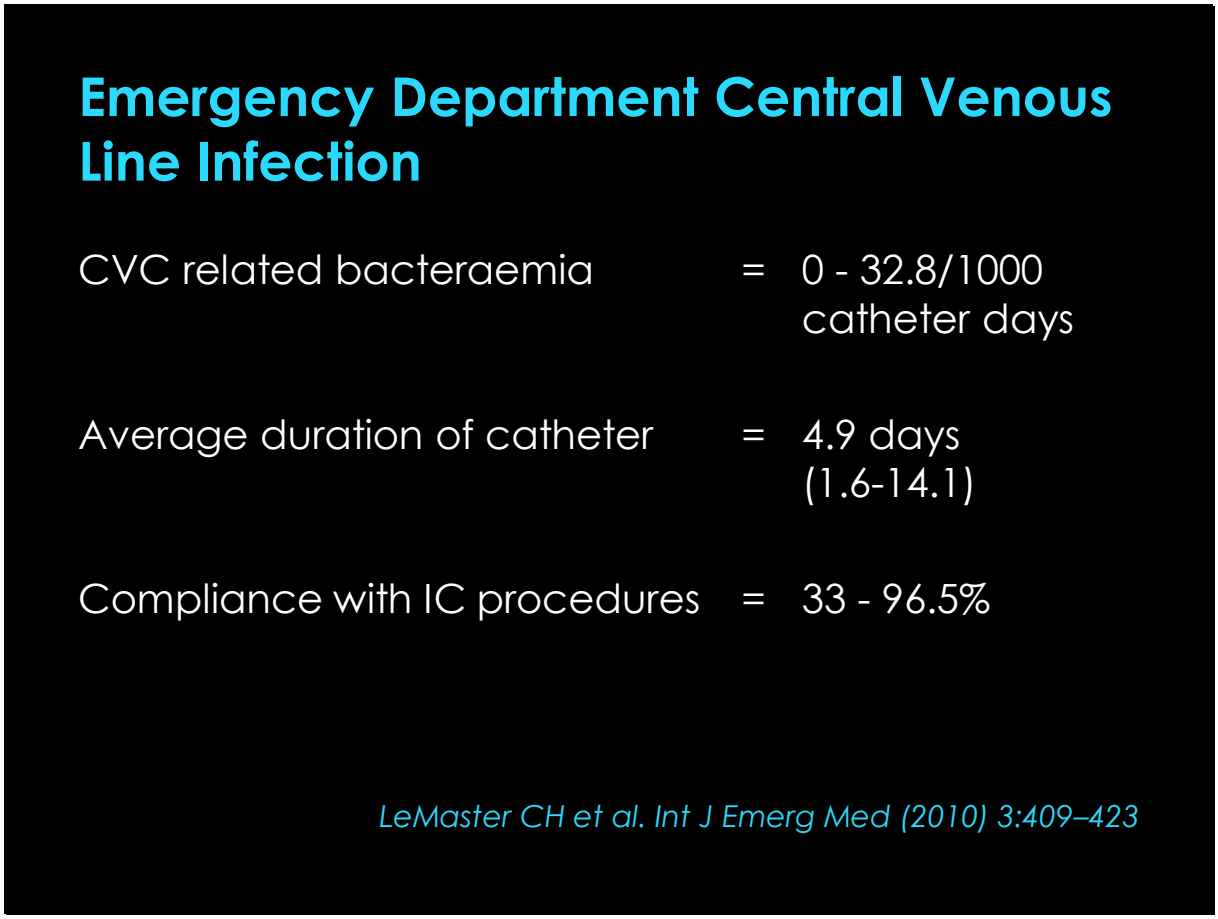
23 Mills

The 2009 EQUIP study commissioned by the GMC highlighted the prevalence of prescribing errors in 124,260 medication orders across 19 hospitals.

70% of the errors identified in this study occurred at the front door leading one to wonder if having pharmacists in the ED and admission units might improve safety. It is known that the acquisition of an accurate medication history within the ED is poor. In the UK, a pharmacist independent prescriber completed systematic medicine reconciliation in A&E and initiated an inpatient prescription chart. Medicine reconciliation completed within 24 hours of admission increased from 50% to 100% and prescription chart initiation in A&E increased from 6% to 80%. The prescribing error rate was reduced from 3.3 errors to 0.04 errors per patient.

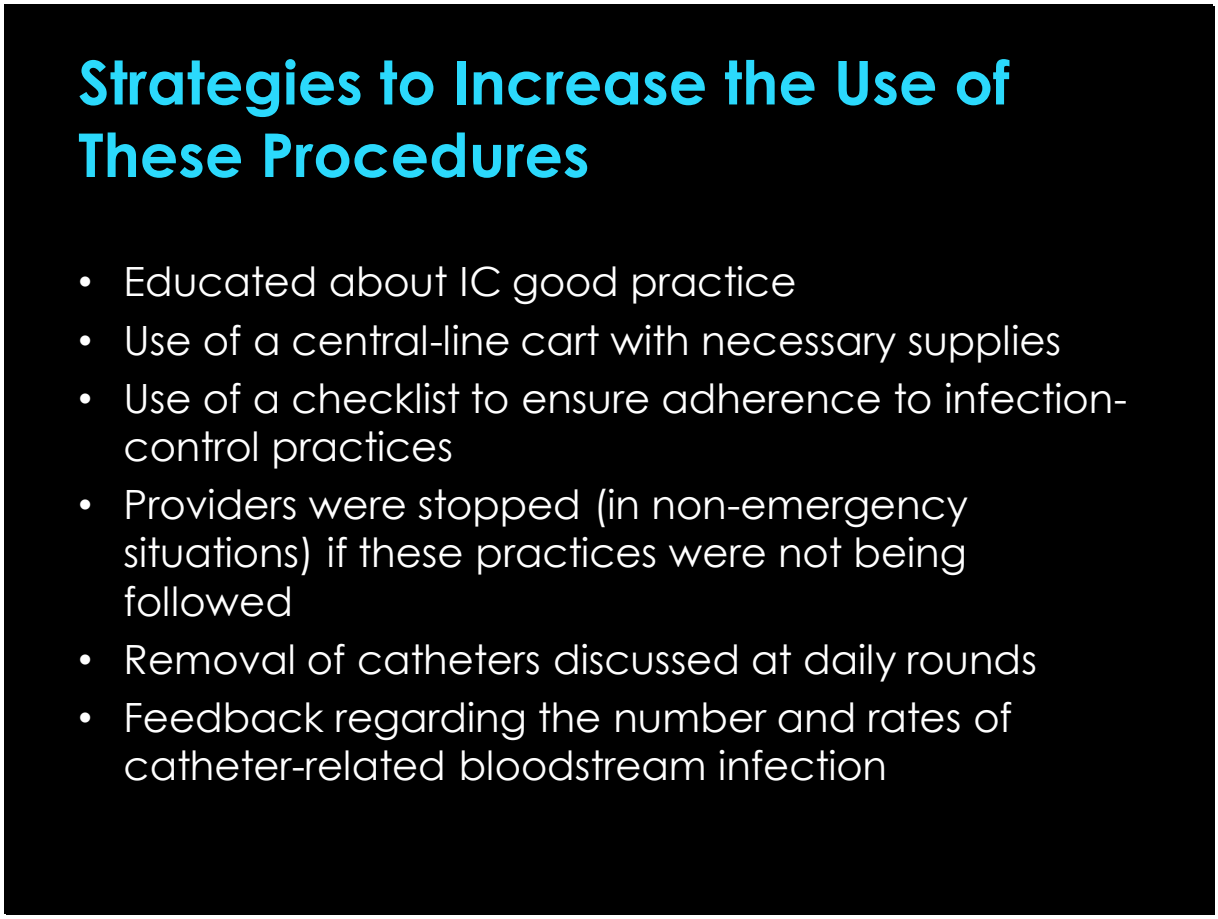
24 CVC

In caring for your patient with sepsis the use of early goal-directed therapy in the ED results in a 16.5% reduction in mortality but you may be exposing them to other risks



25 LeMaster

The existing data for emergency department- placed invasive lines are poor, but suggest they are a source of infection, remain in place for a significant period of time, and that adherence to maximum barrier precautions is poor.



26 Strategies

In this prospective cohort study involving 103 ICUs, representing 85% of Michigan's ICUs. Significant improvements in CVL associated infections were demonstrated. The interventions included:

- a programme to reduce the rate of catheter-related bloodstream infection outlined on this slide.
- the use of a daily goals sheet to improve clinician-to-clinician communication within the ICU
- an intervention to reduce the incidence of ventilator-associated pneumonia
- a comprehensive unit-based safety program to improve the safety culture

Table 3. Rates of Catheter-Related Bloodstream Infection from Baseline (before Implementation of the Study Intervention) to 18 Months of Follow-up.*

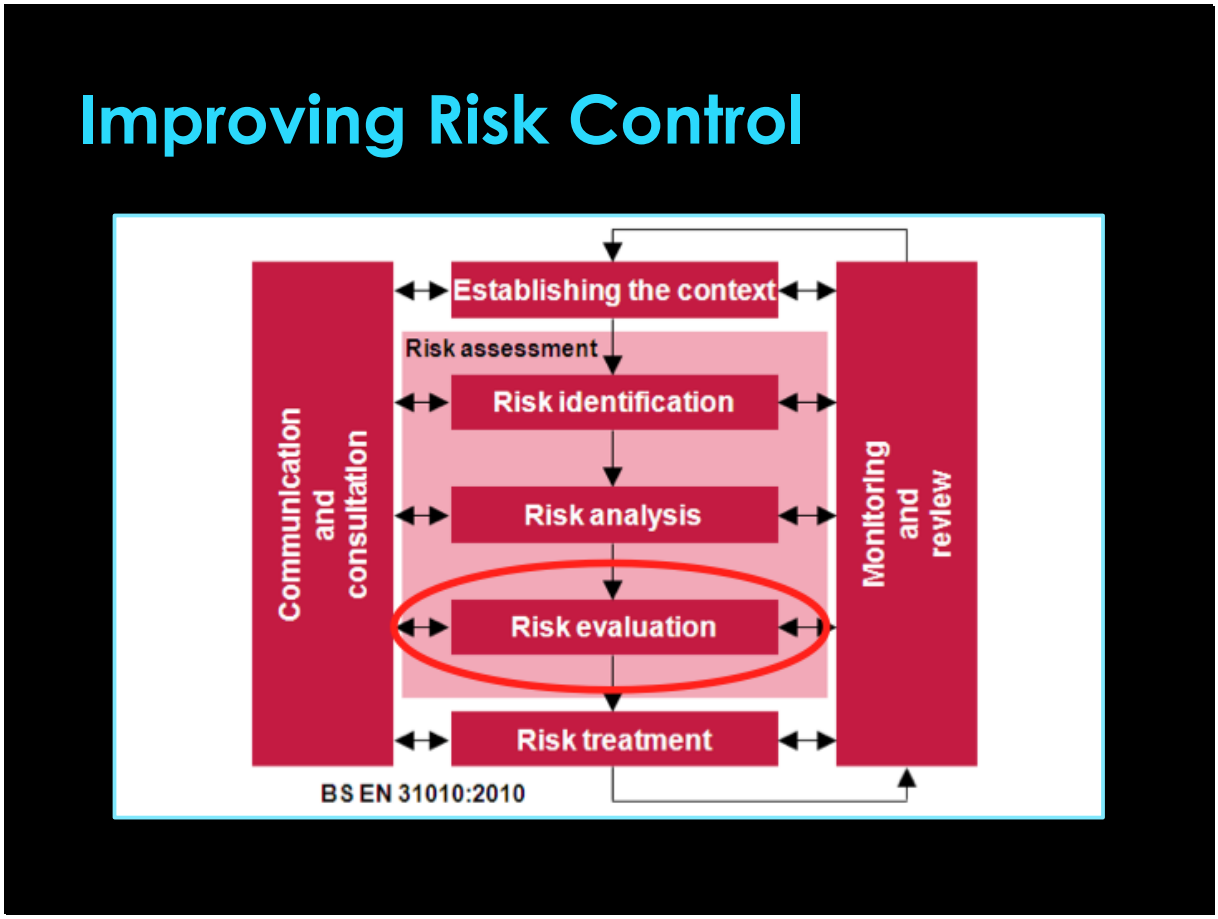
Study Period	No. of ICUs	No. of Bloodstream Infections per 1000 Catheter-Days				
		Overall	Teaching Hospital	Nonteaching Hospital	<200 Beds	≥200 Beds
		median (interquartile range)				
Baseline	55	2.7 (0.6–4.8)	2.7 (1.3–4.7)	2.6 (0–4.9)	2.1 (0–3.0)	2.7 (1.3–4.8)
During implementation	96	1.6 (0–4.4)†	1.7 (0–4.5)	0 (0–3.5)	0 (0–5.8)	1.7 (0–4.3)†
After implementation						
0–3 mo	96	0 (0–3.0)‡	1.3 (0–3.1)†	0 (0–1.6)†	0 (0–2.7)	1.1 (0–3.1)‡
4–6 mo	96	0 (0–2.7)‡	1.1 (0–3.6)†	0 (0–0)‡	0 (0–0)†	0 (0–3.2)‡
7–9 mo	95	0 (0–2.1)‡	0.8 (0–2.4)‡	0 (0–0)‡	0 (0–0)†	0 (0–2.2)‡
10–12 mo	90	0 (0–1.9)‡	0 (0–2.3)‡	0 (0–1.5)‡	0 (0–0)†	0.2 (0–2.3)‡
13–15 mo	85	0 (0–1.6)‡	0 (0–2.2)‡	0 (0–0)‡	0 (0–0)†	0 (0–2.0)‡
16–18 mo	70	0 (0–2.4)‡	0 (0–2.7)‡	0 (0–1.2)†	0 (0–0)†	0 (0–2.6)‡

* Because the ICUs implemented the study intervention at different times, the total number of ICUs contributing data for each period varies. Of the 103 participating ICUs, 48 did not contribute baseline data. P values were calculated by the two-sample Wilcoxon rank-sum test.
† P≤0.05 for the comparison with the baseline (preimplementation) period.
‡ P≤0.002 for the comparison with the baseline (preimplementation) period.

Pronovost P et al. N Engl J Med. 2006. 28;355:2725-32

27 Pronovost results

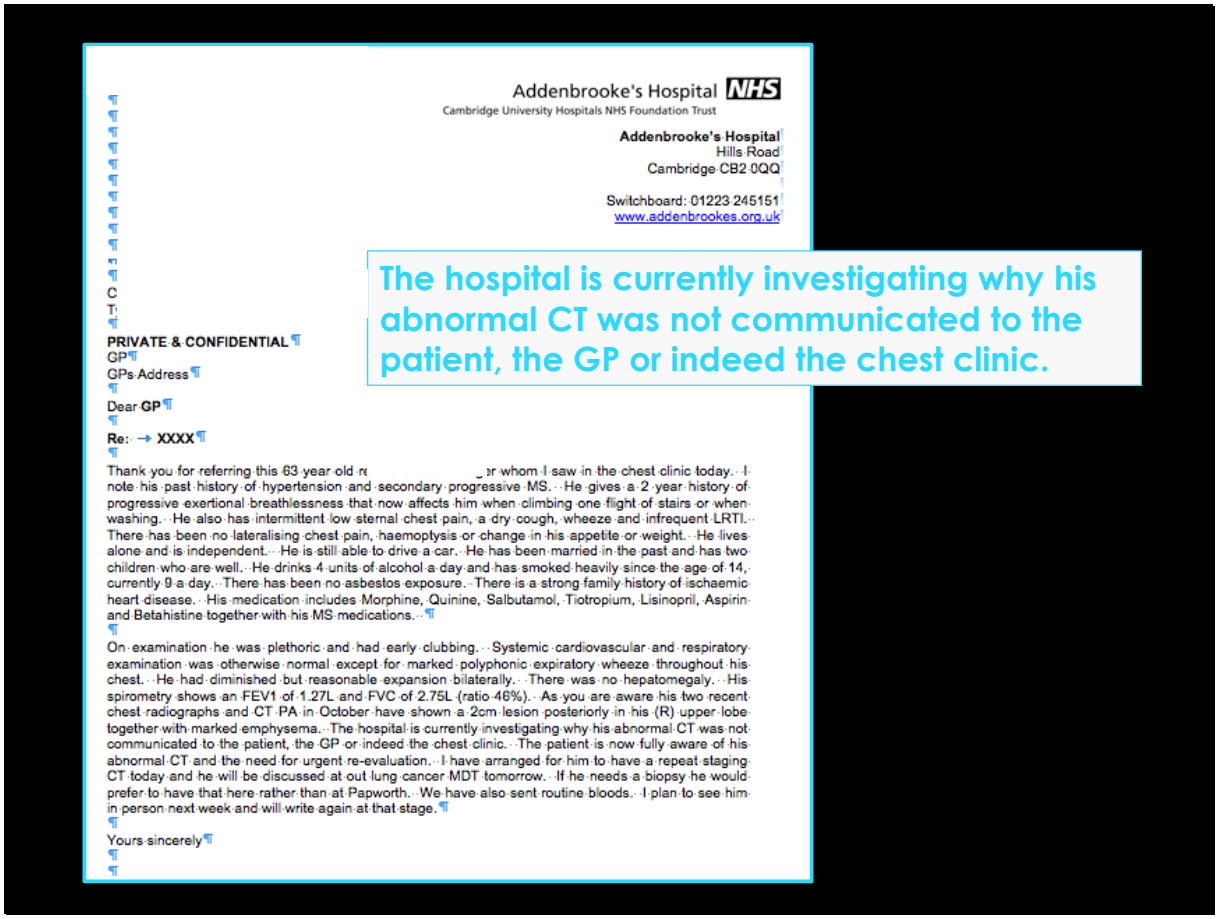
The total number of catheter-days changed little during the study. The overall median rate of catheter-related bloodstream infection decreased from 2.7 (mean, 7.7) infections per 1000 catheter-days at baseline to 0 (mean, 2.3) at 0 to 3 months after implementation of the study intervention (P≤0.002) and was sustained at 0 (mean, 1.4) during 18 months of follow-up. The authors of this study have shown for that every $1 invested in doing this $200 dollars were saved.



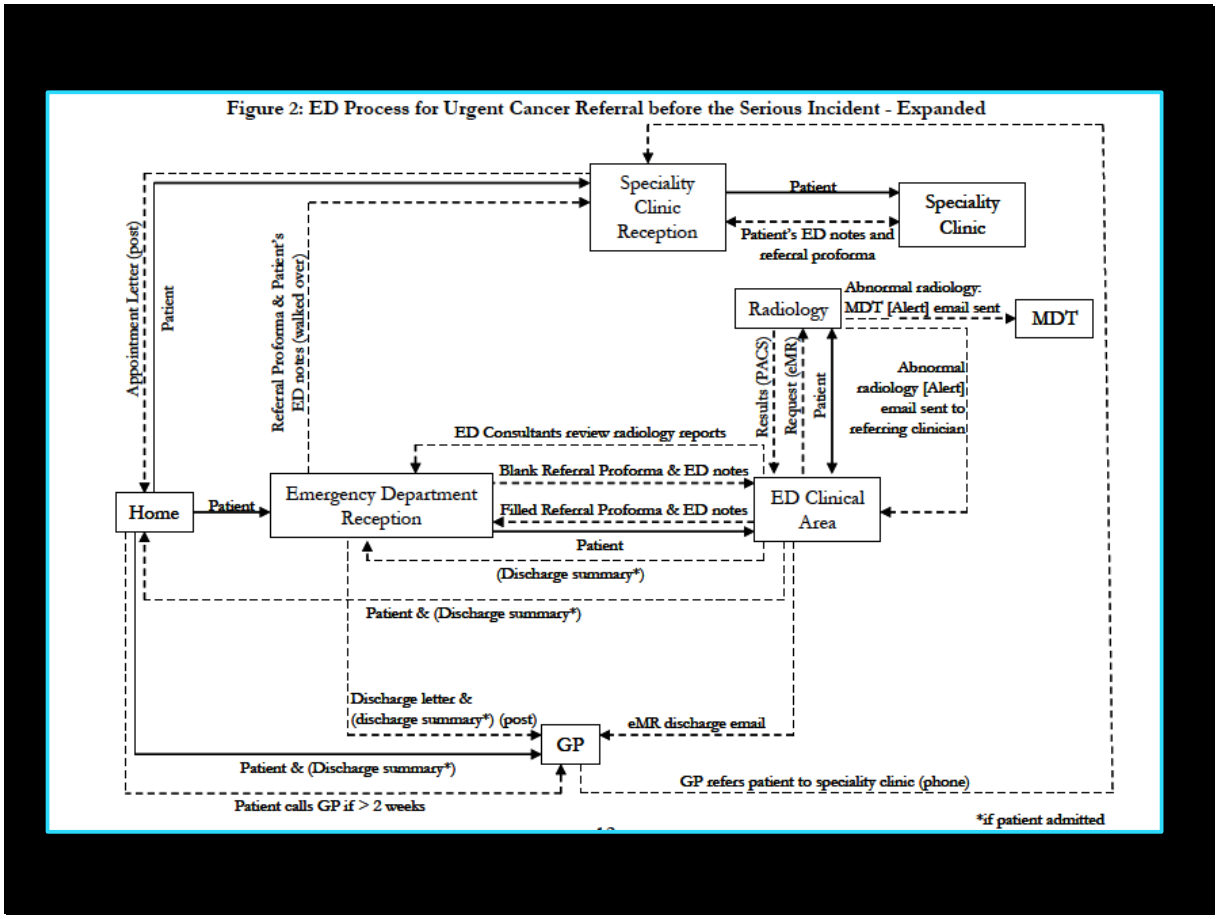
28 Managing risk

There is an assumption that an understanding of the risks will lead to good risk control but there is limited evidence to indicate this improved risk analysis has resulted in improved safety.

Often the risk controls we put in place are in the form of administrative controls, such complete this form, which are in fact widely accepted to be the weakest form of risk control. One of the problems with administrative controls is that unlike design controls, which work even when no-one is watching; admin controls do not. Whilst the implementation of the controls identified may be measured the *success* of the risk controls implemented are seldom measured nor is risk migration as a result of a control ever considered in my experience. (Nursing observation charts)



29 Serious incident

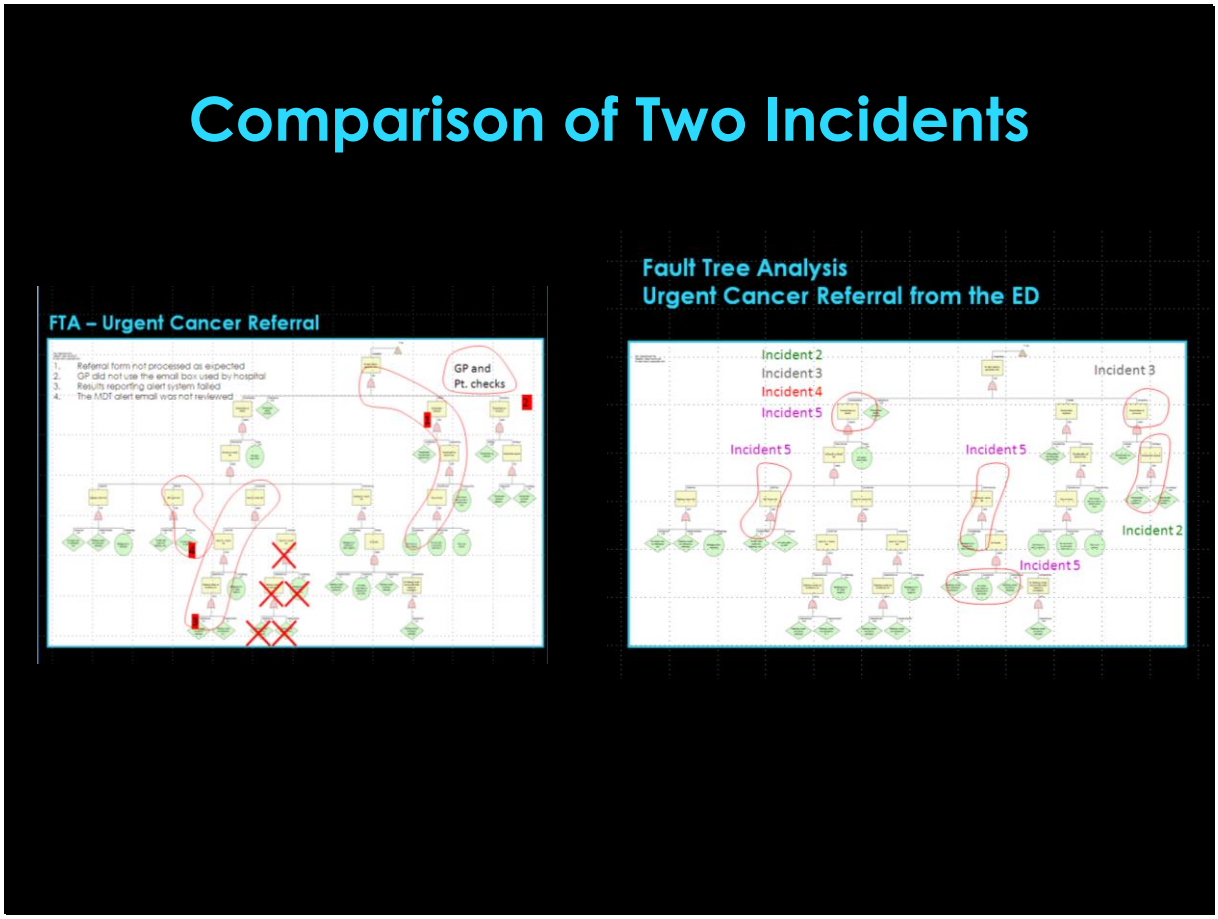


30 Map of process

But it kept happening, over 3 months there were 4 near misses – each caught by the very same astute receptionist.

Most of us will recognize the reactive methods for managing risk – consecutive death note review to identify harm events, safety incident reporting, root cause analysis. Despite this we were not solving the problem which continued to be seen as an ED issue.

PHA is a tool that allows assessment of the risk and then prioritization of interventions to reduce the risk. It can also be used to test the reliability of achieving the risk reduction. There is lots of evidence for this in industry but little if none within the healthcare sector. We have to get better at this…designing systems and managing risk.



31 Cancer Incident

Fault trees are tools that are used to visualize the risk so that you can work out the robustness or vulnerability of the event or process.

A vulnerable system is one that in which the system is at risk because any of it components individually can lead to system failure.

What we did here was having worked out what the process was we then mapped out where the systems was failing – you can see for each of the incidents it fails in a different place – so no wonder each of the RCAs were not identifying all risks and solving the problem. PHAs require significant resource as a multidisciplinary team is required to work through the process, identify where the risk is present and then identify opportunities to mitigate the risk. But in the long run has been shown (outside the health care system) to save money through the reduction or error and inefficiency. I suspect we need to do more of these.

32 Summary

I have a colleague who likens a shift in the ED these days to being similar to Custer's last stand…comms down, your daftest doctor has just arrived but your safest has just gone sick, orders are being ignored or not getting through and you are constantly fighting off the incoming Indians whilst your staff dwindles by the minute. I would suggest the current state of affairs cannot continue

We need to stop and take the time to design our systems more effectively so that they improve safety whilst recognizing this is not something you can do overnight or on the cheap – in the long run safety will save money but it will require significant investment up front and we need to get better at showing how effective safety interventions can be, are not only in terms of patient outcomes but also in terms of costs