

Final Report

Evaluation of the Huddling Up for Safer Healthcare (HUSH) Scaling Up Project

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70% of ward staff in five hospitals successfully embedded Patient Safety Huddles

“I understand if a patient is at risk, more now than ever before because I don’t have to seek out information because any issues are highlighted by the huddle.”

Healthcare Assistant

“[Team] members work more co-operatively when caring for patients and are able to help each other more effectively.”

Staff Nurse

“I think it’s more learning culture, it’s introduced a learning culture and an interest in the changes and interest in improvement and that’s what we’re aiming to be as a trust. More of an improvement based culture, a learning culture. Like you say, it’s knock down those defensive barriers.”

Coach

“My support at the beginning was based on the results of the wards that had already started them, the enthusiastic leadership, and because I couldn’t really see that they could do any harm. But now if I went to another Trust and they weren’t doing safety huddles I would be keen to get them introduced.”

NHS Leader

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List of Abbreviations (alphabetical)

Abbreviation	Description
AHSN	Academic Health Science Network
AKI	Acute Kidney Injury
BGH	Barnsley General Hospital
BFPSHS	Barriers and Facilitators to Patient Safety Huddles
BIHR	Bradford Institute for Health Research
CAH	Chapel Allerton Hospital
DE	Developmental Evaluation
DP	Deteriorating Patient
EDR	Evaluation Dress Rehearsal
HCA	Healthcare Assistant
HRO	High Reliability Organisations
HUSH	Huddle Up for Safer Healthcare
LGI	Leeds General Infirmary
LTHT	Leeds Teaching Hospitals Trust
MDT	Multi-disciplinary Team
MRC	Medical Research Council
NEWS	National Early Warning Score
NHS	National Health Service
NVivo	Software that supports qualitative and mixed methods research
PDSA	Plan Do Study Act – cycles to test out changes
PPI	Public and Patient Involvement
PRASE	Patient Reporting and Action for a Safe Environment
PSH	Patient Safety Huddle
PU	Pressure Ulcer
QI	Quality Improvement
RoI	Return on Investment
SA	Situation Awareness
SAFE	Situation Awareness for Everyone
SAFER	SAFER patient flow bundle
SBAR	Situation Background Assessment Recommendation
SGH	Scarborough General Hospital
SIC	Stages of Implementation
SJUH	St James's University Hospital
SPC	Statistical Process Chart
TIA	The Improvement Academy
THF	The Health Foundation
TSC	Teamwork and Safety Climate
UoB	University of Bradford
VTE	Venous Thromboembolism
WLR	Ward Level Report
YHEC	York Health Economics Consortium

Executive Summary

Introduction

In August 2015, The Health Foundation (THF) funded a team from Yorkshire and the Humberside region to scale up Patient Safety Huddles (PSH) in 136 in-patient wards. This was in three NHS Trusts (York Teaching Hospital NHS Foundation Trust, Leeds Teaching Hospitals NHS Trust and Barnsley Hospital NHS Foundation Trust), comprising five different acute hospitals across a wide geography in Yorkshire.

The project incorporated an in-built evaluation led by the Evaluation Team, which addressed four themes of the scaling up: the implementation and fidelity of PSHs; the outcomes and effectiveness of the PSHs; the Return on Investment (RoI); and learning from scaling up.

The HUSH (Huddling up for Safer Healthcare) team initially described PSHs as: “a vehicle for daily, brief, frontline, non-hierarchical, multi-disciplinary, focussed discussion of a specific patient harm, led by a senior clinician and supported by quality improvement skills, coaching, data visualisation and feedback” (Health Foundation bid February, 2015).

PSHs are designed to reduce adverse events by enhancing situational awareness of safety concerns on the hospital ward in real time. Originating in North America, PSHs have been implemented in a wide range of healthcare settings. Evidence suggests that PSHs are effective in promoting teamwork and inter-professional communication, but there is scant evidence of their impact on patient harms such as falls, pressure ulcers and cardiac arrests.

This report is the final evaluation report by the Evaluation Team setting out the findings in relation to each of the four themes. The evaluation of the HUSH project was an inter-disciplinary multi-partner project that incorporated staff from the University of Bradford (UoB), the York Health Economics Consortium (YHEC); the Improvement Academy (TIA) and input from patient/public representatives.

Evaluation Approach

Given the complexity of the intervention, the evaluation team has adopted a multi-method, Developmental Evaluation approach integrated with a series of regular “HUSH Evaluation Dress Rehearsals” where a shared learning environment was developed for the implementation and evaluation team to discuss progress and issues as they emerged.

The intervention (PSH or huddle) was scaled up across adult-inpatient wards and so the unit of analysis was the hospital ward. We used a mixed methods approach incorporating both qualitative and quantitative methods to evaluate the project. Three key data sources were considered: (1) Routinely collected harms data (incidence of falls, pressure ulcers and emergency calls); (2) Ward level documentation completed by the implementation team as part of the HUSH scaling up project; and (3) Independent observations and data collection by the Evaluation Fellow. A key methodological device for evaluation was the triangulation of these different data sources. The

HUSH Operation Plan (31.07.2017) listed 136 HUSH wards but 44 were excluded from the evaluation (e.g. paediatric wards were excluded), providing a final evaluation sample size of 92 wards.

Findings

Implementation and Fidelity of PSHs

There were 92 wards in the evaluation. Of these, four wards (4%=4/92) did not commence PSHs. Seventy five wards (82%=75/92) were noted as being embedded on the operational plan, but on independent observation 64 wards (85%=64/75, 70%=64/92) were found to be undertaking a PSH. Thirteen wards (14%=13/92) commenced PSHs but did not achieve embedded status of their PSH by the end of the evaluation (31.07.2017).

The fidelity scores of wards with embedded PSHs (66 PSHs observed on 64 wards) ranged from 3 to 8 (of 9) and with a mean of 4.9. The majority of these PSHs were found to be brief - 92% (61/66) were 15 minutes or less and 80% (53/66) were 10 minutes or less.

Team working and patient safety climate

The overall patient safety grading (pooled across all Trusts) showed significant improvements and twelve of the 28 (43%) questions in the Teamwork and Safety Climate survey showed significant positive improvements post embedding of PSHs. No question on the survey showed a negative change.

Across the survey questions both York and Leeds Trusts had no negative changes, while Barnsley showed negative changes across four questions. In Leeds the greatest positive changes were in relation to: the overall patient safety grading; learning from the errors of others; being more able to speak up about problems with patient care; and feeling supported by other personnel. In Barnsley the greatest positive changes were in relation to: satisfaction with the collaboration with medical staff; knowing the names of colleagues; and a culture of learning from errors. In York the greatest positive changes were in relation to: overall patient safety grading; briefings being more common on the ward; and improvements in the communication of important issues.

Analysis by job role indicated that the overall patient safety grade did not show an improvement among doctors, but did improve positively among all other job roles (nursing staff, allied health professionals, nursing support staff and other ward support roles). Nursing and nursing support staff showed a positive change in relation to learning from the errors of others. Nursing and allied health professionals showed a positive change in relation to briefings being more common on the ward, and allied health professionals, nursing and ward support staff all showed a positive change in the perceived difficulty in discussing errors in their clinical area.

A total of 169 respondents completed the evaluation survey (137 at first survey and 32 at second survey). More than three quarters of frontline team respondents in the sample wards reported improvements in communication (88%=121/137), teamwork (79%=108/137) and safety culture (75%=103/137) on their wards. Of those who answered the question, 83% (124/150) indicated that they would miss the PSH if it was stopped tomorrow.

Respondents from Leeds and Barnsley hospitals were more likely to report that: the PSH had reduced harms on the ward (49% (=5/112) and 50% (=5/10) compared to 27% (=4/15) at Scarborough Hospital); improved communication with colleagues (93% (=104/112) and 90% (=9/10) compared to 53% (=8/15) in Scarborough Hospital); and improved teamwork (84% (=94/112) and 80% (=8/10) compared to 40% (=6/15) in Scarborough Hospital). The Leeds hospitals were more likely to report that if PSHs were stopped tomorrow they would miss them (82% (=92/112) for Leeds hospitals compared to 30% (=3/10) in Barnsley and 40% (=6/15) in Scarborough).

For the survey questions exploring the impact of the PSH on reducing harms and improving communication and teamwork, fewer doctors answered positively compared to other job roles (nursing, non-clinical and allied health professionals).

Harm reduction

The pooled hospital results showed a non-significant reduction in falls (IRR=0.884, 95% Confidence Interval (CI) 0.768 to 1.017, $p=0.086$) when PSHs were started in a ward but a significant reduction in the rate of falls after PSHs were started (IRR=0.995, 95% CI 0.990 to 0.999, $p=0.017$). At Trust level, only Leeds hospitals showed significant reduction in level of falls when PSHs were started on a ward (IRR=0.812, 95%CI 0.67 to 0.983 $p = 0.033$).

The pooled modelling results for pressure ulcers showed a non-significant reduction in pressure ulcers after PSH were started (IRR=0.787, 95% CI 0.594 to 1.042, $p=0.094$). At Trust level, Barnsley showed a reduction in the level of pressure ulcers (IRR=0.573, 95%CI 0.393 to 0.836, 95%CI $p=0.004$) and the rate of pressure ulcers after PSHs were started (IRR=0.986, 95%CI 0.973 to 0.999 $p=0.038$). Leeds (IRR 1.01, 95%CI 1.002 to 1.019, $p = 0.013$) and York (IRR=1.015, 95%CI 1 to 1.031, $p = 0.045$) showed an increase in the rate of change of pressure ulcers.

Return on Investment

The base case Return on Investment (RoI) associated with wards addressing harms associated with reducing falls was over 100%. The reduction in falls of 0.1125 per ward per week was associated with savings of £292 per fall avoided, whilst the cost of the intervention, including all staff costs, was £141 per ward per week.

There was a reduction in cardiac arrest calls of 0.02 calls per ward per week and each call avoided was associated with savings of £2,667. The cost of the intervention was £100 per ward per week of which £93.50 were staff-related costs, primarily to attend the huddles. If all staff costs are considered incremental then the RoI is negative. However, the staff costs associated with the huddles would have been incurred by the NHS Trusts prior to the introduction of huddles and are thus not incremental costs. Huddles had an excellent RoI ranging from 577% to 875%, with a base case of over 700% when the incremental costs of activities to support huddles and project costs only were included in the cost base.

Limitations in the analysis are clearly stated in the body of the report. Where assumptions were made by the author to determine costs or value of benefits, these are clearly stated and were tested out with clinical leads and stakeholders. Sensitivity analysis was undertaken to identify the variables having most influence on the results.

Lessons from scaling up

Barriers to scaling up and implementation at ward level centred on the key areas of:

- The staffing situation on the ward and a perception that sufficient staff needed to be in place for a huddle;
- Poor leadership or a lack of leadership for the huddle; and
- The situation where a top down or mandated approach to implementation had been adopted.

Enabling factors for successful huddles included:

- The coaching and support provided by the HUSH Team;
- Where teams had high levels of belief in the intervention and were motivated (leaders in particular) to take part;
- Effective and confident huddle leaders;
- Shared learning between wards; and
- A flexible approach to scaling up that supports ownership of the huddle at individual ward level.

The reliability of huddles was threatened by staff and leadership changes, the introduction of other safety initiatives on a ward and merging of the huddle into another ward-based meeting or forum.

Overall there was little support from respondents and interviewees for the incorporation of patient or carer concerns in the PSH. The PSH was viewed as an inappropriate forum for this and concerns were raised about confidentiality and the extra time that it would take to bring these concerns into the PSH.

Conclusions

In this scaling up project 70% of wards in five different hospitals successfully embedded PSHs. PSHs were generally associated with positive feedback from front line staff, enhanced team working and safety culture with mixed evidence on reduction in harms alongside embedded learning for all those involved with the HUSH project and its evaluation.

This is a major achievement especially when we consider the barriers and enablers to successfully scaling up innovations in the National Health Service (NHS), as noted in a recent Health Foundation Report: "There are certainly themes and learning to draw out and share, some of which challenge conventional wisdom; not least the importance of winning hearts as well as minds, of working with the realities of power and politics, of deep engagement with users and adopters in the innovation process, of the central role of teams and organisations in the spread process as well as heroic individuals, of the iterative testing and development of ideas in different contexts, and of the patience, course-correction and sheer bloody-minded determination that can be required to succeed." (Albury et al. 2018).

1 Introduction

1.1 Overview

Patient safety remains a key priority for healthcare systems globally (WHO(Europe) 2013). In the English National Health Service (NHS) about 10% of patients experience an adverse event during their hospital stay (Vincent et al. 2008). Adverse events have been defined as unintended injuries caused by the management of a patient's healthcare rather than being due the disease process (Vincent and Amalberti 2015). Adverse events can result in extended hospital stays with cost consequences for the NHS, disability and in some instances death (Dingley et al. 2008). Hogan et al (2012) reported that approximately 5% of deaths in ten English NHS hospitals were avoidable. Furthermore in 2013, the Francis Enquiry (Francis 2013) and the Berwick Review (Berwick 2013) highlighted concerns with the quality and safety of patient care in the NHS, with a call for urgent action to address this.

Efforts to reduce adverse events through patient safety and quality improvement initiatives have increased in healthcare settings (Vincent et al. 2013). Baines et al suggest that large scale quality improvement programmes can contribute to a reduction in the number of preventable adverse events (Baines et al. 2015). A relatively recent innovation, to mitigate threats to patient safety in hospital wards, is the patient safety huddle (PSH), which draws on the theory of High Reliability Organisations (HRO)(Weick et al. 1999) and Situational Awareness (SA)(Brady et al. 2014).

Typically, PSHs are multidisciplinary meetings to identify and respond to patient safety issues, often, as one component of a wider multifaceted programme aimed at enhancing patient safety. PSHs are brief daily ward based meetings that focus on the promotion of patient safety. Goldenhar et al have defined huddles as: "...typically short briefings designed to give frontline staff and bedside caregivers opportunities to stay informed, review events, make and share plans for ensuring well-co-ordinated patient care."(Goldenhar et al. 2013)

In February 2015, following a scaling up award from The Health Foundation (THF), a major project to scale up PSHs, known as HUSH (Huddling Up for Safer Healthcare)¹ in five hospitals (three National Health Service (NHS) Trusts) in the Yorkshire & Humberside region of the England was undertaken.

Before proceeding further with this report, it is worth highlighting the challenges to scaling up innovations in the National Health Service (NHS) as stated in a recent HF report (Albury et al. 2018): "There are certainly themes and learning to draw out and share, some of which challenge conventional, wisdom; not least the importance of winning hearts as well as minds, of working with the realities of power and politics, of deep engagement with users and adopters in the innovation process, of the central role of teams and organisations in the spread process as well as heroic

¹ The original title for this evaluation was "Mixed-methods, developmental evaluation of a quality improvement initiative to scale up a complex intervention, patient safety huddles (PSH), across three acute hospital trusts in Yorkshire". This has now been changed to "Evaluation of the Huddling Up for Safer Healthcare (HUSH) Scaling Up Project".

individuals, of the iterative testing and development of ideas in different contexts, and of the patience, course-correction and sheer bloody-minded determination that can be required to succeed." It is against this backdrop that the progress of the HUSH team and the evaluation team need to be considered.

A separate report from the HUSH implementation team, led by Leeds Teaching Hospitals Trust (LTHT), was submitted to THF (LTHT, 2017). The four key aims of HUSH were to:-

- Implement PSHs in 129² hospital wards across 5 acute hospitals, 3 NHS Trusts.
- Deliver demonstrable improvements in ward level patient safety culture.
- Deliver a significant reduction in patient harm.
- Generate learning about the implementation of safety huddles that is valuable regionally and nationally across the NHS.

This report is from the Evaluation Team, which was led by staff from the Faculty of Health Studies at the University of Bradford, with input from staff at York Health Economics Consortium (YHEC) and The Improvement Academy (TIA). The original evaluation protocol was submitted to THF with further revisions in April 2016 (McDonach et al. October 2015). This final evaluation report builds on the Interim Evaluation Reports submitted in September 2016 (Crosswaite and Mohammed 2016).

Given the complexity of the intervention, the evaluation team have adopted a multi-method, Developmental Evaluation (Patton 2011) approach integrated with a series of regular "HUSH Evaluation Dress Rehearsals" where a shared learning environment was developed for the implementation and evaluation team to discuss progress and issues as they emerged. This provided an opportunity for 'double loop' learning for the implementation and evaluation teams. The evaluation of the HUSH project determines the extent to which the HUSH project met its original aims across four evaluation themes as shown below:

- The implementation and fidelity of PSHs,
- Outcomes and effectiveness of PSHs,
- The Return of Investment of PSHs, and
- Learning from scaling up PSHs.

In the next section we provide a brief review of PSHs to provide further context for the HUSH project and its evaluation.

² The original HUSH scaling up plan was based on 129 wards. This total changed over the course of the project and at 31.07.2017 the total number of wards was 136. However, for the purposes of the evaluation, 92 wards were evaluated because of exclusions (e.g. due to ward closures and mergers, etc) described later in the report.

1.2 Patient Safety Huddles: a brief literature review

The PSH is one example of an intervention designed to reduce adverse events in hospitals by promoting better communication and teamwork in the ward setting. The PSH draws on the practice of High Reliability Organisations or HROs (e.g. the nuclear and aviation industries) (Weick et al. 1999) and incorporates the key principles of situation awareness (SA)(Brady et al. 2014).

The PSH through its focus on 'real time' safety concerns and the identification of safety risks, aims to reduce the incidence of harms as identified by the ward teams themselves. This often includes one or more of the four harms measured through the NHS Safety Thermometer: pressure ulcers, falls with harm, infection among patients with urinary catheters, and venous thrombus embolism (VTE)(Improvement 2013). Alongside preventing patient harms, the PSH seeks to enhance the safety culture by promoting improved communication and teamwork, a central component of patient safety. Leonard et al (Leonard et al. 2004) argue that a failure to communicate effectively contributes to the occurrence of adverse events in hospital. Clear and effective communication is of particular importance in the context of complex healthcare settings. Other initiatives that also aim to improve communication such as SBAR (situation, background, assessment, recommendation),(Leonard et al. 2004) and Leadership Walk-rounds (Frankell et al. 2008) have been widely implemented in hospitals. Identified barriers to effective communication include: established hierarchies or 'power distance'; authoritarian leadership; a lack of standardised communication approaches; and the impact of human factors in healthcare (Leonard et al. 2004).

PSHs take place within varied and complex health settings, aiming to promote seamless and consistent communication of patient safety related information. Healthcare involves multiple professionals from a wide range of disciplines who together provide care at different times across the day, often in different locations which can increase the risk of gaps in communication (Dingley et al. 2008). Dingley et al (Dingley et al. 2008) investigated initiatives designed to improve communication and teamwork. They found that support at all levels of staff was important alongside hospital leaders demonstrating their support for communication and team-working and operating as role models for the wider staff body.

Regular PSHs are seen to contribute to improvements in safety climate and Psychological Safety (Edmondson, 2002). An environment in which patient safety concerns can be recognised and voiced by all members of the healthcare team contributes to 'Psychological Safety'(Leonard and Frankell 2012). The role of effective leadership in creating Psychological Safety is paramount. This encompasses positive leadership attitudes towards collaboration, shared patient safety goals, and the creation of an organisational culture that is fair, and that facilitates an environment of positive and open learning (Leonard and Frankell 2012).

1.2.1 Characteristics of Patient Safety Huddles

The mainly North American literature on PSHs highlights the diversity of models, approaches and settings for huddles. The definition of a huddle varies in terms of both scope and utility and currently there is no generally accepted definition.

Cooper and Meara (Cooper and Meara 2002) provide a description of 'The Organisational Huddle Process' developed in response to a need to quickly resolve problems, drive decision making to

lower organisational levels, enhance accountability, and promote empowerment and interdisciplinary collaboration in a US medical centre. The aim of their huddle was to provide an opportunity for honest dialogue in a blame free culture, based on the concept of an ensemble. They report that the success of their huddles depended upon senior leadership support and the presence of effective collaboration, open communication, trust, honesty and accountability.

Provost and McDaniel (Provost and McDaniel 2012) note the widespread use of huddles in North America as part of quality improvement (QI) initiatives. National recommendations (US) are for frequent and short briefings that enable management to be aware of impending crises before they become bigger problems. Huddles are seen to operate within Complex Adaptive Systems (CAS) providing a distinctive vehicle for communication. The authors (Provost and McDaniel 2012) note key barriers to the flow of safety information including:

- Assumptions that if senior staff or managers are aware of a specific (safety) issue, others will automatically also be aware of or informed about the same issue (known as the “fallacy of centrality”); and
- Obstacles created by hierarchies and boundaries within an organisation (e.g. a hospital).

They propose that huddles mitigate these barriers, fostering higher levels of trust and cultivating Psychological Safety where staff can feel safe admitting to mistakes. In addition, they conclude that huddles can offer a micro-culture for the wider organisation promoting openness and opportunities for learning.

Drawing on their study of huddles in a Cincinnati Paediatric Hospital, Goldenhar et al (Goldenhar et al. 2013) note that huddles provide a venue for raising concerns, efficient information exchange, improved teamwork, better working relationships and higher levels of trust and respect among staff. Their qualitative study concluded that huddling at the same time every day at an agreed venue, enhanced information sharing and communication and promoted greater levels of accountability. Huddles helped to create a ‘bigger picture’ across the hospital and higher levels of collaboration.

A review of studies³ that described PSHs identified five types of PSH:

1. The daily ward or unit based huddle that takes place across the course of the day.
2. The retrospective adverse event huddle that reviews and implements actions in response to an adverse event that previously occurred on the ward or unit (e.g. a patient fall).
3. Leadership huddles that involve both senior and frontline staff and that operate daily across a department or organisation.
4. Tiered huddles that occur across the day and at different organisational levels. For example, the three-level tiered huddle system that takes place daily at the micro/unit, meso/departmental, and macro/organisational leadership levels (Goldenhar et al, 2013).
5. Multi-intervention approaches that include huddles as one component of a package or bundle of patient safety interventions that are implemented in a ward or unit.

³ Crosswaite et al, *in preparation*

1.2.2 Impact of Patient Safety Huddles

We have not identified any systematic reviews of huddles in hospital ward settings, but reviews of huddles in other settings or of initiatives to promote communication, have been published. Evidence from studies conducted in the operating theatre setting (Operating Room in North America) suggests that huddles promote teamwork and inter-professional communication (Glymph et al. 2015). One systematic review investigated the evidence for effectiveness of leadership walk-rounds and multi-component interventions (including training and communication interventions but not huddles). The authors conclude that interventions can improve staff perceptions of safety culture and have the potential reduce patient harm, but the strength of the evidence for effectiveness was regarded as low (Weaver et al. 2013).

Other studies have shown that ‘huddles’ can have a positive impact on patient safety by: promoting collaborative communication, mitigating organisational boundaries and hierarchies that would otherwise impede effective social interactions (Provost and McDaniel 2012); and that by contributing to a culture of collaboration and collegiality can result in enhanced safety awareness and the capacity for reducing or eliminating patient harms (Goldenhar et al. 2013).

Stockmeier and Clapper (Stockmeier and Clapper 2010) note that ‘huddles’ are often one component of a wider programme of patient safety within a single hospital, and as such it is difficult to measure their impact as a distinct intervention. This applies to the HUSH project, as the PSH is one patient safety initiative among other safety initiatives in each of the five hospitals.

1.3 Huddling Up for Safer Healthcare

The Patient Safety Huddles (PSH) in the Huddling Up for Safer Healthcare (HUSH) project were conceived as a complex intervention, specifically for hospital-based teams, which sought to enhance team-working and safety climate in the ward environment and thereby reduce patient harms (e.g. falls). The HUSH team described their particular PSH as “...a ‘vehicle’ for daily, brief, frontline, non-hierarchical, multi-disciplinary, focussed discussion of a specific patient harm, led by senior clinical management and supported by quality improvement skills, coaching, data visualisation and feedback.” (Revised Health Foundation Bid, Scaling Up Safety Huddles, February 2015). This initial description was based on preliminary insights from eight pilot wards. As such there were ten key features of the PSH based on these early theories namely:-

1. A focused meeting about one or more agreed patient harm(s).
2. Informed by quality improvement tools (including: measurement of harms and Plan-Do-Study-Act (PDSA) Cycles).
3. Senior clinical leadership (i.e. led by a senior clinician)
4. Agreed actions – either individual or team actions/interventions to reduce risks or patient harms.
5. Daily from Monday to Friday as a minimum.
6. Brief: from 5 to 15 minutes.
7. Multidisciplinary team (MDT) involvement with at least nursing and medical staff.
8. Frontline team involvement (50% of ward based team as a minimum).
9. Ground rules and agreed parameters e.g. non-hierarchical and non-judgmental.

10. A predictable time and venue – to be determined by the ward team to meet their local needs.

These features were used to inform nine criteria for evaluation of the fidelity of PSH in the HUSH project (Figure 1). The HUSH team devised these nine criteria based on their earlier, pre-scaling, experience, but anticipated that ward teams would adapt the PSH to their needs and as such some of these nine criteria would emerge as being more or less central to the success of a PSH than others. This was part of the flexible, responsive and adaptive approach to implementation adopted by the HUSH team and, later in this report, we summarise the learning of the HUSH team about the essential characteristics of a high quality PSH.

From the outset, the HUSH project team estimated (based on early experience with pilot wards), that wards would typically progress from initial engagement about PSH, to embedding PSHs in their ward, over a 24-week period.



Figure 1: The nine initial criteria that define the fidelity of a PSH

1.4 Scaling up Patient Safety Huddles

The HUSH team set out to scale up PSHs in 136 in-patient wards, in three NHS Trusts (York Teaching Hospital NHS Foundation Trust, Leeds Teaching Hospitals NHS Trust and Barnsley Hospital NHS Foundation Trust), comprising five different acute hospitals across a wide geography in Yorkshire. The HUSH team used an Operation Plan that targeted the introduction of huddles in 18 cohorts of wards (at an average of 11 wards per cohort). Initial engagement from the HUSH team with ward staff started in August 2015 until January 2017. During the scaling up of PSHs, the HUSH team revised (up/down) the number of wards because of ward closures, ward mergers and exclusions (e.g. because wards were found to be for day case patients only and not in-patient wards). Even with

this revised number of wards, the scaling up of PSH in the HUSH project appears, to the best of our knowledge, to represent the largest scaling-up and spread of huddles in the NHS.

HUSH was a multi-partner project (Figure 2) that incorporated coaching and support for wards, alongside informal training, the use of routinely collected data on key patient harms, connecting ward teams, sharing learning and experience, identifying solution to barriers, and the celebration of success with ward teams. Full details of the approach are outlined in key documents elsewhere (LTHT 2017; McDonach et al. October 2015).

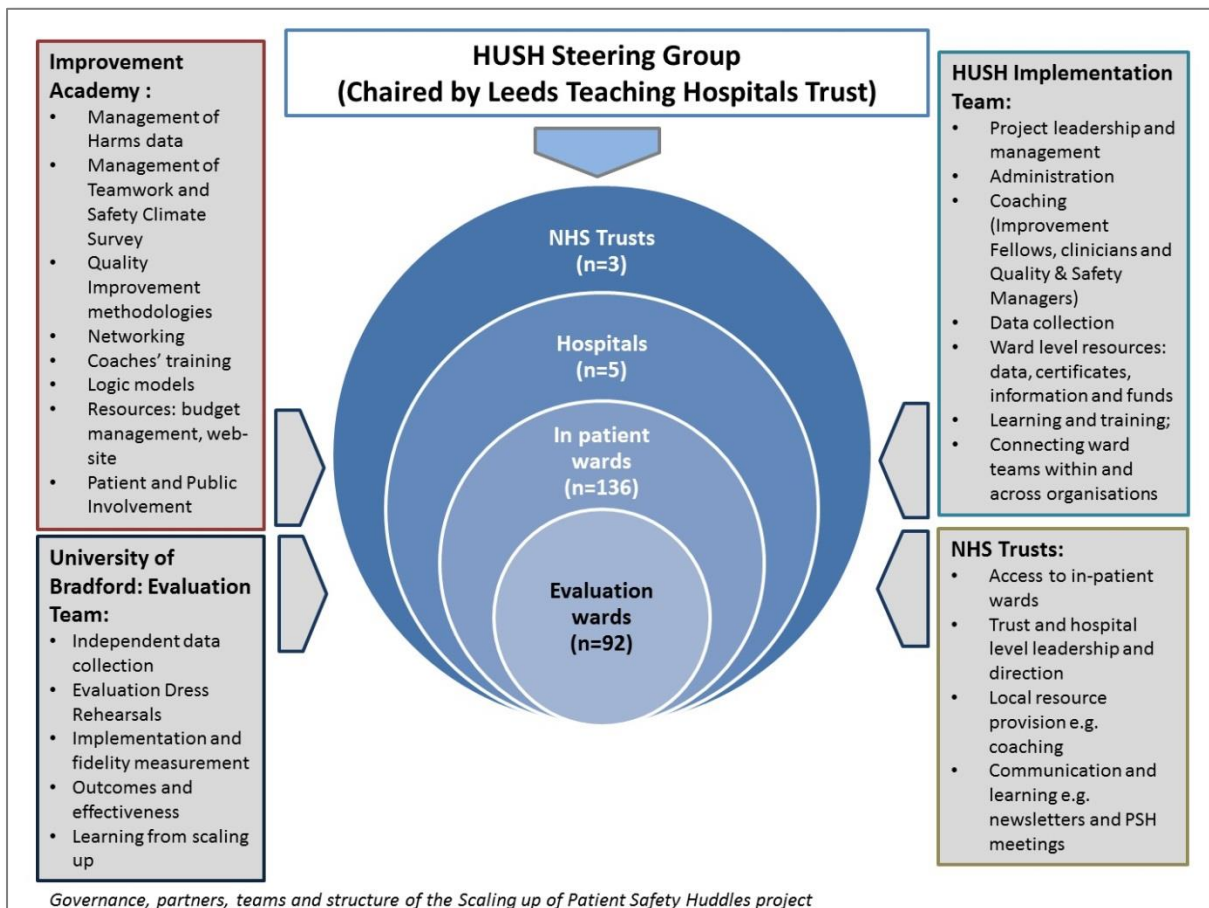


Figure 2: Schematic diagram showing the HUSH project structure

For the purposes of the evaluation 44 wards were excluded from the total of 136 in-patient wards on the Operation Plan (31.07.2017). The reasons for exclusion are given in Table 1. This resulted in a set of 92 (=136-44) wards that were included in the evaluation.

Reason for exclusion	Number of wards (N=44)
Pre-scaling up pilot wards (already embedded before HUSH)	8
Paediatric ward (14 of this which were involved in another huddles project: Situation Awareness For Everyone - SAFE)	18
Temporary ward (taken off of the Operation Plan) ⁴	2
Day case ward	2
Ward taken off the Operation Plan (by the HUSH Team)	1
Ward closures	2
Ward merger (where 2 or more wards on the operation plan merged, they were counted as 1 ward for the evaluation)	9
Not an in-patient ward	2

Table 1: Ward exclusions from the Operation Plan (31.0702017)

1.5 Organisational Context for the HUSH project

The scaling up and evaluation of HUSH took place within dynamic and complex organisational contexts against a backdrop of major change in the NHS. The three NHS Trusts participating in HUSH, had strategic goals for quality and safety and specific plans and policies for taking such strategies forward. All Trusts had a wide range of quality improvement (QI) initiatives under way. Each Trust has implemented a number of patient safety initiatives before, during or alongside the HUSH project, and consequently scaling up of the PSH did not occur in isolation of other patient safety work.

Similarly, each Trust chose its own approach to supporting the project through resource provision, networking and communications activities. Over the two-year timescale of the project each Trust faced challenges and organisational stresses (e.g. high demands on services) that potentially impacted on the HUSH project and its evaluation. Box 1 below includes a summary for each Trust providing examples of some of the organisational and contextual issues. Information was sourced from: Trust web sites⁵, stakeholder interviews and feedback, and other information shared at project meetings (e.g. Steering Group Meetings). The key point to note is that there were some important contextual factors at each Trust.

⁴ One ward was excluded because when this ward was contacted by the Evaluation Fellow (24.10.2016) it was being used as a temporary ward and another ward (that was included in the evaluation) was temporarily based there.

⁵ Leeds: <http://www.leedsth.nhs.uk> Barnsley: <http://www.barnsleyhospital.nhs.uk> York: <https://www.yorkhospitals.nhs.uk>

Context	Leeds	Barnsley	York (Scarborough) ⁶
Organisational resources and staffing	Work with the Virginia Mason Institute on the Leeds Improvement Method. Executive sponsorship for HUSH project. Local PSH coaches.	Local PSH coaches Executive sponsorship for HUSH	Local PSH coaches. Patient Safety Conferences (showcasing PSH).
Examples of local patient safety initiatives	Patient safety programme that includes: falls, pressure ulcers and Deteriorating Patient (DP). Falls and DP Patient Collaboratives , PSH, AKI (Acute Kidney Injury) project (Health Foundation), Ward Health Check. SAFE (Situational Awareness for Everyone) on paediatric wards.	VitalPAC (for the monitoring of vital signs in patients), safety huddles, PRASE (Patient Reporting and Action for a Safe Environment) project, improved approach to AKI and sepsis.	Reduction targets for falls and pressure ulcers (PU). Strategic focus on DP early warning trigger tools. SAFER patient flow bundle ⁷ , patient safety walk-rounds, PSH cross ward meetings. PU reduction plans. Removed VitalPAC from Scarborough and used in-house IT solution.
Strategies and policies	The Leeds Way (2014-19): patient centred, fair, collaborative, accountable and empowered. Patient safety is an improvement priority (2017-18) with: AKI, sepsis, PU, falls, DP, safety huddles, anti-microbial stewardship and Parkinson's disease programmes. Goal to deliver harm free care to 95% of patients.	Strategic objective – 'patients will experience safe care'. Five year strategic plan outlines goals to deliver consistently safe care. Four quality improvement (QI) goals.	Quality and Safety one of 4 Trust ambitions. Patient Safety Strategy – Sign Up to Safety action plan, implementing SAFER patient bundle, early identification of DP, sepsis screening. Operation Fresh Start to enhance patient flow and reduce length of stay (Scarborough Hospital) – safety culture measured as a corporate exercise.
Other local factors (during the HUSH project)	Ward mergers, moves and closures. Increasing demand on services and higher bed occupancy rates. Medical outliers on (non-medical) wards. Changes in Quality and Safety staffing.		

Box 1: The organisational and strategic context for the HUSH project in each NHS Trust – some examples

⁶ In August 2015 Scarborough Hospital was an interdependent hospital but during the course of HUSH it was incorporated into York NHS Hospitals Trust.

⁷ SAFER: S-Senior Review; A-All patients; F-Flow; E-Early discharge; and R-Review

2 Evaluation aims, themes and questions

The evaluation of the HUSH project aimed to determine the extent to which the HUSH project met its original aims across four evaluation themes as shown below (followed by the specific questions in each theme).

1. The implementation and fidelity of PSHs,
2. Outcomes and effectiveness of PSHs,
3. The Return of Investment of PSHs, and
4. Learning from scaling up of PSHs.

Evaluation themes	Evaluation questions
Implementation & fidelity	<ol style="list-style-type: none"> 1. What proportion of wards implement PSHs and with what level of fidelity? 2. What proportion of wards manage to embed PSH post implementation? 3. Are PSHs 'short and sweet'? 4. Describe how PSH might work to enhance safety climate and patient safety?
Outcomes & effectiveness	<ol style="list-style-type: none"> 1. Is there an improvement in team working after implementation of PSHs? 2. Is there an enhancement of patient safety after implementation of PSHs? 3. Is there a reduction in patient harm following implementation of PSHs? 4. What are the adverse positive/negative consequences of PSHs?
Return of Investment	<ol style="list-style-type: none"> 1. What is the return on investment of PSHs?
Learning from Scaling Up	<ol style="list-style-type: none"> 1. What are the adverse positive/negative consequences of PSHs? 2. What are the barriers and enablers to successful implementation of PSHs? 3. What is the whole hospital impact of PSHs? 4. What is the shared learning from scaling up PSHs?

Box 2: Evaluation questions by theme

The next section describes the evaluation methodology.

3 Evaluation Methodology

3.1 Overview of the evaluation approach

The evaluation of the HUSH project was an inter-disciplinary multi-partner project that incorporated staff from the University of Bradford (UoB), the York Health Economics Consortium (YHEC); the Improvement Academy (TIA) and input from patient/public representatives. The staff are listed in the box below.

Name	Affiliation	Main Role in Evaluation
Kate Crosswaite	UoB	Evaluation Fellow
Joyce Craig	YHEC	Conducting the RoI study
Claire Marsh	TIA	Leading on the patient involvement work
Michael Rooney	TIA	Leading on collation of routine harms data
Muhammad Faisal	UoB	Statistical analysis
Eileen McDonach	UoB	Produced the first version of the evaluation protocol
Mohammed A Mohammed	UoB	Overall lead

Box 3: The Evaluation Team and roles

Given the challenges and complexity of (a) implementing PSHs in the HUSH project and (b) the evaluation of complex interventions in dynamic environments, the evaluation team adopted a Developmental Evaluation approach with multiple methods to help address these challenges. This approach is in line with the MRC guidance for complex interventions, although not explicitly referred to as Development Evaluation (Craig et al. 2008).

3.2 Developmental Evaluation

Developmental Evaluation (DE) is particularly appropriate for complex settings such as healthcare. It offers an approach which facilitates a regular feedback process between those delivering the project (the HUSH team) and the evaluation team. Patton (Patton 2011) has described DE as follows: "Developmental Evaluation supports innovation development to guide adaptation to emergent and dynamic realities in complex environments. Innovations can take the form of new projects, programs, products, organizational changes, policy reforms, and system interventions. A complex system is characterized by a large number of interacting and interdependent elements in which there is no central control. Patterns of change emerge from rapid, real time interactions that generate learning, evolution, and development – if one is paying attention and knows how to observe and capture the important and emergent patterns. Complex environments for social interventions and innovations are those in which what to do to solve problems is uncertain and key stakeholders are in conflict about how to proceed."

DE offers an approach that supports social innovation and in which the evaluators work in partnership with those who are taking forward an innovation (the scaling up of PSHs for example). DE involves setting evaluative questions and gathering data and information that will form the feedback and support during the developmental phase of a project (Patton 2006). For this evaluation the Evaluation Team worked alongside the HUSH team from the outset. Emerging findings and other evaluation related information were presented, reviewed and discussed with the

HUSH team and other stakeholders at four Evaluation Dress Rehearsal (EDR) events that were held over the course of the project. In addition to the EDRs the Evaluation Fellow attended weekly Operation Meetings during the formative stages of the project and presented emerging evaluation findings at a range of HUSH events. This approach offered an opportunity for all the HUSH project team and the evaluation team to review and alter their approach in response to emergent findings. This 'double loop' learning facilitated on-going review, support for decision-making, and data based assessments throughout the scaling-up process. An important implication of our approach, is that, in so far as any generalisations are made from the HUSH project, it should be noted that the evaluation is an integral component of the project and should therefore be seen as being part of the intervention (Lilford 2017).

3.3 Estimating the Return on Investment

A summative evaluation methodology was used to estimate the Return on Investment (RoI) for the PSHs and associated interventions introduced to reduce the absolute risk of harms from falls and cardiac arrest emergency calls. The benefits are the estimated value to the NHS of the achieved reduction in falls or cardiac arrest calls, compared with the baseline. Hence the comparator was the baseline resources used, and patient harms experienced, prior to the introduction of PSHs.

A RoI is calculated by subtracting incremental costs from the value of the incremental benefits and dividing the result by the incremental costs. In this evaluation the incremental costs and benefits are expressed as a cost or benefit per ward per week. A range of plausible costs and benefits were used in sensitivity analyses to calculate a range of RoIs, to show the central values and dispersion around these.

A recent literature review conducted for the Department for Business, Innovation and Skills estimated mean private sector rates of return to research and development investments of around 30% or 20% to 25% for the median values. The social returns to the public sector were estimated to be slightly lower at 20% (Economics 2014). These provide external benchmarks to compare the calculated RoIs with. Further details of the RoI methodology are included in Appendix Four.

The return on investment (RoI) element of the evaluation was undertaken in order to provide an independent, informed view on:

- The financial value of undertaking PSHs by systematically measuring the resources required and those saved as a result of their implementation;
- To inform future decision making by sharing the findings so others can generalise these to their own settings.

It also provides the funders with feedback on the stewardship of the financial resources received and shows local implementation teams the financial consequences of the huddles.

Only the costs and benefits associated with adopting PSHs on wards seeking to reduce the risk of falls and/or cardiac arrest calls were evaluated. These harms were selected because (a) falls is the most frequently selected harm across the wards and (b) there are no publications reporting clinical and cost effectiveness of interventions to reduce cardiac arrest calls. Such calls are often made as a

patient approaches end of life, indicating an emergency has arisen at this critical juncture. Calls are thus indicative of unexpected harm arising which will often have adverse consequences for patients and family/carers. This analysis starts to develop an evidence base to inform initiatives to reduce these calls.

Financial consequences from other interventions which are being addressed concurrently in huddles, for example to reduce risks from pressure ulcers, or hospital acquired infections (HAI) or to improve nutrition, are not quantified as part of this analysis.

3.4 Patient and Public Involvement

The patient involvement (PPI) element of the evaluation emerged over the course of the project after workshops with PPI representatives from each of the three Trusts. Some approaches to patient involvement were tested on three wards and subsequently views on PPI were sought from frontline staff members, the HUSH team and senior NHS stakeholders. Further details on the PPI work have been included in Appendix Three.

3.5 Unfeasibility of randomisation and controlled comparisons

Although the evaluation team considered the possibility of randomising the order in which wards were targeted by the HUSH team and/or controlled comparisons, this proved to be unfeasible because of practical factors. The order in which wards were approached was continuously changed by the HUSH team in response to availability of coaches, staffing changes in the HUSH team and ward staff and other practical issues (e.g. wards keen to test huddles, ward mergers, organic spread to a ward, or lack of engagement from a ward) – the HUSH team responded appropriately to these “facts on the ground” by revising the wards in the operational plan so as to maximise the likelihood of successful scaling up. Indeed, these factors meant that the initial plan to scale up PSH in 129 wards was modified on a regular basis as wards were added or reviewed. Across the two years of the project the number of wards included in the operation plan ranged from 134 to 146, with a final number of 136 on 31st July 2017 – due to ward moves, the addition of wards, closures, mergers and exclusions (e.g. A&E and day case wards). These fluctuations in ward numbers highlight the changing environment in which the HUSH project was operating.

3.6 Unit of analysis

The intervention (PSH) focused on ward teams and so the primary unit of analysis was the ward although organisational (Trust/hospital) level impact was also of interest, especially from a scaling up perspective. However, for reporting purposes, we present the aggregate (wards grouped by NHS Trust, specialty and job role) findings in the main body of the report, whilst ward specific results are reported in a supplementary file (Supplementary File: Ward Reports). Ward names have been replaced with codes to maintain confidentiality.

3.7 The measurement framework

The measurement framework to support the evaluation incorporates three data sources: (1) routinely collected ward level harms data (from each NHS Trust), (2) ward level data collection (e.g. TSC surveys), and (3) independent observations and data collection by the Evaluation Fellow (KC) and/or staff from the evaluation team.

Table 2 overleaf describes each ward level data source and identifies who was responsible for collecting it (HUSH team shaded in 'blue' and Evaluation Team shaded in 'green'). Data collected by the HUSH Team commenced in August 2015 and data collected by the Evaluation Team commenced in March 2016.

It should be noted that in terms of data collection the Evaluation Team were responsible for the independent spot audit of PSHs on wards (including a deeper dive evaluation survey in a sub-sample of wards – see later). The responsibility for data collection for the other data items either rested with the ward/hospital staff (e.g. NHS thermometer data) and/or the HUSH Implementation Team (e.g. Stages of Implementation Checklist, Ward level reports, Barriers & Enablers of PSH questionnaires).

		Pre-implementation phase	Implementation Phase	Sustainability Phase	Follow up
Data Collection	0 weeks	4 weeks	16 weeks	4 weeks	24+ weeks
HUSH Operation Plan	Wards allocated to a cohort.	Record of progress of each ward in Operation Plan from first engagement to 'embedded' status.			Review and monitoring
Teamwork and Safety Climate (TSC) Survey		TSC Survey (pre-embedded)	TSC Survey (post-embedded)		
Stages of Completion (SIC) & Ward Level Reports (WLR)		Coaches complete a SIC and WLR for each ward to provide dates for 29 scaling up activities across 6 stages.			
Barriers and Facilitators to Patient Safety Huddles Survey (BFPSHS)		BFPSHS (pre-embedded) for wards that require extra support at pre-implementation	BFPSHS (post-embedded) follow-up for wards that required extra support		
Ward level routine harms data	Routine harms data sets agreed with each Trust at the outset of the project. HUSH team and IA collate data and generate SPC run charts for each ward. Routine harms data sets include: incidence of falls, pressure ulcers and 2222 calls.				
General ward information	Collation of key information for each evaluation ward: number of beds, specialty, patient group and other ward level information.				
PSH observations (Evaluation Fellow)				PSH observations on all embedded wards.	
Evaluation survey (deeper dive wards only)		Frontline teams (n=25) invited to complete an evaluation questionnaire either before 'embedded' status or retrospectively.		Frontline teams that completed the survey prior to embedded invited to complete again at post embedded	
Group interviews with a sub-set of the 'deeper dive' wards.				In depth group interviews with n=5 frontline teams after 'embedded' status	

Table 2: Ward level data collected by the HUSH Team and the Evaluation Team

3.8 Implementation and Fidelity of PSH

Implementation of PSH on a ward incorporated three stages of implementation for PSHs over a 24-week period: -

- Pre-implementation (0 to 4 weeks)
- Implementation (5-20 weeks)
- Self-sustaining (21-24 weeks) after which the PSH is considered embedded

Data collection for both implementation and evaluation took place across this 24-week period and for up to six months afterwards. These stages were tracked using the Stages of Implementation Checklist described below.

3.8.1 Stages of Implementation Checklist

The Stages of Implementation Checklist (SIC) was adapted from the Stages of Implementation Completion eight-stage tool of implementation (Saldana 2014). It offers an approach to measuring the implementation of interventions such as the PSH. The adapted SIC (see Appendix One) was used by the HUSH team to manage, standardise and structure the process of implementation, and as a measurement tool for the evaluation team. The SIC has three implementation phases: pre-implementation, implementation and self-sustaining/embedded (sustainability). The SIC instrument captures the non-linear progression of the implementation of the PSH on each ward. A ward can achieve 'embedded' status (15 PSHs in ≤ 21 consecutive days) in advance of completing the other implementation phases. There are two scores from the SIC process - time spent in each phase (duration) in weeks, and the percentage of activities completed in a given stage (Box 4)

Stages of Implementation (SIC)	Number of weeks	Activities
Start date to embedded	24 weeks	Total time for implementation (dates from SIC checklist)
Three phases of implementation (consisting of 29 activities) -		
Pre-implementation phase (n=14 activities)	4 weeks	Engagement: consultant meeting and date to implement huddles; Feasibility: coach engages with team; Band 5 nurse identified; baseline TSC and BFPSH surveys; and harms agreed. Readiness: feedback on baseline TSC survey, harms data review, Plan Do Study Act (PDSA) for testing.
Implementation phase (n=11 activities)	16 weeks	Services and consultation begins: 1 st PSH and 1 st 5 consecutive PSHs; On-going services, fidelity, monitoring and feedback: multi-disciplinary team (MDT) involvement in PSH, data review and inclusion in PSH, coach visit to PSH, follow-up TSC and BFPSH surveys.
Sustainability (n=4 activities)	4 weeks	Self-sufficiency: 15 PSHs in ≤ 21 consecutive days (embedded PSH); 3 team members have led PSH; PSH on 7 consecutive days and on 21 consecutive days.

Box 4: The Stages of Implementation

3.8.2 The Ward Level Report

The Ward Level Report was developed by the HUSH team as an additional resource for capturing information about each ward and the progress with PSH implementation. Initially it was proposed that a Band 5 nurse on each ward alongside the allocated coach would be responsible for completing this diary/logbook document (included as part of a coaching pack). The Ward Level Report included key information: details of team members; other patient safety work on the ward; chosen focus areas of harm; progress against the PSH operational definition; records for the Barriers and Facilitators to PSH and the Teamwork and Safety Climate questionnaires; and a progress and achievements record (see Appendix One). In practice the Band 5 nurse option was not deployed (due to staffing models and funds being available retrospectively) and so the Ward Level Report as a data collection exercise was not implemented for the majority of wards - although some of the data collection activities were shared by coaches and other staff in the HUSH project team.

3.8.3 Structured observations of PSHs by the Evaluation Fellow

The Evaluation Fellow independently conducted observations of PSHs on wards that achieved embedded status (as noted by the HUSH team and recorded in the Operation Plan – 31/07/2017). Wards which had not been recorded as having “embedded PSH” were not visited.

The observations of live PSHs involved, ideally, an unannounced visit by the Evaluation Fellow to each embedded ward. In practice, almost all visits to wards by the Evaluation Fellow required prior notice to obtain the necessary permissions and access to come and observe the PSH in action. This usually involved prior discussion (face to face or over the phone) with senior ward staff about access and timings of their PSH. Using a PSH observation checklist (see Appendix One) based on the nine criteria that defined the PSH in the HUSH project and supporting information, the Evaluation Fellow observed the huddle as it took place on each embedded ward and then recorded insights in the observation checklist.

3.9 Measurement of Outcomes and Effectiveness

3.9.1 Teamwork and Safety Climate Survey

The Teamwork and Safety Climate (TSC) Survey (see Appendix One) was used by the HUSH team as a quality improvement and engagement tool and was administered on wards at two-time points – during the pre-implementation or implementation phases (pre-embedded) and after PSHs were embedded (post-embedded). The general plan of the HUSH team was that the first approach to a ward would include measurement and feedback of TSC before implementation, or if this was not possible (e.g. because a ward team had decided to commence PSH through their own initiative), before embedded and then again post-embedded. In the case of Scarborough hospitals all pre-embedded TSC Surveys had been completed a year before the HUSH project started in that hospital. In the other hospitals the ‘pre-embedded’ TSCs were contemporaneous with the HUSH project. The TSC survey was administered by the HUSH team (ward coaches) and staff at the Improvement Academy collated data for each ward. Survey results were fed back to wards as part of the scaling up project and the survey was then repeated after the ward had an embedded PSH. The HUSH Project Manager provided TSC data to the evaluation team.

This TSC survey is based on the validated and widely used Safety Attitudes Questionnaire (SAQ)(Sexton et al. 2006) which incorporates measurement of both Teamwork (questions 1 to 14) and Safety Climate (questions 15 to 27) with one additional question added (question 28 focusing on an overall assessment of patient safety on the ward⁸). The first TSC Survey in Scarborough did not include the question 28. The SAQ uses a five-point Likert scale in which respondents indicate their level of agreement with each statement (ranging from Disagree Strongly to Agree Strongly). The SAQ is completed anonymously although job role and other related information is requested. It is not possible to determine if the same member of staff completed the SAQ pre and post embedded PSH.

We used the generalised estimating equation (GEE) with robust standard errors to estimate the change in TSC scores pre versus post embedded PSH. The clustering variable was the ward. The response variable was each item in the TSC but recoded as a continuous score where the five-point Likert scales were turned into numeric values (1-low to 5-high). We commenced with models with a single binary (0=pre-embedded versus 1=post-embedded) covariate to estimate any difference in the scores for each question. We assumed an exchangeable correlation structure. Our results focus on the difference between post-embedded and pre-embedded size across the three NHS trusts (Leeds, Barnsley, York), four specialities (Medicine, Surgery, Critical Care, Others), and six job roles categories (Nursing staff, Doctors, Allied health professionals, Nursing support staff, Ward support staff, Others) reported from model coefficients with 95% Confidence Intervals (95%CI). For ward specific results we produced radar plots showing the pre versus post embedded changes for each item in the TSC (see Supplementary File: Ward Level Reports for details).

3.9.2 Routinely collected patient harms

During the early stages of the evaluation, routine data sets were agreed with the HUSH team and each of the three NHS Trusts. These included incidence data in relation to the following harms: falls, pressure ulcers and for Leeds only – emergency (crash ‘2222’ calls including for cardiac arrests). Routine data sets were received on a four-week basis from each Trust and managed by TIA in order to generate Statistical Process Control (SPC) charts for feedback to hospital ward teams. These data sets were shared with the evaluation team and were used in our analyses.

We used a Poisson generalised estimating equation (GEE) with robust standard errors, with wards as the cluster, to estimate parameters for each harm separately (falls, pressure ulcers, emergency calls and those that were cardiac arrest). We assumed a first order auto-regressive order (AR1) correlation structure as these counts of harms followed a Poisson distribution. We structured the data to undertake an interrupted time series analysis (Wagner et al. 2002). Each model had three covariates – week (centred to the week in which PSH were embedded in each ward), a binary variable indicating the week in which PSH were embedded (0=pre-embedded versus 1=post-embedded) and a post-embedded week variable which is zero beforehand and then runs from one to the final number of weeks after PSHs were embedded. This model set up allows us to test if there was any effect at the time PSH are embedded (by the binary variable) and if the rate of change of

⁸ This additional overall grade for safety question is taken from the Agency for Healthcare Research and Quality Hospital Survey on Patient Safety Culture <https://www.ahrq.gov/sops/quality-patient-safety/patientsafetyculture/hospital/index.html>

harms is different pre versus post embedded PSH. We used a similar modelling approach to examine the impact of the PSH if we use the first PSH huddle date as opposed to the date when PSH were embedded. We present results from both the models using each time point (first PSH date and embedded PSH date) separately. Because of missing data, the numbers of wards are not the same when considering first PSH date versus embedded PSH date.

We report effect size in terms of incidence rate ratio (IRR) which is a synonym of relative risk (RR) – where a value of 1 indicates no change, a value >1 indicates an increase in risk and a value <1 indicates a reduction in risk. Statistical significance was set at $p < 0.05$. We report all model coefficients with 95% Confidence Intervals (95%CI) and p-values. Ward level results are presented graphically in a supplementary file (Supplementary File: Ward Level Reports). All analyses were carried out using R (for graphics)(Team 2015) and STATA (for pre-processing and modelling)(Stata 2014).

3.10 Capturing feedback on PSHs and the scaling up process

3.10.1 Barriers and Facilitators to Patient Safety Huddles

The Barriers and Facilitators to Patient Safety Huddles (BFPSH) questionnaire (see Appendix One) was based on the Theoretical Domains Framework (Michie et al. 2005) and the Improvement Academy's Achieving Behaviour Change Toolkit (YHAHSN 2017). This 26-item questionnaire incorporates a five-point Likert scale ranging from one (Strongly Agree) to five (Strongly Disagree). The HUSH team administered the questionnaire in those wards that appeared to be struggling to implement the PSH (as a means to identify specific barriers and enablers). This then informed the use of specific interventions for identified barriers in order to support successful implementation. At the time of writing this report, the data from the BFPSH was not available to the evaluation team and so could not be included.

3.10.2 Feedback from stakeholders

Stakeholders (Senior NHS staff, frontline ward staff, HUSH project leaders, coaches and Improvement Fellows) were invited by the Evaluation Fellow to provide feedback on the project and their views and experience of PSHs at two-time points (during the initial stages of the evaluation and then again towards the end of the project). Feedback was sought through interview (face to face or telephone) or questionnaire (see Appendix One) with the interview schedules and questionnaire based on the evaluation questions. Additional group interviews were conducted with 20% (5/25) of the deeper dive sub-sample ward teams (see later). These additional interviews were a convenience sample based on willingness to participate and hospital.

All of the interviews were conducted by KC (Dr Claire Marsh was co-facilitator for four of the group interviews). All interviews were audio recorded and transcribed (by Type Out⁹). The qualitative analysis utilised the Framework Method (Ritchie and Spencer 1994; Gale et al. 2013) using NVivo and Microsoft Excel. This incorporated the following stages:

⁹ <https://www.typeout.co.uk/>

1. Familiarisation with transcribed data
2. Creation of thematic framework (aligned to evaluation questions) using NVivo
3. Indexing to a framework (based on evaluation questions) using NVivo
4. Charting and summarising using Excel
5. Mapping and interpretation using Excel

Double checking for themes and indexing to the framework (steps 2 and 3) was carried out by a co-coder for two sources using a 10% sample. As a result of this cross-checking process two revisions were made to 'charting and summarising' at stage four with additional sub-themes.

3.10.3 The Evaluation Survey: Feedback from frontline teams

Frontline teams in the 25 deeper dive sub-sample wards (a purposive sample selected according to cohort, specialty and hospital – see later) were invited to complete an Evaluation Survey (Appendix One) and provide feedback regarding their views on and experience of the PSH on their ward. This evaluation survey questionnaire was devised to align with the evaluation themes and questions. The pre-embedded evaluation survey (sometimes administered *retrospectively* after the PSH had been recorded as embedded) incorporated 25 questions in four sections and for the post-embedded follow-up wards, was modified to reduce the number of questions by excluding those questions that were not being answered or were providing overlapping responses, and to include additional questions to investigate patient/carer involvement (a total of 20 questions across 5 sections). Wards that had completed the survey at the pre-embedded stage were approached to complete a second survey after they had achieved embedded status. Responses to all evaluation survey questionnaires were collated in a spreadsheet.

Analysis included frequencies for each question and cross tabulations to investigate responses by Trust and specialty. Where text answers were provided the responses were coded to themes and analysed quantitatively (frequencies for each theme).

3.10.4 Patient and Public Involvement

The Patient and Public Involvement (PPI) element of the project was led by Dr Claire Marsh (see Appendix Three for details). The approach involved the following:

- Workshops with patient representatives from each of the three NHS Trusts;
- Testing of different approaches to patient/carer involvement in three wards in Leeds;
- Inclusion of patient/carer involvement questions in post-embedded questionnaires, group interviews and second interviews or questionnaires with stakeholders; and
- Interviews and questionnaires were administered and conducted by the Evaluation Fellow and Dr Claire Marsh. Data analysis was conducted by Dr Marsh (see Appendix Three).

3.11 The deeper dive sub-sample of wards

A 'deeper dive' sub-sample of 25 wards was purposively selected by the Evaluation Fellow to enable further (deeper) evaluation. The sample represented the specialities of wards as set out in the Operation Plan across the five hospitals irrespective of status (e.g. embedded) of PSHs on that ward. Due to ward moves, mergers and closures, some of the wards originally selected had to be substituted with replacements. Wherever possible a similar ward was sought for ward replacements, however this was not always possible, so an appropriate, nearest match was made, as judged by the Evaluation Fellow. Table 3 shows the selected sample of 25 deeper dive wards by hospital and speciality.

The Operation Plan (31.07.2017) incorporated 18 cohorts over 18 months (from August 2015 to January 2017) with two pause months. The 'deeper dive' sample captured wards from most (14 of 16) of the cohorts and across all the specialties.

NHS Trust	Leeds			Barnsley	York	All
Hospital	SJUH	LGI	CAH	BGH	SGH	
Number of wards in Evaluation	38	23	3	16	12	92
Deeper dive Evaluation wards	9 (24%)	7 (30%)	1 (33%)	5 (31%)	3 (25%)	25 (27%)
Speciality						
General Medical	4	1	-	-	1	6
General surgery	1	-	-	1	-	2
Medical admissions	-	-	-	1	-	2
Specialist surgery	1	1	-	-	1	3
Elderly care	-	-	-	1	1	2
Orthopaedics	-	2	1	-	-	3
Others	3	3	-	2	-	7

Table 3: Deeper-dive evaluation wards by NHS Trust, hospital and specialty (n=25)

3.12 Ethics and approvals

The evaluation protocol (McDonach et al. October 2015) was submitted to the UoB ethics committee and to the Research and Development Department of each NHS Trust for approval in November and December 2015 respectively. All approvals to proceed were given by March 2016 and the evaluation work was defined as 'evaluation or service review'. As such there was no requirement for full ethical review through the IRAS or NHS ethics committee processes. Access to the NHS Trusts was gained through an Honorary Contract with LTHT for the Evaluation Fellow and permissions in writing from Barnsley and York. Throughout the project, data management was in line with the Data Protection Act (1998) and Trusts' Confidentiality and Data Protection policies and procedures.

4 Results

4.1 Number of wards in the evaluation

The final number of wards in the evaluation was 92 (Table 4), of which 82% (75/92) were recorded by the HUSH team as having embedded PSHs over a two-year time period (starting: Aug 2015).

Ward set	Number of wards
Number of wards in Operation Plan (31.07.2017)	136
Wards excluded	44
Wards included in this evaluation	92
Embedded wards	75

Table 4: Number of wards in the evaluation

The table below shows the included/excluded wards by hospital. Scarborough General Hospital (SGH) had 100% (12/12) embedded PSHs, Leeds Trust (LTHT) including St James's University Hospital (SJUH), Leeds General Infirmary (LGI) and Chapel Allerton Hospital (CAH) had 81% (52/64); and Barnsley General Hospital (BGH) (Barnsley NHS Foundation Trust) had 69% (11/16).

NHS Trust	Leeds	Leeds	Leeds	Barnsley	York	All
Hospital	SJUH	LGI	CAH	BGH	SGH	
Number of wards	N=50	N=43	N=3	N=27	N=13	N=136
Wards excluded	12 Embedded cohort (n=8) Paediatric wards (n=1) Temporary wards (n=2) Day case ward (n=1)	20 Paediatric wards (n=13) Day case wards (n=1) Ward moves (n=3) Ward mergers (n=3)	-	11 Ward closure (n=1) Paediatric wards (n=3) Ward move (n=1) Ward mergers (n=6)	1 Paediatrics (n=1)	44
Wards in the evaluation	38	23	3	16	12	92
Embedded wards	31 (81.5%)	18 (78%)	3 (100%)	11 (69%)	12 (100%)	75

Table 5: Number of: wards, excluded wards, evaluation wards and embedded evaluation wards (based on the Operation Plan 31/07/2017) by hospital

4.2 Data completeness

Evaluation data collection commenced in March 2016 and was completed in July 2017. The extent of data completion for the embedded wards is highlighted below:-

- Stages of Implementation Checklist (SIC) – 100% (75/75)
- Teamwork and Safety Climate (Pre and Post embedded PSH) – 89% (67/75)
- BFPSH survey questionnaire – 11% (8/75)
- Independent observation of PSH in embedded wards – 85% (64/75)
- Ward Level Reports – 36% (27/75)

The data collected/completion for each of the embedded evaluation wards (n=75) has been summarised in Appendix Two and Table 6 shows the sample sizes and response rates for other data collection methods. The largest sample sizes were for TSC (2850 responses from 66 wards) followed by the evaluation survey (169 responses from 25 wards). The key data collection challenges are described in the next section.

Data collection method	Target	Total responses	Number of respondents pre-embedded status	Number of respondents post embedded status
Evaluation survey	Deeper dive sample wards (n=25)	169	137	32
Stakeholder interviews or online questionnaire	HUSH project leaders and coaches, frontline teams, NHS senior stakeholders.	22	15	7
Group interviews with ward teams	Deeper dive sample wards (n=5)	19	-	19
Teamwork and Safety Climate Survey	Frontline teams in 66 wards in 3 NHS Trusts	2850	1477	1373
Barriers and Facilitators to PSH questionnaire	Wards (n=8) facing barriers to implementation	80	54	26

Table 6: Responses to evaluation data collection instruments

4.3 Key challenges in collecting data

The complexity of the HUSH project posed challenges for the collection of data. Box 5 highlights the key challenges and the adjustments and responses that were made by the Evaluation Team:

Barriers or challenges	Impact on the evaluation	Adjustments or response
Delays in gaining approvals for commencing data collection due to UoB ethics processes and access permissions from each NHS trust.	Delays to the start of data collection. In Barnsley and Leeds data collection started in March 2016 and in Scarborough, June 2016.	Review of the evaluation timetable and re-scheduling of data collection activities. Delays in completion of all data collection. Insufficient time was available to conduct the PSH observations for the ten 40+ weeks (40 weeks after the recorded embedded date) group. Sustainability issues will be explored through additional evaluation work with the pilot wards (Embedded cohort).
The pace of the HUSH scaling up and the movement of wards across the Operation Plan as those with an interest were prioritised.	This impacted on the planned timings for data collection in particular gaining feedback from deeper-dive ward teams at two- time points: pre-embedded and post embedded.	Only four of the 25 'deeper dive' evaluation wards had a pre-embedded before and post-embedded evaluation survey.
Frontline team reluctance to complete evaluation surveys (the HUSH project and the evaluation together included up to six survey requests).	On some wards the number of evaluation surveys completed was low. Response rates to some TSC surveys were very low.	Decision to conduct in depth group interviews with a sub-sample of the 'deeper dive' wards (n=5)
The Ward Level Report (WLR) was not completed for a majority of wards. This was due to B5 nurses on the wards not taking on this task and coaches having insufficient time to complete it.	Information from the WLR (i.e. for the RoI) was available for approximately a third of wards and a proportion of those WLRs submitted to the Evaluation Team were incomplete, as they did not include all the information requested (mainly sections 6 to 10).	For the RoI, discussions with senior NHS staff and/or project leaders were undertaken to gather information about the mechanisms associated with the PSH at ward level. Wards were asked for additional ward-related information when the Evaluation Fellow undertook introductory visits in advance of the PSH observations.
Gaining baseline data for the TSC was compromised by the pace of the scaling up and the challenges associated with conducting the TSC survey on busy and pressured wards.	The lack of true baselines for the TSC data set has meant that over time comparisons for Teamwork and Safety Climate are based on two-time points rather than a true baseline and follow up.	Results have been presented for all the TSC data available in relation to changes (over the 28 questions) across two-time points (pre-embedded and post-embedded) reflecting duration and progress of routine huddles on the wards.
Ward mergers and moves in Leeds (n=19) and Barnsley (n=6).	Wards included in the evaluation and deeper dive sample reduced over the course of the project.	On-going review of the evaluation wards and re-allocation of wards to the deeper dive sample.
Complete data sets for routinely collected harms data were not available to the evaluation team.	The evaluation has been unable to report on harms data sets as follows: Incidence of emergency calls for York and Barnsley.	The results for harms data have been reported for falls and pressure ulcers in all trusts and emergency calls (including for cardiac arrest) for Leeds Trust only.
The BFPSH questionnaire was used on very few wards (n=8) and no data was available to the Evaluation Team	Results from the BFPSH questionnaire could not be included in the evaluation.	Due to the low number of completed questionnaires and the unavailability of data the results for the BFPSH have not been reported on in the evaluation.

Box 5: Barriers and challenges for the evaluation, impact and adjustments made in response to these

4.4 Implementation and Fidelity

The data sources for determining the implementation and fidelity of the PSH were the:

- Operation Plan (31.07.2017)
- Stages of Implementation Checklist (SIC)
- PSH independent observation (by the Evaluation Research Fellow)
- Logic models
- Stakeholder feedback

4.4.1 What proportions of wards embed PSH?

There were 92 wards in the evaluation. Of these, four wards (4%=4/92) did not commence PSHs. Seventy five wards (82%=75/92) were noted as being embedded on the operational plan, but on independent observations 64 wards (85%=64/75, 70%=64/92) were found to be undertaking a PSH. Fifteen percent (=11/75) of the embedded wards were found to not have a PSH on the ward or not to be conducting a PSH on the day of the observation. Thirteen wards (14%=13/92) commenced PSHs but did not achieve embedded status of their PSH by the close of the evaluation (31.07.2017).

Four wards did not wish to huddle or faced major barriers at engagement. Barriers to, or a reluctance to implement huddles have been identified through general feedback and at operation meetings. The reasons for not implementing the PSH tended to fall into three main areas¹⁰ as follows:

1. Ward leaders or teams stated that they did not wish to implement the PSH;
2. Small units or wards (eight beds or less for example) that had a specialist remit and considered that they already have effective communication and multi-disciplinary working in place; and
3. Ward leaders who considered that patient safety issues are adequately covered as part of the handover (at shift changes) or other ward based meetings.

Scarborough General Hospital (SGH) had 100% (=12/12) embedded PSHs, Leeds Trust (LTHT) including St James's University Hospital (SJUH), Leeds General Infirmary (LGI) and Chapel Allerton Hospital (CAH) had 81% (=52/64); and Barnsley General Hospital (BGH) (Barnsley NHS Foundation Trust) had 69% (=11/16). A tabulation of all embedded wards is shown in Table 5.

¹⁰ Based on data from the Operation Plan (31.07.2017), PSH observations - embedded wards, and operational meetings.

4.4.2 Stages of Implementation Checklist

Ward level results for the Stages of Implementation (SIC) have been included in the ward specific reports (Supplementary File: Ward Level Reports). Table 7 summarises the number of weeks from 'start date of implementation to PSH embedded date' for all embedded wards (n=75). The PSH on wards in SJUH and LGI achieved embedded status more quickly when compared to the other hospitals and within the 24 week period set for scaling up. The mean number of weeks for the three other hospitals (CAH, BGH and SGH) all exceeded this 24 week period. However, the overall mean for all wards (19.6) was within the anticipated 24 weeks.

Wards	Median (weeks)	Mean (weeks)	Min (weeks)	Max (weeks)
All (n=75 wards)	13	19.6	1	86
SJUH (n=31 wards)	13	18	2	86
CA (n=3 wards)	61	48	5	79
LGI (n=18 wards)	9	18	1	57
Barnsley (n=11 wards)	30.5	36	5	71
Scarborough (n=12 wards)	18	25	6	85

Table 7: Number of weeks between start date and embedded date for embedded wards (n=75)

4.4.3 Observations and fidelity of PSHs on wards with embedded PSHs

Eighty-five percent (=64/75) of wards identified as having successfully embedded PSHs on the Operational Plan were independently seen and verified by the Evaluation Fellow to be undertaking a PSH. Fifteen percent (=11/75) of the embedded wards were found to not have a PSH on the ward or not to be conducting a PSH on the day of the observation (unannounced visit to the ward). On two of the wards, two PSH were observed consecutively¹¹ giving a total of 66 observations.

The fidelity of each observed PSH (n=66 observations) was assessed by the Evaluation Fellow, against nine pre-defined criteria (Table 8).

¹¹For one ward the PSH observation took place in different bays and for the other the observation took place at two different times on the same ward.

PSH characteristic	Number of PSHs observed with each characteristic (based on 66 observations on 64 wards)
1.Do PSHs take place at the same time every day	53 (80%)
2.Is the PSH led by the most senior clinician	6 (9%)
3.Review of number of days since last harm conducted	18 (28%)
4.Review of improvement run chart conducted	-
5.Debrief of any harm since last huddle	23 (35%)
6.Discussion of who at risk today and what needs to be put in place	63 (95%)
7.Are participants asked if anyone has any other concerns	37 (56%)
8.Is the PSH 'short and sweet'	61 (92%)
9.Non-judgemental 'fear free' space	64 (97%)

Table 8: Frequency of the nine PSH characteristics as seen in 66 PSHs by the Evaluation Fellow

The mean fidelity score was 4.9 (out of a maximum of 9), the lowest fidelity score for a PSH was three and the highest fidelity score for a PSH was eight. The three highest scoring criteria were, "Non-judgemental (97%=64/66)", "Who is at risk today (95%=63/66)" and "PSH 'short and sweet' (92%=61/66)". The three lowest scoring criteria were "Review of number of days since last harm (28%=18/66)", "PSH led by the most senior clinician (9%=6/66)", and "Review of improvement run chart (0%=0/66)". It should be noted that the HUSH team were alert to the need to review their original preliminary nine-criteria and later in the report we present the revisions.

4.4.4 What proportion of wards sustain PSHs 40+ weeks post implementation

Six ward observations were conducted by the Evaluation Fellow, 40+ weeks after each ward was determined to have an embedded PSH (operation plan 31.07.2017). Of these wards five (5/6=83%) were conducting daily huddles (on the day of the ward visit and observation). For the single ward not conducting huddles on the day of the observation (June 2017), the staff stated that huddles did take place when the Sister (and PSH lead) was on duty.

4.4.5 Are PSH "short and sweet"?

Eighty percent (=53/66) of the observed PSHs were ≤10 minutes and 92% (=61/66) were ≤15 minutes. As such the PSH characteristic 'short and sweet' was achieved consistently across the observed embedded PSHs.

4.5 Describe how PSH might work to enhance safety climate and patient safety

The data sources for understanding how PSHs work were:

- Logic Models
- A Theory of Change
- Insights from key stakeholders (HUSH coaches, project leaders, senior NHS staff and frontline ward teams)

4.5.1 Logic models and Theory of Change

Throughout the HUSH project logic models were used to understand the mechanism of the patient safety huddle and to elucidate how it enhances patient safety and safety climate and in turn reduces patient harms. Two models were developed by the HUSH team (see below) drawing on their learning and experience of supporting the wards, observing PSHs, and from the scaling up experience.

4.5.2 Safety Culture Logic model

The Teamwork and Safety Culture logic model (Figure 3) was subject to intermittent review by the HUSH team during the project and was discussed at an Evaluation Dress Rehearsal. The model outlines how resources (leadership, coaching and data) support the PSH and related activity which then leads to greater safety awareness on the ward and empowerment of the team to improve patient safety. Outcomes such as enhanced motivation and a link between the PSH and harm reduction combined to improve safety culture on the ward.

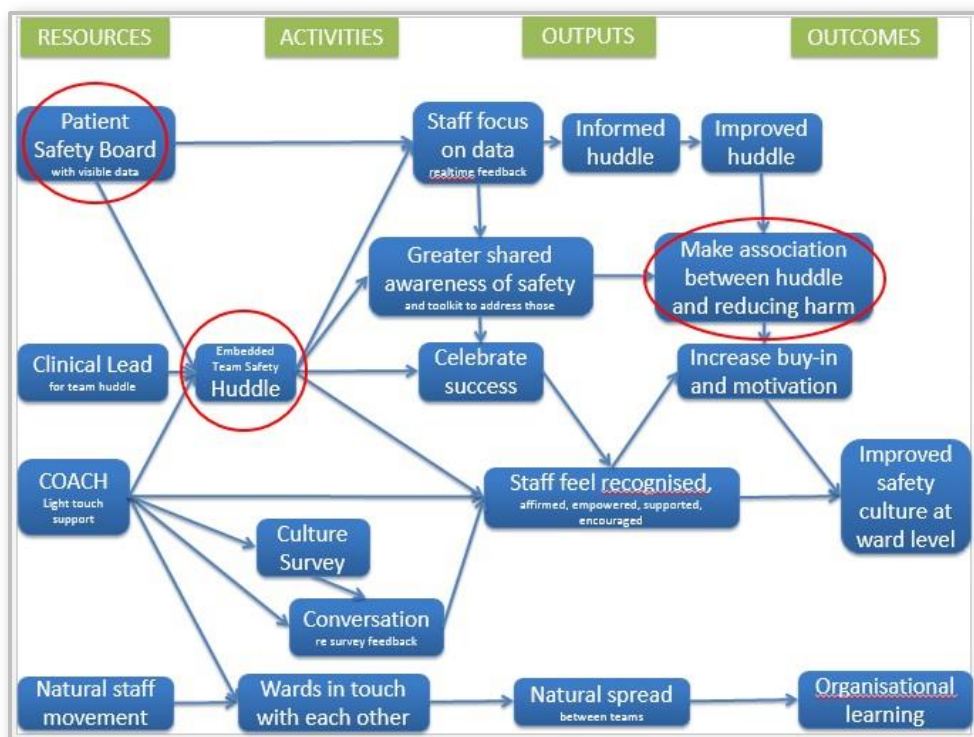


Figure 3: Teamwork and Safety Climate logic model

4.5.3 Theory of Change

The HUSH team as part of their sustainability planning produced a Theory of Change diagram to illustrate their learning regarding the theoretical mechanisms of the PSH. The theory of change illustrated below (Figure 4) shows how the elements of the HUSH project ‘ignited a spirit of learning at team level’ which contributed to embedded cultural change in wards. This cultural change at team level was seen to reach a ‘tipping point’ and to then generate cultural change at an organisational level. This process was regarded as central to the sustainability of huddles. The team propose further review of their theories (beyond the scope of this evaluation report).

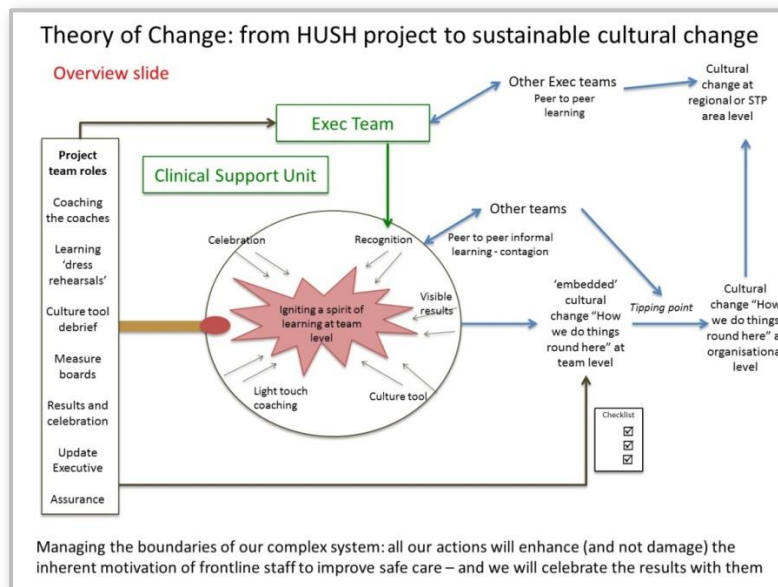


Figure 4: HUSH project theory of change

4.5.4 Insights from Stakeholders

This data is from HUSH stakeholders including: NHS senior staff, HUSH coaches and leaders, and frontline teams who took part in the group interviews. Respondents were asked to share their views on how the PSH might work to enhance safety climate and patient safety. The main themes and some illustrative quotes of the feedback received have been summarised in Box six below:

Box 6: Stakeholder feedback on how the PSH might enhance teamwork and patient safety

<p>Implementation and Fidelity: Describe how the PSH might work to enhance safety climate and patient safety?</p>
<p>Staff roles and the MDT</p> <p>Through involvement of the wider team including housekeepers and ward clerks.</p> <p><i>“The change in culture, engagement of all staff members, of all professional groups. The hierarchy and that sort of thing, in that some people are mentioning that there is a strong buy-in from some, groups of staff like housekeepers and ward clerks etc. they’re really on the periphery of patient care, they’re not really dispensing medications or writing up charts or administering direct medical nursing care, but I think the huddles gives them a way of engaging.” CH_01</i></p>

Ward management and activities

The PSH prompts action on the ward - highlighting concerns leads to an action plan.
Prioritisation of patients where the PSH prompts medical staff to see the most unwell first.
A daily PSH provides continuity for team members over the week (e.g. when team members are on leave or not on shift).

Awareness of ALL patients and not just those in a sub-team or patients linked to a named nurse.

"... there's something about the whole situation of awareness of the team so as doctors, you know, you see loads of people trying to get out of bed all the time but when it's in your head about who's really, really high risk, as soon as you see that patient you'll either go and help them straight away or you'll call for help, you know which ones ... if you're in the middle of doing something you know which ones you need to stop and go and help immediately."

PL_04

The PSH provides an overview of the ward and for the voices of support staff to be heard (highlighting issues that may not be noticed by senior staff).

The PSH had led to some wards implementing new approaches to preventing harms e.g. introducing *cohorting* on the ward to prevent falls.

The PSH leads to the ward taking ownership of harm prevention.

Team attitudes, knowledge and beliefs

The PSH can be a mechanism for changing and challenging attitudes or beliefs about patient harms.

It helps to create a belief that team members can make a difference and as such preventing harms is within their control.

Team members gain knowledge about harms and their prevention e.g. where and why a patient fell.

Ward context and resources

Staffing issues don't have to be a barrier to improvement.

The PSH creates an environment in which staff feel valued for their contribution - a culture of openness is fostered.

Approach to conducting huddles

The PSH as a forum for immediate feedback on harm incidents.

PSH characteristics and principles

The PSH provides a distinctive venue for raising concerns.

The PSH is a mechanism for speaking up – empowering teams.

It is a forum for local feedback that in turn can lead to culture change.

Having a PSH in place means that patient safety has a higher profile on the ward.

The frequency of discussion of risks to patients is increased by the PSH.

Reductions in patient harm as a result of the PSH

The PSH leads to greater awareness of data relating to patient harms.

Greater levels of knowledge and awareness contribute to reductions in harms

PSH could potentially have a positive impact on patient harms not the subject of discussion in the huddle.

When there has been a shift from an acceptance (of harms) to a need to act.

4.6 Outcomes and Effectiveness

The data sources for measuring the outcomes and effectiveness of PSHs were:

- Before and after comparisons of TSC survey scores for each ward (n=28 questions)
- Harms data sets (incidence of harms) routinely collated by the three NHS Trusts
- Feedback from key stakeholders (HUSH coaches, project leaders, senior NHS staff and frontline ward teams)

4.6.1 Is there an improvement in team-working and safety climate post PSHs?

4.6.1.1 Teamwork and Safety Climate Survey: results by Trust

Figure 5 shows the TSC survey model results pre versus post embedding of PSH for each question (see Appendix One for questionnaire) across the three Trusts. Visual inspection of Figure 6 for all hospitals shows a general positive shift to the right for the majority of questions with question 28 (“Please give your unit an overall grade on patient safety”), question 19 (“The culture in this clinical area makes it easy to learn from the errors of others”), question 12 (“Briefings are common in this clinical area”) and question 8 (“I have the support I need from other personnel to care for patients”) showing the largest changes.

For Leeds the greatest positive changes were seen for question 28 (“Please give your unit an overall grade on patient safety”), question 19 (“the culture in this clinical area makes it easy to learn from the errors of others”), question 8 (“I have the support I need from other personnel to care for patients”) and question 2 (“In this clinical area it is difficult to speak up if I perceive a problem with patient care”). None of the questions showed negative changes in Leeds.

For Barnsley the picture was more mixed. The largest positive changes were seen for question 13 (“I am satisfied with the quality of collaboration that I experience with medical staff in this clinical area”), question 19 (“the culture in this clinical area makes it easy to learn from the errors of others”), and question 9 (“I know the first and last names of all the personnel I worked with during my last shift.”). Several questions showed a negative change – question 27 (“My suggestions about safety would be acted upon if I expressed them to management.”), question 16 (“I would feel safe being treated here as a patient.”), question 25 (“This organisation is doing more for patient safety now, than it did one year ago”) and question 26 (“Leadership is driving us to be a safety-centred organisation.”).

For York (SGH), most questions showed a positive shift. The largest positive changes were seen for question 28 (“Please give your unit an overall grade on patient safety”), question 12 (“Briefings are common in this clinical area”) and question 10 (“Important issues are well communicated at shift changes.”). None of the questions showed negative changes in York (SGH).

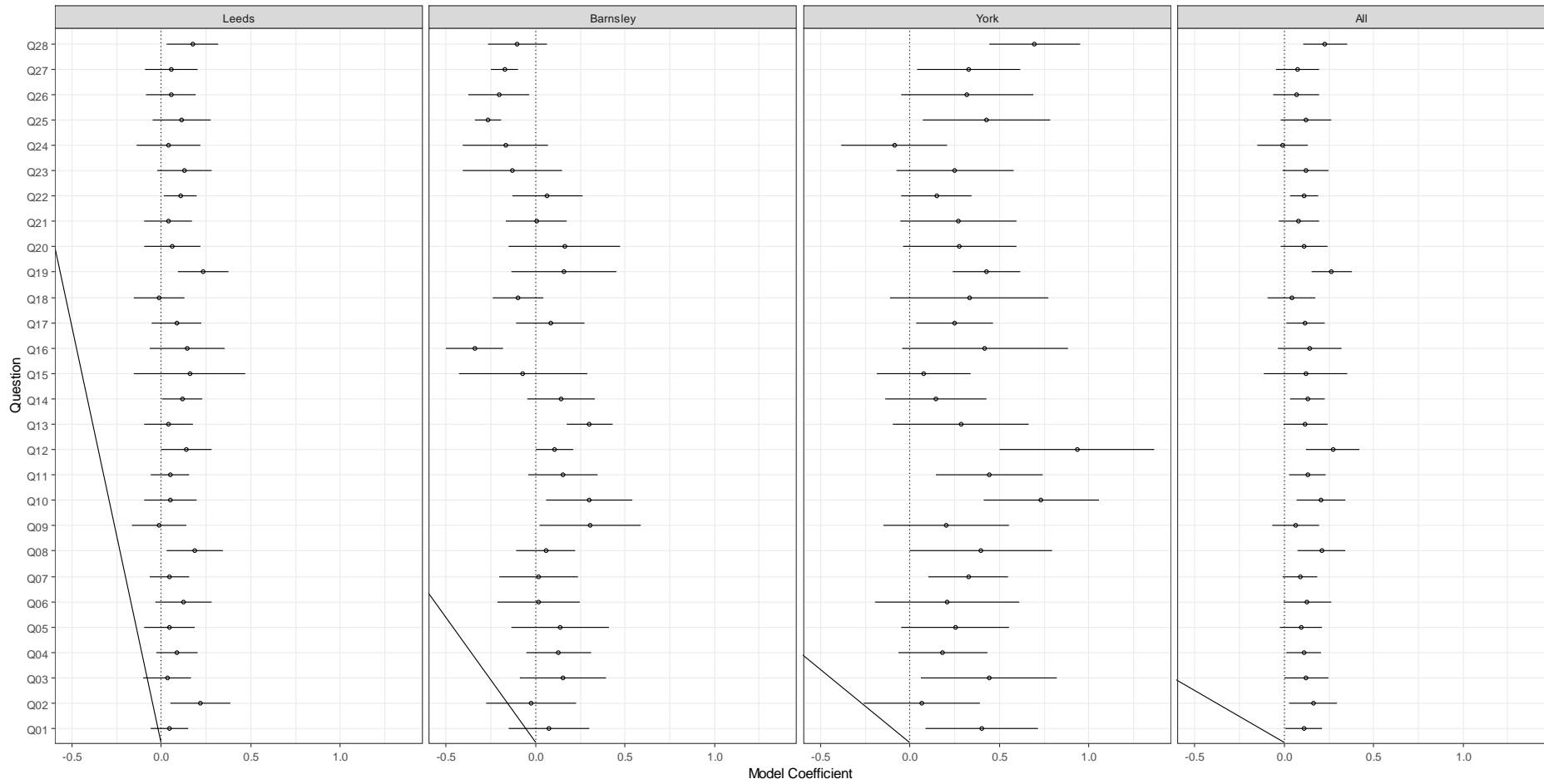


Figure 5: Results for Teamwork and Safety Climate questions by NHS Trust. Model coefficients above zero show a positive change and those below zero show a negative change. The horizontal lines are 95%CI.

4.6.1.2 Teamwork and Safety Climate Survey: results by specialty

The TSC responses were analysed across specialties: medicine, surgery, critical care and others as shown in Figure 6. The critical care wards showed the greatest positive changes across most questions with one question showing negative change (question 6 – “I am frequently unable to express disagreement with the medical staff here.”). Question 15 (“The levels of staffing in this clinical area are sufficient to handle the number of patients”) had the largest positive change.

The surgical wards showed positive change across nine of the questions. The largest change was in question 12 (“Briefings are common in the area”). There were no questions with a negative change. For medical wards two questions showed a significant change, question 12 (“Briefings are common in the area”) and question 19 (“The culture in this clinical area makes it easy to learn from the errors of others.”).

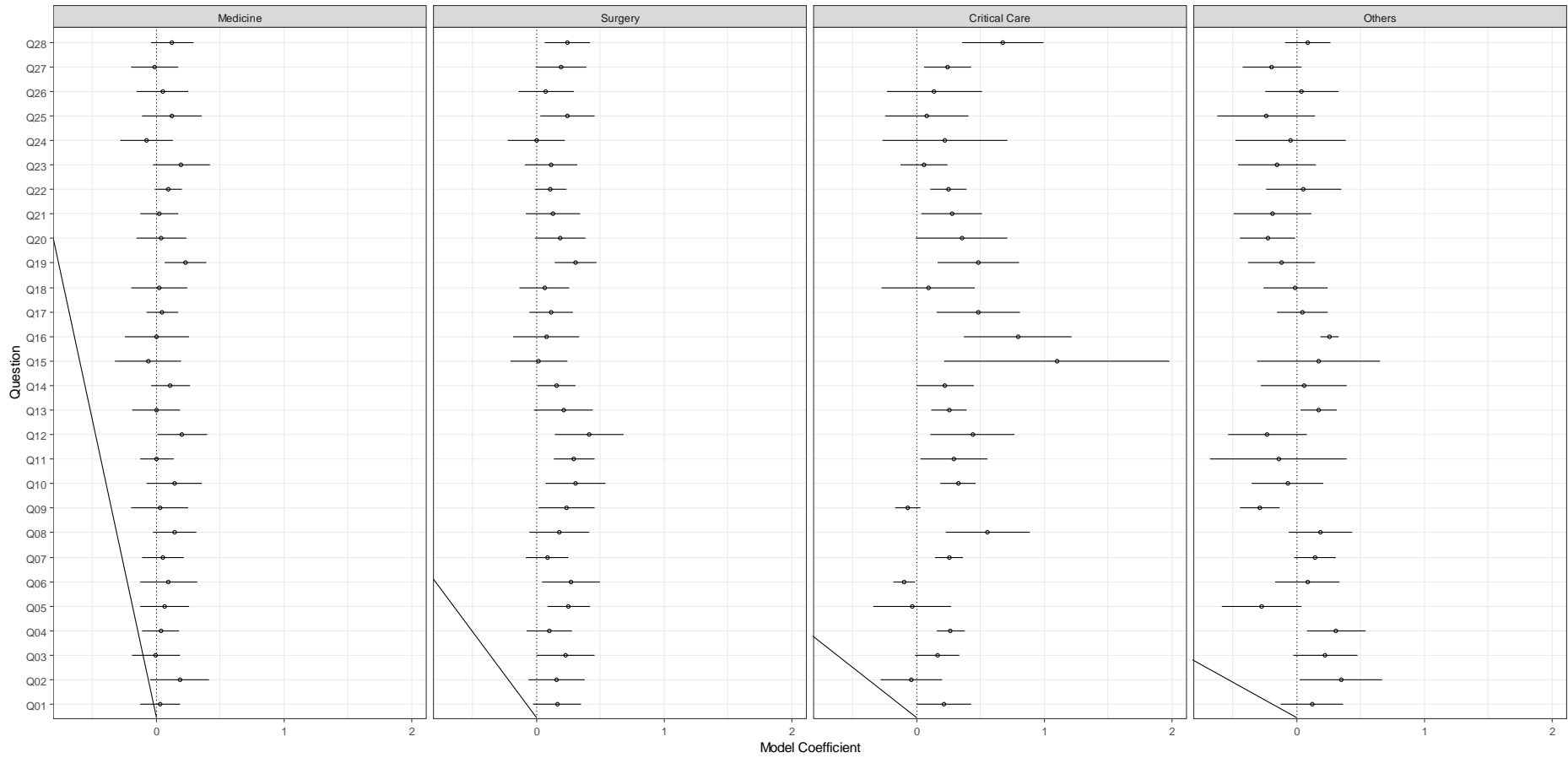


Figure 6: Teamwork and Safety Climate results by specialty. Model coefficients above zero show a positive change and those below zero show a negative change. The horizontal lines are 95%CI

4.6.1.3 Teamwork and Safety Climate Survey: results by job role

The results for the TSC questions by job roles: nursing staff, doctors, allied health professionals, nursing support staff, ward support (ward clerks and housekeepers), and others are shown in Figure 7. All staffing groups bar the doctors showed a positive change in their assessments of overall patient safety grade (question 28).

For nursing staff, the largest positive changes were seen with respect to questions: 20 (“I received appropriate feedback about my performance”), 19 (“The culture in this clinical area makes it easy to learn from the errors of others”), 17 (“I am encouraged by my colleagues to report any patient safety concerns I may have”), and 12 (“Briefings are common in this clinical area”). No question showed negative change. For doctors, the largest positive changes was with respect to question 9 (“I know the first and last names of all the personnel I worked with during my last shift”). No question showed negative change.

For allied health professionals the largest positive change was with respect of question 12 (“Briefings are common in this clinical area”), question 23 (“In this clinical area, it is difficult to discuss errors”), and question 22 (“I know the proper channels to direct questions regarding patient safety in this clinical area.”). No question showed negative change.

For nursing support staff, the largest positive changes were seen with respect to question 23 (“In this clinical area, it is difficult to discuss errors”) and question 19 (“The culture in this clinical area makes it easy to learn from the errors of others.”). Question 24 showed negative change (“Hospital management does not knowingly compromise the safety of patients”).

For ward support staff, there was a positive change in overall safety grade (question 28). No question showed negative change. For other staff, there was positive change in overall safety grade (question 28), along with question 23 (“In this clinical area, it is difficult to discuss errors.”), question 10 (“Important issues are well communicated at shift changes”) and question 8 (“I have the support I need from other personnel to care for patients.”). No question showed negative change.

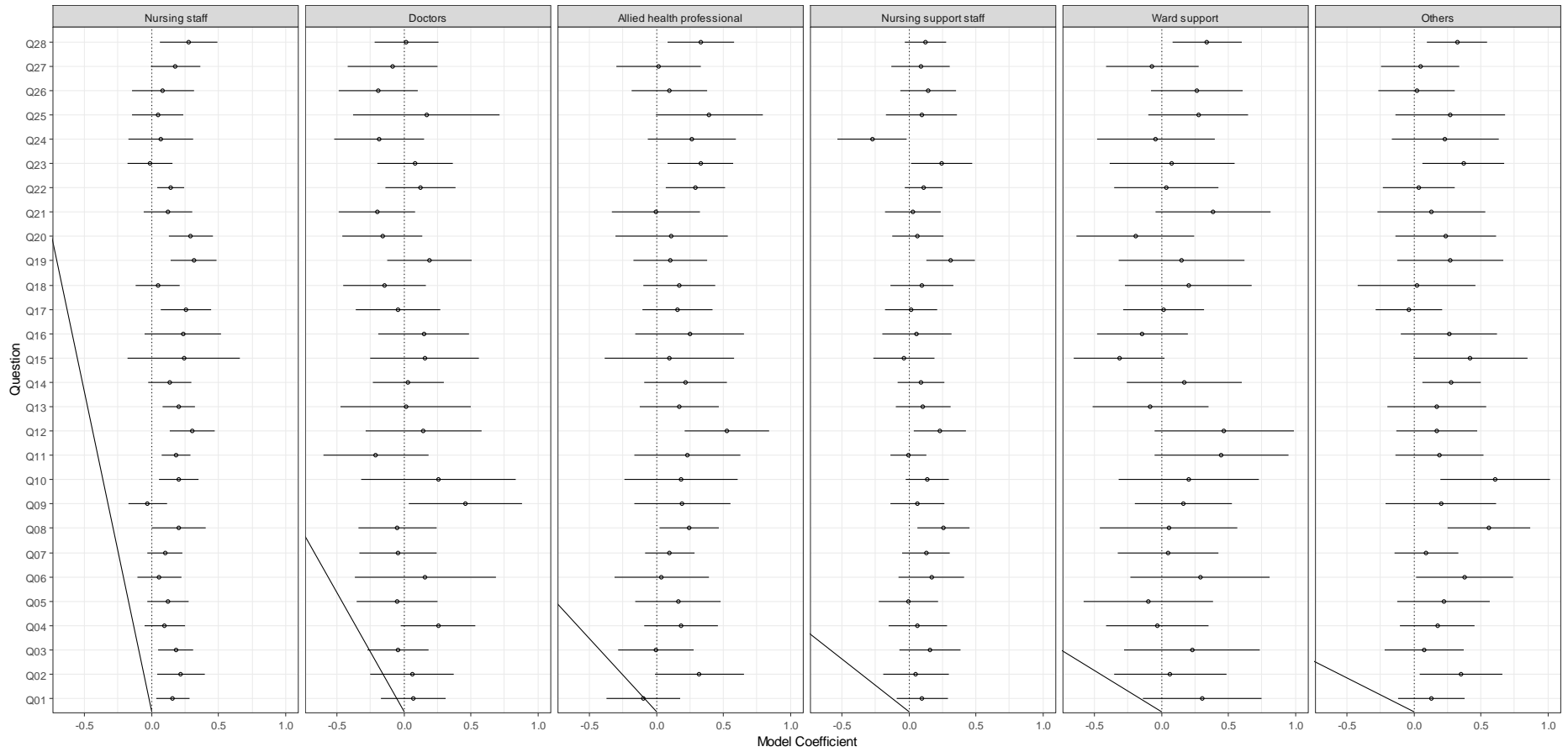


Figure 7: Teamwork and Safety Climate results by job roles. Model coefficients above zero show a positive change and those below zero show a negative change. The horizontal lines are 95%CI

4.6.2 Is there a reduction in patient harm following implementation of huddles?

The extent to which patient harms reduce after PSHs were started or embedded was investigated using an interrupted time series analysis using weekly harms data for all the wards where such data was available. The model coefficients (IRR – incident rate ratios) are shown in the tables below. There are two variable of interest:-

- the step change variable which estimates the extent to which there was change in the level of harms (e.g. falls, step change up/down) coincident with the week that PSH were recorded as started or embedded. A reduction in level of harms is indicated by an IRR <1.
- the after variable which estimates the extent to which the rate (e.g. falls per week) of harms, changed after the week that PSH were started or embedded. A reduction in rate of harms is indicated by an IRR <1.

We developed two models – the first model used the date of the first PSH as the interruption time point and the second model used the date that PSH were embedded as the interruption time point.

Table 9 shows the modelling results for falls and pressure ulcers based on the first huddle date. The pooled hospital results show a non-significant reduction in falls (IRR=0.884, p=0.086) when PSHs were started in a ward but a significant reduction in the rate of falls after PSHs were started (IRR=0.995, p=0.017). At Trust level, only Leeds hospitals showed significant reduction in falls. The pooled modelling results for pressure ulcers showed a non-significant reduction in pressure ulcers after PSH were started (IRR=0.787, p=0.094). At Trust level, Barnsley showed a reduction in the level of pressure ulcers (IRR=0.573, p=0.004) and the rate of pressure ulcers after PSHs were started (IRR=0.986, p=0.038). Leeds and York showed an increase (p<0.05) in the rate of change of pressure ulcers.

Harm	Effect (Model covariate)	Leeds N=40 wards	Barnsley N=10 wards	York N=10 wards	All N=60 wards
Falls	Before	1.008 1.002 to 1.014 p = 0.015	1.001 0.993 to 1.009 p = 0.772	1.003 0.998 to 1.008 p = 0.189	1.002 0.998 to 1.006 p = 0.280
Falls	After	0.988 0.982 to 0.994 p < 0.001	0.995 0.982 to 1.007 p = 0.405	0.997 0.99 to 1.004 p = 0.366	0.995 0.99 to 0.999 p = 0.017
Falls	Step change	0.812 0.67 to 0.983 p = 0.033	0.974 0.712 to 1.332 p = 0.867	0.866 0.675 to 1.111 p = 0.257	0.884 0.768 to 1.017 p = 0.086
Falls	constant	0.946 0.788 to 1.136 p = 0.554	1.223 0.632 to 2.366 p = 0.550	1.226 0.814 to 1.846 p = 0.330	0.987 0.81 to 1.203 p = 0.901
	Effect (Model covariate)	Leeds N=35 wards	Barnsley N=7 wards	York N=4 wards	All N=46 wards
Pressure Ulcers	Before	0.998 0.995 to 1.002 p = 0.340	1.014 1.006 to 1.022 p = 0.001	0.989 0.983 to 0.995 p < 0.001	1 0.997 to 1.004 p = 0.928
Pressure Ulcers	After	1.01 1.002 to 1.019 p = 0.013	0.986 0.973 to 0.999 p = 0.038	1.015 1 to 1.031 p = 0.045	1.007 0.999 to 1.014 p = 0.073
Pressure Ulcers	Step change	0.819 0.58 to 1.156 p = 0.256	0.573 0.393 to 0.836 p = 0.004	1.063 0.574 to 1.968 p = 0.846	0.787 0.594 to 1.042 p = 0.094
Pressure Ulcers	constant	0.234 0.159 to 0.345 p < 0.001	0.605 0.282 to 1.297 p = 0.197	0.263 0.175 to 0.394 p < 0.001	0.279 0.196 to 0.397 p < 0.001

Table 9 Results from statistical model for falls and pressure ulcer data based on the first huddle date for wards that embedded PSHs as per the operational plan

Shaded cells indicate p<0.05

Harm	Effect (Model covariate)	Leeds N=40 wards	Barnsley N=10 wards	York N=10 wards	All N=60 wards
Falls	Before	1.006 1.001 to 1.01 p = 0.022	0.998 0.994 to 1.002 p = 0.26	1.002 0.996 to 1.007 p = 0.55	1 0.996 to 1.003 p = 0.805
Falls	After	0.991 0.985 to 0.997 p = 0.003	1.001 0.992 to 1.01 p = 0.864	1.003 0.994 to 1.011 p = 0.541	0.999 0.994 to 1.004 p = 0.638
Falls	Step change	0.848 0.703 to 1.023 p = 0.085	0.782 0.539 to 1.136 p = 0.197	0.811 0.636 to 1.034 p = 0.091	0.865 0.74 to 1.011 p = 0.068
Falls	constant	0.892 0.737 to 1.079 p = 0.238	1.097 0.72 to 1.673 p = 0.666	1.155 0.73 to 1.828 p = 0.538	0.902 0.766 to 1.063 p = 0.219
	Effect (Model covariate)	Leeds N=35 wards	Barnsley N=7 wards	York N=4 wards	All N=46 wards
Pressure Ulcers	Before	0.999 0.996 to 1.001 p = 0.317	0.994 0.978 to 1.01 p = 0.474	0.991 0.979 to 1.003 p = 0.156	0.999 0.997 to 1.002 p = 0.501
Pressure Ulcers	After	1.011 1.001 to 1.021 p = 0.026	1.013 0.977 to 1.05 p = 0.481	1.019 0.991 to 1.048 p = 0.175	1.01 1.002 to 1.019 p = 0.015
Pressure Ulcers	Step change	0.78 0.592 to 1.027 p = 0.077	0.788 0.209 to 2.962 p = 0.724	0.886 0.638 to 1.231 p = 0.47	0.726 0.541 to 0.975 p = 0.033
Pressure Ulcers	constant	0.24 0.175 to 0.329 p < 0.001	0.314 0.217 to 0.454 p < 0.001	0.258 0.129 to 0.514 p < 0.001	0.272 0.21 to 0.352 p < 0.001

Table 10 Results from statistical model for falls and pressure ulcer data based on the embedded huddle date for wards that embedded PSHs as per the operational plan.

Shaded cells indicate p<0.05

Table 10 shows the modelling results for falls and pressure ulcers based on the date PSHs were embedded. The pooled hospital results showed a non-significant reduction in falls (IRR=0.865, p=0.068) when PSHs embedded in ward. At Trust level, only Leeds hospitals showed significant reduction rate of falls. The pooled modelling results for pressure ulcers showed a significant reduction in pressure ulcers after PSH were embedded (IRR 0.726, p=0.033) but an increase in the rate of pressure ulcers after PSHs were started (IRR=1.01, p=0.015). At Trust level, Leeds showed an increase in the rate of pressure ulcers after PSHs were embedded (IRR=1.011, p=0.026).

Table 11 shows the modelling results for 2222 calls and cardiac arrest calls for Leeds only using the first PSH date and the embedded PSH date. No significant changes were seen these harms in Leeds pre vs post PSH.

Harm	Model Covariate	Leeds First Huddle Date N=27 wards	Leeds Embedded PSH Date N=27 wards
2222 calls	Before	0.996 0.991 to 1.002 p = 0.175	0.997 0.992 to 1.002 p = 0.231
2222 calls	After	1.001 0.994 to 1.008 p = 0.761	1.001 0.994 to 1.008 p = 0.713
2222 calls	Step change	1.244 0.936 to 1.654 p = 0.132	1.17 0.872 to 1.57 p = 0.295
2222 calls	constant	0.157 0.124 to 0.198 p < 0.001	0.159 0.125 to 0.202 p < 0.001
	Model Covariate	Leeds First Huddle Date N=20 wards	Leeds Embedded PSH Date N=20 wards
Cardiac Arrest Calls	Before	1.001 0.997 to 1.005 p = 0.762	1.001 0.998 to 1.004 p = 0.592
Cardiac Arrest Calls	After	1.003 0.995 to 1.011 p = 0.504	1.004 0.995 to 1.013 p = 0.348
Cardiac Arrest Calls	Step change	0.794 0.536 to 1.176 p = 0.249	0.729 0.478 to 1.113 p = 0.143
Cardiac Arrest Calls	constant	0.076 0.054 to 0.109 p < 0.001	0.078 0.054 to 0.111 p < 0.001

Table 11 Results from statistical model for 2222 calls and Cardiac Arrest Calls data based on the first huddle date for wards that embedded PSHs as per the operational plan
Shaded cells indicate p<0.05

For all Trusts, there was a statistically non-significant reduction in level of falls (per week per ward) (IRR: 0.891, 95%CI 0.761 to 1.045, p=0.155). This translates to a reduction, albeit statistically non-significant, in levels of falls from 0.874 (95%CI 0.727 to 1.058) per week per ward before PSHs were embedded to 0.779 (95%CI 0.648 to 0.912) after PSHs were embedded. On a ten-week scale this equates to 8.74 falls per ten weeks before PSHs were embedded compared to 7.79 falls per ten weeks per ward after PSHs were embedded. There was no difference in the rates of change of falls before versus after embedding PSHs.

Similarly, for all Trusts, there was a statistically non-significant reduction in pressure ulcers when PSHs were embedded (IRR: 0.724, 95%CI 0.489 to 1.073, p=0.108). This translates to a reduction in pressure ulcers from 0.271 (95%CI 0.196 to 0.347) per week per ward before PSHs were embedded to 0.197 (95%CI 0.131 to 0.262) after PSHs were embedded. This equates to 2.71 pressure ulcers per ten-week period before PSHs were embedded compared to 1.96 pressure ulcers per ten week period per ward after PSHs were embedded. There was no difference in the rates of change of pressure ulcers before versus after embedding PSHs.

Whilst the pattern of results was similar across hospitals, there were some notable differences for Leeds Trust (LTHT). In this case there was a significant reduction in the rate of falls after PSHs: IRR 0.990, 95%CI 0.985 to 0.996, p=0.001. However, there was no significant step change in falls at the time when PSHs were embedded. This difference in rate of change before compared to after PSHs were embedded, meant that four weeks after PSHs were embedded, the difference in falls per ward per week was 0.10 (95%CI 0.053 to 0.147) beforehand versus 0.057 (95%CI 0.037 to 0.077), which equates to 1 versus 0.57 falls per ten-week period per ward.

For pressure ulcers at Leeds, there was a borderline significant drop after PSHs were embedded: IRR 0.658, 95%CI 0.419 to 1.032, p=0.068, which translates to a reduction from 0.103 (95%CI 0.048 to 0.158) per ward per week to 0.058 (95%CI 0.042 to 0.075) after PSH were embedded. This equates to 1.03 pressure ulcers per ten weeks before PSHs were embedded to 0.58 pressure ulcers after PSHs were embedded. There was no difference in the rates of pressure ulcers pre versus post embedded PSHs.

4.6.3 At what stage of implementation do PSH begin to deliver improvements?

We focus on the impact of PSH in terms of a step change in harms and as shown in Figure 8, that on the whole, there is little difference between using the first huddle date versus the embedded date.

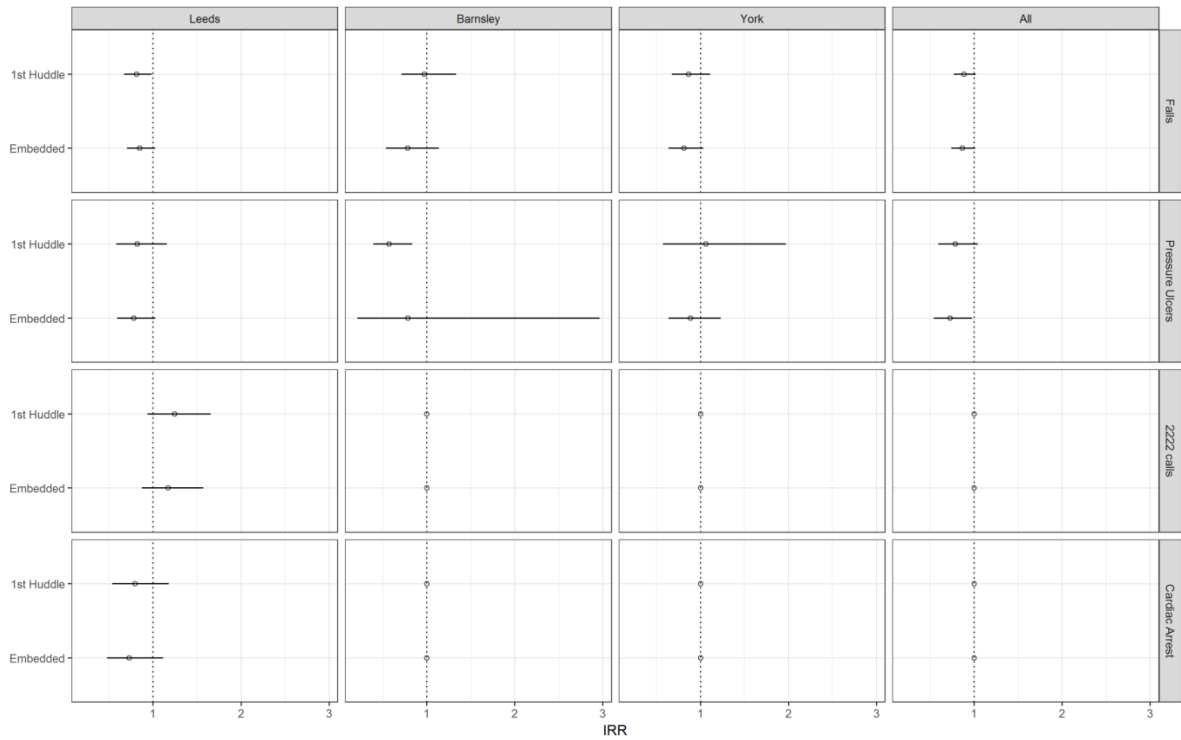


Figure 8 Comparing the incident rate ratios (IRR) (with 95%CI) of the extent to which PSHs were associated with a step change in harms pre vs post PSH based in the first huddle date vs the embedded huddle date across Trusts.

4.6.4 What are the unintended consequences of PSH? Insights from stakeholders

This data is from stakeholders (NHS senior staff, HUSH coaches and leaders, and frontline teams who took part in the group interviews). Respondents were asked to share their perceptions of the unintended positive or negative consequences of the PSH. The main themes have been summarised in box seven below:

Box 7: Feedback from stakeholders on the unintended positive and negative consequences of the PSH

Outcomes and Effectiveness	
What are the unintended positive consequences of PSH?	What are the unintended negative consequences of PSH?
<p>The scaling up approach The unexpected speed and success of the scaling up project.</p> <p>Involvement of the whole ward team The unanticipated positive impact of including all (and not just clinical) staff in the PSH.</p> <p>PSH characteristics and principles If an incident occurs the PSH provides a venue for accountability.</p> <p>Positive changes on the ward Improvements in teamwork and communication (among the ward team).</p> <p>Unexpected or unintended consequences of the huddles Improvements in the relationship between the hospital's Patient Safety team and individual wards – this opened up a new channel of communication. Pharmacists suggested including medications issues in the PSH. The decision to introduce organisation-wide huddles in one Trust.</p> <p>Changes in communication among the ward team The PSH stimulates discussions about patient safety among teams. The PSH generates an environment in which team members feel they have a voice and can 'speak up' about any concerns. Sharing of information about every patient on the ward (not just those in sub teams). Doctors don't need to seek this information out e.g. by looking in files. The PSH informs temporary staff or others who do not know the patients. Knowing the name of other team members improves communication.</p> <p>How the PSH improves communication The PSH is a vehicle for the provision of up to</p>	<p>The Scaling up process A perception that HUSH is a Leeds project (leading to less buy-in at other sites).</p> <p>Approach to implementation on the wards Huddles mandated by senior managers on some wards.</p> <p>Ward organisation and context Managing the continuity of care when the PSH takes place – staff are not in the ward bays for a period of time. Time pressures when the ward is very busy – managing to fit the PSH in. Interruptions when the huddle is taking place e.g. phone ringing. Some patients will fall regardless of the PSH because of their condition e.g. confusion (frontline staff views).</p> <p>Involvement of whole ward team Not everyone is enthusiastic about the PSH and some may not want to contribute.</p> <p>Huddle characteristics and principles Repetition of issues in the PSH that have already been covered in other ward meetings. The time taken to gather together the team for a huddle. When huddles take too long. Dislike among the team of the term 'huddle' and a preference for 'safety briefing'. Determining what is relevant for inclusion in the huddle. A focus on one harm may mean attention is diverted away from other patient harms. Early reductions in harms (after implementing PSH) are not always sustained</p>

<p>date information/knowledge about patients in real time.</p> <p>It is a mechanism for communication across the whole MDT and not just one professional group.</p> <p>It generates communication where everyone knows and shares the plan of care for patients at risk of harm(s).</p> <p>The PSH offers a venue for discussing patient discharges and referrals.</p> <p>Non-clinical staff have a voice.</p> <p>The PSH is a distinctive forum for communicating concerns that would not be addressed elsewhere.</p> <p>The PSH leads to more focussed discussions.</p> <p>Improvements in team-working</p> <p>The improved team-working (resulting from PSH) reduces the traditionally fragmented approach of each professional group operating independently on the ward.</p> <p>Involving the MDT generates a shared understanding and provides a skills mix - generating different professional perspectives.</p> <p>PSH discussions direct and co-ordinate staff and re-allocations to assist each other – this leads to improved use of staff resources.</p> <p>The PSH promotes teamwork by flattening the hierarchy.</p>	
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Stakeholders tended to place a greater emphasis on the unintended positive consequences of the PSH as opposed to negative consequences. These related to key themes: improvements in communication and with the wider MDT in particular, observed changes in team-working that the PSHs had helped to bring about, and the pace of scaling up. The quotes below illustrate these positive consequences:

“I think the major thing, the major positive has been including the untrained staff, the impact that they have had in reducing harm in a way that we would never ... so intuitively we knew that they should be included in a huddle, but I don’t think any of us could have anticipated how much of a positive impact they were going to have, they’ve almost outshone nurses and therapists, and most of our case studies have revolved around that, a wonderful housekeeper or a wonderful ward clerk that just made a big difference to patient outcomes, so that’s been positive.” PL_05

“.. one day we’ll do this [implement the huddles] on the acute floor and then within three years we’re going to every ward in the organisation, that is like ... that’s amazing, isn’t it, test one thing, one early, simple thing and to think it could possibly be done at scale is ... like that’s amazing.” PL_04

The negative consequences related to the contextual or environmental aspects of PSHs or determining the PSH approach and getting the timing right. The quote below illustrates the challenge of timing for huddles:

“We need to get it in our head don’t we, that there has to be a certain time [for the huddle] and I don’t know where the alarm clock is but I think we need to bring it back because I always forget.” GI_03

4.7 What is the return on investment of patient safety huddles

Appendix Four provides more detail on the economic analyses, the findings from which are summarised in this section.

4.7.1 Return on investment from PSHs focussing on reducing inpatient falls

The method section identified two approaches to measure the clinical benefit from adopting PSHs. The mean reduction across the two approaches was 0.1125 falls per week.

Cost analyses estimated higher weekly costs of £141 per ward focusing on falls, comprising:

- Mean cost of huddles £95.39 (67%)
- Cost of related activities £42.00 (30%)
(Of which falls review £36.56)
- Project costs £3.70 (3%)

The cost base relevant to the RoI calculation is one measuring the incremental costs associated with PSHs and related activities. The comparator is ward costs before the intervention. Given some wards were already doing falls reviews, sensitivity analyses were provided assuming a nil increase in costs for this component (total costs £104.52) and a 50% increase in the cost of the effort now devoted to the review compared to baseline (total cost £122.80).

There is also an argument to exclude the staff cost of huddles. The rationale is that no additional ward time is required for huddles, rather this activity displaces other, more dis-jointed, activities and hence is more efficient than previous working practices. This is consistent with the qualitative feedback suggesting huddles are not seen by ward staff as adding to workload but rather are an effective use of time.

Recently NHS Improvement published a report which estimated each inpatient fall costs the NHS on average £2,600 (NHS Improvement, July 2017). Given the mean reduction in falls per ward per week of 0.1125, estimated savings per week per ward were £292.50.

Under the base case the RoI was 107%, rising to over 3,500% if no staff costs were included. Results were also sensitive to adopting the lower values for savings from falls avoided. All the sensitivity analyses showed returns well above the private sector norm of 30% (Frontier Economics, 2014) except when one assumed:

- A 50% lower length of stay for an inpatient fall from that measured by NHS Improvement and the incremental costs exceeded £123 per week.

- A 25% lower length of stay for an inpatient fall and a 20% increase in the total cost of the intervention assuming all staff functions are undertaken by new staff rather than displacing existing activities.

The two key uncertainties in this analysis are:

- Whether the PSH plus falls interventions has increased workload on wards. There is no evidence that it has in wards which were adequately staffed when the PSH was implemented or subsequently. This will continue to be monitored.
- Whether the national cost per inpatient fall generalises to these settings. An analysis of falls severity gives no reason to suggest it does not apply.

If the number of inpatient falls avoided with huddles are about one every 10 weeks, and adopting the national published cost per inpatient fall avoided of £2,600 suggests wards can incur expenditure of up to £225 a week and still achieve an RoI of 30%. This is much higher than the costs associated with introducing huddles, making these a cost-effective intervention to address this harm.

4.7.2 Return on investment from PSHs focussing on reducing cardiac arrest calls

Cost analyses estimated higher weekly costs of £100 per ward focusing on reducing cardiac arrest calls per week, comprising:

- Mean cost of huddles £93.56 (93%)
- Cost of intervention £2.78 (3%)
- Project costs £3.70 (4%)

However, as noted in the previous section, not all of these are incremental costs, in particular the staff costs associated with the huddles would have been incurred by the NHS Trusts prior to the introduction of huddles. It has not been possible to quantify the impact of the huddles on staff workload within a ward and hence the 'true' incremental costs.

The benefit per cardiac arrest call avoided was estimated at £2,667, with the largest element being avoiding the need to transfer 21% of patients experiencing a cardiac arrest to a critical care setting, saving £2,288 per patient. Other savings per call avoided were associated with less disruption on the ward (£195), no requirement to call out the emergency team (£99) and savings in consumables (£85). The mean number of cardiac arrest calls avoided from introducing huddles was estimated at about 0.02 calls per ward per week.

Huddles had an excellent RoI ranging from 577% to 875%, with a base case of over 700% when the incremental costs of activities to support huddles and project costs only were used (about £6.50 per week per ward). If one included the cost of staff time to attend huddles then the returns were always negative. The savings from cardiac events avoided were lower than the weekly cost of the activities needed to implement the huddle, project costs and staff cost of the huddle per ward.

If one assumes PSHs have had no impact on non-cardiac calls (that is the reason for the increase in non-cardiac calls is external to this intervention) then, if the cost of activities per ward per week related to reducing cardiac calls are £40, the RoI is 32%. This is similar to RoI rates recorded in the private sector.

Limitations with the RoI methodology include the failure to measure and value some factors including:

- The improved quality of life associated with avoiding falls and improving the end of life experience for patients and families.
- A reduction in potential complaints relating to both harms. Such complaints are not uncommon, are expensive to investigate, requiring a lot of senior management time and can impact adversely on staff morale.
- Organisational benefits stemming from factors such as improving team work, communication and staff morale.

The main strength of the work is that it was informed by the experience of adopting PSHs across 32 wards for cardiac arrest calls and 54 wards addressing falls. The project has been supported by good data analyses support, giving confidence in reported outcomes. We have also used local staff costs and grade mix and local costs for supplies where possible.

The main uncertainty common to both RoI estimates is the impact of huddles on incremental ward staff costs.

In conclusion, implementing huddles to reduce falls or cardiac arrest calls offer a high RoI if these do not lead to an overall increase in ward workload. The cost of the activities plus project costs to support huddles are small compared to the savings per harm avoided.

4.8 Insights from the deeper dive sample of wards

The evaluation survey was completed by frontline team members included in the deeper dive sub-sample wards (n=25) ideally at two-time points (pre-embedded and post embedded) depending on the status of the ward as recorded in the Operation Plan. If when first approached 'deeper dive' wards had already embedded the PSH then only a retrospective/post-embedded evaluation survey was undertaken. A total of 21 wards participated in the first survey with 137 responses and five (of the 21) wards participated in a second survey generating 32 responses. Overall there were fewer responses at the second survey due to only five wards being eligible for both pre-embedded and post-embedded data collection. Responses were higher for LTHT hospitals than SGH or BGH reflecting the higher number of evaluation wards in Leeds. Response rates by hospital, speciality, and job role are shown in Table 12.

Category		Number of responses to first survey (n=137)	Number of responses at second survey (n=32)
Hospital	Barnsley	10 (7%)	-
	Chapel Allerton	9 (6.5%)	-
	LGI	43 (31%)	7 (22%)
	SJUH	60 (44%)	19 (59%)
	Scarborough	15 (11%)	6 (19%)
Specialty	Medical	37 (27%)	6 (19%)
	Others*	58 (42%)	26 (81%)
	Surgical	36 (26%)	-
Job Roles	Doctors	14 (10%)	3 (9%)
	Nursing staff	83 (60.5%)	23 (72%)
	non-clinical staff	33 (24%)	5 (16%)
	Allied healthcare professionals	7 (5%)	1 (3%)

Table 12: Evaluation survey responses by hospital, specialty and job role.

*Others includes: Critical care and urgent care wards (ICU and HDU), oncology wards, gynaecology, orthopaedic and maternity wards.

4.8.1 Perceptions of ward staff on the impact of PSHs

The evaluation survey asked respondents about their views regarding the impact of the PSH on their area of work. While a majority of respondents considered that the PSH had reduced harms, and improved communication, teamwork and safety culture, a higher percentage overall (88% (=121/137) at first survey and 97% (=31/32) at second survey) reported improvements in communication. More than two thirds of all respondents reported that as a result of the PSH they understand safety issues more and that ward staff were more open about discussing safety issues. Table 13 shows the results for the six questions included in this section of the survey.

Question	Response Option	Number of responses to first survey (n=137*)	Number of responses to second survey (n=32)
Has the PSH reduced harm on your ward?	Yes	64 (47%)	12 (37.5%)
	No	8 (6%)	1 (3%)
	Don't know	59 (43%)	19 (59%)
Has the PSH improved communication with colleagues?	Yes	121 (88%)	31 (97%)
	No	11 (8%)	1 (3%)
Has the PSH improved teamwork in your area?	Yes	108 (79%)	27 (84%)
	No	23 (17%)	4 (12.5%)
Has the PSH improved safety culture?	Yes	103 (75%)	-
	No	20 (15%)	-
	Don't know	1 (0.7%)	-
As a result of the PSH do you feel that you understand safety issues:	More	110 (80%)	27 (84%)
	About the same	22 (16%)	5 (16%)
	Less	-	-
As a result of the PSH are ward staff more open about discussing safety issues:	More	96 (70%)	24 (75%)
	About the same	35 (25.5%)	8 (25%)
	Less	1 (0.7%)	-

Table 13: Summary of responses to six questions

NB: *missing data not included in the results reported

Frontline staff were asked about their perceptions of the impact of PSHs in their area (n=122 respondents at first survey). The main impact of the PSH was in relation to 'raising awareness or concerns and being informed' (31%=38/122 of respondents), followed by 'improvements in teamwork and the MDT approach (15.5% =19/122); and 'improvements in communication' (11% =14/122). One respondent considered that the PSH was time consuming. Improvements in patient-related information and communication are illustrated in the quotes included below:

"Although the safety huddles are just beginning to become established I feel that they will formalise some of the informal discussions that already take place. I think that the safety huddles have helped to fast track some patient reviews and have improved escalation concerns or clinical deviations from normal." P125

"I feel it provides better communication on the unit. Everyone feels informed and is aware more of the surrounding patients' needs, also plans for the shift." P156

At second survey (n=32 responses) the main impact was seen to be the enhanced awareness, knowledge and communication among members of the staff team (56%=16/30). Nearly one third of respondents considered the main impact to be the identification of 'at risk' patients (28% =9/30) and ten percent (=3/30) considered it to assist in supporting other members of the team. One respondent considered that the PSH made no difference on their ward due to the high turnover of patients. The impact of enhanced awareness is illustrated in the quote included below:

"[This ward] is a big unit which is very busy, at times (in the past) you may not have known what was happening at the other side of the unit. The huddles have helped bring the team together at set points of the day to make everyone aware of what is happening for example a confused patient or someone that is struggling with a busy patient. [It] promotes team work." P134

4.8.2 How communication with colleagues has improved

Respondents were asked in what ways communication with colleagues has improved (first survey, n=101). They considered that communication had improved as a result of: enhanced multi-disciplinary working on the ward (24% =24/100); followed by better management of the workload (13%=13/100); and greater raising of concerns and issues (13%=13/100). Improved communication is illustrated by the quote below:

"You are only handing over information to one group in one session rather than having to communicate with lots of different professionals." P39

For the second survey 28 responses to this question were received. The greatest number of responses (26%=7/27) related to the benefits of communication taking place across the whole multi-disciplinary team, followed by the role of communication in supporting the prioritisation of patients and their care (22%=6/27) and the role of the PSH in ensuring that there is more communication taking place was mentioned by 18.5% (=5/27). The benefits of multi-disciplinary communication are illustrated by the quote included below:

"Nurses can talk directly, for example, to physios, pain team, at the start of the shift. Instant result then as they can see your patient straight away and already be able to provide answers to any queries you may have." P143

4.8.3 How teamwork has improved

For the first survey there were 86 responses to the question asking how teamwork has improved on the wards. Twenty seven percent (=23/86) of respondents considered that improvements in teamwork were due to improved communication between the MDT, followed by enhanced co-operation and co-ordination of care across the team (15%=13/86), and better sharing of knowledge within the team (13%=11/86). The value of co-operation is illustrated by the quote below:

"[Team] members work more co-operatively when caring for patients and are able to help each other more effectively." P39

At the second survey (n= 23 responses to this question) more than half of those who responded (61%=14/23) considered that the PSH had improved teamwork by facilitating the support for, and between, staff team members e.g. allocating staff resource to those who needed additional assistance with their patients. Equal numbers of respondents (n=3/23) considered that teamwork on their ward was variable depending on individual staff members on shift (13%) and that the PSH has improved teamwork by supporting the prioritisation of patients (13%). One respondent stated that teamwork on the ward was already good prior to implementation of the PSH. The variability of teamwork is illustrated by the quote below:

“But this is dependent on the team that is on shift, some people are more open to teamwork than others.” P134

4.8.4 Views and Experience of ward staff in respect of the PSH

The survey asked respondents about their views and experience regarding the PSH. A majority of respondents felt slightly or a lot more able to speak about safety concerns as a result of PSHs (71%=93/131 at survey one and 59%=19/32 at survey two). The consensus was that senior staff or management are supportive of the PSH on the ward with 85% (n=112/131) providing a positive response at first survey and 91% (n=29/32) at second survey. The responses to questions in this section are included in Table 14.

Question	Response Options	Number of responses at first survey (n=137*)	Number of responses at second survey (n=32)
Do you feel more able to speak out about safety concerns as a result of PSHs?	A lot more	58 (42%)	10 (31%)
	Slightly more	35 (25.5%)	9 (28%)
	About the same	38 (28%)	13 (41%)
Do you feel senior staff or management support PSHs?	Yes	112 (85%)	29 (91%)
	No	5 (4%)	3 (9%)
	Don't Know	14 (10%)	-

Table 14

Question	Response Options	Number of responses at first survey (n=137*)	Number of responses at second survey (n=32)
Do you feel more able to speak out about safety concerns as a result of PSHs?	A lot more	58 (42%)	10 (31%)
	Slightly more	35 (25.5%)	9 (28%)
	About the same	38 (28%)	13 (41%)

Do you feel senior staff or management support PSHs?	Yes	112 (85%)	29 (91%)
	No	5 (4%)	3 (9%)
	Don't Know	14 (10%)	-

Table 14: Summary of responses to two evaluation questions

NB: *missing data not included in the results

4.8.5 Unintended negative or positive consequences of the PSH

At the first survey there were 39 responses to the question: “Have there been any unintended positive or negative consequences of PSHs?” Aspects of the PSH that team members had not anticipated included: allocating or finding time for huddling (as both a positive and a negative impact) and for some the time-consuming aspects of the PSH itself (15%=6/39). Other unintended consequences identified by respondents included: the improvements in communication and awareness of patient safety (18%=7/39); the variation across the staff teams in committing to and participating in the PSH – a perception that some staff do not see it as worthwhile (13%=5/39); the inclusivity of the PSH (13%=5/39); and the positive outcomes as a result of the PSH (13%=5/39). The perception that the PSH is time consuming and its role in improving communication are illustrated by the quotes included below:

“We are told to reduce the time on handovers yet are told to do safety huddles. A good handover should highlight safety issues.” P168

“It has allowed us to identify problems earlier. It helps with communication with families when we are all singing off the same hymn sheet.” P39

4.8.6 Learning from the PSH

There were 96 responses at the first survey to the question: “What is the main thing you have learned from PSHs?” More than one third (35%=34/96) of respondents reported that they had learned about the importance of better communication and teamwork. Similarly, a third of respondents (33%=32/96) had learned about the importance of highlighting patient deterioration on the ward. Small numbers of respondents mentioned learning about how and when to raise concerns (9%=9/96), the need to have an awareness of all patients in the ward (8%=8/96) and the role of the PSH in improving team morale (2%=2/96). The two illustrative quotes below show how the PSH is seen to raise team morale:

“That small changes lead to big changes. Team building improves morale an open reporting environment benefits everyone.” P39

“That it boosts morale to look at the unit's safety on a daily/shift basis as part of a team. It gives [a] feel[ing] of belonging and makes you aware of all patients on the unit.” P48

4.8.7 What teams liked the most about the PSH

At the first survey there were 109 responses to the question: “What do you like most about PSHs?” Respondents liked the team-building aspects of the PSH (35%=37/107), followed by its role in raising awareness across the ward (29%=31/107), and the understanding that they gained of patients’ needs and risks (23%=25/107). The role of the PSH in raising awareness is illustrated by the quote below:

“That they will act as a good way of reminding me to focus on patient safety issues - ensures they stay at the back of my mind throughout the day.” P132

At the second survey there were 28 responses to this question. More than a third (39%=11/28) liked the daily review of the patients and the 'current ward situation' that the PSH provided. Nearly one third (29%=8/28) particularly valued the team-work and inclusiveness of the PSH, and five (17%=5/28) like the greater awareness of patient safety that the PSH had generated. The information and awareness raising characteristics of the PSH are illustrated through the quote provided below:

"Everyone is given the same information and is made aware of situations that could escalate. It makes the team more efficient and professional." P177

4.8.8 What teams liked least about the PSH

At the first survey, 74 responses were received to the question: "What do you like least about PSHs?" The practical aspects of organising the PSH and its impact on the busy ward were the aspects least liked by respondents (42%=31/74). This was followed by issues around the timing of the PSH (15%=11/74), its potential negative impact on patient care (11%=8/74), and a situation where some ward team members do not take part or where PSH participants do not contribute (9%=7/74). The challenge of finding the right time to huddle and the lack of enthusiasm sometimes observed among PSH participants are illustrated in the quotes below:

"There is no ideal time to get people together, if there was a specific time they would occur more frequently. They only appear to happen once in a 24 hour period when things can change quite significantly in that time." P157

"Sometimes they feel forced and sometimes it is physically too busy with critically ill patients that it becomes impractical to carry out i.e. becomes unsafe." P38

"Not everyone feels enthused by the process. Calling it a safety huddle is patronising (a better name is called for)." P158

At the second survey, 21 people provided responses to this question. The least liked aspect of the PSH was the time taken up by it, or the problems associated with finding the right time during the day for the ward – this was mentioned by 11 of the 21 respondents (52%). Others (19%=4/21) considered that the PSH took time away from patient care. The perception that the PSH is time consuming and concerns about patient care while the huddle is taking place are illustrated by the quotes below:

"Time consuming. So busy with individual patients sometimes don't fully take in concerns of patients the other side of the unit." P165

"Making sure all patients are being taken care of while a safety huddle is happening." P 137

4.8.9 If the PSH was stopped tomorrow, would you miss it?

All respondents were asked to respond to the question “If the patient safety huddle was stopped tomorrow, would you miss it?” More than two thirds of respondents (74% at survey one and 72% at survey two) provided a positive response indicating strong support for the PSH on in-patient wards. Table 15 shows results for this question for all the survey respondents:

If PSHs were stopped tomorrow, would you miss them?	Number of responses at first survey (n=118/137 answered question)	Number of responses at second survey (n=32/32 answered question)
Yes	101 (85.5%)	23 (72%)
No	17 (14%)	9 (28%)

Table 15: Responses to ‘if PSHs were stopped tomorrow would you miss them.’

4.8.10 Further comments from frontline teams

A total of 43 further comments were provided on the PSH in the first and second surveys. The key themes and their frequencies are shown in Figure 9.

Comments about the contribution of the PSH to patient safety were the most frequent (30%=13/43), followed by comments about the involvement of the MDT (16%=7/34), and the focus or structure of the PSH (21%=9/43). Additional comments were made in relation to: regularity (7%=3/43) and staffing (9%=4/43); a need for further support or training was raised by seven percent (=3/43); and issues around team-work and patient care were mentioned by five percent. The quotes included below illustrate the need for a flexible approach to the PSH on each ward, staffing issues, and the learning that has emerged from the HUSH project:

“...I work on other wards where [the] huddle is also a ward-round therefore takes longer - but it works for that ward in that format. I think a little bit of variety is needed for each ward to adapt the core principles of safety huddles.” P169

“Staffing levels need to be at a safe level before members of [the] nursing team can engage in a safety huddle. This is not always the case. Staff members need to be relieved to step away from their patient in order to engage in a safety huddle. On ITU this is not always possible. The effect of safety huddles has been a very positive one. Long may it continue.”

P 37

“... I think they are fantastic. We have a 13:00 huddle on HDU and since 2013 we have added more. Since working with Bradford University and Improvement Academy I like the way it brings the team together for a re-group throughout the day.” P129

A need for information about the impact of PSHs on patient harms (to the ward) was mentioned by three percent and two respondents stated that they did not consider the PSH to be beneficial.

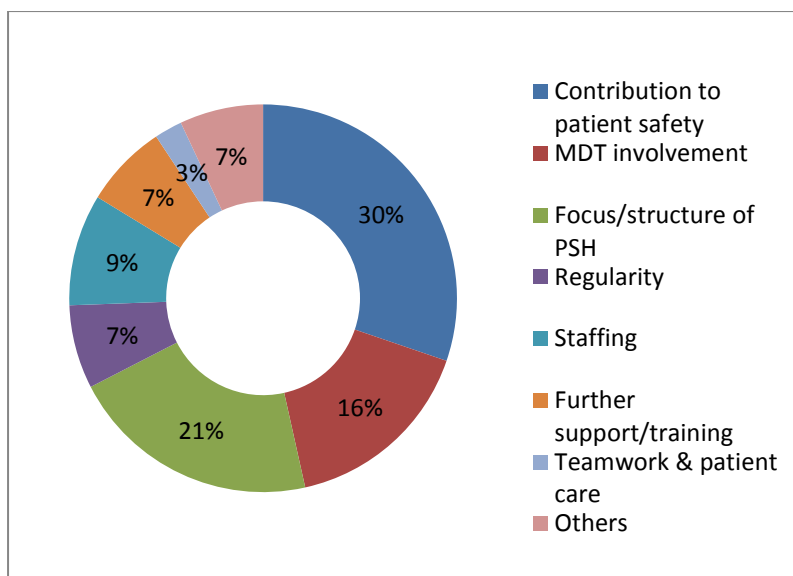


Figure 9: Themes of further comments

4.8.11 Selected responses by: Trust, specialty and frontline team roles

The data sets for both first and second survey were analysed by Trust, ward specialty, and frontline team roles. As the second survey had a smaller response group (n=32 responses from five wards) compared to the first survey (n=137 respondents from 21 wards), second survey results by Trust, specialty and frontline team roles have only been presented for question 18 'If PSHs were stopped tomorrow, would you miss them?'

Respondents from Leeds hospitals and BGH were more likely to report that: the PSH had reduced harms on the ward (49% =55/112 and 50%=5/10 compared to 27%=4/15 at SGH); improved communication with colleagues (93%=104/112 and 90%=9/10 compared to 40%=8/15 in SGH); and improved teamwork (84%=94/112 and 80%=8/10 compared to 40%=6/15 in SGH). The Leeds hospitals were more likely than either BGH or SGH to report that if PSHs were stopped tomorrow they would miss them (82%=92/112 for Leeds hospitals compared to 30%=3/10 in BGH and 40%=6/15 in SGH). The results are shown in Table 16.

Question	Leeds (n=112)	Barnsley (n=10)	York (n=15)
	<i>answering 'yes'</i>	<i>answering 'yes'</i>	<i>answering 'yes'</i>
Has the PSH reduced harms on your wards?	55 (49%)	5 (50%)	4 (27%)
Has the PSH improved communication with colleagues?	104 (93%)	9 (90%)	8 (53%)
Has the PSH improved teamwork in your area?	94 (84%)	8 (80%)	6 (40%)
If PSHs were stopped tomorrow, would you miss them?	92 (82%)	3 (30%)	6 (40%)

Table 16 Results for selected questions by Trust at survey one

Overall surgical wards were more positive in their responses. In relation to three questions (Has the PSH reduced harms on your ward? Has the PSH improved communication with colleagues? and If PSHs were stopped tomorrow, would you miss them?) the surgical wards had higher numbers of respondents answering 'yes' when compared to medical and other wards. However, other ward specialties had a higher number of respondents answering 'yes' to the question 'Has the PSH improved teamwork in your area?' compared both medical and surgical wards. Table 17 below shows the results for these questions by specialty.

Question	Medical wards (n=37)	Surgical wards (n=36)	Other wards (n=58)
	<i>answering 'yes'</i>	<i>answering 'yes'</i>	<i>answering 'yes'</i>
Has the PSH reduced harms on your ward?	17 (46%)	21 (58%)	22 (38%)
Has the PSH improved communication with colleagues?	30 (81%)	34 (94%)	51 (88%)
Has the PSH improved teamwork in your area?	26 (70%)	28 (78%)	49 (84%)
If PSHs were stopped tomorrow, would you miss them?	22 (59%)	30 (83%)	44 (76%)

Table 17 Results for selected questions by specialty

Across questions shown below the number of doctors answering positively was lower when compared to nursing staff, non-clinical and others. Non-clinical were very positive about the role of the PSH in improving communication with colleagues, with 91% (=30/33) answering 'yes' to this question – although positive responses were high overall ($\leq 86\%$ across all of the job roles). Results for key questions by job roles are shown in Table 18.

Question	Doctors (n=14)	Nursing staff (n=83)	Non-clinical staff (n=33)	Allied healthcare professionals (n=8)
	<i>answering 'yes'</i>	<i>answering 'yes'</i>	<i>answering 'yes'</i>	<i>answering 'yes'</i>
Has the PSH reduced harms on your wards?	5 (36%)	83 (46%)	18 (54.5%)	4 (50%)
Has the PSH improved communication with colleagues?	12 (86%)	73 (88%)	30 (91%)	7 (87.5%)
Has the PSH improved teamwork in your area?	10 (71%)	68 (82%)	27 (82%)	7 (87.5%)
If PSHs were stopped tomorrow, would you miss them?	8 (57%)	64 (77%)	25 (76%)	7 (87.5%)

Table 18 Results for selected questions by job roles

At survey two, medical wards, respondents from SGH, and nursing staff were more likely to respond positively to the question ‘If the PSH was stopped tomorrow, would you miss it?’ As the numbers within these groups were small it is difficult to draw any firm conclusions from the results. Results for the second survey (n=32 responses) in relation to this question are presented in Table 19.

Category	If the PSH was stopped tomorrow would you miss it?
	<i>answering yes</i>
Trust:	
LTHT (n=26)	18 (69%)
York Trust (n=6)	5 (83%)
Barnsley Trust (n=0)	-
Speciality:	
Medical wards (n=6)	5 (83%)
Surgical wards (n=0)	-
Other wards (n=26)	18 (69%)
Job Role:	
Doctors (n=3)	2 (67%)
Nursing team (n=23)	17 (74%)
Untrained/non-clinical staff (n=5)	3 (60%)
Physiotherapist (n=1)	1 (100%)

Table 19 Survey two responses by Trust, speciality and job role for Q18 If the PSH was stopped tomorrow would you miss it? (n=32)

NB: n=0 indicates no responses.

4.9 Learning from scaling up

The data sources for capturing the learning from the HUSH scaling up project were:

- Feedback from stakeholders: HUSH coaches, project leaders, senior NHS staff and frontline ward teams.
- Evaluation survey (pre and post embedded)
- Views and feedback on patient/carer involvement in huddles: group interviews, evaluation survey and stakeholder interviews/questionnaires.

4.9.1 What are the barriers and enablers to successful implementation of PSH

Feedback from stakeholders and frontline teams regarding implementing the PSH on wards tended to relate to organisational and contextual factors, absence of leadership and appropriate skills for leading the PSH, and encountering entrenched beliefs and values in relation to the PSH e.g. that falls are inevitable on the ward. However, some of these were also enablers for implementation e.g. leadership skills and values and beliefs among wards team when approached. Key enabling factors were the external support and coaching that the HUSH project provided. The quotes below illustrate some of these barriers and enablers for successful implementation.

Barriers:

“That it takes too much time out of the day for the ward and it doesn’t fit into what they’re doing, I think that’s probably one of the biggest barriers.” CH_03

“...there were times when the coaches would come with really good intentions but the staff didn’t know that they were coming so they may have informed someone but that person then wasn’t on duty so the staff are busy, the coach arrives, the coach would be reasonable, they’ve never been unreasonable at all but can’t always then say, “that’s okay, I’ll come tomorrow instead, is tomorrow going to be a better day, you’ve got a lot of absence today.” So had we appointed someone locally who could then say, “that’s alright, I’ll come back, what about tomorrow afternoon?” or something like that, “will that work better for you?”, I think that would have helped us and that’s what we have learnt as part of our evaluating implementation.” NS_11

Enablers:

“...whoever leads it has to be able to demonstrate they’ve got the commitment of who else is on the ward at the time, so it depends what time you do it, it depends who is on the ward. I do think probably the Ward Manager is the constant, and so in many ways I think they probably are well placed but they have to have the medical staff who are available engaged with it in my view.” NS_10

“So not only the data coming in but the certificates so there’s something about the support in the background because if that was left to us to do as an organisation then it might get done three months later, it might get to the ward another month later, so it wouldn’t be time as an enabler it’s definitely [timely] data and certificates and support which because it’s sort of done outside the individual organisation...” PL_04

The main themes for the barriers and enablers are summarised in Box eight below:

Box 8: The barriers and enablers to successful implementation of PSH: main themes (stakeholders and frontline teams)

Barriers -	Enablers -
<p>Ward organisation and context</p> <p>Time required for conducting a huddle.</p> <p>Wards regard themselves as too busy to accommodate huddles (a daily event when there are so many other pressures on the ward).</p> <p>Problems with finding the right time for the huddle.</p> <p>The PSH being unreliable when there are staffing problems on the ward.</p> <p>The situation where a patient was identified as being at risk (via PSH), but there were insufficient staff on the ward to take forward preventive action(s) e.g. constant observation of the patient.</p> <p>Staff and multi-disciplinary roles</p> <p>Difficulties in gaining the initial 'buy in' from senior or medical staff.</p> <p>Barriers between staff roles (e.g. doctors and nurses) that are resistant to being broken down.</p>	<p>Gaining knowledge and skills for conducting huddles</p> <p>Learning from other wards e.g. visits to see another huddle</p> <p>The role of coaches</p> <p>Coaches providing a point of contact, support and liaison for the ward.</p> <p>A positive relationship between the coach and the ward.</p> <p>A non-prescriptive approach to support and coaching enables implementation.</p> <p>Time spent building positive relationships with the ward.</p> <p>Harms data and PSH evidence</p> <p>The role of data and evidence to support engagement with wards.</p> <p>Leadership</p> <p>Successful engagement with ward leaders.</p> <p>Skilled and confident leadership for the PSHs.</p> <p>Leaders with previous experience of huddles</p>

<p>Leadership</p> <p>The most senior clinician may not always be available to lead the PSH.</p> <p>When the (usual) leader is not on the ward the huddle does not take place.</p> <p>Reluctance from leaders to engage with the HUSH project.</p> <p>Team beliefs, attitudes and knowledge</p> <p>Dislike of the name 'huddle'.</p> <p>Insufficient evidence leads to a lack of knowledge of, or confidence in huddles.</p> <p>Ward teams not understanding SPC run charts.</p> <p>Team approach to conducting huddles</p> <p>Insufficient understanding of the PSH among staff teams e.g. huddles that just list patients at risk and don't focus on any actions (deviation from the principles of the PSH)</p> <p>The HUSH approach and support</p> <p>Coaches that are external (to Trust).</p> <p>The need for one point of access for support when implementing on a ward.</p> <p>Mixed messages from project leaders regarding pushing wards to conduct huddles versus allowing them to emerge organically on the wards.</p> <p>Organisational or management approach</p> <p>Managers mandating huddles on some wards.</p>	<p>and who have a belief that they can make a difference.</p> <p>Approach to conducting huddles</p> <p>A quick huddle engages doctors.</p> <p>Celebration of a reduction in harms.</p> <p>External support for implementation</p> <p>Involvement of the Improvement Academy.</p> <p>Meetings to introduce the PSH (multiple wards) and provide on-going support.</p> <p>Initial introductory visits to wards by the project leader to invite and gauge interest levels.</p> <p>Ward team's beliefs, knowledge and attitudes</p> <p>A perception (among the team) that the PSH is worthwhile.</p> <p>Challenging (entrenched) beliefs about the inevitability of patient harms e.g. falls.</p> <p>Ward context and organisation</p> <p>Finding a time to huddle that works best for the ward.</p> <p>Creating a champion role (named staff member) can be an enabler.</p> <p>Bundles and 'crib sheets' provide clarity on actions that need to be taken.</p> <p>Factors in promoting motivation or enthusiasm for the PSH</p> <p>Making huddles 'fun'.</p> <p>Feedback on TSC results can be motivating for wards.</p> <p>Motivational factors include - myth busting, celebration and emphasising the positives.</p> <p>A spirit of competition between wards can be motivating for wards that are testing/implementing huddles.</p> <p>Wards having a choice regarding taking part (not mandated).</p>
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4.9.2 What is the whole hospital impact of PSH

Across all three Trusts in the HUSH project there was a consensus that senior NHS managers and executives have a vital role to play in successful scaling up. Participation in the scaling up project and implementation of the PSH had wider impacts at organisational level. These related to four overarching themes: an enhancement of cross-organisational learning and communication; raised awareness of patient safety and its importance at organisational level; the spread of the PSH to other (non-HUSH) wards or sites; and the dissemination of information about PSHs organisation-wide. Communication across the whole organisation to share stories about PSHs and their impact on patient safety outcomes was identified as a facilitator for implementation. The positive characteristics of the PSH – positive impacts and prevention of harms – constituted a good news story for hospital leaders. The quotes below provide some illustrative examples:

“... it [a newsletter featuring huddles] goes to all users on email and it’s also printed off for the clinical nurses because not everybody accesses their emails. It goes in the hospital buzz, it goes everywhere, and if you talk to consultants that is one of the things they do read, which is interesting because I think they delete lots of things but they do like that.” NS_10

“...one of the things that we did was we had our annual patient safety conference last year and we devoted a very large section of the morning platform [to huddles] so everybody at the conference [heard about them].” NS_11

“I think it’s more learning culture, it’s introduced a learning culture and an interest in the changes and interest in improvement and that’s what we’re aiming to be as a trust. More of an improvement based culture, a learning culture. Like you say, it’s knock down those defensive barriers.” CH_16

Box nine below shows the main themes in relation to the whole hospital impact of the PSH:

Box 9: Main themes for the whole hospital impact of the PSH

What is the whole hospital impact of the PSH?

The organisational approach to implementation

Senior staff play an important role in PSH implementation and there is a need for executive leadership at Trust level.

Most senior staff/executive leads have a role in disseminating information about huddles e.g. relating accounts of huddles on wards at Board Meeting and management meetings.

Cross organisational communication about huddles supports implementation e.g. newsletters and patient safety conferences.

Organisational Learning

The contribution of the HUSH project to a culture of learning across the organisation was recognised

Learning from the approach taken to implementation of PSHs (scope for transferability to other initiatives)

Huddles perceived as a good news story for organisational leaders and senior managers.

Organisational spread

Huddles implemented in other hospital sites (within the organisation)

Contribution of huddles to organisation-wide patient safety

Patient safety accorded a higher priority

Contribution of PSHs to patient safety recognised at executive level

4.9.3 What is the shared learning from scaling up

Overall, interviewees (stakeholders and frontline staff) shared many examples of their learning from the scaling up project. The right organisation of and context for the PSH, was important. This related to the ‘fit’ of the huddle with the daily ward routine and how it related to other established ward meetings or forums. The cross-cutting theme of leadership – having the right leaders with skills for huddling and a belief in its value - was frequently reported. Stakeholders also reported learning relating to the use and value of QI tools and resources that can facilitate implementation and motivate teams. The implementation process was recognised as a factor in the success or not of huddles on wards and the need for a ‘bottom-up’ approach was reiterated by many of the interviewees. It was generally acknowledged that there would be challenges for the sustainability of routine and embedded PSHs going forward and the types of challenges for sustainability were highlighted. Some illustrative quotes have been included below:

*“I mean if you get the ward teams to co-produce something like a safety huddle and to adapt it to your own setting, then I think your chance of success in the long terms is a lot higher.”*CH_1

“I think it’s the perception of evidence. So, I think as cardiologists are very evidence-based and places like neurosurgery and surgeons are very evidence-based type of clinicians, so I think if you tell them you want to do something and change something they want to see the evidence for it.” CH_3

“I’ve realised that, actually, they can be effective without a doctor leading them. My scepticism about the transferability was how would a surgeon lead a huddle, when it was something that they weren’t necessarily passionate about and they had to be in theatre and stuff. But, actually seeing some of these amazing, like, surgical nurses who are really assertive and tend to be excellent leaders, that seems to be particularly strong within surgery. Their huddles are really effective and also very concise, from my experience anyway, and it, kind of, proved to me it didn’t necessarily need to be a consultant who was leading them.” CH_15

“If I was to go back and start again, I would do things very differently. So, I think that we locally have put some resource into what we’re now calling sustainability, so somebody who’s working with staff so they understand huddles and what data they need and, you know, how we can A, keep them going and B, spread and develop. If we are starting again I would give that person that responsibility from the outset.” NS_11

The feedback from stakeholders is summarised in Box 10 below:

Shared learning

The role of the coach in scaling up

A co-production approach between the coach and the ward works best.

Relationship building supports implementation e.g. coach already known to ward, regular coach visits.

The success or failure of a PSH can depend on the coach.

In the early stages (of scaling up) coaches have an important role in modelling the PSH and observing its early development on the ward.

Clear and consistent training and direction is needed for the coaching role - in order for coaches to have the right knowledge and skills.

Involvement of the whole ward team

Gaining the involvement and support of medical staff can be challenging on some wards (but possible to start without them), but the PSH can be successful without doctors being involved.

Those not actively participating in the huddle can still benefit (listening in).

QI tools and resources

Use of data and 'evidence' is a key tool in gaining initial interest and engagement with the ward. Conducting the Teamwork and Safety Climate survey during implementation was a challenging process - wards were not always receptive.

More time and effort should have been invested by the HUSH team in getting scaling up started i.e. building strong relationships with Trusts and ensuring clarity on roles and responsibilities.

The importance of resources for scaling up was highlighted including: coaches, data, certificates etc.

Investment in local resources is a factor in local success e.g. local coaches and support.

Huddle characteristics and principles

Wards need to 'own' their huddle.

Acknowledging that huddles are useful on the ward but not the answer to all patient safety concerns.

Poor quality huddles can undermine motivation to address patient safety issues – teams having a perception that they are 'just another activity' that has to be done.

Teams don't always form a connection between huddles and incidents of patient harm. This needs to be explicit.

Single discipline huddles can also be effective e.g. pharmacists.

A blame free environment is a key ingredient for successful huddling.

Leadership skills and attributes

Effective confident leadership for the huddle is essential.

Learning that the PSH lead doesn't have to be the most senior clinician emerged over the course of implementation. The ward sister or other team member can be an effective lead.

Getting the ward leaders on board at the beginning is crucial.

Leaders with previous experience of a huddle are particularly valuable at engagement.

The leadership of huddles is better if it is an allocated role for one individual.

The approach to implementation on wards

There is the potential for conflict between wards and senior managers when the implementation of huddles is imposed.

The right supportive culture at Trust level can reduce barriers and support implementation.

Mandating wards to conduct huddles is overwhelmingly regarded as ineffective.

Ward organisation and context

Finding the right time to suit all participants is crucial – the fit with ward routine is a factor in achieving embedded status.

Wards need the flexibility to decide when is the best time for them to conduct their PSH -this is a non-rigid approach.

The scaling up process

Recognising that each ward is different so a flexible approach is required.

A bottom-up implementation is required for effective scaling up.

Over time the scaling up became easier by reaching a 'tipping point'.

External support for wards was seen as beneficial.

A clear and dynamic operational plan is important for successful implementation.

Spending more time engaging with middle managers e.g. matrons would have improved the process.

There was too much paperwork as part of the scaling up approach (in the blue folder).

When wards don't want to engage with implementation - the best approach is to leave them alone. It is possible to re-approach if appropriate.

Sustainability of the PSH after implementation

The threat of the PSH merging with other ward meetings and losing the patient safety focus e.g. merging with a handover or board round, can affect its continuity.

Wards need to take ownership of the PSH to sustain it.

Sustainability is threatened when other patient safety initiatives take precedence and affect the continuity or reliability of the PSH.

Establishing the PSH as a core part of routine on the ward is vital.

Other pressures on wards will potentially challenge the sustainability of the PSH

Changes in leadership can destabilise an embedded huddle

Different professional roles who bring their own agenda to the PSH, can destabilise and threaten the patient safety focus of the PSH.

4.9.4 Characteristics of a high quality PSH

The HUSH team set out nine criteria for a high quality PSH at the outset based on the original project proposal (funded by The Health Foundation in February 2015¹²), and early testing on eight wards in SJUH. These in turn contributed to the measurement framework for the evaluation. The original nine operational criteria for a high quality PSH have now been revised (see Figure 10) and classified into more (inner circles of the figure) or less important (outer circles of the figure). The four most important characteristics are now considered to be, asking "who is at risk today?", "what needs to be put in place to mitigate the risk?", having a "Non-judgemental space where staff feel free to speak up" and involves a "range of staff including non-clinical staff". Key learning from the first set of criteria are highlighted below.

- The PSH does not need to be led by the most senior clinician and can be led effectively by a confident/credible healthcare professional;
- The review of an improvement run chart/SPC chart was not an essential characteristic of the PSH. Data on harms (incidence or days between) can be displayed on the ward patient safety board in the background but does not have to be integral to the PSH. Most teams preferred to track changes in their harms data by recording the 'days between' an incidence

¹² The Health Foundation (2015) The Health Foundation announces six projects to scale up health care improvement - See more at: <http://www.health.org.uk/news/health-foundation-announces-six-projects-scale-health-care-improvement#sthash.dbHKsPHf.dpuf>

of harm rather than incidence over time. This was particularly appropriate for harms that tended to occur rarely on a ward e.g. pressure ulcers. Ward teams reported that the 'days between' information was more easily understood than an SPC chart.

- While huddling at the same time and place every day was seen as important it was recognised that for some wards conducting the PSH after/before the handover or board round also worked well.

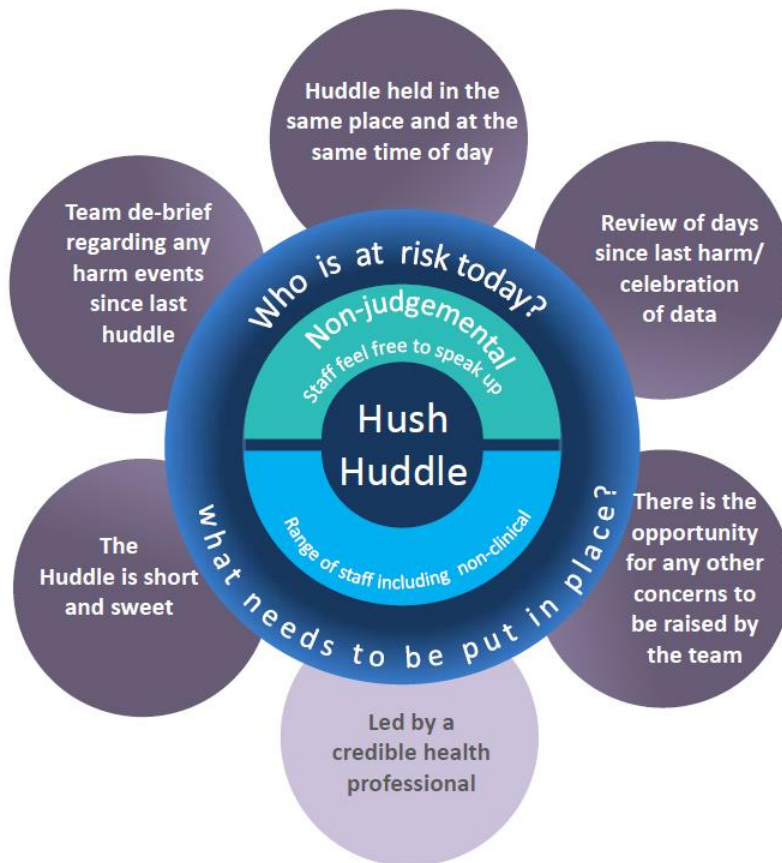


Figure 10 Revised characteristics of a high quality PSH

4.9.5 Stages of Implementation

The three stages of implementation (as measured through the ward SIC) had originally been envisaged to take place over a 24 week period and to pass through three phases: pre-implementation (0-4 weeks); implementation (5-20 weeks); and self-sustaining (and embedded over a 4 week timescale to week 24). In practice wards did not progress through these three stages in a linear fashion, but instead progressed across a wide range of differing timescales. For example, some wards moved into the self-sustaining phase very quickly, with twelve of the evaluation wards progressing from start date to embedded date in four weeks or less. Others spent long periods of time in the pre-implementation and implementation phases (more than half of the wards spent 20 weeks or more in these phases). Across all 75 of the evaluation wards the mean timescale for start date to embedded date was 19.6 weeks and the median was 13 weeks – both below the anticipated 24 week timescale.

On this basis, the learning was that multiple factors determine timescales for implementation and as such it is subject to variability. Furthermore, some wards commenced implementation, stopped and then re-started at a later stage with a re-engagement process (perhaps after there had been a change in the ward leadership). The SIC did not capture this cessation of huddling or re-starting after a break. Similarly, it proved very difficult to capture that exact date for embedding as this depended on accurate recording taking place on the ward or the availability of the allocated HUSH coach to visit wards (this may have been some time after embedded huddling was actually taking place).

The Operation Plan (31.07.2017) used to guide the scaling-up listed 136 wards across the five hospitals. Cohort one commenced in August 2015 and cohort eighteen (the final cohort) commenced in January 2017. At the end of July 2017 and six months after the start of the final cohort, 109 wards (80%) were recorded as being embedded. However, HUSH team members reported that beyond that date wards had continued to achieve embedded status and at 24.01.2018, 84% (112/133) were recorded as embedded. Therefore, the learning has been that wards with support, continue to achieve routine PSHs over a significant period of time after first engagement.

4.9.6 Patient and Public Involvement (PPI) in Patient Safety Huddles

The consultation workshops that were held with patient representative groups in Leeds, Barnsley and Scarborough, at the outset of the project, revealed to the Implementation team that members of the public had a clear appetite for PSHs to help address communication problems that exist between clinicians and patients. The sentiment expressed by the patient groups was 'it is great that staff are improving communication amongst themselves, but can PSHs help improve communication with patients?' In the original "10 key features of a PSH" (p.11), an explicit mechanism for listening to patient concerns was not specified. The HUSH project provided an opportunity to consider this question.

Initially, three wards engaged in small-scale testing of mechanisms to incorporate patient or carer concerns in huddles and these revealed significant barriers which suggested that spread of this idea would not be possible within the current PSH format. These barriers related to time, perceived relevance and practicalities. Small-scale testing was therefore stopped to enable further exploration of these barriers through the post-embedded evaluation activities which revealed the following learning points:

- 1) The majority of respondents surveyed at post-embedded 69% (n=22) said they did not think patient or carer concerns should be an aspect of the PSH.
- 2) Group interviews revealed a more complex picture:
 - a. There was still an overwhelming majority who thought that patients and carers should not be involved in PSHs but on probing, it was found that this related specifically to the notion of patients or carers **attending** PSHs.
 - b. It was agreed that some issues that patients or carers were likely to raise would in fact be relevant to PSHs such as 'feeling vulnerable amongst aggressive patients', 'having things like glasses at hand', 'safeguarding issues (family mentions that patient falls at home, certain visitors should not come in)', 'nutrition', 'falls' but that there were already mechanisms in place to hear about these from patients or carers (e.g. 'comfy' rounds

and morning checks for day-to-day concerns, and Friends and Family Test for more general concerns). Staff also felt that patients or carers would just talk to them with concerns as they arose.

- c. There is some scope for establishing formal mechanisms to ensure that patients or carers raise issues that can be brought to PSHs e.g. nominated staff and volunteers ask patients or carers and bring concerns to PSHs. Some staff were particularly interested in the potential for volunteers to fulfil this role.
 - d. There was some interest in the potential for posters, leaflets and 'write-on' slips to be used to help raise awareness of PSHs, and invite patients or carers to record concerns, however some staff felt that writing down concerns over-formalises a process that would occur more effectively through spontaneous talking that staff must make time for.
- 3) Interviews and surveys with six stakeholders allowed for broader reflection on progress:
- a. Four stakeholders felt that the concerns of patients or carers were relevant to safety, and that some were of the type already discussed in PSHs such as 'falls' but they also recognised the value of patients or carers' concerns that are relevant to safety but are from a different perspective, often focusing on different topics.
 - b. Of the four stakeholders who expressed interest in PPI in PSHs, three had concluded somewhat reluctantly that PSHs, were the not the right forum for patient or carer concerns around safety. This was mainly because of the strong emphasis on 'focus' that had become a central component of the PSHs, and one that staff value and largely agree is an essential component for success.
 - c. They agreed that there is still scope to develop ways to prompt patients or carers to provide feedback to staff through the day that could be filtered for huddles, but that currently that are no simple ways of doing this that could be promoted to staff as part of the PSH format: nurses do not have time to ask additional questions, and currently on most wards, there are not sufficient, regular, volunteers nor the structures in place to support them.

A more detailed analysis of the surveys and group interviews with respect to PPI, along with supporting quotes, is included as Appendix Three.

5 Discussion

5.1 Findings by Evaluation Questions

The main findings relating to each of the evaluation questions have been summarised in Box 11 below:

Box 11: Summary of key findings from the evaluation (continued overleaf)

Evaluation Question	Key findings	Source
Implementation and Fidelity of PSH		
What proportion of wards implement huddles?	There were 92 wards in the evaluation. Of these, four wards (4%=4/92) did not commence PSHs. Seventy five wards (82%=75/92) were noted as being embedded on the operational plan.	Operation Plan 31.07.2017
What proportion of wards implement PSH and with level of fidelity?	Of the 75 wards noted as having embedded PSHs, on independent observation 85% (=64/75) were found to be undertaking a PSH. Fifteen percent (=11/75) of the embedded wards were found to not have a PSH on the ward or not to be conducting a PSH on the day of the observation. The fidelity scores of wards with embedded PSHs (66 PSHs observed on 64 wards) ranged from 3 to 8 (of 9) and with a mean of 4.9.	PSH observation SIC
Are PSH 'short and sweet'?	The majority of these PSHs were found to be brief - 92% (61/66) were 15 minutes or less and 80% (53/66) were 10 minutes or less.	PSH observation
Describe how PSH might work to enhance safety climate and patient safety?	The ward teams' approach and response to the PSH enhances safety climate and patient safety through: A shared understanding of patients and co-operation; Generation of higher levels of awareness, knowledge, and skills for harm prevention; Providing prompts for staff to act; Providing a mechanism for patient prioritisation; Generation of an overview of all patients on a ward; Specific PSH characteristics – brief, inclusive and specific; Empowerment of staff and a venue for everyone to have a voice; Higher levels of collaboration across team; The creation of a specific venue in which they can raise concerns.	Evaluation survey Logic Models Stakeholder feedback Teamwork and Safety Climate Survey

Outcome and Effectiveness of PSH		
2.1. Is there an improvement in team-working and safety climate after implementation of the PSH?	<p>Overall patient safety grading significantly improved across the total ward group and twelve of the 28 (43%) questions in the TSC survey showed significant positive improvements over time.</p> <p>Three quarters or more of frontline team respondents reported improvements in communication, teamwork and safety culture on their wards.</p>	<p>Evaluation Questionnaire</p> <p>Teamwork & Safety Climate Survey</p>
2.2 Is there a reduction in patient harm following implementation of PSH?	<p>The pooled hospital results showed a non-significant reduction in falls (IRR=0.884, 95% Confidence Interval (CI) 0.768 to 1.017, p=0.086) when PSHs were started in a ward but a significant reduction in the rate of falls after PSHs were started (IRR=0.995, 95% CI 0.990 to 0.999, p=0.017). At Trust level, only Leeds hospitals showed significant reduction in level of falls when PSHs were started on a ward (IRR=0.812, 95%CI 0.67 to 0.983 p = 0.033).</p> <p>The pooled modelling results for pressure ulcers showed a non-significant reduction in pressure ulcers after PSH were started (IRR=0.787, 95% CI 0.594 to 1.042, p=0.094). At Trust level, Barnsley showed a reduction in the level of pressure ulcers (IRR=0.573, 95%CI 0.393 to 0.836, 95%CI p=0.004) and the rate of pressure ulcers after PSHs were started (IRR=0.986,95%CI 0.973 to 0.999 p=0.038). Leeds (IRR 1.01, 95%CI 1.002 to 1.019, p = 0.013) and York (IRR=1.015, 95%CI 1 to 1.031, p = 0.045) showed an increase in the rate of change of pressure ulcers.</p>	Harms data
2.3. At what stage of implementation do PSH begin to deliver improvement?	Overall, there was no material difference when comparing reduction in harms based on the first huddle date vs the embedded huddles dates.	Harms data
2.4. What are the unintended positive/negative consequences of the PSH?	<p><i>Positive –</i></p> <p>Better communication and team-working</p> <p>MDT co-operation and sharing information across all roles.</p> <p>Inclusion of the whole team</p> <p><i>Negative –</i></p> <p>Time for and timing of huddles</p> <p>Mandated approaches to delivering the PSH</p> <p>Interruptions to the PSH</p> <p>Repetition of issues covered in other meetings</p> <p>Terminology</p>	<p>Evaluation Questionnaire</p> <p>Stakeholder feedback</p>

Return on Investment of PSH		
3. What is the return on investment (ROI) of safety huddles?	<p>The base case ROI associated with wards addressing harms associated with reducing falls was over 100%. The reduction in falls of 0.1125 per ward per week was associated with savings of £292 per fall avoided, whilst the cost of the intervention, including all staff costs, was £141 per ward per week.</p> <p>The base case ROI for wards seeking to reduce cardiac arrest calls was over 700% if the cost of PSHs was excluded from the cost base. The ROI was always negative if all staff costs were included. The reduction in calls was estimated at 0.02 per ward per week. Estimated savings were £2,667 per cardiac arrest call avoided, with the cost of the intervention, including all staff costs, being £100 per ward per week.</p>	YHEC methodology
Learning from Scaling Up (Critical Success Factors)		
4.1. What are the barriers and enablers to successful implementation of PSH?	<p><i>Barriers –</i> Context for and organisation of huddles Problems with ward staffing Top down approach less successful Lack of leadership Beliefs and values regarding the inevitability of harms External coaches</p> <p><i>Enablers –</i> Effective ward leaders HUSH coaching support Harms data and PSH evidence Belief in the value of PSHs Motivated teams</p>	<p>Stakeholder feedback</p> <p>Frontline teams – evaluation survey and group interviews</p>
4.2. What is the whole hospital impact of PSH?	<p>Enhanced cross organisational communication and learning Raised awareness of patient safety across the hospital and organisation Spread of PSH intervention to other sites (not in HUSH project) Positive PSH intervention is a ‘good news’ story for disseminating organisationally.</p>	Stakeholder feedback
4.3. What is the shared learning from scaling up PSH?	<p>PSH does not have to be led by most senior clinician to be a success. A flexible approach leads to ward ownership. A positive relationship between the ward and the HUSH coach is important. Wards learn from each other and can initiate independently. QI tools support daily PSH and engagement. Strong relationships between partners should have been in place from the outset.</p>	<p>PSH observations</p> <p>Stakeholder feedback</p> <p>Evaluation survey</p> <p>Group interviews with ward teams</p>

	<p>A poor quality huddle undermines team motivation to address patient harms. Successful PSHs require confident and committed leaders. The 'bottom-up' approach to implementation supports ownership by the ward. A reliable PSH can be lost if merged with another ward meeting. Multiple concurrent initiatives on a ward can challenge PSH reliability.</p>	
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5.2 Further discussion

In this scaling up project 70% of wards in five different hospitals successfully embedded PSHs. PSHs were generally associated with positive feedback from front line staff, enhanced team working and safety culture with mixed evidence on reduction in harms.

This is a major achievement especially when we consider the barriers and enablers to successfully scaling up innovations in the National Health Service (NHS), as noted in a recent Health Foundation Report: "There are certainly themes and learning to draw out and share, some of which challenge conventional wisdom; not least the importance of winning hearts as well as minds, of working with the realities of power and politics, of deep engagement with users and adopters in the innovation process, of the central role of teams and organisations in the spread process as well as heroic individuals, of the iterative testing and development of ideas in different contexts, and of the patience, course-correction and sheer bloody-minded determination that can be required to succeed." (Albury et al. 2018).

The evaluation gathered a large body of data on the approach to scaling up, implementation of huddles and their impact, outcomes and effectiveness in different ward settings and hospitals across three Trusts. The HUSH project and proposed evaluation methodology were ambitious and many of the challenges and barriers encountered over the two years of scaling up were not anticipated, requiring significant flexibility and adaptation to ensure that timely progress and data capture was achieved. The complex hospital setting and a state of flux generated by wards moves, closures, re-organisations and on-going pressures on NHS staff, meant that the evaluation was focused on a 'moving target'.

While complete data sets to inform all the evaluation questions were not always available, we found that through the Developmental Evaluation approach that incorporated 'double loop' learning and two-way communication, we have gained valuable insights and successfully monitored and measured the scaling up project. Through the use of multiple methods and triangulation¹³ we have presented evidence that illuminates the relationship between PSHs and safety climate and patient harms. The focus on fidelity, implementation and theory development for the PSH has provided

¹³ Triangulation facilitates the validation of data through an approach that incorporates cross-verification across data collection methods

valuable insights into the mechanism for the effects of the PSH and enhanced understanding of the 'black box' between implementation of the innovation and its outcomes or effects.

A review of the Operation Plan (31.07.2017) informed the allocated status of each evaluation ward (adult in-patient wards only). A high proportion of wards (96%) had commenced implementation of the PSH and a large majority of all evaluation wards achieved embedded status (81.5%). As such the implementation was very successful, implying that wards were able to adopt and adapt the PSH as part of their daily routine and to continue regular huddles reliably. Some wards stopped after gaining embedded status, generally due to changes in leadership, staffing pressures or ward mergers. However, most of the wards in this group did have plans to re-start. As such the huddle was largely regarded as a valuable initiative by those it was targeted at. The wards that declined to implement tended to be smaller and specialist units that did not consider that the PSH would enhance their patient safety related communication or had a ward leader or team opposed to implementation.

PSH observations on 64 wards highlighted the variable fidelity scores of huddles with scores ranging from three to eight (of nine criteria). However, consistently the huddles observed incorporated three key criteria - being non-judgemental, brief, and incorporating discussion of 'who is at risk today'. Other criteria for auditing the fidelity of huddles were deemed less important as the project progressed. The need for the huddle lead to be the most senior clinician ceased to be so important when nurses (usually the sister or ward manager) successfully led high quality huddles. Similarly, where the HUSH team had initially seen the review of data as an important component of the huddle, this changed over time and data e.g. SPC run charts, although still regarded as important were instead displayed on the ward safety boards. However, as the role of data and the importance of evidence was consistently highlighted by evaluation respondents, we consider that changes in harms for a given ward are important and have a role to play in motivating staff and making huddles worthwhile and seen to be delivering results. Ward certificates were provided by the Improvement Academy and delivered by coaches reinforcing positive outcomes e.g. reductions in falls. These appeared to reinforce the value of the PSH, as well as contributing to team motivation.

It was common for huddles to take place on a seven days per week basis. For example on several ICU wards in Leeds huddles took place at key stages across the day, usually to coincide with the staff shift changeover. This finding provides an illustration of how some wards embraced the PSH, recognised the contribution it made to the management and organisation of their patients, and the contribution it could make to the prevention of patient harms. In contrast to this, examples of wards that did not embrace the huddle were observed, in such cases an automated approach to the PSH, an absence of productive discussion about patients at risk, and disinterest among participants were noted. It is likely that the local team culture and less skilled and confident leadership contributed to these ineffective approaches. The general enthusiasm for huddles and a belief in their value by ward leaders however, cannot be underestimated.

While the PSH observations were meant to be unobtrusive, we think it is highly unlikely that an entire team of ward staff would undertake a PSH in a different manner in the presence of the

Evaluation Fellow (termed the Hawthorne effect¹⁴). Furthermore, while actions to reduce or prevent patient harms were discussed in huddles, we did not verify the follow through actions relating to these on the ward.

The Stages of Implementation Checklist (SIC) data indicated that on average wards embedded PSHs within the pre-defined 24 week period; however there were outliers in both directions, ranging from just one week to 86 weeks. Some wards reported that finding the right time for the PSH challenging, especially when aiming to accommodate the requirements of all members of the MDT. Ward moves, mergers and staffing and leadership changes also tended to extend the 'start date to embedded' timescale. The HUSH team experienced difficulties in gaining TSC data and then providing feedback for many wards, resulting in delayed pre-implementation and implementation phases (as defined in the SIC). In many instances the time spent in either pre-implementation or implementation phases or both, exceeded by weeks or months the time taken from start to embedded. This highlights the challenges of using surveys to gather information and data from ward teams - some teams felt that they were constantly being asked to fill in surveys or that they were just too busy on the ward to take the time out. The large number of activities included in the SIC (29 in total) highlights the complexity of the scaling up approach and the burden of recording and reporting for busy coaches.

Significant improvement was seen over time in the teamwork and safety climate scores which correlated with the routine practice of huddles on the wards. Respondents overall gave an improved grade for patient safety on their wards from pre-embedded to post embedded. These outcomes triangulated with feedback from the evaluation surveys and stakeholders – respondents overwhelmingly felt that huddles had improved communication, teamwork and safety culture on their wards. However, the TSC results were less positive for respondents from Barnsley wards. During the latter part of the project ward mergers and moves particularly in Barnsley General Hospital added further complexity to the data collection processes. Alongside these TSC results a high percentage of Barnsley wards were not embedded (31%) and for more than half (54.5%) there was found to be no PSH on the ward. These results together, suggest that implementation was less successful at the Barnsley site. In contrast to this, Scarborough General Hospital showed the highest levels of improvement across TSC questions and a high number of embedded wards.

Due to data not being available it is not possible to draw any conclusions on the Barriers and Facilitators for Patient Safety Huddles Questionnaire results.

The impact of PSHs on harms is less clear because of on-going initiatives to address these harms and in the absence of controlled comparisons we had to undertake pre versus post (interrupted time series) analyses which produced mix findings suggesting that further contextual details are required to understand why some wards experienced a reduction in harms and others did not.

The challenges and barriers to implementation were consistent across data sources and in some wards these affected the reliability of embedded huddles or progress towards a self-sustaining

¹⁴ "The Hawthorne effect is a change in behaviour as a response to observation and assessment." (Sedgwick and Greenwood, 2015 p1)

status. Organisational and contextual factors included finding the best time and place to huddle, time wasted while waiting for participants to gather, and time spent conducting the huddle. Particularly on busy and pressured wards, the brevity of the huddle was a crucial factor. Alongside the focus on patient safety and patients identified as at risk, a short and well led huddle was the most effective, and as such the most likely to be sustained over time.

Changes on the ward posed a threat to the embedded huddle and these consistently centred on ward re-organisations, staffing pressures and the absence or loss of an established PSH lead. Leadership was a strong cross cutting theme. This was less about the job role of the lead (a doctor, nurse or other team member) and more about skills for leadership including confidence, consistency and a commitment to the concept and value of the PSH. Where the PSH was merged with other meetings it tended to lose focus and in some instances stopped entirely over time. However, there were examples of high quality huddles consistently taking place immediately before or after another ward meeting (e.g. board round) that were both focused and reliable. The distinctiveness of the PSH as a standalone ward activity (even when aligned to another ward meeting) , that is solely focused on harms prevention is an important factor in achieving and sustaining reliability over time.

By exploring the approach to scaling up and the theoretical concepts that underpin the PSH, this evaluation has highlighted the main elements of effective operation and delivery. Effective scaling up appears to be determined by the following main characteristics:

- Promotion of ownership by the ward through facilitation of a flexible approach and adaptations for individual wards that at the same time retain key aspects such as a distinctive focused daily and brief interdisciplinary meeting. Thus, non-mandated approaches to implementation work best.
- Wards need to have a belief in the PSH and a willingness to test on their wards. The vital role of effective leadership should not be underestimated.
- Learning within and between wards is a key component for scaling up. When the value of huddles is reinforced at managerial and organisational levels they are more likely to be reliable and sustained.
- Resources (both external and internal) were vital to this scaling up project. The HUSH team invested considerable time and effort with a tenacious approach to engagement and an undented enthusiasm for the project. Without the investment of this HUSH resource, it is probable that scaling up would have been less successful overall. As such it is likely that in the absence of supporting resources (e.g. coaches, provision of data and QI tools) scaling up will not succeed and adoption of huddles will be sporadic.
- The proliferation of quality and improvement initiatives in the NHS and the current zeitgeist for tackling patient harms, provides the context in which the PSH can succeed. As such its contribution should be enhanced through multi-component interventions and corporate sponsorship for the prevention of adverse events and the promotion of patient safety.
- On the basis of our evaluation findings the components of the PSH that facilitate its effect on both teamwork and safety climate and harm reduction are as follows:
 - **Inclusivity** – input and team-working across the MDT;

- **Awareness raising** – promoting *psychological safety*¹⁵ on the ward and patient related knowledge;
- **Communication** – greater communication about patients and between roles and disciplines;
- **Empowerment** – of the whole team, to provide a safe forum and a venue for speaking up;
- **Prioritising** - determining the best approach for preventing patient deterioration;
- **Brevity** – less than 15 minutes;
- **Focused** – on at-risk patients and harms prevention;
- **Effectively led** – by a committed and confident team member;
- **Predictable and consistent** – an agreed PSH venue, time and approach;
- **Overview** – of all patients and the wider situation on the ward; and
- **Workload management** – review and re-allocation of the staff resource.

The absence of pre PSHs baseline data for the TSC survey means that we do not have uncontaminated before data for comparison. One reason why this is the case is because the HUSH team integrated the TSC into their intervention as a pre-cursor to PSH, but some wards commenced with PSH without the TSC having been completed. Nonetheless, across all data sets it is clear that PSH implementation has been successful, most stakeholders have provided positive feedback on its benefits for their wards and it has been seen as a relatively simple initiative for identifying and responding to patients at risk. This positive response at the level of both ward teams and from the organisations involved, in itself highlights the utility of the huddle and its use as a tool for wards to adapt for their own needs. This flexibility has contributed to its widespread adoption and there is scope for building on this approach. For example, a series of short huddles across the working day have been implemented on some critical care wards, organisation-wide huddles are being tested out in one of the Trusts, and the tiered model outlined by Goldenhar et al (Goldenhar et al. 2013) provides an example of how organisations can build further on ward-based or ‘micro’ level huddles.

The evidence for the longer-term sustainability of an embedded PSH remains less clear, and it is likely that over time there will be attrition among the 80% embeddedness rate identified. Factors such as new ward based initiatives, ward moves or re-organisation and staff changes all pose a potential threat to the embedded huddle. As such, an understanding of the characteristics of wards that do achieve longer-term sustainability (36+ months) will be a valuable next step for the evaluation. Sustainability planning for the HUSH project has been undertaken to ensure that support is in place, to enable wards to continue, re-start after a break, or to implement huddles over the longer term. On-going support will be made available to existing and new wards through coaches (within each Trust) and the work of the Yorkshire and Humber AHSN.

The body of published evidence on the impact and outcomes of patient safety huddles is limited. However, the findings from this evaluation concur with those of key authors who have investigated

¹⁵ “A safety culture in healthcare can be thought of as one where staff have positive perceptions of psychological safety, teamwork, and leadership, and feel comfortable discussing errors.” The Health Foundation, 2013

huddles in relation to: the important role of leadership in effective huddles (Cooper and Meara 2002; Leonard and Frankell 2012); the contribution of huddles to improvements in teamwork and communication, particularly communication between multi-disciplinary roles (Provost and Mcdaniel 2012; Glymph et al. 2015); and its role in improving safety culture (Weaver et al. 2013).

6 Conclusions

In this scaling up project 70% of wards in five different hospitals successfully embedded PSHs. PSHs were generally associated with positive feedback from front line staff, enhanced team working and safety culture with mixed evidence on reduction in harms alongside embedded learning for all those involved with the HUSH project and its evaluation.

7 Recommendations from the evaluation team

1. We strongly advocate a Developmental Evaluation (DE) approach with regular dress rehearsals for shared learning.
2. We also recommend a *concordat approach* (Brewster et al. 2015) for evaluation – an agreement set out and agreed at the beginning of a project which is revised over the course of the project. A concordat states with clarity the roles and responsibilities of all project partners, delivery timescales, and expectations relating to governance and reporting.
3. Evaluation should commence prior to the start of implementation to maximise opportunities to identify and establish control or comparison wards and establish the measurement framework. This would enhance the rigour of an evaluation and the robustness of results and outcomes.
4. The scope of this evaluation included a wide range of questions (and methods) but with hindsight focusing the evaluation on a smaller set of issues is recommended. This might be achieved as part of the *concordat*.

8 Appendices

The appendices listed below are provided in separate files.

8.1 Appendix One: Evaluation and data collection instruments

8.2 Appendix Two: Data collected for evaluation wards

8.3 Appendix Three: Patient and public involvement in patient safety huddles

8.4 Appendix Four: Return on Investment

8.5 Appendix Five: An evaluation of eight wards that pioneered the use of patient safety huddles

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