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OPTIMISING PATIENT SAFETY THROUGH BEHAVIOURAL MODIFICATION

Improving the Human Factors: Driving Best Practice and Outcomes

FOREWORD

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We welcome the publication of this paper, which places human factors, behavioural changes, a commitment to learning and proper investment at the heart of patient safety.

There needs to be collaboration across all fields and health industries, to affect real change and drive best patient experience. The Patients Association is pleased to be part of these discussions, to contribute to the experience of patients when things go wrong in healthcare.

Working together, we can make a difference to morbidity and mortality rates, and the avoidable associated cost burden. We encourage you all to study this paper so that we can work together to create the behavioural changes we wish to see.

The key areas outlined in this paper are: antimicrobial resistance (AMR); falls and hospital bed injuries; healthcare associated infections (HCAIs); medication errors; pressure ulcers and sepsis. While investment in medical technology is going to be essential, there are many other changes, low cost, but systematic, which will help.

Behaviours can change. In 1983 the government introduced the seatbelt law, and fines for those who did not comply. This behavioural change took time, but now when in a car, wearing a seatbelt is an automatic reflex. This practice is estimated to have saved 14,955 lives during 2017.

We can achieve the same in healthcare, by design, and by promoting a cultural and behavioural shift – be it routine, methodical handwashing, the use of proper gloves, safety clothing, with no shortcuts and patients who are engaged in their care accountability. The costs and barriers to change are further detailed in this paper, but the important thing to remember is that we can be the architects of the future we want.

Education will play a major role in informing budget holders of what they can do to reduce falls from hospital beds. While some upgrades may be costly, a mobility plan and assessment, and some necessary equipment will all directly reduce fall rates. Each year the NHS bill is estimated at £630m in this area.

Understanding why behaviours differ, and what can be done to encourage adherence to best practice, utilising technology, redesigning technologies that already exist, informing patients who can champion best practice in safety, and ensuring the right support and measurement, with appropriate incentives in place is essential.

Utilising our health system can be a scary place for patients and their carers. We need to do all we can to reassure and protect patients, involving them as proactive partners in their care, to enable those who provide care to do it safely.

Read this paper and share it with your colleagues – we are sure there is food for thought, and we look forward to hearing your ideas and discussing with you.

BEHAVIOUR CHANGE FOR IMPROVEMENT

The complexity of factors influencing behaviour in clinical systems means that a single approach to assuring best practice is unlikely to be successful in eliminating all errors that lead to adverse health events. Human factors ergonomics (HFE) is a scientific approach that aims to understand the interaction between people and other elements of a system in order to design and optimise how systems perform.

Applying HFE to optimise practice can help to understand and address all the different factors related to the care environment, equipment, organisation and tasks that interfere with the implementation of evidence-based practice.

In the Systems Engineering Initiative for Patient Safety (SEIPS) model, the person (including both their knowledge/skills and beliefs/values) is the central component of the work system, recognising that the system needs to support people to do the right thing. Other components of a clinical system that affect how the person behaves are:

- Tools and technology: availability of equipment
- Tasks: complexity and work-arounds
- Internal environment: interactions with physical environment
- External environment: regulations, policy and economic conditions
- Organisational factors: social and behavioural norms.

Human behaviour can be strongly influenced by social and psychological factors, which explains why education alone is often not successful in changing behaviour. Understanding and applying the science of behaviour is essential to establish and sustain desired change. The COM-B ("capability", "opportunity" "motivation" and "behaviour") model suggests that there are three conditions that underpin behaviour:

- Capability: the psychological and physical ability to know what to do and how to do it
- Motivation: the desire to apply the behaviour, which may be influenced by a mixture of emotional responses, habit and cost-benefit analysis
- Opportunity: the way in which the environment supports the behaviour by providing the appropriate physical, social and cultural resources.

By analysing how these conditions affect a specific behaviour, strategies can be developed that target interventions at the desired behaviour. These might include:

- Restructuring the environment or equipment
- Introduction of rules
- Use of incentives (sanctions or rewards)
- Increasing knowledge/skills
- Prompts or reminders
- Mechanisms to induce negative or positive responses.

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In delivering behavioural and cultural change in the NHS, industry has a positive role to contribute e.g. adoption of automated processes that deliver the safest practices, training in technology, messaging used in meetings and cross-sector partnership that transcends all care environments.

Industry also supports implementation of key initiatives, for example, the AMR 20-year vision, a document which references the need to work with industry for the plans to be a success. Industry can also have a critical role in educating and empowering consumers to work as partners with healthcare professionals in preventing adverse incidents.
This document discusses six adverse health events that impact patient safety and the barriers to preventing them. It is clear that there are viable medical technology solutions to address these, however, in order for these to be implemented, behaviour change must also be adopted as described above.

AMR requires behaviour change from both healthcare users and healthcare providers, alongside medical technology interventions. Strategies such as prompts and reminders alongside national guidelines help to implement modification in practice from a healthcare provider perspective. National campaigns with a widespread audience, such as the television advert about correct use of antibiotics in the UK, is a way that behaviour may be modified through increasing knowledge for healthcare users.

In the case of patient falls, behaviour-modification techniques such as a restructure of environment and the introduction of rules can be used alongside medical technology solutions to improve patient safety. The bed exit alarm system will provide a restructure of the environment yet without the introduction and implementation of rules to go alongside this new system healthcare providers will not have the capability to effectively use these systems and determine where and when they are required.

HCAIs are a significant adverse health event present within secondary care. Many of the barriers that prevent successful interventions which reduce transmission of HCAIs could be overcome with behaviour-change strategies. A reward system used across wards within a trust could provide incentives and motivation for health care providers to utilise medical technology tools and general infection-prevention procedures.

It would be of benefit to apply the COM-B model to medication errors and use this to understand which components of the problem contribute to the behaviour that leads to these errors. It has been shown in an emergency department that 24% and 54% of medication errors are due to physicians and nurses respectively, thus initiating behaviour change will have to start with an analysis of the capability, opportunities and motivations surrounding physician prescribing and nurse administration. This analysis can then be used to adapt behaviours and encourage use of medical technology to reduce medication errors.

In order for change to take place in the identification and management of pressure ulcers, behaviour modification tools which incorporate increasing knowledge, prompts and reminders and the implementation of rules should be considered. With increased knowledge and implementation of rules, a greater priority might be given by those who may have a lack of awareness in this area of clinical care and thus an increased budget proposed for medical technology solutions for pressure ulcers.

Sepsis is rapidly becoming a much better recognised and understood condition with the help of global initiatives. In some cases it is preventable and can continue to be combatted with the aid of further behaviour change in healthcare users who may not have the clinical acumen to recognise early signs and from healthcare providers who must utilise the strategies in place to identify, monitor and manage sepsis.

1. ANTIMICROBIAL RESISTANCE

The Problem

The World Health Organisation (WHO) define, antimicrobial resistance (AMR) as "the ability of a microorganism (like bacteria, viruses, and some parasites) to stop an antimicrobial (such as antibiotics, antivirals and antimalarials) from working against it. As a result, standard treatments become ineffective, infections persist and may spread to others."[1]

The UK AMR Strategy 2019-24 summarises the scale and challenge of AMR to the UK. It states that "antimicrobials, particularly antibiotics, have saved millions of lives since they were first discovered"2, however "no new classes of antibiotic have been discovered since the 1980s"[2]. This, together with the increased and inappropriate use of the drugs we already have, means we are heading rapidly towards a world in which our antibiotics no longer work. We need to act now to rescue this situation.[3]

Evidence collected for the European Centre for Disease Prevention and Control (ECDC) suggests that infections with antimicrobial resistance bacteria accounted for up 33,100 deaths across Europe[4]. The WHO estimates that by 2050, this will lead to 10 million deaths every year[5]. Estimates of the economic impact suggest that this will trigger a reduction of 2.0 to 3.5% in gross domestic product (GDP), costing the world up to $100 trillion[5]. There is a growing awareness and commitment to responding to this challenge and the UK is leading the development of plans that will deliver a cross sector political, professional and public global solution.

Prevention

Preventing the occurrence of infections is by far one of best ways to reduce the necessity for antimicrobial use and thus combat the growing problems with AMR. Specifically, patient safety can be improved by:

- Reducing hospital admissions with strategies in place within community and primary care
- Improving population health through health-promotion strategies and patient understanding of the appropriate use of antibiotics
- High standard of patient care and reduced length of hospital stay with input from multidisciplinary teams to aid in discharge planning
- Ensuring broad Infection Prevention Control strategies across hospitals, including education and training for staff, regular monitoring of practices and the appropriate use of materials and equipment.

Barriers

Global communities, through the United Nations & WHO, are in the process of refreshing their strategies to combat AMR. This is centred on developing new pharmacological molecules. There is also a widely held view that technology must be harnessed, with a fundamental change in practitioner prescribing behaviours, be that of a physician, nurse, allied health professional or community/lay care giver. This is particularly important in developing countries where unqualified care givers may have had limited education and are caring for large groups of people.

Current strategy, however, fails to highlight how much the healthcare industry actions can complement and strengthen public and governmental programs at both local and global levels. This is despite it being raised as early as 2008 in Lord Darzi's report "High Quality Care for All." 6 Core emphasis is placed primarily on the role of future innovations. This particularly refers to the funding and development of future antimicrobials, yet insufficiently highlights the role that existing tools, particularly infection prevention practices, diagnostics and stewardship, have in reducing the inappropriate use of existing antimicrobials. This includes the recognition and appropriate management of human factors[7].

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In addition, current strategy fails to communicate the impact of human factors on the successful delivery of infection prevention and stewardship. Indeed, in the UK, effective and consistent handwashing proves to be on ongoing challenge in some acute settings. This must be addressed in concurrence with a drive towards an improved approach to diagnostic stewardship when prevention techniques have failed.

The WHO have concluded that awareness alone does not intrinsically lead to behaviour change[8]. Programmes designed to drive behaviour change require a combination of data to inform policy makers, regulation, procurement practices, tools for implementation, and strategies to correct misunderstanding among the public.

Whilst industry has been campaigning for some time on infection reduction, especially those caused by gram-negative infections, such as Klebsiella species and Escherichia coli, many hospital-acquired infections (HAI), including respiratory tract infections, urinary tract infections (UTIs) and surgical site infections, are most severe or difficult to treat when caused by a gram-negative bacterium. It is therefore critically important that healthcare professionals (HCPs) implementing guidelines for HAIs do not become complacent in tracking and reporting infections, as this can lead to infection prevention and reduction being neglected.

Industry supports action from government to place infection prevention at the top of the agenda, to focus on reducing infections and targeting the association of HAIs and antibiotic use. It is positive to see AMR awareness increasing, as well as adding carbapenem-resistant gram-negative infections to the list of notifiable diseases in existing laboratory reporting systems, but only when deployed in a way that drives consistent compliance to guidelines.

However, none of this change will deliver improvement without further surveillance around certain infections and partnering with the NHS to provide training and improve leadership at all levels.

Medical Technology Solutions

The medical technology industry is not only a diagnostic industry but a valuable partner in combatting the challenge that AMR presents. The industry has global reach and influence, offering significant opportunity to citizens. We have a responsibility to combat AMR and ensure that the learning derived in economically affluent societies is shared, to assure a more global and effective approach.

There is significant evidence regarding the use of medical technology to negate/compensate the impact of adverse human factors and system failures, to assure effective AMR prevention and management. These can be wide-ranging and include low and high-level technology, as well as data monitoring and education. In AMR, this technology can range from simple devices such as single use skin antiseptics to prevent transmission of infections, through to complex rapid diagnostics that deliver specific treatment regimens to target complex infections.

Partnering with industry to develop real-time, patient-level data, so that clinicians can see infection, treatment and resistance histories to optimise life-saving treatments for serious infections, including sepsis, and to help develop new interventions for AMR, will be key. This will enable the NHS to "be able to report on the percentage of prescriptions supported by a diagnostic test or decision support tool by 2024."[9]

This will enable industry to underwrite a baseline opposition for current practice that can be monitored and managed by more robust surveillance and direct engagement of healthcare professionals to support behavioural change of practice, particularly in critical areas such as sepsis where identifying the optimal treatment or appropriate antimicrobial use is key.

2. FALLS & HOSPITAL BED INJURIES

The Problem

The WHO defines a fall as an "event which results in a person coming to rest inadvertently on the ground or floor or other lower level"[10]. The impact of a fall can vary in its severity, from no harm, through to death. Falls are particularly common for elderly patients, with 77% of all reported inpatient falls happening to those over the age of 65[11]. Elderly patients are also more likely to be harmed from such events as a result of increased frailty.

Data from the National Reporting and Learning System (NRLS) indicates that in the period 2015/16, there were 250,000 falls reported across three main hospital settings. The most commonly reported type of incident being in acute and community hospitals, and the third most commonly reported incident in mental health hospitals[10]. The length of hospital stay generally correlates with the severity of harm or injury. For patients over 65 who experience a moderate degree of harm as a result of a fall, data indicates an average hospital stay of 12 days if surgery is not required[10]. This figure is increased to 23 days should surgery be required, with a cost of £4,329 per patient[10] The average direct impact cost per 'moderate harm' fall for those over 65 is £8,068[10]. Falls cost the NHS and social care an estimated £630 million annually[10].

Prevention

Inpatient falls are common and can be life-changing for patients. Thus, measures to prevent events in hospital are critical. As falls are associated with increased length of stay, multiple interventions by a multidisciplinary team are tailored to reduce the likelihood of falls. To minimise risk, patients should have:

- A review of their medication to identify any that may contribute to an increased the risk of falls
- A vision assessment (if clinically indicated)
- Walking aids positioned within reaching distance (where required)
- Accessibility to a personal call bell
- An assessment for delirium (if clinically indicated)
- A continence care plan (where required)
- A practical mobility assessment, to identify a patient's mobility level and risks associated to individual patients
- A mobility plan in place, to reduce the risk of muscle deterioration, which is a large contributing factor towards patient falls
- The correct equipment available at ward level to be used with patients at different mobility levels (beds, stand aids, hoists, hoists slings, walking frames, walking sticks).

Barriers

It is clear that an investment in equipment to protect patients from falls is required. Indeed, the cost of equipment outweighs the costs associated with patient falls within the NHS. There are not only financial benefits but more importantly there would be significant patient benefits including, reducing harm, treatment, length of stay, readmission rates, return to functional life earlier. Subsequently, an increase would be reflected in overall patient satisfaction levels. Barriers to investment, as detailed below, must therefore be understood and challenged in order to reduce patient falls within the NHS:

- Budgets – currently do not provide sufficient expenditure to purchase effective equipment
- Perspective of budget allocations - investment in equipment needs to be considered as a driver of efficiency in savings for a return in investment due to the cost saved in caring for patients who have suffered harm as a result of inpatient falls.
- Staffing levels – a reduced nurse-to-patient ratio has a significant effect on the ability to provide the necessary care to reduce patient falls
- Education - increased falls-prevention education is required, what can be done on high-risk areas to reduce falls and the importance of falls prevention to protect patients
- Ownership - all healthcare professionals at all levels should be involved in protecting patients from falls.

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Medical Technology Solutions

Patient falls from beds account for 12% - 77% of inpatient falls[10]. The use of equipment with and without advanced technology has been shown to reduce patient falls. An example of this is the bed exit alarm system, at present there is only very low-level evidence available thus the effect in the rate of falls is uncertain[12]. This technology works by activating the alarm's sensor (which is placed within the bed), whenever a falls risk patient attempts to leave the bed space. The alarm sends an alert which may be sited either locally at the bed side or as a handheld device carried by the HCP looking after the patient. This device acts to prevent falls rather than products designed to reduce injury caused by a fall such as low-rise beds, which can in fact increase fall rates due to the amount of patient strength needed to stand from a low height. Patients with poor flexibility are also affected by the use of devices for fall-associated injury reduction and thus these patients would be more suited to fall prevention devices such as the bed exit alarm.

Early mobilisation protocols have also been effective in reducing patient muscle deterioration, engaging patients in active exercises maintains patient strength resulting in helping to reduce the risk of a patient fall. Immobility or bed rest reduces muscle mass between 1.5% and 2% per day in the first few weeks[13]. Using equipment for mobilising patients away from the bed is vital as over 30% of patients fall when waking as shown in the National Patient Safety Agency 2010 update of slips, trips and falls data. Assessing a patient's mobility early in their hospital admission using a bedside mobility assessment will help to determine the most appropriate equipment for that patient. Mobilisation equipment can vary from walking sticks through to mobile hoists with standing slings.

3. HEALTHCARE ASSOCIATED INFECTIONS (HCAIs)

The Problem

A healthcare-associated infection (HCAI) is any infection that develops as a result of healthcare intervention. Unlike the infectious diseases commonly encountered in the community, most HCAIs are caused by pathogens that take advantage of compromised patients whose normal defences against infection have been impaired. Recent advances in healthcare and technology have enabled the treatment of previously fatal conditions, the delivery of invasive healthcare interventions in community settings and early discharge from hospital. As a result, most hospital beds are occupied by seriously ill patients who are highly susceptible to acquiring infection, and infection prevention and control procedures are paramount in ensuring patient safety.

There are several factors that increase the risk of acquiring infection in healthcare settings:

- Transfer of microorganisms through frequent contact between healthcare staff, patients, equipment and within the healthcare environment
- Inpatients become more susceptible to infection as their immune system may be compromised by underlying diseases, immunosuppressive therapy, or extremes of age
- The breach of, or damage to, natural defences that protect the body from infection such as the skin or respiratory tract by invasive devices or treatments
- Widespread use of antimicrobial therapy may destroy bacteria that normally colonise and protect mucosal surfaces, enabling harmful micro-organisms to establish infection and also encourages the emergence of resistant strains with enhanced capacity to spread and/or cause infection.

Why are HCAIs a problem?

Infections acquired as a result of healthcare cause considerable morbidity and mortality. Infections contribute to prolonged hospital stays, may lead to invasive or surgical procedures and in severe cases long term disability or fatality. Patients who acquire HCAIs have been found to have lower health status scores, and delayed return to employment and normal activities[14].

In addition to the impact on patients, HCAIs incur costs to hospitals, community healthcare services and society as a whole. In hospital, patients who acquire an HCAI generate nearly three times more costs than an average patient as a result of additional specialist care, antimicrobial and other drug therapy, tests and treatments.

Few hospitals have systems in place to routinely collect and analyse information about HCAIs and therefore the size of the problem is often underestimated. In 2011-12 the European Centre for Disease Prevention & Control (ECDC) conducted a European-wide prevalence study of HCAIs and found that 6% of patients had at least one HCAI and two-thirds of these infections affected the respiratory tract, surgical site or urinary tract[15]. Invasive devices such as intubation tubes or catheters were important contributory factors and in specialties that use these devices frequently, such as intensive care or high dependency, the risk of a patient acquiring HCAIs is much higher.

The acquisition of infection as a result of hospital or other healthcare treatment has important implications both for the patients affected and the organisations concerned. HCAIs are seen as important indicators of quality and their prevention is key to ensuring that services provided by the NHS are of a high quality in terms of patient safety, experience and clinical effectiveness. Therefore, HCAIs remain a prevalent issue. It is recognised and accepted that to maintain the improvements of the past 20 years will necessitate a reliance on achieving high compliance with key interventions that denote a safe patient environment.

Prevention

There is evidence that it is possible to prevent a significant proportion of HCAIs through the implementation of an infection prevention and control (IPC) programme co-ordinated by specialist infection control practitioners which includes:

- Policies and procedures
- Staff education and training
- Outbreak detection and management
- Surveillance of HCAIs
- Quality improvement initiatives including audit.

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The cornerstone of infection prevention practice is the application of the following core principles of practice in the care of all patients:

- Effective and timely hand hygiene, including safe glove use
- Appropriate use of protective clothing
- Decontamination of patient equipment
- Safe handling of used or waste materials.

Aseptic techniques used in the management of invasive devices and susceptible sites, such as wounds or incisions, are critical in protecting patients from infection. This means adhering to best practice procedures to ensure such sites are protected from contact with non-sterile items, including hands. Enhanced precautions may be required for the care of some patients colonised or infected with pathogens that have a propensity to spread in a healthcare environment. Such isolation precautions may also be required to protect the most vulnerable patients from infection, including those with a compromised immune system such as transplant patients.

The epic3 national guidelines on the prevention of HAI in acute care16 are accredited by National Institute for Health and Care Excellence (NICE) and underpin infection prevention policy and procedures across NHS Trusts.

These guidelines provide recommendations produced from the evaluation of research evidence for practice related to standard precautions and the management of invasive devices. Adherence to these guidelines within NHS Trusts will contribute to maintenance of infection prevention standards nationally.

Within NHS trusts and practices techniques such as surveillance, clinical audits and the use of care bundles also play a role in reducing the prevalence of HCAIs. Surveillance is the systematic monitoring of the occurrence of disease in a population and plays an important role in detecting outbreaks of HCAIs, and providing outcome measures that can be used to monitor the quality of care and drive improvement. Clinical audit is also an important quality improvement process used to provide feedback on performance to improve specific aspects of care. Care bundles can be used to focus on between three and five elements of care that are essential to prevent an HCAI and provide a mechanism to drive improvement by monitoring these critical aspects of care.

To keep those using the NHS safe, the service must function with an extremely high-throughput and hygiene demands. It will look to deploy hi-tech solutions which can demonstrate increased safety, efficacy and enhanced patient experience, i.e. they will reduce infections (or infection risks), or reduce costs or enhance patient experience.

Barriers

Barriers to successful deployment of interventions for the prevention of HCAIs include:

- A lack of awareness amongst healthcare staff of their individual role within infection prevention strategies and how as an individual or within a team each member can contribute
- Poor design and optimisation of workflow within clinical environments for example availability of dirty utilities across multiple wards
- Maintaining up-to-date information on current infection prevention procedures and disseminating this to staff with an awareness of how this impacts other practical procedures
- Lack of communication which would help patient understanding of the impact patients can make to contribute to infection prevention and the effect this has on patients themselves, the hospital and staff
- Healthcare workers' perception the priority of this problem.

Medical Technology Solutions

There are a wide variety of ways in which medical technology can support infection prevention in healthcare settings, with many examples of collaboration between specialist practitioners in infection prevention control and industry in creating solutions to infection control problems. These include:

- Technology innovation: technology that can reduce the risk of HCAIs, for example, high-level disinfectants with broad spectrum efficacy that are safe for healthcare workers and the environment, equipment drapes to protect equipment such as probes, operating theatre lights, microscopes and robotics
- Technology that supports best practice: improving compliance to infection control, such as alcohol hand rub that is tolerated well and use of UV markers to identify most critical touch points for cleaning
- Ergonomics: improving the suitability of equipment or devices, such as, systems that enable staff to decontaminate equipment with accessible disinfectant products suitable for the application – placement of wipes within clinical areas
- Efficient processes with infection prevention control at their core: operating theatre turnover process to ensure cleaning is safe, thorough and timely
- Education: supporting best practice in preventing infections through surveillance, audit cycles and feedback loops, educational materials, campaigns and scenario-based training.

4. MEDICATION ERRORS

The Problem

The National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) defines a medication error as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer"[17]. It is estimated that there are 237 million errors that occur in England each year[18]. The problem costs the NHS an estimated £1.6bn 18. The challenge is very much a global one, as such, the WHO global initiative aims to reduce severe avoidable medication-related harm globally by 50% in the next 5 years. The current cost to a 400-bed acute NHS hospital is £600,000 per year.18 Interestingly, drug errors are four times more likely to occur in general wards[19], compared to areas such as theatre or Neonatal Intensive Care Units.

Prevention

The Department of Health and Social Care established a Short Life Working Group (SLWG) in September 2017. This group provides advice to the Secretary of State for Health and Social Care on the scope of a programme of work to improve medication safety in line with the WHO Challenge.

They identified a strategic framework of four domains:

- Patients and the public
- Medicines
- Health care professionals
- Systems and practices of medication.

Interestingly, a study of medication errors in the emergency department showed that 24% of errors could be attributed to physicians and 54% to the nurses, and that they most commonly occurred at the administration phase (36%)[20]. Through a commitment to NHS e-prescribing, errors are anticipated to drop dramatically. Equally, a growing awareness of ready-to-use medications can help avoid errors.

Barriers

We know we have a myriad of safe devices and systems available, which are not utilised, as innovation is currently stifled.

Currently, solutions are yet to be adopted into practice, factors contributing to this include:

- Clinical
  - Lack of Knowledge
  - Resistance to Change
  - Cost
  - Alignment of separate departments e.g. Pharmacy policy with Nursing Practice for a workable solution.
- Procurement
  - Perception of Cost
  - Failure to specify value and safety with enough "weighting"
  - Lack of Knowledge.
- Industrial
  - Lack of data
  - Cost vs. return on investment.

We must also define a benchmark for errors, as due to poor reporting, there is an assertion there are no problems.

Medical Technology Solutions

A medical device designed and proven to reduce these complications will offer significant economic value that may warrant premium pricing. These devices could play a key part of a multifaceted strategy to prevent medication errors and improve patient safety through improving standardisation.
It is recognised that many parts of the medical technology industry are highly supportive of the promotion and adoption of value-based procurement within healthcare sectors across the globe. Suppliers of technology can provide transparent and evidence-based data to substantiate value-based claims; and where proposed benefits can be under-written in the form of an agreement that apportions equitable responsibility for both parties. In addition, creating an economic and policy-driven environment conducive to the financial goals of hospitals and physicians will facilitate wider adoption.

5. PRESSURE ULCERS

The Problem

Pressure ulcers are the result of prolonged pressure on the skin, with obstruction of capillary flow causing ischemic injury that results in in tissue damage. Friction, shear and moisture can all accelerate the forming of a pressure ulcer.

NHS Safety Thermometer reported that from April 2014 to the end of March 2015, just under 25,000 patients had developed a new pressure ulcer, and on average, 2,000 pressure ulcers are newly acquired each month within the NHS in England alone[21]. Pressure ulcers are a key indicator of the quality and experience of patient care. Despite progress in their management, they remain a significant healthcare problem, with up to 200,000 people developing a new pressure ulcer in 2017/18, at a treatment cost to the NHS of more than £1.4 million every day[22].

The older population are the most likely group to have pressure ulcers; this is especially true for those older than 70, up to a third of whom will have had surgery for a hip fracture. Age alone is not a risk factor; rather, it is the problems common in older people that are associated with pressure ulceration (hip fractures, faecal and urinary incontinence, smoking, dry skin, chronic systemic conditions, and terminal illness). Pressure ulcers in older patients are associated with a fivefold increase in mortality, and in-hospital mortality in this group is 25% to 33%[23]. 7-8% of those who develop pressure ulcers will die from related complications (such as sepsis or osteomyelitis)[24]. They can also result in longer lengths of stay in hospitals, with one study finding adult patients experienced an extended stay of over 4 days[25]. Another study found patients over 75 years of age, who develop a pressure ulcer in hospital, had a 10 day longer stay[26]. Those with spinal injuries form another distinct group, in whom the prevalence is 20% - 30%, one to five years after injury.

A review of death and severe harm incidents reported to the NRLS found that pressure ulcers were the largest proportion of patient safety incidents in 2011/ 2012, accounting for 19% of all reports 27. It has been acknowledged that a significant proportion of pressure ulcers are avoidable (NHS Stop the Pressure)27. The cost of treating a pressure ulcer varies from £1,214 to £14,108; costs increase with severity due to increased healing time and an increased likelihood of complications[28].

We know that many pressure ulcers are preventable, so when they do occur, they can have a profound impact on the overall wellbeing of patients and can be both painful and debilitating[29]. Preventing them will improve care for all vulnerable patients.

Prevention

Prevention of pressure ulcers is the most obvious solution with ongoing risk assessments. To reduce the chance of forming a pressure ulcer, hospital patients should be:

- Encouraged to eat and drink, and assisted with eating and drinking when needed
- Repositioned regularly (ideally with a schedule)
- Encouraged to make small shifts in weight if the patient is able
- Placed on a therapeutic surface for better weight distribution and reduction of the extrinsic pressure
- Provided with other technologies such as heel protectors.

There are a number of therapeutic surfaces that provide the solution to prevent the incidence of pressure sores, including powered/non-powered/gel technology and air surfaces. A more holistic care plan is needed for patients to ensure an accurate risk assessment and the use of available technologies as appropriate.

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Barriers

The up-front cost of investing in preventative measures to reduce the incidence of pressure ulcers, weighed against the cost of treatment, has obvious financial benefits. Moreover, there are major benefits to patient care and overall well-being. It is therefore imperative that the barriers to investment are better understood:

- Lack of awareness of the severity of this clinical issue within the organisation of the NHS leads to budgets for this area of investment being neglected
- Patients with multiple co-morbidities require multiple interventions often derived from different clinical areas, thus the responsibility for the care of simple yet harmful problems such as pressure ulcers may be overlooked
- Unidentified patients at high risk of pressure ulcers could occur due to a shortfall in holistic approach to patients within the NHS
- The market is segmented to ensure that the risk to patients is considered when the decision surface is decided upon. The install number, however, often does not reflect the demand, as we see an increase in elderly inpatients with numerous clinical complications/risks.

Medical Technology Solutions

The use of equipment such as seating or beds that are not specifically designed to provide pressure relief can also contribute to the development of pressure ulcers. As pressure ulcers can arise in a number of ways, interventions for prevention and treatment need to be applied across a wide range of settings, including the community, care homes and hospitals. As such, NICE has made several recommendations through Quality Standard QS89 and Clinical Guideline G179. The guidelines (Quality Standard QS89, Statement 8) states: "People at high risk of developing pressure ulcers are provided with pressure redistribution devices"[27].

Pressure redistribution devices work by reducing or redistributing pressure, friction or shear forces. Devices include high-specification mattresses, gel technology, pressure redistribution cushions and equipment that offloads heel pressure. Gel Technology is pressure redistribution technology that buckles and absorbs the patient's weight, helping to reduce pressure, friction and sheer via patient immersion.

The type of device a person needs will depend on their circumstances, for example, their mobility, the results of the skin assessment, their level of risk, the site that is at risk, the person's weight and the person's general health. Using pressure redistribution devices as soon as possible can prevent pressure ulcers developing and help to treat them if they do arise, ensuring patient safety and improving the experience of people at high risk.

6. SEPSIS

The Problem

In 2017, the World Health Assembly, the decision-making body of the WHO, adopted a resolution to improve the prevention, diagnosis and management of Sepsis. Severe infections and sepsis are the most common reasons for admission to hospital and perhaps the most common cause of inpatient deterioration. In the United Kingdom, there are more than 250,000 episodes of sepsis annually with at least 44,000 people dying as a result 30. Sepsis claims more lives than breast, bowel and prostate cancer put together, but until recently, few had heard of it. The Sepsis Trust commissioned an independent piece of work from the York Health Economics Consortium (YHEC) to estimate the cost burden of Sepsis to the NHS and the wider economy. Conservative estimates put a direct cost to the NHS of at least £1.5 billion 30.

Prevention

It is known that sepsis is caused by an infection; identifying risk factors should always prompt a high index of suspicion. The message for health professionals is to always "think sepsis" and a set criteria which would indicate potential acute illness. Track-and-trigger warning scores such as the National Early Warning Score (NEWS) as developed by the Royal College of Physicians in 2012 and updated to NEWS 2 in 2017 are available and have formal endorsement from NHS England and NHS Improvement to become the early-warning system for identifying acutely ill patients.

Early warning scores (EWSs) are based upon a simple aggregate scoring system which is a score allocated to the physiological measurements that are already recorded in routine practice. EWSs are highly relevant in identifying potential sepsis and to further support this NICE issued guidelines in 2016 (NG51) to support in the identification and management of sepsis in the community and in hospitals 31. NG51 provides a series of algorithms for the identification and severity of assessment of sepsis at the bedside, known as Red Flags to indicate a high risk of deterioration.

Barriers

- A lack of sepsis symptom recognition at all levels from primary care (general practice), community settings, ambulance services and within secondary and tertiary care within hospitals
- Failure to correlate EWSs with sepsis can be a barrier to early detection
- The pressures placed on healthcare systems which are resource-constrained, can lead to variation in practice at local levels not being fully understood
- Communication between primary and secondary care regarding the management of cases of suspected or proven sepsis – if responses are optimised and co-ordinated, outcomes will improve
- Failure to regularly monitor for deterioration in a sepsis case.

Medical Technology Solutions

Medical technology has a huge part to play in the early detection of sepsis:

- Novel electronic tools in primary care to assist GPs in checking for signs of sepsis
- Connected Scoring Apps with on-device calculators at the bedside
- Customised messages based upon the calculation on next steps of treatment
- Customisation of early warning protocol with on-device alerts to aid clinical decision support at the bedside
- Full Hospital Connectivity, capturing patient data linking into EMR systems.

Education surrounding sepsis for health professionals will also play a part in improving outcomes, specifically focusing on the prevention of sepsis. There is currently no mandatory training for health professionals and thus there is a risk of a lack of understanding of the burden of the disease.

CONCLUSION

Our group works continually to support improved patient safety in healthcare through a range of options – including changing behaviour. This paper has aimed to clearly outline the six key areas where behavioural change is needed. All six can be alleviated through simple changes in what is currently common practice, and thus deliver best outcomes and best patient experience at minimal additional cost.

However, education alone is not enough. To drive real behavioural change, we must support those leading hospitals, CCGs and other healthcare services. They need to have the right systems in place enabling and empowering all those working in healthcare, as well as ensuring there is appropriately-tiered accountability.

This is a call to action placed on all of us. Hygiene, cleanliness, and accuracy are all affordable, achievable and non-negotiable in delivery. Let's encourage and motivate our healthcare colleagues to strip down the barriers preventing them from achieving greater patient safety, as well as encouraging them to activate the patient to monitor and share delivery roles.

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