Team situational awareness: practitioner-centred design of a safety huddles toolkit

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Abstract. Patients die every year as a result of a failure to recognize early warnings of deterioration. A contributing factor is poor team communication and situational awareness. This paper describes the practitioner-centred design of a safety huddles toolkit. Interviews, observations and collective discussions conducted synchronously (face-face) and asynchronously (virtually) informed decisions to iteratively design the toolkit. As a result, the toolkit is designed to be continuously adapted to allow practitioner-led improvement for different clinical specialties. Indicative findings suggest practitioners find it to be a useful toolkit to adopt safety huddles and to improve team communication and patient awareness. The tool is being spread further six months following project completion and is enclosed.

Keywords. Situational Awareness, safety huddles, human-centred design.

1. Introduction

In recent years, across the whole of the healthcare sector there have been a number of serious untoward incidents in relation to the failure for healthcare practitioners to recognise and respond to deterioration in patients, including children. This is a lethal problem, with up to 6,000 patients a year dying as a failure to recognise the early warnings of deterioration (Royal College of Physicians, 2012). The deterioration of children in hospital is a well-documented contributing factor, which includes; the failure to monitor and observe patients adequately, a failure to recognise the deteriorating patient, a failure of healthcare teams to communicate effectively, and a failure to respond correctly or in a timely manner (Pearson, 2011; National Patient Safety Agency, 2009). The causes are multi-factorial, and are not unique to one health care environment, but poor communication and situational awareness always plays some role. There is no doubt that communication among teams in complex, high-pressured and safety critical environments, such as in a healthcare setting, is challenging. Unfortunately given the challenging nature of communication, ineffective communication is one of the leading contributing causes of medical errors and patient harm (Leonard, Graham and Bonacum, 2004). Given this, a feasible intervention has been sought to improve communication, situational awareness and early recognition of the deteriorating patient in the hope that it would reduce the number of patients that die each year as a result of these factors.

1.1 Safety huddles

Safety huddles (see Goldenhar et al, 2015) are identified as a solution to overcome poor communication and improve both individual and team situational awareness. They have received a lot of attention in the quality and safety literature following their successful migration from the aviation industry (e.g. Taylor, 1990) and successful adoption in secondary care in the USA (see Goldenhar et al, 2013). They are also advocated by the Institute for Healthcare Improvement (2016) and are reported to improve team effectiveness and, as a result, to reduce patient harm (Edelson et al, 2008). For these purposes, safety huddles are multi-professional, structured, quick, team or group meetings held in the working environment
at regular intervals to support reflective learning and include all team members from Health Care Assistants to Consultant’s in charge. They give team members a snap shot of what is going on, what is needed and what could be improved upon. As a result, safety huddles improve individual and team situational awareness by, for example, providing the opportunity to take stock and identify ‘watchers’ or patients with deteriorating acuity. Providing this opportunity to reflect and to improve team situational awareness can reduce harm (Paul et al, 2010) as an important contributor to a safety surveillance system.

1.2 Situational awareness

Situational awareness is a construct that has been applied usefully to inform systems design in a number of industries including aviation, nuclear power and the oil industry. Despite this success it is a well-debated construct (see Endsley, 2015) in relation to:

   i) Definition (see Stanton et al, 2010);

   ii) Measurement (see Salmon et al, 2009 for a discussion, and examples for measuring both individual and team situational awareness across Taylor, 1990; Durso et al, 1998; Golombek et al, 2015; Goldenhar et al, 2015), and;

   iii) Identity across disciplines (see Endsley, 2015 for a discussion and Dane, 2011 for an example of application in management).

Situational awareness has drawn a lot of attention in healthcare, with the lack of situational awareness being implicated as a contributing cause of patient deaths. In this case situational awareness is attributed to the individual but given the reliance on teamwork in healthcare settings and the shared responsibility team situational awareness is also a necessity.

1.3 This study

As a part of a drive for continuous improvement in patient safety and to mitigate against serious untoward incidents, University Hospitals of Leicester NHS Trust have sought to improve communication, situational awareness and team working, by implementing safety huddles (sometimes called safety briefings) as part of planned interventions for “operationalising safety” (Vincent et al, 2008).

The Children’s Emergency Department and Children’s Intensive Care Units manage the most unwell paediatric patients in the hospital. There are similar themes surrounding errors related to Human Factors, such as prescribing and identification of deterioration. There are differences though in terms of communication, particular medication errors and with processes specific to each area. In contrast, general paediatric wards often have patients with a greater complexity but lower acuity. There are lower nurse to patient ratios in view of this which necessitates a different but equally important requirement for situational awareness in order to identify the deteriorating child or maintain optimal patient flow.

Although safety huddles are reported to be effective in the literature (Goldenhar et al, 2013), to be adopted effectively, it is imperative that safety huddles are not forced upon healthcare teams as a management device to improve performance. An approach which could produce resentment from the adopting teams. On the contrary, to ensure safety huddles are fit for purpose and to maximise the chance of adoption and diffusion, healthcare practitioners must participate in their design and production and direct the adoption. A latent benefit of such an approach will also encourage team members to work together; a number of reports (Berwick, 2013 and Keogh, 2013) have emphasised the importance of developing a positive, learning organisational culture. Differences in hierarchical status and power dynamics make speaking up and voicing concerns a challenge; these power differences can act as a strong inhibitor to speaking up (Liao et al, 2014). Safety huddles provide an opportunity to overcome the historical
hierarchical barriers that exist in the health care setting. Safety huddles include all grades of healthcare professionals from Health Care Assistant to Consultant, working as a team to identify and prioritise patient acuity and risk.

1.4 Aim and summary

Safety huddles are short multi-professional meetings and include all staff on the ward from housekeeper to the consultant in charge. Safety huddles improve situational awareness and team communication and as a result it is anticipated that they will contribute to reducing the 6000 deaths associated with the failure to recognise the early warnings of deterioration (Royal College of Physicians, 2012). It is also anticipated that they will create a more supportive culture and environment that improves team and organisational learning.

This paper describes the design and evaluation of the safety huddles Toolkit, designed to roll out safety huddles across different ward and clinical areas in a tertiary children’s hospital. The objectives were:

I) To develop an implementation safety huddle toolkit to facilitate healthcare providers to adopt safety huddles using a Human Centred Design approach.

II) To evaluate the adoption of the safety huddle toolkit and the effectiveness of collaboration between human factors and healthcare practitioners.

2. Methods

A project team was formed and made-up of six healthcare practitioners (nurses and doctors), two non-healthcare practitioners and two other non-healthcare practitioners employed within the healthcare setting. Only one member of the team had a dedicated human factors background but three other members had knowledge of the subject. The project was conducted in the context of an extremely high-pressured healthcare environment meaning ideas to conduct codesign workshops for the toolkit were not feasible.

2.1 Approach

A key tenet of Human factors is Human Centred Design (for further information, see: ISO 9241-210:2010) and ensuring that the design of a product is fit and appropriate for the context of use. In this case the product is the safety huddle and the accompanying toolkit to support diffusion across teams. To achieve an effective design therefore, a participatory approach had to be taken, designing ‘for and with’ the end user (Eason, 1995). This approach was deemed necessary given the technical knowledge of huddles required to structure safety huddles, whilst acknowledging the socio-political environment of healthcare settings, and the need to engage with teams to maximise the chance of successful adoption (Eason, 1995). In this case therefore, healthcare practitioners and knowledge of the environment collected through interviews and observations formed the technical knowledge to underpin the huddle design, and healthcare practitioners, who would be adopting the toolkit, participated in the process, to overcome socio-political dynamics, and actively contribute to the design to ensure the outcome would fit with team values.

2.2 Procedure

A number of approaches were used to ensure that the toolkit reflected a human centred design approach for and with users (Eason, 1995). To provide context to the non-healthcare practitioner members of the team and inform design, interviews (n=17) were conducted on the wards that would pilot the huddles toolkit with healthcare practitioners from all levels and occupations. They focused on daily routines and working practice, team communication, situational awareness and dynamics. Observations on the wards were also conducted to provide insight to possible approaches for the safety huddles to be conducted.
Information from the observations and interviews were used to build from with the healthcare practitioners to design the toolkit. Subsequently, the toolkit was developed through a series of informal face-face group meetings in addition to asynchronous communication via two digital tools. The first was a secure online chat application, the second an online project software package which contained the project and toolkit documentation. These tools enabled the team to operate virtually, continuously throughout the project fitting around workload and shift patterns; the clinical part of the team operated across three hospitals in additional to the non-clinical team members operating from remote locations. Both pieces of software were granted permission to be used for the purposes of the project. Face-face meetings were used to collectively design the structure and timings of the safety huddles whilst the digital applications were used to share ideas, and to evaluate initial versions of the toolkit as they were piloted on the wards. Weekly meetings were held to discuss the evaluation of the latest version of the toolkit. Opportunities to participate in the process through formal and informal discussions with the project team were publicised with the wider and multi-professional health care teams adopting the safety huddles. The rationales for design decisions are described as a part of the findings section. Interviews and a brief questionnaire were used to evaluate the toolkit with individuals that had adopted safety huddles and the toolkit.

3. Findings – the Toolkit

The design of the toolkit takes three parts. First, ‘Explaining Huddles’ includes reference to two elements of the safety huddles toolkit. Second, the ‘Huddle Iterative Design Toolkit’ section details how a Human Centred Design approach was taken to ensure that safety huddles evolve and improve analogous to Plan Do Study Act cycles (Hignett et al, 2015), this includes reference to one further element of the safety huddle toolkit. Third, the evaluation – commentary from users following their extended use of the toolkit.

3.1 Part 1: Explaining Huddles

First, a ‘How to get Huddles Started’ guide was developed to support teams in adopting Huddles. A guide to identifying a watcher was also developed given that the patient’s acuity means that they are most likely to deteriorate rapidly. These are both key components of the Toolkit used to ensure that all team members know the signs to look for in deteriorating patients, including those members without formal medical qualifications. These elements are available from the authors.

3.2 Part 2: Huddle Iterative Design

The tool contains six main elements designed to encourage reflection on the safety huddles by the team. Early feedback was also provided to the adopting teams by the huddle clinicians to ensure changes were made early rather than huddles continuing with poor practice, e.g. taking too long or discussing non-pertinent information. The rational for the first five elements is described below and the sixth in the next section:

i) Element 1: Introduction and descriptive data

The introduction (Figure 1) encourages the team to actively reflect on their huddle to improve it through an iterative cycle. It requests a date, ward and time stamp to ensure a record is kept.

<table>
<thead>
<tr>
<th>Date:</th>
<th>Ward:</th>
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<tbody>
<tr>
<td>Start Time:</td>
<td>End Time:</td>
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![Image](https://via.placeholder.com/150)

Figure 1: Element 1 of the Huddle Assessment Tool – introduction and descriptive data.

ii) Element 2: Clinical prompts
The clinical prompts (Figure 2) are designed to remind the team of the purpose of the Huddles and are specifically designed to the children’s hospital context. These may change in other specialties. The clinical prompts were adapted from the SAFE (situation awareness for everyone) programme run by the Royal College of Paediatrics and Child Health (RCPCH, 2016) and from research in the Cincinnati Children’s Hospital and Medical Centre (Brady et al, 2013) which identified five risk factors associated with preventing deterioration. These are:

1. Even when vital signs are normal family concerns should always be taken seriously.
2. Risks are increased with high-risk therapies and the child is more likely to deteriorate.
3. Elevated early warning score are an indicator of deterioration but are not always present.
4. Clinician gut feeling are important this is where any member of staff senses that the child is not right even when there is no obvious indication, sometimes referred to as watchers
5. When there are concerns about communication with the patient or family members (e.g. comprehension issues or they speak a different language to the healthcare team)

iii) Element 3: Attendees

The requirement to capture attendees acts as a register but also reminds all attendees that all wider team members are valued team members and should be invited to safety huddles. The intervention and behaviour change literature (Michie, Johnston and Francis, 2008) tells us that without periodic reinforcement, there is a danger that historical barriers to team membership around professions would creep in. The safety huddle lead was also captured to ensure that this can be rotated. Again the design of the attendees list must be tailored to each context.

iv) Elements 4 and 5: Huddle design, practice and reflection prompts

These two elements require the team to consider their huddle practice. In Figure 4 we see questions pertinent to the huddle practice to support iterative improvements to future huddles. The questions encourage team reflection on who actively participates and whether or not it is considered of value. In Figure 5 we see questions prompting reflection but are more related to whether or not the huddle included aspects that should not typically be included in a huddle – aspects out of scope like discussions of handover. Also pragmatic questions related to whether the huddle started on time and if it extended beyond five minutes; in which case the huddle may become a distraction and burden rather than of value.
v) Element 6: Team reflection on safety huddles

To ensure team members are asked to consider and reflect on the efficacy of the huddle open ended questions are also included in the Huddle Assessment Tool (Figure 6).

Figure 6: Open ended questions related to the huddles to inform improvement. Questions must be adapted to another context.

3.3 Part 3: Evaluating safety huddles

Given the complexity of the environment and safety critical nature of the UHL NHS Trust’s Children’s Hospital and future adopting sites, the measurement and evaluation of improving situational awareness through safety huddles must be done in situ, without putting patients at additional risk and be available continually to frequently evaluate the toolkit and safety huddles.

This in situ approach is contrary to some approaches reported in the situational awareness literature. For example, the freeze approach to measuring situational awareness is commonly utilised in simulations (SAGAT, Endsley and Garland, 2000). This is not considered appropriate outside of a simulation or non-safety critical setting. Whilst the most common approach to measuring SA in situ typically takes one of two forms, Situation Awareness Rating Technique (SART), which requires an observation of task performance (Taylor, 1990), and Situation Present Assessment Method (SPAM), which asks questions in real time (Durso et al., 1998). These approaches were not considered appropriate alone due to the safety critical context interference that direct questioning may pose.

More recent studies of huddles (Goldenhar et al, 2013) have not explicitly focused on the measurement of situational awareness, rather focusing on the improvement of patient safety and team performance. These are essentially used as proxies to demonstrate the effectiveness of huddles and therefore improvements in team situational awareness. For example, after implementing huddles, Goldenhar et al (2013) conducted interviews with key stakeholders and focus groups with healthcare practitioners to establish themes related to staff perceptions of huddles. They reported that huddles improved efficiencies and quality of information sharing, increased levels of accountability, empowerment, and sense of community, which together create a culture of collaboration and collegiality that increases the staff’s quality of collective awareness and enhanced capacity for eliminating patient harm. Similarly, Golombek et al (2015) focused on the effectiveness of huddles through informal feedback in situ of the huddles and formal feedback through interviews and feedback prior to and following huddles. Meeting minutes and notations collected at the time of the huddles were also evaluated (Golombek et al 2015).

Adopting a quality improvement approach alongside Human Centred Design could be beneficial as it will ensure the toolkit continually improves (Hignett et al, 2015). However, this requires a continual mechanism to iteratively evaluate safety huddles. This has been designed into the Toolkit based on posing
questions in real time (adopted SPAM method, Durso et al, 1998). There are also no studies published that compare the adoption of safety huddles to patient outcomes. To achieve this for each safety huddle the following questions were incorporated to allow a comparison to real patient outcomes. The questions are based on the nine-item SART questionnaire (Taylor, 1990), which is not deemed to be feasible in the context of the Children’s Hospital given the imperative that Huddles are conducted rapidly and not onerous. To overcome this, teams were asked to answer the following questions as a part of the huddles: Identify patients likely to be discharged out of the hospital in the next 24 hours? Identify patients are likely to be discharged to another ward area in the next 24 hours? Identify patients will be receiving unusual treatments for this area (e.g. outliers requiring unfamiliar medication) in the next 24 hours? Identify patients most likely to require an unexpected intervention (e.g. escalation of care) in the next 24 hours?

As above, these questions were tailored to the environment of the study. An additional open text box is also provided for additional comments. These questions, contained in the safety huddle assessment tool for the purposes of the study, may not be necessary if the toolkit was scaled.

Figure 7: Situational Awareness (adopted heavily from Taylor, 1990) questions to be completed by a junior member of the team. An open-ended question is included. Questions must be adapted to another context. Question five in the figure above has since been removed.

4. Discussion and Conclusion

This paper describes a safety huddles toolkit designed to roll out safety huddles across different ward and clinical areas in a tertiary children’s hospital. The two objectives were successfully completed. First, a safety huddle toolkit was developed using a Human Centred Design approach. Second, the indicative findings of the adoption of the safety huddle toolkit suggest it is effective and the collaboration between human factors and healthcare practitioners a success.

Overall the team worked very effectively with continuous and motivated participation; the team are continuing to collaborate. The largest challenge reported by the team was finding time for face-face synchronous meetings. This was overcome by adopting two digital tools. This was novel for the team but a solution that should be explored further for asynchronous human factors collaborations, for example, the best approach for adopting these tools could be considered.

Indicative findings from the initial analyses of the evaluation interviews and questionnaire suggest that 49 of the 50 teams who have used the toolkit find it to be useful and in all but one case they felt the toolkit was organized. Verbatim quotes from healthcare practitioners paint a very positive picture of the toolkit:

“Very useful process for the ward to help focus care goals the team have for patients if they are unstable and helps the overall organisation of the ward, the huddle is successful in my opinion”; “First time taking part in ward 12s huddle. Found it useful in terms of knowing a brief overview of the ward and plans for the day”; “Found the huddle to be very helpful in making all members of the team aware of any concerns or situations that other members may have. Try to get everyone in the same place at the same time”; “Highlight children who are without parents, good for nurses to highlight who doctors need to see first,”
like watcher.”

The indicative findings suggest that healthcare practitioners can use this toolkit to effectively learn to adopt safety huddles. Further evidence of this is that the adoption of the toolkit is continuing six months after this project ended. Evidence of an impact on patient outcomes is not available at the time of this paper. Evaluation of the safety huddles in relation to the impact on system capacity is ongoing.

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