How to avoid Health Acquired Pressure Ulcers (HAPUs): Using System Dynamics to identify the Leverage Point

Aneurin Bevan University Health Board

This approach demonstrates the value of using System Dynamics to explore the root causes of so-called 'harm events' in hospital settings. The results of the analysis informed a Quality Improvement collaborative focused on reducing the incidence of pressure ulcers acquired at the Royal Gwent Hospital in Newport, Wales. Within two years, up to ten frontline teams prevented (at least) 265 pressure ulcers and averted more than £1.5 million in cost while securing better quality care for patients and improved patient experience.

Background

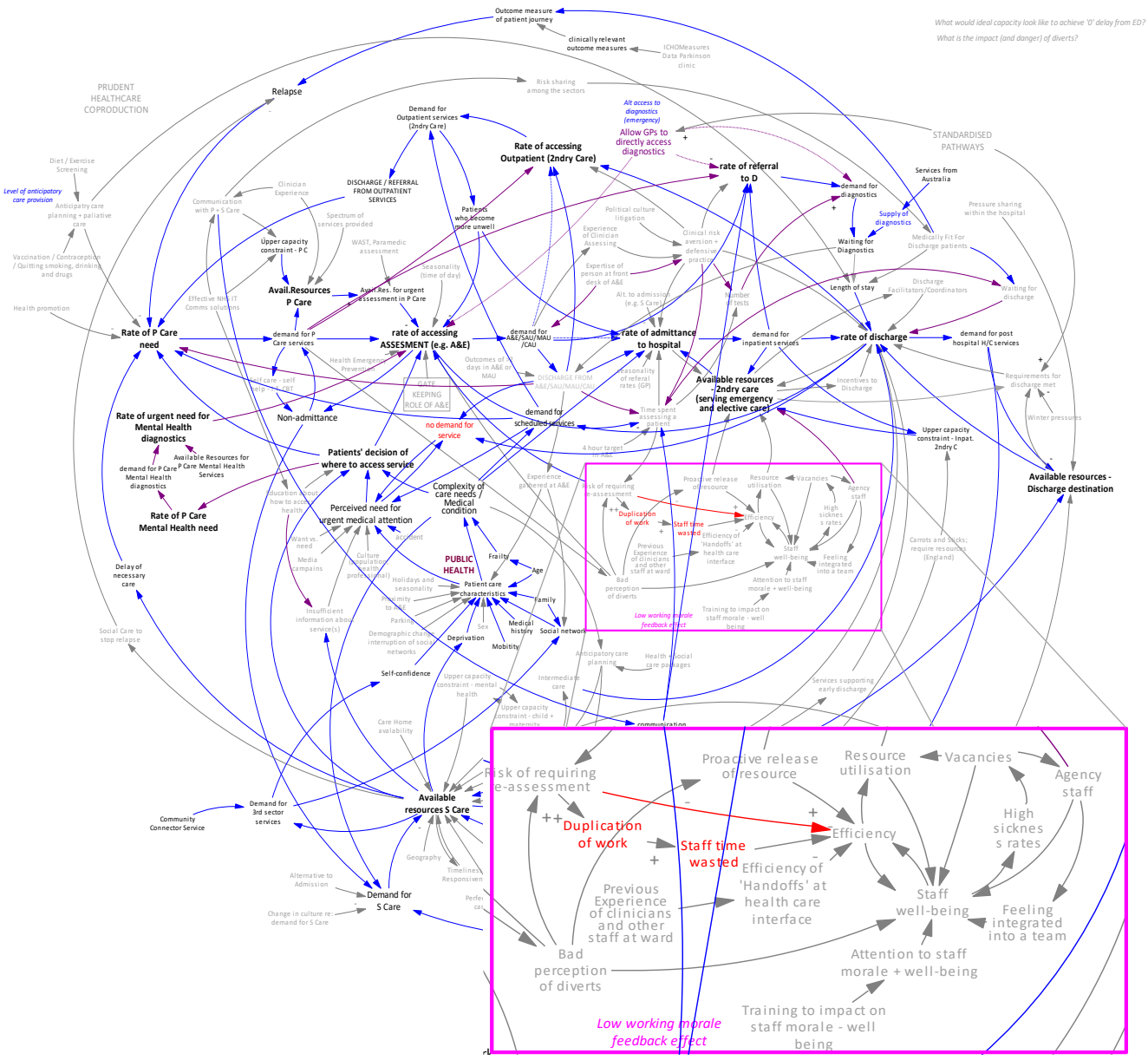
Pressure ulcers are painful, humiliating and isolating for the individual, impair mobility and thus diminish a patient's quality of life in a multitude of ways. At worst, pressure ulcers can be fatal. In terms of their impact on inpatient demand, a pressure ulcer lengthens inpatient stay by at least 5-8 days and therefore not only affects the suffering patient but also reduces the resources and services available to other patients. During the first eight months of 2017, nursing staff reported more than 500 Health Acquired Pressure Ulcers (HAPUs) for the two major acute hospitals within Aneurin Bevan University Health Board (ABUHB). The **health and well-being cost to patients and their families was substantial,** as was the cost of additional inpatient bed days. In addition, it cost ABUHB more than £500K per year in redress compensation, and negatively impacted on **staff morale and clinical culture**.

How the Work Was Done

By mid-2017, the Aneurin Bevan Continuous Improvement (ABCi) team, ABUHB's internal Improvement Centre, was tasked to set up and facilitate a nurse-led Quality Improvement (QI) collaborative. The objective was to minimise HAPU incidences. The collaborative aimed to enable frontline nursing staff at the 770-bedded Royal Gwent Hospital to develop specific **QI skills** and use them **alongside wound care and prevention knowledge** to enhance compliance with timely pressure ulcer risk assessment and quality of care. The initiative had Executive support.

A co-production approach, involving ABCi, frontline and Senior Nursing staff, the Tissue Viability team and the mattress management team, led to the development of the collaborative's objectives, avenues of improvement and an Excel-based data collection system. The latter enabled the initially six, later ten, active collaborative teams to instantaneously learn about the effects of small changes tested within a Plan-Do-Study-Act (PDSA) framework. One crucial element remained, however, initially unaddressed: creating a learning culture. This is where System Dynamics kicked in.

In December 2016, two post-doc mathematicians – at that time, both based at Cardiff University as well as the NHS – had finalised their **System Dynamics model of the ABUHB Unscheduled Care (USC) system**. The comprehensive model had evolved over 18 months, in a sequence of three workshops involving 40+ stakeholders from Primary, Secondary, Community and Social Care. Moreover, the process had included an extensive literature review, incorporated individual expert opinions and the voice of the patient through a SenseMaker® experiment. Experts from ABUHB's Operational Management team and the System Dynamics community validated the structure of the model. One of the model's by-products was, what we called, a **'staff well-being loop'**, which appeared in all sectors of care.



What is the nature of this 'staff well-being loop' (framed in pink in the USC causal loop diagram above)? Imagine an infection, a fall or a HAPU has happened at a hospital ward. For engaged staff, this creates the perception of doing a lousy job, of letting a patient down, of working inefficiently. This impacts on how staff feel. If this happens more frequently, sickness rates and vacancies increase. Agency staff step in, affecting team structure, cohesion and morale. In the absence of successful team integration, staff neither feel well nor safe. They fear being punished or humiliated for speaking up with concerns, questions, ideas or mistakes. Trapped in such a psychologically unsafe place, sickness rates and vacancies further increase. The latter negatively feeds back on reduced team integration and well-being but also impacts on resource utilisation and diminishes available resources. The workload for each (remaining) member of staff increases and less and less time is free for the (risk) assessment of a single patient. Mistakes and slippages happen more regularly. Among other unintended consequences, HAPUs occur. This, in turn, puts staff under additional stress, which reinforces the vicious cycle. Employing no other intervention than holding staff accountable to a target value for compliance with, e.g., risk assessment, amplifies the problem. It increases anxiety. The fear of being punished for doing something wrong makes it less likely that staff will find a way of resolving these challenges. Also, fear may negatively impact on transparent, open reporting and duty of candour.

Results

The 'staff well-being loop' uncovered that generating QI skills and clinical knowledge would not be enough to reduce HAPU incidences at Royal Gwent Hospital. ABCi employs a Consultant Clinical Psychologist (to support leadership development) whom the collaborative leads invited to join them in designing a full-day learning session to introduce the frontline teams to (i) the concept of **psychological safety**, (ii) the importance of **learning from failure** and (iii) the **emotional impact of failure** on the individual (Jun 2018). When teams experienced setbacks – but also in times of high exposure due to success – collaborative leads provided **targeted support** that went far beyond regular QI coaching (Jul-Nov 2018). Subsequently, the frontline teams participated in a **Schwartz round** focusing on the emotional impact of failure, facilitated jointly by the Consultant Clinical Psychologist with the participation of the Director of Nursing (Apr 2019). The latter helped participants deal with the **cognitive dissonance** created by the apparent contradiction of two beliefs. These are '*I am a caring and experienced professional*' and '*Another patient has had a pressure ulcer which means I am bad at my job*'. These two beliefs are experienced as mutually contradictory and create dissonance. They can lead to anxiety, shame and guilt. Also, these two beliefs may lead to counterproductive judgements to reduce the conflict that leads to the dissonance. For example, '*There's nothing anyone can do to prevent pressure ulcers given the circumstances we work in*' is a belief that increases the likelihood of getting caught in the vicious circle described earlier.

Applying the principles of Systems Leadership and Strategic Communications supported creating a **safe community, with a shared purpose and an increased sense of belonging**. Participants reported they felt a **sense of personal growth and development** and a renewed commitment to providing excellent standards of care. If they failed, they learned from it. Over time, staff were able to share failure openly within the collaborative, reflected, learned again and then excelled.

Value and learning

Different levels of engagement in the collaborative implied that some frontline teams made more significant improvements than others, varying from 48% to 90% reduction in pressure damage. Most wards now have well-established processes of care and assessment and were able to maintain their improvements. In September 2019, the health board brought the HAPU Prevention collaborative to a planned closure. By that time, the ten actively participating frontline teams had prevented at least 265 HAPUs (which corresponds to a minimum reduction of bed demand by 1,325 days). Stratifying by the grade of the wound enabled estimation of the total cost averted for ABUHB over 23 months (by using Statistical Process Control methods), amounting to more than £1.5M.

A System Dynamics model **identified the leverage point** to flip patient care from potentially harmful to safe. The relationship between staff well-being and patient outcomes was nothing new—but its evidence was not generic or borrowed from elsewhere. It was established by ABUHB staff for ABUHB staff in an in-house SD model building process—and this was the credibility it needed to find its way into practice. The QI collaborative took place over 23 months. It was able to evolve and develop over time, ensuring that changes were supported and embedded. Focusing on creating psychological safety within the collaborative, and reinforcing the sense of belonging, we observed that the ability to engage and remain curious (when things did not go well) built resilience. Also, it empowered staff to reflect and learn to eradicate a suboptimal practice and sustained team participation when setbacks arose. In this climate, the newly acquired QI skills could prosper and improve the reliability of assessment and care processes.

Further information

The inspirational work of the collaborative nursing teams was shortlisted for a Times Nursing Award in 2018. In 2019 the QI collaborative won the All Wales Continuous Improvement (AWCIC) Award for *Doing*

Better Things, the NHS Wales Award for *Improving Patient Safety*, and the ABUHB-internal Staff Recognition Award.

For more information on the development process of the System Dynamics model of the ABUHB Unscheduled Care system and the learning gathered along the way, see http://systemdynamics.org.uk/wp-content/uploads/2017-Day2-Behrens2-Poster.pdf or contact Doris Behrens and Jennifer Morgan (emails below). For further details on the Pressure Ulcer Prevention collaborative, see https://www.researchgate.net/publication/342644099_Fail_often_-_learn_fast_Easier_said_than_done, https://www.researchgate.net/publication/325216875_Reducing_Health_Acquired_Pressure_Ulcers_at_Royal_Gwent_Hospital_Newport_Wales, or contact Doris Behrens (email below), the collaborative's Improvement Advisor (IA). Furthermore, please find updates on ABCi's current working focus on systematically integrating psychology and QI within the framework of a national, funded (QExchange) project at https://q.health.org.uk/idea/2019/psychology-4-improvement/. If the latter sparks your interest, please feel invited to contact Benna Waites (email below) or Rachel Trask (Rachel.Trask@wales.nhs.uk).

Authors

Doris A. Behrens
ABCi, Aneurin Bevan University Health Board
Doris.Behrens@wales.nhs.uk
Principal Mathematical Modeller, IHI-IA

Jennifer Morgan
NHS Wales Delivery Unit
Jennifer.Morgan@wales.nhs.uk
OR and Modelling Development Manager

Benna Waites
Aneurin Bevan University Health Board
Benna.Waites@wales.nhs.uk
Consultant Clinical Psychologist

Rhiannon Jones
Aneurin Bevan University Health Board
Rhiannon.Jones2@wales.nhs.uk
Director of Nursing