Safety at the heart of healthcare

Helen Hughes describes the steps being taken to address the widescale issue of avoidable harm

The World Health Organization estimates that avoidable harm in healthcare is one of the 10 leading causes of death and disability worldwide. The NHS states that in the UK there are around 11,000 avoidable deaths annually due to safety concerns. Suggestions are that this could have doubled during the COVID-19 pandemic.

Since the 1980s and 1990s there has been increased awareness and understanding of the importance of patient safety. However, despite a range of international and national initiatives aimed at reducing avoidable harm, this remains a persistent and widescale problem.

INDEPENDENT VOICE

Patient Safety Learning is a charity and independent voice for improving patient safety. We believe that to address the challenge of avoidable harm in healthcare we need to think and act differently, transforming our approach. We believe that patient safety is not just another priority – it is a core purpose of health and social care.

We are focused on two main areas of activity: policy influencing and campaigning; and patient safety through 'how to' resources, products and services.

SIX FOUNDATIONS OF SAFE CARE

In our report, *A Blueprint for Action*, we outline what we believe is needed to address the underlying systemic causes of avoidable harm. Underpinned by analysis and evidence, we identify six foundations of safe care for patients along with practical actions:

1. Shared learning
Organisations should set and deliver goals for learning, report on progress and share their insights widely for action.

2. Leadership
We emphasise the importance of overarching leadership and governance for patient safety, including modelling behaviour that creates a just culture.

3. Professionalising patient safety
All staff should have the skills, knowledge, and support to deliver safe care, and recognise that organisational standards and accreditation for patient safety need to be developed and implemented.

Above: Patient safety is paramount in healthcare

Right: The Patient Safety Learning hub launched in 2019 and has seen its impact increase significantly

> ## "We believe that all health and social care organisations must have access to patient safety standards"

These standards need to be used by regulators to inform their assessment of safe care.

4. Patient engagement
We must ensure that patients are valued and engaged in patient safety at the point of care if things go wrong, and in co-producing improvements in services.

5. Data and insight
Ensure better measurement and reporting of patient safety performance, both quantitative as well as qualitative – not just capturing data on error and avoidable harm, but proactively assessing risk.

6. Just culture
All organisations should publish goals and deliver programmes to eliminate blame and fear, introduce or deepen a just culture, and measure and report transparently on progress.

DEVELOPING STANDARDS
One of the key reasons that we struggle to reduce avoidable harm in healthcare is that we don't have or apply standards for patient safety at a system and organisational level as we do for other safety issues, or in a way that other industries approach safety management systems.

We believe that all health and social care organisations must have access to comprehensive patient safety standards and that, by adopting and implementing standards, these organisations will be able to deliver safer care and embed a commitment to patient safety throughout their work. This would also enable patients, leaders, clinicians, the wider public and regulators to assess their progress and performance.

Since 2020 we have been developing and designing a set of unique patient safety standards and support tools that can help organisations not only establish clearly defined safety aims and goals, but also guide their implementation and demonstrate their achievement.

These standards are based on 20 years of research, as well as learning from inquiries, policy and good practice from healthcare, both in the UK and internationally. We have built on insight and learning from human factors and ergonomics widely applied in other safety-critical industries.

We have supplemented this with our own research, working in partnership with organisational patient safety specialists and practitioners to ensure that our standards are quality assured with 'real world' practicality. Our aim is that these will help to deliver enhanced, evidence-based safety outcomes and behaviours.

We are currently working with NHS organisations on how these standards and a self-assessment tool that we have developed can be implemented as an integral part of a broader programme of changes for managing patient safety. We will

Helen Hughes
Chief Executive of Patient Safety Learning

formally launch our Patient Safety Standards later this year.

SHARED LEARNING
Another 'how to' resource we have developed to improve patient safety is the hub (pslhub.org), our free shared learning platform for patient safety. Designed by and for patient safety professionals, clinicians and patients, the hub offers a powerful combination of tools, resources, stories, ideas, case studies and good practice to anyone who wants to make care safer for patients. Its core features include:
- Learn – the knowledge repository area of the hub, moderated to ensure the content is consistently high quality
- Communities – a place to discuss patient safety concerns and how to address them
- News and Attend – updates on patient safety initiatives, current issues and upcoming events.

Since its launch in October 2019 the hub has had 791,000 page views and over 396,000 visits. It now has 2,600 members from 980 organisations across 74 countries.

There are several key areas of surgical safety where we have been building up resources on the hub and receiving contributions from members, including work to prevent surgical fires and surgical site infections, meet the challenge of the elective care waiting list and acknowledge the importance of preoperative and postoperative preparation and care.

We are also supporting the establishment of a National Safety Standards for Invasive Procedures network where leaders can meet, share insights and resources, and promote good practice.

We gather and monitor this resource's impact on a continual basis and know that healthcare professionals use it to source proven good practice and apply it to their own organisations. Patient groups and communities of interest are using it to network and campaign with greater visibility and effectiveness. We are also seeing it being used by staff and patients as an informal source of research to collect insights and perspectives from the frontline of patient safety.

Join the hub today

We welcome the support of the Royal College of Surgeons of Edinburgh and look forward to its Members accessing our extensive range of resources for learning, contributing and sharing knowledge for safety.

Sign up for free at pslhub.org and join the growing number of healthcare professionals, patients, managers, regulators, researchers, policymakers and campaigners as we support the global online community of people who share the same vision as us – a world where patients are free from avoidable harm.

Contact us
✉ Email: hello@patientsafetylearning.org
🐦 Twitter: @ptsafetylearn
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Cutting-edge design

Maryanne Mariyaselvam describes some of the latest solutions being developed to protect patients and clinicians from potential errors
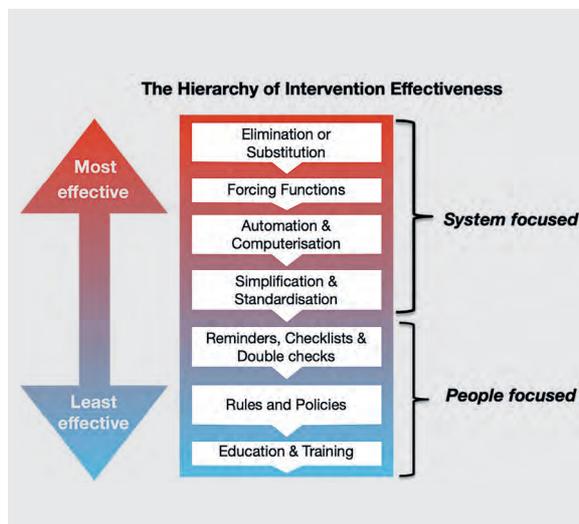
The foundations that keep clinical practice as safe as possible and that have improved over time include education, standards, professional organisations, personal diligence and commitment. However, the environment in which clinicians work has a profound impact on patient outcomes and the inevitability of errors occurring despite our best efforts.

Frontline clinicians are acutely aware of the impact of resource limitations and the organisation of healthcare systems within which we work. This includes the team structures, patient pathways and the limitations of medications and devices that are available to us. Sometimes we are clearly set up to fail.

However, if failure occurs, the clinician at the head of the team can be held personally responsible at a local, regulatory or even criminal level[1-3], potentially leading to more defensive medicine from the profession and resulting in incalculable patient harm.

Investigation is not supposed to apportion blame[4]. However, there tends to be a focus on the acts or omissions of individuals rather than the context in which errors have occurred. The high-reliability industries have led the way in safety improvement and optimisation. They came to understand over decades that the culture of blame can be both individually unfair and counterproductive in improving outcomes when dealing with highly motivated groups. Professional organisations should call this out and support members when they are under individual scrutiny in this way.

The hierarchy of intervention effectiveness (Figure 1) was first described within high-reliability

Figure 1: The hierarchy of intervention effectiveness, a risk-management theory describing the effectiveness of interventions used in the workplace. Image created and adapted from data published by Cafazzo and St-Cyr, 2012

industries and is now increasingly used in healthcare and patient safety[5]. Traditionally, at the top of the hierarchy is "elimination and substitution"; that is, can you achieve the goals by not doing the risky task at all or by doing something else – for example, one could eliminate air crashes by grounding all planes.

In many situations, this may be impractical or impossible. So for a specific task, although the lower elements of the hierarchy, such as education and training, are laudable and absolutely necessary, designing risks out of the system is the most effective control.

In daily life, we see design solutions that prevent error. A classic example is the microwave oven – its combined off-switch/door latch ensures a level of safety where education and diligence would be ultimately ineffective. However, at

UK petrol pumps, despite it being impossible to put a diesel nozzle into a petrol tank – and this error being extremely rare – the error of putting petrol into a diesel tank occurs every three minutes[6] because, to avoid this, we rely on colour-coding, haptics, education, warning signs, individual diligence and punishment – it is very costly to make this error!

A type of design solution that is helpful but less 'hard' is described as a nudge – for example, the embossed picture of a fly placed centrally on the porcelain of a urinal, designed to reduce spillage in public toilets[7].

There are many examples in medicine. Specifically, in the operating theatre, the medical gases that we use have Schrader connectors that are unique for each gas at the wall and have non-interchangeable screw threads at the other end, making misconnection all but impossible. One can only imagine the deaths that would have occurred if we were relying on diligence and checking alone. Although more than 99% effective, error can still occur with any design, as shown in multiple extraordinary events, such as the Westminster Hospital tragedy when the gas pipes were connected to the wrong outlets during servicing[8].

Our group[9] specialises in the conceptualisation, development, implementation and evaluation of design solutions for errors that occur in the operating theatre. The concept is perhaps the easiest part, but the realisation of an approved marketable product and the implementation across healthcare systems is the challenge.

This article shows some examples of these solutions, which have been fully developed and marketed in the UK or have reached late-stage development.

> **If failure occurs, the clinician at the head of the team can be held personally responsible**

Solutions for the operating theatre

FULLY DEVELOPED AND MARKETED IN THE UK

1. Non-injectable arterial connector (NIC)

Wrong-route drug administration into an arterial line causes limb ischemia hours after the insult and so causation is not always overt. The NIC is a hub with a one-way valve that prevents this and also protects the transducer set from bacterial contamination[10]. It now protects patients in around a third of NHS hospitals and has won the AAGBI innovation award as well as the National Patient Safety Award.
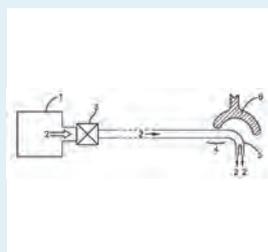
2. WireSafe

Retained central venous catheter guidewires are the most common 'never events' in emergency medicine. The WireSafe makes this impossible by rendering the equipment required to complete the procedure inaccessible until the wire is removed[11]. Crucially, the WireSafe also improves the speed and safety of procedures for the clinician and has been well received by the hospitals that have implemented it[12]. It received the President's Award for outstanding achievement from the Royal College of Anaesthetists and was highly commended at the National Patient Safety Award.

3. High-flow nasal safety cannulae

Transnasal humidified respiratory insufflation and ventilatory exchange (THRIVE) is now commonly used for preoxygenation at induction of anaesthesia or during procedural sedation. A common error – placing a facemask over the nasal interface in an emergency – can lead to rapid stomach insufflation due to the high flow rates of oxygen used (>60 l/min). By using a collapsible nasal interface at the malar region and proximal relief valve, we found that we could divert and vent the high-flow oxygen when the facemask compressed the tubing that supplies nasal prongs[13]. An example of this technology is now marketed by Fisher & Paykel under the brand name Optiflow Switch.

4. SAFIRA

Injecting local anaesthetic into nerves at high pressure causes temporary or permanent injury and is a leading cause of claims in the UK[14]. It is impossible to accurately determine injection pressure by feel alone. The Safe Injection of Regional Anaesthesia (SAFIRA) system is a single operator, automated injection system that limits the pressure to safe levels[15]. It protects the patient from injury and the clinician from litigation. SAFIRA, which is now marketed worldwide, has been highly successful and received the National Patient safety award in 2021.

Maryanne Mariyaselvam
Former research fellow, The Queen Elizabeth Hospital Kings Lynn NHS Foundation Trust. Now undertaking an MD at University of Cambridge

1. NIC: Protects an arterial line from mis-injection error and bacterial contamination. Amdel Medical (www.amdelmedical.com)

2. WireSafe: prevents guidewire retention. Venner Medical International. (www.vennermedical.com/venner-wiresafe)

3. A prototype high-flow nasal oxygen safety device to divert oxygen from the patient when a face mask is applied (from patent WO2016203211A1, with permission)

4. SAFIRA: Protects against nerve injury during regional local anaesthesia infiltration. Medovate (www.medovate.co.uk)

AT LATE-STAGE DEVELOPMENT

Arterial Glucosave

The Health Service Investigation Branch (HSIB) is currently investigating the problem of patient harm and death from neuroglycopenia-based brain injury following the wrong flush solution being used with arterial transducer sets and a resultant sampling error[16]. The Arterial Glucosave is in development and utilises the glucose oxidase colour-change technology used in glucose test strips for diabetics. This gives a dramatic warning to clinicians at point of care before the error causes harm[17].

Humidicare

There are different types of filters in breathing circuits that must be placed at specific locations depending on type and whether active humidification is used or not[18]. This complexity causes confusion and they are commonly misplaced by staff. This has caused a recent spate of avoidable deaths in the UK[19]. The Humidicare is a breathing circuit filter under development[20] with a heat-dependent colour-change technology embedded in the plastic to alert staff if an error of placement has occurred before patient harm has ensued.

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