DEveloping a Complex Intervention for DEteriorating Patients using Theoretical Modelling (DECIDE study)

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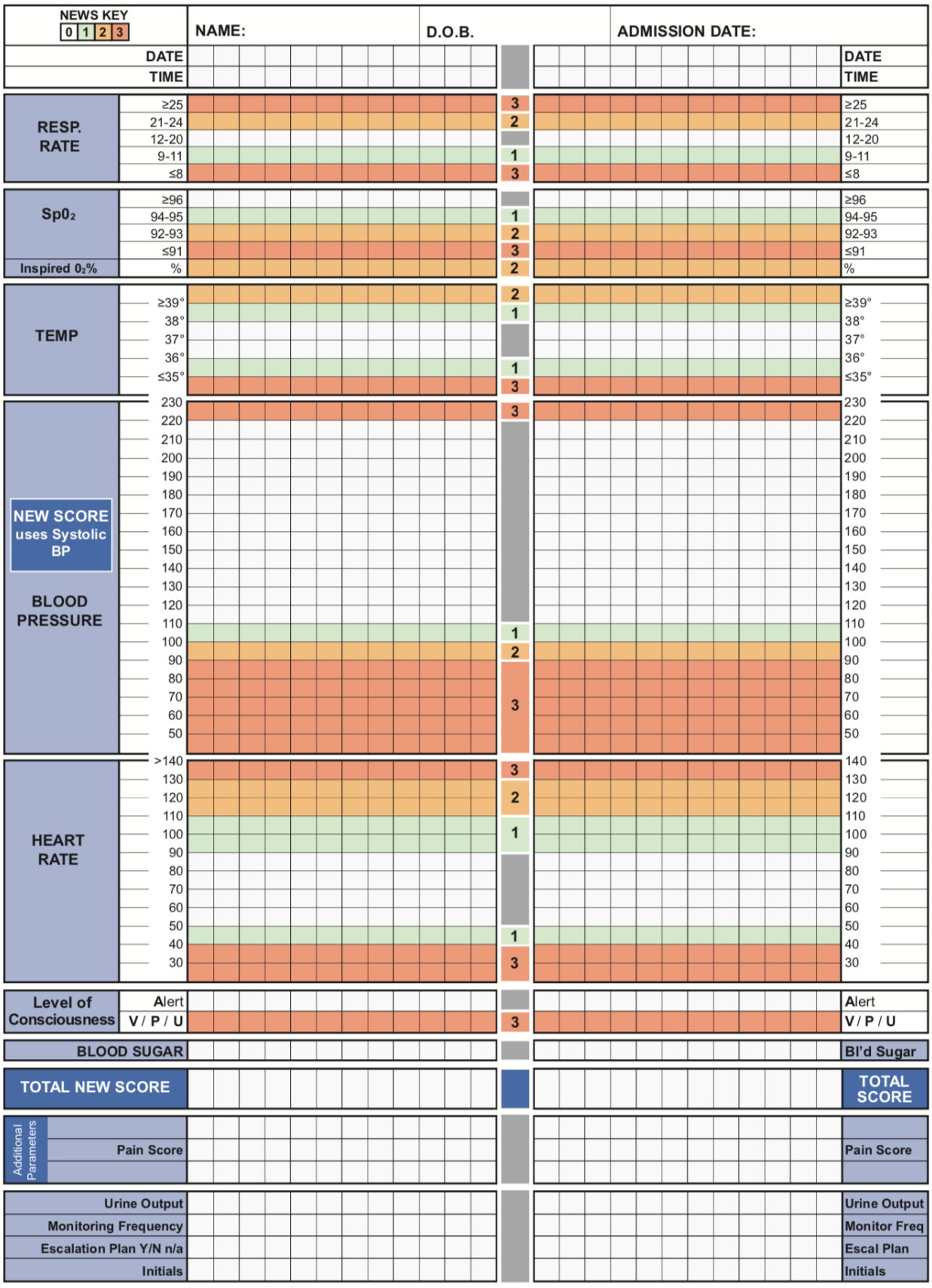
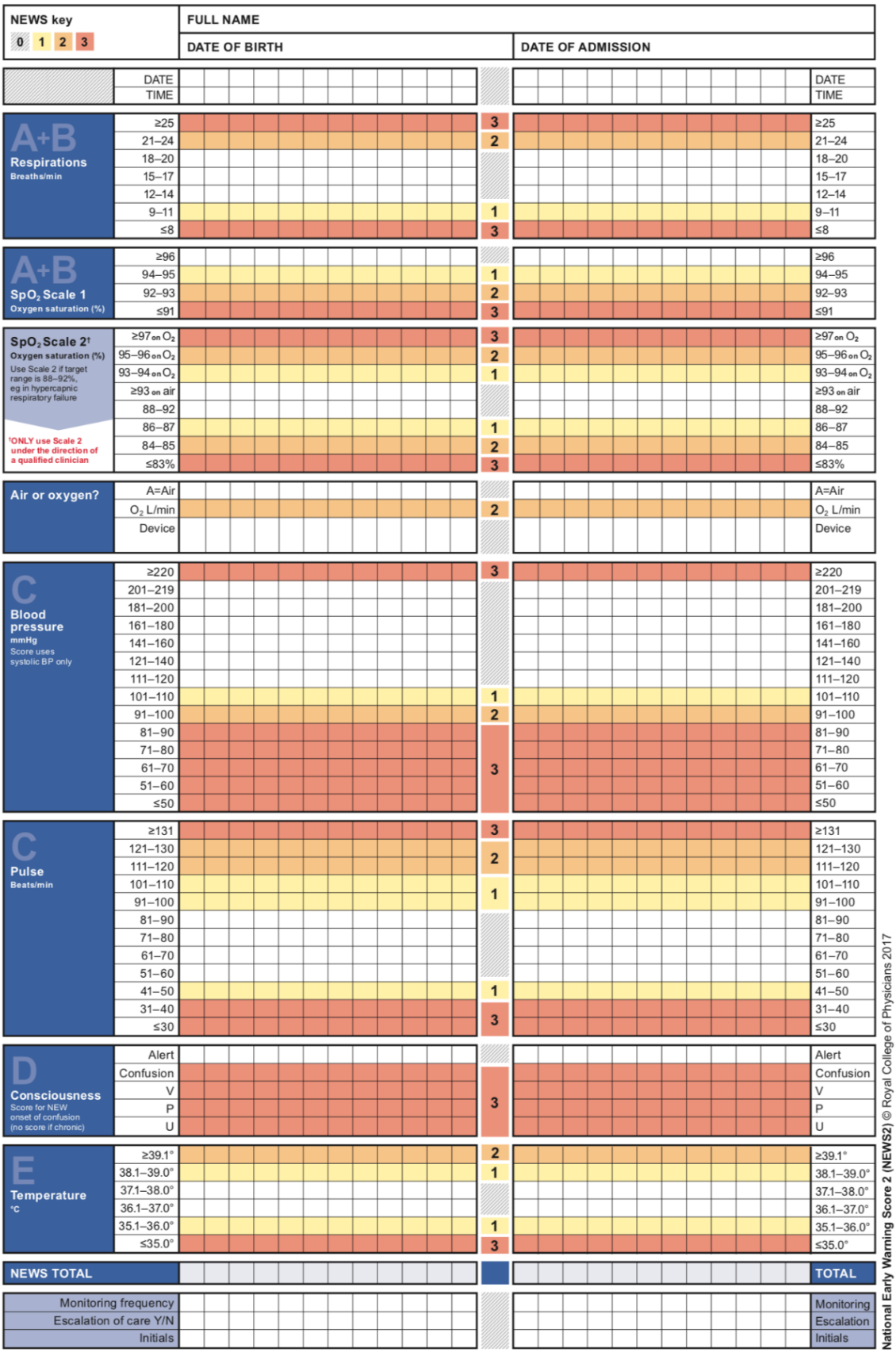
Appendix 1 - Paper-based NEWS tool



Appendix 2 - Paper-based NEWS2 tool



NEWS key 0 1 2 3	FULL NAME		DATE OF BIRTH		DATE OF ADMISSION	
	DATE / TIME					DATE / TIME
A+B Respirations Breaths/min	≥25	3				≥25
	21–24	2				21–24
	18–20					18–20
	15–17					15–17
	12–14					12–14
	9–11	1				9–11
	≤8	3				≤8
A+B SpO_2 Scale 1 Oxygen saturation (%)	≥96					≥96
	94–95	1				94–95
	92–93	2				92–93
	≤91	3				≤91
SpO_2 Scale 2† Oxygen saturation (%) Use Scale 2 if target range is 88–92%, eg in hypercapnic respiratory failure †ONLY use Scale 2 under the direction of a qualified clinician	≥97 on O_2	3				≥97 on O_2
	95–96 on O_2	2				95–96 on O_2
	93–94 on O_2	1				93–94 on O_2
	≥93 on air					≥93 on air
	88–92					88–92
	86–87	1				86–87
	84–85	2				84–85
	≤83%	3				≤83%
Air or oxygen?	A=Air					A=Air
	O_2 L/min	2				O_2 L/min
	Device					Device
C Blood pressure mmHg Score uses systolic BP only	≥220	3				≥220
	201–219					201–219
	181–200					181–200
	161–180					161–180
	141–160					141–160
	121–140					121–140
	111–120					111–120
	101–110	1				101–110
	91–100	2				91–100
	81–90	3				81–90
	71–80					71–80
	61–70					61–70
	51–60					51–60
	≤50					≤50
C Pulse Beats/min	≥131	3				≥131
	121–130	2				121–130
	111–120					111–120
	101–110	1				101–110
	91–100					91–100
	81–90					81–90
	71–80					71–80
	61–70					61–70
	51–60					51–60
	41–50	1				41–50
	31–40	3				31–40
	≤30					≤30
D Consciousness Score for NEW onset of confusion (no score if chronic)	Alert					Alert
	Confusion	3				Confusion
	V					V
	P					P
	U					U
E Temperature °C	≥39.1°	2				≥39.1°
	38.1–39.0°	1				38.1–39.0°
	37.1–38.0°					37.1–38.0°
	36.1–37.0°					36.1–37.0°
	35.1–36.0°	1				35.1–36.0°
	≤35.0°	3				≤35.0°
NEWS TOTAL						**TOTAL**
Monitoring frequency						Monitoring
Escalation of care Y/N						Escalation
Initials						Initials

National Early Warning Score 2 (NEWS2) © Royal College of Physicians 2017

Appendix 3 – The 19 criteria from the survey by Birken et al (2017) to assess how experts select a theory or framework

1. Analytic level, e.g. individual, organizational, system
2. Logical consistency/plausibility, i.e. inclusion of meaningful, face-valid explanations of proposed relationships
3. Description of a change process, i.e. provides an explanation of how changes in process factors lead to changes in implementation-related outcomes
4. Empirical support, i.e. use in empirical studies with results relevant to the framework or theory, contributing to cumulative theory-building
5. Generalizability, i.e. applicability to various disciplines, settings, and populations
6. Application to a specific setting (e.g. hospitals, schools) or population (e.g. cancer)
7. Inclusion of change strategies/techniques, i.e. provision of specific method(s) for promoting change in implementation-related processes and/or outcomes
8. Outcome of interest, i.e. conceptual centrality of the variable to which included constructs are thought to be related
9. Inclusion of a diagrammatic representation, i.e. elaboration in a clear and useful figure representing the concepts within and their interrelations
10. Associated research method (e.g. informs qualitative interviews, associated with a valid questionnaire or methodology for constructing one), i.e. recommended, or implied method to be used in an empirical study that uses the framework or theory

11. Process guidance, i.e. provision of a step-by-step approach for application
12. Disciplinary approval, i.e. frequency of use, popularity, acceptability, and perceptions of influence among a given group of scholars or reviewers, country, funding agencies, etc.; endorsement or recommendation by credible authorities in the field
13. Explanatory power/testability, i.e. ability to provide explanations around variables and effects; generates hypotheses that can be empirically tested
14. Simplicity/parsimony, i.e. relatively few assumptions are used to explain effects
15. Specificity of causal relationships among constructs, i.e. summary, explanation, organization, and description of relationships among constructs
16. Disciplinary origins, i.e. philosophical foundations
17. Falsifiability, i.e. verifiable; ability to be supported with empirical data
18. Uniqueness, i.e. ability to be distinguished from other theories or frameworks
19. Fecundity, i.e. offers a rich source for generating hypotheses
None of the above

Taken from: Birken, S. A. *et al.* (2017) 'Criteria for selecting implementation science theories and frameworks: Results from an international survey', *Implementation Science*, 12(1). doi: 10.1186/s13012-017-0656-y

Appendix 4 - Published protocol for the DECIDE study

The study protocol was accepted for publication in April 2019 in the *Journal of Advanced Nursing* (impact factor: 3.187, ranked 9/124 for nursing). The paper has been cited three times since publication.

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STATEMENT OF CO-AUTHORS of JOINT PUBLICATIONS

TO WHOM IT MAY CONCERN

Title of publication: DEveloping a Complex Intervention for DEteriorating Patients using Theoretical Modelling (DECIDE study): study protocol

Name of candidate: Duncan Smith

Title of research thesis: DEveloping a Complex Intervention for DEteriorating patients using theoretical modelling (DECIDE study).

Name of first supervisor: Professor Leanne M Aitken

We, the undersigned, co-authors of the above publication, confirm that the above publication has not been submitted as evidence for which a degree or other qualification has already been awarded.

We, the undersigned, further indicate the candidate's contribution to the publication in our joint statement below.

Signature:

Name: **Duncan Smith**

Date: April 2022

Signature:

Name: **Jill J Francis**

Date: April 2022

Signature:

Name: **Leanne M Aitken**

Date: April 2022

The candidate's contribution to the publication

Contribution	Author		
	Duncan Smith	Jill J Francis	Leanne M Aitken
Funding acquisition	✓	✓	✓
Conceptualisation	✓	✓	✓
Data collection	N/A	N/A	N/A
Data analysis	N/A	N/A	N/A
Drafting the manuscript	✓		
Editing the manuscript	✓	✓	✓
Approving the manuscript	✓	✓	✓

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PROTOCOL

JAN Leading Global Nursing Research WILEY

DEveloping a Complex Intervention for DEteriorating patients using theoretical modelling (DECIDE study): Study protocol

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Abstract

Aim: To develop a theory-based complex intervention (targeting nursing staff), to enhance enablers and overcome barriers to enact expected behaviour when monitoring patients and responding to abnormal vital signs that signal deterioration.

Design: A mixed method design including structured observations on hospital wards, field notes, brief, unrecorded interviews and semi-structured interviews to inform the development of an intervention to enhance practice.

Methods: Semi-structured interviews will be conducted with nursing staff using a topic guide informed by the Theoretical Domains Framework. Semi-structured interviews will be transcribed verbatim and coded deductively into the 14 Theoretical Domains Framework domains and then inductively into "belief statements". Priority domains will be identified and mapped to appropriate behaviour change techniques. Intervention content and mode of delivery (how behaviour change techniques are operationalized) will be developed using nominal groups, during which participants (clinicians) will rank behaviour change techniques/mode of delivery combinations according to acceptability and feasibility. Findings will be synthesised to develop an intervention manual.

Discussion: Despite being a priority for clinicians, researchers and policymakers for two decades, "sub-optimal care" of the deteriorating ward patient persists. Existing interventions have been largely educational (i.e. targeting assumed knowledge deficits) with limited evidence that they change staff behaviour. Staff behaviour when monitoring and responding to abnormal vital signs is likely influenced by a range of mediators that includes barriers and enablers.

Impact: Systematically applying theory and evidence-based methods, will result in the specification of an intervention which is more likely to result in behaviour change and can be tested empirically in future research.

KEYWORDS

afferent limb failure, behaviour, deteriorating patient, focused observation, national early warning score (news), nursing, rapid response system, theoretical domains framework (TDF)

1 | INTRODUCTION

Since a seminal paper that reported "sub-optimal care" of deteriorating ward patients was published two decades ago (McQuillan et al., 1998), the recognition of and response to, a deteriorating patient in a hospital ward has been a priority of clinicians, academics and policy-makers. Patients who deteriorate are at risk of adverse outcomes such as cardiac arrest, unplanned intensive care admission and death (Calzavacca et al., 2010; Tirkkonen et al., 2013). These endpoints are frequently preceded by a period of physiological deterioration reflected by changes in vital signs, including: heart rate, respiratory rate, blood pressure, temperature, oximetry and level of consciousness (Goldhill & McNarry, 2004; Kause et al., 2004).A delay in the recognition of, or response to, these physiological antecedents increases the likelihood of a patient reaching an adverse outcome (Boniatti et al., 2014).

2 | BACKGROUND

2.1 | Rapid response system

To facilitate a timely and clinically appropriate response to patient deterioration, healthcare organizations have implemented rapid response systems (RRS) in the UK, North America and Australasia (DeVita et al., 2006; Johnstone, Rattray, & Myers, 2007). Despite differences in the how these services have been operationalized, the characteristics are often similar. RRS frequently have an afferent and an efferent limb (DeVita et al., 2006) (Figure 1). In this context, "limb" refers to a sequence of actions performed in a specified timeframe. Expected afferent limb behaviours include monitoring a patient's vital signs, recognizing abnormality (which signals deterioration) and notifying a more senior or expert clinician (termed escalation), in a specified timeframe (DeVita et al., 2006; Lyons, Edelson, & Churpek, 2018). The mode of notification could include any combination of face-to-face communication, telephone communication and use of technology, for example, a hospital pager system (DeVita et al., 2006; Lyons et al., 2018; Smith, 2010). These behaviours are typically enacted by nursing staff including Registered Nurses, preregistration nursing students and healthcare assistants (Mackintosh, Humphrey, & Sandall, 2014; Smith & Aitken, 2016). The *efferent limb* of the RRS includes all actions that follow escalation performed by the responder/s (DeVita et al., 2006). Efferent limb behaviours include performing additional patient assessment, initiating treatment or stabilizing interventions and facilitating a transfer of the patient to a higher care setting for example a critical care unit (Bannard-Smith et al., 2016; DeVita et al., 2006; Lyons et al., 2018).

2.2 | Track and trigger tools

To enhance the *afferent limb* of the RRS, "track and trigger" tools have been widely implemented to facilitate identification of patients with deranged physiology requiring escalation. From the tools available, aggregate scoring track and trigger charts (also known as early warning scoring tools) appear to most reliably predict patients at greatest risk (Smith, Prytherch, Schmidt, & Featherstone, 2008). Specifically, the National Early Warning Scoring (NEWS) tool is advocated as the "gold standard" in the UK context (Royal College of Physicians, 2017; Smith, Prytherch, Meredith, Schmidt, & Featherstone, 2013).

A key element of all track and trigger charts is to prompt nursing staff carrying out the clinical observations to increase the frequency of monitoring and to escalate. For NEWS, if the aggregate score generated from a complete set of vital signs (possible range: 0–20) equates to medium (score of 5 or 6 points) or high risk (exceeding 7), nurses are prompted to escalate (Royal College of Physicians, 2017). Despite escalation protocols or algorithms being explicitly linked to the track and trigger tool, there

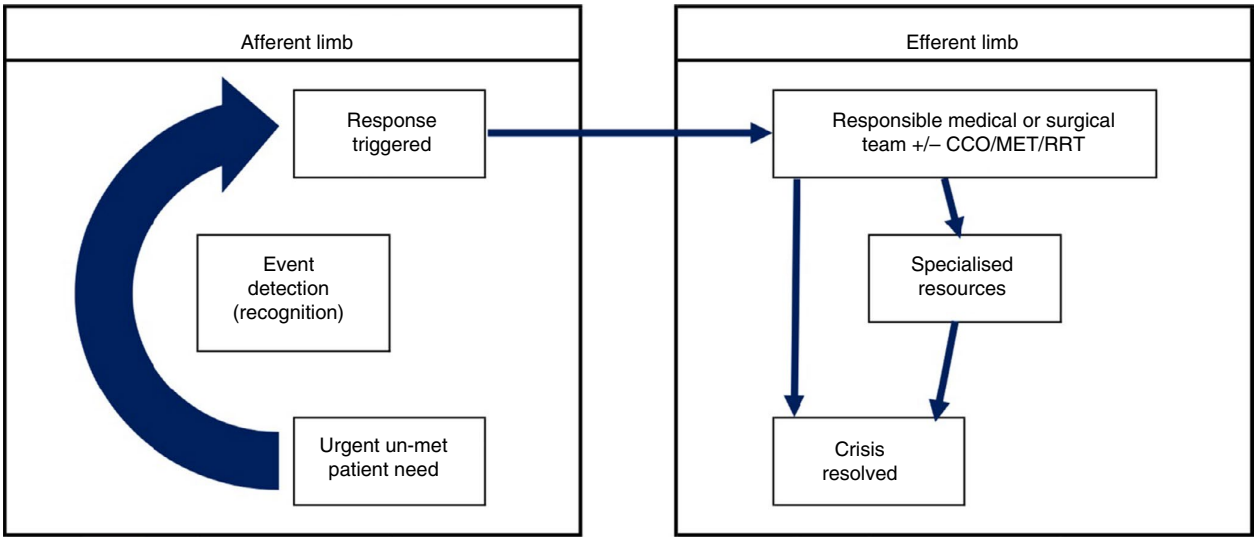

FIGURE 1 Conceptual model of the rapid response system (RRS). [Colour figure can be viewed at wileyonlinelibrary.com]

is evidence that nursing staff are failing to change their behaviour and increase the frequency of monitoring (Hands et al., 2013; Kolic, Crane, McCartney, Perkins, & Taylor, 2015; Smith & Aitken, 2016)and escalate care, despite the relevant criteria being met (Odell, 2015; Shearer et al., 2012; Tirkkonen et al., 2013). This is described as "afferent limb failure" (ALF) (Johnston, Arora, King, Stroman, & Darzi, 2014; Trinkle & Flabouris, 2011).

2.3 | Afferent limb failure

Afferent limb failure poses (ALF) a significant threat to hospitalized patients. Despite this, the reasons for ALF remain poorly understood. Gaps in the existing body of knowledge were reported in a recently published integrative review of international studies related to nurses' recognition and response to deteriorating patients (Massey, Chaboyer, & Anderson, 2017). From the review, no studies were identified that explored how nurses monitor patients, how effective they are at monitoring or how nurses use vital signs to recognize and respond to patient deterioration. Theorizing and modelling the causal pathway to ALF using a behavioural focus will address this knowledge gap. It will also allow the development of specific interventions aimed at modifying behaviours that are proximal antecedents to ALF.

2.4 | The theoretical domains framework of behaviour change

A published scoping review identified 83 different theories of behaviour and behaviour change (Davis, Campbell, Hildon, Hobbs, & Michie, 2014). Many of these theories are complex, making their use challenging for multidisciplinary research teams and researchers without a background in health psychology (Michie et al., 2005). Furthermore, several of the constructs proposed in these theories are overlapping or related in meaning, making it difficult for researchers to identify which theory or construct is most appropriate for investigating a particular behavioural problem (Michie et al., 2005). In 2005, a group of cross-disciplinary experts used a consensus approach to synthesize 33 theories and 128 theoretical constructs to form an integrative framework (Michie et al., 2005) which became known as the Theoretical Domains Framework (TDF). Following further refinement, a second iteration of the TDF comprising 14 domains (Figure 2) was validated (Cane, O'Connor, & Michie, 2012). The benefits of using the TDF to address behavioural problems include: its accessibility to researchers who lack expertise in health psychology or social sciences (Wilkinson et al., 2015); breadth of underpinning theory; and the broad coverage offered by the 14 domains that allows a wide range of barriers and enablers to identify behaviour change (Atkins et al., 2017; French, Green, O'Connor, McKenzie, & Francis, 2012; Wilkinson et al., 2015). Since its inception, a growing body of international research has emerged using the TDF to assess behavioural problems and develop behaviour change interventions targeting clinical staff (Craig et al., 2017; Roberts, Hooper, Lorencatto, Storr, & Spivey, 2017; Sargent, McCullough, Del Mar, & Lowe, 2017).

3 | THE STUDY

3.1 | Aim

The aim is to develop a theory-based complex intervention to enhance enablers and overcome barriers to perform expected afferent limb behaviours (e.g. monitoring patients and responding to abnormal vital signs).

3.1.1 | Objectives

1. To compare behaviours observed in the hospital wards with the expected behaviours (as specified in local policy and national guidelines).
2. To identify where ALF is occurring in the sequence of observed behaviours and to offer theoretically formulated explanations for it.
3. Based on the theoretically formulated explanations, to develop a complex intervention to target behaviours associated with ALF and assess the acceptability of the intervention to staff prior to feasibility testing (to be conducted as a separate study).

3.2 | Design

Research will be conducted in three phases:

1. Structured observation and brief (unrecorded) interviews used to identify the causal pathway to ALF (addressing objective 1).
2. The Theoretical Domains Framework (TDF) will be used to investigate factors perceived by staff to influence their afferent limb behaviour (addressing objective 2).
3. The content (behaviour change techniques) and modes of delivery (e.g. face-to-face group training sessions, digital intervention) for the complex intervention will be informed by nominal groups with clinical stakeholders (addressing objective 3).

3.3 | Recruitment and sampling

3.3.1 | Phase 1

Recruitment will occur in a metropolitan teaching hospital in the UK. A minimum of two acute wards will be identified using local data. To elicit a wide range of enablers and barriers to afferent limb behaviour, contrasting wards will be recruited using criteria listed below:

Ward 1

- No reported adverse incidents involving patient harm associated with ALF in the past 12 months;
- High numbers of timely referrals to the local rapid response team.

TDF (v2) domain *	Content of the domain and *Plain-English explanation* †
1. Knowledge	An awareness of the existence of something *What do they know and how does that influence what they do?*
2. Skills	An ability or proficiency acquired through practice
3. Social/Professional role and identity	A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting *How does who they are as a Health Care Provider influence whether they do something or not?*
4. Beliefs about Capabilities	Acceptance of the truth, reality or validity about an ability, talent or facility that a person can put to constructive use *Do they think they can do what they should do and how does that influence whether they do it or not?*
5. Optimism	The confidence that things will happen for the best or that desired goals will be attained *The confidence that things will happen for the best or that desired goals will be attained*
6. Beliefs about Consequences	Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation
7. Reinforcement	Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus *How have their experiences (good and bad) of doing it in the past influence whether or not they do it?*
8. Intentions	A conscious decision to perform a behaviour or a resolve to act in a certain way *How does how inclined they are to do something influence whether they will do it?*
9. Goals	Mental representations of outcomes or end states that an individual wants to achieve *How important is what they do and does that influence whether or not they do it? What standards are they trying to reach, how does that influence whether or not they do it?*
10. Memory, Attention and Decision Processes	The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives
11. Environment, Context and Resources	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence and adaptive behaviour *What are the things in their environment that influence what they do and how do they influence?*
12. Social Influences	Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviour *What do others think of what they do? Who are they and how does that influence what they do?*
13. Emotion	A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event *How do they feel about what they do and do those feelings influence what they do?*
14. Behavioural Regulation	Anything aimed at managing or changing objectively observed or measured actions *Do they have strategies that have/do enable them to enact the behaviour?*

FIGURE 2 Domains and content of the theoretical domains framework (TDFv2). *: Atkins et al., *(2017); †: Additional file 3 from Presseau et al., (2017).

Ward 2

- Will have reported 1 or more adverse incidents involving patient harm associated with ALF in the past 12 months;
- Low numbers of timely referrals to the local rapid response team.

This information is routinely presented at the hospital's deteriorating patient steering committee meeting. Permission has been granted to use these data to identify target wards. One hundred and eighty hours of fieldwork is proposed during the period of structured observation. This duration has been informed by published observational studies of similar focus and methods (Gillespie, Wallis, & Chaboyer, 2008; Mackintosh et al., 2014). Using a small sample of wards will allow the researcher to become immersed in each and ensure a "thick description" of the setting and participant behaviour (Nannan Panday, Minderhoud, Alam, & Nanayakkara, 2017; Reeves, Kuper, & Hodges, 2008). This will also mitigate observer effects thereby increasing the likelihood that participants habituate to the researcher's presence (Pope, 2005). Senior nurses and ward managers for the selected wards will be issued with written information. If senior nurses do not give permission for their staff to be approached, the researcher will return to the local data to identify alternative wards.

A purposive sample (balance of clinical banding) of nursing staff will be recruited. Participants will be shadowed and observed, during a clinical shift, performing behaviours associated with the afferent limb, by one researcher (DS) with extensive clinical experience. There is evidence that frequency of monitoring and nursing staff compliance with escalation protocols decreases at night and during weekends (Hands et al., 2013; Kolic et al., 2015). Therefore, observation will be carried out during weekdays, weekends and overnight.

3.3.2 | Phase 2

A subset of staff (observed in phase 1) will be selected for a semi-structured interview. Some staff will have been observed enacting expected afferent limb behaviour; whilst others will have been observed not responding as expected (i.e. not seen to respond at all or seen to enact an unexpected behaviour).Data saturation will be determined as follows: (a) an *initial analysis sample* of 10 interviews will be conducted with nursing staff; (b) data from the *initial analysis sample* will be analysed and coded by two members of the research team; (c) a *stopping criterion* of three will be used, meaning that saturation will be achieved when no new themes were identified from three subsequent consecutive interviews (Francis et al., 2010).

3.3.3 | Phase 3

Two nominal groups are planned, each including a purposive (balance of clinical discipline and banding) sample of 8–12 participants. This has been informed by published studies where nominal group techniques were used (Dening, Jones, & Sampson, 2013; Varga-Atkins, Bunyan, Fewtrell, & McIsaac, 2011; Williams, White, Klem, Wilson, & Bartholomew, 2006). Nursing staff from the two participating wards will be recruited for group 1 and members of the hospital's deteriorating patient steering committee (membership includes: medical staff, nurse managers, nurse educators and members of the local rapid response team) for group 2. These two separate groups will be selected to reduce the likelihood that an imbalance in power between participants has a negative impact on the group dynamic (Shaha, Wenzel, & Hill, 2011). Permission to electronically invite staff to participate will be sought from the ward managers and the committee Chair.

3.4 | Materials

3.4.1 | Structured observation guide

A documentary analysis of local deteriorating patient policy (Smith, Sekhon, Francis, & Aitken, 2019) will give information about expected nursing staff behaviour, in relation to "who should do what, to whom, when, where and how" (Michie, 2004). A structured observation guide will be developed (as described by Roller & Lavrakas, 2015) using these policy-specified behaviours. Policy-specified behaviours will be summarized as "key moments" (signals to the researcher during fieldwork, to observe a behaviour and/or to carry out a brief interview) by one member of the research team (DS) with considerable experience in managing deteriorating patients. Key moments will be reviewed for appropriateness and clinical accuracy by a second member of the research team (LMA – a clinician with expertise in critical care research) and members of the hospital's rapid response team.

Field journal

A field journal will be maintained throughout the observation period to record observational data (Tracy, 2013) including:

1. Contextual detail related to key moments (who, what, where, when, how)
2. If, during the key moment, the expected behaviour was observed
3. Whether an alternative behaviour was observed instead – "unexpected behaviour"

Brief interviews with participants (following a key moment) will also be paraphrased in the field journal (Gillespie et al., 2008). Field notes will inform the questions asked during subsequent semi-structured interviews (particularly in relation to which specific afferent limb behaviours should be explored). As a Registered Nurse, with experience of managing deteriorating patients, the researcher will need to maintain a high level self-awareness and situational awareness during data collection activities (attributes promoting "reflexivity") (Tracy, 2013; Vindrola-Padros & Vindrola-Padros, 2018). To promote self-awareness and to allow transparency in later reporting of research outputs, the researcher's feelings, reactions and perceptions will also be recorded in the field journal as "reflexive notes" (as advised by Roller & Lavrakas, 2015).

The observation guide and field journal will be piloted for 1 week and revised thereafter. During the pilot work, key moments, field notes and reflexive notes will be presented to two members of the research team (a professor of critical care and an implementation scientist), allowing data collection decisions to be challenged and defended thus enabling revisions to the structure and content of the field journal.

Interview topic guide

An interview topic guide will be developed in collaboration with the research team (DS, LMA, JJF). The guide will be based on the 14 theoretical domains of the TDF (Atkins et al., 2017; Roberts et al., 2017; Sargent et al., 2017).Questions will be written broadly to explore the barriers and enablers to all behaviours recognized to be part of the afferent limb for example, monitoring and recording vital signs, calculating NEWS, escalating to an appropriate clinician (Lyons et al., 2018). The interview guide will be piloted with nursing staff from a non-participating ward to ensure it is comprehensive and it makes clinical sense. Any revisions will be made prior to fieldwork. Observational and brief-interview data (from phase 1) will provide insight into which *specific* afferent limb behaviours are not consistently being enacted. Based on these observations, the topic guide will be revised iteratively to include additional, more focused questions targeting specific behaviours that need to be changed.

Nominal group materials

An information package will be developed for nominal group participants and issued prior to the nominal group meetings. The package will describe phases 1 and 2 of the research and will contain the list of behaviour change techniques (BCTs) synthesized from the mapping of priority TDF domains to the BCT taxonomy (Michie et al., 2013). The information package will be developed in collaboration with the research team (DS, LMA, MC) and reviewed by patient advisors. Documents have been developed (Data S1) for individual participants to rank the acceptability (how well accepted the intervention component would be by recipients) and feasibility (how easily or conveniently the intervention component could be operationalized) of the selected BCT/mode of delivery combinations (Harvey & Holmes, 2012; Martins, Taylor, Morgan, & Fern, 2017; McMillan et al., 2014).

3.5 | Data collection

3.5.1 | Phase 1 – theorizing the evidence–practice gap

Data collection strategies will include structured observation (on hospital wards), field notes and brief, unrecorded interviews with staff (conducted by DS). Using a structured observation guide, observation will focus on key moments when afferent limb behaviours should occur. These key moments will be identified from the literature and a documentary analysis of local deteriorating patient policy (Smith et al., 2019), making data collection focused and deductive (Cruz & Higginbottom, 2013; Tracy, 2013).

Phase 2 – modelling the complex intervention

Semi-structured interviews will be conducted (by DS) with the same participants. Given the clinical context of the research, the timing of the interview will be negotiated with the participant. Interviews will explore the factors that are perceived by staff to have influenced the observed behaviour. An interview topic guide will be developed using the TDF (Cane et al., 2012; Francis, O'Connor, & Curran, 2012) and revised iteratively based on phase 1 field data. Interviews will be held in a private room, separate from the ward and digitally audio-recorded to enable transcription.

The priority domains for behaviour change will be identified through consensus discussion with the research team which comprises researchers with expertise in critical care nursing (LMA, DS) and implementation science (MC)using criteria reported in previously published work where the TDF was used (Atkins et al., 2017; Francis et al., 2010; Islam et al., 2012).Priority domains will be mapped to an appropriate taxonomy of behaviour change techniques (BCTs) (Michie et al., 2013) using a systematic method. BCTs are considered the "active ingredients" of an intervention that bring about the change in behaviour (Michie, Atkins, & West, 2014).The mapping process will furnish a preliminary list of possible techniques that may be used in combination as part of the complex intervention (Cane, Richardson, Johnston, Ladha, & Michie, 2015; French et al., 2012; Michie, Johnston, Francis, Hardeman, & Eccles, 2008). Example BCTs are provided in Figure 3.

Phase 3 – deciding the content and mode of delivery

The behaviour change intervention literature distinguishes between the content of an intervention (i.e. the replicable components such as BCTs) and its mode of delivery (i.e. how those BCTs are delivered to intervention recipients) as some modes of delivering BCTs will be considered more acceptable in the local context (Michie et al., 2008). As such, the final content and mode of delivery will be informed by two nominal groups with clinical staff. The nominal groups will be facilitated by members of the research team (DS, LMA).

The structure and procedure for the nominal groups, informed by published studies where nominal groups were used (Dening et al., 2013; McMillan, King, & Tully, 2016; Varga-Atkins et al., 2011), will be as follows: (a) before the group convenes, participants will be sent the information package; (b) on arrival, the purpose, ground rules and structure of the group will be explained to the participants; (c) participants will be asked: *"Are there any other ways to deliver the BCTs from the list in my organisation, that were not included in the information package?"* and given time to individually respond to the question (and document their response on "sticky" notes); (d) all participants will be invited to openly share their responses (these will be displayed to the group) and to discuss, clarify and dispute the additional BCT/mode combinations; (e) participants will work together to sort and group "sticky" notes to generate agreed themes and priorities; (f) participants will be asked to select the five BCT/mode combinations that are most acceptable and individually rank them from 1 (most acceptable) to 5; (g) participants will be then asked to select the five

Example BCTs	Description
Goal Setting	Set or agree on a goal defined in terms of the behaviour to be achieved.
Self-monitoring of behaviour	Establish a method for the person to monitor and record their behaviour(s) as part of the behaviour change strategy.
Social Support (unspecified)	Advise on, arrange or provide social support (e.g., from friends, relatives, colleagues, buddies or staff) or non-contingent praise or reward for performance of the behaviour.
Instruction on how to perform a behaviour	Advise or agree how to perform the behaviour.
Salience of consequences	Use methods specifically designed to emphasise the consequences of performing the behaviour with the aim of making them more memorable.
Social comparison	Draw attention to others' performance to allow comparison with the person's own performance.
Prompts/cues	Introduce or define environmental or social stimulus with the purpose of prompting or cueing the behaviour. The prompt or cue would normally occur at the time or place of performance.
Habit reversal	Prompt rehearsal and repetition of an alternative behaviour to replace an unwanted habitual behaviour.
Credible source	Present verbal or visual communication from a credible source in favour of or against the behaviour.
Social reward	Arrange verbal or non-verbal reward if and only if there has been effort and/or progress in performing the behaviour.
Reduce negative emotions	Advise on ways of reducing negative emotions to facilitate performance of the behaviour.
Re-structuring the physical environment	Change, or advise to change the physical environment in order to facilitate performance of the wanted behaviour or create barriers to the unwanted behaviour (other than prompts/cues, rewards and punishments).
Identification of self as role model	Inform that one's own behaviour may be an example to others.
Self-talk	Prompt positive self-talk (aloud or silently) before and during the behaviour.
Imaginary reward	Advise to imagine performing the wanted behaviour in a real-life situation followed by imagining a pleasant consequence.

FIGURE 3 Fifteen example behaviour change techniques (BCTs) with descriptions.

BCT/mode combinations that are most feasible for local implementation and individually rank them from 1 (most feasible) to 5.

3.6 | Data analysis

3.6.1 | Phases 1 and 2

Analysis of field notes and transcripts of semi-structured interviews will be both deductive and inductive and will broadly follow Gale's , Heath, Cameron, Rashid, and Redwood (2013) "framework method" using the following steps: (a) transcripts will be reviewed for accuracy, revised where necessary and de-identified; (b) initially, data will be deductively coded according to the TDF domains; (c) utterances (sections of transcribed text reflecting responses from participants) in each domain will then be inductively sorted and grouped with other similar statements; (d) a "belief statement" will be synthesized to summarize the group of similar utterances (Islam et al., 2012; Roberts et al., 2017); (e) to develop robust and defensible coding, belief statements will be reviewed by an independent member of the research team (MC) to ensure that they adequately represent the utterances grouped beneath them. Any disagreements will be reconciled through consensus discussion (Roberts et al., 2017); (f) for each belief statement, the frequency of utterances (including those where the domain is perceived to be a barrier to afferent limb behaviour and those where the domain is perceived to be an enabler to afferent limb behaviour) will be recorded. This will help identify domains that are potentially "controversial" that is, where there are conflicting beliefs expressed by one participant or between different participants. In this context, frequency will refer to the number of different participants who mention the theme (as opposed to the number of times mentioned). Any participant utterances where a domain is suggested to be particularly influential will also be highlighted that is, if the participant uses emphatic language to report the influence on behaviour for example, "yes getting feedback is really, really important to me". This information and the frequency of utterances, will be of particular importance when agreeing priority domains to target in subsequent phases of the research (Islam et al., 2012; Patey et al., 2012).

3.6.2 | Phase 3

Through discussion, debate and review, the research team (DS, LMA, MC) will shortlist a final list of BCT/mode of delivery combinations.

BCT/mode combinations that were ranked highly and/or frequently by the nominal group participants will be considered first by the research team during this process. Where there are significant discrepancies between the two groups, the research team will review the notes taken during the nominal groups (individually by participants and by the facilitator during the gathering of group ideas) to agree the final list of BCT/mode of delivery combinations. From the final list, an intervention manual will be developed by the research team and patient advisors which will include detail on how the intervention components will be operationalized during subsequent feasibility testing.

Ensuring rigour in data analysis

Ten per cent of transcripts (from semi-structured interviews) will be randomly selected and coded independently by two clinical members of the research team (DS, LMA). A codebook will be developed to include key codes, definitions and exemplars (Gale et al., 2013; Tracy, 2013). Both researchers will meet to compare coding and calculate percentage agreement. The codebook will be reviewed iteratively, and the codes/definitions discussed and refined. Where consensus cannot be easily attained, an implementation scientist (MC) will be consulted. This process will be repeated until the calculated level of inter-coder agreement reaches 60% (Atkins et al., 2017; Landis & Koch, 1977) and both coders verbally agree on the codes/definitions. After inter-coder reliability has been demonstrated, all subsequent coding will be performed independently by one researcher (DS). Any additional uncertainties that arise during the independent coding process will be reconciled through consensus discussion with the research team (DS, LMA, MC).

4 | ETHICAL CONSIDERATIONS

4.1 | Procedure for consent

The researcher will contact ward managers, via email, to obtain permission to visit their wards and speak to staff. Once permission from ward managers has been given, the researcher will attend handover meetings and staff "huddles" to give verbal and written information to nursing staff on the goals and scope of the research. These interactions will take place over a period of 2–3 weeks, to ensure that all staff receive information about the study and are aware of how data will be collected and when these activities are planned. The researcher's email address will be shared with staff so that they can make contact individually and confidentially to request further information about the research. Consent will be managed using both "opt out" and "opt in" approaches.

4.1.1 | Phase 1

"Opt out" approaches have been cited as beneficial in obtaining more diverse and less biased sampling in studies considered to be low risk to participants (Junghans, Feder, Hemingway, Timmis, & Jones, 2005; Krousel-Wood, Muntner, Jannu, Hyre, & Breault, 2006; Vellinga, Cormican, Hanahoe, Bennett, & Murphy, 2011). Phase 1 of this study is considered low risk because (a) participants are staff who can opt out at any stage; (b) participants will be observed carrying out normal activities that is, activities considered part of their job role; (c) no direct audio or video recordings of staff will be made during their normal work activities. In addition, as the observation focuses on specific staff behaviours, the opt out approach in this context should enable the researcher to be time-efficient (several staff could be observed in one clinical shift); reduce the frequency of periods where no staff are enacting behaviours of interest (therefore reducing redundant collection); and ensure that the research runs to the proposed timeline. During phase 1, a range of strategies will be used to allow staff to opt out (e.g. staff can prospectively and privately complete an opt out form and deposit it in a locked box in the staff room). For further details of opt out strategies and a copy of the opt out form, see Data S2.

Phase 2

Following the observations, participants will be invited to take part in an individual interview. Contact with potential participants will be made by the researcher on an ad-hoc basis during observation. Only staff who volunteer and opt in will be interviewed. Participants will be given written and verbal information about the interview (by the researcher) and will be asked to sign a consent form before they participate. Voluntariness of participation will be stressed on the consent form. Participants will also be asked for their consent to use direct quotations in outputs of this research.

Phase 3

Participants from phases 1 and 2 will be invited (via email) to attend a nominal group meeting in phase 3 of the study. These staff will be contacted initially at least 2 months prior to the date when the nominal groups are scheduled. Reminder emails will be sent 1 week prior to the group. Staff who voluntarily opt in will be sent an information package not later than 1 week prior to the group. All participants will be required to sign a consent form.

4.2 | Patient safety

Patients will not be recruited as they are not the target participants of this research (participants are nursing staff). It is plausible that patients will not want the nurse caring for them to be observed, particularly when the nurses are engaged in patient-facing activities for example, measuring vital signs. Hence, patients will be notified verbally by the researcher and/or the member of nursing staff when the researcher is present on the ward. This information will also be displayed on laminated signs around the ward when the researcher is present and observing staff. If a patient and/or visitor indicates that they are unhappy with their nurse being observed, then the researcher will withdraw and will ensure that they do not observe participants (staff) when they are in that patient's bed area.

It is possible that the researcher will observe clinical practice that is considered unsafe and does not adhere to local policy and procedure for example, a patient with clear signs of physiological deterioration not receiving an appropriate response. An'escalation protocol' for the researcher to follow in this situation has been devised and agreed by appropriate hospital staff. It is also plausible that a participant will make a disclosure during an interview that pertains to overt patient harm or an issue of safeguarding. Participants will be informed – at the beginning of the interview – that in these circumstances the researcher may need to notify their line manager so that further investigation can take place. If such a disclosure is made, the researcher will signal this in the interview and offer the participant the opportunity to be part of this conversation.

4.3 | Research governance

This research protocol was independently reviewed by the local Research Ethics Committee (REC) held in the sponsor organisation (a higher education institution); and a full National Health Service REC. Favourable opinion and permissions to conduct all three phases of the research were granted in August 2018 (REC ref: PhD/18-19/03) and October 2018 (REC ref: 18/NS/0118) respectively. Local (hospital level) permissions from the Research and Development department were granted in November 2018 (R&D ref: 18/0569).

5 | DISCUSSION

In this paper, we report a replicable method for developing a behaviour change intervention to improve responses to an elevated NEWS. Despite the level of attention that ALF has attracted from clinicians, health service researchers and policy-makers, the problem of "sub-optimal care" of the deteriorating ward patient persists, over two decades after it was first described (Findlay, Shotton, & Mason, 2012; McQuillan et al., 1998; NCEPOD, 2018). Many of the existing interventions targeting ALF are educational and appear to have been developed based on a *tacit* assumption that a lack of staff "knowledge" and "skills" are the major barriers to afferent limb behaviour (Connell et al., 2016; Lyons et al., 2018). In a systematic review, conducted to report the effectiveness of educational interventions at improving responses to deteriorating patients, only two studies from the sample (n = 23) attempted to measure directly the association between education and patient outcomes (Connell et al., 2016). One study, reported no significant difference in staff awareness of risk, 30-day patient mortality and 180-day patient mortality, following a 1-day multidisciplinary educational intervention (Fuhrmann, Perner, Klausen, Østergaard, & Lippert, 2009). At present, the evidence supporting educational programmes as effective interventions to change clinical staff's afferent limb behaviour remains equivocal. Additionally, there is increasing acknowledgement that when enacting behaviours of the afferent limb, staff behaviour is likely influenced by a range of different mediators (barriers and enablers) that is, it is unlikely that a lack of knowledge and skills are the only barriers to afferent limb behaviour (Chua et al., 2017; Connell et al., 2016; Rihari-Thomas, DiGiacomo, Phillips, Newton, & Davidson, 2017).

The 14 domains of the TDF provide broad coverage of the potential barriers and enablers to behaviour change (Atkins et al., 2017). Systematically applying the TDF, using the methods described, should advance our understanding of why ALF persists and enable the development of a theory-based intervention which is more likely to result in behaviour change and can be tested empirically in future research (Craig et al., 2008).

5.1 | Limitations

The research required to develop this intervention will be undertaken in one metropolitan teaching hospital. We acknowledge that the barriers and enablers to afferent limb behaviour may vary between organizations and that following local feasibility testing, further multisite work would be required if larger scale-up were to be considered.

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CONFLICT OF INTEREST

No conflict of interest has been declared by the author(s).

AUTHOR CONTRIBUTIONS

All authors have agreed on the final version that met at least one of the following criteria (recommended by the ICMJE [http://www.icmje.org/recommendations/]):

- substantial contributions to conception and design, acquisition of data or analysis and interpretation of data;
- drafting the article or revising it critically for important intellectual content.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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Appendix 5 - Structured observation guide used during focused ethnography in phase 1 data collection

Key moment	Expected (policy-specified) afferent limb behaviour	Likely mode of data collection
Monitoring vital signs (Routine monitoring)	– When the patient's NEWS is 0, the RN/HCA should measure at least 1 full set of vital signs over the course of a shift (day or night)	– Review of NEWS chart (paper or electronic) by the researcher – Direct observation of staff using electronic/manual equipment to measure vital signs
	– When the patient's NEWS is low risk (1-4), the RN/HCA should measure vital signs 4 hourly (at minimum)	– Review of NEWS chart (paper or electronic) by the researcher – Direct observation of staff using electronic/manual equipment to measure vital signs
Monitoring vital signs (Responsive monitoring)	– After recording a NEWS ≥5, the frequency of vital signs monitoring should be increased to a minimum of 1 hourly measurements	– Review of NEWS chart (paper or electronic) by the researcher – Direct observation of staff using electronic/manual equipment to measure vital signs
	– Monitoring of vital signs is initiated/increased due to a non-NEWS related trigger e.g. patient reports feeling unwell or returns from the operating theatre	– Direct observation of staff using electronic/manual equipment to measure vital signs
Recording vital signs and calculating the National Early Warning Score (NEWS)	– Every time an HCA/RN measures vital signs, all 6 parameters should be recorded accurately and contemporaneously	– Review of NEWS chart (paper or electronic) by the researcher – The respiratory rate on the chart/EHRS should consistently match the respiratory rate counted at the bedside
	– Every time an HCA/RN measures vital signs, an accurate NEWS should be calculated (this is automated on the EHRS)	– Review of NEWS chart (paper or electronic) by the researcher
	– NEWS uplifted by 2 points for patients visibly on oxygen therapy	– Review of NEWS chart (paper or electronic) by the researcher
	– NEWS uplifted by 3 points for patients with new confusion	– Review of NEWS chart (paper or electronic) by the researcher

Escalation (Within the ward-based nursing team e.g. informing another member of nursing staff)	– If the HCA is measuring the vital signs and the NEWS is elevated (i.e. ≥5), the HCA escalates to the RN so that they can perform further assessment	– Seeing/overhearing a conversation between HCA and RN
	– If a RN is notified about a patient with an elevated NEWS (i.e. ≥5), he/she responds by performing further bed-side assessment e.g. further vital signs monitoring, ABCDE assessment	– RN seen going to the bedside of a patient who has been escalated by an HCA
	– All patients identified as at risk (i.e. with raised NEWS) require a RN to inform the nurse in charge and decide on the escalation needed	– Seeing/overhearing a conversation between RN and NIC
Escalation (Outside of the ward-based nursing team e.g. informing a doctor or the CCOT).	– When escalating an elevated NEWS, communication between RNs and other responders is structured using the 'ISBARD' communication tool	– Seeing/overhearing a conversation between RN and doctor and/or CCOT
	– After recording a NEWS ≥5, the RN should escalate to the parent medical team +/- CCOT +/- night nurse practitioners	– Seeing/overhearing a conversation between RN and doctor and/or CCOT and/or night nurse practitioner, following an episode of patient monitoring/escalation. Note if this is opportunistic (i.e. responder already on the ward) or deliberate/overt (i.e. responder contacted from another location in the hospital)
	– If, following escalation by a RN, the initial responder does not/is unable to attend in the time specified in Trust policy (i.e. no greater than 30 minutes from referral for medium-risk patients, and no greater than 15 minutes from referral in high-risk patients) then further escalation should be carried out	– Seeing/overhearing a conversation between RN and doctor and/or CCOT

Appendix 6 - Field journal template used to record field data during phase 1

Location: T09N/T08	Date:	Start time:

No.	**Key moment** that cued the observation **Note the time of the key moment*	Staff enacting the behaviour (Actor)	**Description of the observed event (or an account of the event as described in retrospect by a participant)** • *Who did (or said) what, to who, when, where, how, and with whom?* • *Context* - what else was going on in the ward area? • *General mood* - what? How was this conveyed? By whom?	**Response to brief questioning** by the researcher. **Note time of brief questioning*
	Time_____ Direct observation □ Retrospective account □ Chart review □	HCA RN Band__ *Uniform:* Navy Royal blue Light green Dark green Bank/agency Substantive		Time_____

Reflexive notes:

Follow up actions (e.g. follow-up staff member for TDF interview):

Researcher interventions:

Appendix 7 - Interview topic guide for healthcare assistant participants (structured according to the TDF)

Question number	Afferent limb behaviour (measuring vital signs; recording and scoring using NEWS; escalating)	Example questions and prompts	Comments
		Knowledge	
1.	Measuring, recording, and escalating	What do you do when you notice that a patient is deteriorating? – What Trust guidelines or policies for the management of deteriorating patients are you aware of? Are you aware of any differences between the paper-based NEWS v1 and the NEWS v2 that has been implemented at UCH with EPIC? Which vital signs do you consider to be most important in the early detection of deteriorating patients?	This question could also be coded as TDF domain Environmental Context & Resources. This question could also be coded as TDF domain Beliefs about Consequences
		Skills	
2.	Measuring	How skilled are you in measuring vital signs? How skilled are you at measuring the pulse/respirations? – What has made you skilled? OR [depending on the response] Why do you think you have not developed those skills? – Can you talk me through how you measure the respirations? – Is there anything in particular that makes it easy/difficult to measure the respirations?	These questions could also be coded as TDF domain Beliefs about Capabilities
3.	Measuring	Have you ever had training on measuring vital signs? – If so, what sort of training? Was it helpful/un-helpful? – If not, how would you feel about training?	
		Memory, attention, and decision processes	
4.	Measuring and escalating	Thinking about when you are measuring patients' vital signs… – How do you know whether measuring vital signs will or will not be one of your tasks for the day? – How do you know when it is time to measure a patient's vital signs? – How do you decide when to repeat the vital signs?	

		– Can you think of a time when you started measuring vital signs without anyone telling you to? – How do you decide whether to tell another member of staff that you are concerned about a patient's vital signs?	
Environmental context, and resources			
5.	Recording and escalating	Do you ever have any difficulties when entering the vital signs onto EPIC? – If so, what are these difficulties? – If not, what makes it so straightforward to enter the vital signs? – I have noticed that some of your colleagues note the vital signs down on another piece of paper before later entering them onto NEWS. Why do you think that might be? Is this something that you have ever done? If so, what made it easier to write it on another sheet of paper than to enter onto NEWS? – Do you think that there are any problems associated with writing the vital signs on a piece of paper first? Do you ever have any difficulties looking at vital signs that have been entered by somebody else? – If so, what are these difficulties? – If not, what makes it straightforward to look at these vital signs? What is your experience of entering and looking at vital signs on EPIC compared to using the paper NEWS chart that the Trust had before? How do you use the NEWS on EPIC to decide whether to escalate? – Does EPIC make this easy? If yes, how? If no, how could it be improved? Are there any situations which make it difficult for you to escalate in a timely way?	This question could also be coded as TDF domain Beliefs about Capabilities This follow-up question could also be coded as TDF domain Memory, Attention and Decision Processes.
6.	Escalating	Once you have decided to call for help, how do you do this? – Talk me through how you communicate in this situation?	This follow-up question could also be coded as TDF domain Skills
Social, professional role & identity			
7.	Measuring, recording, and escalating	To what extent do you consider measuring and recording vital signs, and escalating an elevated NEWS, to be part of your role?	

		– Is any particular part of this process more [or less] part of your role than any other? – What about colleagues, is there any part of this process that is more [or less] part of their role?	
Social influences			
8.	Escalating	Have you ever got feedback on your actions after you escalated a deteriorating patient? – If yes, can you give an example? – How much of a difference did that feedback make to how you escalated? What part, if any, does teamwork play in the recognition of and/or response to deteriorating patients? I have noticed the safety huddles and briefings that take place on the ward, what role – if any – do you think these play in improving the care of deteriorating patients?	This follow-up question could also be coded as TDF domain Behavioural Regulation
9.	Escalating	How much do the opinions of your colleagues about NEWS affect how you respond to the score? – Do you see your colleagues responding in the same way [or differently] to the NEWS? – How does that affect how you respond to the NEWS?	
Emotions			
10.	Measuring, recording, and escalating	How much does your emotional state affect your performance when a patient is deteriorating? – Any particular emotional state? – Any particular aspect of your performance?	
Belief about consequences			
11.	Recording and escalating	How accurate do you think the NEWS chart is for detecting patients who are deteriorating? Why?	
12.	Escalating	In terms of NEWS, what would be a medium-risk score to you? – Talk me through how you respond to a patient with a medium-risk score? – Would you do anything differently if the score was 5 (or 6) *[question dependent on answer from higher-level questions]* – If you find a patient has a NEWS of 5, how do you respond to that? *[question dependent on answer from higher-level questions*	This question could also be coded as TDF domain Knowledge

		i.e. not required if they have already answered in response to questions above]
		– What are the advantages of responding like that?
		  ○ To patients? To you?
		– What are the disadvantages of responding like that?
		  ○ To patients? To you?
		– What other factors change your response to a NEWS of 5?
			This follow-up question could also be coded as TDF domain Memory, Attention and Decision Processes

13.	Escalating	In terms of NEWS, what would be a high-risk score to you?
		– Talk me through how you respond to a patient with a high-risk score?
		– If you find a patient has a NEWS of 7, how do you respond to that? *[question dependent on answer from higher-level questions i.e. not required if they have already answered in response to questions above]*
		– What are the advantages of responding like that?
		  ○ To patients? To you?
		– What are the disadvantages of responding like that?
		  ○ To patients? To you?
		– What other factors change your response to a NEWS of 7?
			This question could also be coded as TDF domain Knowledge
			
			This follow-up question could also be coded as TDF domain Memory, Attention and Decision Processes

Goals			
14.	Measuring, recording, and escalating	Thinking of all your other clinical priorities you have on the ward, how important is it to you to measure and record vital signs? Why? How do you prioritise which of the vital signs you measure every time and which you do not? Do you have any particular goals for measuring/recording vital signs and/or escalating a deteriorating patient? – Does your team? – The hospital/Trust in general?	This follow-up question could also be coded as TDF domain Knowledge
Reinforcement			
15.	Measuring, recording, and escalating	Does the Trust reward staff for following guidelines or policies for deteriorating patients? – Are there penalties for not doing this?	
Behavioural regulation			
16.	Measuring, recording, and escalating	Are you aware of any action plans that are in place at this Trust to improve performance in recognising and responding to deteriorating patients?	This question could also be coded as TDF domain Goals

		– Have you changed anything yourself to improve your own performance? Can you explain?	
Intentions			
17.	Measuring, recording, and escalating	How do you intend to (continue to) follow Trust guidelines and policies for recognising and responding to deteriorating patients in daily clinical practice?	
Optimism			
18.	Measuring, recording, and escalating	How optimistic - or pessimistic - are you that following Trust policy and guidelines for recognising and responding to deteriorating patients will improve care of deteriorating patients in the future?	
Beliefs about capabilities			
			See follow-up questions for Q2 & Q5

Appendix 8 - Interview topic guide for registered nurse participants (structured according to the TDF)

Question number	Afferent limb behaviour (measuring vital signs; recording and scoring using NEWS; escalating)	Example questions and prompts	Comments
		Knowledge	
1.	Measuring, recording, and scoring and escalating	What do you do when you notice that a patient is deteriorating? – What Trust guidelines or policies for the management of deteriorating patients are you aware of?	
2.	Recording and escalating	Are you aware of any evidence for the use of the National Early Warning Score (NEWS) tool? Are you aware of any differences between the paper-based NEWS v1 and the NEWS v2 that has been implemented with EPIC? Which vital signs do you consider to be most important in the early detection of deteriorating patients?	This question could also be coded as TDF domain Environmental Context & Resources. This question could also be coded as TDF domain Beliefs about Consequences
		Skills	
3.	Measuring	How skilled are you in measuring vital signs? How skilled are you at measuring the pulse/respirations? – What has made you skilled? OR [depending on the response] Why do you think you have not developed those skills? – Can you talk me through how you measure the respirations? – Is there anything in particular that makes it easy/difficult to measure the respirations?	These questions could also be coded as TDF domain Beliefs about Capabilities
		Memory, attention, and decision processes	
4.	Measuring and escalating	Thinking about when you are measuring patients' vital signs… – How do you know whether measuring vital signs will or will not be one of your tasks for the day? – How do you know when it is time to measure a patient's vital signs? – How do you decide when to repeat the vital signs? – How do you decide whether to tell another member of staff that you are concerned about a patient's vital signs?	

		In your role, do you ever take charge of the ward? [If 'no', the next question is not applicable] – How do you decide which staff to allocate where?	These questions could also be coded as TDF domain Environmental Context & Resources
Environmental context and resources			
5.	Recording and escalating	Do you ever have any difficulties when entering the vital signs onto EPIC? – If so, what are these difficulties? – If not, what makes it so straightforward to enter the vital signs? – I have noticed that some of your colleagues note the vital signs down on another piece of paper before later entering them onto NEWS. Why do you think that might be? Is this something that you have ever done? If so, what made it easier to write it on another sheet of paper than to enter onto NEWS? – Do you think that there are any problems associated with writing the vital signs on a piece of paper first? Do you ever have any difficulties looking at vital signs that have been entered by somebody else? – If so, what are these difficulties? – If not, what makes it straightforward to look at these vital signs? What is your experience of entering and looking at vital signs on EPIC compared to using the paper NEWS chart that the Trust had before? How do you use the NEWS on EPIC to decide whether to escalate? – Does EPIC make this easy? If yes, how? If no, how could it be improved? Are there any situations which make it difficult for you to escalate in a timely way?	These questions could also be coded as TDF domain Beliefs about Capabilities This follow-up question could also be coded as TDF domain Memory, Attention and Decision Processes.
6.	Escalating	Once you have decided to call for help, how do you do this? – Talk me through how you communicate in this situation?	This follow-up question could also be coded as TDF domain Skills
Social, professional role & identity			
7.	Measuring, recording, and escalating	To what extent do you consider measuring and recording vital signs, and escalating an elevated NEWS, to be part of your role? – Is any particular part of this process more [or less] part of your role than any other? – What about colleagues, is there any part of this process that is more [or less] part of their role?	

Social influences			
8.	Escalating	Have you ever got feedback on your actions after you escalated a deteriorating patient? – If yes, can you give an example? – How much of a difference did that feedback make to how you escalated? What part, if any, does teamwork play in the recognition of and/or response to deteriorating patients? I have noticed the safety huddles and briefings that take place on the ward, what role – if any – do you think these play in improving the care of deteriorating patients?	This follow-up question could also be coded as TDF domain Behavioural Regulation
9.	Escalating	How much do the opinions of your colleagues about NEWS affect how you respond to the score? – Do you see your colleagues responding in the same way [or differently] to the NEWS? – How does that affect how you respond to the NEWS?	
Emotions			
10.	Measuring, recording, and escalating	How much does your emotional state affect your performance when a patient is deteriorating? – Any particular emotional state? – Any particular aspect of your performance?	
Beliefs about consequences			
11.	Recording and escalating	How accurate do you think the NEWS chart is for detecting patients who are deteriorating? Why?	
12.	Escalating	In terms of NEWS, what would be a medium-risk score to you? – Talk me through how you respond to a patient with a medium-risk score? – Would you do anything differently if the score was 5 (or 6) *[question dependent on answer from higher-level questions]* – If you find a patient has a NEWS of 5, how do you respond to that? *[question dependent on answer from higher-level questions i.e. not required if they have already answered in response to questions above]* – What are the advantages of responding like that?	This question could also be coded as TDF domain Knowledge

		○ To patients? To you? – What are the disadvantages of responding like that? ○ To patients? To you? – What other factors change your response to a NEWS of 5?	This follow-up question could also be coded as TDF domain Memory, Attention and Decision Processes
13.	Escalating	In terms of NEWS, what would be a high-risk score to you? – Talk me through how you respond to a patient with a high-risk score? – If you find a patient has a NEWS of 7, how do you respond to that? *[question dependent on answer from higher-level questions i.e. not required if they have already answered in response to questions above]* – What are the advantages of responding like that? ○ To patients? To you? – What are the disadvantages of responding like that? ○ To patients? To you? – What other factors change your response to a NEWS of 7?	This question could also be coded as TDF domain Knowledge This follow-up question could also be coded as TDF domain Memory, Attention and Decision Processes
Goals			
14.	Measuring, recording, and escalating	Thinking of all your other clinical priorities you have on the ward, how important is it to you to measure and record vital signs? Why? How do you prioritize which of the vital signs you measure every time and which you do not? Do you have any particular goals for measuring/recording vital signs and/or escalating a deteriorating patient? – Does your team? – The hospital/Trust in general?	This follow-up question could also be coded as TDF domain Knowledge
Reinforcement			
15.	Measuring, recording, and escalating	Does the Trust reward staff for following guidelines or policies for deteriorating patients? – Are there penalties for not doing this?	
Behavioural regulation			
16.	Measuring, recording, and escalating	Are you aware of any action plans that are in place at this Trust to improve performance in recognising and responding to deteriorating patients?	This question could also be coded as TDF domain Goals

		– Have you changed anything yourself to improve your own performance? Can you explain?	
Intentions			
17.	Measuring, recording, and escalating	How do you intend to (continue to) follow Trust guidelines and policies for recognising and responding to deteriorating patients in daily clinical practice?	
Optimism			
18.	Measuring, recording, and escalating	How optimistic - or pessimistic - are you that following Trust policy and guidelines for recognising and responding to deteriorating patients will improve care of deteriorating patients in the future?	
Beliefs about capabilities			
			See follow-up questions for Q3 & Q5

Appendix 9 - Coding manual

TDF domain and content	Decision rules (when to code or not to code into this domain)	Exemplar coding for this domain (quotes derived from pilot interviews)
1. Knowledge An awareness of the existence of something *What do they know and how does that influence what they do?*	<u>Consider coding to this domain:</u> – Discussion about evidence related to the target behaviour (or lack thereof). – Awareness of policy and/or guidelines related to deteriorating patients and/or target behaviour (or lack of awareness). – Description of conflicts between NEWS policy/guidelines and what is done in clinical practice. – Anecdotal evidence regarding the target behaviour. – Descriptions of evidence that would convince them to use NEWS. – Procedural knowledge: Tends to be hypothetical – knowing how the process of recording vital signs, calculating NEWS and escalation would be carried out. Utterances reflecting only procedural knowledge (e.g., not intentions) typically do not include use of 1st person e.g., "we do X and then Y" or "you do X and then Y" or "do X and then Y". <u>Inappropriate coding to this domain:</u> – If the participant describes 'training' but does not specify how the training was delivered, and if it specifically involved the transfer of knowledge, then do not code at this domain. – If the description contains personalised accounts of hypothetical behaviour e.g.,"I would re-measure the obs" then consider coding at intentions instead (procedural knowledge may be implied within these utterances). – Knowledge must be explicit within the utterance not implicit e.g., *Can you tell me why you called PERRT?* "The sats dropped on 4L of oxygen" – in the context of this question, the participant appears to have knowledge that a drop in	<u>Example 1:</u> *Interviewer:* Are you aware of any evidence for the use of the National Early Warning Scoring tool? *Participant:* "…**I know that there's a lot of research done around when patients trigger on the NEWS that it means that something else is happening and that's why we follow the rules of escalation, because it generally is an initial sign that something's going wrong**. But I couldn't name you specific evidence…" RN Pilot#1 <u>Example 2:</u> *Interviewer:* *In terms of NEWS, what would be a medium risk score to you?* *Participant:* Again, **it would be based on the patient and, you know, their past medical history, what they're currently presenting with, but for me a, sort of three to a four would be a medium risk.** RN Pilot#2 Rationale: Procedural knowledge (lack of) <u>Example 3:</u> *Interviewer:* What's your response to a high-risk NEWS?

	$Sp0_2$ on oxygen warrants escalation. However, this knowledge is not explicit within the response and therefore this text is uncodable. If the participant had said "a drop in sats on oxygen increases the NEWS to X – which meets the criteria for when we call PERRT" then procedural knowledge would have been explicitly demonstrated.	*Participant:* So, my response would be again, **hourly perhaps even half hourly observations** depending on, you know, what their vital signs actually are. We're quite lucky with the heart monitors that actually you can cycle the machines to check the blood pressure every five minutes if you like. So, we're very lucky that we have the technology to be able to do that on our ward. And it stores all the information for you, so you've got a record. But if I didn't have that and I was using a Dinamap **it would be at least hourly observations**. **I would escalate to the medical team and to PERRT at that point if they had a score of that high**. RN Pilot#2 Rationale: Procedural knowledge (and lack of) – Also, code at domain: **Intentions** in view of the following utterance within this text: *"…. But if I didn't have that and I was using a Dinamap **it would be at least hourly observations**. **I would escalate to the medical team and to PERRT at that point if they had a score of that high**…"* Rationale: Local policy NEWS escalation guidance (double code with Knowledge) – Also, code at domain: **Environmental Context & Resources** in view of the following utterance within this text: "…***We're quite lucky with the heart monitors that actually you can cycle the machines to check the blood pressure every five minutes if you like. So, we're very lucky that we have the technology to be able to do that on our ward. And it stores all the information for you, so you've got a record***…" Rationale: Availability of resources - in the ward context - to enact target behaviours <u>Example 4:</u> *Interviewer:*

		Do you think there are any other situations where NEWS isn't as applicable, to use your language? *Participant:* I think it's always a fairly good place to start. It gives you, like I say, a basic thing that everybody understand and it's like a common language between doctors, nurses, and healthcare assistants**. If someone says a high number to you, that automatically triggers that something is potentially not right, in your brain**. Other than like I've just said, it's not always, it has to be a patient-to-patient basis, but on the whole I haven't really come across any negatives using it. RN Pilot#2 Rationale: Procedural knowledge – *Code also at the domain:* ***Beliefs about Consequences*** in view of the following utterance within this text: "…*Other than like I've just said, it's not always, it has to be a patient-to-patient basis,* ***but on the whole I haven't really come across any negatives using it****…"* Rationale: Description of outcome of using NEWS
2. Skills An ability or proficiency acquired through practice	<u>Consider coding to this domain:</u> – Descriptions of having (or not having) repeatedly practiced a skill or needing to repeatedly practice a skill. – Discussion of the skills of monitoring vital signs using electronic equipment or 'manual' methods e.g., feeling the pulse, counting the respiratory rate. – Mention of other skills required to enact the behaviours e.g., use of a structured communication tool like SBAR (Situation, Background, Assessment, Recommendation). – The only circumstance in which an utterance reflected the skills domain and nothing else (i.e., not belief about capabilities) would be if a participant mentioned needing specific training or practice to develop skill X. <u>Inappropriate coding to this domain:</u> – If the participant describes 'training' but does not specify how the training was delivered, and if it specifically	<u>Example 1:</u> *Interviewer:* Do you ever have any difficulties when calculating the NEWS? *Participant:* No *Interviewer:* So, what makes it straightforward to calculate the NEWS? *Participant:* It's quite a simple chart, the colours are there and I'm confident with doing vital signs**. I think it's just a mixture of a bit of practice** and also just knowing the chart and knowing, without looking at it, what would trigger anyway RN Pilot#1

	involved the practicing of skills, then do not code at this domain. – Beware of utterances that appear to be about skills but, on closer inspection, are really at domain: belief about capabilities e.g., "…I'm good with blood pressures and pulses, I can feel regularities, irregularities. Yes, blood pressure, I'm good at hearing the sounds, audible sounds…" RN Pilot#1 This utterance is more belief about capabilities because the participant is speaking about how proficient they are at performing the behaviour rather than becoming more skilled from practice/training.	– Also, code at domain: **Knowledge** in view of the following utterance within this text: *"…also just knowing the chart and knowing, without looking at it, what would trigger anyway…"* – Also, code at the domain: **Environmental Context and Resources** in view of the following utterance within the text: *"…It's quite a simple chart, the colours are there…"* <u>Example 2:</u> *Interviewer:* *How skilled are you at measuring them manually, the vital signs?* *Participant:* Well, **I might have to have a few goes to get it all in the right place**, but I think in an emergency situation, we have had to do them a few times on the ward, just because if their blood pressure is that low, a Dinamap won't pick it up. I would say definitely room for improvement on that skill. **Or just more practice, to be honest.** It's very rare, they've kind of taken away, all the manual cuffs are kept in a store room now, because nobody ever uses them. They did use to be in the individual side rooms but I think there was something to do with infection control and moving them in and out, so we tend not to have-, I mean, they're on the ward, but they're not easily accessible in the bays like the Dinamaps. I think often, a lot of people, kind of, freak out about doing manual blood pressure, just because **it's something that you don't do particularly often so it's a skill that you feel if you don't do it every day, you lose it a little bit.** RN Pilot#2 Rationale: Relates to proficiency acquired through practice. – Also, code at domain: **Beliefs about Capabilites** in view of the following utterance within this text: *"…Well, I might have to have a few goes to get it all in the right place, but I think in an emergency situation, we have had to do them a*

		few times on the ward, just because if their blood pressure is that low, a Dinamap won't pick it up. ***I would say definitely room for improvement on that skill…."*** Rationale: Proficiency in carrying out a target behaviour – Also, code at the domain: **Environmental Context and Resources** in view of the following utterance within the text*: "…Well, I might have to have a few goes to get it all in the right place, but I think in an emergency situation, we have had to do them a few times on the ward****, just because if their blood pressure is that low, a Dinamap won't pick it up.*** *I would say definitely room for improvement on that skill. Or just more practice, to be honest. It's very rare,* ***they've kind of taken away, all the manual cuffs are kept in a store room now, because nobody ever uses them. They did use to be in the individual side rooms but I think there was something to do with infection control and moving them in and out, so we tend not to have-, I mean, they're on the ward, but they're not easily accessible in the bays like the Dinamaps****…"* Rationale: Limitations and availability of resources - in the ward context - to enact target behaviours <u>Example 3:</u> *Interviewer:* *How do you intend to continue to follow the Trust guidelines and policies for recognising and responding to deteriorating patients in your daily practice?* *Participant:* So, we have quite a few study days that we have to go on to ensure that we're in line with Trust practice. **I've got, is it intermediate life support at the end of the month? So, they're quite keen on us to keep up those skills and develop those skills**. So, we have a lot of training days. I mean the guidelines are always available. There's a lot of, kind of, verbal teaching. For example, you know if PERRT

		comes to see a patient of yours. They're quite good at, it's not a formal teaching session, it's not a formal handover of guidelines but they'll maybe explain something to you that perhaps you didn't know before. That is a formal Trust policy but it's not been printed out and given to you. So, I think there is a lot of informal teaching of Trust policies. And there's obviously the training days which is based on Trust policy but you're not, kind of, handed a hard copy of patient deterioration policy. Pilot RN#2 Rationale: Relates to training and acquiring skills in the target behaviours. – Also, code at domain: **Social Influences** in view of the following utterance within this text: *"…if PERRT comes to see a patient of yours. They're quite good at, it's not a formal teaching session, it's not a formal handover of guidelines but they'll maybe explain something to you that perhaps you didn't know before**…."*** Rationale: Description of the influence of others on the behaviour
3. Social, Professional Role and Identity A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting. *How does who they are as a HCP influence whether they do something or not?*	<u>Consider coding to this domain:</u> – Discussion about who enacts the behaviours. Specifically, what each different health care professional does as it relates to (or would relate to) enacting the behaviour(s). – What participants usually do when enacting the behaviour(s). – Descriptions of 'shared care' involving different health care professionals. – More specific than social influence. A description of what someone else is doing (e.g., "Health Care Assistants monitor the vital signs" "Registered Nurses escalate to the doctor"). – Statements such as *"that's just what I do as a registered nurse"* OR *"I just see that as part of my role" or "it's my job as a nurse/HCA to…"* <u>Inappropriate coding to this domain:</u>	<u>Example 1:</u> *Interviewer:* To what extent do you consider measuring and recording vital signs and escalating an elevated NEWS to be part of your role? *Participant:* "…**I think it's fully my role**. Obviously **healthcare assistants would do your obs for patients four-hourly when you're not concerned, but as soon as someone's deteriorating, they don't have the clinical knowledge. They might do, but they're not expected to have the clinical knowledge about what's happening**. **So, if someone's unwell, it's fully my responsibility basically**…" RN Pilot#1 <u>Example 2:</u>

	– If participant describes relationship i.e. a need for someone else's behaviour, code at 'Social Influences' instead.	*Interviewer:* *Once you've decided to call for help, then, how do you go about this? How do you do it?* *Participant:* Once I'd come and ask them to review the patient, often I will stress if it's quite urgent because if you just go in and say, 'Please can you come and have a look at this patient?' I think your wording is very important. They might go, 'Oh, I've got three more to see then I'll come down to you.' You need to go in and really say, 'I'm really concerned about this patient. I think potentially or they are very unwell. Please can you come and see them first?' I think that's very important to stress because everyone's got a priority list and unless you put that patient at the top of your doctor's or a senior nurse, they might not get seen as soon as they should. I think yes, that would be-, It's just about getting people to prioritise and listen to your concerns. **There have been a few occasions when it's not always picked up on and you end up in a bit of a, not an argument but you have to really push to get what you want. Then, as a nurse, that is your job. You're advocating on your patients' behalf.** RN Pilot#2 Rationale: Clear association between target behaviour and professional role – Also, code at domain: **Beliefs about Consequences** in view of the following utterance within this text: *"…I think that's very important to stress because everyone's got a priority list* ***and unless you put that patient at the top of your doctor's or a senior nurse, they might not get seen as soon as they should****. …"* Rationale: Belief about outcomes of the target behaviours – Also, code at the domains: **Behavioural Regulation and Social Influences** in view of the following utterance within the text: *"…****often I will stress if it's quite urgent because if you just go in and say, 'Please can you come and*****

		have a look at this patient?' I think your wording is very important. They might go, 'Oh, I've got three more to see then I'll come down to you.' You need to go in and really say, 'I'm really concerned about this patient. I think potentially or they are very unwell. Please can you come and see them first?' Rationale: Coping, scripts, adapting behaviour to overcome resistance. Also, a belief that she can socially influence a colleague is also driving target behaviour in this utterance <u>Example 3:</u> *Interviewer:* Is there part of that process, thinking about monitoring, calculating the score and then escalation, is there any part of that that you think is more or less your role? *Participant:* **No. I think it's all my role. I also think it's all everybody's role. I think it's a nursing assistant role, I think it's a staff nurse role, I think it's whatever your level**. I don't think that responsibility ever changes because, at the end of the day, the patients are your priority and observations are how we monitor their vital signs and how well they're doing. **I think it is a key part of nursing responsibility. I think sometimes there can be a bit of a culture as to jobs are separated out, as in nursing assistants do the obs, nurses don't do the obs, but I think that's a very difficult way of looking at it**. Particularly, for example, on a ward like mine where, if you are in yellow zone, you don't have a healthcare assistant. You do your own observations**, so I do think it's a very important part of the nursing job. I think in terms of then being able to interpret it and escalate it as necessary is a real key part of the job. It's not the only thing we do but I think it's one of the most important.** RN Pilot#2 Rationale: Discussion about who is responsible for what (according to professional role)

		– Also, code at the domain: **Environmental Context & Resources** in view of the following utterance within the text: *"…Particularly, for example, on a ward like mine where, if you are in yellow zone, you don't have a healthcare assistant. You do your own observations…"* Rationale: Clinical context influencing behaviour
4. Beliefs about Capabilities Acceptance of the truth, reality or validity about an ability, talent, or facility that a person can put to constructive use *Do they think they can do what they should do and how does that influence whether they do it or not?*	<u>Consider coding to this domain:</u> – Descriptions of how easy or difficult it will/would be to enact the behaviour(s). – Descriptions of how confident a participant feels that they would be in enacting the behaviour(s).	<u>Example 1:</u> *Interviewer:* How often does that [negative feedback] happen? *Participant:* "…Not often, but I think **it probably happens earlier in your career when you're not quite as confident in your assessment**, so you're not quite as knowledgeable as to what actually you should be just saying straightaway. You might waffle a bit because you want to give a full story, but actually saying A, B and C would be enough. They've come in with this and this has happened would be enough for someone to say okay, we'll come and see you. So, I think earlier on you do try and be really thorough and actually it sometimes just backfires a bit…" RN Pilot#1 – Also, code at domain: **Knowledge** in view of the following utterance within this text: "…you're not quite as knowledgeable as to what actually you should be just saying straightaway. You might waffle a bit because you want to give a full story, but actually saying A, B and C would be enough…" <u>Example 2:</u> *Interviewer:* Why don't you think it's charted often? Why do you think it's rarely charted (relates to new confusion)? *Participant:*

		I think it's partly the way it's phrased, in terms of, like, new confusion. In my experience, most patients that become confused are often elderly. Not all of them, **but often some of them will have a background of dementia that's quite difficult,** particularly for maybe less experienced staff, **sometimes even myself** or healthcare assistants, **to pick up on if it's a new confusion or if it's their baseline in terms of dementia.** RN Pilot#2 Rationale: Description of difficulty enacting target behaviour <u>Example 3:</u> *Interviewer:* *Have you changed anything yourself, X, to improve your own performance? And can you explain if so?* *Participant:* Yes, **I think I've definitely changed in the sense that I've become more confident in my own opinion and being able to interpret these and looking after deteriorating patients. I'd hope that I haven't become any less, I can't think of the word, any less conscientious in how I action those things. I hope, that if anything, I've become more alert to looking after deteriorating patients**. I know that I've had a few experiences that have made me much more aware. Like, for example, that lady that aspirated half an hour after my shift and died because she had a huge bowel obstruction. Obviously, nothing was picked up on scans. We couldn't have done anything about it but that's made me much more aware that patients who have bowel obstructions have the potential to have risks, you know, that I didn't know about before. So, I think I've learned a lot, and I think you continue to learn and that's then influenced by practice. I hope I've not become any less because when you're new, you're obviously absolutely high alert on absolutely everything. Someone moves, and you flinch. I hope that I've not become any less, you know, blasé

		about NEWS scores. I think through experience you become a bit more able to make your own clinical judgements. RN Pilot#2 Rationale: Relates to confidence and perceived competence in enacting the target behaviour
5. Optimism The confidence that things will happen for the best or that desired goals will be attained *The confidence that things will happen for the best or that desired goals will be attained*	<u>Consider coding to this domain:</u> – Participants' descriptions of their level of optimism regarding the effectiveness of the target behaviour. – Code both positive and negative answers.	<u>Example 1:</u> *Interviewer:* How optimistic are you, or pessimistic are you, that improving performance of what the Trust policy document says we should be actioning will improve care of deteriorating patients? *Participant:* "…**So, I guess I'm optimistic**, but that's quite a broad - there are a lot of other things that come into play with - I don't know**. If you had one patient and you were always responding to just their NEWS, you could do a stellar job**. But if you have - for example, sometimes you have five patients and they're all triggering, you can't follow the Trust's policy escalation because you don't have the manpower to do everything you want to do, if you know what I mean…" RN Pilot#1 – Also, code at domain: **Environmental Context and Resources** in view of the following utterance within this text: *"...sometimes you have five patients and they're all triggering, you can't follow the Trust's policy escalation because you don't have the manpower to do everything you want…"*
6. Beliefs about Consequences Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation	<u>Consider coding to this domain:</u> – Participants' beliefs about outcomes of enacting the target behaviours – includes outcomes for the patient and/or members of the clinical team. – Positive and negative outcomes of using NEWS and/or enacting target behaviours (includes consequences for the patient, impact on health care professionals, and impact on the ward/department).	<u>Example 1:</u> *Interviewer:* So, when you've had feedback, did it make a difference to the way that you escalated concerns afterwards? *Participant:*

	– Beliefs about patient outcomes – both theoretical and based on experience using NEWS. – Descriptions/explanations of how NEWS is beneficial – Potential long-term outcomes of using NEWS. – Descriptions of clinical factors (or lack of) that influence the target behaviours *e.g., patients with COPD always score high on NEWS* (also consider coding at Environmental Context and Resources). – Descriptions of concerns regarding the accuracy of NEWS (also consider coding at Environmental Context and Resources). – Descriptions of 'learning curves' and getting into the habit of enacting target behaviours. <u>Inappropriate coding to this domain:</u> – Clinical consequences for patients should not be coded at this domain unless there is a clear relationship between the patient outcome and the target behaviour e.g., a description of how a patient with a high respiratory rate is more likely to collapse is an anticipated patient consequence but not a consequence of any target behaviours. In comparison, a participant describing how they monitor $Sp0_2$ more frequently in patients with COPD, because they believe that they are more likely to suffer respiratory arrest, would be coded at this domain.	"…So, **if you escalate to a doctor** and you say this is the patient, they're scoring a little high, I'm just worried about them and they're like and? Okay, well I'd like - **if you're not getting a positive response to your concern, it definitely makes you think well, I just won't do it next time, will I, because you're not going to help**…" RN Pilot#1 <u>Example 2:</u> *Interviewer:* So, from whom have you experienced this kind of [negative] feedback? *Participant:* "…I think maybe as well **when I first started, I didn't like calling PERRT because I'm worried that I don't know the questions they're going to ask me over the phone**. When they used to ask me about blood gases, I didn't even know what a bicarb looked like. So, I was like I don't know which one's a bicarb. That's technically my issue, not theirs, I don't know what are the clinical things that I should know…" RN Pilot#1 – Also, code at domain: **Knowledge** in view of the following utterance within this text: "…*When they used to ask me about blood gases, I didn't even know what a bicarb looked like. So, I was like I don't know which one's a bicarb. That's technically my issue, not theirs, I don't know what are the clinical things that I should know…"* <u>Example 3:</u> *Interviewer:* Are you aware of any evidence for the use of the National Early Warning Score? *Participant:*

		Well it's used as a basic fundamental system across every hospital, it's a flat line system, so, I guess, at least going from hospital-to-hospital or ward-to-ward there's a continuation, everyone understands it. It's like a total basic fundamental in nursing care which I think is useful, but I'm not aware of any reason why we use it nationally other than it gives a very clear outline. I mean I think they're bringing out NEWS 2 at some point because they've noticed some issues, that, for example**, if you've got a COPD patient**. **So often their target saturations would be between 88% to 92%, but that will trigger a NEWS score. It's not always specifically accurate for individual patients**. On the whole **it's very good but it can, sort of, inflate their numbers and we have to take that into consideration. It's not always as applicable,** but it's a good place to start. Did that answer the question? RN Pilot#2 Rationale: Patient clinical factor that would influence the target behaviour/accuracy of NEWS. – Also, code at domain: **Environmental Context & Resources** in view of the following utterance within this text: "…*for example, if you've got a COPD patient. So often their target saturations would be between 88% to 92%, but that will trigger a NEWS score. It's not always specifically accurate for individual patients. On the whole it's very good but it can, sort of, inflate their numbers and we have to take that into consideration. It's not always as applicable, but it's a good place to start…"* Rationale: Patient clinical factors that would influence whether or not NEWS is followed (also code at 'Beliefs about Consequences') – Also, code at domain: **Knowledge** in view of the following utterance within this text: "…*but I'm not aware of any reason why we use it nationally other than it gives a very clear outline…"* Rationale: Knowledge of scientific guidelines/evidence (lack of)

7. Reinforcement Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus *How have their experiences (good and bad) of doing it in the past influence whether or not they do it?*	<u>Consider coding to this domain:</u> – Reinforcement/reward for following NEWS. – Also, code 'no' answers. – Can also include hypothetical reinforcement/reward. – Reward includes social reward i.e., praise or thanks from a senior or respected colleague – Some content here may be more appropriately coded as at Social Influences depending on participants' phrasing. If the social influence is subsumed within the description of reinforcement, then consider only coding at reinforcement. However, if the participant elaborates to describe how the reinforcement impacted on their perceived competence and confidence in enacting target behaviour – then consider also coding at Beliefs about Capabilities.	<u>Example 1:</u> *Interviewer:* Does the Trust reward staff for recording vital sign observations and reporting abnormalities? *Participant:* "…No.." *Interviewer:* Any penalties for not doing it? *Participant:* "…Yes, I think if you - well, from a day-to-day basis, if someone's not doing obs or recording any NEWS, whether it be a nurse or a healthcare assistant, if it's not been done it's certainly immediately brought up, because we would have quality rounds who are going around. If someone hasn't had a set of obs in a while, or if they've been scoring high and they haven't had another set of obs - but it's more a one-to-one conversation, why hasn't this happened? Can you make sure this has happened? Then obviously revisiting it if it doesn't happen again, but it usually does. **In terms of bigger sanctions, no, not that I know of…"** RN Pilot#1 – Also, code at domain: **Behavioural Regulation** in view of the following utterance within this text: *"…if it's not been done it's certainly immediately brought up, because we would have quality rounds who are going around…"* <u>Example 2:</u> *Interviewer:* Does the Trust reward staff for following the guidelines or policies? *Participant:*

		Not that I've ever experienced. I mean, I'm sure it's, kind of, rewarded in the sense of, as a Trust hopefully we're meeting national targets and as a ward we're meeting the criteria, because obviously audits happen. They go round and they look at what we're doing and what we're not doing, and I'd hope that we're within in compliance. That we're meeting the targets, and then **I feel like our reward is not being reprimanded for it.** RN Pilot#2 Rationale: 'No' answer <u>Example 3:</u> *Interviewer:* So, are there any penalties for not following guidelines, that you're aware of? *Participant:* **Not that I'm aware of because I don't think we've ever incurred any. I could be wrong, to be honest I think observations is potentially the one thing we've never really had any feedback on**. RN Pilot#2 Rationale: 'No' answer
8. Intentions A conscious decision to perform a behaviour or a resolve to act in a certain way	<u>Consider coding to this domain:</u> – A description of personal intent to enact the target behaviour (includes forward planning of intended behaviours). – Use of the 1st person "I will", "I would", even "I always" (if describing an event retrospectively) should signal the coder to strongly consider coding at this domain. – Participant's descriptions of how motivated they are to enact the behaviour(s). – To be coded at Intentions the utterance must include an explicit description of personal intent (i.e., use of 1st person), motivation or inclination to perform the behaviour. – Participant's inclinations to consistently enact the behaviour(s).	<u>Example 1:</u> *Interviewer:* How do you intend to follow Trust policy in daily clinical practice when monitoring and recording vital signs and following NEWS? *Participant:* "…I think that's just about getting on top of - when you start the day being on top of your workload. **So, making sure that obs are done when they should be done, and they're recorded properly, and they're escalated properly.** That's just part of my job day-to-day. I don't think I start the day setting out, like

	– Local protocols/procedures (double code at knowledge). – Participants' descriptions of when they are, and are not, inclined to enact the behaviour(s). Also, code to other domains as necessary (i.e., 'Beliefs about Consequences') **Note:** Indicator of intention must be explicit and not inferred. <u>Inappropriate coding to this domain:</u> – This is different from how effective they think NEWS is in recognising the responding to deteriorating patients ('Beliefs About Consequences') and different from how much of a priority enacting the behaviour(s) is to them ('Goals'). – Be careful not to code the reasons for the intention (focus on statements that directly reflect their intention and motivation). – If a procedure is described in a non-personalised way e.g., "the obs are done" or "the staff nurse is called" this demonstrates procedural knowledge more than intent to enact the behaviour and should therefore be coded at Knowledge (it is possible to know the correct procedure but not to be motivated to enact it).	today I must make sure that - **it's just part of what I expect to happen and what I make sure happens**…" RN Pilot#1 – Also, code at the domain: **Behavioural Regulation** in view of the following utterance within this text: *"…I think that's just about getting on top of - when you start the day being on top of your workload …"* – *Code also at the domain:* **Social, Professional Role and Identity** in view of the following utterance within this text: *"That's just part of my job day-to-day".* <u>Example 2:</u> *Interviewer:* How do you decide whether to tell another staff member that you're concerned about the vitals? *Participant:* Again, I use the score, so the numbers that they're currently scoring, but I will also go and tell them even if I don't think it's reflected in their numbers yet. So I mean, the doctors actually probably get a bit frustrated at me because I'm very conscientious in terms of how they are and if I think that they have the potential to deteriorate. I think that might be just because of the ward we work on, people do deteriorate very quickly, it's very important to spot the early signs. **So yes, if they're scoring above a five, I will let the doctors know**, or if I think, I touched upon it earlier, there's another factor, for example really poor urine output, but their blood pressure is still holding, and they're not tachy, and everything else is okay with them. I would still just go and speak to them about it because it might be that the moment we give something, it'll set them off and then they'll deteriorate. So I would always. **Five is normally my threshold for letting the doctors know...** RN Pilot#2

		Rationale: Inclination to consistently enact the target behaviour ("my threshold") – Also, code at the domain: **Knowledge** in view of the following utterance within this text:*"Five is normally my threshold for letting the doctors know…"* Rationale: Procedural Knowledge – Also, code at the domain: **Memory, Attention & Decision Processes** in view of the following utterance within this text: "…***Again, I use the score, so the numbers that they're currently scoring, but I will also go and tell them even if I don't think it's reflected in their numbers yet****…Five is normally my threshold for letting the doctors know, but **again if it is totally out of character for a patient, they've been really well and they've had a NEWS score of zero for days, and all of a sudden they start scoring three or four, I'll start to wonder why and then escalate if necessary. Often I'll maybe put them on more frequent obs and then use my judgement of when to let the doctors know,** but it's more about being prepared for the fact that they could potentially deteriorate, and make sure that you've done everything along the way, to keep as close an eye on them as possible…"* Rationale: Description of a decision process related to NEWS – Code at the domain: **Beliefs about Consequences** in view of the following utterance within this text: "…*Often I'll maybe put them on more frequent obs and then use my judgement of when to let the doctors know, **but it's more about being prepared for the fact that they could potentially deteriorate, and make sure that you've done everything along the way**, to keep as close an eye on them as possible…"* Rationale: Description of patient outcome

		– Code at the domain: **Beliefs about Capabilities** in view of the following utterance within this text: *"…Again, I use the score, so the numbers that they're currently scoring, but I will also go and tell them even if I don't think it's reflected in their numbers yet. So I mean, the doctors actually probably get a bit frustrated at me* ***because I'm very conscientious in terms of how they are and if I think that they have the potential to deteriorate****. …"* Rationale: Self-esteem – *Code also at the domain:* **Environmental Context & Resources** in view of the following utterance within this text: *"…So I mean, the doctors actually probably get a bit frustrated at me because I'm very conscientious in terms of how they are and if I think that they have the potential to deteriorate.* ***I think that might be just because of the ward we work on, people do deteriorate very quickly, it's very important to spot the early signs****…"* Rationale: Impact of environment on behaviour
9. Goals Mental representations of outcomes or end states that an individual wants to achieve *What standards are they trying to reach, how does that influence whether or not they do it?*	<u>Consider coding to this domain:</u> – Description of the target behaviours in context of an endpoint. This differs from 'intentions' where the participant may describe their resolve to enact a behaviour without any mention of an endpoint or outcome from doing so. – Descriptions of how enacting the behaviours is in conflict with other aspects of the care they provide (goal conflict). <u>Inappropriate coding to this domain:</u> – Code at intentions instead if the participant doesn't explicitly mention outcomes, end states or prioritising. – Descriptions of prioritising one behaviour over another should not automatically be coded at this domain. Evidence of prioritisation without explicit evidence of a target endpoint is more likely to reflect a decision-making process, so consider coding at Memory, Attention and Decision Processes. To code at this domain, the utterance	<u>Example 1:</u> *Interviewer:* Do you have any particular goals for measuring, recording vital signs and/or escalating a deteriorating patient? *Participant:* Goals, what like just on a day-to-day shift? *Interviewer:* Yes. *Participant:* "…Just **making sure it's done correctly and on time and within the timeframe that we're meant to be doing them**. So, **whether it be four-hourly or 15 minutes**, just **making sure that they're done and documented properly…"**

	must contain evidence of an endpoint or outcome of the behaviour alongside evidence of prioritisation (goal prioritisation).	RN Pilot#1 Example 2: *Interviewer:* *Thinking about when you're measuring patients' vital signs, how do you know whether measuring vital signs will or will not be one of your tasks for the day?* *Participant:* I mean, for where I work it's always a task. **It's, to be honest, one of the number one tasks that we do**. We have a lot of acutely unwell patients who are on hourly or half-hourly observations, **for us it's a real parameter of deterioration or if patients are improving**. So for me it's probably one of the primary things that we do on a day-to-day basis. I think perhaps other wards where patients are more stable or they're there for rehab and things like that, you probably don't need to do them as often, but at least every four hours on my ward. RN Pilot#2 Rationale for coding: Description of enacting target behaviours with explicit description of the end-state of the behaviour e.g., "a real parameter of deterioration or if patients are improving" – *Code also at the domain:* **Intentions** in view of the following utterance within this text: "*…* So for me it's probably one of the primary things that we do on a day-to-day basis…" Rationale: Intention to consistently enact the target behaviour e,g., day-to-day – *Code also at the domain:* **Environmental Context & Resources** in view of the following utterance within this text: *"…I think perhaps other wards where patients are more stable or they're there for rehab and things like that, you probably don't need to do them as often, **but at least every four hours on my ward**…"* Rationale: Influence of environment on behaviour

		Example 3: *Interviewer:* So, thinking about all your clinical priorities on the ward, how important is it for you to measure and record vital signs? And why? *Participant:* **I think it's potentially one of the most important** for where I work. **It gives you, not the clearest indication, but a very good indication of your patient. If they're responding to treatment, if they're not. If they need, you know, a further treatment plan.** It gives you a basis to work with because, you know, you're covering your A to E assessment with it, without actually having to go through each individual one. But it's a good place to start. I think again, I've said, probably a million times, it's a common thing that everybody uses and understands. And yes, I think it's probably one of the most important tools that we have. And I'm not entirely sure what they did before it? Did they have a different version or? RN Pilot#2 Rationale: Description of enacting target behaviours as a priority – *Code also at the domain:* ***Environmental Context & Resources*** *in view of the following utterance within this text: "…* ***I think it's potentially one of the most important for where I work*** *...and yes,* ***I think it's probably one of the most important tools*** *that we have"* Rationale: Influence of context on behaviour – *Code also at the domain:* ***Beliefs about Consequences*** in view of the following utterance within this text: ***"… It gives you, not the clearest indication, but a very good indication of your patient. If they're responding to treatment, if they're not. If they need, you know, a further treatment plan…"***

10. Memory, Attention, and Decision Processes The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives	Consider coding to this domain: – When/why would it be easy to forget – Descriptions of decision processes related to the target behaviours. – Descriptions of whether enacting the behaviours is a priority (may also be double coded as goals). – Descriptions of NEWS as a 'decision tool'. – If the participant describes choosing between a range of potential behaviours, then this suggests a decision-making process and consideration should be given to coding at M, A & DP. However, this domain also covers 'memory' and 'attention' i.e., descriptions of NEWS helping to remind a participant to do something or even drawing their attention to a problem (helping them to 'selectively focus' as per the definition). So…if an utterance contains direct reference to NEWS as a 'decision-tool' (as opposed to just descriptions of the tool with comments on its usefulness [or not]), then it may be more appropriate to code at M, A & DP than Environmental Context and Resources. – It is plausible that, where participants have described their decision-making process, the utterance will contain contextual detail and quite possibly some intended actions. If the context and intended actions are part of a broader description of a decision process, then code only at MADP (i.e., not EC&R and Intentions). However, if the participant demonstrates procedural knowledge (or lack of) within the utterance, double code at the knowledge domain too. Likewise, if part of the decision involves accessing a resource to enact the behaviour, this should also be coded at EC&R to allow barriers to be 'teased out' at a more granular level. Inappropriate coding to this domain: – Descriptions of decision processes not related to the target behaviours i.e., no explicit reference made to NEWS or the monitoring of vital signs that form part of NEWS (BP, temperature, pulse, respiratory rate, level of consciousness, $Sp0_2$) but instead discussion about other clinical assessments (e.g., blood glucose) made in	Example 1: *Interviewer:* Do you know what to do when you notice that a patient is deteriorating? *Participant:* "…Yes, **I'd say the first thing I'd probably do is escalate, but it depends on the situation. So, if they look like they'll suddenly be worse, I'd do a set of obs first**. **If I'm worried about any of their vital signs that have changed, then I would speak to the doctor. But equally, if their obs are still fine but I'm worried about how they look, I would still speak to the doctor** probably. It all depends on what their NEWS is, I suppose, or how they look and what their condition is…" RN Pilot#1 *Code also at the domain:* ***Intentions*** *in view of the following utterance within this text: "…Yes,* ***I'd say the first thing I'd probably do is escalate, but it depends on the situation. So, if they look like they'll suddenly be worse, I'd do a set of obs first. If I'm worried about any of their vital signs that have changed, then I would speak to the doctor. But equally, if their obs are still fine but I'm worried about how they look, I would still speak to the doctor****…"*

	isolation. This is different to the participant discussing how they might use other information **alongside** NEWS as here the additional information is potentially influencing the target behaviour.	
11. Environmental Context and Resources Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence and adaptive behaviour *What are the things in their environment that influence what they do and how do they influence?*	<u>Consider coding to this domain:</u> – Descriptions of the NEWS tool (either paper-based or the electronic equivalent) and its usefulness. – Description of equipment used to enact the behaviours e.g., monitoring equipment, communication devices for escalation e.g., mobile phone apps. – Descriptions of other staff (as a resource) in relation to their competency, assuming that there is explicit reference to how this impacts on the participant's behaviour e.g., if I am working with a bank nurse I perceive to be 'not very good' then I am more likely to do the vital signs myself. – Availability of resources to enact the behaviours (this includes physical resources (e.g., equipment, facilities) and human resources (e.g., access to appropriate personnel within the clinical environment). – Discussion about limitations of equipment used (including NEWS itself in paper and electronic form). – Context of the clinical environment itself that would/does influence the behaviours. – Descriptions of how more time will be required for following NEWS guidance – time is a 'resource' therefore consider coding at this domain if the participant mentions time e.g., descriptions of carrying out a procedure using approach X takes longer than approach Y. – Patient clinical factors that would influence whether or not NEWS is followed (also code at 'Beliefs about Consequences'). – Descriptions of how a participant might access other clinicians who are available to them as a resource – should be coded at this domain. – If the participant links their behaviour to the patient's clinical condition (i.e., "I monitor the $Sp0_2$ because they have COPD") then code at this domain. However, if the	<u>Example 1:</u> *Interviewer:* How user friendly is the NEWS chart for recording vital signs? *Participant:* "…But generally, **I think it's pretty straightforward**. People are good as well at - because of the colour system as well, even if something drops or goes up a little bit, if it triggers into that orange or red bit, it prompts especially healthcare assistants. Even if actually it's not concerning to tell you, because it's gone into a colour that's alerting us…" RN Pilot#1 Also, code at the domain: **Memory, Attention and Decision Processes** in view of the following utterance within this text: ***"…because of the colour system as well, even if something drops or goes up a little bit, if it triggers into that orange or red bit… because it's gone into a colour that's alerting us…"*** <u>Example 2:</u> *Interviewer:* Once you've made the decision that you're going to call for help, you're going to escalate, how do you do this? *Participant:* "…**On my old ward it wasn't so easy to get doctors involved, because they're not on the ward**. So, I think **on AMU it's quite good because you can just grab - there's always someone around that you can grab**, just to get someone else's opinion, someone else involved…" RN Pilot#1

	participant elaborates to include descriptions of how they consider different information and/or options, to inform their behaviour, consider coding at Memory, Attention and Decision Processes instead. <u>Inappropriate coding to this domain:</u> – Descriptions of how a participant reaches out to other clinicians, who are available to them, that goes on to include a clear description of the role of that clinician – is more appropriate for coding at Social, Professional Role and Identity (as above, simple statements without reference to role should be coded at this domain). – It is plausible that, where participants have described their decision-making process, the utterance will contain contextual detail and quite possibly some intended actions. If the utterance does not include evidence of a bigger-picture thought process (i.e., the context and behaviour are clearly linked with no other influencing factors described), then code at this domain. However, if the participant uses contextual information to explain a wider thought process (one where several contextual cues are used to inform target behaviour) consider coding at M, A & DP <u>only</u> rather than at this domain. – If the description includes reference to NEWS as a decision-tool, then consider coding at Memory, Attention and Decision Processes rather than Environmental Context and Resources.	– Also, code at the domain: **Social Influences** in view of the following utterance within this text: *"…there's always someone around that you can grab, just to get someone else's opinion, someone else involved…"* <u>Example 3:</u> *Interviewer:* How do you know whether measuring vital signs will be one of your tasks for the day, or won't be one of your tasks for the day? *Participant:* "…Well I guess it all depends on the handover, but **if you're taking handover at the beginning of the day you always do it by the bedside, so you can first of all see your patients and also you'll get some information from overnight.** Generally, anyone that you're concerned about, or they've expressed concern about…" RN Pilot#1 – Also, code at the domain: **Social Influences** in view of the following utterance within this text: ***"…you'll get some information from overnight. Generally, anyone that you're concerned about, or they've expressed concern about…"***
12. Social Influences Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviour. *What do others think of what they do? Who are*	<u>Consider coding to this domain:</u> – Discussion about how social interactions with others influence the behaviours – Discussing the importance of other staff 'buying-in'. – Discussion of the need for other's activity *"We need doctors to respond when we call them".* – Descriptions of how staff follow the instructions of other members of the healthcare team e.g., a registered nurse following instructions from a more senior colleague or a health care assistant following instructions from a RN.	<u>Example 1:</u> *Interviewer:* Have you ever got feedback on your actions after you escalated a deteriorating patient? If so, Is it helpful, or unhelpful? *Participant:* "…**Yes, it's helpful, definitely, because you always, I think - I'm never completely 100 per cent confident in my decisions**. I'm pretty sure I am, **but you don't want to risk**

they and how does that influence what they do?	– Descriptions of unit-wide pattern of thought related to the target behaviour (consider social norms). <u>Inappropriate coding to this domain:</u> – Specific descriptions of the roles of others i.e. what someone else is doing or not doing "HCAs monitor vital signs" "Nurses make the decision to escalate care" should be coded at 'Social Professional Role and Identity.' – If another professional blocks or enables a behaviour merely by being present (i.e., the participant makes no reference to [past or present] communication with the individual) then it may not be appropriate to code at this domain. Instead, consider coding at Environmental Context & Resources. An example of this, if a participant reports being unable to enact target behaviours because another professional was with the patient, and they could not physically get to them, the barrier is not social influence and this should be coded at Environmental Context & Resources.	**missing something out** a lot of the time. **So, it's nice to know that actually you do have the right judgement**…" RN Pilot#1 – Also, code at the domain: **Beliefs about Capabilities** in view of the following utterance within this text: ***"…I'm never completely 100 per cent confident in my decisions…"*** <u>Example 2**:**</u> *Interviewer:* *Does that impact on you, your colleagues not behaving in the same way that you would behave?* *Participant:* **I don't think it impacts on me** directly. If I pick up on it, I will say something. Just because they're not my patient, doesn't mean I'm going to ignore the fact that, actually, I think they're potentially quite unwell. If, you know, I think that, I will go and record a set of observations myself. There have been occasions where I've had to do that. **Yes, it doesn't directly impact on me** but if I think something has been missed or ignored, I will action it myself, because, you know, just because I've got six patients doesn't mean that they're just mine. You know, I have a responsibility and a PIN number to look after. Not everyone, I can't look after everyone, but like, in your zone, if you like, because we work in little groups**.** It would be unreasonable to consider other zones but I always think within your zone regardless of whose patients are who, they're all your responsibility. **Everybody in every zone takes that opinion as well. Like I say, we all work very well together. If we had an agency nurse that wasn't picking up on their NEWS score as we thought would be appropriate, we would step in and action it ourselves within the zones to try and break it down a bit. Yes, I guess I would. It doesn't directly impact me, but I would do something about it.** RN Pilot#2

		Rationale for coding: Description of how others influence the behaviour (e.g., the agency nurse) – Also, code at the domain: **Social, Professional Role and Identity** in view of the following utterance within this text: *"….Just because they're not my patient, doesn't mean I'm going to ignore the fact that, actually, I think they're potentially quite unwell. If, you know, I think that, I will go and record a set of observations myself…AND…You know, I have a responsibility and a PIN number to look after…"* Rationale for coding: Relates to professional role as a RN – Also, code at the domain: **Intentions** in view of the following utterance within this text: "…*Just because they're not my patient, doesn't mean I'm going to ignore the fact that, actually, I think they're potentially quite unwell**. If, you know, I think that, I will go and record a set of observations myself. There have been occasions where I've had to do that**.*…" Rationale for coding: Description of explicit intent to enact a target behaviour <u>Example 3:</u> *Are there any situations which make it difficult for you to escalate in a timely way?* Again, because of the nature of the ward, I often have two or three patients who are actually acutely unwell and sometimes even all four of them. It's very difficult to be keeping up with everything you need to do for all of them. For example, they're all on hourly obs, hourly urine outputs, all the medications they need, to actually find the time to go and find the doctor or wait for PERRT to ring you back and that kind of thing. Sometimes you do just have to use your own nursing skills and your own nursing knowledge to keep them stable until you can find that person that you're looking for. You can always beep them but,

		again, it's not the easiest way to get through to people, particularly on a night shift. We're quite lucky, we have our own doctor at night but maybe they're down in resus or in a crash call or something and they're not there. **There's also always the nurse in charge that you can grab, or you can delegate and ask people who are maybe not as busy** as you to say, 'Sorry, please can you find the doctor for me and get them to come and see me because actually I can't leave here at the moment?' There are ways around it but it can be tricky. **The trick is to not just think you can manage it on your own, because you can't**. RN Pilot#2 Rationale for coding: Discussion of the need for others' activity. – Also, code at the domain: **Behavioural Regulation** in view of the following utterance within this text*: "…Sometimes you do just have to* ***use your own nursing skills and your own nursing knowledge to keep them stable until you can find that person that you're looking for****…or you can delegate and* ***ask people who are maybe not as busy as you to say, 'Sorry, please can you find the doctor for me and get them to come and see me because actually I can't leave here at the moment?' There are ways around it but it can be tricky****…"* Rationale for coding: Coping plans, problem solving, scripts and strategies to enact target behaviours "there are ways around it" – Also, code at the domain: **Environmental Context and Resources** in view of the following utterance within this text: "…**There's also always the nurse in charge that you can grab, or you can delegate and ask people who are maybe not as busy…" AND** *"…Again****, because of the nature of the ward, I often have two or three patients who are actually acutely unwell and sometimes even all four of them. It's very difficult to be keeping up with everything you need to do for all of them****. For example, they're all on hourly obs, hourly urine***

		outputs, all the medications they need, ***to actually find the time to go and find the doctor or wait for PERRT to ring you back*** *and that kind of thing…"* Rationale for coding: Influence of resources (nurse in charge/other staff) and clinical context on the target behaviours.
13. Emotion A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event *How do they feel about what they do and do those feelings influence what they do?*	<u>Consider coding to this domain:</u> – Descriptions of emotions experienced by HCA/RNs when enacting the behaviours (can be positive or negative). – Descriptions of when participant would be worried/concerned about enacting the behaviours – Include 'no' answers. <u>Inappropriate coding to this domain:</u> – Descriptions of patient's emotions.	<u>Example 1:</u> *Interviewer:* Have you ever got feedback on your actions after you escalated a deteriorating patient? *Participant:* "…I think **when you start off, that escalating is always a bit scary** maybe, whereas now it's a bit like well, if people respond negatively to an escalation, or if it's not their problem, it's just like I'll go somewhere else then. It doesn't affect you personally, the way it did initially…" RN Pilot#1 – Also, code at the domain: **Behavioural Regulation** in view of the following utterance within this text: *"…if people respond negatively to an escalation, or if it's not their problem, it's just like I'll go somewhere else then…"* <u>Example 2:</u> *Interviewer:* *How much does your emotional state affect your performance when a patient is deteriorating?* *Participant:* **I try to not let it. Sometimes it's difficult, especially if you've known them for a long time** or there's a whole load of other factors in there, but I always try and keep a level head. The moment you let emotions or stress or anything get to you, your ability to concentrate just goes out the window. **So I think it's very important to put that aside. You might go home at**

		the end of the day and feel awful, have a little cry or whatever, but I try and, kind of, literally hone in on the fact that they're really unwell. This is what they need, this is what they need me to do now and push everything else aside, because it can really impact on your ability to focus and look after them properly. At the end of the day, they're your patients. Yes, you can have a bit of an attachment to them but, you know, it's a working relationship, if you like. **So yes, I try to not let it, I think would be my answer. I guess you're always human.** RN Pilot#2 Rationale: Description of emotions related to enacting the target behaviours – Also, code at the domain: **Behavioural Regulation** in view of the following utterance within this text: "…***This is what they need, this is what they need me to do now and push everything else aside, because it can really impact on your ability to focus and look after them properly…"*** Rationale for coding: self regulation
14. Behavioural Regulation Anything aimed at managing or changing objectively observed or measured actions *Do they have strategies that have /do enable them to enact the behaviour?*	<u>Consider coding to this domain:</u> – Self-regulatory strategies already in place that would influence the behaviours. Focus on self- regulatory strategies only (not all strategies). – Coping plans, problem solving scripts/strategies used in response to resistance they describe when enacting target behaviours. – Descriptions of auditing or spot-checks recommended for implementation. – Requesting feedback to improve performance in enacting target behaviours (also consider coding at 'social influences'). – Descriptions of deliberate and/or considered strategies or plans for future behaviour that are broader than one momentary decision. – For Behavioural Regulation to be evident within an utterance it is probable that the participant will describe	<u>Example 1:</u> *Interviewer:* Have you changed anything yourself to improve your own performance in this area [recognising and responding to a deteriorating patient]? *Participant:* "…**I think I've probably refined my practice and what I do first. I think over time you just develop your own routine as to how you like to do things.** I guess again it's all about learning, **in the beginning, if someone's unwell, there's a bit of running about like a headless chicken for a while, which actually now if someone says someone's unwell, that's fine, you go straight to them, you do an assessment and you take it from there**…" RN Pilot#1

	both 'Beliefs about Consequences' and 'Intentions'. Coding an utterance at both domains should signal that Behavioural Regulation may be present, and prompt closer inspection for evidence of this. If plans and coping strategies are not explicit enough to code at Behavioural Regulation, then the utterance should be coded at 'Beliefs about Consequences' and 'Intentions'. However, if these domains are part of a bigger picture of thought that suggests Behavioural Regulation is occurring just code at this domain as the other domains are secondary. <u>Inappropriate coding to this domain:</u> – If the participant provides an explanation of a decision taken in the moment then this may be more appropriately coded at Memory, Attention and Decision Processes e.g., if a participant describes bleeping a doctor, not getting a response, so going to find a doctor in the ward office, this would be an example of a 'decision in the moment' and therefore should be coded at Memory, Attention and Decision Processes and Environmental Context & Resources (as the behaviour is also contingent on the doctor being in the physical environment). However, if the participant stated that they know that at night the doctors are very slow to respond to bleeps, so they tend to put out a cardiac arrest call much sooner than they would during the day, as part of their escalation plan, this provides clear evidence of Behavioural Regulation and should be coded as such.	<u>Example 2:</u> *Interviewer:* *How much do the opinions of your colleagues about NEWS affect how you respond to the score?* *Participant:* I've only been qualified nearly 11 months now, so I am still learning, I'm still newly qualified. **Often, I will ask their opinion. I'll say to them, 'Do you think it could be this?' or not, 'Would you be concerned?' but sort of along those lines of, 'Oh, my patient is scoring this. Do you think I should alert the critical outreach team?' You'll give them a background of what they've come in with, etc.** I value their opinion, so you don't doubt yourself, but I will always still go with my gut instinct rather than what somebody else has told me to do. The same with the doctors. Again, we're all very good at supporting each other, picking up on things and knowing if someone's lacking in confidence or could do with a bit of advice on if their patient is scoring-, I have been given advice and my colleagues have said, 'Your patient has got a NEWS score of this, have you done a set of obs recently?' It's not meant in a, you know, 'Have you done this yet? Why aren't you looking after your patients properly?' It's in a supportive way. **I think I have definitely asked opinions before from Band 5s, Band 6s, whether to escalate. It's always someone who's got more experience in these situations**, **I think is good to value their opinion on what they would do if it was you**. At the end of the day, it's your decision. RN Pilot#2 Rationale: Requesting feedback on target behaviour to improve performance – *Also, code at the domain: **Social Influences** in view of the following utterance within this text: "…**Often, I will ask their opinion**. I'll say to them, 'Do you think it could be this?' or not, 'Would you be concerned?' but sort of along those lines of, 'Oh, my patient is scoring this. Do you think*

		I should alert the critical outreach team?' You'll give them a background of what they've come in with, etc. ***I value their opinion****,* ***so you don't doubt yourself, but I will always still go with my gut instinct rather than what somebody else has told me to do. The same with the doctors. Again, we're all very good at supporting each other, picking up on things and knowing if someone's lacking in confidence*** *or could do with a bit of advice on if their patient is scoring-,* ***I have been given advice and my colleagues have said, 'Your patient has got a NEWS score of this, have you done a set of obs recently?' It's not meant in a, you know, 'Have you done this yet? Why aren't you looking after your patients properly?' It's in a supportive way.*** *I think I have definitely asked opinions before from Band 5s, Band 6s, whether to escalate. It's always someone who's got more experience in these situations, I think is good to value their opinion on what they would do if it was you. …"* Rationale: Discussion about how others influence the behaviours; discussing the importance of other staff 'buying-in'; discussion of the need for other's activity

Appendix 10 - Table linking BCTs to the 14 domains of the TDF (BCT mapping tool)

	Techniques judged to be effective in changing behaviour within the conceptual categories (domains) of the TDF - Cane et al., (2015)													
Behaviour Change Techniques[1]	1. Knowledge	2. Skills	3. Social, professional Role & Identity	4. Beliefs about Capabilities	5. Optimism	6. Beliefs about Consequences	7. Reinforcement	8. Intentions	9. Goals	10. Memory, Attention & Decision Processes	11. Environment Context & Resources	12. Social Influences	13. Emotions	14. Behavioural Regulation
Action Planning (including implementation intentions)									■	■				
Antecedents	■													
Anticipated regret						■								
Anticipation of Future Rewards or Removal of Punishment							■							
Avoidance/changing exposure to cues for the behaviour											■			
Behavioural Contract								■						
Behavioural Rehearsal/Practice		■												
Biofeedback	■													
Body Changes		■												
Classical Conditioning							■							
Commitment								■						
Comparative Imagining of Future Outcomes						■								
Counter conditioning							■							
Covert Conditioning						■								
Covert Sensitisation						■								
Differential reinforcement							■							
Discrimination training							■							
Discriminative (Leaned) Cue											■			
Emotional Consequences						■							■	
Extinction							■							
Feedback on behaviour	■													
Focus on Past Success				■										
Goal Setting (Behaviour)									■					
Goal Setting (Outcome)									■					
Graded tasks		■												
Habit formation		■												
Habit reversal		■												
Health Consequences	■													
Identification of Self as a Role Model												■		
Incentive							■							
Information about Others' Approval												■		
Material Reward							■							
Modelling or Demonstrating the Behaviour												■		
Negative Reinforcement							■							
Non-specific Reward							■							
Prompts/Cues										■	■			
Pros and Cons						■								
Punishment							■							
Reduce Negative Emotions													■	
Response cost							■							
Restructuring the physical environment											■			
Restructuring the social environment											■	■		
Review Behaviour Goals									■					
Review of Outcome Goal(s)									■					
Salience of Consequences						■								
Self Reward							■							
Self-assessment of Affective Consequences													■	
Self-monitoring of Behaviour										■				■
Shaping							■							
Social and Environmental Consequences						■								
Social Comparison												■		
Social Reward							■					■		
Social Support (Emotional)												■	■	
Social Support (Practical)												■		
Social Support or Encouragement (General)			■									■		
Thinning							■							
Threat						■	■							
Verbal Persuasion to boost Self-Efficacy				■	■									
Vicarious Reinforcement						■						■		
Total BCTs	4	5	1	2	1	10	17	2	5	3	5	10	4	1
Number that overlap	0	0	1	1	1	1	2	0	1	3	2	5	2	1

Key:
1. BCTs (n=59) listed are those where domain allocation was reliable *i.e.*, consistent domain allocation by experts with high confidence
BCTs were not allocated to these TDF domains consistently and with high confidence in the Cane et al., (2015) work, therefore BCTs were identified from the original Michie et al.,(2008) taxonomy (n=4)
Emboldened BCTs are commonly identified BCTs as observed in Michie et al.,(2013).

References:
Cane, J. *et al.* (2015) 'From lists of behaviour change techniques (BCTs) to structured hierarchies: Comparison of two methods of developing a hierarchy of BCTs', *British Journal of Health Psychology*. Wiley/Blackwell (10.1111), 20(1), pp. 130–150. doi: 10.1111/bjhp.12102.
Michie, S. *et al.* (2008) 'From Theory to Intervention: Mapping Theoretically Derived Behavioural Determinants to Behaviour Change Techniques', *Applied Psychology*. Wiley/Blackwell (10.1111), 57(4), pp. 660–680. doi: 10.1111/j.1464-0597.2008.00341.x.
Michie, S., Johnston, M. (2013). Behavior change techniques. In M. D. Gellman & J. R. Turner (Eds.), Encyclopaedia ofbehavioral medicine (pp. 182–187). New York: Springer

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Appendix 11 – Facilitator's guide for nominal groups (in phase 3)

Summary of facilitator roles

Facilitator 1 (DS)	Lead the group including introductions, ground rules, and signalling transitions between the different activities.
Facilitator 2 (MC)	Providing expert guidance on the appropriateness of the linkages between BCTs and applications proposed by the group during stage 2.
Facilitator 3 (JD)	Providing expert guidance on the appropriateness of the linkages between BCTs and applications proposed by the group during stage 2.
Facilitator 4 (LA)	Typing participant responses onto the virtual whiteboard/shared MS Word document in real time. Taking paper notes and intermittent screenshots of the virtual whiteboard/shared MS Word document to ensure that key information is not lost if there is software/hardware failure. Updating the ranking list of BCTs/applications, in real time, based on information from the virtual whiteboard/shared MS Word document.

Introduction and briefing (facilitator 1) – 15 minutes

- Open, welcome and thank participants for attending
- Ask all participants to say "hello" and to briefly introduce themselves (clarify the role of each supervisor, including the role of the health psychologists within the facilitation team)
- Clarify the nominal group process including the context, purpose, ground rules* and structure
- Offer the participants the opportunity to ask questions about the content of the information package e.g. to clarify the meaning of any BCTs (any questions may be deferred by DS to MC or JD to answer)
- Stress *"we are using this technique as it has been shown to allow everyone to contribute equally to feedback"*

**Ground rules:*

- Please respect one another's privacy by not discussing who attended or repeating anything that is said.
- If you do not understand a point made by another group member, be respectful in your inquiry
- Where the technology allows, keep video cameras switched on to facilitate a more personal feel to the group (opportunities for private work will be sign posted).
- Mute microphones when not speaking or participating in silent or private activities.
- Use the 'raise your hand' icon if you wish to speak within the group during the more open discussions in stage 2.
- Try not to get too pre-occupied with the language of the BCTs, the focus of discussion should be more on **how** the BCTs could be delivered.
- Whilst creativity and innovation are encouraged, request that participants try to keep their focus on ways of the delivering the BCTs rather than broader solutions (e.g. major organisational changes within the hospital or reforms to nursing education) to the example barriers given in the table.
- The barriers and enablers within the table are examples i.e. this is not an exhaustive list.
- Facilitators may interrupt to move the conversation on. This does not mean that the suggestion being made is not valuable, it will just be to ensure that we keep to time.

Stage 1 – individual responses (facilitators 1 and 4) (15 mins + 25 mins)

- Facilitator 1 poses the opening question:

"Are there any other ways (or better ways) that the BCTs listed in table 1 could be applied at UCLH, that were not included in the information package?"

- Participants are asked to privately and silently consider alternate ways in which the BCTs in table 1 (3rd column) could be applied (put into action) at UCLH (other than the examples in column 5 *–though suggesting an amendment to, or an elaboration of, one of these examples is quite acceptable*). They do not need to come up with ideas for every BCT, just those that speak to them the most. *Every group member will have the chance to share one idea minimum. We may have the opportunity to cycle around the group more than once and hear several ideas; however, we may not (it really depends on time). As*

such, if participants have several suggestions, ask that they share them in the order of priority so that we will have heard the most important points from their perspective.

- Participants may want to jot ideas down on a piece of paper or on a separate notes page on their computer so that they do not forget.
- Participants are encouraged to think as broadly, creatively, and as 'out of the box' at this stage as they can (scaling down will come in later activities if appropriate).
- Participants are told that they have 15 minutes, but that they will be prompted when they are due back into the virtual space.

- After 15 minutes, facilitator 1 brings the group out of their silent phase and asks each person in turn to give just 1 idea that they came up with in response to the question. *Note: when the participants are sharing their ideas, ask that they clarify which BCT their idea relates to so that this can be captured on the whiteboard/shared MS Word document. They do not need to read out the barrier – just to clarify the number and the BCT to which their idea relates.*
- When offering suggestions during the 'round robin' exercise remind participants to speak descriptively without lots of evaluation (e.g. rationale) or opinion.
- Participants are asked not to repeat an idea that has already been given in the information package or by another participant during the group, but they may present an idea if it represents a "variation on the same theme" i.e., it extends an existing idea or involves a different level of emphasis.
- Whilst the participants are giving their response, facilitator 4 types the ideas onto a virtual whiteboard/shared MS Word document (that all group members can see). Each idea is numbered (13,14,15…) for ease of reference later **[Note: numbering should start at 13 as 1-12 are the number labels given to the existing examples within the information package].** *Points should be typed into text boxes so that they can be manipulated. A landscape A4 sheet should be used in MS Word to make it easier for participants to read the information* (see appendix 1 for further guidance).
- This round robin exercise continues until all ideas have been offered up and recorded or time runs out for this activity.
- Once an idea has been added to the virtual whiteboard/shared MS Word document it belongs to the whole group and decision making about grouping ideas etc. should reflect this.

Stage 2 – clarification and consolidation of responses (facilitators 1, 2, 3 & 4) (25 minutes)

- Participants are invited by facilitator 1 to seek clarification from other participants about their suggestions/ideas.
- Participants are then invited to edit their whiteboard/shared MS Word document by merging suggestions/ideas that overlap. Number labels applied in stage1 may be used for ease here. If 2 points are merged, a new number may be allocated to the resultant point. *Note: the facilitator must be careful at this stage not to comment on or evaluate the points/decisions made by the participants. However, DS can consider asking open questions to seek further clarification if the link between the BCT and application seems tenuous e.g. can you explain how that application relates to the BCT?*

*****15 to 20-minute comfort break for participants here – during the comfort break all facilitators enter another MS Teams space and focus on the following:***

- Adding BCT/applications to the ranking sheet so that it can be shared (see appendix 2 for further guidance) – facilitator 4.
- Prioritising where the BCT and suggested application do not clearly link and need to be adjusted - facilitators 2 & 3.
- Agreeing how to feedback adjustments to the participants.

- Facilitators 2 and 3 invited to comment on the linkages between the BCTs and the applications generated during stage 1 (this might include gently highlighting where a BCT and application do not appear to align or where there appears to be confusion about the meaning of a BCT).

Stage 3 – ranking exercises (20 minutes - 10mins + 10mins)

- The link for the ranking document in Qualtrics is posted into the Teams discussion thread (having been updated in real time by facilitator 4) - https://cityunilondon.eu.qualtrics.com
- Participants are asked to access the poll and do two things:
- From the longer list they should **rank 5 of the BCTs and applications** that they feel would be the **most acceptable** to ward staff.

- When they click on the link it will take them to a list of the BCTs and applications from the table plus any additional ones that were suggested by group members (these will have been added on during the discussion and will appear at the bottom of the list). They should rank from 1 (most acceptable) to 5. This can be done by typing the number (1-5) in the little box above the relevant point (see pictures in appendix 1). *
- Highlight to the participants that the numbers they see next to the points below reflect either the number from the table within the information package, or the number allocated on the virtual whiteboard/shared MS Word document in Microsoft Teams. As such, they should **not** let this number influence how they rank the items, this is just a label to help them identify each of the items from the information that they already have.
- They should then repeat this activity according to how easily they believe the BCT/applications could be put into practice at UCLH from 1 (easiest) to 5.

*Remind participants that any BCTs and applications that they do not rank will not be seen by the research team to be part of their response, so they do not need to attempt to vote on these (Qualtrics will block them from doing so). They should just focus on ranking the 5 that they consider to be the most important. This does not mean that other BCTs and example applications will not be considered by the research team when they are compiling the preliminary intervention. All BCTs will be considered; however, those that they rank highly (top 5) will be prioritised.

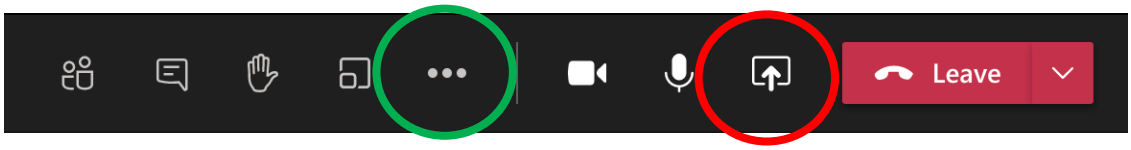
Closing remarks
Inform participants that a summary of the ranking data will be circulated via email. Invite participants to comment on the accuracy by responding to the email if they want to.
Thank participants again for their contributions.

Nominal group facilitator guide - Appendix 1

Guidance for facilitators on how to capture participants' ideas during stage 1 of the NGT

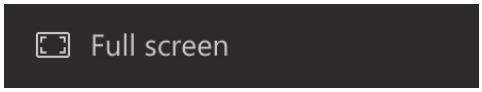
Technique 1 – using the Whiteboard app within MS Teams

1. To create a whiteboard display, click the icon encircled in red on the control bar below

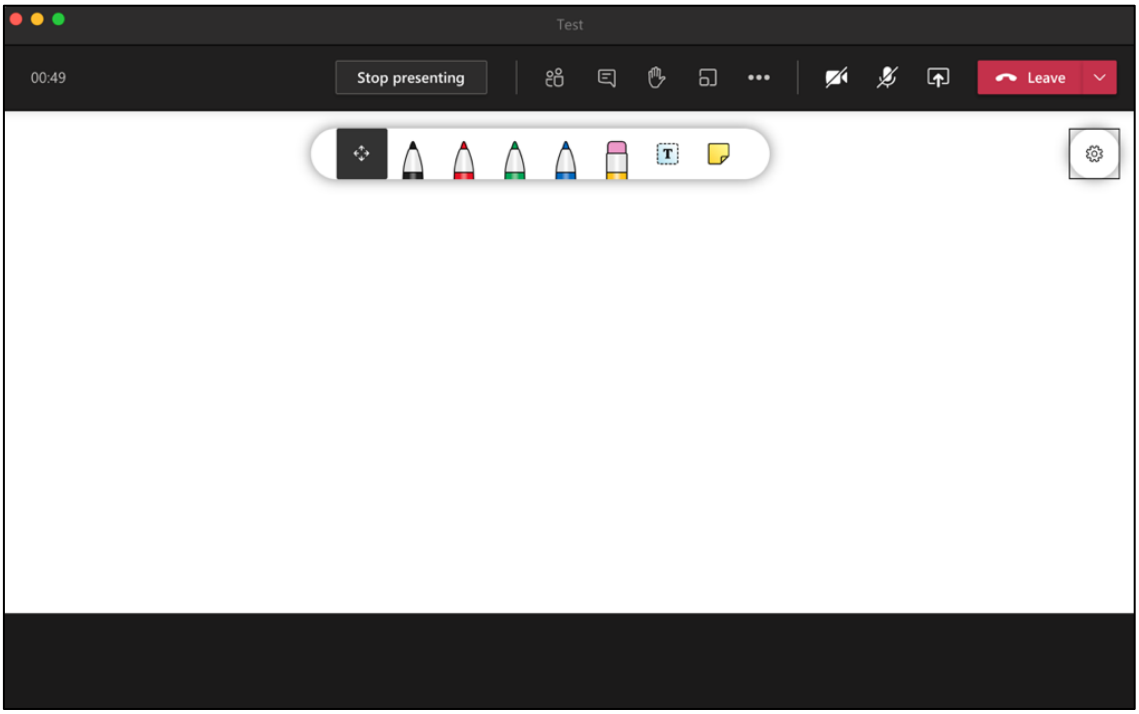


2. Clicking on this icon should display an additional 'tray' on your screen. Within this tray, you should see a whiteboard icon (pictured below). **Click on this icon to launch a whiteboard.**

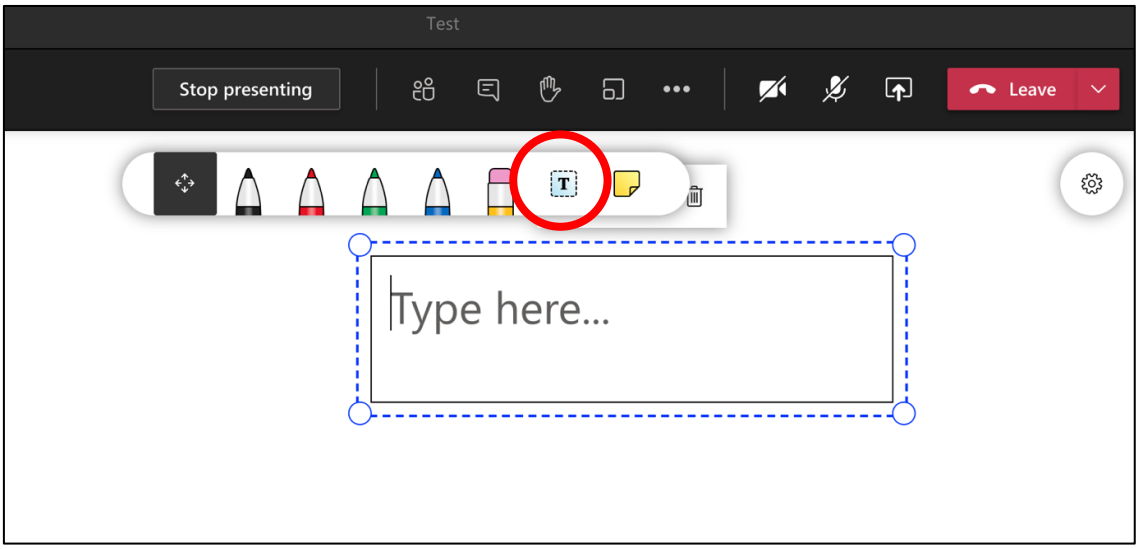
3. Once the whiteboard has launched, activate full screen mode by clicking on the three-dot button on the tool bar (encircled in green on the picture above) and then select full screen mode as below:



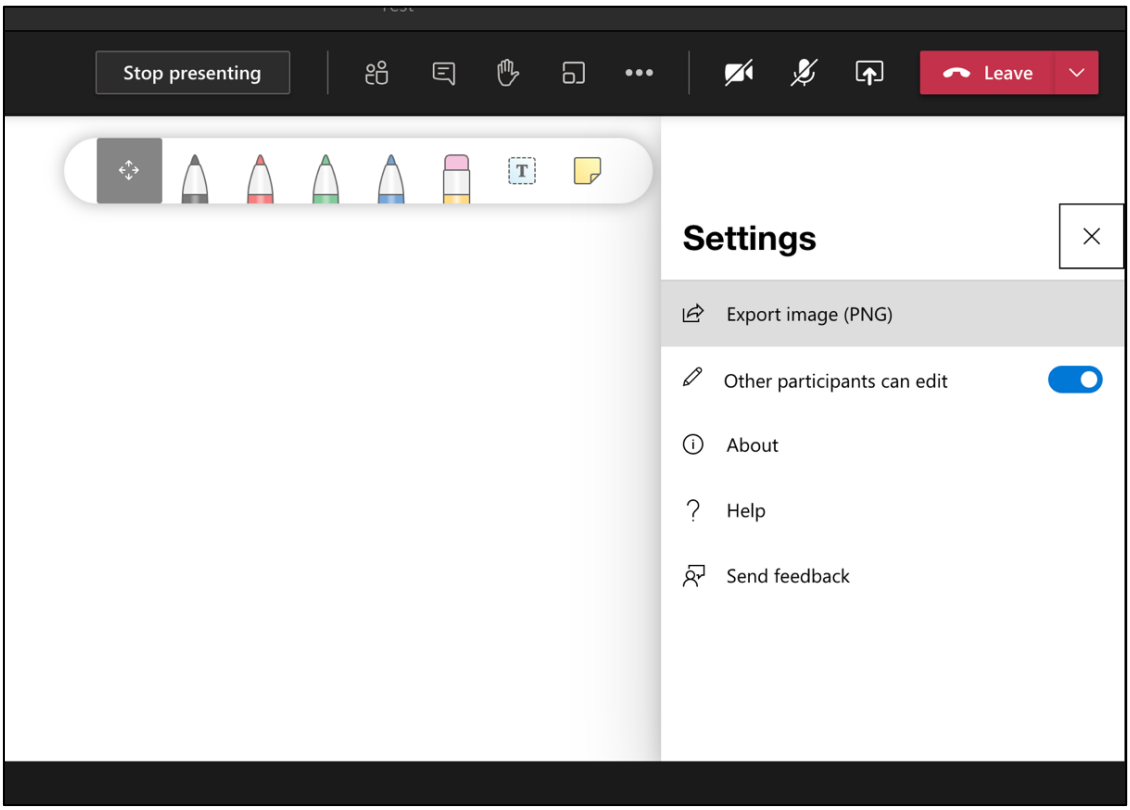
The whiteboard should then appear as you see here:



4. Use the text box icon (encircled in red on the picture) on the whiteboard tool bar to insert text boxes. When active (as seen in the picture here), these can be manipulated (i.e., their size changed) and moved around the screen.



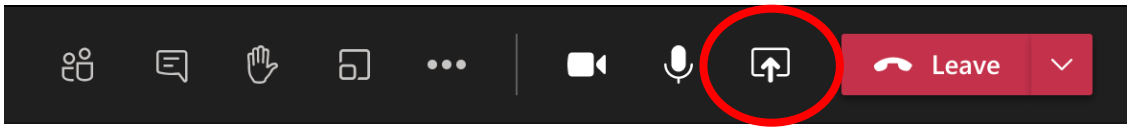
5. Intermittently, export and image of the whiteboard by clicking on the cog icon and selecting ‘export image (PNG)’ as seen in the picture below. This will save a copy of the whiteboard (and its content) into the downloads folder of the operator’s computer.



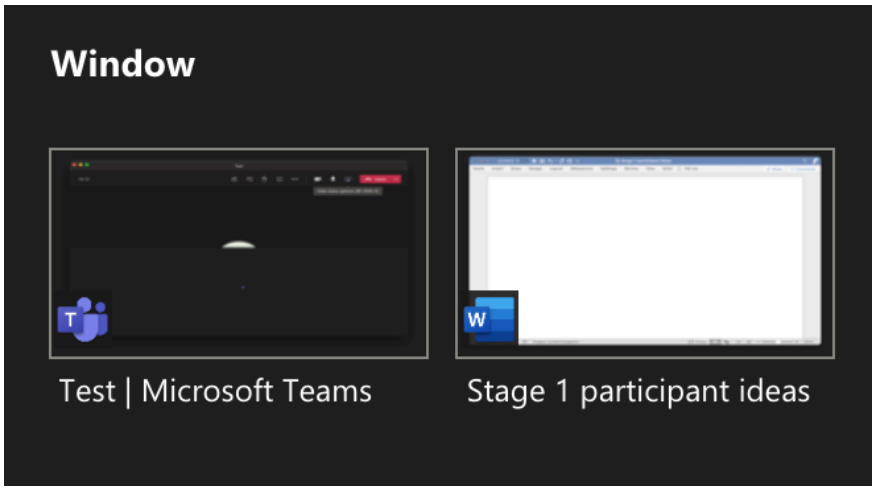
6. Finally, to remove the whiteboard from view, click ‘stop presenting’. It is worthy of note that if you return to the whiteboard within the same meeting, it should still display as it was left i.e., any content that was added before.

Technique 2 – using a MS Word document that is shared with the participants through MS Teams
If the whiteboard does not launch effectively, the backup plan is to use a Microsoft Word document and the share screen option in Teams. Instructions on how to do this can be found below:

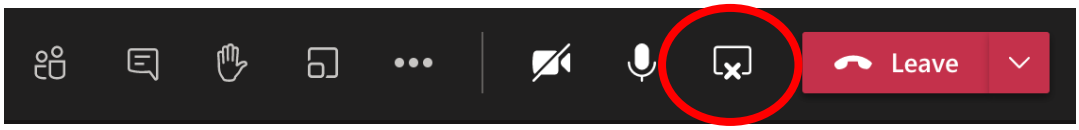
1. Open an MS Word blank document and change the document alignment to landscape and all of the document margins to 1cm (some margins may need to be slightly larger than this, but MS Word will prompt for these to be ‘fixed’ before the changes are applied)
2. Save the document with an appropriate filename to the desktop
3. Remove unnecessary rulers and ribbons from the top of the screen to maximise participants view of the page when the screen is shared
4. Open MS Teams and enter the meeting with the word document open in the background
5. When you are ready to share your Word document, click the icon encircled in red on the control bar below



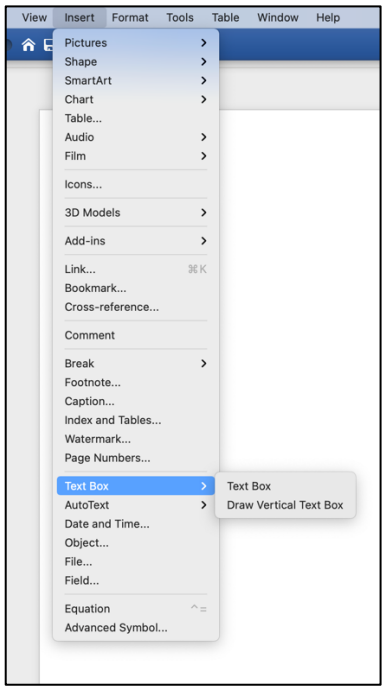
6. Clicking on this icon should display an additional ‘tray’ on your screen. Within this tray, you should see a Window section (pictured below). Any documents open in the background, should be visible within this space. Here, the blank word document has been saved as Stage 1 Participant Ideas. **Click on this document to share with participants.**



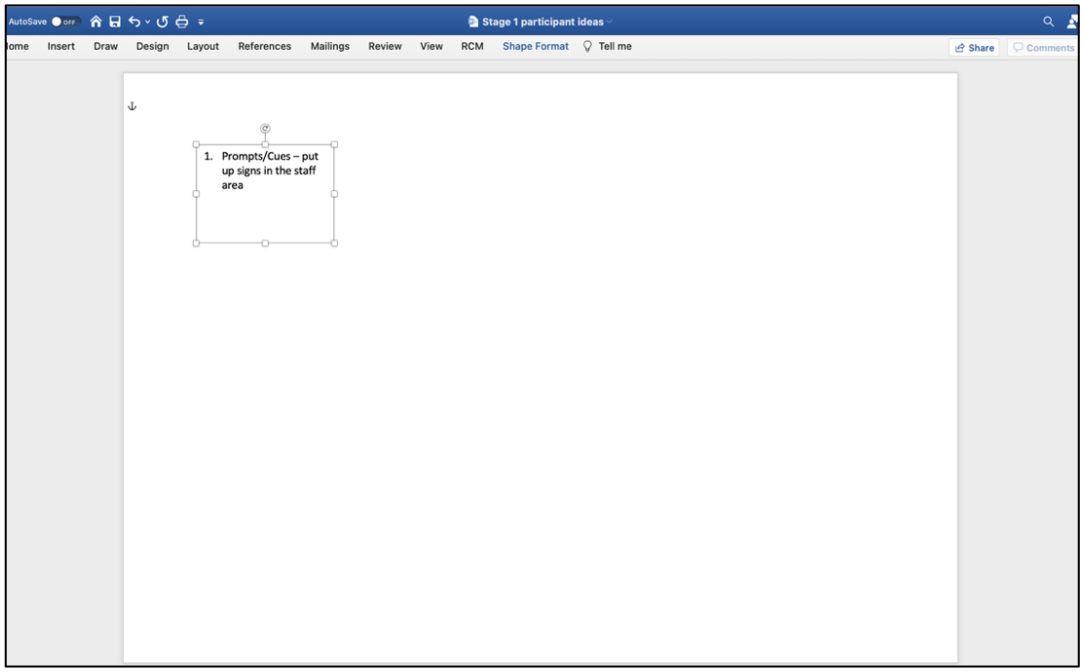
7. The selected document should then appear on your screen with a red box around it (to signal that the document is being shared). Anything typed into this document will be displayed to all participants.
8. To stop sharing this document at any time, either click **'stop presenting'** which may appear on an additional tool bar that only appears when you are sharing your screen, or click on the icon encircled in red below, from the main MS Teams toolbar.



9. When you are sharing the Word document and participants are volunteering ideas that you wish to share, type participants' points into text boxes as this will allow ideas to be moved around and edited as the conversations progress. To do this, click **insert** and then **text box** as seen in the image below:



10. Once the text box appears on the screen, type the idea into the box. The boxes can be manipulated and moved around the page when highlighted (as seen below). This will be particularly useful when converging ideas in stage 2.



11. Remember to click **save** intermittently to ensure that the content of the sheet is captured should the technology fail at any stage.

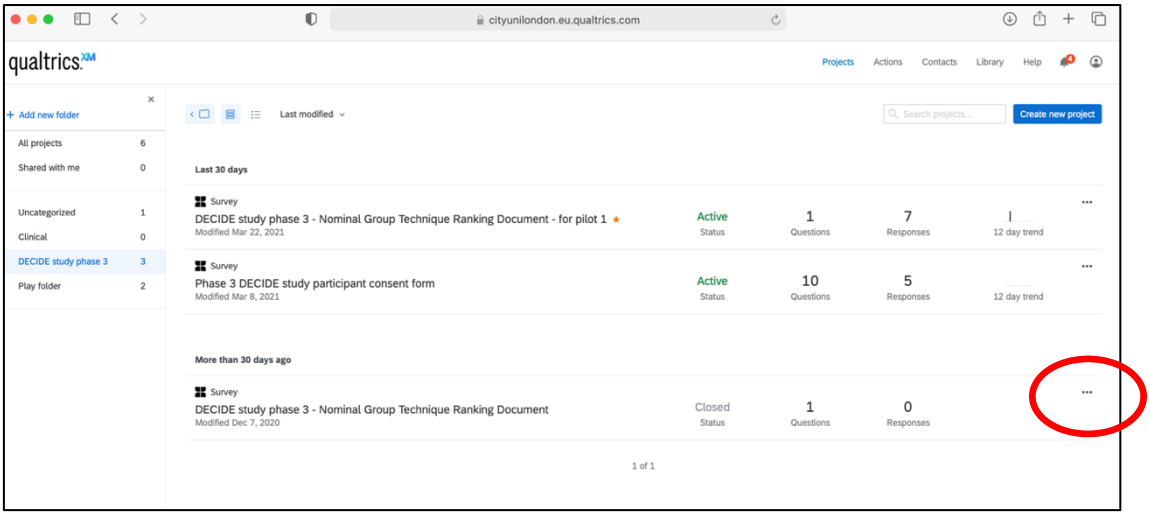
Nominal group facilitator guide - Appendix 2

Guidance on how to add group suggestions to the ranking documents in Qualtrics and how to publish for stage 3 voting activities

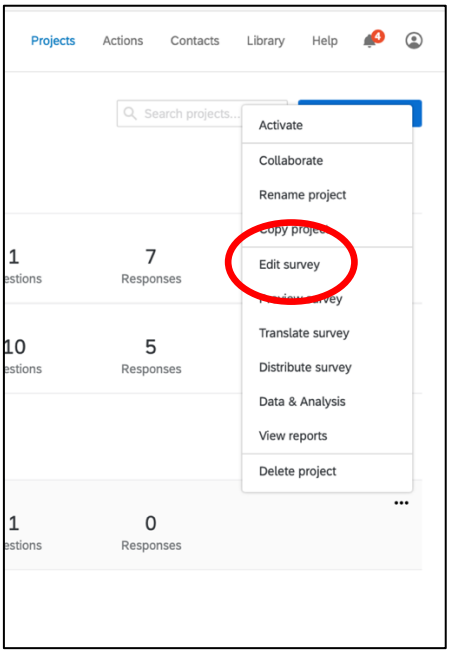
Open the Qualtrics package using the following link: https://cityunilondon.eu.qualtrics.com

(Note, you will require your City username and password to access)

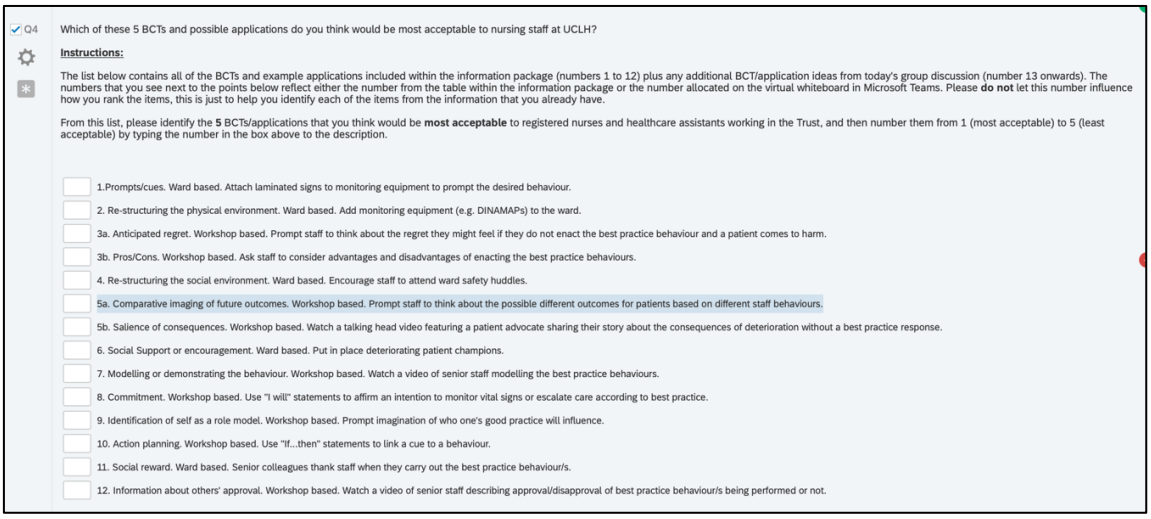
1. From the Qualtrics dashboard, you should be able to see the relevant document which will have been shared ahead of the groups.



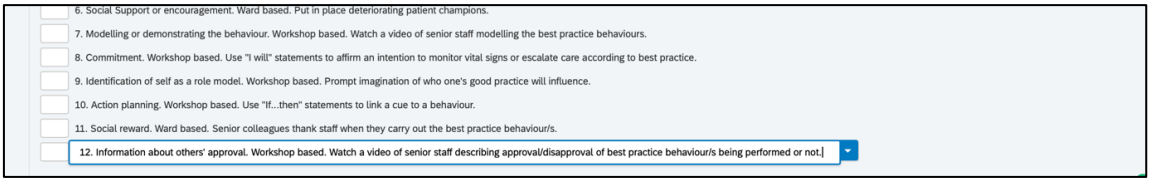
2. Left click your mouse on the 3 dots visible to the right of the relevant document (circled in red above) which will open an additional menu. From this menu, select **edit survey**



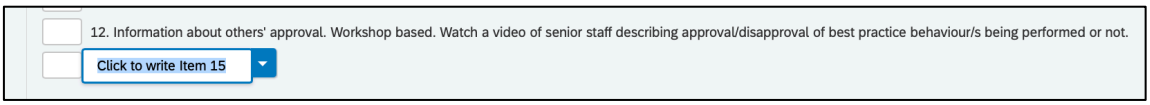
3. This will open the survey in editing mode. Existing BCT/applications already entered ahead of the group (matching those in the participant information package) will appear as below:



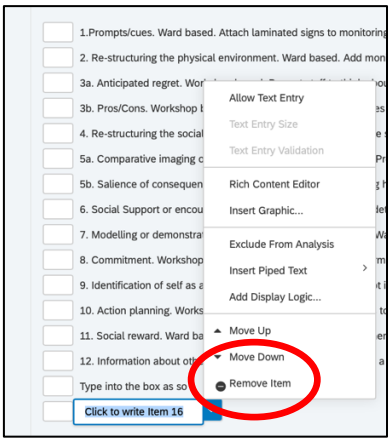
4. To add additional points to the bottom of the list, **left click** on the last entered piece of information so that it is highlighted as below:



5. With the cursor at the end of the sentence, hit **enter** on your keyboard. This should automatically insert a new line and allow text to be entered as seen below:

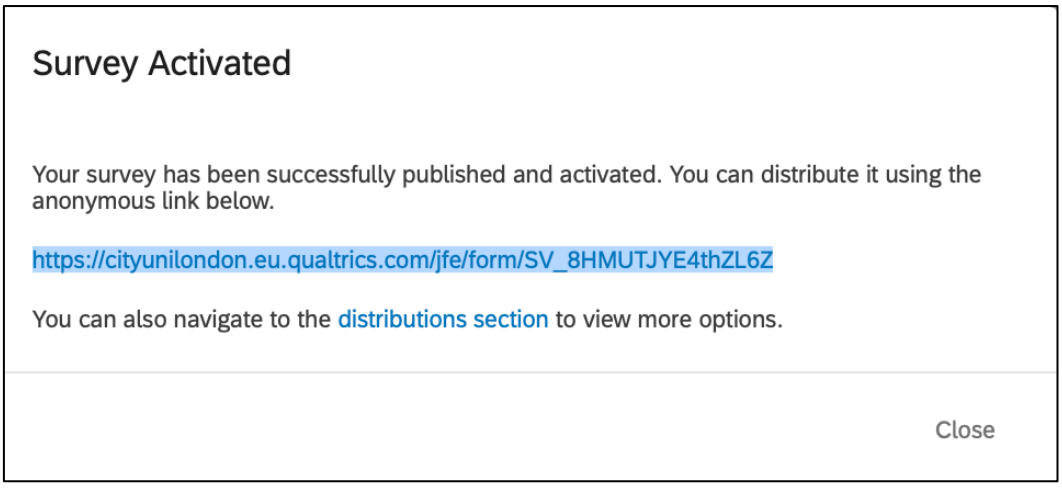


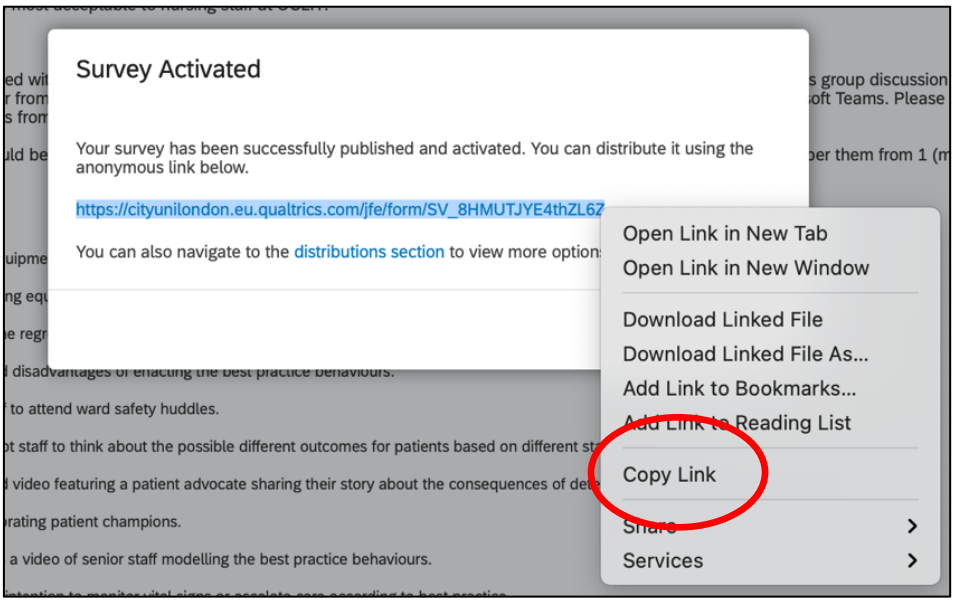
6. Number the point and add the information using the format of BCT followed by brief description of application (ideally no more than one line of description). Once the point has been added, hit the enter key and a new line will be added to the document. If you want to go back and edit at any point, just click over the text to make it active for editing.
7. To remove a line for any reason, **left click** the down arrow icon that will appear when a box is active and select **remove item** as circled in red on the menu pictured below:



8. Once you are ready to share the ranking document with participants, click the **publish** icon in the top right of the Qualtrics screen (note, you may wish to preview the survey first so you can check how it will appear to participants – previews will appear in a new window).

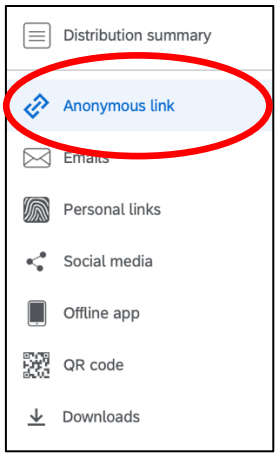
9. Clicking publish should automatically display the survey activated link (first picture below). You can highlight this link from the dialogue box and then using the **right click** of the mouse, display a menu that will allow you to **copy link**. The link can then be pasted directly into the chat space of MS Teams (second picture below).





10. Alternatively, once the survey has been published. Click the distributions option from the top left of the Qualtrics screen which will open a new display.

11. From the menu that appears on the left of the new window (first picture below), left click **anonymous link** to display the link (second picture below) which can also be copied and pasted into the MS Teams chat for participants.



Appendix 12 – Information package for nominal group participants (phase 3)

What is the purpose of this document?

Thank you for expressing interest in participating in a group discussion using nominal group technique. By now, you should have received a participant information sheet (v3.0 20/7/20) with more detailed information about the research. Please read this sheet before you read this package. This document should complement the information in the information sheet and provide you with more detail about what you will be discussing at the meeting.

What research has already been completed?

In phases 1 and 2 of this research project, data were collected by observing the behaviour of nursing staff when monitoring patients' clinical observations and responding to signs of deterioration. Nursing staff (registered nurses (RNs) and healthcare assistants (HCAs)) were then interviewed to explore their views on what influences their behaviour in response to patient deterioration. These data have now been analysed, using structured approaches, and a theoretical framework of behaviour change applied.

From these earlier processes, the research team have put together a list of **behaviour change techniques (BCTs)** that respond to the barriers to ideal practice that nursing staff describe. The BCTs are linked to behavioural theories and could change staff behaviour and improve responses to deteriorating patients. BCTs are considered the "active ingredients'' of behaviour change interventions and broadly work by either promoting desired behaviours or inhibiting unwanted behaviours.

Multiple BCTs are available to address the identified barriers and enablers, but it is likely that some of them will be easier to deliver and more acceptable to staff in the Trust than others. The group process that you have been invited to will help to identify the optimal combination of techniques that are both acceptable and feasible.

What will we be discussing?

During the group discussion you will be asked to consider the BCTs listed in the table over the page and, specifically, how they could be applied on the wards in your Trust.

To help put these techniques into context, we have offered some examples of the barriers (i.e. factors that prevent a RN/HCA doing the right thing) and enablers (i.e. factors that help a RN/HCA to do the right thing) that staff who were interviewed believed affected their behaviour when monitoring patients' clinical observations and escalating care. To help you to make sense of the BCTs, descriptions in plain-English are included in table 1. You will also find some examples of how these BCTs could be applied in your Trust (these are just examples; you may have alternative suggestions which you will be invited to share at the group meeting).

ACTION POINT: It would be helpful if you could read through the list of techniques and example applications before attending the group. It will also be very helpful if you can see the table of examples during the meeting so that you can refer to it. As such, you may wish to print the table out before the meeting and have it with you or, alternatively, have it visible on a second computer screen or different device during the group discussion. There will be an opportunity at the start of the group to ask questions about any of the BCTs that you have not understood and/or would like more information about.

Row no.	**Example** beliefs from interview participants reflecting barriers and enablers	Behaviour Change Technique/s (BCT)	Plain-English explanation of the BCT	**Examples** of how the BCT/s could be delivered in your Trust (the application)
1a	If a patient has abnormal vital signs/an elevated NEWS, some HCAs attempt to improve the score with interventions (e.g. asking the patient to drink more) or perform further monitoring rather than escalating immediately to a RN (potential barrier).	Prompts/cues	Introduce an item into the environment that will prompt or cue the behaviour. The prompt or cue would normally occur at the time or place that the behaviour is performed.	**Could be delivered in the ward setting:** Laminated signs are attached to the DINAMAP reminding HCAs, nursing associates or student nurses, that they should immediately escalate a NEWS of 5 or more to a RN so that they can assess the patient further.
1b	Staff believe that the nurse-in-charge of the ward and/or senior nursing colleagues are resources to be called upon when a patient deteriorates (potential enabler).	Prompts/cues	Introduce an item into the environment that will prompt or cue the behaviour. The prompt or cue would normally occur at the time or place that the behaviour is performed.	**Could be delivered in the ward setting:** A pop-up or best practice advisory is incorporated into EPIC to prompt the RN to notify the nurse-in-charge about a deteriorating patient.
2a	The monitoring of clinical observations may be hindered by a lack of physical resources, in particular a lack of DINAMAPS and digital thermometers (potential barrier).	Re-structuring the physical environment	Change the physical environment to facilitate performance of the wanted behaviour or create barriers to the unwanted behaviour.	**Could be delivered in the ward setting:** DINAMAPS and digital thermometers are added to the ward environment and positioned close to the entrance of each bay so that they are easily accessible to RNs/HCAs. A marker is added to the floor so it is clear where the equipment should be returned to.
2b		Re-structuring the physical environment	Change the physical environment to facilitate performance of the wanted behaviour or create barriers to the unwanted behaviour.	**Could be delivered in the ward setting:** Wall mounted clocks with a second hand are added to the ward environment to facilitate the accurate measurement of respiratory rate.
3	HCAs believe that patients may be upset if they are woken overnight to have their vital signs monitored (potential barrier).	Anticipated regret	Create an awareness of the future regret that will be felt if the unwanted behaviour is performed.	**Could be delivered in a deteriorating patient workshop:** Staff are asked to think about the degree of regret that they might feel if a patient came to harm because their condition worsened, and was not detected quickly, because vital signs were not monitored overnight.
4		Pros/Cons	Prompt people to identify and compare reasons for wanting (pros) and not wanting to (cons) change their behaviour.	**Could be delivered in a deteriorating patient workshop:** Advise RNs/HCAs to list and compare the advantages and disadvantages of waking patients up to perform vital signs monitoring overnight.

Row no.	**Example** beliefs from interview participants reflecting barriers and enablers	Behaviour Change Technique/s (BCT)	Plain-English explanation of the BCT	**Examples** of how the BCT/s could be delivered in your Trust (the application)
5a	Some HCAs believe that they are not able to regularly attend ward huddles or do not find them a useful resource for drawing attention to deteriorating patients (potential barrier).	Re-structuring the social environment	Change the social environment to facilitate performance of the wanted behaviour or create barriers to the unwanted behaviour.	**Could be delivered in the ward setting:** Set the expectation that at least one HCA representative per shift will attend the ward safety huddles. Plan, ahead of time, which HCA/s will attend the huddles alongside registered colleagues. This could be included on the staff duty rota. Prior to attending the safety huddle, the senior HCA would be asked to check in with all their HCA colleagues on duty and ask the following questions: "do any of your patients have an elevated NEWS?" and/or "are you worried that any of your patients are deteriorating or likely to deteriorate?". These concerns would be escalated to RNs (including the nurse-in-charge) at the huddle.
5b		Re-structuring the social environment	Change the social environment to facilitate performance of the wanted behaviour or create barriers to the unwanted behaviour.	**Could be delivered in the ward setting:** Incorporate short case study discussions into safety huddles. Encourage HCAs to present a case study and talk about their role in the care of a patient who was deteriorating or vulnerable to deterioration.
6	Some HCAs believe that when they escalate to a RN their concerns will be dismissed, or the RN will 'explain away' the elevated NEWS (potential barrier).	Comparative imagining of future outcomes	Prompt people to imagine and compare future outcomes of changed versus unchanged behaviour.	**Could be delivered in a deteriorating patient workshop:** Prompt HCAs to imagine and compare likely or possible outcomes following immediate escalation of an elevated NEWS to the RN versus no escalation or delayed escalation.
7		Salience of Consequences	Emphasise the consequences of performing/not performing the behaviour with the aim of making them more memorable.	**Could be delivered in a deteriorating patient workshop:** Provide a short 'taking head' video clip of a patient talking emotively about the negative consequences that delayed escalation (when they deteriorated) had on their future health and wellbeing. Provide an alternate video with a different patient talking about the positive consequences that timely escalation had on their future health and wellbeing.

Row no.	**Example** beliefs from interview participants reflecting barriers and enablers	Behaviour Change Technique/s (BCT)	Plain-English explanation of the BCT	**Examples** of how the BCT/s could be delivered in your Trust (the application)
8a	Experienced HCAs believe that it is their role to teach or "prompt" new HCAs on how to use the monitoring equipment and/or how to record vital signs (potential enabler).	Social Support or Encouragement	Advise on, arrange, or provide social support, praise, or reward for performance of the behaviour.	**Could be delivered in the ward setting:** From the existing ward team, identify local deteriorating patient champions (at both RN and HCA level). These champions could provide ward-based support and encouragement to their colleagues to enact 'best practice' behaviours when monitoring and recording vital signs.
8b		Social Support or Encouragement	Advise on, arrange, or provide social support, praise, or reward for performance of the behaviour.	**Could be delivered in the ward setting:** From the existing ward team, allocate new/junior HCAs a more senior 'HCA mentor' who will support and encourage them to deliver best practice behaviours when monitoring and recording vital signs.
9a	Staff believe that their colleagues have/do not have a positive and encouraging attitude towards them when they are monitoring vital signs and escalating deterioration (potential barrier).	Modelling or demonstrating the behaviour	Provide a visual sample of the behaviour being performed. This could be directly in person or indirectly (e.g. via film, pictures) for the person to work towards.	**Could be delivered in a workshop setting:** RNs/HCAs are shown a short video clip of a respected and credible senior PERRT nurse modelling the monitoring of vital signs (including the manual measurement of respiratory rate) and escalating care using the ISBARD[1] communication tool.
9b	Staff believe that nursing colleagues perceived to be 'senior' and 'experienced' positively influence their behaviour when measuring vital signs and escalating deterioration (potential enabler).	Modelling or demonstrating the behaviour	Provide a visual sample of the behaviour being performed. This could be directly in person or indirectly (e.g. via film, pictures) for the person to work towards.	**Could be delivered in the ward setting:** Senior nurses and matrons intermittently return to the floor and participate in clinical assessment of patients including the monitoring of vital signs to role model good practice for junior RNs and HCAs.
10	HCAs intend to monitor patient's respiratory rates when measuring vital signs (potential enabler).	Commitment	Ask the person to make a statement indicating a commitment to change behaviour.	**Could be delivered in a deteriorating patient workshop:** Ask staff to make a commitment using an "I will" statement. Here, the "I will" statement will relate to the intention to monitor respiratory rate every time vital signs are measured. This statement could be recorded on a sticky note or a postcard and returned to the individual a month or so later to remind them of their commitment.

Row no.	**Example** beliefs from interview participants reflecting barriers and enablers	Behaviour Change Technique/s (BCT)	Plain-English explanation of the BCT	**Examples** of how the BCT/s could be delivered in your Trust (the application)
11	HCAs believe that the frequency of vital signs are measured is influenced by instructions from the RN (potential enabler).	Identification of self as a role model	Inform people that their behaviour may be an example to others.	**Delivered in a deteriorating patient workshop:** After discussing the circumstances in which monitoring of vital signs should be increased, RNs are asked to picture themselves explicitly delegating repeat monitoring to an HCA. RNs are then asked to identify who might be learning from their good practice.
12	If the medical team responsible for a patient who is deteriorating do not respond when called, RNs might reach-out to other potential responders for assistance including other medical staff on the ward and/or PERRT (potential enabler).	Action planning	Prompt detailed planning of performance of the behaviour (must include at least one of the following: when, where, how often, and for how long, the behaviour should be performed).	**Could be delivered in a deteriorating patient workshop:** Ask RNs to think of cues that help them to escalate a deteriorating patient appropriately to different responders. Request that RNs produce "if…then" statements linking a cue to the correct behaviour. This could be carried out with sticky notes on a board e.g. ask the group to use sticky notes to record cues ("if") and then to repeat the exercise with actions on new sticky notes ("then"), before linking the cues and behaviours together.
13	Staff believe that when they demonstrate good practice in escalating a deteriorating patient, their behaviour may be reinforced with positive feedback from another member of nursing staff or a doctor (potential enabler).	Social Reward	Arrange verbal or non-verbal reward if there has been effort and/or progress in performing the behaviour includes Positive reinforcement.	**Could be delivered in the ward setting:** Senior RNs (e.g. ward managers, nurse in charge, CPFs, deteriorating patient champions) to thank and praise staff whenever they escalate an elevated NEWS appropriately.
14	RNs tendency to escalate care for a deteriorating patient is influenced by the response that they get from the PERRT nurse (positive or negative) (potential barrier or enabler).	Information about others' approval	Provide information about what other people think about the behaviour. The information clarifies whether others will like, approve, or disapprove of what the person is doing or will do.	**Could be delivered in a deteriorating patient workshop:** RNs are shown a short video clip of senior PERRT nurses describing the behaviours that they approve of in relation to escalation of care for a deteriorating patient.

[1] A structured communication tool used within the Trust to facilitate clinical conversations specifically related to escalation of care for a deteriorating patient **I**ntroduction, **S**ituation, **B**ackground, **A**ssessment, **R**ecommendation, **D**ecision

How will I access the group given the current COVID-19 pandemic?

Considering the COVID-19 pandemic, the group discussion will be carried out online using Microsoft (MS) Teams. In appendix 1, you will find additional information on how to access the online group, some basic ground rules when participating in an online meeting, and practical information about how to use MS Teams during the meeting.

ACTION POINT: Even if you are familiar with MS Teams, please try to read the ground rules section (section 2) and the participation section (section 3) beforehand, as this may be helpful.

To participate, you will need access to a computer, laptop, tablet or, at minimum, a smart phone with internet access. Your device will need a working microphone and, ideally, a functioning video camera. To maintain connectivity, you will need to be logged onto a stable internet connection during the group. Whilst we do not anticipate very sensitive or confidential content arising during the discussion, it would still be advisable to try and position yourself in a quiet and private environment during the group.

Before the group, the researcher will offer you the chance to do a test call on MS Teams. This will involve a short call (likely 5-10mins) with the researcher, where you both login to MS Teams together to check that your connection is satisfactory and that your microphone and, if appropriate, video camera is working too. A test call is not compulsory but may be useful particularly if you have not used MS Teams before or are unsure about the effectiveness of your IT equipment.

What if my situation changes on the day of the group and I cannot attend?

If you cannot attend, please feel free to email the researcher (duncan.smith.1@city.ac.uk) to notify him beforehand. This is not mandatory but will help him to know not to expect you in the group.

What if I am held up and cannot join the group on time?

Access to the group will close 10 minutes after the start time. Unfortunately, this means that if you are more than 10 minutes late you will not be able to join. This is to prevent disruption for other participants.

What if too few people turn up to the group?

If several people drop out beforehand and the decision is made to postpone the group, due to low numbers, the researcher will send you an email as soon as possible notifying you and the other participants that the group has been postponed due to low numbers. It is possible that people will not notify the researcher that they can no longer attend and will just not turn up on the day. If this happens, then a decision may be made to postpone the group at the start of the meeting. Whilst this would be unfortunate, it would be an unforeseen situation. Every effort will be made by the research team to avoid this.

How will the group be structured?

The researcher will ask you to sign a consent form to participate. As the group is being held online, a link to this will be emailed across to you at least one week before the meeting so that you can sign it electronically and return it to the researcher. When everybody has arrived in the online space, the researcher will facilitate introductions and lay out the ground rules for the group (at this point the researcher may mute everybody else's microphones to reduce noise). You will then be provided with an opportunity to ask any questions about the BCTs and the example applications that are laid out in table 1.
Then, the researcher will start by asking the group the following question:

"Are there any other ways (or better ways) that the BCTs listed in the table could be applied at UCLH, that were not included in the information package?"

- First, you will be asked to think about this question privately. You are invited to think as **flexibly and creatively** as possible about how the BCTs could be put into practice on the wards at UCLH.

- You will then be invited to share your thoughts and other members of the group will be asked to do the same. This will be done in a 'round robin' format. This means that everybody will be invited to share one idea at a time, person by person, until everybody has said everything that they want to. As ideas are presented, a member of the research team will type them onto a virtual whiteboard in MS Teams so that everybody can see the new ideas.
- Then, you will be asked to openly discuss all the ideas that have been shared with group members. This is an opportunity to ask other group members about their suggestions and to clarify your understanding. At this stage, as a group, you may decide to combine some ideas if you agree that they are very similar.
- After the discussion, you will be asked to do **2 things**:
    - First, from the longer list of BCTs/applications (including the original ones from the information package and those added during the group discussion), you will be asked to vote on the **5*** BCT/applications that you believe would be the **most acceptable** to staff at UCLH ranking them from 1 (most acceptable) to 5.
    - Then, you will be asked to repeat the same activity, but this time ranking the **5*** BCT/applications that you believe would be **easiest to put into practice** on the wards at UCLH from 1 (most easy) to 5.
- After the group, the researcher will send you a summary of the information from these ranking exercises using email. You will be invited to comment on the information by replying to the email, but a response is not compulsory.

***** Any BCTs and applications that you do not rank will not be seen by the research team to be part of your response, so you do not need to attempt to rank these. Just focus on voting on the 5 that you consider to be the most important. This does not mean that other BCTs and example applications will not be considered by the research team when they are compiling the preliminary intervention. All BCTs will be considered; however, those that you and the other participants rank highly (top 5) will be prioritised.

What will happen to the data after the group?

After the group, the researcher will collate the information from the ranking exercises. Those BCTs and applications that were ranked highest by participants, will be reviewed first by the researcher and his supervisors when they are drafting the preliminary behaviour change intervention.

Further guidance about these activities will be provided by the researcher during the group. However, if you have any questions or concerns, please do not hesitate to contact the researcher: duncan.smith.1@city.ac.uk

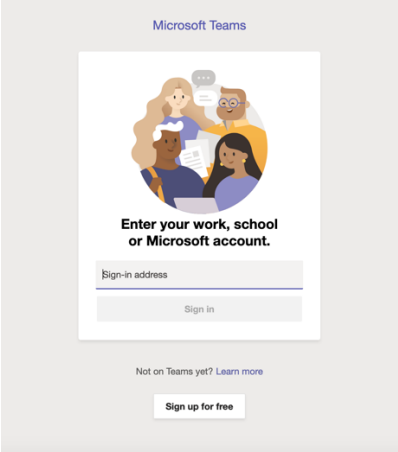
Thank you for reading this information package.

Information package for participants - Appendix 1

1. **Downloading and accessing Microsoft Teams**

If you need to download MS Teams onto your personal device (computer, laptop, or tablet) click on the link here

Once you have downloaded the app, you may choose to login to MS Teams using your NHS email and password. You can do this by simply clicking onto the app to launch it and the following pop-up should appear:



You will be sent a link, via email, to access the group meeting. If you click on the link, then it should open MS Teams (once downloaded) and take you into the meeting.

Ground rules when participating in a group discussion on MS Teams

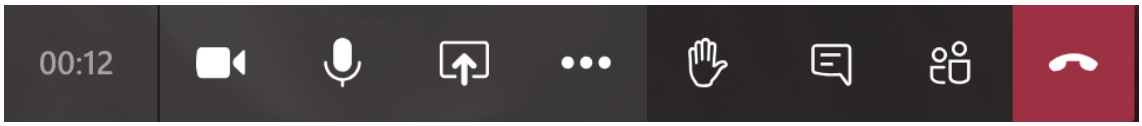
Where possible, try to keep your camera on during the group. Whilst this is not compulsory for participation, being able to see one another will help to create a more personal feel to the discussion.

To reduce background noise if you are not speaking try to keep your microphone muted. This can be achieved by clicking the microphone icon on the control bar. Don't forget to turn your microphone on when you are trying to speak to the group.

During the discussion and clarification exercises, if you would like to raise a new point or comment on something that another group member has said, you can 'raise your hand' by clicking on the hand icon (see below). This will make it clear to the facilitator that you have something to say. Once you have spoken you can put your hand down by clicking on the same icon again.

Participation during the group

Your participation can be facilitated by the control bar that will appear on your screen once you have joined the meeting.

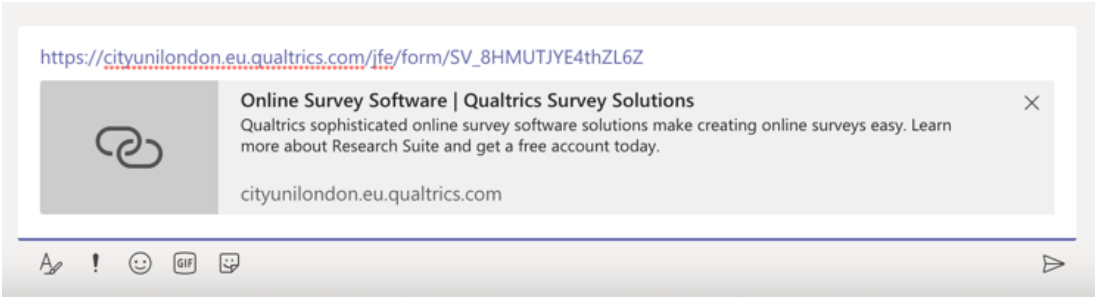


Icons on the control bar explained from left to right:

Camera icon 	Click this to turn your camera on and off (in the picture above the camera is switched on). If the camera is off, there will be a strikethrough on the icon (like the picture on the left)
Microphone icon 	Click this to turn your microphone on and off (in the picture above the camera is switched on). If the microphone is off, there will be a strikethrough on the icon (like the picture on the left).
Hand icon 	Use this icon to 'put your hand up' and notify the facilitator that you have something to say. Please don't forget to un-mute your microphone to speak! Once you have spoken, if you click on the same icon again this will 'put your hand down'.

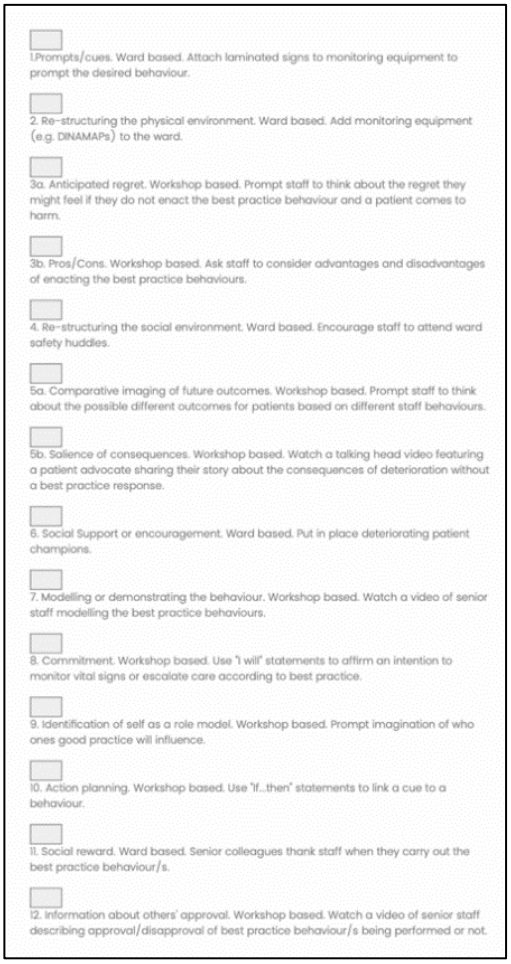
Speech bubble icon 	Use this icon to open the discussion thread and to post a thought or a comment for the group.

In stage 3, when you are asked to participate in the ranking exercises, a link that you can click on will be posted by the facilitator into the discussion feed (see image for an example below):



The link will open a separate web page for you (in a software package called Qualtrics).

You will see a list of the BCTs and the example applications that are laid out in the table (numbered 1-14). Any new ideas of how these BCTs could be applied at UCLH, will have been added to the list during the meeting (these new ideas are likely to appear at the bottom and will be numbered 15 onwards). The list will look like this:

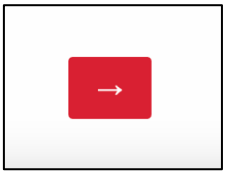


On a desktop computer or laptop

Or, like this on a smartphone

When participating in the ranking activities, you can add a number above the point (between 1 and 5) to reflect your decision. Please note, you will only be able to vote on 5 items (no more and no less).

Once you have voted on your 5 items, you can submit your response using the button at the bottom of the sheet that looks like this:



Appendix 13 – Example page from the spreadsheet used during final consensus meeting

TDF Domain	Target behaviour/s (summarised in brief)	Belief statements reflecting barriers (summarised and written in the first person)	Behaviour change techniques *Bold = multiple domains*	Potential applications of BCTs (% of total score from NGT for acceptability group 1, group 2) [% of total score from NGT for feasibility group 1, group 2]	Notes (based on discussion in the first stakeholder meeting)
Knowledge	Counting of respiratory rate	– I do not know the correct procedure for measuring respiratory rate – I do not identify a change in respiratory rate as an early indicator of patient deterioration (other vital signs are more important)	Information provision	Workshop delivered by credible facilitators	Include Also need to review other belief statements for knowledge related barriers that may need to be addressed as part of the training component (based on comment from MC) – a few of these barriers elsewhere are highlighted in yellow
	Recording vital signs directly into the EHR	– I do not know that writing vital signs on paper before later entering them onto the EHR is poor practice			
	HCAs escalating to the RN RNs reassessing patients themselves RNs escalating to CCOT/medical team Frequency of vital signs monitoring increased	– I do not know that NEWS has an evidence base – I do not know about the existence of a local policy for deteriorating patients – I do not know what is written in the local policy for deteriorating patients – I do not know what specific score range constitutes a high-risk NEWS – I do not know what specific score range constitutes a medium-risk NEWS			
	Frequency of vital signs monitoring increased	– I do not know that patients with an elevated NEWS require their vital signs to be measured more frequently than every 4 hours			
Social, Professional Role and Identity	RNs re-assessing a patient themselves	– It is not the role of the RN to regularly check vital signs/NEWS that have been measured and recorded by HCAs – It is not the role of the RN to routinely measure and record vital signs	**Social support or encouragement**	1. Deploy deteriorating patient champions (HCA and RN level) and ensure clear expectations and training (15%, 27%) [6%, 49%] 2. Mentoring system – senior HCAs allocated to mentor junior HCAs (20%, 6%) [10%, 0%]	Include Need to consider a package for the champions that will include receiving all intervention components plus more. Do not include – logistically complex. Who would undertake this role? The most experienced HCAs are not necessarily the most appropriate to mentor and could be passing on poor practice (supported by observational data from phase 1).
	Frequency of vital signs monitoring increased	– It is the role of HCAs to measure and record vital signs without prompting or delegation from the RN			
	Further escalation if to multiple responders if needed	– My professional responsibility ends when I notify the next clinician along the escalation pathway – HCAs should not escalate further than a RN if they believe that a patient is deteriorating			
Beliefs about Consequences	Recording vital signs directly into the EHR	– There are no unfavourable consequences from recording vital signs on paper before then later entering them onto the EHR	Salience of Consequences	1. **Workshop based** – 'talking head' videos of patients talking emotively about the consequences of delayed escalation and timely escalation (13%, 37%) [0%, 14%] 2. **Workshop based** – 'talking head' videos of patients who were escalated appropriately (NA, 37%) [NA, 14%]	Include Include all BCTs and applications listed here. The starting point of this activity would be a series of "talking heads" videos. These videos would include a patient advocate speaking about the consequences of delayed recognition/response. A video of a patient speaking about when recognition/response went well will also be included. This is particularly important as the "positive story" was ranked more highly by the clinical group. Also, need to include some videos of HCAs speaking about the consequences of RNs being dismissive when they escalate to them. All videos will be followed up by structured activities including reflection and group discussion that would include the Pros/Cons, Anticipated Regret, Comparative imaging BCTs.
	HCAs escalating to the RN	– If I tell an RN about an elevated NEWS, then they will 'explain it away' e.g., state why the score is abnormal and why it should be tolerated – If I tell an RN about subtle changes in a patient's vital signs, then they will be dismissive			
	Frequency of vital signs monitoring increased	– If I wake a patient up overnight to monitor their vital signs, they may be upset	Pros/Cons	**Workshop based** – RN/HCA asked to list and compare pros and cons of enacting the desirable behaviour (15%, 0) [2%, 0%]	
			Anticipated regret	**Workshop based** – RN/HCA asked to consider degree of regret that they might feel if the desirable behaviour was not enacted, and a patient came to harm (7%, 13%) [0%, 0%]	
			Comparative imaging of future outcomes	**Workshop based** – prompt HCAs to imagine and compare likely or possible outcomes following immediate escalation of an elevated NEWS to the RN versus no escalation or delayed escalation (4%, 7%) [6%, 0%]	

Appendix 14 – Opt-out form (phase 1)

Please initial box

1.	I confirm that I have had the project explained to me, and I have read the participant information sheet (v2.6 29/10/18), which I may keep for my records. I have decided that I do not wish to participate in the study and therefore I withdraw consent to be observed directly or approached by the researcher. I understand that the researcher may be present observing and/or interacting with other staff when I am working.	
2.	This information will be held by City as data controller and processed for the following purpose(s): • At the beginning of a period of data collection (observation), the researcher will cross check this data with staff allocation information to identify who has opted out of the study and does not wish to be observed • The details of staff who have chosen not to participate will not be disclosed to any other individual *The lawful basis for processing under General Data Protection Regulation (GDPR) for personal data is public task* ***GDPR Article 6(1)(e)***	
3.	I understand that any information I provide is confidential, and that no information that could lead to the identification of any individual will be disclosed in any reports on the project, or to any other party. No identifiable personal data will be published. The identifiable data will not be shared with any other organisation. City, University of London will retain this information for a period of 10 years. At this time this information will be destroyed.	
4.	I agree to City recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on City complying with its duties and obligations under the under the General Data Protection Regulation (GDPR).	
5.	I would like to opt-out of this study.	

_____	_____	_____
Name of Participant	Signature	Date
_____	_____	_____
Name of Researcher	Signature	Date

When completed, 1 copy for participant; 1 copy for researcher file.

Appendix 15 – Participant Information Sheet (PIS) (phases 1 and 2)

Principal Investigators:

Mr Duncan Smith (the researcher)
Professor Leanne Aitken (the supervisor)

Introduction

We would like to invite you to take part in a research study. Before you decide whether you would like to take part it is important that you understand why the research is being done and what it would involve for you. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

The context of this research

This DECIDE study is being carried out as part of a research degree (Doctor of Philosophy - PhD). The research will be undertaken by Duncan Smith (referred to as 'the researcher' throughout this information sheet) who is currently enrolled as a MPhil/PhD student at City, University of London. He also holds an Honorary Contract with University College London Hospitals (UCLH) NHS Foundation Trust (referred to as The Trust throughout this information sheet). The research is funded by the National Institute of Health Research (NIHR). The project will be funded from 1st May 2018 until 31st April 2022 (inclusive).

What is the purpose of the study?

Part of a nurse's role is to monitor patients' clinical condition. This typically involves measuring and recording blood pressure, heart rate, breathing rate, temperature, conscious level and oxygen level (known collectively as clinical observations). Taking these measurements at intervals allows nurses to detect when a patient is becoming more unwell and needs to be seen by a senior nurse or a doctor. If this process fails, and the patient's condition starts to worsen without recognition, there is a higher risk that the patient will collapse or die.

To support nurses in recognising deteriorating patients, specific tools have been developed and are used widely in hospitals within the UK. These tools provide a record of the measurements whilst also generating an 'early warning score' (EWS) for each patient every time clinical observations are carried out. As a rule, the higher the score the greater the risk that the patient will continue to deteriorate. Importantly, the charts also instruct nursing staff on what action to take based on the EWS. If a patient has a medium or high score, nursing staff should contact a senior nurse or doctor for additional help. Unfortunately, there is evidence that these instructions are not always followed, leaving unwell patients at risk of further deterioration.
The aim of this research is to develop an intervention to change the behaviour of nurses when they are reacting to a high EWS from a patient. To develop this intervention, it is important to first understand what the 'ideal behaviours' are so that inappropriate responses, or non-responses, can be identified and staff can be supported to change them.

Why have I been invited?

In order to fully explore what influences the behaviour of nursing staff when they are monitoring patients and responding to signs of deterioration, it is important that the researcher witnesses a range of different behaviours from a range of staff. Therefore, nursing staff of different clinical bands (registered nurses and health care assistants) and with different levels of experience, are being invited to participate.

You have been invited to participate as you are employed by the Trust as a registered nurse and - as part of your clinical role - are likely to be involved in monitoring patients' clinical observations, assessing patients with an elevated NEWS, and calling for additional help in the event of patient deterioration.

As the research focuses on the behaviour of nursing staff, non-nursing members of the multi-disciplinary team will not be invited to participate. This includes doctors and therapy staff e.g., physiotherapists, occupational therapists and speech and language therapists. Also, student nurses and nursing staff employed by an agency will not be invited to participate as they are not employed directly by the Trust.

Do I have to take part?

No, participation in the project is voluntary, and you can choose not to participate in part or all of the project. You can withdraw at any stage of the project without being penalised or disadvantaged in any way.

The researcher will first spend time on the wards observing you and your colleagues when you are monitoring clinical observations or responding to signs of patient deterioration. If the researcher sees something of interest, he may approach you and ask you about your actions and decisions. These discussions will be brief (less than 5 minutes), and the researcher will be careful not to ask any questions in front of patients or family members. If you do not wish to be observed or approached by the researcher at all, you can choose to 'opt-out' before or during the process by completing an 'opt-out' form. These will be provided by the researcher and copies left in the staff room so that you can complete the form privately and return it to a sealed box anonymously (this information will not be shared with anybody else). If you complete this form, the researcher will not observe you, or approach you, at any time during the observation phase of this research.

During the observations, the researcher will take paper-based notes and will then dictate these notes into a digital recorded. No identifiable information will be recorded within these notes. As the researcher will not record your name, or other personal details, it will not be possible to separate your data from any other participant. For this reason, if you decide to opt-out in the middle of the observation phase, it will not be possible to destroy the data already collected.

Following the observation on the wards, you may be asked if you would like to participate in an individual interview. It is up to you to decide whether or not to take part. If you do decide to take part, you will be asked to sign a consent form to participate. Even if you consent to participate, you are still free to withdraw at any time without giving a reason. You may also refuse to answer all or part of a question without justifying this decision.

What will happen if I take part?

Whilst the entire period of the research is 4 years, the researcher will spend 6 months observing staff and carrying out individual interviews across 2 ward areas. This will mean that the researcher is present on the wards observing for a total of 180 hours (approximately) during day shifts, night shifts and at weekends. It is impossible to predict how much time the researcher will spend observing each staff member, as this will depend on staff rotas and the researcher's availability to attend the ward.
Any staff who volunteer to be interviewed can expect to take part in a single interview, lasting 40-60 minutes. The date and time of the interview can be discussed and agreed with the researcher. Interviews will be held in a private room within the Trust and audio recorded. If you volunteer, the researcher will ask you to introduce yourself at the beginning of the interview and confirm your role. A series of open questions will then be asked to explore what you believe influences your behaviour - and the behaviour of your colleagues – when you are monitoring or responding to deteriorating patients. The researcher may use a prompt sheet with example questions to structure the interview but may also ask further un-planned questions based on your answers and responses. Your managers and colleagues will not be informed of what has been shared during the interview, although you will be asked for consent for anonymised quotes to be used in the write-up of this research (for example in the student's thesis and/or research publications). However, if you disclose something, during an interview, that relates to direct patient harm - or an issue of safeguarding - the researcher may have to inform your line manager. If this does happen, the researcher will notify you during the interview so that you are aware and can be part of the conversation with your manager, if you wish.

What are the possible disadvantages and risks of taking part?

The research will take place in your normal working environment and therefore the risks are low. Care of deteriorating patients is potentially an upsetting subject. If you feel upset or anxious at any stage, you should notify the researcher. This may lead to you being withdrawn from the study and/or advised to contact Occupational Health for further support.

What are the possible benefits of taking part?

If you chose to participate you may contribute to an improved Trust-level understanding of nursing staff behaviour when responding to deteriorating patients.

What will happen when the research study stops?

If for any reason, the research is stopped prior to completion, the interview data will be kept anonymised, but all personal details will be destroyed. On completion of the research - and after the required period of time that data has to be kept - all data will be destroyed using an appropriate method such as cross shredding for any paper records and permanent file deletion if held electronically.

Will my taking part in the study be kept confidential?

The researcher will take notes during the period of observation but will not record any identifiable information in these notes. Audio files from interviews will be stored in an encrypted file on a password protected computer terminal at City, University of London. The interviews will be typed-up (transcribed) by a GDPR-compliant professional transcription service. At this stage, only the researcher will have access to the data before it is anonymised. Once the interviews are transcribed; the researcher will remove all identifiable (personal) information. Only when the data is anonymised will it be shared with other members of the research team (academic supervisor(s)) during data analysis. Any paper files will be stored in a locked filing cabinet at City, University of London. This will include opt-out forms and consent forms. All data generated from this research will be retained for a period of 10 years.

What should I do if I want to take part?

If you would like more information or to volunteer to participate, contact the Duncan Smith using the email address at the bottom of this information document.

What will happen to results of the research study?

At least two publications in peer-reviewed journals are planned during the period of research. In addition, the findings will be written-up in the researcher's PhD thesis. The researcher will also work with patient advisors (who have agreed to be involved in the project) to develop a plain-English summary of the research findings. If you would like a copy of any of these documents, please contact Duncan Smith using the email address below. Pseudonyms ('fictitious names') will be used in any of the research outputs to ensure that you and the other participants cannot be identified.

What will happen if I do not want to carry on with the study?

You are free to withdraw from the study without an explanation or penalty at any time.

Who has reviewed the study?

This study has been reviewed by the North of Scotland Research Ethics Committee

What are my rights under the data protection legislation?

City, University of London is the sponsor for this study based in the United Kingdom. We will be using information from you in order to undertake this study and will act as the data controller for this study. This means that we are responsible for looking after your information and using it properly. City, University of London will keep identifiable information about you for 10 years after the study has finished. No data will be held on the NHS site at any stage during or after the study.

Your rights to access, change or move your information are limited, as we need to manage your information in specific ways in order for the research to be reliable and accurate. If you withdraw from the study, we will keep the information about you that we have already obtained. To safeguard your rights, we will use the minimum personally-identifiable information possible.
You can find out more about how we use your information at www.city.ac.uk/about/city-information/legal and/or by contacting the Information Compliance Team at dataprotection@city.ac.uk or phone 0207 040 4000, who will liaise with City's Data Protection Officer Dr William Jordan to answer your query.

What if there is a problem?

For research undertaken in the UK if you have any problems, concerns or questions about this study, you should ask to speak to a member of the research team. If you remain unhappy and wish to complain formally, you can do this through City's complaints procedure. To complain about the study, you need to phone 020 7040 3040. You can then ask to speak to the Secretary to Senate Research Ethics Committee and inform them that the name of the project is: DEveloping a Complex Intervention for DEteriorating Patients using Theoretical Modelling (DECIDE study).

You could also write to the Secretary at:
Anna Ramberg
Research Governance & Integrity Manager
Research & Enterprise
City, University of London
Northampton Square
London
EC1V 0HB
Email: Anna.Ramberg.1@city.ac.uk

City holds insurance policies which apply to this study. If you feel you have been harmed or injured by taking part in this study, you may be eligible to claim compensation. This does not affect your legal rights to seek compensation. If you are harmed due to someone's negligence, then you may have grounds for legal action.

Further information and contact details

Supervisor:
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Researcher:
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City, University of London
Division of Nursing
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Northampton Square, London EC1V 0HB
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UCLH Patient Advice Liaison Services (PALS)
PALS
Ground Floor Atrium
University College Hospital
235 Euston Road
London NW1 2BU
(t): 0203 447 3042
(e): uclh.pals@nhs.net

Appendix 16 – Consent form for participation in a semi-structured (audio-recorded) interview (phase 2)

Please initial box

1.	I confirm that I have had the project explained to me, and I have read the participant information sheet (v2.6 29/10/18), which I may keep for my records. I understand that this will involve: • being interviewed by the researcher. • allowing the interview to be audiotaped.	
2.	This information will be held and processed by City as data controller for the following purpose(s): • the audio files from the interview will be professionally transcribed by a GDPR-compliant transcription company. • the anonymised transcript will be read by the researcher and his academic supervisor(s). • the information from the interview transcript will be analysed using a structured framework (the Theoretical Domains Framework). • some of the information may be reported as direct quotations within the final PhD thesis and/or publications in relevant academic journals (these will be de-identified). *The lawful basis for processing under General Data Protection Regulation (GDPR) for personal data is public task* ***GDPR Article 6(1)(e)***	
3.	The identifiable data will be shared with Sterling Transcription Services or Take Note Ltd. These organisations have provided written data sharing and confidentiality agreements with City to abide by the General Data Protection Regulation (GDPR).	
4.	I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalised or disadvantaged in any way.	
5.	I understand that I can request that my interview data be withdrawn and not included in the research until it has been de-identified. Once these data have been de-identified (anonymised) I will no longer be able to request this.	
6.	I agree to City recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on City complying with its duties and obligations under the under the General Data Protection Regulation (GDPR).	
7.	I agree to the use of anonymised quotes in publication.	
8.	I agree to take part in the above study.	

_____	_____	_____
Name of Participant	Signature	Date
_____	_____	_____
Name of Researcher	Signature	Date

Appendix 17 – Participant Information Sheet (PIS) (phase 3)

Principal Investigators:

Mr Duncan Smith (the researcher)
Professor Leanne Aitken (the supervisor)

Introduction

We would like to invite you to take part in a research study. Before you decide whether you would like to take part it is important that you understand why the research is being done and what it would involve for you. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

The context of this research

This DECIDE study is being carried out as part of a research degree (Doctor of Philosophy - PhD). The research will be undertaken by Duncan Smith (referred to as 'the researcher' throughout this information sheet) who is currently enrolled as a MPhil/PhD student at City, University of London. He also holds an Honorary Contract with University College London Hospitals (UCLH) NHS Foundation Trust (referred to as The Trust throughout this information sheet). The research is funded by the National Institute of Health Research (NIHR). The project will be funded from 1st May 2018 until 31st April 2022 (inclusive).

What is the purpose of the study?

Part of a nurse's role is to monitor patients' clinical condition. This typically involves measuring and recording blood pressure, heart rate, breathing rate, temperature, conscious level, and oxygen level (known collectively as clinical observations). Taking these measurements at intervals allows nurses to detect when a patient is becoming more unwell and needs to be seen by a senior nurse or a doctor. If this process fails, and the patient's condition starts to worsen without recognition, there is a higher risk that the patient will collapse or die.

To support nurses in recognising deteriorating patients, specific tools have been developed and are used widely in hospitals within the UK. These tools provide a record of the measurements whilst also generating an 'early warning score' (EWS) for each patient every time clinical observations are carried out. As a rule, the higher the score the greater the risk that the patient will continue to deteriorate. Importantly, the charts also instruct nursing staff on what action to take based on the EWS. If a patient has a medium or high score, nursing staff should contact a senior nurse or doctor for additional help. Unfortunately, there is evidence that these instructions are not always followed, leaving unwell patients at risk of further deterioration.

The aim of this research is to develop an intervention to change the behaviour of nurses when they are reacting to a high EWS from a patient. To develop this intervention, it is important to first understand what the 'ideal behaviours' are so that inappropriate responses, or non-responses, can be identified and staff can be supported to change them.

Why have I been invited?

In phases 1 and 2 of this research project, data were collected by observing the behaviour of nursing staff when monitoring patients' clinical observations and responding to signs of deterioration. A sample of nursing staff were then interviewed to explore their views on what influences behaviour in response to patient deterioration. These data have now been analysed, using structured approaches, and a theoretical framework for behaviour change applied. From these earlier processes, the research team have put together a list of behaviour change techniques that are supported by theory and could change staff behaviour and improve responses to deteriorating patients. It is quite possible that some of these techniques will be more acceptable to staff in this Trust than others.

As nursing staff from a ward that participated in the earlier phases of this research, you have been invited to attend a nominal group (a form of group discussion) to help establish which techniques are most acceptable and to discuss how they could be put into practice within your ward and this Trust.

Do I have to take part?

No, participation in the nominal group is voluntary, and you can choose not to participate. You can withdraw at any stage without being penalised or disadvantaged in any way. If you do decide to take part, you will be asked to sign a consent form.

What will happen if I take part?

The nominal group discussions will take place after the observations and individual interviews have been carried out. If you volunteer to participate, you will be sent information about the meeting at least 1 week before it takes place. As well as information about the location and timing, you will be sent an information package to help you make sense of the information that will be discussed. In preparation for the group discussion, it would be very helpful if you could read over the information package before attending the meeting. The meeting will take place within the Trust, will include 8-12 participants, and should last no more than 2 hours. All attendees will be nursing staff from wards that participated in the earlier phases of the research.

During the group, the researcher will facilitate several activities to encourage discussion between you and the other group participants. These activities may include thinking and reflecting privately and sharing your thoughts with other group members. You will also be asked to help prioritise techniques for behaviour change by ranking them according to how acceptable you believe they would be within the Trust and how easily they could be implemented. These activities will be explained in more detail in the information package that you will receive beforehand and at the start of the meeting. If you would like to ask any questions about the content of the package, or the structure of the group, you should contact the researcher using the email below. The researcher's supervisor may also be present at the group to help facilitate the discussion and to take notes. After the group, you will be sent a summary of the main discussion points via email. It is up to you if you chose to respond to this email message or not.
What are the possible disadvantages and risks of taking part?

The research will take place in the Trust and therefore the risks are low. Care of deteriorating patients is potentially an upsetting subject. If you feel upset or anxious at any stage, you should notify the researcher. This may lead to you being withdrawn from the study and/or advised to contact Occupational Health for further support.

What are the possible benefits of taking part?

If you participate in the group discussion, you will help the research team determine what components of the behaviour change intervention would be acceptable for use within your ward area and the Trust.

What will happen when the research study stops?

If for any reason the research is stopped prior to completion, the data will be kept anonymised, but all personal details will be destroyed. On completion of the research - and after the required period of time that data has to be kept - all data will be destroyed using an appropriate method such as cross shredding for any paper records and permanent file deletion if held electronically.
Will my taking part in the study be kept confidential?

These discussions will not be audio or video recorded. As a participant, you may be asked to make some brief notes or jottings during the group discussion. The researchers may also take notes (handwritten and/or computer-based) during the nominal group but will not record any identifiable information in these notes. Electronic files with notes from the group discussion will be stored in an encrypted file on a password protected computer terminal at City, University of London. Any paper notes will be stored in a locked filing cabinet at City, University of London. This will include consent forms. All data generated from this research will be retained for a period of 10 years.

What should I do if I want to take part?

If you would like more information or to volunteer to participate, contact the Duncan Smith using the email address at the bottom of this information document.

What will happen to results of the research study?

At least two publications in peer-reviewed journals are planned during the period of research. In addition, the findings will be written-up in the researcher's PhD thesis. The researcher will also work with patient advisors (who have agreed to be involved in the project) to develop a plain-English summary of the research findings. If you would like a copy of any of these documents, please contact Duncan Smith using the email address below. Pseudonyms ('fictitious names') will be used in any of the research outputs to ensure that you and the other participants cannot be identified.

What will happen if I do not want to carry on with the study?

You are free to withdraw from the study without an explanation or penalty at any time.

Who has reviewed the study?

This study has been reviewed by the North of Scotland Research Ethics Committee

What are my rights under the data protection legislation?

City, University of London is the sponsor for this study based in the United Kingdom. We will be using information from you in order to undertake this study and will act as the data controller for this study. This means that we are responsible for looking after your information and using it properly. City, University of London will keep identifiable information about you for 10 years after the study has finished. No data will be held on the NHS site at any stage during or after the study.

Your rights to access, change or move your information are limited, as we need to manage your information in specific ways in order for the research to be reliable and accurate. If you withdraw from the study, we will keep the information about you that we have already obtained. To safeguard your rights, we will use the minimum personally-identifiable information possible.
You can find out more about how we use your information at www.city.ac.uk/about/city-information/legal and/or by contacting the Information Compliance Team at dataprotection@city.ac.uk or phone 0207 040 4000, who will liaise with City's Data Protection Officer Dr William Jordan to answer your query.

What if there is a problem?

For research undertaken in the UK if you have any problems, concerns or questions about this study, you should ask to speak to a member of the research team. If you remain unhappy and wish to complain formally, you can do this through City's complaints procedure. To complain about the study, you need to phone 020 7040 3040. You can then ask to speak to the Secretary to Senate Research Ethics Committee and inform them that the name of the project is: DEveloping a Complex Intervention for DEteriorating Patients using Theoretical Modelling (DECIDE study).

You could also write to the Secretary at:
Anna Ramberg
Research Governance & Integrity Manager
Research & Enterprise
City, University of London
Northampton Square
London
EC1V 0HB
Email: Anna.Ramberg.1@city.ac.uk

City holds insurance policies which apply to this study. If you feel you have been harmed or injured by taking part in this study, you may be eligible to claim compensation. This does not affect your legal rights to seek compensation. If you are harmed due to someone's negligence, then you may have grounds for legal action.

Further information and contact details

Supervisor:
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(e): uclh.pals@nhs.net

Appendix 18 – Consent form for participation in a nominal group (paper copy of a form that was issued electronically using Qualtrics) (phase 3)

Please initial box

1.	I confirm that I have had the project explained to me, and I have read the participant information sheet (v2.5 29/10/18), which I may keep for my records. I understand that this will involve: • the researcher sending information, before the nominal group discussion, to help me prepare and make sense of what will be discussed. • being part of a discussion group (a nominal group) facilitated by the researcher and his academic supervisor(s); • **No** audio or video recordings, however jottings and notes taken by me and/or the research team (paper and computer-based) may be used in the research.	
2.	This information will be held and processed by City as data controller for the following purpose(s): • notes may be made by you, other participants, or by members of the research team during the discussion – these do not need to be labelled with identifiable information e.g., your name, job role or area of work. • these notes will be retained, reviewed, and discussed by the researcher and his academic supervisor(s) after the group. *The lawful basis for processing under General Data Protection Regulation (GDPR) for personal data is public task* ***GDPR Article 6(1)(e)***	
3.	I understand that I will be sent (via email) a summary of these data, so that I can comment and verify the accuracy of the information.	
4.	I understand that confidentiality cannot be guaranteed for information which I may disclose in the nominal group.	
5.	I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalised or disadvantaged in any way.	
6.	I agree to City recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on City complying with its duties and obligations under the under the General Data Protection Regulation (GDPR).	
7.	I agree to the use of anonymised quotes in publication.	
8.	I agree to take part in the above study.	

_____	_____	_____
Name of Participant	Signature	Date
_____	_____	_____
Name of Researcher	Signature	Date

Appendix 19 – Sign that was displayed in ward areas during focused ethnography (phase 1)

Notice to patients and visitors on XX

This ward is currently part of a research project whereby a researcher is observing certain nursing staff as part of wider study

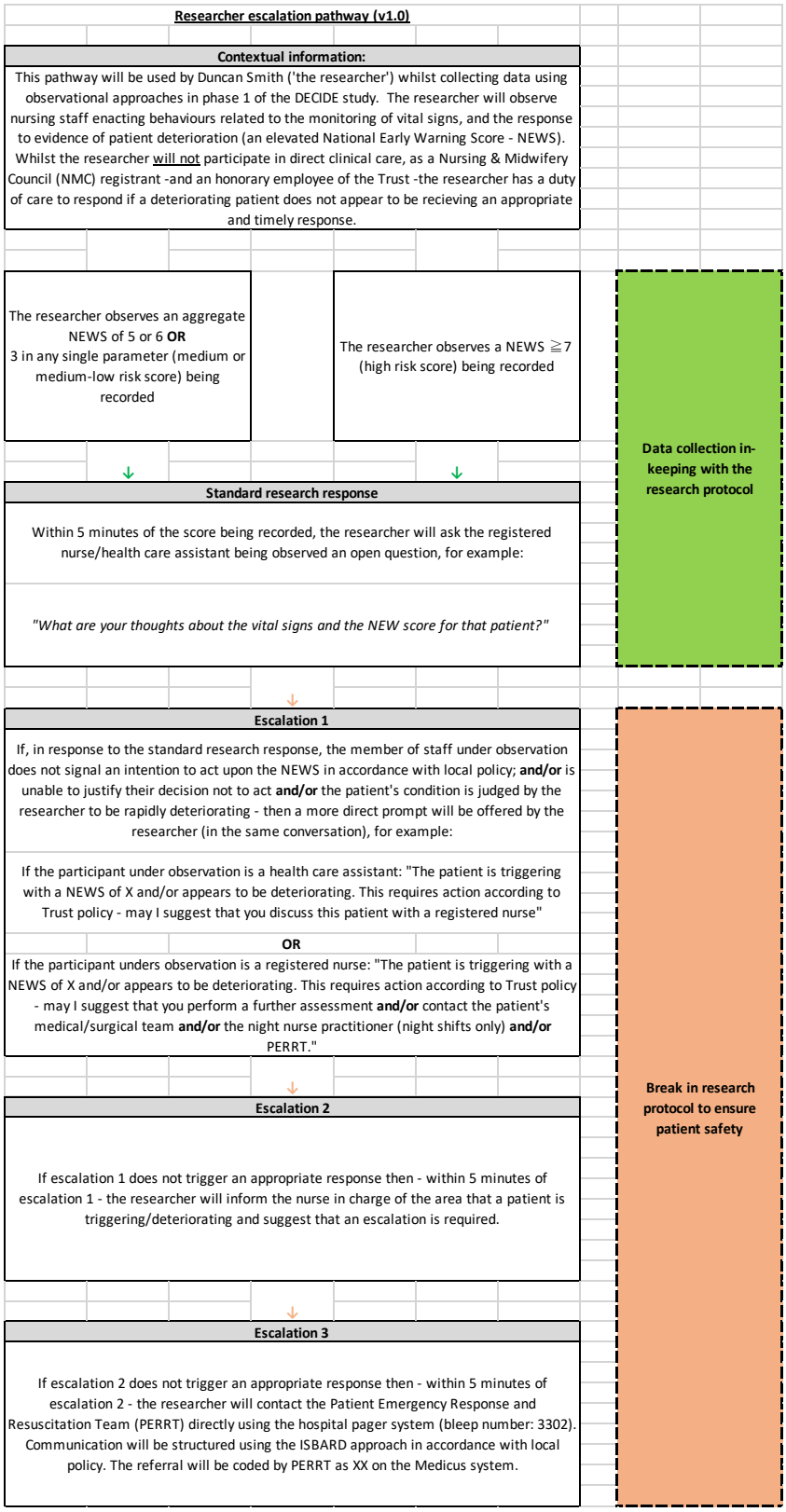
What does this mean for me as a patient or visitor?

- The participants of the research are staff <u>not</u> patients or visitors
- The researcher will not be collecting any data that could identify you, or any of your sensitive medical information
- You might notice that the researcher is observing your nurse when they are measuring your observations (your pulse, blood pressure, oxygen level)
- If you feel uncomfortable about your nurse (or the nurse caring for a patient that you are visiting) being observed, please do the following:
    - **Tell your nurse, or any other member of staff, straight away, that you do not want your nurse to be observed**
    - **You can also tell the researcher directly**

If you object, your nurse will not be observed again when they are measuring your observations.

Thank you for taking the time to read this.

Appendix 20 – Researcher escalation protocol to ensure patient safety (phases 1 and 2)



Appendix 21 – Favourable opinion letter from Research Ethics Committee

North of Scotland Research Ethics Committee (1)

Summerfield House
2 Eday Road
Aberdeen
AB15 6RE

Please note: This is the favourable opinion of the REC only and does not allow you to start your study at NHS sites in England until you receive HRA Approval

29 October 2018

Mr Duncan J Smith
NIHR/HEE Clinical Doctoral Research Fellow City, University of London
Northampton Square LONDON
EC1V 0HB

Dear Mr Smith

Study title: **DEveloping a Complex Intervention for DEteriorating Patients using Theoretical Modelling (DECIDE study)**
REC reference: **18/NS/0118**
Protocol number: **PhD/18-19/03**
IRAS project ID: **247047**

The Research Ethics Committee reviewed the above application at the meeting held on 25 October 2018. Thank you for attending along with your Academic Supervisor, Professor Leanne Aitken, by telephone to discuss the application.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this favourable opinion letter. The expectation is that this information will be published for all studies that receive an ethical opinion but should you wish to provide a substitute contact point, wish to make a request to defer, or require further information, please contact hra.studyregistration@nhs.net outlining the reasons for your request.
Under very limited circumstances (e.g. for student research which has received an unfavourable opinion), it may be possible to grant an exemption to the publication of the study.

Ethical opinion
The members of the Committee present gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

Conditions of the favourable opinion

The REC favourable opinion is subject to the following conditions being met prior to the start of the study.

Please provide written assurance that the study participants are not the patients.

Please add Members of the Trust's Deteriorating Patient Steering Committee to the principal inclusion criteria [A17-1].

Please update the planned start date of 01/05/2018 [A69-1].

Please clarify the points mentioned in the HRA Initial Assessment within your response to the REC Opinion letter.

Please amend the last sentence under the heading 'What will happen to results of the research study?' in the Participant Information Sheet to clarify that 'Pseudonyms will be used to maintain the anonymity of participants in all project outputs'.

You should notify the REC once all conditions have been met (except for site approvals from host organisations) and provide copies of any revised documentation with updated version numbers. Revised documents should be submitted to the REC electronically from IRAS. The REC will acknowledge receipt and provide a final list of the approved documentation for the study, which you can make available to host organisations to facilitate their permission for the study. Failure to provide the final versions to the REC may cause delay in obtaining permissions.

Management permission must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise).

Guidance on applying for HRA and HCRW Approval (England and Wales)/ NHS permission for research is available in the Integrated Research Application System, at www.hra.nhs.uk or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of management permissions from host organisations.

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database. This should be before the first participant is recruited but no later than 6 weeks after recruitment of the first participant.
There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to request a deferral for study registration within the required timeframe, they should contact hra.studyregistration@nhs.net. The expectation is that all clinical trials will be registered, however, in exceptional circumstances non registration may be permissible with prior agreement from the HRA. Guidance on where to register is provided on the HRA website.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Ethical review of research sites

NHS Sites

The favourable opinion applies to all NHS sites taking part in the study taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Extract of the meeting minutes

The Chief Investigator, Mr Duncan Smith, and Academic Supervisor, Professor Leanne Aitken, were welcomed to the meeting by telephone.

The Chair informed the researchers that there were observers in attendance at the meeting and that they could request that the observers be asked to leave if they wished to do so. The researchers confirmed that they had no objection to the observers being present.

Social or scientific value; scientific design and conduct of the study

The Committee asked for clarification on what would happen if unsafe practice was witnessed outwith the research observation.

Mr Smith confirmed that his professional duty of care superseded the research project. The escalation process would be followed in any situation where patient safety was threatened.

In private discussion, the Committee would request written assurance from the researcher that the study participants were not the patients.

Informed consent process and the adequacy and completeness of participant information

The Committee was concerned by the 'opt-out' component of phase 1 nurse observation as it could be coercive and asked for the justification for using this approach.

Mr Smith replied that he would be giving talks about the study, data collection and distributing the participant information sheets to staff in the participant wards. In the month prior to phase 1 data collection, staff who did not wish to be observed could complete the opt-out form privately and put in a locked box. Staff could also opt-out during the data collection phase. Additionally, he would be there at shift handover to offer a further opportunity to opt-out if staff did not wish to be observed.

The Committee asked for further information about the opt-out form.

Mr Smith explained that this gave staff the opportunity to privately record if they did not want to participate and be observed. Staff would either tell him or put the completed form in the box.

The Committee was concerned that if staff opted-out of the observation phase, their line manager would be informed.
Mr Smith replied that line managers would not be informed, and that was the real purpose of having a locked box for the opt-out forms.

Suitability of the applicant and supporting staff

The Committee asked about research training, including GCP and qualitative research.

Mr Smith replied that research training was woven into his NIHR fellowship and added that he had attended a number of courses about data collection methods. He was booked onto the GCP (Good Clinical Practice) course in December. Most of his training as part of the fellowship was qualitative.

Suitability of supporting information

In private discussion, the Committee noted some minor changes required in the application documentation and this would be included in the opinion letter.

Other general comments

In private discussion, the Committee acknowledged the points requiring clarification in the HRA Initial Assessment Form and this would be included in the opinion letter.

In response to the opportunity from the Committee to ask any questions, Mr Smith gave further information about his training in qualitative research. He advised that he had academic support and his supervisor was experienced in qualitative research.
The researchers were thanked for attending by telephone and left the meeting.

Please contact the REC Manager if you feel that the above summary is not an accurate reflection of the discussion at the meeting.

Approved documents

The documents reviewed and approved at the meeting were:

Document	Version	Date
Confirmation of any other Regulatory Approvals (e.g. CAG) and all correspondence [CAG provisionally supported outcome and correspondence]		26 October 2018
Contract/Study Agreement template [Honorary contract between University College Hospital and the student/CI (Duncan Smith)]		21 March 2016
Participant information sheet (PIS) [Phase 3 ward staff PIS]	2.4	18 September 2018
Participant information sheet (PIS) [Phase 3 Deteriorating Patient Steering Group PIS]	2.4	18 September 2018
Referee's report or other scientific critique report [Feedback from NIHR Clinical Doctoral Research Fellowship selection panel]		16 May 2017
Research protocol or project proposal [DECIDE study protocol]	1.5	19 September 2018
Summary CV for Chief Investigator (CI) [CI CV: Duncan Smith]	1.0	03 July 2018
Summary CV for student [Student CV: Duncan Smith]		03 July 2018
Summary CV for supervisor (student research) [1st supervisor CV: Leanne Aitken]		03 July 2018

Membership of the Committee

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

Notifying substantial amendments
Adding new sites and investigators
Notification of serious breaches of the protocol
Progress and safety reports
Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website: http://www.hra.nhs.uk/about-the- hra/governance/quality-assurance/

HRA Training

We are pleased to welcome researchers and R&D staff at our training days – see details at http://www.hra.nhs.uk/hra-training/

18/NS/0118	**Please quote this number on all correspondence**

With the Committee's best wishes for the success of this project. Yours sincerely

Professor Nigel Webster Chair

Appendix 22 – Letter of approval from the Confidentiality Advisory Group (CAG)

Health Research Authority
Skipton House 80 London Road
London SE1 6LH

Mr Duncan Smith
7a Cliff Road
Brighton
BN2 5RD

Dear Mr Smith
Telephone: 020 7104 8207 Email: hra.cag@nhs.net

Application title:	**DEveloping a Complex Intervention for DEteriorating Patients using Theoretical Modelling (DECIDE study)**
CAG reference:	**18/CAG/0178**
IRAS project ID:	**247047**
REC reference:	

Thank you for your research application, submitted for approval under Regulation 5 of the Health Service (Control of Patient Information) Regulations 2002 to process patient identifiable information without consent. Approved applications enable the data controller to provide specified information to the applicant for the purposes of the relevant activity, without being in breach of the common law duty of confidentiality, although other relevant legislative provisions will still be applicable.

The role of the Confidentiality Advisory Group (CAG) is to review applications submitted under these Regulations and to provide advice to the Health Research Authority on whether an application should be approved, and if so, any relevant conditions. This application was considered at the precedent set CAG meeting held on 05 October 2018. The application was considered via the Precedent Set process under criteria 10 – Incidental disclosures of identifiable information made to an applicant who is observing practices and procedures in a health and social care setting.

Health Research Authority decision

The Health Research Authority, having considered the advice from the Confidentiality Advisory Group as set out below, has determined the following:

1. The application is approved, subject to compliance with the standard and specific conditions of approval.

Please note that the legal basis to allow access to the specified confidential patient information without consent is now in effect.

This letter should be read in conjunction with the outcome letter dated 26 October 2018.
Context

Purpose of application

This application from City, University of London set out the purpose of medical research which aims to develop an intervention to change the behaviour of nurses when reacting to a patient's 'Early Warning Score' (EWS). EWS is a tool which is used in hospital to assist nurses in recognising deteriorating patients. These tools provide a record of clinical observations, including blood pressure, heart rate, breathing rate, temperature, and oxygen levels, which also generating an early warning score every time observations are performed. The higher the score, the risk is greater that deterioration will continue. The tools also instruct staff on what action to take – for example, if a patient has a medium or high EWS, nurses should contact a doctor for assistance. There is however evidence that these instructions are not always followed, leaving unwell patients at risk.

The proposed study involves staff only and has been submitted to the CAG as an element of the project will involve researchers observing nurses undertaking clinical observations on hospital wards. The behaviours which are observed on the wards will be compared to the ideal behaviours set out in the published guidance. The research team do not require access to confidential patient information for the purposes of the study; however, it is recognised that in observing staff undertaking their daily tasks, it is likely that the researcher will be incidentally exposed to confidential patient information.
A recommendation for class 5 and 6 support was requested to cover activities as described in the application.

Confidential patient information requested

Cohort

Staff observations will be undertaken at two hospital wards providing general care for acutely unwell medical and/or surgical patients. Across 6-8 months period, 180 hours of staff observation will be undertaken across the two wards.

The applicant is not seeking support to access any confidential patient information during the observation of nursing on the hospital's wards; however, it has identified that this may incidentally be disclosed. It cannot be foreseen what items of confidential patient information would be disclosed. Some clinical details may be of interest to the study; however, it is confirmed that these would relate to the clinical observations that form part of the EWS and would not fall within the definition of confidential patient information.

Confidentiality Advisory Group advice

A Sub-Committee of the main CAG reviewed the applicant's written response to the request for further information detailed in the provisionally supported outcome in correspondence.

Replace the text in the poster to provide a make clearer how a patient can object to the researcher's observation – provide a revised document for review.

The applicant provided a revised poster for information.

The Sub-Committee received the document, and no further queries were raised in this areaConfidentiality Advisory Group advice conclusion

The CAG agreed that the minimum criteria under the Regulations appeared to have been met and that there was a public interest in projects of this nature being conducted, and therefore advised recommending support to the Health Research Authority, subject to compliance with the specific and standard conditions of support as set out below.

Specific conditions of support (Final)

Favourable opinion from a Research Ethics Committee (**Confirmed 30/10/2018**).
Confirmation from the IGT Team at NHS Digital of suitable security arrangements via Information Governance Toolkit (IGT) submission (**Confirmed – University College London Hospitals NHS Foundation Trust – has a published satisfactory reviewed grade on V14.1, 2017/18**).

As the above conditions have been met, this letter provides confirmation of final approval. I will arrange for the register of approved applications on the HRA website to be updated with this information.

Annual review

Please note that your approval is subject to submission of an annual review report to show how you have met the conditions or report plans, and action towards meeting them. It is also your responsibility to submit this report on the anniversary of your final approval and to report any changes such as to the purpose or design of the proposed activity, or to security and confidentiality arrangements. An annual review should be provided no later than **07 November 2019** and preferably 4 weeks before this date. If at any stage, you no longer require support under the Regulations as you will cease processing confidential patient information without consent you should inform the Confidentiality Advice Team of this in writing as soon as possible.

Reviewed documents

The documents reviewed at the meeting were:

Document	*Version*	*Date*
CAG application from (signed/authorised) [CAG Form 18CAG0178]		21 September 2018
Data Protection Registration [Data protection register]		28 February 2005
Other [18CAG0178 CAT Advice Form Response]		01 October 2018
Other [Associate Dean Letter]		05 February 2018
Other [E-mail Re 18CAG0178 Provisionally Supoprted Outcome (to Applicants)]		29 October 2018
Patient Information Materials [Notice to patients and visitors during observation]	1	
Patient Information Materials [Notice to patients and visitors during observation]	2	29 October 2018
REC favourable opinion letter and all correspondence [18/NS/0118 Fav Op Conds]		29 October 2018
Research protocol or project proposal [DECIDE study protocol]	1.5	19 September 2018
Write recommendation from Caldicott Guardian (or equivalent) of applicant's organisation [DPO Letter of Support]		04 October 2018

Membership of the Committee

The members of the Confidentiality Advisory Group who were present at the consideration of this item or submitted written comments are listed below.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website: http://www.hra.nhs.uk/about-the- hra/governance/quality-assurance/

HRA Training

We are pleased to welcome researchers and R & D staff at our training days – see details at http://www.hra.nhs.uk/hra-training/

Yours sincerely, Miss Kathryn Murray
Senior Confidentiality Advisor

Appendix 23 – Letter of approval from the Health Research Authority (HRA)

07 November 2018

HRA and Health and Care Research Wales (HCRW) Approval Letter

Mr Duncan J Smith
NIHR/HEE Clinical Doctoral Research Fellow City, University of London
Northampton Square LONDON
EC1V 0HB

Email: hra.approval@nhs.net Research-permissions@wales.nhs.uk

Study title:	**DEveloping a Complex Intervention for DEteriorating Patients using Theoretical Modelling (DECIDE study)**
IRAS project ID:	**247047**
Protocol number:	**PhD/18-19/03**
REC reference:	**18/NS/0118**
Sponsor	**City, University of London**

Dear Mr Smith

I am pleased to confirm that **HRA and Health and Care Research Wales (HCRW) Approval** has been given for the above referenced study, on the basis described in the application form, protocol, supporting documentation and any clarifications received. You should not expect to receive anything further relating to this application.

How should I continue to work with participating NHS organisations in England and Wales? You should now provide a copy of this letter to all participating NHS organisations in England and Wales, as well as any documentation that has been updated as a result of the assessment.

Following the arranging of capacity and capability, participating NHS organisations should **formally confirm** their capacity and capability to undertake the study. How this will be confirmed is detailed in the "*summary of assessment*" section towards the end of this letter.

You should provide, if you have not already done so, detailed instructions to each organisation as to how you will notify them that research activities may commence at site following their confirmation of capacity and capability (e.g. provision by you of a 'green light' email, formal notification following a site initiation visit, activities may commence immediately following confirmation by participating organisation, etc.).

It is important that you involve both the research management function (e.g. R&D office) supporting each organisation and the local research team (where there is one) in setting up your study. Contact details of the research management function for each organisation can be accessed here.

How should I work with participating NHS/HSC organisations in Northern Ireland and Scotland?

HRA and HCRW Approval does not apply to NHS/HSC organisations within the devolved administrations of Northern Ireland and Scotland.

If you indicated in your IRAS form that you do have participating organisations in either of these devolved administrations, the final document set and the study wide governance report (including this letter) has been sent to the coordinating centre of each participating nation. You should work with the relevant national coordinating functions to ensure any nation specific checks are complete, and with each site so that they are able to give management permission for the study to begin.

Please see IRAS Help for information on working with NHS/HSC organisations in Northern Ireland and Scotland.

How should I work with participating non-NHS organisations?
HRA and HCRW Approval does not apply to non-NHS organisations. You should work with your non- NHS organisations to obtain local agreement in accordance with their procedures.

What are my notification responsibilities during the study?
The document "*After Ethical Review – guidance for sponsors and investigators*", issued with your REC favourable opinion, gives detailed guidance on reporting expectations for studies, including:
Registration of research
Notifying amendments
Notifying the end of the study
The HRA website also provides guidance on these topics, and is updated in the light of changes in reporting expectations or procedures.

I am a participating NHS organisation in England or Wales. What should I do once I receive this letter?
You should work with the applicant and sponsor to complete any outstanding arrangements so you are able to confirm capacity and capability in line with the information provided in this letter.

The sponsor contact for this application is as follows:

Name: Duncan Smith
Email: duncan.smith.1@city.ac.uk

Who should I contact for further information?
Please do not hesitate to contact me for assistance with this application. My contact details are below. Your IRAS project ID is **247047**. Please quote this on all correspondence.
Yours sincerely,

Natalie Wilson Assessor

Email: hra.approval@nhs.net

Copy to: *Professor Chris Hull, City, University of London, Sponsor contact*
Mr Cameron Berg, University College London Hospitals NHS Foundation Trust, Lead NHS R&D contact

List of Documents

The final document set assessed and approved by HRA and HCRW Approval is listed below.

Document	*Version*	*Date*
Confirmation of any other Regulatory Approvals (e.g. CAG) and all correspondence [CAG provisionally supported outcome and correspondence]		26 October 2018

Confirmation of any other Regulatory Approvals (e.g. CAG) and all correspondence [CAG Fully supported outcome]		07 November 2018
Contract/Study Agreement template [Honorary contract between University College Hospital and the student/CI (Duncan Smith)]		21 March 2016
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Public Liability Insurance Certificate for the Sponsor (City, University of London)]		29 June 2018
HRA Schedule of Events	1	15 October 2018
HRA Statement of Activities	1	15 October 2018
Interview schedules or topic guides for participants [Interview topic guide for HCA]	3.6	09 October 2018
Interview schedules or topic guides for participants [Interview topic guide for RN]	3.6	09 October 2018
Interview schedules or topic guides for participants [Observation guide]	2.0	29 August 2018
Interview schedules or topic guides for participants [Nominal group topic guide - Nursing staff & members of Deteriorating Patient Steering group]	1.1	30 August 2018
IRAS Application Form	247047/1264127/37/321	17 August 2018
IRAS Checklist XML [Checklist_30102018]		30 October 2018
Letter from funder [Intent to fund letter from the NIHR]		26 February 2018
Letter from sponsor [Letter confirming City, University of London REC approval and study registration]		08 August 2018
Letters of invitation to participant [Template email to ward managers]	1.0	21 May 2018
Letters of invitation to participant [Email template - to be sent to nursing staff for phase 3 recruitment]	1.0	09 October 2018
Letters of invitation to participant [Email template to be sent to deteriorating patient steering committee members for phase 3 recruitment]	1.0	09 October 2018
Other [Cover letter with responses to conditions of REC FO]	1.0	29 October 2018
Other [Poster to display for patients and visitors during phase 1 observation]	2.0	29 October 2018
Other [Letter from sponsor organisation's data protection officer]		04 October 2018
Other [Researcher escalation protocol]	1.0	17 May 2018
Other [INVOLVE briefing notes for researchers]	*February*	01 February 2012
Other [Phase 3 information package for nominal group participants]	1.0	10 October 2018
Participant consent form [Phase 2 consent form]	2.2	16 October 2018
Participant consent form [Consent form phase 3]	2.2	16 October 2018
Participant consent form [Opt-out form phase 1]	1.3	29 October 2018

Participant information sheet (PIS) [Phase 3 ward staff PIS]	2.5	29 October 2018
Participant information sheet (PIS) [Phase 3 Deteriorating Patient	2.5	29 October 2018

Steering Group PIS]		
Participant information sheet (PIS) [Phases 1 and 2 HCA PIS]	2.6	29 October 2018
Participant information sheet (PIS) [Phases 1 and 2 RN PIS]	2.6	29 October 2018
Referee's report or other scientific critique report [Feedback from NIHR Clinical Doctoral Research Fellowship selection panel]		16 May 2017
Research protocol or project proposal [DECIDE study protocol]	1.6	29 October 2018
Summary CV for Chief Investigator (CI) [CI CV: Duncan Smith]	1.0	03 July 2018
Summary CV for student [Student CV: Duncan Smith]		03 July 2018
Summary CV for supervisor (student research) [1st supervisor CV: Leanne Aitken]		03 July 2018

Summary of assessment

The following information provides assurance to you, the sponsor and the NHS in England and Wales that the study, as assessed for HRA and HCRW Approval, is compliant with relevant standards. It also provides information and clarification, where appropriate, to participating NHS organisations in England and Wales to assist in assessing, arranging, and confirming capacity and capability.

Assessment criteria

Section	Assessment Criteria	Compliant with Standards	Comments
1.1	IRAS application completed correctly	Yes	The applicant has been made aware that any documents generated during the research for use with participants in subsequent phases will need to be submitted as a substantial amendment.
2.1	Participant information/consent documents and consent process	Yes	No comments

3.1	Protocol assessment	Yes	No comments
4.1	Allocation of responsibilities and rights are agreed and documented	Yes	This is a non-commercial, single site study taking place in the NHS. A statement of activities has been submitted and the sponsor is not requesting and does not expect any other site agreement to be used.
4.2	Insurance/indemnity arrangements assessed	Yes	No comments
4.3	Financial arrangements assessed	Yes	Sponsor is not providing funding to participating NHS organisations.
5.1	Compliance with the Data Protection Act and data security issues assessed	Yes	No comments
5.2	CTIMPS – Arrangements for compliance with the Clinical Trials Regulations assessed	Not Applicable	

Section	**Assessment Criteria**	**Compliant with Standards**	**Comments**
5.3	Compliance with any applicable laws or regulations	Yes	No comments
6.1	NHS Research Ethics Committee favourable opinion received for applicable studies	Yes	No comments
6.2	CTIMPS – Clinical Trials Authorisation (CTA) letter received	Not Applicable	
6.3	Devices – MHRA notice of no objection received	Not Applicable	
6.4	Other regulatory approvals and authorisations received	Yes	No comments

Participating NHS Organisations in England and Wales

This provides detail on the types of participating NHS organisations in the study and a statement as to whether the activities at all organisations are the same or different.
This is a non-commercial, single site study. There is one site-type involved in the research. Activities and procedures as detailed in the protocol will take place at participating NHS organisations. The Chief Investigator or sponsor should share relevant study documents with participating NHS organisations in England and Wales in order to put arrangements in place to deliver the study. The documents should be sent to both the local study team, where applicable, and the office providing the research management function at the participating organisation. Where applicable, the local LCRN contact should also be copied into this correspondence. If chief investigators, sponsors or principal investigators are asked to complete site level forms for participating NHS organisations in England and Wales which are not provided in IRAS or on the HRA or HCRW websites, the chief investigator, sponsor or principal investigator should notify the HRA immediately at hra.approval@nhs.net, or HCRW at Research-permissions@wales.nhs.uk. We will work with these organisations to achieve a consistent approach to information provision.

Principal Investigator Suitability

This confirms whether the sponsor position on whether a PI, LC or neither should be in place is correct for each type of participating NHS organisation in England and Wales, and the minimum expectations for education, training and experience that PIs should meet (where applicable).
A Local Collaborator (LC) is expected at participating NHS organisations. Sponsor does not expect research staff to undertake any specific or additional training for the study.

GCP training is not a generic training expectation, in line with the HRA/HCRW/MHRA statement on training expectations.

HR Good Practice Resource Pack Expectations

This confirms the HR Good Practice Resource Pack expectations for the study and the pre-engagement checks that should and should not be undertaken
No Honorary Research Contracts, Letters of Access or pre-engagement checks are expected for local staff employed by the participating NHS organisations. Where arrangements are not already in place, research staff not employed by the NHS host organisation undertaking any of the research activities listed in the research application would be expected to obtain a Letter of Access based on standard DBS checks and occupational health clearance.

Other Information to Aid Study Set-up

This details any other information that may be helpful to sponsors and participating NHS organisations in England and Wales to aid study set-up.
The applicant has indicated that they do not intend to apply for inclusion on the NIHR CRN Portfolio.

Appendix 24 - Favourable opinion letter from Research Ethics Committee (following submission of a major amendment for phase 3 of the project due to the COVID-19 pandemic)

North of Scotland Research Ethics Service
Summerfield House 2 Eday Road Aberdeen
AB15 6RE

Telephone: 01224 558458
Facsimile: 01224 558609 Email: nosres@nhs.net

NHS Grampian

Please note: This is the favourable opinion of the REC only and does not allow the amendment to be implemented at NHS sites in England until the outcome of the HRA

31 July 2020

Mr Duncan J Smith 7a Cliff Road BRIGHTON
BN2 5RD

Dear Mr Smith

Study title: DEveloping a Complex Intervention for DEteriorating Patients using Theoretical Modelling (DECIDE study)
REC reference: 18/NS/0118
Protocol number: PhD/18-19/03 Amendment number: PhD/18-19/03 Amendment date: 20 July 2020
IRAS project ID:247047

The above amendment was reviewed by the Sub-Committee in correspondence.

Ethical opinion

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

Approved documents

The documents reviewed and approved at the meeting were:

Document	*Version*	*Date*
Completed Amendment Tool: Amendment Tool	1.2	11 June 2020
Letters of invitation to participant: Phase 3 – template email for deteriorating patient steering committee members	2.0	20 July 2020
Letters of invitation to participant: Phase 3 – template email for ward nursing staff	2.0	20 July 2020
Letters of invitation to participant: Phase 3 – template email for ward managers/senior nurses	1.0	20 July 2020

Document	*Version*	*Date*
Participant Information Sheet (PIS): PIS phase 3. Deteriorating Patient Steering Group participants	3.0	20 July 2020

Participant Information Sheet (PIS): PIS phase 3. Ward nursing staff participants	3.0	20 July 2020

Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

Working with NHS Care Organisations

Sponsors should ensure that they notify the R&D office for the relevant NHS care organisation of this amendment in line with the terms detailed in the categorisation email issued by the lead nation for the study.

Amendments related to COVID-19

We will update your research summary for the above study on the research summaries section of our website. During this public health emergency, it is vital that everyone can promptly identify all relevant research related to COVID-19 that is taking place globally. If you have not already done so, please register your study on a public registry as soon as possible and provide the HRA with the registration detail, which will be posted alongside other information relating to your project.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

HRA Learning

We are pleased to welcome researchers and research staff to our HRA Learning Events and online learning opportunities – see details at: https://www.hra.nhs.uk/planning-and- improving-research/learning/

IRAS Project ID - 247047: Please quote this number on all correspondence

Yours sincerely

Professor Nigel Webster Chair

Appendix 25 – The levels of patient risk associated with NEWS2 score ranges

NEWS2 aggregate score range	Suggested level of risk for the patient
0-4	Low risk
3 in any single parameter	Low-medium risk
5-6	Medium risk
≥ 7	High risk

Adapted from: Royal College of Physicians, 2017, p.30, chart 2.

Appendix 26 – Exerts extracted directly from field notes related to each key moment of the afferent limb (phase 1)

Key moment of the afferent limb	Descriptive account of observations	Exert from field notes in support of descriptive account (including data label)
Routine monitoring of vital signs	In some cases, it was very clear that the HCA or RN being observed were enacting expected behaviour in counting the patient's respiratory rate as part of routine monitoring. In these instances, staff were seen looking at a fob watch on their uniform, at a wall-mounted clock or, more frequently, at a timer on an electronic thermometer as described in the field notes exert.	*HCA measuring vital signs using electronic equipment. Measured BP with a cuff and then later applied $Sp0_2$ probe. Appeared to be counting respiratory rate. Continuously looking at the patient's chest. Using the digital thermometer as a timer (overheard the timer beeping). Asked the patient not to talk at this point.* Post EHR 14
	Often, it was less clear if the respiratory rate had been counted as expected. On one occasion, an HCA was heard openly stating to a colleague that they did not have sight of a clock. Despite this, they proceeded to record a respiratory rate on the NEWS chart.	*Two HCAs seen working together carrying out routine monitoring of vital signs (it appears that one HCA is teaching the other). More experienced HCA heard saying– do you want to do the resps? Trainee HCA heard to say – I don't have a watch, then looked briefly at the chest (less than 10 secs) with no obvious attempt made to count the time.* Post EHR 4
	Some staff were also seen enacting unexpected behaviour in relation to the use of electronic monitoring equipment. On several occasions, HCAs were observed applying finger probes for measuring $Sp0_2$ to a patient's ear. This was often seen in response to the monitoring equipment alarming when first applied to a digit.	*HCA seen attaching pulse oximeter probe to the patient's finger. Machine heard alarming. Screen visible – $Sp0_2$ reading 88%. HCA removed finger probe and attached to the patient's ear. Machine continued to alarm (no longer able to see the reading at this point). HCA detached all equipment* Pre EHR 12
Responsive monitoring of vital signs	The expected behaviour of responsive monitoring typically involved the monitoring of vital signs in a single patient more frequently than other patients in their bay. Both RNs and HCAs were seen enacting these behaviours in the pre and post EHR context. RNs were more frequently observed enacting responsive monitoring compared to routine monitoring.	*Shortly after routine monitoring by an HCA, a RN walked back into the bay with electronic monitoring equipment and proceeded to repeat vital signs in bed X. The HCA, who was seen monitoring earlier, called out to the RN from across the bay, I've just done them, why are you doing them again? The RN responded – the BP was 89, I need to re-check.* Post EHR 9
	On some occasions, electronic monitoring devices were left connected to the patient and stationed in the patient's bed space to permit more frequent measurement of vital signs. This was recorded as expected behaviour in the context of a deteriorating patient.	*Observed 2 HCAs setting up electronic monitoring equipment at a patient's bedside. One of the HCAs was heard explaining how you can programme the machine to cycle a blood pressure every hour. When the HCAs left, the equipment was still attached to the patient.*

		Pre EHR 6a
	Infrequently, responsive monitoring was triggered by concerns raised by the patient and/or a relative carer. In the entry below a basic level of responsive monitoring occurred. However, this was considered an example of unexpected behaviour as only $Sp0_2$ was requested by a senior registered nurse, rather than a complete set of vital signs.	*A patient's relative was seen to approach a deputy sister and overheard saying my mum is struggling to breath – I think that she needs a nebuliser. The deputy sister immediately went into the patient's bed space and appeared to observe the patient from the end of the bed. After, she said to a more junior RN – can you re-check the sats please?* Pre EHR 13
	When approached by an HCA about a patient with an elevated NEWS or abnormal vital signs, RNs were seen to delegate further monitoring back to an HCA or student nurse, rather than assessing the patient further themselves (the expected behaviour). This was observed on multiple occasions involving different patients including a patient with an un-recordable blood pressure, a patient who had already been reviewed by critical care, and a patient with a high NEWS.	***17:03*** *DS notified the nurse in charge about a patient with a NEWS 7 who had not had any vital signs recorded for 2 hours. The nurse in charge (NIC) said that she was not aware of this.* ***17:08*** *the NIC heard saying to an HCA working in the bay – his NEWS is 7 so can you just check his obs (gesturing towards the patient with NEWS 7). The NIC then left the bay.* Post EHR 24
	Chart reviews were frequently conducted by DS to assess the timeliness of repeat monitoring after a NEWS trigger. Examples of expected behaviour were found illustrating monitoring frequency being increased, according to policy, for medium and high-risk NEWS.	*Chart review of patient with the highest NEWS on the ward:* ***11:27*** *RR 20, BP 125/58, HR 72, Temp 36.4°C, $Sp0_2$ 91% on 9L of oxygen – NEWS 5;* ***12:26*** *RR 24, BP 139/65, HR 69, Temp 36.8 °C, $Sp0_2$ 92% on 9L of oxygen – NEWS 6.* Post EHR 13a
	There was also evidence of unexpected behaviour in view of delayed monitoring (i.e. > 1 hour between episodes) for patients with both medium and high-risk NEWS.	*Chart review of patient identified as at risk from safety huddle:* ***10:32*** *NEWS 9;* ***14:32*** *NEWS 8* Post EHR 18
Recording vital signs and/or calculating the NEWS	The behaviours related to the recording of vital signs, and the generation of an aggregate NEWS, were the most variable between the pre and post EHR periods. In the pre EHR context, review of paper NEWS charts highlighted inconsistency in the accuracy of recorded information. On some occasions, evidence of expected behaviour was found whereby all vital signs were recorded legibly, and an accurate NEWS was calculated. On other occasions, specific vital signs were missing, or an aggregate NEWS was not recorded, or the aggregate NEWS was recorded but was not calculated correctly.	*Chart review: all vital signs entered. However, it was documented that the patient was receiving 5% oxygen and NEWS recorded as 5 (DS calculated as 7).* Pre EHR 24a
	Infrequently, the time recorded on the NEWS tool (paper and electronic) appeared to reflect the time that the vital signs were due rather than the time that they were seen to be measured. This was considered unexpected behaviour.	*Directly observed vital signs being measured, by an HCA, routinely at* ***17:35****. On chart review, time recorded is* ***18:00****.* Pre EHR 27b

	The EHR appeared to remedy errors in the calculation of NEWS, however there were still occasions where incomplete recording of vital signs by staff (unexpected behaviour) prevented the EHR generating an aggregate score.	***14:49*** *chart review of patient requiring an emergency response (cardiac arrest trolley and ECG machine taken into the bed space, nursing and medical staff coming and going). At* ***14:23****, NEWS 8. Since then, 4 sets of vital signs recorded on the EHR with no aggregate NEWS due to missing respiratory rate.* Post EHR 6
	Where patients were visibly confused/delirious, this was not always recorded and scored as expected on the NEWS chart.	***13:00*** *Chart review of patient triggering concern (had cardiac arrest call placed earlier in the day) all vital signs recorded. The NEWS is correct for recorded data. However, overheard CCOT nurse and RN agreeing that the patient had been acutely confused since* ***9am****. On the NEWS chart, the patient's level of consciousness consistently recorded as 'alert'.* Pre EHR 36
	The practices of staff when recording the vital signs was highly variable. In the post EHR context, some HCAs and RNs were seen to enter vital signs directly into either a desktop computer or a workstation on wheels. Some HCAs used hand-held devices to enter the vital signs immediately after they had measured them. All these behaviours facilitated contemporaneous recording and were therefore considered expected.	*HCA observed measuring vital signs routinely in an open bay of patients. After taking measurements, she enters the information immediately into a hand-held (reading off the screen of the electronic monitoring equipment) before moving on to the next patient.* Post EHR 11b
	Other HCAs were observed jotting several patients' vital signs down on a piece of paper (typically a paper towel or clinical handover sheet) before then entering them into the EHR later using a desktop computer. These behaviours created a delay in recording and were therefore considered unexpected.	*HCA seen entering vital signs into the EHR, using a bench computer at the entrance to a bay of patients. Numerous vital signs listed on the piece of paper and being entered into the system one by one. From glancing at the piece of paper it appears that vital signs are recorded next to a bed number.* Post EHR 11
Escalation within the ward-based nursing team	In both the pre and post EHR context, escalation behaviours were less frequently observed than monitoring, recording, and scoring behaviours. HCAs were observed escalating, as expected, to RNs in the pre and post EHR contexts and were typically overheard reporting concerns with specific vital signs. Less frequently, HCAs were overheard raising concerns about an elevated NEWS.	*Observed HCA carrying out routine monitoring of vital signs in an open bay of patients. After measuring vital signs on the patient in bed X, the HCA approaches the RN working in the bay and is heard saying – his sats are only 92%.* Post EHR 4b
	The nurse in charge (NIC) of the ward was also a target of escalation by both RNs and HCAs. On both floors, RNs were observed notifying the NIC about a deteriorating patient. This is considered expected behaviour.	*Observed commotion in a patient bathroom. HCA responds first and then calls for the RN. The RN arrives and enters the bathroom. RN heard saying to the HCA bring back lots of gauze*

		and asking for monitoring equipment. RN then says to the HCA get [names NIC] straight away. Post EHR 12b
	On one occasion, an HCA used the emergency buzzer to obtain help from the ward team.	*The emergency buzzer sounds. Medical and nursing staff rush to side room X. 10 minutes later, an HCA comes out of the room to retrieve equipment. She meets another HCA who asks – what is going on? The HCA replies, I came back from my break, and he had his call bell on. I went into the room, and he was collapsed on the bed and gasping. I couldn't move him because he is quite big, so I pressed the button.* Post EHR 20
	On both floors, there were situations where patients with abnormal vital signs and elevated NEWS had not been escalated by the HCA who undertook the measurements to the responsible RN.	***13:54*** *chart review of patient with highest NEWS on the ward:* ***13:00*** *NEWS 7. DS notified the RN looking after the patient and asked if she was aware. She replied that she had just spotted it on the system. DS asked – were you told? She replied – no, I was told by X [names HCA] that it was all fine.* Post EHR 15
Escalation outside of the ward-based nursing team	On both floors, RNs were observed escalating, as expected, to external personnel including medical staff and CCOT. These behaviours were enacted in both the pre and post EHR contexts. In most cases, the escalation occurred via the hospital pager system, which involved staff dialling a pager number into the telephone, entering their contact extension for the responder, and then waiting by the telephone for the responder to return their call.	*Observed and overheard a conversation between a RN and CCOT using the telephone at the nurses' station. After the RN put the phone down, another RN sitting at the desk asked - was that CCOT? She responded, yes, I had to call them as I have bleeped the [medical] team 3 times and they haven't rung me back.* Post EHR 13b
	On floor A, there were several occasions where escalation to medical staff occurred in person rather than over the telephone. Typically, this involved a RN approaching a doctor from the office on the ward and bringing them to the bedside of a patient.	*Senior RN seen walking purposefully through the ward holding a high flow oxygen mask. The RN went behind the curtain of a patient in an open bay. The RN then came out of the cubicle and left the bay. Within 3 minutes, the RN returned with a doctor behind her.* Pre EHR 23
	There were instances where patients met criteria for escalation but had not been escalated by RNs to the CCOT. On one occasion, a patient who had already been identified as potentially needing a step-up to ICU care, was not escalated as expected.	*CCOT nurse arrives on the ward and enters to the patient's bed space. After spending time with the patient, the CCOT nurse is overheard saying to the RN - we should really have been called yesterday when the NEWS was 10. I came up yesterday evening to follow-up and found all these high scores.* Pre EHR 26

Appendix 27 – TDF domains, themes, belief statements, and frequency counts from analysis of brief, not audio-recorded, interviews (phase 2)

TDF domain	Themes	Belief statements	RN belief	HCA belief	Frequency	
					Barrier	Enabler
Knowledge	Procedural knowledge for measuring vital signs	Staff know/do not know the correct procedure for measuring respiratory rate	×	✓	5	5
		Staff know/do not know that all patients should have their vital signs checked every 4 hours as a matter of routine	×	✓	0	3
		Staff know/do not know that patients with an elevated NEWS require their vital signs to be measured more frequently than every 4 hours	×	✓	0	1
	Procedural knowledge for escalation	RNs know that when a patient deteriorates, they may need to escalate to a range of different health professionals including the nurse-in-charge and/or medical team and/or critical care outreach team	✓	×	0	2
		Staff know that when the NEWS is elevated it should trigger a response i.e. escalation	✓	×	0	4
Social Professional Role and Identity	Delineation of tasks according to professional role and/or hierarchy	Staff believe that it is/is not the role of the RN to measure and record vital signs	×	✓	1	0
Beliefs about Consequences	Consequences related to recording vital signs	HCAs believe that writing vital signs onto a piece of paper is less time consuming than entering them directly into the EHR	×	✓	1	0
		HCAs believe that entering vital signs directly into the EHR, using a hand-held device, is less time consuming than entering them directly into a desktop computer	×	✓	0	1
	Consequences of escalating	Staff believe escalating to CCOT will result in a faster response, particularly at night, and/or anticipate feeling supported by them when they attend	✓	×	0	1
Reinforcement	Positive reinforcement from praise or recognition	Staff believe that when they demonstrate good practice in escalating a deteriorating patient, their behaviour sometimes will be reinforced with positive feedback from another member of nursing staff or doctor	×	✓	0	1
Intentions	Intention to monitor and record vital signs	Staff intend to re-check a deteriorating patient's vital signs and/or to monitor a deteriorating patient's vital signs more frequently than just routine monitoring	✓	×	0	2
		HCAs intend to write vital signs onto paper, and then later enter them into the EHR	×	✓	2	0

	Intention to escalate	HCAs intend to escalate to a RN	×	✓	0	1
		RNs intend to escalate to the critical care outreach team	✓	×	0	1
		RNs intend to escalate to the medical team	✓	×	0	1
Memory, Attention and Decision Processes	Deciding to monitor vital signs	HCAs make decisions about when and where to start routine monitoring of vital signs based on workload, ward routines and/or the patients they perceive to be most vulnerable	✓	✓	2	0
	Using other (non-NEWS) data or trends to make decisions	Staff look at the trend in the aggregate NEWS and/or the trend in specific vital signs when making decisions about whether to act	✓	×	0	2
		Staff consider other clinical information (e.g. patient history, other symptoms) alongside the NEWS and/or specific vital signs when making decisions about whether to act	✓	×	0	1
	Deciding to escalate	If the medical team responsible for a patient who is found to be deteriorating do not respond when called, RNs decide to reach-out to other potential responders for assistance including other medical staff on the ward and/or the CCOT	✓	×	0	1
	Deciding to intervene or re-monitor	If a patient has abnormal vital signs/elevated NEWS, staff attempt to improve the score with some interventions, and/or re-check the vital signs, before deciding if further escalation is required	✓	✓	1	1
Environmental Context and Resources	Contextual 'red flags' that signal deterioration or increased likelihood of deterioration	Staff believe that deteriorating patient have some objective clinical signs that should raise concerns and trigger further monitoring of vital signs and/or escalation. These signs include changes in breathing; and/or level of response; and/or temperature; and/or heart rate; and/or blood pressure	✓	✓	0	9
		Staff believe that patients who have a 'disease label' reflecting their diagnosis or clinical status and/or have received a particular treatment or intervention need particularly regular monitoring and/or rapid escalation	✓	✓	0	4
	The physical environment	Staff believe that they can use the emergency buzzer to get urgent help in an emergency	×	✓	0	1
	Human resources	Staff believe that a lack of staff and/or a mismatch between the number of staff on duty and the level of patient dependency prevents them from monitoring vital signs on time and/or reviewing the NEWS tool for elevated scores	✓	×	1	0
		Staff believe that the medical team is a resource that can be called upon when a patient deteriorates	✓	×	0	4
		RNs believe that the critical care outreach team is a resource that can be called upon when a patient deteriorates	✓	×	0	3

	Time as a resource	Staff believe that a lack of time and/or an unpredictable ward environment prevents them from monitoring vital signs on time and/or reviewing the NEWS tool for elevated scores	×	✓	1	0
	Physical tools, resources, and equipment	Staff believe that the electronic equipment used for measuring vital signs does not always give accurate readings and that when there is doubt about the accuracy, the vital signs need to be re-checked using manual methods	×	✓	0	1
		Staff believe that the monitoring of vital signs is hindered by a lack of material resources, in particular a lack of electronic monitoring equipment	✓	✓	3	0
		HCAs find timers on the digital thermometers helpful to count respiratory rates as often clocks in the wards are broken or out of view	×	✓	0	2
		HCAs cannot consistently use the hand-held devices for entering vital signs, as they are sometimes locked away in an office to which they do not have access	×	✓	1	0
	Entering/reviewing vital signs on the EHR NEWS	Staff will/will not use the hand-held devices for entering vital signs as they believe it is/is not easier and more efficient than entering them into a desktop computer or writing on paper	×	✓	2	3
		Staff believe that a disadvantage of the EHR is the lack of colour and visual representation of a trigger and/or the lack of clarity about how the aggregate NEWS is comprised i.e. from which specific parameters the patient is scoring	✓	✓	3	0
		Staff believe that an advantage of the EHR is that all staff can view the vital signs in real time and/or simultaneously	✓	✓	0	2
		Staff believe that an advantage of the EHR is that the NEWS is calculated automatically	✓	✓	0	2
		Staff believe that the EHR has improved record-keeping as paper NEWS charts - by comparison - were often illegible, poorly written or included inaccurate information	✓	✓	0	1
Social Influences	Handovers and staff ‘huddles’	Staff believe that the frequency of vital signs monitoring is influenced by information exchanged between nursing staff at shift handover	×	✓	0	2
	Influence of colleagues perceived to be senior	HCAs believe that the frequency that vital signs are measured is influenced by instructions from a RN	×	✓	0	2
		New and inexperienced HCAs and/or student nurses are influenced by experienced HCAs who guide them on how to monitor/record vital signs and how to escalate deterioration	×	✓	2	0

	The influence of external personnel	How frequently a patient's vital signs are measured is influenced by instructions from the medical team and/or CCOT	×	✓	0	1
Behavioural Regulation	Flexible strategies for escalation	If the initial clinicians - to whom the staff escalate - are not available/do not respond or do not take the action expected, to ensure that a deteriorating patient gets reviewed, staff will take different approaches, calling more frequently or contacting other clinicians, until they get the desired response	✓	×	0	1
Key: Highlighted belief statements are those which represent barriers and/or enablers expressed only in a brief, not audio-recorded, interview (i.e. not in a subsequent semi-structured TDF informed interview).						

Appendix 28 – TDF domains, themes, belief statements, and frequency counts from analysis of audio-recorded semi-structured TDF-informed interviews (phase 2)

TDF domain	Themes	Belief statements *Highlighted belief statements met at least 1 of the prioritisation criteria* ***belief statements reflecting beliefs of personal importance to participants*	[1]Pre-EHR belief	[2]Post-EHR belief	Belief expressed in semi-structured TDF interview			
					[3]RN belief	[4]HCA belief	[5]Frequency	
							Barrier	Enabler
1.Knowledge	The evidence-base underpinning NEWS	Registered nurses (RNs) know/do not know that National Early Warning Score (NEWS) is an evidence-based tool	✓	✓	✓	×	7	9
	Local (Trust-level) policy for deteriorating patients	Staff know/do not know about the existence of a local policy for deteriorating patients	✓	✓	✓	✓	17	8
		Staff know/do not know what is written in the local policy for deteriorating patients	✓	✓	✓	✓	7	2
		Staff know/do not know about the structured communication tool, used within the Trust, for escalating a deteriorating patient	✓	✓	✓	✓	3	1
	Procedural knowledge for measuring vital signs	Staff know/do not know the correct procedure for measuring respiratory rate	✓	✓	✓	✓	9	10
		Staff know to leave electronic monitoring equipment attached to a deteriorating patient to facilitate frequent re-measuring of vital signs	✓	✓	✓	✓	0	4
		Staff know/do not know that all patients should have their vital signs checked every 4 hours as a matter of routine	✓	✓	✓	✓	1	25
		Staff know that if specific vital signs are abnormal then they should increase the frequency of monitoring	×	✓	✓	✓	0	7
		Staff know/do not know that all vital signs should be measured, with every episode of monitoring, so that a NEWS can be calculated	×	✓	✓	✓	2	8
		Staff know/do not know that patients with an elevated NEWS require their vital signs to be measured more frequently than every 4 hours	✓	✓	✓	✓	4	16
	Procedural knowledge for recording vital signs	Staff know/do not know that writing vital signs on paper before later entering them onto the EHR is poor practice	×	✓	✓	✓	3	9
	Knowledge of NEWS algorithms/guidance	Staff know/do not know what specific score range constitutes a high-risk NEWS	✓	✓	✓	✓	19	7

		Staff know/do not know what specific score range constitutes a medium-risk NEWS	✓	✓	✓	✓	17	4
		Staff have/do not have accurate knowledge of how a specific abnormal vital sign translates into score of 0-3, which then contributes to the aggregate score	✓	✓	✓	✓	7	6
		Staff know that patients with chronic respiratory diseases (e.g. COPD) may have modified target peripheral oxygen saturations, due to their disease	✓	✓	✓	✓	0	10
		Staff know/do not know about the differences between NEWS1 and NEWS2	×	✓	✓	✓	5	10
	Procedural knowledge for escalation	Healthcare assistants (HCAs) know that when a patient deteriorates, they need to contact the responsible RN and/or the nurse-in-charge	✓	✓	×	✓	0	9
		RNs know that when a patient deteriorates, they may need to escalate to a range of different health professionals including the nurse-in-charge and/or medical team and/or critical care outreach team	✓	✓	✓	×	0	8
		Staff know that when the NEWS is elevated it should trigger a response i.e. escalation	✓	✓	✓	✓	0	19
		Staff do not know that when the NEWS is elevated, they should respond according to the protocol, regardless of previous scores or how the aggregate score is derived	✓	×	✓	✓	2	0
	Clinical knowledge beyond NEWS	Staff do/do not identify a change in respiratory rate as an early indicator of patient deterioration	✓	✓	✓	✓	7	9
		RNs know that when a patient deteriorates, other clinical data may be useful, alongside NEWS, and know what assessments to carry out, and/or what immediate interventions might be needed	✓	✓	✓	×	0	5
		Staff have/do not have accurate clinical knowledge about why a specific vital sign may be deranged (i.e. outside of acceptable ranges)	✓	✓	✓	✓	3	10
		Staff have/do not have accurate knowledge about acceptable or normal parameters for specific vital signs	×	✓	✓	✓	3	1
2. Skills	Developing skills through different strategies	HCAs develop skills in measuring vital signs through working with clinical colleagues in the ward setting	✓	✓	×	✓	0	5

		Staff receive training on how to measure vital signs using 'manual methods'	✓	✓	✓	✓	0	5
		Staff do not have the opportunity to practice taking blood pressure and/or pulse manually in the ward setting	✓	×	✓	✓	7	0
		Staff associate good skills in monitoring vital signs with frequent opportunities to practice	×	✓	✓	✓	0	8
3. Social, Professional Role and Identity	Bank staff	HCAs believe that bank staff do not always provide optimum care in recognising and responding to deteriorating patients	✓	×	×	✓	3	0
	Importance of role	HCAs believe that they have an important role in recognising deteriorating patients, because they deliver a lot of direct care and therefore may notice the deterioration first**	✓	✓	×	✓	0	5
	Professional responsibility and accountability	Staff believe that their professional responsibility ends/does not end, when the next clinician along the escalation pathway is notified	✓	✓	✓	✓	4	1
		When staff have a sense of ownership over a patient or group of patients, they feel responsible for giving them the best care. This includes recognising, and responding to, signs of deterioration	✓	✓	✓	✓	0	14
		RNs feel reassured that the patients they are responsible for are "safe" if they have all had their vital signs recorded on time and if they have had the opportunity to measure them**	✓	✓	✓	×	0	6
		The professional responsibility and accountability that a RN has, informs their role in recognising and responding to deteriorating patients**	✓	✓	✓	×	0	10
	Delineation of tasks according to professional role and/or hierarchy	Staff believe that HCAs should measure and record vital signs with/without prompting or delegation from the RN overseeing the patient's care**	✓	✓	✓	✓	17	7
		Staff believe that it is/is not the role of the RN to measure and record vital signs	✓	✓	✓	✓	9	5
		Staff believe that the nurse-in-charge of the ward has a role in assisting more junior staff when they are responding to a deteriorating patient	✓	✓	✓	✓	0	7
		Staff believe that HCAs should/should not escalate further than a RN if they believe that a patient is deteriorating	✓	✓	✓	✓	21	4

		When a RN is informed about a deteriorating patient, it is their responsibility to undertake further assessment, and/or re-check the vital signs, and/or clarify the plan of care with other members of the ward team	✓	✓	✓	✓	0	7
		When a RN is informed about a deteriorating patient, it is part of their role to deliver some basic interventions, before escalating further	✓	✓	✓	✓	0	10
		When a RN is informed about a deteriorating patient, it is their responsibility to escalate care	×	✓	✓	✓	0	7
		Staff believe it is/is not the role of the RN to regularly check vital signs/NEWS that have been measured and recorded by HCAs	×	✓	✓	✓	1	5
		Experienced/senior HCAs believe that it is their role to teach or "prompt" new HCAs on how to use the monitoring equipment and/or how to record vital signs	×	✓	×	✓	3	0
4. Beliefs about Capabilities	Self-confidence measuring and recording the vital signs	Staff do/do not believe in their ability to measure and record vital signs accurately using electronic devices and/or manual methods	✓	✓	✓	✓	1	16
		Staff are/are not confident measuring and recording vital signs accurately using electronic devices and/or manual methods	✓	✓	✓	✓	1	10
		Staff believe it easy/difficult to accurately measure a patient's respiratory rate	×	✓	✓	✓	2	10
		Staff believe that it is easy/not difficult to consistently record the vital signs correctly on the EHR and to review vital signs recorded by others	×	✓	✓	✓	0	11
		Staff do/do not believe in their ability to consistently record the vital signs correctly on the NEWS chart and/or to correctly calculate the aggregate NEWS	✓	×	✓	✓	3	11
	Self-confidence escalating	Staff have/do not have confidence in their ability to promptly escalate when a patient has signs of deterioration	✓	✓	✓	✓	3	9
	Seniority, experience, or delegation	Staff believe that having more experience in clinical practice, has increased their level of confidence in recognising and responding to deteriorating patients	✓	✓	✓	✓	0	10

		Staff believe that receiving positive feedback from senior colleagues has improved their self confidence in their ability to recognise and/or respond to deteriorating patients	✓	✓	✓	✓	0	5
5. Optimism	The value of policy/guidelines	Staff have/do not have confidence in the Trust deteriorating patient policy, and/or the NEWS tool, which makes them/does not make them optimistic that following policy will improve care of patients in the future	✓	✓	✓	✓	2	19
		Staff are optimistic about the inclusion of the 'new confusion' parameter (within the level of consciousness assessment of NEWS2), and believe that it is a positive addition to the tool	×	✓	✓	✓	0	2
	EHR	Staff are cautiously optimistic that the implementation of electronic NEWS (as part of an Electronic Health Record) will continue to improve care of deteriorating patients	✓	✓	✓	✓	0	4
	Staff capabilities	Staff are pessimistic that staff do not always have the requisite knowledge/skills to enact the behaviours outlined in the Trust policy and/or believe that more should be done to enforce the policy	✓	✓	✓	✓	4	0
6. Beliefs about Consequences	Consequences related to recording vital signs	Staff believe that recording vital signs on paper before then later entering them onto the EHR, is/is not associated with risks	×	✓	✓	✓	1	5
		Staff enter vital signs directly into a hand-held device or workstation on wheels (rather than writing on paper first), so that the information is immediately available to other members of the team	×	✓	✓	✓	0	4
	Consequences of escalating	Staff believe escalating to the critical care outreach team (CCOT) will result in a faster response, particularly at night, and/or anticipate feeling supported by them when they attend	√	✓	✓	✓	0	7
		Staff believe that when they escalate, they will be told what action to take next	×	✓	✓	✓	0	3
		HCAs believe that when they escalate, the RN will come and review the patient	×	✓	×	✓	0	2
		HCAs believe that if they notify a RN about an elevated NEWS they will 'explain it away' i.e. state why the score is abnormal and why it should be tolerated	×	✓	×	✓	3	0

		Staff believe that when they escalate, they will be asked how the NEWS is derived (i.e. which parameters are abnormal) and therefore need to have this information before escalating	×	✓	✓	✓	0	4
		HCAs believe that early escalation is advantageous as it reduces workload and saves time further down the line	×	✓	×	✓	0	2
		RNs believe that if they are not assertive when escalating then the responder may not attend to assess their patient	×	✓	✓	×	0	2
		Staff believe that if they pull the 'crash bell' other staff will respond quickly making the process "easier"	×	✓	✓	✓	0	3
		Staff believe that if they notify the nurse-in-charge about a deteriorating patient then they will get/will not get additional support	✓	×	✓	✓	1	3
	Avoiding reprimand or being dismissed	Staff believe that more senior member of the team will be annoyed, and/or will not be able to respond to the patient effectively, if they do not complete the NEWS or escalate as they should	✓	✓	✓	✓	0	5
		Staff believe that if they frequently reach out to members of the medical team and/or CCOT they will be "wasting their time" and/or that they then may be angry/dismissive towards them	✓	✓	✓	✓	9	0
		HCAs believe that RNs will be/will not be dismissive when they are told about subtle changes in patient's vital signs	✓	×	×	✓	2	2
	Impact on the patient	Staff believe that, when a patient deteriorates, recognising the deterioration and responding effectively prevents further deterioration and potentially saves lives**	✓	✓	✓	✓	0	19
		RNs believe that if a patient is already receiving maximum treatment, then CCOT may not be able to offer any further intervention and therefore further review is not needed/not beneficial	✓	✓	✓	×	3	0
		HCAs believe that patients may be upset if they are woken overnight to have their vital signs monitored	×	✓	×	✓	2	0
7. Reinforcement	Positive reinforcement from praise or recognition	Staff believe that positive feedback on their actions from senior nurses and/or medical staff has/has not improved their performance in monitoring vital signs and escalating care**	✓	✓	✓	✓	3	12

		Staff believe that when they demonstrate good practice in escalating a deteriorating patient, their behaviour sometimes will be reinforced with positive feedback from another member of nursing staff or doctor	✓	✓	✓	✓	0	12
		Staff believe that their team will receive a material reward for good practice in monitoring vital signs and escalating care, but are unclear what form the reward would take and/or how it would be delivered to them	✓	×	✓	✓	0	3
	Lack of any reinforcement (positive or negative)	Staff believe that they have never experienced any form of feedback on their behaviour, when monitoring vital signs and/or escalating a deteriorating patient	✓	✓	✓	✓	5	0
		Staff have no knowledge of ward-level or Trust-level rewards for encouraging good practice in monitoring vital signs and/or escalating care	✓	✓	✓	✓	22	0
		Staff have little knowledge, or are vague, about ward-level or Trust-level sanctions for discouraging under-performance in monitoring vital signs and/or escalating care	✓	✓	✓	✓	21	0
	Anticipated negative feedback or reprimand	RNs believe that senior RNs on the ward (including charge nurses/ward managers) will highlight if individual/team performance is poor in monitoring vital signs and/or escalating care	✓	✓	✓	×	0	5
		Staff are afraid that if they do not perform well in monitoring vital signs and/or escalating care, then they will be reprimanded or receive negative feedback from a more senior nurse**	✓	✓	✓	✓	0	7
8. Intentions	Intention to monitor and record vital signs	Staff intend to re-check a deteriorating patient's vital signs and/or to monitor a deteriorating patient's vital signs more frequently than just routine monitoring	✓	✓	✓	✓	0	20
		Staff intend to routinely monitor patients' vital signs	✓	✓	✓	✓	0	4
		HCAs intend to enter vital signs directly into a hand-held device or desktop computer	×	✓	×	✓	0	4
		HCAs intend to monitor a patient's respiratory rate	×	✓	×	✓	0	2
		Staff intend to make the monitoring of vital signs a priority	✓	×	✓	✓	0	2
	Intention to assess further or review the	Staff intend to carry out further assessment on a patient who is deteriorating (including top-to-toe assessment e.g. Airway, Breathing, Circulation etc.,)	✓	✓	✓	✓	0	5

	accuracy of recorded information	RNs intend to check the aggregate NEWS for accuracy	✓	×	✓	×	0	2
		RNs intend to compare vital signs recorded against previous measurements	✓	×	✓	×	0	2
	Intention to escalate	HCAs intend to escalate to a RN	✓	✓	×	✓	0	13
		When escalating, staff do/do not intend to use a structured communication tool to communicate	✓	✓	✓	✓	11	1
		RNs intend to escalate to the critical care outreach team	✓	✓	✓	×	0	10
		RNs intend to escalate to the medical team	✓	✓	✓	×	0	8
		Staff intend to escalate to the nurse-in-charge of the ward and/or a senior colleague	✓	✓	✓	✓	0	8
		Staff intend to escalate but are not explicit about who they would escalate to	✓	✓	✓	✓	8	0
		Staff intend to continue escalating along the line of potential responders until they get an expected response	✓	×	✓	✓	0	5
		RNs intend to use the emergency call system for immediate escalation	✓	×	✓	×	0	2
	Intention to follow local policy or NEWS guidance	Staff intend to follow local policies and protocols for deteriorating patients and/or review these sources of information	✓	✓	✓	✓	0	11
		RNs intend to consult NEWS for guidance on escalation	✓	×	✓	×	0	2
9. Goals	Monitoring goals	Staff believe that measuring vital signs is a priority; it ensures that patients are safe by providing a baseline and/or highlighting if the patient is responding to delivered interventions and/or if their overall condition is deteriorating or improving**	✓	✓	✓	✓	0	20
		RNs aim to measure the vital signs themselves more frequently, or to re-check vital signs measured by a HCA, to ensure that the information recorded is accurate**	✓	✓	✓	×	0	9
		HCAs will prioritise monitoring a deteriorating patient within their care until there is evidence of improvement in the patient's condition	✓	×	×	✓	0	2
	Escalation goals	If a patient is deteriorating, staff aim to escalate and/or re-escalate as quickly as possible so that the patient is seen by an appropriate clinician**	✓	✓	✓	✓	0	5

		When escalating by telephone, RNs aim to get as much feedback as possible by being prepared and/or ensuring that all pertinent information is handed over	✓	×	✓	×	0	2
	Intervention goals	RNs aim to provide appropriate interventions for a deteriorating patient, in the ward context, and/or aim to have patients who do not respond to treatment transferred to another department where their needs can be met	✓	×	✓	×	0	2
	Putting patients first	Staff believe that their personal goal and/or the goal of their team is to put patients and their safety first**	×	✓	✓	✓	0	4
	Personal goals	HCAs aim to do a good job in monitoring vital signs so that more of their registered colleagues want to work alongside them	✓	×	×	✓	0	2
	Goal conflict	Staff experience conflict between the goals that they set for a deteriorating patient, and goals that they set to meet the needs of other patients for whom they are responsible	✓	✓	✓	✓	4	0
	Keeping patients safe throughout a shift	Staff aim to get their patients through a shift safely without event and/or to end the shift with their patients having a low NEWS	×	✓	✓	✓	0	6
10. Memory, Attention and Decision Processes	Deciding to monitor vital signs	HCAs make decisions about when and where to start routine monitoring of vital signs based on workload, ward routines and/or the patients they perceive to be most vulnerable	✓	✓	×	✓	6	0
		Staff decide to prioritise the monitoring of vital signs over other ward-based tasks**	×	✓	✓	✓	0	2
	Normalising the abnormal	When a patient has abnormal vital signs and/or an elevated NEWS, staff use information about the patient's history and/or previous NEWS to decide if the abnormality is a new change or something more persistent. If it is persistent, it is believed to be normal for the patient i.e. their baseline and not a cause for concern	✓	✓	✓	✓	21	0
		If a patient has a minor abnormality in vital signs and/or NEWS, staff consider simple explanations for a spurious or 'one off' abnormal recording and decide to repeat vital signs and/or to tolerate the abnormality rather than escalating immediately	✓	✓	✓	✓	12	0

	Using other (non-NEWS) data or trends to make decisions	Staff look at the trend in the aggregate NEWS and/or the trend in specific vital signs when making decisions about whether to act	✓	✓	✓	✓	0	15
		Staff consider other clinical information (e.g. patient history, other symptoms) alongside the NEWS and/or specific vital signs when making decisions about whether to act	✓	✓	✓	✓	0	14
		When informed about a potentially deteriorating patient, the RN assesses the patient further him/herself before deciding what action to take next	✓	✓	✓	×	0	9
	Using NEWS as a decision aid	The NEWS tool is used as a decision aid to guide further monitoring of vital signs and/or escalation	✓	✓	✓	✓	0	16
	Making decisions collaboratively	Staff believe that HCAs and RNs make decisions together about how to respond to a deteriorating patient	✓	✓	✓	✓	0	4
	Deciding to escalate	HCAs make decisions about whether to pull the emergency buzzer or inform a RN based on how unwell they believe the patient to be	×	✓	×	✓	0	4
		HCAs decide to increase the frequency of vital signs monitoring based on the condition of the patient	×	✓	×	✓	0	3
		RNs decide to escalate to a senior nurse on the ward before another responder (e.g. medical team or CCOT)	✓	✓	✓	×	4	0
		RNs decide to escalate to the medical team before the CCOT as they believe that the doctors are responsible for the patient, and can prescribe treatment and perform/order specific investigations that the CCOT cannot	✓	✓	✓	×	4	0
		If the medical team responsible for a patient who is found to be deteriorating do not respond when called, RNs decide to reach-out to other potential responders for assistance including other medical staff on the ward and/or the CCOT	✓	✓	✓	×	0	6
	Deciding to intervene or re-monitor	If a patient has abnormal vital signs/elevated NEWS, staff attempt to improve the score with some interventions, and/or re-check the vital signs, before deciding if further escalation is required	✓	✓	✓	✓	5	12

11. Environment, Context and Resources	Contextual 'red flags' that signal deterioration or increased likelihood of deterioration	Staff are prompted to act, if the condition of a patient they know and believed to have been 'stable' appears to rapidly change	✓	✓	✓	✓	0	8
		Staff believe that deteriorating patient have some objective clinical signs that should raise concerns and trigger further monitoring of vital signs and/or escalation. These signs include changes in breathing; and/or level of response; and/or temperature; and/or heart rate; and/or blood pressure	✓	✓	✓	✓	0	14
		Staff believe that patients who have a 'disease label' reflecting their diagnosis or clinical status and/or have received a particular treatment or intervention need particularly regular monitoring and/or rapid escalation	✓	✓	✓	✓	0	15
		Some staff believe that their subjective impression of the patient and/or their own degree of 'worry' is important when deciding what action to take for a deteriorating patient**	✓	✓	✓	✓	0	12
	Contextual factors that mitigate concern	Staff accept that the NEWS will be artificially inflated in the patients with chronic respiratory disease, and therefore do not worry in this context and/or do not believe that they need to follow the NEWS protocol in these patients	✓	✓	✓	✓	13	0
	Patient characteristics that make monitoring vital signs more difficult	Staff believe that certain patient characteristics make it more difficult to accurately measure the vital signs e.g. patient's body shape or the patient's behaviour	×	✓	✓	✓	6	0
	The physical environment	Some staff believe that recognising and responding to deteriorating patients is particularly important because of the acuity of the clinical context in which they are working**	✓	✓	✓	✓	0	12
		Staff believe that they can use the emergency buzzer to get urgent help in an emergency	✓	✓	✓	✓	0	10
	Human resources	Staff believe that a lack of staff and/or a mismatch between the number of staff on duty and the level of patient dependency prevents them from monitoring vital signs on time and/or reviewing the NEWS tool for elevated scores	✓	✓	✓	✓	12	0

		RNs look for available HCAs to undertake monitoring of vital signs. If this human resource is not available to them, then they believe that the task will fall to them or another RN or a pre-registration student	✓	✓	✓	×	0	7
		Staff believe that the medical team is a resource that can be called upon when a patient deteriorates	✓	✓	✓	✓	0	19
		RNs believe that the critical care outreach team is a resource that can be called upon when a patient deteriorates	✓	✓	✓	✓	0	16
		RNs believe that the night nurse practitioners are a resource that can be called upon when a patient deteriorates	×	✓	✓	×	0	2
		Staff believe that the nurse in charge of the ward and/or senior registered nursing colleagues are resources that can be called upon when a patient deteriorates	✓	✓	✓	✓	0	16
		HCAs believe that a registered nursing colleague is a resource to be called upon when a patient deteriorates	✓	✓	×	✓	0	14
		Staff believe that bank staff may not always be effective in monitoring vital signs and/or escalating	×	✓	✓	✓	3	0
		RNs believe that some HCAs will reliably report abnormalities in vital signs whilst others will not	✓	✓	✓	×	3	0
		Staff will take over or repeat monitoring of vital signs and/or escalating a deteriorating patient, even if they are not formally allocated to the patient, if the patient is being cared for by a member of bank staff or a pre-registration student	✓	×	✓	✓	0	7
		HCAs may not be able to report a patient who appears to be deteriorating, to the RN, because the RN is busy doing other tasks	✓	×	✓	✓	2	0
	Time as a resource	Staff believe that a lack of time and/or an unpredictable ward environment prevents them from monitoring vital signs on time and/or reviewing the NEWS tool for elevated scores**	✓	✓	✓	✓	11	0
		When attempting to escalate a deteriorating patient using the hospital pager system, staff believe that there can be long delays before getting a response - particularly out of hours e.g. night shifts	✓	✓	✓	✓	14	0

	Physical tools, resources, and equipment	RNs believe that using a structured communication tool is/is not useful when escalating a deteriorating patient	✓	✓	✓	×	3	9
		HCAs believe that the electronic equipment for monitoring vital signs gives you all the information required and/or that there is no need to undertake additional measurements e.g. using manual techniques	✓	✓	×	✓	5	0
		Staff believe that the electronic equipment used for measuring vital signs does not always give accurate readings and that when there is doubt about the accuracy, the vital signs need to be re-checked using manual methods	✓	✓	✓	✓	0	11
		Staff believe that the monitoring of vital signs is hindered by a lack of material resources, in particular a lack of electronic monitoring equipment	✓	✓	✓	✓	10	0
	Entering/reviewing vital signs on the EHR NEWS	Staff will/will not use the hand-held devices for entering vital signs as they believe it is/is not easier and more efficient than entering on to a desktop computer or writing on paper	×	✓	✓	✓	7	5
		Staff believe that a disadvantage of the EHR is the lack of colour and visual representation of a trigger and/or the lack of clarity about how the aggregate NEWS is comprised i.e. from which specific parameters the patient is scoring	×	✓	✓	✓	10	0
		Staff believe that an advantage of the EHR is that all staff can view the vital signs in real time and/or simultaneously	×	✓	×	✓	0	3
		Staff believe that an advantage of the EHR is that the NEWS is calculated automatically	×	✓	✓	✓	0	9
		HCAs believe that it is possible to make errors when recording vital signs on the EHR e.g. entering vital signs data into the wrong cell	×	✓	×	✓	4	0
		Staff believe that it is/is not easy to review the trend in vital signs on the EHR	×	✓	✓	✓	1	4
		Staff believe that the EHR has improved record-keeping as paper NEWS charts - by comparison - were often illegible, poorly written or included inaccurate information	×	✓	✓	✓	0	7
		Staff believe that the EHR is "user friendly" and that it is easy to enter and view vital signs	×	✓	✓	✓	0	9

	Entering/reviewing vital signs on the paper NEWS	Staff believe that the colour bands reflecting the different scores for each parameter makes the NEWS chart user-friendly	✓	×	✓	✓	0	9
		Staff believe that the paper version of the NEWS chart can be difficult to use because the boxes are too small/the chart has too much on it, making it difficult to write on and/or difficult to read/interpret	✓	×	✓	✓	10	0
	Safety huddles	Staff believe that they are/are not able to regularly attend ward huddles and do/do not find them a useful resource for drawing attention to deteriorating patients	×	✓	✓	✓	6	7
	The NEWS tool as a resource	Staff believe that the NEWS tool provides useful guidance on how to respond to a patient's vital signs and/or helps to facilitate escalation, when there are signs of deterioration**	✓	✓	✓	✓	0	16
		Staff believe that the NEWS does/does not provide an accurate reflection of how unwell a patient is and their potential for further deterioration	✓	✓	✓	✓	16	19
12. Social Influences	Handovers and staff 'huddles'	Staff believe that the frequency of vital signs monitoring is influenced by information exchanged between nursing staff at shift handover	✓	✓	✓	✓	0	7
	Influencing colleagues	HCAs try to persuade RNs to contact PERRT and/or the medical team if they perceive a patient to be deteriorating	×	✓	×	✓	0	2
	Influence of peers	Staff believe that, through teamwork, RNs and/or HCAs influence each other when responding to a deteriorating patient	✓	✓	✓	✓	0	11
		Staff believe that their colleagues have/do not have a positive and encouraging attitude towards them when they are monitoring vital signs and escalating deterioration	✓	✓	✓	✓	6	6
		RNs believe that whilst they may approach a colleague for an opinion about a deteriorating patient, their colleagues' suggestions have little or no influence on what they do next	✓	✓	✓	×	5	0
		RNs believe that their peers positively influence their behaviour when measuring vital signs and escalating deterioration	✓	×	✓	×	0	5
		HCAs believe that the frequency that vital signs are measured is influenced by instructions from a RN	✓	✓	×	✓	0	12

	Influence of colleagues perceived to be senior	New and inexperienced HCAs and/or student nurses are influenced by experienced HCAs who guide them on how to monitor/record vital signs and how to escalate deterioration	×	✓	×	✓	5	0
		Staff believe that nursing colleagues perceived to be 'senior' and 'experienced' (including the nurse educator and charge nurses) positively influence their behaviour when measuring vital signs and escalating deterioration	✓	✓	✓	✓	0	12
	The influence of external personnel	How frequently a patient's vital signs are measured is influenced by instructions from the medical team and/or CCOT	✓	✓	✓	✓	0	8
		RNs tendency to escalate care for a deteriorating patient is influenced by the response that they get from the CCOT nurse when they do (whether it be perceived as a positive or negative response)	✓	×	✓	×	1	1
13. Emotions	No impact	Staff <u>do not</u> believe that their feelings and emotional responses impact on their behaviour when monitoring vital signs and escalating care	✓	✓	✓	✓	0	13
	Positive feelings	RNs feel a sense of relief once they have completed the monitoring of vital signs on all their patients	×	√	×	✓	0	2
	Negative feelings	RNs believe that caring for a deteriorating patient (or the prospect of doing so), is associated with negative emotions including feeling 'stressed' 'anxious' 'panicked'	✓	√	✓	✓	13	0
		Staff feel angry, upset, or embarrassed after a negative experience when attempting to escalate a deteriorating patient	✓	×	✓	✓	3	0
	Negative feelings becoming positive feelings or actions	When caring for a deteriorating patient, staff believe that they can turn negative emotions into positive actions that improve their performance (i.e. using 'the adrenaline' productively)	✓	✓	✓	✓	0	8
		When caring for deteriorating patients, staff believe that negative emotions they experience are reduced once they have escalated to a more senior member of the team	✓	×	✓	✓	0	3
14. Behavioural Regulation	Measuring vital signs and calculating the NEWS	Staff believe that measuring and recording the respiratory rate accurately is a priority and have developed strategies to ensure that they do this correctly when they are	✓	✓	✓	✓	0	11

		carrying out routine monitoring of vital signs, or re-checking vital signs on a deteriorating patient						
		When calculating the aggregate NEWS, staff use strategies to focus in on the task and block out other distractions to ensure that the score is calculated correctly	✓	×	✓	✓	0	2
		HCAs regulate the time that they start and finish the routine monitoring of vital signs, to ensure that the task is completed and free from interruptions caused by staff meal breaks and/or other patient-facing activities on the ward	✓	×	×	✓	0	3
		Staff regulate the duration and order in which vital signs are recorded, routinely and in deteriorating patients, based on patient clinical need	✓	×	✓	✓	0	3
	Time management	To ensure that the RN can meet the additional needs of a deteriorating patient, they call upon colleagues to take on other aspects of their work so that they have the time to devote to a more unwell patient	✓	×	✓	×	0	2
	Flexible strategies for escalation	If the initial clinicians - to whom the staff escalate - are not available/do not respond or do not take the action expected, to ensure that a deteriorating patient gets reviewed, staff will take different approaches, calling more frequently or contacting other clinicians, until they get the desired response	✓	✓	✓	✓	0	11

Key

[1]If the belief statement represents views of participants who were interviewed prior to the implementation of the Electronic Health Record (i.e. in the paper NEWS context), then a tick will appear in this column. If not, then a cross will appear in this column.

[2]If the belief statement represents views of participants who were interviewed after the implementation of the Electronic Health Record (i.e. in the electronic NEWS context), then a tick will appear in this column. If not, then a cross will appear in this column.

[3]If the belief statement represents a belief expressed by registered nurses (RNs) this column will be ticked. If not, then a cross will appear in this column.

[4]If the belief statement represents a belief expressed by healthcare assistants (HCAs) this column will be ticked. If not, then a cross will appear in this column.

[5]Frequency counts reflect the number of different participants who expressed this belief during a semi-structured interview (not the number of times that the belief was mentioned). Where the belief represents a barrier for some participants and an enabler for others there will be a frequency count in both the barrier and enabler columns. For example, in relation to the first belief statement: *RNs know/do not know that NEWS is an evidence-based tool*

For 9 participants this belief was an enabler i.e. the participants knew that NEWS was evidence based

For 7 participants this belief was a barrier i.e. the participants did not know that NEWS was evidence based

Appendix 29 - Professional roles of participants attending nominal groups

NGT 1 - leadership group participants (number of participants in this role who attended)	NGT 2 - clinical group participants (number of participants in this role who attended)
– Deputy chief nurse (1) – Consultant in intensive care medicine (1) – Quality improvement practitioner (1) – Clinical-academic physiotherapist (1) – Senior nurse - education (2) – Senior nurse - critical care outreach (4) – Lead clinical nurse specialist (1) – Ward matron (1)	– Charge nurse/ward manager (2) – Clinical nurse specialist (1) – Deputy charge nurse (1) – Staff nurse (2) – Healthcare assistant (1)

Appendix 30 – Draft intervention manual

TIDieR element (Hoffmann *et al.*, 2014)	**Description**	**Links to related literature**
Brief name of the intervention	A complex, theory-based, behaviour change intervention to strengthen the afferent limb of the rapid response system (i.e. to improve recognition and response to deteriorating ward patients).	
Stage of implementation	Intervention development in accordance with the Medical Research Council (2006) guidance and stages 1 - 3 of the implementation process described by French et al (2012).	French et al., 2012; Medical Research Council, 2006
Voice[1] of the author	This draft intervention manual was written by a clinical-academic nurse as the main output of a doctoral (PhD) project. The manual reflects the endpoint of a programme of empirical work where the broad aim was to develop a theory-based, draft, behaviour change intervention. In addition to writing this manual, the author was involved in all the empirical work that preceded it. This included designing the study; collecting data; analysing the corpus of data and synthesising the data in the preparation of this document. Throughout the research, the author was supervised by a professor of critical care, by two researchers with expertise in health psychology and behaviour change (one of whom is also a registered nurse), and a senior clinician with extensive experience and expertise in management of deteriorating patients. All members of the supervision team reviewed this draft manual. This intervention manual was also reviewed by a patient advisor who was involved throughout the programme of work. Comments made by members of the supervision team and patient advisor were used to inform amendments to this manual on an iterative basis.	[1]The inclusion of the 'voice' within the intervention manual is based on guidance in the paper by Cotterill et al., (2018)
Why *Describe any rationale, **theory**, or goal*	Using the Theoretical Domains Framework (TDF) (Cane, O'Connor and Michie, 2012) of behaviour change, the determinants of seven target behaviours were mapped to specific Behaviour Change Techniques (BCTs) using expert consensus literature (Cane *et al.*, 2015). The identification and specification of the target behaviours is reported elsewhere in a paper by Smith et al (2020). Using Nominal Group Technique (NGT), NHS clinicians and leaders scrutinised a shortlist of the BCTs and potential applications (approaches to operationalise BCTs) and ranked them according to acceptability and feasibility. Combinations of BCTs and applications that were ranked highly and/or frequently by participants of the NGT groups were considered first by the research team when this draft manual was compiled. The theoretical basis of the intervention reported in this draft manual is provided by 12 BCTs (listed below) that met the following criteria: – Were mapped from theoretically informed determinants; that is, mapped from the TDF domains representing the most important barriers and enablers to the target behaviour/s (the qualitative research conducted to identify these domains is reported elsewhere (Smith *et al.*, 2021)).	

	– Are suitable for an intervention targeting health professionals and could be operationalised in a facilitated workshop or in an acute ward environment. – Were shortlisted by the research team following application of the APEASE criteria (Michie, Atkins and West, 2014). In addition, specific combinations of BCTs and applications were ranked highly and/or frequently for acceptability and feasibility by NHS clinicians, leaders, and managers during NGT groups **and/or** were considered of high importance by the research team (i.e. considered as having potential to impact favourably on nursing staff behaviour). BCTs included within the intervention: 1. *Social support or encouragement* 2. *Salience of consequence* 3. *Pros/cons* 4. *Anticipated regret* 5. *Comparative imagining of future outcomes* 6. *Action planning* 7. *Prompts/cues* 8. *Re-structuring the physical environment* 9. *Re-structuring the social environment* 10. *Information about others' approval* 11. *Identification of self as a role model* 12. *Social reward* *Information provision* - unlike the 13 techniques listed above, information provision is not a BCT mapped from the expert consensus literature. However, like the other techniques, the inclusion of *information provision* was informed by the theoretically deduced determinants of the target behaviours. From the TDF-based interview study with nursing staff (Smith *et al.*, 2021), barriers related to *procedural knowledge* were identified for six of the seven target behaviours. Within the wider literature, findings of systematic reviews corroborate this finding, suggesting that a lack of knowledge is an important precursor to inconsistent afferent limb behaviour amongst nursing staff (Massey, Chaboyer and Anderson, 2017; Treacy and Stayt, 2019). Further, education was reported to be an enabler of staff enacting the desired behaviours in other published review papers (Chua *et al.*, 2019; Olsen *et al.*, 2019). Based on these findings, this intervention will include a training component to address potential knowledge deficits that may be driving inconsistent afferent limb behaviour amongst RNs and HCAs.	
What (procedures)	*Social support or encouragement (targeting RNs and HCAs in the clinical setting)* Identify nursing staff from acute ward areas to become deteriorating patient champions[2]. Here, a champion is defined as an advocate of patient safety who will 'champion' the appropriate use of NEWS and relevant local policy (definition informed by Campbell et al., 2008 p252). The broad objectives of	[2]The benefits of champions are broadly reported by Thompson et al (2006).

*Describe **each of the procedures**, activities, and/or processes*	the champion role will be to empower frontline nursing staff to use NEWS effectively, to achieve consistency in practice, and to provide a local resource for colleagues at the point of care (Luton *et al.*, 2018). They will work as mentors and educators to other staff and act as a link between CCOT and the ward. Champions should have an enhanced level of knowledge about NEWS2 and relevant local policies and procedures. The champions should concentrate on encouraging the following desired behaviours: – RNs monitoring vital signs themselves (e.g. when a healthcare assistant (HCA) reports that a patient's NEWS is elevated) – RNs escalating care to the medical team/critical care outreach team (CCOT) – RNs/HCAs/NAs appropriately increasing the frequency of vital signs monitoring – RNs/HCAs/NAs continuing to escalate along the line of potential responders until there is an appropriate response. *Salience of consequence; Information about others' approval; Pros/cons; Anticipated regret; Comparative imagining of future outcomes (targeting RNs and HCAs in a workshop setting)* This cluster of **5 BCTs** would be delivered using a series of 'talking heads' videos followed by facilitated reflection and discussion. The specific procedure for delivering these BCTs is described below: – *Video 1* – show a 'talking head' video of a patient advocate who deteriorated without appropriate recognition and response speaking emotively about the **negative consequences** that delayed care had on their health and wellbeing. – *Facilitated activity 1* –provide context by highlighting that there are several points within the process (i.e. the afferent limb) where desired behaviours may not be enacted by RNs or HCAs, and patients are left vulnerable to un-interrupted deterioration. One example of this is when patients who are at risk (have a medium or high NEWS), do not have their vital signs monitored more frequently at night. Divide the larger group of participants into smaller groups (including both RNs and HCAs). Ask participants to think about, and discuss, the **pros/cons** of increasing the monitoring of vital signs at night. Pros/cons generated by small group discussions may be noted down (on flipchart paper with a column for pros and a column for cons) so that the ideas can be presented/shared to all group members. Use the pros/cons to summarise to the group the argument for/against adopting the desired behaviour. Ask participants to reflect momentarily on the **degree of regret** that they would feel if patient deterioration was not detected due to delayed monitoring (i.e. if the cons were thought to outweigh the pros for enacting the desired behaviour). – *Video 2* – show a 'talking head' video of a patient who deteriorated and received appropriate/timely recognition and response speaking emotively about the **positive consequences** of receiving 'best practice' care[3]. Immediately after the patient testimony, a respected senior nurse from the critical care outreach team appears on the video and identifies the behaviours from RNs and HCAs that would likely have made a difference to this patient and others like them, **highlighting their**	Examples of unit-level champions in different clinical contexts have been identified; including: pressure ulcer prevention in children (Luton *et al.*, 2018); management of diabetes (Jornsay and Garnett, 2014); sepsis screening in ICU (Campbell, 2008). [3]There is evidence that appreciation from patients/service users is a highly valued form of non-financial reward for nurses (Seitovirta *et al.*, 2018).

approval of HCAs escalating care to RNs, and RNs escalating care to medical staff/CCOT after completing their own assessment of the patient.

- *Facilitated activity 2* - use this video to affirm the potential positive consequences of enacting the desired behaviour despite the identified cons. Emphasise how high the stakes may be for patients (underscored by the messages in both patient 'talking head' videos) and for nursing staff (underscored by the message from the CCOT nurse).
- *Facilitated activity 3* - establish context by highlighting that another point within the process where desired behaviours may not be enacted is where escalation of care from the HCA to the RN takes place. Breakdown in communication can occur because some HCAs fear being dismissed when they try to escalate care to a RN.
- *Video 3* – show a 'talking head' video of HCA/s speaking emotively about the **negative consequences** of being dismissed when trying to escalate care to a RN.
- *Facilitated activity 3 (cont.)* – ask group members to take a moment to reflect on the content of the video and comment/share personal experiences as they feel comfortable. Ask the entire group to split into pairs with one HCA and one RN (as group size permits). Prompt the HCAs to **imagine possible outcomes** (for them and the patient) following immediate escalation of an elevated NEWS to the RN versus no escalation or delayed escalation. Ask the HCAs to share the outcomes that they imagined with the RN with whom they are paired. Ask the RNs to take on the role of supportive and encouraging listener. Once the activity is complete, bring the group back together and ask for comments on reflections from the entire group. Use group reflections to summarise and close this activity.

Action planning (targeting HCAs in a workshop setting)

- Write several (4 or 5) pre-prepared 'if statements' on flipchart paper and display for all HCA participants to see at the front of the room. Examples of 'if statements' that may be used are "*If the NEWS is 2 but the patient says they feel unwell then…"* or *"if the NEWS is 6 but the patient has had the same score for 24 hours then…"*
- Prompt HCAs to reflect on the 'if statements' that are displayed and instruct them that they are to complete the statement by adding the action that they think is most appropriate (i.e. adding in the 'then' element).
- Ask HCAs to add at least one action for each 'if statement' on the board. This can be achieved by HCAs writing actions for the various statements on separate sticky notes and then adding these to the display under the relevant 'if statement' (acknowledge that there may be actions that are common to several 'if statements').
- Summarise the 'if…then' statements presented and completed by the group. Reinforce the suggested actions that align to the desired behaviours (in this instance, the HCA informing the RN irrespective of circumstance and increasing the frequency of monitoring, unless they have been given explicit instructions regarding a variance to these actions by a RN).

– Link back to the information provision activities where NEWS guidance and expectations from local deteriorating patient policy were outlined.

Prompts/cues (targeting HCAs in the clinical setting)

– Attach laminated signs to all electronic monitoring equipment on the ward prompting HCAs to escalate care to a RN immediately if the NEWS is elevated (i.e. ≥ 5) or if they are concerned.
– Although wording on the signs will remain constant, the background colour, font etc. will be changed intermittently (to be negotiated with ward managers) to avoid the signs becoming 'wallpaper'.
– It is anticipated that this technique will prompt the desired behaviour (HCAs consistently escalating care to RNs) addressed beforehand in the workshop during the aforementioned information provision activities and the action planning tasks.

Re-structuring the physical environment (targeting RNs and HCAs in the clinical setting)

– Add monitoring equipment to the participant wards so that there is a monitoring unit at the entrance to each bay of patients and/or between several private rooms. Ideally, there should be 1 monitoring device to every 4-6 patients. With each monitoring unit, add a digital thermometer with a timer to facilitate the counting of respiratory rate.
– Add a visual marker on the floor, so that it is clear to where the monitoring equipment should be returned (the agreed location will need to be in proximity to a power socket to facilitate charging of the equipment when it is not in use).
– Add clocks with second hands to the participant wards to facilitate the counting of respiratory rate. Ensure that these are visible to staff from patients' bedspaces even when the curtains are pulled around (positioning should be informed by ward nursing staff through walk arounds).

Re-structuring the social environment; Social reward; Information about others' approval (targeting RNs and HCAs in the clinical setting)

This cluster of 3 BCTs would be delivered as part of a re-structure of existing mid-shift 'huddles' for nursing staff[4]. Here, a 'huddle' is defined as a '10-20 minute stand-up meeting' (Franklin et al., 2020 p851) with the broad aim of 're-establishing situational awareness, reinforcing plans already in place, and assessing the need for plans to be adjusted' (Edbrooke-Childs et al., 2017 p366). The specific procedure for delivering these BCTs during the safety huddle is described below:

– Set the expectation that both HCAs and RNs attend the mid-shift nursing staff safety huddle which should take place a minimum of once per shift including days, nights, and weekends.
– **Re-structure the huddles** so that the first 5 minutes[5] is spent addressing patient safety with a focus on deteriorating patients.
– The safety huddle should be facilitated by the nurse-in-charge (NIC) of the shift, who should offer all staff (HCAs and RNs) an opportunity to highlight patients who have an elevated NEWS (at risk), as well as patients who they think may deteriorate soon i.e. 'the watchers'[6].

[4]The broad benefits of clinical staff participating in safety huddles has been reported in the paediatric patient safety literature (Goldenhar *et al.*, 2013; Edbrooke-Childs *et al.*, 2017).

[5]Staff engagement and collaboration are optimised when safety huddles are brief, structured, and focused on essential information only (Edbrooke-Childs *et al.*, 2017).

- The nurse leading the safety huddle will be prompted to **thank/praise any staff member** who raises a concern in this setting.
- Where an elevated NEWS is reported or concern is expressed, a decision about next steps should be agreed by the responsible RN/NIC before HCAs leave the huddle.
- When available, the NIC can share positive feedback about patient/s from the ward who have been 'rescued' due to a timely response[7]. This might include the NIC reading out an email from the CCOT about good practice i.e. where a deteriorating patient was taken to ICU following prompt escalation of care, or where a patient did not require admission to ICU because of prompt escalation and effective ward-based treatment (**the email will include explicit reference to the specific nursing staff behaviours that the CCOT approve of**).
- After the safety component of the huddle is complete, set the expectation that HCAs return to delivering patient care and RNs remain, as required, to discuss other aspects of care e.g. patient flow, discharge planning etc. (beyond the scope of this intervention).

Information about others' approval (targeting RNs and HCAs in the clinical setting)

- Prepare CCOT nurses to provide feedback to ward nursing staff on their approval of behaviours related to effective escalation of care (HCAs to RNs and RNs to medical staff and CCOT).
- Where possible, feedback will be delivered in person by CCOT nurses to ward nursing staff. Where this is not possible, a short email will be sent by the CCOT nurse to the appropriate ward manager and/or champions so that it can be read out at the next safety huddle (so that it is heard by both RNs and HCAs).

Identification of self as a role model (targeting RNs in the workshop setting)

Establish context by highlighting that the frequency of vital signs monitoring (by HCAs) is influenced by instructions from the RN responsible for the patient. Prompt RNs to imagine how and when they would enact this behaviour. Prompt the RNs to picture themselves enacting this behaviour in their ward setting and consider privately who they might be setting a good example for. After silent contemplation, explore these reflections with the group and emphasise the potential impact that they may have as role models for colleagues (particularly colleagues who are more junior and/or less experienced).

Social reward (targeting RNs and HCAs in the clinical setting)

- Prepare RNs (of all bands) to thank and praise[8] HCAs when they approach them to escalate care in the ward environment.
- Prompt RNs who take on the NIC role to thank and praise RNs and HCAs who identify patients with an elevated NEWS or 'watchers' during safety huddles. This will be prompted by the huddle facilitator's guide/script.
- Prepare CCOT staff to thank and praise RNs when they appropriately escalate care.

[6]Patients who are considered at risk of deterioration in the near future have been labelled as 'watchers' in the wider huddle literature (Goldenhar *et al.*, 2013; Brady and Goldenhar, 2014).

[7]Reward and celebration have been identified as factors that contribute to the sustainability of safety huddles (Montague *et al.*, 2019). Also, see literature on the importance of praise and reward to nursing staff (Sveinsdóttir, Ragnarsdóttir and Blöndal, 2016; Seitovirta *et al.*, 2018).

[8]Findings of empirical work suggest that praise has a positive impact on nurses' job satisfaction, performance at work, and commitment to their organisation (Sveinsdóttir, Ragnarsdóttir and Blöndal, 2016).

	Information provision (targeting RNs and HCAs in the workshop setting) The workshop component of the intervention will include the delivery of a package of training. The learning outcomes of the training have been informed by knowledge-related barriers identified from empirical work[9]. By the end of the training participants will be able to: – Briefly summarise the evidence underpinning NEWS with particular focus on the strengths and limitations of the tool. – Recognise the Trust policy document for monitoring vital signs and escalating care and describe how the document can be accessed within the organisation. – Broadly outline the contents of the Trust policy document and explain the differences between the policy and the National Early Warning Score 2 (NEWS2) protocol. – In the context of NEWS2, explore the differences between a low, low-medium, medium, and high-risk score with reference to how these risk levels are derived, and the actions required by HCAs and RNs in relation to each. – Describe the differences between the scale 1 and scale 2 oxygen saturation parameters and explore the circumstances in which each should be applied with rationale. – Explain how and why the normal parameters for vital signs and the 'trigger ranges' on the NEWS2 tool differ. – Describe the correct procedure for counting a respiratory rate. – Explore different approaches that may be used to increase accuracy and reliability of respiratory rate measurement. – Recognise that altered respiratory rate can independently predict patient outcomes in a range of clinical contexts. – Explore the potential consequences (to staff and patients) of not entering vital signs data directly into the electronic health record.	[9]Knowledge-related barriers are reported in an earlier publication from this programme of work (Smith *et al.*, 2021).
What (materials) ***Describe any physical or informational materials*** *used in the intervention, including those provided to participants or used in*	**General materials required** – Facilitator's guide for the intervention workshop **Specific materials for the delivery of each BCT** *Social support or encouragement* ID card lanyards displaying the text 'deteriorating patient champion' for champions to wear (upon completion of the agreed preparation and training) to ensure that they are visible to their colleagues and patients[10]. *Salience of consequence* Three pre-recorded 'talking head' videos to be shown during the intervention workshop. Two videos will involve patient advocates, the remaining video will feature HCAs. *Pros/cons*	[10]Champions should be clearly visible to other staff (Luton *et al.*, 2018)

intervention delivery or in training of intervention providers	Flipchart paper and marker pens for participants to record ideas from pros/cons activity carried out during the intervention workshop. *Anticipated regret; Comparative imagining of future outcomes; Identification of self as role model* No specific materials required for the delivery of these BCTs – these are reflective activities. *Action planning* – Flipchart paper and marker pens for pre-prepared 'if statements' to be written on during the intervention workshop. – Sticky notes and pens for HCA participants to use for the 'if…then' activity carried out during the intervention workshop. *Prompts/cues* Laminated signs prompting HCAs to escalate care if the NEWS is elevated (i.e. ≥ 5) or if they are concerned. These signs will need to be large enough to be noticed by HCAs when they are monitoring patients' vital signs, but not so large that they impair the use or function of the monitoring equipment. *Re-structuring the physical environment* – Procure monitoring equipment. Notwithstanding respiratory rate and conscious level, these devices should be capable of measuring all vital signs that are included in NEWS (e.g. heart rate, blood pressure, peripheral oxygen saturations). – Procure digital thermometers with a simple timer function. – Procure battery powered clocks with a second hand. *Re-structuring the social environment* A safety huddle facilitators guide including a basic script for the NIC to use when leading the huddle[11]. *Information about others' approval* A template email for the CCOT nurses to populate/amend and send on to ward staff following timely escalation of care and/or a positive patient outcome. This email will be sent to ward managers/champions from the ward area if feedback cannot be delivered in person (i.e. due to high CCOT workload). *Social reward* – A short presentation (10-15 minutes) targeting RNs. To increase awareness of the importance of 'praise', the presentation will include a summary of the potential benefits of purposeful and meaningful praise to nursing staff with reference to published empirical research[12]. The presentation will also include persuasive content highlighting the favourable impact that RN validation and praise can have on HCAs' escalation behaviour. Anonymised quotations from HCA participants of the barriers/enablers study (Smith *et al.*, 2021) will be displayed to underscore this message.	[11]The use of a 'script' is advocated to ensure that huddles are concise and that the content is consistent (Stapley *et al.*, 2018). [12]The delivery of 'purposeful praise' has been identified as beneficial to nursing staff (Sveinsdóttir, Ragnarsdóttir and Blöndal, 2016). Further, there is evidence that recognition, appreciation, and respect are valued more highly by nurses than financial rewards (Seitovirta *et al.*, 2018).

	– A short presentation (10-15 minutes) targeting CCOT nurses at CCOT away days. To increase awareness of the importance of 'praise', the presentation should include a summary of the potential benefits of praise to nursing staff with reference to published empirical research. The presentation will also include persuasive content highlighting the favourable impact that CCOT nurse validation and praise can have on RN's escalation behaviour. Anonymised quotations from RN participants of the barriers/enablers study (Smith *et al.*, 2021) will be displayed to underscore this message. The importance of CCOT nurses being explicit about the behaviours that they approve of during episodes of purposeful praise should be emphasised (link to *information about others' approval* BCT). – The safety huddle facilitators guide/script will include a prompt for facilitator of the huddle to thank and praise staff who raise concerns about a potentially deteriorating patient i.e. a patient with an elevated NEWS, with deranged vital signs, or causing clinical concern[13] (i.e. the 'watchers'). *Information provision* – A presentation (no longer than 60 minutes of content) targeting all participants of the intervention workshop. The content of the presentation will be informed by the learning outcomes for the training package listed in the 'how' section of this manual. – NEWS2 lanyard cards displaying the NEWS2 parameters for each level of patient risk. For distribution at the intervention workshop for participants to take away.	[13]See literature about the predictive validity of 'nurse worry or concern' (Douw *et al.*, 2016, 2018; Romero-Brufau *et al.*, 2019).
Who will provide *For **each category of intervention provider** (e.g. psychologist, nursing assistant), describe their **expertise, background and any specific training given**.*	*Social support or encouragement* – Delivered by deteriorating patient champions. Identify potential champions in collaboration with ward managers and ensure staff at RN (band 5 and band 6) and HCA (band 2 and band 3) levels are included. Ask staff who demonstrate interest and enthusiasm for improving the care of deteriorating patients to commit to the role initially for a one-year period. Inform potential champions that the role will be undertaken as an extension of their existing duties but may be incorporated into their professional development plan (appraisal) objectives and used to support career progression (e.g. applications for progression from band 5 to band 6). – Ensure champions receive the content of the intervention workshop first (i.e. before other participants). – To function as a local resource for colleagues, champions will require an additional level of training and an ongoing programme of mentorship and education[14]. Offer both RN and HCA Champions a place on the Resuscitation Council (UK) Immediate Life Support course. This 1-day course provides a nationally recognised qualification. The course is hosted by the Trust and facilitated by members of the local CCOT. The course includes content on recognition and response to deteriorating patients as well as emergency life support procedures (see link for course programme). – Offer RN champions a place on the Trust's enhanced care qualification in specialism (QIS). This is a 6-session programme facilitated by senior nurses from the CCOT and other specialist nurses	[14]The outlined programme of education and support for deteriorating patient champions is informed by similar work where champions were deployed in different clinical contexts (Campbell, 2008; Jornsay and Garnett, 2014; Luton *et al.*, 2018).

from the Trust (see appendix 1 for the course programme). The content of the programme strongly aligns to the recognition of, and response to, deteriorating patients in a non-critical care environment. Following completion of the clinical teaching, recipients of the QIS are offered the opportunity to complete a work-based learning module and achieve 15 academic credits at either degree or master's level.

- Identify at least one member of the CCOT to be the 'link nurse' for the deteriorating patient champions.
- A short (i.e. 30 minutes to 1 hour) monthly meeting will be convened for the champions across different ward areas to meet and discuss their progress, identify any barriers that they are encountering, and share strategies for overcoming barriers. This meeting may also be attended by the CCOT link nurse/s.
- Every 6 months, a longer (2-3 hours) educational meeting will be held. The programme of this meeting will be tailored to address topics that arise during the shorter monthly meetings. The CCOT link nurse will develop the programme for this meeting in collaboration with the champions.

Salience of consequence; Information about others' approval; Pros/cons; Anticipated regret; Comparative imagining of future outcomes; Action planning, Identification of self as a role model; Information provision

These 8 BCTs will all be delivered in the intervention workshop by a team of facilitators who, between them, will have clinical expertise in the recognition of and response to deteriorating patients; experience of facilitating participatory workshops; have a broad understanding of the intervention, and specific knowledge of the BCTs being operationalised.

Prompts/cues

- Contact members of the local infection control team to ensure that any signage attached to monitoring equipment does not contravene infection control policy or interfere with equipment cleaning procedures.
- Ward housekeepers (with permission from ward managers/matrons) will be responsible for ensuring that the laminated signage attached to monitoring equipment remains in good condition, and that the signage is re-printed intermittently with the same text but with different background and font.

Re-structuring the physical environment

- Discuss the cost and feasibility of adding equipment to the environment with budget holders including ward managers, senior nurses, and matrons (as appropriate).
- Contact staff from the estates department (and medical physics as required) about adding clocks and visual markers/labelling to the floor to identify where monitoring equipment should be positioned when not in clinical use (this will include markers for existing monitoring equipment and any equipment added to the environment as part of the intervention).

Re-structuring the social environment; Social reward; Information about others' approval

	These BCTs will be delivered in a mid-shift nursing safety huddle including RNs and HCAs. These huddles will be facilitated by the NIC (likely to be a band 6 RN or higher). *Information about others' approval* This BCT will be delivered by nurses from the local CCOT (in person or via email).	
How *Describe the modes of delivery*	*Social support or encouragement; Prompts/cues; Re-structuring the physical environment; Re-structuring the social environment; Social reward* These **5 BCTs** will be delivered in the acute ward setting. *Prompts/cues* will be targeted at HCAs only. All other BCTs will be targeted at RNs and HCAs. *Salience of consequence; Pros/cons, Anticipated regret, Comparative imagining of future outcomes, Action planning, Identification of self as a role mode; Information Provision.* These **7 BCTs** will be delivered in a half-day facilitated face-to-face workshop. Group participants should include both RNs and HCAs (of varying bands) in roughly equal numbers. During the workshop, 2 activities (covering **5 BCTs)** will be delivered to the entire group (i.e. to both RNs and HCAs). One activity (an *action planning* task) will involve HCAs only. Whilst the HCAs are participating in the action planning activity, RNs will participate in a separate activity where the *identification of self as a role model* BCT will be delivered. The RNs will also be targeted for a short presentation on the importance of praise and reward for HCAs (to prompt and prepare them to deliver *social reward* in the ward setting). At the point where the RNs and HCAs separate, each sub-group will require an appropriate facilitator. *Information about others' approval.* This BCT will be delivered in both the acute ward setting and in the facilitated workshop (to both RNs and HCAs).	
Where *Describe the type(s) of location(s) where the intervention occurred*	*Social support or encouragement; Prompts/cues; Re-structuring the physical environment; Re-structuring the social environment; Information about others' approval; Social reward* These BCTs will be delivered *in situ i.e.* in acute ward areas outside of critical care. *Information Provision, Salience of consequence, Pros/cons, Anticipated regret, Comparative imagining of future outcomes, Action planning, Identification of self as a role model* These BCTs will be delivered during the intervention workshop. It is expected that this will take place in appropriate training rooms within the education centre of the Trust within which the intervention will be piloted.	
When and how much *Describe the number of times the intervention*	*Information Provision, Salience of consequence, Pros/cons, Anticipated regret, Comparative imagining of future outcomes, Action planning, Identification of self as a role model* All RNs and HCAs from participant wards will attend the intervention workshop once prior to the delivery of the *in situ* BCTs (listed below): *Social support or encouragement; Prompts/cues; Re-structuring the physical environment; Re-structuring the social environment; Information about others' approval; Social reward*	

was delivered and over what period	Continuous delivery in the clinical areas Further content will be added following formal piloting/feasibility testing	
Tailoring	This section will be populated with additional information following formal piloting/feasibility testing	
Modifications[2]	This section will be populated with additional information following formal piloting/feasibility testing	
How well – planned	This section will be populated with additional information following formal piloting/feasibility testing	
How well – actual	This section will be populated with additional information following formal piloting/feasibility testing	
Key: CCOT – critical care outreach team HCA – healthcare assistant NEWS – National Early Warning Score NIC – nurse in charge RN – registered nurse		

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