Achieving High Reliability in NHS Wales

Author:
Mr Philip Banfield, Consultant Obstetrician and Gynaecologist,
Betsi Cadwaladr University Health Board and Honorary Senior Lecturer, Cardiff University

Co-authors:
Trevor Dale, Director, Atrainability
Chris Hancock, Rapid Response to Acute Illness Programme Manager, 1000 Lives Plus
Tim Heywood, Leadership Programme Manager, 1000 Lives Plus
Martin Semple, Associate Director, Royal College of Nursing Wales

Writer:
Jon Matthias, Staff Writer, 1000 Lives Plus

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Improving care, delivering quality
1000 Lives Plus is the national improvement programme supporting organisations and individuals to deliver the highest quality and safest healthcare for the people of Wales.
www.1000livesplus.wales.nhs.uk
Executive summary

This white paper discusses the reduction of error and harm in NHS Wales. It draws on technical theory and practical work from the NHS and other industries subject to catastrophic consequences when things go wrong. It aims to transfer the concepts surrounding ‘high reliability’ to the leaders, managers and clinical staff in order to make NHS Wales a better and safer place to both work and be a patient in.

“High reliability theory... suggests that high risk organisations can function safely despite the hazards of complex systems”1. The core definition of ‘high reliability organisations’ (HROs) is the delivery of desired positive outcomes despite diverse complex pressures that could result in harm.

In the literature, HROs are characterised by the following:
- Sensitivity to operations.
- Reluctance to simplify.
- Preoccupation with failure.
- Deference to expertise and situational leadership.
- Organisational resilience2.

The possibility for misunderstanding of these terms, when they are applied to healthcare, means that each needs contextualising if they are to alter positively the culture and the behaviour of NHS Wales. This paper defines the five principles as follows:
- ‘Sensitivity to operations’ becomes ‘Effective engagement’.
- ‘Reluctance to simplify’ becomes ‘Look beyond the simple and obvious’.
- ‘Preoccupation with failure’ becomes ‘Learn from failure’.
- ‘Deference to expertise and situational leadership’ becomes ‘Value expertise and promote situational leadership’.
- ‘Organisational resilience’ becomes ‘Organisational reflection’.

Several of these concepts have been discussed individually in former white papers from 1000 Lives Plus. High reliability can be seen as the next step in a process that has addressed personal and team performance, person-centred care and the pursuit of quality as a means of reducing costs.

Changing the culture of healthcare organisations is essential for improvements in clinical practice and the quality of healthcare. Cultural change is not necessarily dependent on additional resources and therefore every healthcare organisation in Wales can deliver services at a level of high reliability.

NHS Wales organisations that embed these five adapted principles in their organisational culture and clinical practice will be more likely to deliver high quality services with high reliability - better services delivered every time to every patient.

Introduction

The delivery of healthcare, with its myriad of assessments, procedures and interventions, is inherently risky. There is ample potential for things to go wrong and negative outcomes in the form of poor user experience, harm and even death to occur.

Negative outcomes also carry a financial cost, for example, through prolonged stays in hospital, further treatment and compensation. In some ways, harm and ‘wastage’ are therefore two sides of the same coin. But are failures in care inevitable? Do they go with the territory, or are they indicative of unreliable systems, which lead to poor quality care regardless of the technical ability and personal commitment to high standards held by staff? If the latter is true, what can be done to improve reliability in healthcare, and how might NHS Wales achieve higher reliability in the services it offers?

One of the main barriers to achieving high reliability is the cultural perception that errors and harm are ‘normal’. In a study of seven UK NHS organisations, Susan Burnett et al unpacked the ‘acceptable failure rates’ to show the true effect of poor reliability.

“Overall the reported reliability in the clinical systems studied was between 81 per cent and 87 per cent. Put another way, the clinical systems studied failed on 13-19 per cent of occasions ... For a UK hospital these figures mean doctors dealing with missing clinical information for one in every seven patients seen in clinics; missing or faulty equipment in one of seven operations performed (two in every five operations in some organisations); and time wasted by nurses and pharmacists correcting problems and searching for records or equipment for four or five patients every day on a typical 30-bed ward.”

Although there have been questions over whether healthcare should be compared with HROs such as airlines or nuclear energy generation, it is generally felt that as a work environment healthcare shares many similar characteristics. In a previous 1000 Lives Plus white paper, doctor, astronaut and hospital CEO, Dr Dave Williams introduced the definition of a high-risk ‘operational environment’, as defined by NASA: “a place where we have to make time-critical decisions with significant consequences that cannot be reversed and the outcome can only be modified by subsequent decisions.”

This adequately describes many healthcare situations, where either action or inaction can have significant, irreversible consequences. Such situations include initial diagnosis, medication, invasive therapies, surgical procedures, post-operative care and even the time and means of discharge from hospital and provision of care in community settings.

There are additional complexities. Unlike other arenas where high reliability has been explored, healthcare is centred on the needs of autonomous human beings - the patient.

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1 Burnett, S., Franklin, B.D., Moorthy, K et al. (2012) How reliable are clinical systems in the UK NHS? A study of seven NHS organisations. BMJ Quality and Safety 21: 466-472 originally published online April 11, 2012
This person is not an industrial production process, a nuclear reactor, or an airline flight from one continent to another. All the learning gleaned from high reliability organisations in other economic sectors needs to be handled with care, recognising that the wishes and social needs of the person receiving care should be paramount.

NHS Wales functions conclusively in and as a high-risk environment. The only suitable response is to aim for high reliability. Anything less may result in poorer outcomes and delivery of a service that has the potential to harm and damage individuals and communities in Wales.

Professor Karl Weick has been one of the leading analysts of HROs for three decades and notes that HROs are characterised by an organisational ‘mindfulness’ – an ability to reflect, learn and evolve positively, which enables organisations to avoid many errors and to effectively mitigate the impact of errors that do occur.

Mindfulness can enable organisations to prevent disasters and tragedies, despite working in highly dangerous environments with potentially lethal tools and materials. Weick has distilled the essential facets of a ‘mindful infrastructure’ to the following five organisational behaviours:

- Tracks small failures.
- Resists oversimplification.
- Remains sensitive to operations.
- Maintains capabilities for resilience.
- Takes advantage of shifting locations of expertise.

Central to this is the recognition that high reliability steers away from a punitive focus solely on the immediate circumstances or cause of an adverse or ‘near-miss’ event to a just and thorough focus on systems, organisational culture and wider reflection if such events are to be avoided in the future or in other organisations. It is this that the general public generally ask for when seeking redress for medical mistakes, and NHS Wales cannot afford to fail to address this effectively.

These behaviours are more commonly defined in HRO-related literature as:

- Sensitivity to operations.
- Reluctance to simplify.
- Preoccupation with failure.
- Deference to expertise.
- Organisational resilience.

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7 Weick, KE & Sutcliffe, KM (2007)
The possibility for misunderstanding of these terms, when they are applied to healthcare, means that each needs contextualising if the culture and behaviour of NHS Wales is to change effectively to reduce risk and harm in a manner that is both sustainable and contributes positively to the evolution and maturity of the service.

- ‘Sensitivity to operations’ becomes ‘Effective engagement’ - senior leaders knowing the business of healthcare throughout their organisation from the point of view of the patient - health service interface.
- ‘Reluctance to simplify’ becomes ‘Look beyond the simple and obvious’ - a reluctance to accept simple answers when the circumstances leading up to an adverse event may be complex and involve failures in the system that individuals work in, rather than a lapse of judgment by an individual.
- ‘Preoccupation with failure’ becomes ‘Learn from failure’. HROs have a pre-occupation with assessing how systems have or might fail. Another way of looking at this is identifying the ‘accidents waiting to happen’, or analysing what could go wrong in any given process or procedure. Learning from failure also means learning from ‘near misses’, with an emphasis that a near miss is not evidence of how safe the system is, but evidence of how close a system has come to failure.
- ‘Deference to expertise’ becomes ‘Value expertise and promote situational leadership’. Leadership is not necessarily hierarchical and those ‘in charge’ should always defer to the most knowledgeable or experienced person in the room, regardless of where that person sits in the hierarchy. Active ‘followership’ means all healthcare staff should be willing to step into a leadership role if required by the situation. Everyone therefore contributes to safer and more effective care, those higher up the hierarchy by allowing experts to lead, and those lower down the hierarchy by leading when called upon.
- ‘Organisational resilience’ becomes ‘Organisational reflection’ - an ability to look at the whole and the self, embedding core values of patient safety and the highest possible quality of care together with a sense of justice and an acknowledgement that NHS Wales must evolve an open and non-punitive culture if it is to learn lessons effectively.

These five areas can be seen as the primary ‘drivers’, towards achieving high reliability. As NHS Wales organisations aim towards HRO status, these drivers - and what they mean organisationally and clinically - are crucial to delivering the healthcare services that the people of Wales expect, need and demand.

Each driver is supported by a number of supplementary actions (interventions) that allow that driver to manifest in the organisation and contribute towards the overall drive towards high reliability. These are captured on Figure 1 - A Driver Diagram for Attaining High Reliability.
Figure 1: A Driver Diagram for Achieving High Reliability

Aim

High reliability in all aspects of healthcare in NHS Wales

Drivers

Effective engagement
(Sensitivity to operations)

Look beyond the simple and obvious
(Reluctance to simplify)

Learn from failure
(Preoccupation with failure)

Value expertise and promote situational leadership
(Deferece to expertise)

Organisational reflection
(Organisational resilience)

Interventions

- Promote contact between leaders and front-line (e.g. Leadership WalkRounds).
- Process compliance monitoring (e.g. care bundles, handwashing audit).
- Establish ‘ward to board’ monitoring systems to ensure organisation situational awareness.
- Use quality triggers.

- Perform Root Cause Analysis (RCA).
- Question ‘simple’ reasons.
- Understand deviation and limits of standardisation.
- Flatten hierarchies to encourage questioning of existing practices.
- Apply ‘human factors’ techniques to counteract the effect of human error and establish standardised communication tools (e.g. PSAG board, SBAR, safety briefing etc).

- Systematic review of patterns of mortality and harm.
- Encourage reporting in an “error-friendly learning culture”.
- Examine ‘near misses’.
- Establish a ‘Just Culture’.
- Promote awareness of the vulnerability of the organisation.

- Make expectations explicit (including empowerment to call a halt).
- Train for situational leadership - ‘Knowledge hierarchy’, not ‘authority hierarchy’.
- Promote active followership.
- Feedback on leadership behaviours (e.g. 360 degree review).
- Encourage the ethos of group responsibility.
- Involve the patient and family in designing care systems.

- Develop organisational mindfulness.
- Establish stable decision-making processes, with permitted variation in decisions that are made.
- Rehearse, train and prepare for ‘worst case’ scenarios (e.g. simulation).
- Create culture grouped around values, which allow for autonomy.

Driver 1: Effective engagement (Sensitivity to operations)

“Sensitivity to operations is about the work itself, seeing what we are actually doing regardless of what we were supposed to do based on intentions, designs, and plans.”

The central question facing any healthcare organisation that wishes to be a HRO is ‘What actually happens at the interface between the system and the person being cared for?’ The ‘system’ in this case would be all the tests, treatments, procedures, protocols followed, interactions with staff, paperwork and information given by staff to patients and their families.

It helps to identify the ultimate outcomes of a high reliability system. Don Berwick and Tom Nolan suggest the following five outcomes as targets for healthcare organisations:

- No needless deaths.
- No needless pain.
- No helplessness.
- No unwanted waiting.
- No waste.

Practical implementation of these outcomes in Wales might lead to:

- No unanticipated deaths.
- No manageable pain untreated.
- Empowering patients and staff to get what they need, when they need it and to feel that they are able to secure help in achieving this from their managers and leaders.
- Prioritising waiting times and/or lists against the needs to provide emergency and elective care with all stakeholders - including the public. Also, more timely delivery of results to minimise time waiting for treatment to commence or be assessed.
- Making sure that all resources are utilised to their full, and also to limit overtreatment and duplication.

To assess the reliability of their healthcare organisation, everyone working to deliver care needs to know if and when patients experience any of these five things and how frequently. It is therefore essential for there to be contact between leaders and the frontline clinical teams delivering patient care. There are frequently barriers to this, especially in geographically large organisations offering a diverse range of services, such as NHS Wales organisations.

One example of how these barriers have been broken down are leadership WalkRounds, which provide a structured format for senior managers, clinical leaders and board members to meet and engage with frontline clinical teams in their daily workplace to discuss quality and safety concerns and risks.

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9 Weick, KE & Sutcliffe, KM (2007) 59
WalkRounds afford an opportunity to bridge a perceived disconnect reported to be commonplace in NHS Wales. They must be an honest two-way process if leaders are to understand the realities of the pressures and obstacles that their teams are faced with. There are practical tools and studies of how WalkRounds have improved contact and understanding between the frontline and senior leaders on the 1000 Lives Plus website\textsuperscript{11}.

Process compliance monitoring is a key part of the Model for Improvement utilised by the 1000 Lives Plus programme. Measuring whether new or different procedures are actually being followed is critical to ascertain the effectiveness of those procedures. Measurement is therefore vital in any work to improve the system.\textsuperscript{12}

 Whilst cardiovascular disease (CVD) remains a major cause of death in the UK, mortality from CVD has halved in the period from 1961 to 2011\textsuperscript{13}. Improvements in survival and quality of life following myocardial infarction (MI) are directly related to delivering appropriate treatment in the immediate time period following a heart attack.

The Myocardial Infarction National Audit Project (MINAP) report for 2011 shows the relationship between increasing the reliability with which primary angioplasty takes place within ninety minutes of admission to hospitals and the year-on-year reduction in mortality associated with MI.\textsuperscript{14} The MINAP database shows whether ‘door to treatment’ times are improving or not, and whether the correct processes are being followed. This gives organisations important information on where to focus their improvement efforts to ensure reliability in the delivery of treatment.

The provision of meaningful, believable, timely clinical data remains a major challenge to NHS Wales organisations. Solving this should be a priority for all stakeholders. Similarly, identifying best practice and knowing that it is being followed and applied is crucial in any healthcare organisation seeking high reliability in its services.

The need to know the reliability of processes ties in with the need for knowing the ‘actual’ situation. This is more than just a case of knowing what is being delivered, but also how it is being delivered - is care delivered safely, on time, and in the right place? Clinical and management support of both surveillance and audit becomes critical in knowing that a particular standard was applicable to individual circumstances or patient case mix. Without this dynamic validation, unintended adverse consequences may cause unnecessary patient harm.

The authors of the study into reliability in seven UK NHS organisations identified several factors on the frontline contributing to poor reliability, including:

- Being unable to access supplies and information outside ‘normal working hours’.

\textsuperscript{11} www.1000livesplus.wales.nhs.uk/visible-leadership
\textsuperscript{13} British Heart Foundation Health Promotion Research Group Department of Public Health, University of Oxford.
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- Poor system design “such as using a mixture of paper and computer records”.
- Inappropriate workspace, including poorly-organised unlabelled store-rooms.
- “Poor documentation of medication changes in patients’ health records”.
- No standard procedures “for example, in how certain drugs are prescribed or discontinued ... and how equipment is stored in theatres.”.
- The cultural normalisation of suboptimal or unsafe working conditions - “We found that in many areas, over time, staff had come to accept poor reliability as normal, thus not reporting or challenging problems”.
- Poor reliability overcome through “workarounds”, for example, “using disposable gloves as tourniquets”.

These extrapolated examples are reinforced by conversations with clinicians on the ground. For example, the Transforming Care programme area in 1000 Lives Plus has been documented in several videos that frequently include staff observations regarding missing paperwork, faulty or poorly maintained equipment, and disorganised and cluttered work environments. These suboptimal circumstances, and the resulting levels of falls, pressure ulcers and infections, were routinely accepted as ‘normal’ by staff until they embarked on the programme and were encouraged to take a fresh look at their working practice.

Crucially, staff were engaged and involved in improving their working practices and empowered and supported to do so by their managers or clinical supervisors and colleagues.

Given the critical nature of much of the in-hospital work in NHS Wales, the failures in reliability of simple systems can often have catastrophic consequences for patients. The recent National Confidential Enquiry into Patient Outcome and Death (NCEPOD) report on in-hospital cardiac arrest states that “75 per cent of cases (of arrest) displayed clear warning signs that the patient was deteriorating. These warning signs were recognised poorly, acted on infrequently, and escalated to more senior doctors infrequently.”

This finding of poor reliability in the detection and treatment of acute deterioration is thought to the main contributory factor to the estimated 1,800 annual deaths in Wales due to sepsis. There is evidence that an approach that involves organisation-wide reporting and surveillance, combined with improvements in process reliability, could have a dramatic impact on avoidable hospital mortality and wasteful utilisation of critical care resources.

A recent study found that achieving 80 per cent reliability with the Sepsis Six care bundle in one hospital reduced sepsis mortality by 50 per cent. The authors extrapolate upon these findings to suggest savings that for Wales would equate to 500 fewer deaths and £12 million cost-savings annually.

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16 Burnett, S. et al. (2012)
17 These videos are available online at www.1000livesplus.wales.nhs.uk/tv
Discussing the future of patient safety, Professor Charles Vincent highlighted the need for greater awareness of what is actually going on in healthcare systems:

“Boards have a lot of financial information but when it comes to safety, they don’t have data. It is impossible for them to monitor change. They therefore cannot review performance. They cannot target change. If they make changes they cannot know whether they have been effective. This is the same for all other levels of the organisation.

“Safety initiatives are always happening in context of pressures on system. But unless you have serious data over time you can’t begin to think about these things. What worries me is that hospital boards don’t have that data locally to see whether they are making progress.

“... you need to tackle all areas of hospital, including routine low-risk operations. Also, put some measures in areas which have not usually been measured before. For example, in care of the elderly, where care is hugely variable, and the scale of minor adverse events is colossal as you’d expect with people with lots of co-morbidities.”

Large organisations face a particular challenge in keeping a focus on operational activity without being overwhelmed by data that obscures potential problems, instead of highlighting them. ‘Ward to board’ monitoring of outcomes ensures an organisation is aware of the ‘actual situation’. One way to maintain organisational situational awareness is to use quality triggers to triangulate operational information to focus areas where there is a lack of reliability and increased risk.

Quality triggers need not be complex. However, “... if a small failure is to be treated as a clue to the health of the system, people have to be aware of its wider relevance.” Professor Brian Edwards, based on his attendance of the Inquiry into care at Mid-Staffordshire Hospitals, suggested the following: “I’ve got a new test now when I go into a hospital ... I go to the end of a ward and just stand there and do a buzzer count, how long does it take for buzzers to be answered? I’ll tell you what, that’s a hell of a good test. How long do the buzzers go on?”

When potential deficiencies are indentified, it is appropriate to ask about the system above this end effect; without the necessary data, it is not always possible to know whose performance one should be measuring. Thus, the final element of sensitivity to operations is in understanding patterns of demand on services and capacity issues. These need to be evaluated using the other drivers on the driver diagram, particularly the reluctance to accept a simplistic explanation for bottlenecks in the system and pressure that looks like under-resourcing.

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20 Vincent, C (2012), Is healthcare getting safer?, Cardiff: 1000 Lives Plus. 10
21 Weick, KE & Sutcliffe, KM (2007). 49
Work to improve patient flow in South Warwickshire NHS Foundation Trust, as funded by the Health Foundation, identified significant pressure on Accident and Emergency (A&E) staff in Warwick Hospital, but alleviated this by identifying bottlenecks further up the system, relating to delays in test results from patients being returned to wards, that resulted in delayed discharges. By addressing the issues at the ‘back door’, the pressure at the ‘front door’ was greatly reduced, with no extra staff added at A&E, despite the problem looking like under-staffing.

In an interview for 1000 Lives Plus, Glen Burley, Chief Executive Officer of South Warwickshire NHS Foundation Trust, described the impact of this work. Despite an 11 per cent increase in demand on A&E services, the hospital has seen bed occupancy rates decrease, they have performed well against the four hour target for patient waiting times in the department, an increase in patient satisfaction, and a “step-change” in mortality rates.

The success in Warwick is due to careful analysis of what was actually happening on the frontline - that interface between the patient, their family and the NHS - and not accepting the ‘simple’ solution to pour more resources into A&E. In addition to talking to staff, Glen and his team were aided by a patient complaint, which they used to process map the patient journey through the system. They identified that in an eight-day hospital stay, only 18 per cent of the time “added value”. This understanding from the patient’s perspective was a powerful force to identify how things could be different at the frontline.

**Driver 2: Look beyond the simple and obvious (Reluctance to simplify)**

In a complex system for errors and system failures we might expect to have complicated causes. Over the years many of the solutions proposed for the problems faced by healthcare organisations have not worked because they are too ‘simple’. As mentioned above in the example from South Warwickshire NHS Foundation Trust, the ‘simple reason’ and corollary ‘simple solution’ could well be wrong on both counts - the reason might be erroneous and the solution might not solve the problem.

There are several approaches that can be used in healthcare to identify the causes of problems. One such is ‘Root Cause Analysis (RCA)’, which unpicks the multiple layers in the system that led to failure. RCA uses a variety of tools to look for system level causes of problems. This differs from previous investigation approaches, which seek to identify and allocate accountability and blame for errors as their prime motivation, which does not inherently protect the public from organisation making similar mistakes again or perpetuating an environment where such mistakes are more, rather than less, likely.

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23 The interview with Glen Burley is available online at [www.1000livesplus.wales.nhs.uk/hro](http://www.1000livesplus.wales.nhs.uk/hro)
In the Warwick example, the pressure placed on the A&E department had its root cause in patients not being admitted onto hospital wards, which in turn was caused by wards being unable to accept more patients - with high occupancy due to delays in discharge.

Identifying these root causes enabled the clinical staff at Warwick to alter seemingly unrelated aspects of their system. When blood scientists started work earlier and portering staff delivered samples to the labs more quickly, results could be returned to the ward within a few hours. This resulted in doctors making clinical decisions based on up-to-date bloodwork, so the patient’s health could be accurately assessed and the patient allowed home.

Root Cause Analysis does not improve care unless there is full engagement in the process with clinical and frontline staff. A disconnect causes resentment and poorly performing teams. This has been tackled in the airline industry by embeddings the pilot’s professional organisation into the process. Engagement remains a challenge for NHS leaders, but it is not insurmountable if all the stakeholders are committed to working together.

The improved patient flow in Warwick alleviated the pressure in A&E because it addressed the ‘real’, complicated causes of the problems, rather than superficial issues like staffing levels. It required engagement with clinical teams away from the frontline, with laboratory staff willing to change their working patterns in response to the root cause analysis.

The reluctance to simplify is reinforced by a particular mindset that is identified on the driver diagram interventions as:

- Questioning ‘simple’ reasons that give too superficial an explanation, when a deeper look would reveal much more that might need correcting. It takes time, resources, buy-in from clinical staff and leadership to result in a healthier organisation and safer, more effective care.
- Understanding deviation and the limits of standardisation - human beings are unique, highly variable in both their health and illness, with a great capacity to present with unexpected and novel symptoms. Clinicians rely on symptoms being ‘90 per cent similar, 90 per cent of the time’, but all team members need to be mindful of potential surprises.
- Flatten hierarchies to encourage questioning of existing practices - this welcomes scepticism and questions and encourages everyone to reflectively consider their work. An inability to do this is a feature of large organisations which lose responsiveness to changing conditions. This is seen when comparing primary and secondary care - a GP surgery has an element of functional local control and a capacity to enact immediate changes in a manner that hospitals cannot always do. Challenge leads to discussion and confirmation of a course of action. Confrontation is a sign of dysfunction and the need for effective leadership and team-based working.
- Analysing deep-rooted ‘human factors’ - seeking to understand why the people involved have done or not done certain things. This may reveal training or negligence issues, but often errors, omissions and mistakes are not adequately safe-guarded against within the system.
The ‘mindset elements’ listed above underpin the effectiveness of Root Cause Analysis in organisational learning, where the core values of the team lead to increased safety and error reduction.

As seen in the above example, questioning ‘simple’ reasons is very important and it relies on the first driver, Sensitivity to Operations. The complexity of the healthcare environment needs to be understood by senior managers as one reason why ‘simple’ solutions do not produce the desired improvements.

There is also a need for an understanding of the limits of standardisation. Standard Operating Procedures (SOPs), care bundles and checklists specify the minimum level of performance and are not intended to limit the role of clinical judgement in varying the response to suit circumstances. A nationally-applied example in NHS Wales is the adoption of the National Early Warning Score (NEWS), which was introduced in hospitals throughout Wales in 2012, as part of the 1000 Lives Plus Rapid Response to Acute Illness (RRAILS) programme.

NEWS has been recommended for implementation across the UK by the Royal College of Physicians. It is important for helping organisations in NHS Wales achieve high reliability because it provides a standard language with which to represent the level of risk.

A NEWS score is calculated every time that a patient’s observations are recorded and serves to indicate the level of risk of deterioration for that patient. Patients exhibiting certain symptoms at specific levels are graded on severity, with actions proposed depending on how ill the person is. Coupled with anti-sepsis treatments and other response treatments, the worst effects of illness can be mitigated against. The aim is to reduce admissions to intensive care, cardiac arrests, and avoidable deaths, and there is already some evidence that NEWS is achieving this aim.

However, there does need to be some opportunity for varying responses to the scoring system, for instance, care for patients approaching a natural, anticipated and accepted death should countermand any ‘standard’ response to a high NEWS rating. Similarly, some chronic medical conditions will automatically trigger higher ratings using NEWS, resulting in more false alarms in those patients.

The 1000 Lives Plus Transforming Maternity Services programme explored the use of NEWS in maternity care. Clinical staff highlighted that the physiological changes in pregnancy may lead to a dramatic over-intervention and progressed with a pregnancy specific solution, but standardised the communication and escalation of concerns and the need for senior multi-disciplinary involvement earlier in pregnant women whose clinical condition is deteriorating.

In conclusion, NEWS (and its equivalence in pregnancy) provides patients with standardised assessments, meaning every patient receives the same high standard of care, reliably delivered. The important distinction between the reliable application of NEWS and the varying response it may provoke is vital to the overall reliability of the care that people receive.
An aversion to simplification means welcoming scepticism and questions. The experience of 1000 Lives Plus indicates the most effective changes have been driven from the frontline, when clinical teams have been given the freedom to question basic assumptions about how their services are delivered. An example of this is the reduction of venous thromboembolic (VTE) risk on the obstetric day unit at Glan Clwyd Hospital near Rhyl.

Compliance with the nationally agreed assessment only reached 100 per cent when the healthcare support workers were empowered to make sure that the midwives and doctors had completed and acted on the nationally agreed VTE risk assessment tool - a reversal of the normal hierarchy, but an important demonstration of how teams must progress to function effectively in complex environments.

HROs “… work to create a climate where people feel safe to question assumptions and to report problems or failures candidly.” In addition, “Sceptics, curmudgeons and iconoclasts are welcome in a mindful system, even if their presence is not always pleasurable. But this welcoming attitude exists only if there is a strong shared sentiment that mindfulness is imperative to success.”

The likelihood of staff asking questions is dependent on the culture, particularly the leadership and the ‘team culture’ staff work in. There is a growing understanding that ‘human factors’ play a huge part in organisational culture, as well as in the system failures that cause harm to patients.

Many of the problems that regularly turn up in root cause analysis are attributable to these human factors, the unavoidable and inevitable propensity for humans to make errors. These could be failures in communication, assumptions, complacency, assertion, lapses in judgement, decisions made in haste and without review and basic physiologically induced issues such as stress, fatigue and hunger. Checklists, reminder stickers and improved paperwork have all been used to counterbalance the human factors that can influence clinical work, yet there still seems a reluctance by some professionals to acknowledge that they are fallible.

A case study submitted to 1000 Lives Plus to promote wider learning and improvement showed how failure to interpret and act on an abnormal cardiotocograph (CTG) trace, led to catastrophic results. The team on duty in the maternity had received training, were relatively experienced and followed procedures which had been put in place to minimise the risk of mistakes. Members of the team worked together and concerns were escalated. However, despite all these elements of good professional practice, critical mistakes were made with the interpretation of the CTG trace, leading to failure to act that had catastrophic results - the baby was severely brain damaged as a result of a prolonged period of hypoxia and has been left with permanent severe disability.

24 Weick, KE & Sutcliffe, KM (2007). 62
25 Weick, KE & Sutcliffe, KM (2007). 96
26 A more detailed account of how human factors impact on healthcare can be found in Willson, A (2012) 15-18
In short, the safe delivery of a baby in a complicated labour was overly reliant on staff not making any mistakes. The safety nets in place were insufficient to avoid catastrophic error in this case. It is known from analysis of national trends, that this is an area which has been identified as high-risk across Wales, with similar root causes identified, and in a small minority of cases, similar results.

The case study noted the physical damage caused to the baby in question, the high emotional cost to the child’s family, the significant impact on staff morale, and the high financial cost to the health board. It identified key areas of improvement, almost all relating to improving the human factors at work in the maternity unit - guarding against repeating errors by introducing escalation protocols, better communications tools and the introduction of regular case audits to identify potential future problems before they incur similar tragic results.

“Human factors engineering, crew resource management, briefing and debriefing, high performing teams concepts and Root Cause Analysis are examples of tools that have been implemented to help organisations develop greater reliability and consistency.”

The following human factors approaches should be built into healthcare systems to improve reliability:
- Decision aids and reminders.
- Redundancy and checks.
- Scheduling.
- Connection to habits (what people actually do).

In participating in 1000 Lives Plus collaborative programmes, clinical teams have displayed considerable ingenuity and creativity in adopting human factors thinking. Using Patient Status at a Glance (PSAG) boards, SBAR communication, standardised assessments and involving the whole team has led to demonstrable improvements in reliability. The use of NEWS and the STOP order to remind staff to remove peripheral venous cannulas or urinary catheters are good examples of decision aids and reminders.

There should be ‘redundancy’ in processes, so a failure in one area does not lead to catastrophe, but is ‘caught’ by a secondary (redundant) check. This is important when considering the intensity of work versus, ‘down-time’, bed occupancy and staffing levels as compromise in any of these reduces both the time for checks and thus the safety net that might otherwise be in place.

Scheduling is important in achieving high reliability. Success with intentional rounding, where nurses check on patients regularly, has seen improvements in nursing care, particularly in observing patients who are at risk of dehydration or malnutrition.

Understanding how people actually work also reveals potential areas for improvement - for

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27 The Health Foundation (2011)
29 A video about intentional rounding in Betsi Cadwaladr University Health Board can be found at www.1000livesplus.wales.nhs.uk/tv
example, Transforming Care initiatives rely on an ‘activity follow’ to identify where time is wasted through poor organisation or unclear roles.

**Driver 3: Learn from failure (Preoccupation with failure)**

“HROs are distinctive because they are preoccupied with failure. They treat any lapse as a symptom that something may be wrong with the system, something that could have severe consequences if several separate small errors happen to coincide.”

In addition, “High reliability organisations have a ‘group mindfulness’, which includes an organisation-wide sense of vulnerability and pessimism about possible failures. Responsibility and accountability for reliability is distributed throughout the organisation. Such organisations aim to increase the quality of attention and alertness across all departments and teams.”

HROs guard against failure in two ways - one by imagining all the things that could go wrong, and secondly by rigorously analysing errors and ‘near misses’ to determine the reasons those events occurred. Although incident and near miss reporting is critically important here, it is also essential to look for system issues that may not have been picked up in post hoc reporting. In NHS Wales, systematic review of mortality and harm profiles are starting to prove an invaluable source of information about potential system failure to complement incident and near miss reporting.

‘Preoccupation with failure’ may sound negative and judgemental, but it really translates to a commitment that no error should be unexplored. Industries utilising this approach successfully make resources to investigate available for personal and organisational learning such that the process is routine and investigations are prompt, thorough and meaningful with feedback that is timely and which materially improves care. The primary aim is to improve any failures in the whole system that result from a non-judgemental assessment and willing participation by individuals wanting to improve both safety and quality. Because of this, the starting point is supportive and non-punitive.

It is important for NHS Wales to maturely recognise that delivering healthcare is inherently risky. This message has informed numerous patient safety campaigns in the UK and globally, and yet there seems to be little structured analysis of the ways that healthcare systems fail, even though that failure frequently leads to unnecessary harm, pain and death for patients, and increases wastage and expenditure in organisations that cannot afford extra costs. Performing multiple analyses without engagement and constructive, timely feedback will perpetuate a situation that NHS Wales cannot afford to continue.

Karl Weick suggests that organisations do the following to achieve a ‘preoccupation with failure’:

- “Restate your goals in the form of mistakes” - what do we want to avoid?
- “Create awareness of vulnerability” - ask about what is risky

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30 Weick, KE & Sutcliffe, KM (2007). 9
31 Health Foundation (2011)
The reporting of near misses is instrumental in assessing the reliability of a system. Near misses are potential errors that could easily have happened if the parameters of the situation had changed. Examples in healthcare would include a pharmacist noticing a patient had been prescribed an unusually high amount of a particular drug and questioning it or a surgical team realising that equipment they will need during surgery was missing as they complete a pre-surgical checklist.

These are all instances where an error could have occurred. Reporting them each time they happen enables improvements to be brought into the system, perhaps in the way medicines are described on prescription forms, or the way equipment is laid out in theatre.

There is a tendency to mistakenly regard near misses as evidence of safety and not see them as evidence of potential errors. “... less effective HROs ... look at a near miss and interpret it as evidence of safety and their ability to avoid disaster. When people see a near miss as success, this reinforces their beliefs that current operations are sufficient to forestall unintended consequences.”

Near misses should be regarded as warning shots and should be acted upon to eliminate the possibility of such circumstances replicating in the system as this increases the likelihood of an error actually occurring. “The best HROs know that they have not experienced all of the ways that their system can fail ... they have a deep appreciation for the liabilities of over-confidence.”

There are two major obstacles to identifying near misses. The first is a lack of reporting, often rooted in the fear of staff about potential negative consequences. An “error-friendly learning culture” that encourages reporting needs to establish ground rules that say honest mistakes that are freely reported will not be considered grounds for discipline or suspension.

The NHS Incident Decision Tree can be used or adapted to ascertain what the outcome of any reporting would be. Obviously reckless or criminal behaviour should be the subject of disciplinary action, but not distinguishing between deliberate recklessness and genuine mistakes made in complicated environments is lazy management and inhibits learning because errors are not reported and potential recurring errors cannot be prevented.

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32 Weick, KE & Sutcliffe, KM (2007). 151-152
33 Weick, KE & Sutcliffe, KM (2007). 61-62
34 Weick, KE & Sutcliffe, KM (2007). 3
35 Developed by the National Patient Safety Agency. www.nrls.npsa.nhs.uk/resources/?EntryId45=59900
A working environment that encourages error-reporting and protects staff who admit to making mistakes is sometimes called a ‘just culture’, which exhibits the following characteristics, as defined by Professor of Human Factors and Systems Safety, Sidney Dekker:

- Encourages openness, compliance, fostering safer practices, critical self-evaluation.
- Willingly shares information without fear of reprisal.
- Seeks out multiple accounts and descriptions of events.
- Protects safety data from indiscriminate use.
- Protects those who report their honest errors from blame.
- Distinguishes between technical and normative errors based on context.
- Strives to avoid letting hindsight bias influence the determination of culpability, but rather tries to see why people’s actions made sense to them at the time.
- Recognises there is no fixed line between culpability and blameless error.\(^{36}\)

For NHS Wales to establish highly reliable systems all organisations need to show commitment to developing a culture where errors can be reported, discussed openly and acted upon. This just culture is a pre-requisite to any would-be HRO.

Without a just culture, staff will be reluctant to report errors, for fear of being blamed for them. In the aviation industry, there is an understanding that any pilot freely reporting a genuine error will be immune from blame. Obviously organisations must reserve the right to investigate whether negligence or recklessness contributed to the error, but stating from the outset a commitment to ‘no-blame reporting’ has resulted in a much higher level of near-miss reporting. The increase in reported near misses has been paralleled by a corresponding decrease in serious incidents, indicating the value of learning from near misses.

**Driver 4: Value expertise and promote situational leadership (Deference to expertise)**

Much has been written about leadership in healthcare organisations, but HROs routinely demonstrate ‘situational leadership’, where the expert is expected to take the lead regardless of seniority. The ‘expert’ who possesses essential knowledge about potential problems may well by one of the most junior members of staff. Leadership in a given situation is therefore characterised by a ‘knowledge hierarchy’, rather than an ‘authority hierarchy’.

This is important for generating leadership at all levels, where staff feel empowered to call ‘Halt’ on any system, procedure or treatment they feel is unsafe. As mentioned above, the team in a maternity day centre in Glan Clwyd Hospital were able to show improvements in compliance with certain care bundles only when the healthcare support workers were empowered to ensure that the checks were carried out.

\(^{36}\) See Dekker, S (2007) *Just Culture: Balancing Safety and Accountability*, London: Ashgate Press,
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Situational leadership ties in with the idea of a culture that encourages honest questions and admitting to errors without fear of reprisals. Nobody is unquestionable. Everyone has a responsibility for safety and quality. This ‘group responsibility’ means that a failure to speak up and warn of danger makes a person as culpable as someone who makes an error.

The 2011 Welsh Healthcare Associated Infections Programme (WHAIP) Point Prevalence Study identified that urinary tract infection was the second most prevalent infection in acute hospitals (16.7 per cent) and the primary cause of infection in the non acute setting (36.1 per cent). In both settings at least 50 per cent of cases were catheter associated urinary tract infections (CAUTI).  

A meta-analysis of the literature demonstrated that the instigation of a ‘Stop Order’ signalling the intent to remove catheters when no longer necessary was associated with a 50 per cent reduction in CAUTI.  

The 1000 Lives Plus STOP Campaign has taken important first steps in addressing the shift in culture necessary for widespread adoption of the Stop Order. One of the campaign’s key elements is encouraging all clinical staff to question the need for a catheter to stay in place or challenge the need for insertion.

This utilises active ‘followership’, as explored in a previous white paper, and it is hugely important to achieving high reliability. In addition to this, leadership on the ground require expectations to be explicitly stated. The assumption that people will know what to do in a given situation is naïve and could lead to harm. A key part is the recognition that leader and follower may inter-change depending on turn or circumstances. In this way, neither acquires a dangerous and potentially dominant position, the team is built to be stronger because it is sensitive to changes in circumstance and no worker in the NHS should feel that they are not listened to or unvalued.

Leaders need feedback on the way they lead. A 360 degree review is useful for leaders to understand how their behaviour impacts on the culture - do they encourage people to report issues? Are they approachable? These questions and others help leaders assess their personal effectiveness and contribution towards the organisation becoming an HRO. A leader unable to reflect on these questions may be as responsible as the follower unable to influence the next level above them and NHS Wales needs to address both ends of this spectrum to build effective teams within each HRO.

There is strong evidence that deferring to the expertise of frontline staff improves patient safety and the quality of care. “When frontline employees are given broad decision-making
authority within health care organisations, it creates a context for richer interactions that improve information quality, cross-functional relationships, and co-ordination.”41

Senior leaders still have an integral role to play by promoting the expertise of teams and giving the experts authority. In work to reduce catheter-related bloodstream infections (CRBSI), the explicit support of senior leaders for the implementation of care bundles resulted in a significant increase in compliance with best practice and a reduction in infection rates across Wales. Therefore, “The senior leaders’ role is to provide teams with sufficient resources and incentives, and remove barriers (e.g., political) to the team’s success.”42

‘Deference to expertise’ also recognises that much expertise is held by the patient and the patient’s family. Consulting patients over care plans, and asking for feedback on patient experience, are valuable ways of identifying possible systems failures, near misses and areas for improvement. Including patients and families in Root Cause Analysis adds further insights into past events.

Driver 5: Organisational reflection (Organisational Resilience)

“To be resilient is to be mindful about errors that have already occurred and to correct them before they worsen and cause more serious harm ... a commitment to resilience is evident in a culture that encourages the widespread conviction among all its members that formal procedures are fallible. The mind-set is: since we have not experienced all the ways in which things could fail, we must be continually wary.”43

Resilience is built into the system through pursuing mindfulness, as outlined above, initiating stable decision-making processes that are flexible, for example NEWS, and establishing teams who train and prepare together for situations where they may be called upon to react outside the normal parameters of working. It is this resilience that builds the culture for improvement, because it is inclusive, just and non-judgemental at the outset. The workforce are thinking about errors that have occurred and the potential for things to go wrong in the future, which embeds vigilance in the organisation. This builds wariness and anticipation into everyday practice.

Reflection will breed resilience. There needs to be a greater appreciation for the value of analysing the ways in which care is delivered. There are numerous tools to assess performance and effectiveness at a personal, team and organisational level. What may be missing is the will to apply those tools. A reflective culture must clearly state that measurement is to inform and fuel improvement and not for apportioning blame or criticism.

There is some advantage in utilising multi-disciplinary teams to facilitate investigation and learning that bring together a variety of expertise and knowledge gleaned from multiple sources, because specialist teams may be ‘too close’ to a given system to assess it, critically and objectively. 1000 Lives Plus collaborative working groups have shown the efficacy of multi-disciplinary teams in improving surgical outcomes, cutting healthcare associated infections, and reducing medication errors.

Multi-disciplinary teams function best when they are grouped around a core set of values, which allow for some autonomy in the way they work. When values are clearly stated (for example, we will deliver care safely, we will prevent wastage, we will protect patient dignity, we will follow best medical practice), then staff should frame their decisions in line with the values.

The culture that fosters a sense of belonging and togetherness in reducing risk and cutting avoidable harm is one that NHS Wales should aspire to. The clear message from HROs is that building a reflective and resilient staff, who know what is expected of them, will help build a reflective and resilient culture, which will in turn help create a reflective and resilient organisation that is able to respond to internal and external pressures while still delivering a high quality service.

**Moving towards high reliability**

All NHS health boards and trusts in Wales are committed to improvement and are taking action to improve clinical services. Improvements in Wales, that have been achieved through various 1000 Lives Plus and related initiatives, have been keenly studied by healthcare organisations around the world, including the other home nations, the USA, New Zealand, Scandinavia and mainland Europe.

There has been increased awareness that healthcare needs to be person-centred and patient driven. The public are being asked to help shape health services more than ever before. This is an important corrective in any change initiative, because it will keep the focus on the people relying on the services. It can also provide an important motivator for change - if systems are currently unreliable, then this will have an impact on patient outcomes and focusing on improving care for the patient will provide traction to change the systems.

There are also numerous individuals within NHS Wales who have embraced the quality improvement methodology used by 1000 Lives Plus and have used it to improve their clinical practice. This experienced quorum of professionals, who are well-versed in the techniques that will deliver high reliability, also need to be engaged and motivated in the mission to improve the reliability of services.

These positive experiences and potential resources can all be deployed by NHS Wales health boards and trusts seeking to become high reliability organisations. There are drivers

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that will help move organisations on this journey towards high reliability, and interventions that can be introduced to bring about positive change.

Change will need to take place on many levels from the frontline to the executive board and perhaps even beyond. There is no room for complacency - the people of Wales deserve and demand that the services they receive can be relied upon to deliver safe, effective care that also represents good value to the tax-paying citizen. The evidence of the improvement journey in Wales shows that everyone in the NHS wants to deliver those reliable services.

We need to be honest about where we fail and where we almost fail. We need to dispense with the old blame culture and establish a just culture where errors become opportunities to improve the system. We need to become preoccupied with the analysis of failure as this is the best way to mitigate it. We must refuse simplistic miracle cures and do the hard work of ascertaining the causes of stresses and strains within the complex systems of healthcare.

This white paper describes how everyone associated with NHS Wales can contribute to reducing errors and harm to patients. The benefits are obvious - safer, higher quality, more effective care, with a reduction in costs. All NHS Wales organisations must accept the challenges to become high reliability organisations and adopt the principles and practices outlined in this paper, to achieve this.

The next step is for organisations and clinical teams to apply these principles to their own areas of practice. Together we can move towards the safer, transparent health service we aspire to in Wales and a knowledge that we have joined the ranks of other high reliability organisations.

Further reading
Health Foundation - Evidence Scan: High Reliability Organisations. Available online at: www.health.org.uk

Weick, Karl & Sutcliffe, Kathleen - Managing the Unexpected, Resilient performance in an Age of Uncertainty (2nd Edition)

Online resources
‘Achieving high reliability’ - www.1000livesplus.wales.nhs.uk/hro

Mid Staffordshire: A dark event in the history of the NHS - Causes and Lessons (Audio Recording) - www.1000livesplus.wales.nhs.uk/mid-staff-event

Human factors training provider, Atrainability - www.atrainability.co.uk

All 1000 Lives Plus white papers referenced in this paper are available from www.1000livesplus.wales.nhs.uk/publications
About the author

**Philip Banfield** is a Consultant Obstetrician and Gynaecologist in north Wales and the National Faculty Lead for the 1000 Lives Plus Transforming Maternity Services programme. He has a long record of involvement in clinical governance and clinical audit, with an MD that looked at variations in obstetric outcomes and intervention rates, leading to the development of the audit spiral in maternity care.

A former advisor to the World Health Organization in Quality Assurance in Maternity Care, he is actively involved in research in fetal monitoring in labour and has a particular interest in the teaching and training of emergency skills and drills in obstetrics. He is currently also Honorary Senior Lecturer with Cardiff University and heads the undergraduate team at Glan Clwyd Hospital.

As well as his involvement in 1000 Lives Plus, he is on steering groups for the Welsh Maternity Data Project and the UK Obstetric Surveillance System (UKOSS). He is an past-member of the All-Wales Strategy Group, having a keen interest in pharmacology and therapeutics education and the prevention of errors in clinical practice.

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For print requests, please contact: 1000 Lives Plus, 14 Cathedral Road, Cardiff CF11 9LJ
Tel: (029) 2082 7653 Email: 1000livesplus@wales.nhs.uk

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