Final report

October 2020

Innovating for Improvement

Improving management of staff fatigue during night shift: A collaborative whole team project

Newcastle NHS Hospitals Foundation Trust

In collaboration with,

Northumbria University Newcastle

The Health Foundation

About the project

Project title:

Improving management of staff fatigue during night shift: A collaborative whole team project

Lead organisation:

Newcastle upon Tyne NHS Foundation Trust

Partner organisation(s):

Northumbria University Newcastle

Project lead(s):

Dr Nancy Redfern and Professor Alison Steven

Academic team

Professor Alison Steven

Dr Gemma Wilson

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Clinical team

Dr Nancy Redfern, Dr Ceri Sutherland, Dr Roopa McCrossan, Dr Lucy Powell, obstetricians led by Dr Sophie Whiteway & Dr Suzie Jackson plus midwives led by Lynsey McKay & Chris Govan, anaesthetic and theatre nurses, ODPs, healthcare assistants.

Contents

Part 1: Abstract

Staff recognise the impact of work-related fatigue on care delivery, but often regard it as an occupational hazard. We wanted to change this and establish a robust way of recognising, managing and minimising fatigue amongst midwives, nurses, doctors, and healthcare assistants. With 7000 deliveries/year and >350 staff in our unit there is potential to improve both the quality of patient care and staff safety and morale. Effects of fatigue on work are well known; heightened risk taking, impaired cognitive function, vigilance, and motor performance equivalent to drunk driving. But in healthcare there is a lack of awareness of its significance, a culture of tiredness being a weakness, and no clear fatigue management strategy. Other industries such as airline and petrochemical have fatigue risk management (FRM) systems that create cultures, processes, procedures, and behaviours that prevent accidents. Could we do the same on our labour ward?

We made a slow start. The university and hospital had very different research governance processes, which caused some headaches. The next challenge was explaining the project to senior colleagues with strong research backgrounds, but not in qualitative work. Initially sceptical, we gained their backing with sensitive perseverance.

Although it initially seemed impossible to complete the project during the Covid-19 pandemic, it was actually an enabler. Change became the 'new normal'; the 'NHS clap' campaign emphasised the importance of staff wellbeing. This was the first ever labour ward research project about staff safety and wellbeing, so people were intrigued.
The innovative 'action research' methodology used a 'bottom-up' approach to designing our Fatigue Risk Management Strategy [FRMS], with actions and strategies that staff suggested themselves. As staff engagement grew, newer 'practices' were suggested and tried out. Collaborative teamwork with participation from all staff groups of every grade, meant new FRM strategies were quickly embedded in the labour ward culture. The labour ward culture moved to one where staff talk about their own fatigue and at night work as a team to ensure everyone gets a break. We have created facilities for all staff to power nap in a quiet dark safe area during their break. Rota-making arrangements changed so staff now self-roster, choosing night shift patterns that better suit their sleep patterns. Managers recognise when clinical errors or poor communication is related to staff tiredness, and staff fatigue is going on the risk register. Doctors consider the safety of operating when they've been awake for many hours.

Part 2: Progress and outcomes

The impacts of fatigue and sleepiness are well described. Guidelines and recommendations exist in medicine[1-4] and nursing[5, 6] but there are few examples of these working in practice in acute healthcare, and even fewer risk management strategies for medical and nursing staff.

Our innovative, collaborative project used an emancipatory approach to engage staff in exploring the impact of fatigue on themselves, professional work, and the workplace, and to consider and try out interventions.

We developed a practice-led strategy that helped the whole team manage fatigue risks effectively during night shift.

The Project

The project aimed to co-design a FRMS for the labour ward at Newcastle Hospital with theatre and maternity unit teams [Doctors, Midwives, Nurses, Operating Department Practitioners, Healthcare Assistants] that facilitates effective management of staff fatigue during the night shift.

We drew on action research methodology[7], a participatory, 'bottom up', team approach aimed at engaging and giving ownership. We invited all members of the night shift teams working in the obstetric theatre suite and the maternity unit to participate.

The project included several strands:

1. **Educational elements**: presentations, video and information sharing (Appendix 2 and Appendix 6).

2. **Gathering staff experiences, thoughts and ideas** pertaining to fatigue during the night shift: focus groups.

3. **Monitoring activity** of up to 20 staff. Accelerometer data were collected (Fitbit, Inc.) for around 1 month by an external collaborator SaFR (https://safr.org.uk/). The Fitbits connected to an app showing individual participants their current and predicted fatigue levels for the next 20 hours.

4. **Learning from existing literature**: Review of FRMS from other healthcare organisations and other safety-critical industries and scholarly articles were used to develop a basic template and other information (Appendix 10) .

5. **Choosing interventions and co-designing the risk management strategy**. After initial analysis of focus group data, the **'practice-led fatigue risk management group (PFRMG)'** held a first meeting (17 participants) and began co-designing the risk management strategy. The PFRMG explored ideas and findings from the focus groups and literature, and scoped potential initiatives/actions.

6. **Instigating and implementing** changes to mitigate fatigue. The wider labour ward night shift teams experimented with the chosen initiatives/actions, to see if they were feasible. They made refinements suggested by group members, and the successful strategies were discussed in group meetings with staff members. These initiatives/actions were promoted to more senior trust members with the ability to influence change.

Development of a draft Fatigue Risk Management Strategy (FRMS) Including potential and already effective interventions. We spent a long time co-designing discussing and refining our 'risk management strategy' with group members and with the wider team. We then disseminated this to the Perioperative and Women's Services senior management including senior midwifery and Medical teams for feedback. We also consulted with senior midwifery, nursing, and medical teams about the fatigue elements we added to the risk register. The Consultant Sleep Physician advised on the format and content of the FRMS and System. The final strategy will be presented to trust management.

Significant adjustments had to be made to the original plan regarding timing, project staff, numbers of action research cycles, and impact monitoring activities (see Appendix 4 and Appendix 5).

Monitoring and impact

To monitor and ascertain impact (and as part of the strategy development) we used a mixed methods approach (focus groups, interviews, accelerometer; also see Appendix 7 and Appendix 10).

Educational elements, and posters about the project (Appendix *3*) also heightened awareness of fatigue, thus bringing fatigue into the team's collective consciousness.

We competed six focus groups, in which 26 staff members participated, including, Health care assistants Midwives; Nurses; Operating Department Practitioners; Obstetric and Anaesthetic medical staff. The focus groups gave staff a legitimate forum to discuss fatigue, to acknowledge its existence, share experiences, gain better understanding and make it an accepted topic of conversation. This further heightened the overall awareness of fatigue across the multidisciplinary team. Staff suggestions for strategy development (see Appendix 7) fed into the work of the PFRMG.

Convening this group engendered greater ownership across the multidisciplinary team, of both trying the interventions suggested, and developing the FRMS. For example, available rooms were identified where staff could take naps during night shift. An educational meeting was held where the sleep physician explained the importance of sleep, the impacts of fatigue on work performance and health, and the core elements of a FRMS and process. This further enhanced knowledge and awareness and generated more ideas to include in the FRMS presented to the hospital management team.

At the end of the project staff members commented:

> *"even now if we talk about it [fatigue project] in any shape or form people will say oh yes I remember about it, and they do talk about it [fatigue]"*
>
> *"its been nice to have been part of things, and to think maybe we could change things….buddying and better periods of napping and things.. and make us aware of how tired we are getting at work or driving home from a night shift"*
>
> *"Very helpful project"*

Dr Redfern also met with the Director of Charitable funds and secured funding to buy sofa beds and roll out chairs for staff to use for power naps. The appointment was made by the Assistant Chief Executive, thus raising the issue of staff fatigue with senior management. Money raised by Sir Tom Moore was used, the fatigue project giving the Trust the opportunity to monitor and evaluate the result of its spending.

1:1 semi structured interviews

We completed 4 semi-structured phone interviews with staff members after the Fitbit element was completed (3 wore a Fitbit, 1 wished to give feedback on the project). Although we wanted to undertake more interviews, we felt it inappropriate given the circumstances surrounding the pandemic.

Interviews explored individuals' experiences and perceptions of both the Fitbits (as an intervention increasing awareness of fatigue) of the project, and of fatigue more broadly.

Activity monitoring

Thirteen staff (Doctors, Midwives and Health Care Assistants) working shifts (including nights) took part in the 'Fitbit' study element. This involved wearing a Fitbit linked to a specially designed app created by SaFR (https://safr.org.uk/ ; Appendix 10 page 26) which acted as an 'intervention' and fed into the PFRMG.

Staff commented that the sleep app had changed their behavior:

"'I do like the sleep app … on night shifts it says how much more likely you are to have an accident. I now make sure I have a good rest before night shift"

"the general consensus of opinion [talking to others] *…was [how the app showed] how tired you were on nights, definitely heightened awareness"*

Surprise learning and feedback

There were unanticipated learning points and insights from those involved:

- A consultant obstetrician doing a 24-hour rota suggested the consultants write how many hours they have been awake in reflections of incidents on the labour ward.
- A senior midwife, reviewing a patient complaint (in which the midwife had been unhelpful to a lady who arrived in the middle of the night) recognised that this lack of empathy was likely to be from midwife fatigue.

- A midwife identified that the policy of not giving people fixed night shifts (i.e. almost always Monday, Tuesday, Wednesday) may mean the midwife would not get childcare during the day, when she was meant to be sleeping between night shifts.

These learning points highlighted the value and impact of raising awareness of fatigue and its consequences.

Part 3: Cost impact

The Maternity service is funded by the local Clinical Commissioning Groups. We did not conduct a financial evaluation of the project. However, it is possible that the more person-centred approach to recognising and managing staff fatigue will improve morale and possibly therefore reduce staff burnout, sickness and turnover. Reducing staff turnover will mean less money and time is spent on recruitment and selection, and there will be fewer gaps in rotas.

The education provided as part of this project and also on the hospital intranet has the potential to improve individuals' understanding of ways of mitigating and managing their own fatigue, and empower staff to identify tiredness in colleagues and support them to have rest.

Fatigue is known to impair logical reasoning, vigilance, flexibility of thinking, and worsen mood and ability to communicate, all of which lead to clinical error. A national study estimates the total financial cost of workplace fatigue in the UK as £38 billion per year[8]. Hence, other safety critical industries, including electrical, nuclear and rail services all have FRM systems as part of their safety structure.

Errors in maternity care can be financially costly and cause long-lasting damage to neonates and families. The Royal College of Obstetricians and Gynaecologists report, 'Each Baby Counts' recognises fatigue as a contributory factor in poor obstetric outcomes[9]. If the improved management of staff tiredness on and after night shifts diminishes error this is likely to lead to savings. Although patient and staff safety are the primary drivers in service delivery on the labour ward, interventions that improve cost effectiveness will be welcome.

One potential cost was the purchase of 'Shangri-La' sofas and chairs that can be made into beds at night but used for sitting in during the day. A charitable fund from Sir Tom Moore's fundraising for the NHS became available and we were successful in bidding for funding to buy sofas and roll out chairs.

Other teams in the hospital, such as the Intensive Care Unit, are looking with interest at our work. If they adopt a similar approach, they would also accrue the potential cost savings from fewer sickness absences and lower staff turnover.

Part 4: Learning from your project

Did we achieve what we hoped for?

Although the project did not go completely as planned, we do feel that we achieved a significant amount and that the work started by the project will carry on.

Over the course of the project, there was a gradual change from fatigue being regarded as a personal issue to a culture where the impact of tiredness was acknowledged.

As time went by, there was increasing interest and awareness from all professional groups at all levels of seniority. For example, as their awareness grew consultant obstetricians became more conscious of the impact of tiredness on work performance.

The importance of mitigating strategies such power naps became built into the management of night shifts for all staff groups. It was recognised that childcare during the day between night shifts can be a problem for some staff (often Midwives). Reorganising the rota so each person had a regular night shift might make daytime childcare feasible.

The educational video, posters and presentations heightened awareness as did the Fitbits, even with the small group involved. The Fitbits acted as an intervention, but also offered something tangible as a point of discussion and focus.

There seemed to be a move from a sense of learned helplessness to agency and trying out new ideas. Talking about fatigue has become legitimate.

It will probably take a few more months to get a FRM system embedded in policy in the women's services directorate, and to have fatigue and its impact embedded on the risk register, with measurable outcomes from this intervention.

Enablers

Throughout the project the biggest enabler has been the enthusiasm and commitment of staff to innovation and change.

The positive approach from the midwives in charge and from others who acted as 'local champions' (particularly one midwife who became heavily involved), and from the obstetricians and anaesthetists were pivotal in progressing the project. Input from the sleep physician/anaesthetist who had also worked nights, allowed both production of a video explaining why sleep is important, and expert in-person advice and explanation at team meetings.

Trainee anaesthetists and obstetricians also engaged; some were already aware of the impact of night shift fatigue from their Association of Anaesthetists' work. They were instrumental in ordering and installing the first sofa-bed and establishing 'tea trolley' training. They also helped keep the project in the forefront of peoples' minds and with all other staff groups helped to develop the culture at night.

As time went on, other obstetricians, including the Assistant Medical Director for Quality who has expertise in Human Factors, began to contribute more to the project, partly with suggestions and partly as role models, demonstrating a more evidence-based approach to recognising and managing staff fatigue.

The Trust's Guardian of Safe Working Hours is a strong advocate of power naps and safe working at night and provided external validation and support for the project. She has invested in sofas, using money provided by the BMA for doctors' rest, and

we used her networks to buy the sofas with the Sir Tom Moore money. This form of ‘sponsorship’ also raised the status and profile of the project and of fatigue as an important issue.

The academic research team (one who was very well known to the midwifery practice staff) visited the unit on several occasions to explain the project and facilitate focus groups. This included being present at handover (early morning and mid evening) for meetings, and being around for most of a day. This ‘in-person’ presence and availability was commented on by staff as facilitating relationship building and thus understanding of, and engagement in the project. However, as the project progressed the research team slowly withdrew, facilitating staff to take ownership and control.

The project took place over several more months than originally planned, possibly fortunate in that it gave staff more time to understand the project, gain awareness of the impacts of fatigue on them and their colleagues to be involved, institute and embed changes.

Covid

Although we initially thought the Covid-19 pandemic would stall the project, to the contrary the project was probably helped by the response to Covid.

All team members had to establish new ways of working to address potential risks. Previous complex bureaucratic decision-making processes relaxed, and change became more possible. Given we had a selection of ideas for initiatives to mitigate fatigue ‘ready to go’ from the focus group work (undertaken prior to the pandemic), we were in a good position to harness the situation. Staff wellbeing was an issue with the extra pressure. Hence something simple, such as ensuring everyone got a power nap at night, and looking out for each other in terms of fatigue, was a way of helping with wellbeing. Thus the rapid changes enforced by Covid-19 empowered staff to consider making other positive changes to their workplace culture.

What did not work out quite as planned

We had to make significant changes to the research protocol (see Appendix 4 and Appendix 5).

Timing changes:

Although several team members were experienced in gaining approvals for research studies, the complexities and delays in obtaining the multiple approvals needed were unanticipated. This was significantly compounded by convoluted systems and multiple research office staff changes which impeded progress and required

adjustment of timeframes. It would be useful to have national standards regarding timescales for obtaining approvals and permissions. Health Foundation agreed that the formal start of the project be pushed back to June 2019.

Staff additions:

To facilitate stakeholder engagement a further member of Northumbria University staff Dr Val Larkin, who has established links in the project area, joined the study group. Dr Larkin facilitated introductions and initiation of meetings with key gatekeepers and focus group opportunities.

From this point the project flowed smoothly, with the first cycle of data collection, completed and evaluated and activity monitoring ongoing.

Covid

The pandemic was an unexpected challenge and necessitated immediate project interruption and rethinking.

The importance of staff wellbeing during this uncertain time was increasingly emphasised by the Trust and in wider publicity [e.g. national clap for heroes]. Following discussions with the Trust, the research team and the Health Foundation, we continued with some adjustments (see Appendix 5);

- Cycle 2 cancelled, project adapted to involve minimal additional data collection
- Suspension of face to face activity
- Individuals wearing Fitbits allowed to keep them for slightly longer than planned if they wished.
- Slight extension approved.

Barriers we had to deal with

Views and attitudes towards napping.

Some senior staff expressed the belief that mitigating fatigue through napping during night shifts was not acceptable.

‘*my (staff role/profession) staff do not sleep at night’*.

This view may reflect a previously common opinion that napping during night shift indicates a lack of professionalism, laziness, ‘slacking’ or poor stamina. However

it is hoped that with appropriate information and awareness raising a greater understanding of the issues can be achieved which in turn may improve knowledge of the impacts of tiredness on performance and change such views.

Multiple approvals

The project team had to negotiate and navigate a varied and complex set of approval processes in order to run the project. These were not always obvious or clear and included multiple ethics procedures, NHS trust specific organisational level systems, and more 'local' clinical directorate level approval processes.

> '*you can't do this project in ***** directorate unless we have approved the protocol'*

Specific learning on introducing and sustaining innovations in the NHS

From our experience we learned that an approach which is:

- Designed by a specific team (context specific and situated) to improve their own wellbeing in ways that work for them (with ownership, resonance and fit)
- Informed by their own experience and the facts about the impact of night work on our physiology and health (built on both personal and scientific knowledge)

can be effective in beginning a process of cultural and organisational change.

While some of the research/academic members of the project team are very experienced in gaining approval, we were all shocked at the time it took and the convoluted nature of the processes. In the future we would be much more exacting and insistent about being told of all of the necessary procedures and processes at the start, and would also insist on responsibilities, obligations and timeframes for all parties being clearly set out at the start of the approvals processes.

What we take away

The staff and organisation will take away from this project:

- A realistic fatigue risk management system for the labour ward
- A sense of achievement in engaging people in an improvement that has the potential to make patient care safer and improve staff safety and wellbeing
- Perhaps a greater sense of multi professional team engagement

Key things for others to know

Do not try to adopt our intervention, but design your own.

It may be that some of our resources [e.g. the videos about sleep physiology and night work, and the posters from the Association of Anaesthetists] may be useful to others, but the key to success is engaging and empowering the people directly affected by fatigue, so that the risk management system addresses their needs.

This is much easier with senior buy in from all stakeholder groups. A senior doctor who expects *'trainees to be tough, like we were'* or a manager or nurse who says *'my nurses don't sleep at night'* is a tough problem to manage!

Part 5: Sustainability and spread

Sustaining the 'intervention' beyond the funding period

We are hopeful that the interventions mitigate the effects of fatigue (rotas, rooms to nap in, chairs and sofas for napping etc) are sustained and become embedded as part of '*just what we do around here'*. It is also envisaged that the FRMS will become an official part of the way the service works, with fatigue on the 'risk register'.

We gained and grew support in the following ways

Internally

As more senior staff realised the importance of rest and power naps, managing workload such that people get breaks became a more normal part of the labour ward culture. When the medical trainees rotated in August, we explained the team's approach to fatigue and described what we expected from them. Being new to the unit they regarded this as normal, so adopting the new culture amongst the obstetric and anaesthetic trainees on night shifts was quickly achieved.

Publicity for the project was also circulated across the trust via the intranet (on trust home screen), thus raising curiosity, awareness, and support from the outset.

One of the research team met the Chief Executive and had strong support from her and from the Assistant Chief Executive in carrying out the project. The CEO met with a team from the labour ward during the Covid-19 pandemic to find out how they were managing. The team used the project as an example of good practice.

The Assistant Chief Executive put the team in contact with the Director of Charitable funding. The funds raised by Sir Tom Moore became available and had to be spent on staff wellbeing, so the sofas and chairs were purchased from this.

A team member has been asked to discuss the impact of fatigue on work at the Regional Obstetric Group, as part of their approach to wellbeing.

Externally

We gained and grew support for the project via publicising it and talking about it at any opportunity.

A press release about the project by Northumbria University attracted interest from the Healthcare People Management Association (HPMA)- and a short piece was written about the project for their newsletter.

The project was also covered in the Nursing Standard, a nursing journal widely read by practitioners, academics, and researchers.

The project forms part of the work discussed by the national joint fatigue working group [Association of Anaesthetists, Royal College of Anaesthetists, Faculty of Intensive Care Medicine]. Once we have some evidence as to the value of having fatigue on the risk register, we hope to use this team to encourage others to adopt our approach. Under normal circumstances, when the joint fatigue working group members are invited to conferences to talk about fatigue a resume of the project forms part of our presentations.

The Joint Fatigue Working Group have won the BMJ 'team of the year' award in the workforce and wellbeing category. The project is presented as part of the work they support and gains publicity form this.

The project was presented in a talk on fatigue to the BMA Wellbeing Group in London and at the annual trainee meeting for Emergency Medicine trainees.

The information and infographics from the fight fatigue campaign has been adopted as Scottish Government policy.

Dr Redfern outlined the project as part of a talk on fatigue on a Royal College of Anaesthetists' webinar at which she was asked to speak about fatigue.

We are asked to present the project and run a workshop on fatigue at the Patient Safety Congress 2020, but unfortunately due to Covid this did not go ahead – we hope to present it in the future.

The project was mentioned at the Royal College of Physicians and Surgeons of Glasgow in September in a talk by Dr Redfern.

Spreading the project

The method used to create a FRMS could be replicated elsewhere. However, each department and each organisation would need to develop its own strategy so that it

addresses the unique challenges faced in each department. It is only when the whole of the team understands the importance of managing fatigue during and after night shifts that the team culture will embrace this as part of the way they work.

Milestones for future development

- Getting fatigue on the risk register in maternity
- Getting it on the hospital risk register
- Discussing fatigue and the FRMS with the Medical Director
- Working with other departments interested in taking a FRMS forward, including the hospital's Guardian of Safe Working Hours. [Intensive Care Unit are interested]

Resources and appendices

Appendix 1 Video link

Video link to project overview https://www.youtube.com/watch?v=nVN13LeHDZ4

Appendix 2 Educational presentation

Educational presentation (voiceover)

https://northumbria.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=7406b295-c231-4b90-9983-aad400f7829b

Appendix 3 Project poster

Working nights? Fatigue a familiar feeling?

A collaborative project to develop some ways to ease fatigue

A project: with you, by you, for you

The aim: find out what might help, try out some ideas, develop tailored fatigue strategy for the maternity unit and associated theatres

There are 3 elements – *you can be involved as much as you wish- in 1 or 2 elements or all of them!*

1- Some focus groups will be organised to find out about experiences and hear ideas for what might help. We will also provide some educational resources and information about fatigue

2 – Volunteers (20 max) working nights are invited to:

- use accelerometers (*like fitbits*) for about a month, you see your levels of sleep & alertness etc; & data helps inform the project.
- fill-in a simple questionnaire before and after,
- be interviewed about the experience.

3– A group will be formed to consider the ideas and decide which to try out and how to develop a strategy. Anyone can volunteer to be part of this and it would be great if there were a broad mix of staff. This group might meet a few times.

Groups formed

- Focus groups to discuss ideas & experiences. Education & information re fatigue provided.
- 'Strategy Group' formed to consider ideas, decide which to try, & how to develop a broader strategy.

Cycle 1

- Volunteers (20 max), working nights use accelerometers (e.g. fitbits) for up to a month
  Also complete questionnaires and are interviewed about experience
- People see their own 'levels' & anonymised data analysed to inform strategy development

Try out ideas

- The new ideas (things chosen to help with fatigue) to be tried out.
- By putting them in place **for everyone**

Cycle 2

- Volunteers (20 max), working nights use accelerometers (e.g. fitbits) for up to a month
  Also complete questionnaires and are interviewed about experience can be same people and or different

Strategy group

- Consider data and experiences, develop broad strategy tailored for the area, and recommendations for the future

The Health Foundation

The Newcastle upon Tyne Hospitals NHS
NHS Foundation Trust

Northumbria University
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Appendix 4 Original design

Months													
1	2	3	4 Cycle 1	5	6 Cycle 2	7	8	9	10 C3	11 C3	12	13	14	15
Initial Focus groups		Co-design of interventions				Co-design of interventions			**Run C *(only if needed but unlikely)***			Analysis and slippage if needed		
		SF36		SF36 After Run A and before Run B for new people		SF36		SF36 (new people)			SF36			
			Accelerometer only intervention	1:1 interviews	Intervention (s) and accelerometer	1:1 interviews					1:1 interviews			
Collect strategy Info				Develop draft strategy						Finalise strategy &present				
	Analysis													
Collect routine data (NCL to collect and analyse)														

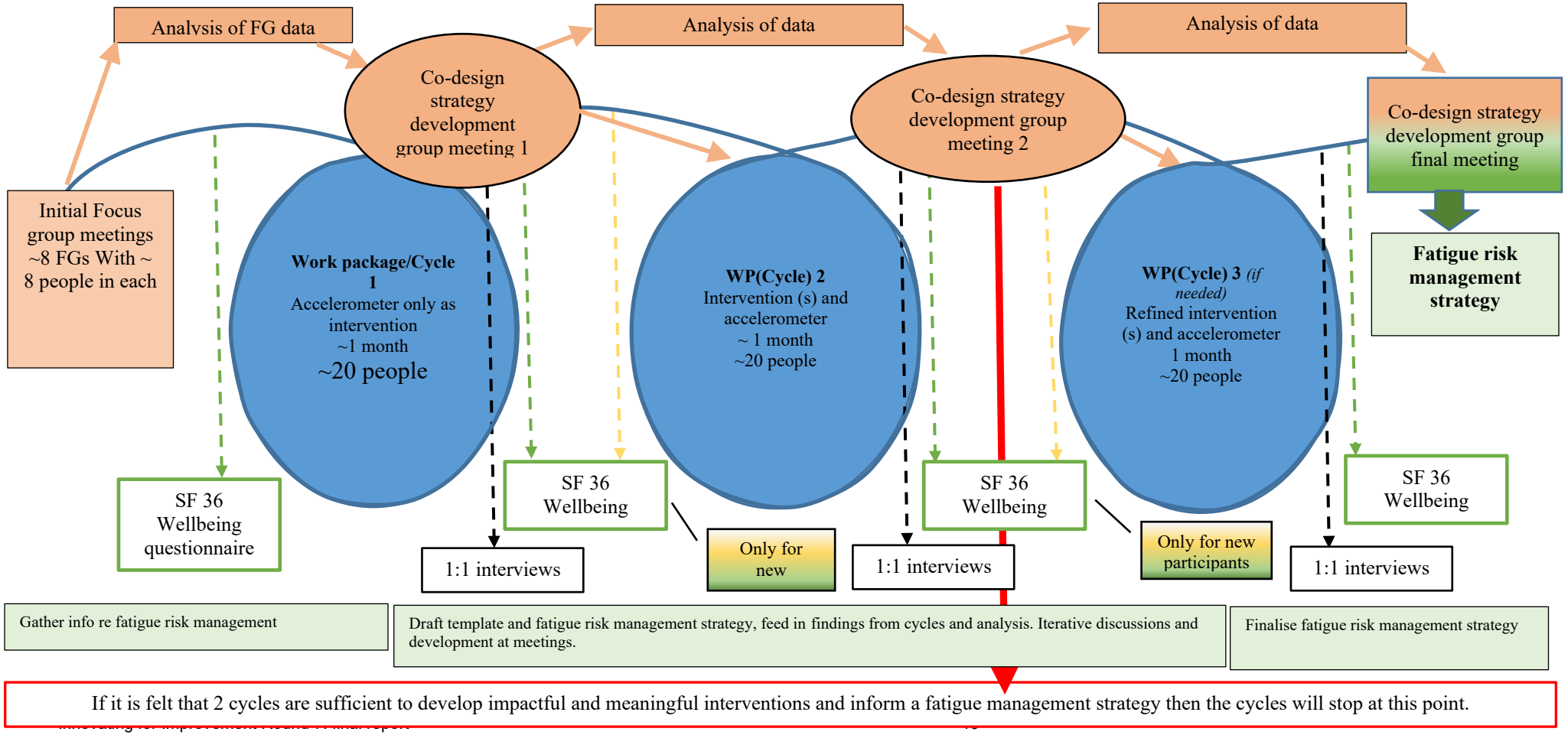
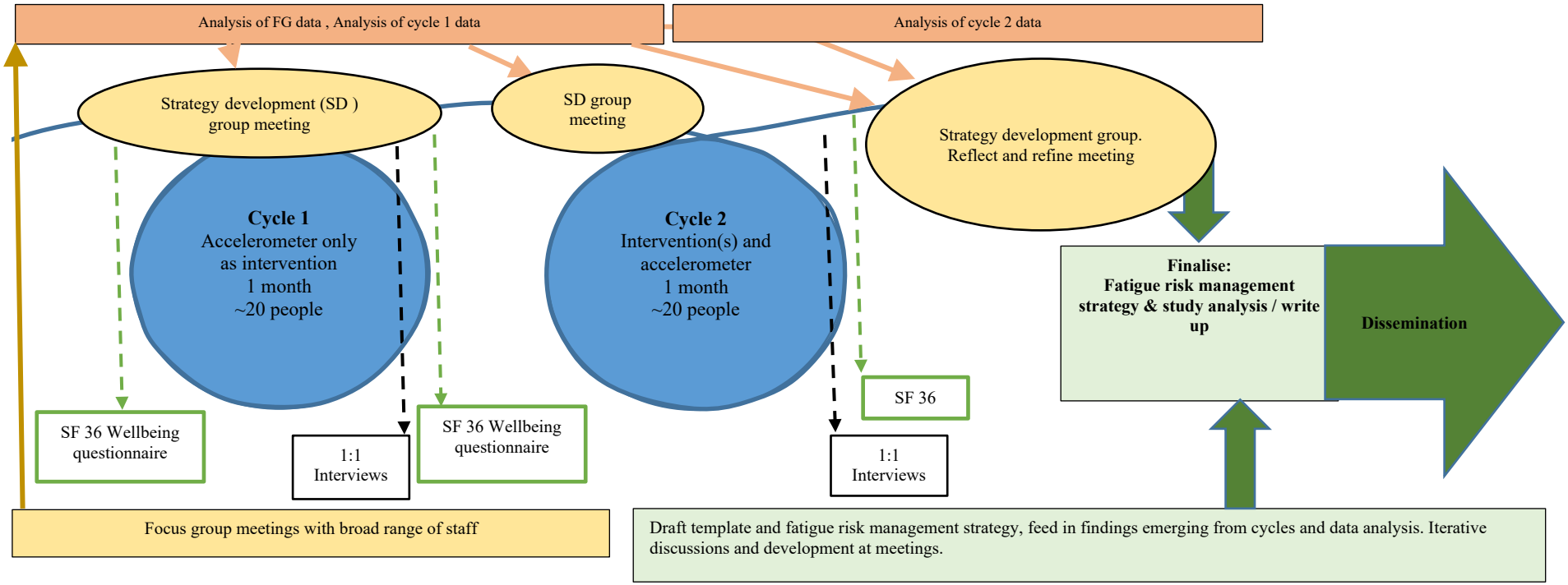


Figure 1 Changes to planned project showing various versions

Months / Versions	1 June 2019	2	3	4	5	6	7	8	9	10 March 2020	11	12	13	14	15
1: Original plan	Set up and Focus groups			Cycle 1 (i.e.SF36, fitbit, interviews)		Cycle 2				Cycle 3 *if needed*					
2: After initial extension (removal of cycle 3)					Focus groups										
								Cycle 1				Cycle 2			
3: Adjusted 'Covid' plan: Removal of cycles 2&3 and elongation of cycle 1								Cycle 1							

Figure 2 Diagram of version 2



Appendix 6 Additional outputs/achievements: Educational elements.

- Dr Ceri Sutherland (sleep physician and project team member) developed and recorded a 25-minute presentation (PowerPoint slides and voiceover). Based on a range of research and evidence the presentation covered: physiological and psychological aspects of sleep and fatigue, ways of mitigating fatigue and resources available. We made the presentation available via a hyperlink to main staff members for distribution to all staff as a resource (See Appendix 2 Educational presentation).

- We displayed posters [developed by the Association of Anaesthetists Joint Fatigue Working Group] prominently in the unit as an additional recourse for all staff groups

- In early February 2020, Mr Jason Eden, (Safr Ltd) attended the unit and presented information about fatigue and fatigue monitoring to a range of staff (approx.15). He provided 20 Fitbits (Fitbit Inc) which connect to a phone app so individuals could see their predicted fatigue level for the next 20 hours, based on their recent sleep patterns.

- At the request of staff, Dr Sutherland attended the unit in person (16th July 2020) to give a more in depth talk and answer questions at the audit meeting. 16 staff members attended including: consultants, health care assistants, midwives, registrars and junior doctors.

- A senior anaesthetic trainee who is part of the research group made a set of slides and a team of anaesthetists, obstetricians, midwives and nurses trained to deliver 'Tea trolley' style very brief training to staff during less busy periods.

- Members of the anaesthetic team involved in related work in anaesthesia (of which this Innovation project forms part) produced a short video for the department of Transport's Driving for Better Business campaign having been invited to a parliamentary reception [later cancelled due to covid] to launch it. This points out the role of employers in ensuring night shift workers do not leave work critically tired and therefore potentially dangerous at the wheel.

- In addition members of the project team also involved in the 'joint fatigue working group' won the British Medical Journal workforce and wellbeing 'Team of the Year' award 2020 https://thebmjawards.bmj.com/winners-2020-oct/

- Short video recorded for the department of Transport's driving for better business campaign. Not directly stemming from this project but related.

Video.mov

- Infographic about fatigue and driving

Appendix 7 Focus groups and process

We used a mixed methods approach drawing on Realistic Evaluation methodology[10].

We invited all the members of the night shift teams: Doctors (anaesthetists, obstetricians), Midwives, Nurses, Operating Department Practitioners and Healthcare Assistants, working in the obstetric theatre suite and the maternity unit to participate in the study. We competed six focus groups, held in the maternity unit to maximise staff attendance. 26 staff members participated.

The focus groups were orientated around eliciting and discussing experiences of fatigue and suggestions and ideas of what could be done to alleviate or mitigate fatigue.

The discussions were recorded and transcribed. We undertook a thematic analysis drawing on principles of realistic evaluation, using a 6-stage approach[11]. Members of the project team undertook individual researcher coding, cross-coding and group data workshops, all to enhance rigour.

Findings from the staff focus groups

Staff suggestions for strategy development fell into 3 themes (see **Appendix *7***):

- The workplace,
- The individual at work, and
- The individual at home

Many themes were replicated in all focus groups, but there were a variety of responses on topics including occurrence of fatigue on nightshift, impact and potential helpful actions and strategies. In total 39 suggestions were made for interventions or actions to help mitigate fatigue.

This suggests that a range of options should be considered in strategy development avoiding a one size fits all approach. A summary list was devised from the suggestions made by staff as to potential solutions to the issues they raised.

Project Process

Once tentative themes were identified by the research team, we convened a co-design development meeting, with 17 participants, including project and practice staff, to review data, draw initial conclusions and define and develop tentative ideas for strategy development.

We gave the attendees documents which outlined the staff suggestions from the Focus Groups. The document was separated into two themes, The Workplace and The Individual at Work, with a total number of 39 suggested interventions.

Attendees were asked to read the suggestions and indicate on the handout which suggested intervention they considered may be feasible, and which was aspirational and then rank those they deemed most feasible. As suggested by The Organisation for Economic Co-operation and Development (OECD) (2018) [10], when commencing strategy development, it is helpful to initially identify interventions deemed most feasible to achieve within the current workplace context. This helps to prevent technicalities of achieving a wide range of aspirational achievements overwhelming developments, enabling 'quick wins' that can fuel subsequent progress. This exercise was completed individually, and all 14 staff members participated.

Following the meeting the research team collated and analysed the collected data and points made during discussion. We scrutinised the feasibility and ranking ratings and highlighted areas of overlap. This was informed by the attendee discussion. From this analysis, a list of potential interventions were grouped and distilled into 4 groups of concerns and we offered these to the strategy development group as the initial focus for consideration.

The strategy development group (PFRMG) held a further meeting [May 22nd] to discuss how the potential interventions identified in the analysis might be put into practice. They identified one or two lead people for each item, the action to be taken and agreed a potential timescale. One researcher [NR] then held meetings with each of the lead people to define the action in more detail and identify what publicity support would be needed to try the idea out in practice.

One action was to hold an educational meeting at which the group's sleep physician explained the importance of sleep, the impacts of fatigue on work performance and on health, and the core elements of a fatigue risk management strategy and process. This generated further ideas that could be included in the fatigue risk management strategy presented to the hospital management team.

Dr Redfern also met with the Director of Charitable funds and secured funding to buy sofa beds and roll out chairs for all staff on the labour ward to use for power naps. This provided the opportunity to raise the issue of staff fatigue with senior management, as the appointment was made by the Assistant Chief Executive. Money raised by Sir Tom Moore was used, giving the Trust the opportunity to monitor and evaluate the result of its spending, via the fatigue project.

Appendix 8 Focus groups themes presentation

Effective fatigue risk management project

The Newcastle upon Tyne Hospitals NHS

The Health Foundation

Northumbria University NEWCASTLE

Aims

- Work collaboratively 'bottom up' develop ideas and interventions to help tackle fatigue
- Try out these interventions and work together to develop a fatigue risk management strategy

Northumbria University NEWCASTLE

Initial Focus group themes

Dr Val Larkin & Prof. Alison Steven

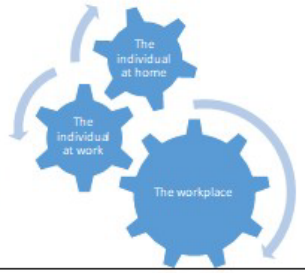
- 6 focus groups to date
- Involving 30 staff members
- Including HCA; anaesthetic nurses; midwives; obstetric medical staff and anaesthetic medical staff
- Many themes were replicated in all focus groups
- There was a range of responses, i.e. not a consensus, regarding fatigue and nightshift work, including its occurrence, impact and potential helpful actions - strategies. This suggests a range of options should be considered in any strategy development, avoiding a one size fits all approach.

Theme one	Category	Codes
The workplace	Workload/ activity	Providing continuity and continuous care
		Unpredictability of labour ward / theatre activity
		High risk / Stressful situations
		Being quiet
	Workplace context and resources	Staffing levels
		Working relationship; with colleagues and ward manager
		Creating a restful environment for labouring women Heat Light Relaxing music
	Implications of fatigue on the workplace	Working on autopilot
		Potential for mistakes
		Loss of workforce

Theme two	Category	Codes
The individual at work	Individual shift rotas	Frequency of night duty
		Response to night duty
		First Night shift
		Consecutive nightshifts
		Turnaround from nights to days / time to recover
	Recognising when individuals are fatigued	Signs of fatigue
		Self-reporting
	Rest opportunities	Use of break times
		Ad hoc additional rest opportunity
		Refreshments
		Stimulation techniques

Theme three	Category	Codes
The individual at home	Potential to have appropriate and good quality sleep	Biological clock
		Daytime noise
		Friends and family
		Personal responsibilities
	The implications of fatigue on home life	Effects on personal life
		Safety

- The interactive and reciprocal nature of the themes raised by the focus group participants



Mirrors Core Principles of WHO (2010) Healthy Workplace Framework and Model.
Available at: https://www.who.int/occupational_health/healthy_workplace_framework.pdf

Another key text to consider is:-

- NHS England (2018) Workforce Health and Wellbeing Framework.
- Available at: https://www.nhsemployers.org/-/media/Employers/Publications/Health-and-wellbeing/NHS-Workforce-HWB-Framework_updated-July-18.pdf?la=1

Staff suggestions for strategy development

- **The workplace**
- Workload activity
- Workplace context and resources
- Provision of rest facilities
- Supportive workplace culture
- Provision of resources
- **The individual at work**
- Shift rotas
- Recognising signs of fatigue
- Rest opportunities
- **The individual at home**

Appendix 9 Accelerometer (Fitbit Inc.) and App element

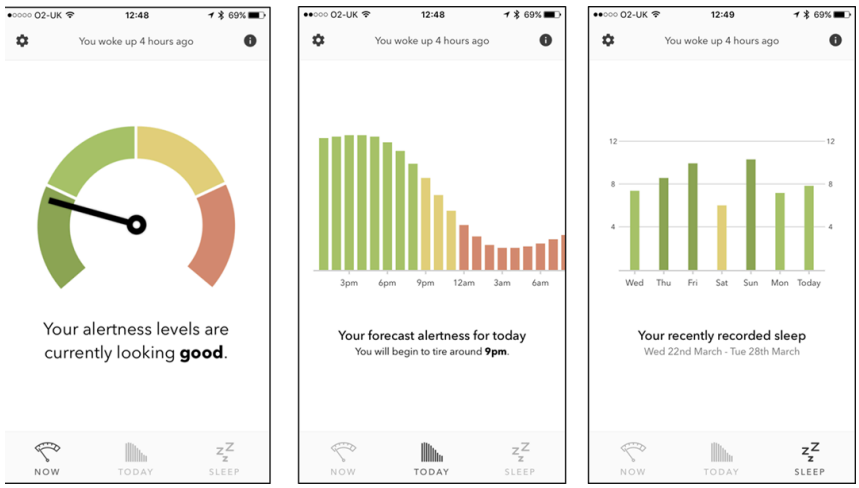
The methodology involves collecting data about participants' sleep using consumer wearables (Fitbit Charge 2) and data about their shift times from work diaries. This allows us to understand their fatigue levels at work through the use of SaFR's (https://safr.org.uk/) bio-mathematical model of fatigue (or fatigue algorithm).

SaFR's model is based on Borbely's Two Process Model and the Three Process Model developed by Akerstedt and Folkard which has been validated in many peer-reviewed studies in a number of industries and used to build fatigue management into daily working practices. The app gives the user a simple 'dashboard' view of their alertness and calculated fatigue levels (see illustration below) which facilitates heightened fatigue awareness.

Thirteen staff members took part in the project, covering Anaesthetists, Obstetricians, Nurses, Midwives, and Healthcare Assistants. They provided both sleep data and shift data (a surprisingly high number provided one but not the other). Once unreliable data was removed, the sample consisted of 11 participants. Data was gathered from 5th of March to the 30th of April with participants starting and finishing at different dates across this period. In total, alertness values for 1530 working hours were obtained.

However it must be stressed that the sample is extremely small and not representative – therefore while some interesting points may have emerged these are in no way representative or generalisable and finding must be interpreted with caution.

Illustration of app 'dashboard':



Summary of data analysis

The levels of alertness and fatigue within the sample were found to be broadly in line with the benchmarks for a 24/7 organisation.

Some interesting findings include:

- There was a clear difference between the alertness levels of doctors and nurses/midwives with nurses/midwives having mean alertness of 10.52 versus 12.05 for all doctors. The difference was even greater amongst the 1st quartile alertness scores, indicating that the least alert nurses/midwives were even more affected by fatigue than the doctor counterparts.

- In nightshifts (any shift which runs through the entirety of 0000-0400), alertness was beneath the amber threshold for 74% of time at work and beneath the red threshold for 47% of the time at work: a considerable level of risk.

- The lowest period of alertness was in the hours of 0000-0700 with the nadir being at 0200-0400. Hence, the greatest risk of fatigue related incidents occurring would be expected to be in the early hours of the morning

However, a number of factors were identified which present increased risk of fatigue-related incidents and also enhanced risk to staff health & wellbeing. These included:

• Staff members obtaining very little sleep (<4hrs and <2.5 hours) on at least one occasion during the project leading to extremely low levels of alertness and very high risk

• Night shifts of 12 hours or more which were found to cause increased fatigue and higher levels of risk

• A high number of consecutive night shifts

• Less than optimal shift patterns

Key recommendations:

1. A comprehensive programme of fatigue education and awareness should be undertaken

2. New working patterns should be developed which take into account the findings and recommendations contained in this report

3. Further study should be conducted to understand the relationship between alertness levels and incident occurrence.

Appendix 10 Fatigue Risk Management Strategy development

The following documents form part of the process of developing the fatigue risk management strategy. The actual final strategy is still being (developed by Dr C Sutherland)

Fatigue on the RVI labour ward .....

why do we need a system to manage it ?

The 2018 'Each baby counts' progress report identifies fatigue as a 'critical contributory' factor in poor neonatal outcomes. Stress and poor situational awareness matter more but both are worsened by fatigue.

Fatigue related accidents are estimated to cost UK employers £115- £240/ yr and fatigue is a factor in 20% of fatal car crashes.

Safety critical industries around the world manage fatigue as a workplace hazard using Fatigue Risk Management Systems (FRMS). These form part of their Health and Safety Policy and are endorsed at the highest level of the organisation

In 2017 the Association of Anaesthetists started the 'Fight Fatigue Campaign' after an anaesthetic trainee died driving home post call. This campaign prompted a successful application for a Health Foundation award to explore fatigue on the RVI labour ward with full support of the CEO of the Trust.

The study started in 2019 and the data is now being used to form a pilote Fatigue Risk Management System within the labour ward at the RVI. The first of it's kind in the NHS as far as we know.

A Fatigue Risk Management System has four main parts

It is an evolving system based on feedback from observed results after intervention subsequent to errors and accidents relating to fatigue.

A key factor in Fatigue Risk Management is

'The risk of withdrawing a medical-related service must not exceed the risk of a fatigue-related error occurring'

Fatigue is an inevitable part of the employment within the 24 hour high risk area of labour ward.

Within the RVI labour ward, focus groups and meetings were held with all staff grades and groups to explore different experiences of fatigue, perceived risks and preferred interventions or ' defences'.

On the basis of these interactions a preliminary Fatigue Risk Management System has been proposed.

Fatigue risk traffic light tables for audit and baseline fatigue risk
(from Queensland Health FRMS 2009)

Level 1 Fatigue risk factor: Shift duration on rota		
Length of shift	Level of risk	Controls
<10	Low	None unless showing signs of fatigue
10-12	Moderate	Assess Levels 2 & 3 Individual self assessment and controls
12-16	High	Assess Levels 2& 3 Individual and team assessment and controls Inform unit director and document Napping and Safe home policy
>16	Very high	Unacceptable risk unless acute patient safety need overrides Report to Unit director Record in datix/fatigue log Initiate all fatigue mitigating interventions and safe home policy

Level 1 Fatigue risk factor: Number of consecutive night shifts or on call		
Number	Level of risk	Controls
1	OK	Assess Level 2 & 3 controls at start of shift
2-3	Moderate	Assess Level 2 & 3 controls at start of and during shift
4	High	Assess Level 2 & 3 controls at start of and during shift Request relief on shift : 2nd operator Inform unit director and document
>4	Very high	No individual should be expected to do this

Level 1 Fatigue risk factor: Time off between shifts		
Hours off	Level of risk	Controls
>12	Low	None unless showing signs of fatigue
10-12	Moderate	Assess Levels 2 & 3 Individual self assessment and controls
8-10	High	Assess Levels 2& 3 Individual and team assessment and controls Inform unit director and document Napping and Safe home policy
<8	Very high	Unacceptable risk unless acute patient safety need overrides Report to Unit director Record in datix/fatigue log Initiate all fatigue mitigating interventions and safe home policy

Fatigue risk traffic light tables for audit and baseline fatigue risk
(from Queensland Health FRMS 2009)

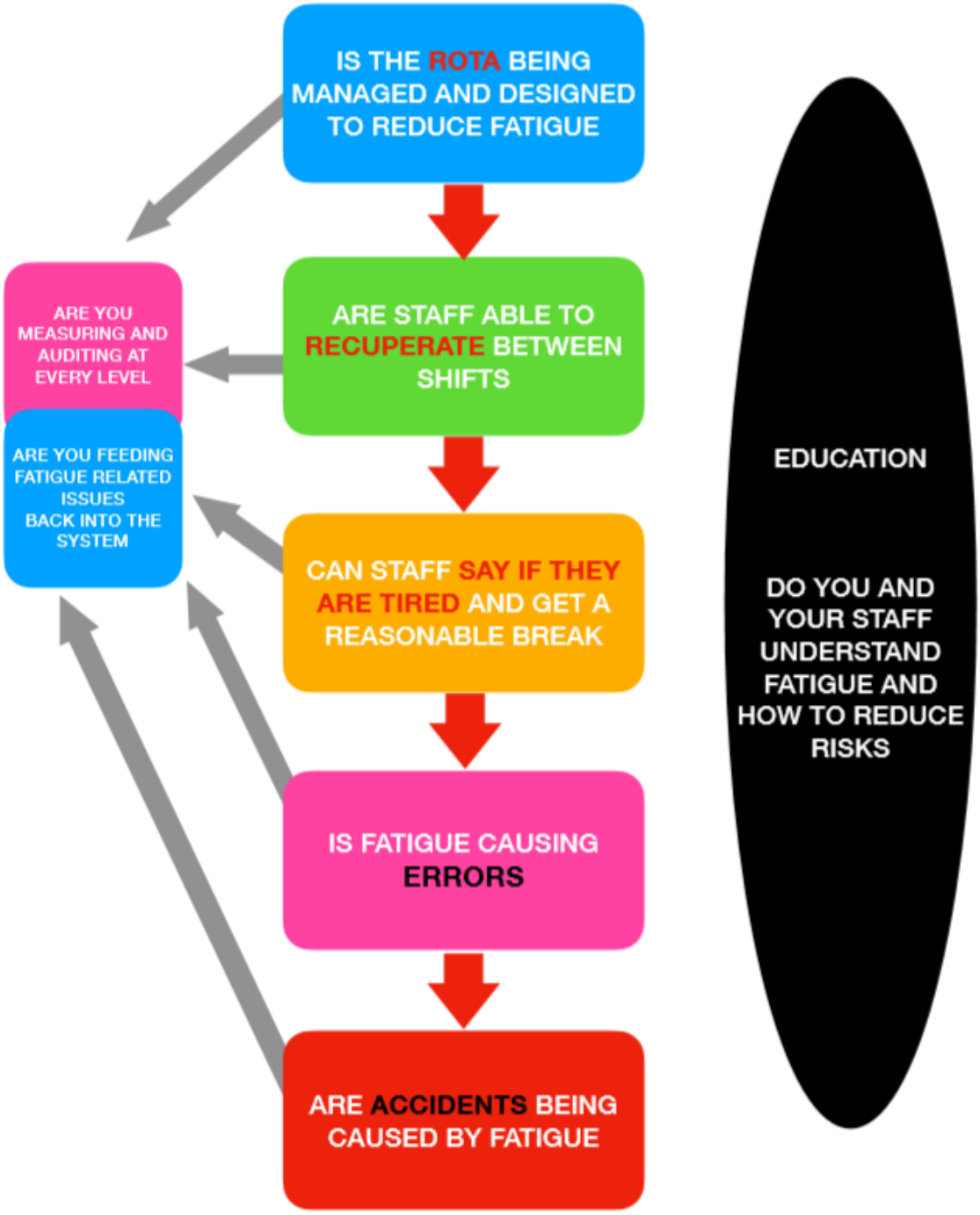
Level 2 Fatigue risk factor: Time awake before shift		
Prior wake/hrs	Level of risk	Controls
<12	Low	None unless showing signs of fatigue
12-14	Moderate	Assess Levels 2 & 3 Individual self assessment and controls
14-16	High	Assess Levels 2& 3 Individual and team assessment and controls Inform unit director and document Napping and Safe home policy
>16	Very high	Unacceptable -must inform unit manager and report on register

Level 3 Fatigue risk factor: Perelli Fatigue score at start of shift		
Fatigue score	Level of risk	Controls
1-3	Low	None unless showing signs of fatigue
4-5	Moderate	Assess Levels 2 & 3 Individual self assessment and controls
6	High	Assess Levels 2& 3 Individual and team assessment and controls Inform unit director and document Napping and Safe home policy
7	Very high	Unacceptable -inform unit manager and report on register

Same Perelli Fatigue Checklist	
1	Fully alert
2	Very lively
3	Okay
4	A little tired
5	Moderately tired
6	Extremely tired
7	Completely exhausted

Control Level	Intervention point	Control	Intervention
Level 1	Sleep opportunity	• Provided at organisational level, allowed by the roster system	• Rota design • Inter-shift recovery time • Actual hours worked • Work intensity/staffing levels • Break opportunity • Break / rest area provision • Commuting time
Level 2	Actual sleep obtained and duration of wakefulness	• Emphasis on individual time management within rostered opportunity provided	• Ensure adequate sleep duration and quality between shifts • Assess sleep time with sleep diaries • Reduce time awake before shifts • Address sleep disorders • Commuting time
Level 3	Fatigue related behaviour and signs noted at work incl. start and end of shift	• Emphasis on individual and colleague fatigue education, reporting culture at workplace and interventions	• Individual sleep wake assessment-Sam Perrelli Fatigue Scale • Monitor self and colleagues for signs and symptoms of fatigue; droopy eyes/presenteeism/memory lapses/irritability/poor emotional control • Performance monitoring • Report fatigue to colleagues and request support if needed • Interventions to improve fatigue : nap/rest/help/task rotation/buddy/light/ caffeine • Priority nap in rest area
Level 4	Fatigue-related errors	• Consideration of fatigue as causal factor. • Experience/observation of fatigue-related behaviours and symptoms. • Fatigue reporting culture	• Stop task • Inform colleague and senior staff member • Record fatigue related error formally in Datix/fatigue log/register • Use interventions from Level 3 • Stop primary operator role • Seek 2nd opinion on critical/high risk decisions • Safe home • Senior team to review Level 1-3 interventions
Level 5	Fatigue-related incidents	• Consideration of fatigue as causal factor. Occurrence of errors actualising to incidents. • Experience/observation of fatigue-related behaviours and symptoms. • Fatigue reporting culture	• Stop task • Inform colleague and senior staff member • Record fatigue related error formally in Datix/fatigue log/register • Use interventions from Level 3 • Stop work • Urgent nap/sleep • Safe home • Fatigue Working Group to review Level 1-3 interventions

SUMMARY OF FATIGUE RISK MANAGEMENT FOR RVI DELIVERY SUITE



Appendix 11 Feedback to the Health Foundation

- Regarding the learning events

  We found these very useful, supportive events that had a friendly collegial atmosphere. It was nice to hear what others were doing and engendered some peer support.

- The support you have received alongside the funding and contact with THF / access to wider Health Foundation resources

  Excellent comprehensive support in the form of mentoring and from the contact people at the HF who were always there to offer advice and listen to the issues we were having – very understanding and very realistic. Easy to access and always very helpful.

Appendix 12: Infographic/Poster (optional section)

The Health Foundation will provide teams with the opportunity to have a Poster or Infographic for dissemination purposes designed for them. Ideally these will be displayed at the April event, however an opportunity will also be provided later in the year. Instructions have been sent to you separately.

The Health Foundation will only provide a designed Poster or Infographic. If you opt to have a poster, we encourage you to also try and do a infographic to support your work yourself.

You are also welcome to include posters you have produced for other events here, as an attachment or link.

Infographics are an impactful and visual way of sharing information about your work quickly and clearly.

They are a great resource that can be added to and updated as the project continues and can support the team to reflect on successes.

We have seen some excellent infographics from Scaling Up Improvement programme including this example by the HIP QIP team.

Appendix 13: End of Project finance statement

Please note this can be returned separately from the report as a clearly labelled attachment.

Innovating for Improvement – Round 7

End of Project finance statement: April 2020

Improving management of staff fatigue during night shift:

Northumbria University & Newcastle upon Tyne NHS Foundation Trust

Please provide a financial summary showing spending against your Innovating for Improvement award budget. Upon receipt of a satisfactory report and financial summary, we will authorise and release your final payment.

This section should be completed and signed off by your finance department. You should report against the exact budget that was signed off in your award agreement using the template below.

We understand there may be variations to the originally agreed budget. Please let us know where this is the case, explain any significant variations and clarify the impact that this has had on the project.

Please highlight any underspends and how you plan to use this money e.g. for dissemination purposes. Note that we will only authorise your underspend with prior notification and where the reallocation will benefit your original project aims.

Budget template (please embed as excel below or provide as clearly labelled attachment)

Organisation	Description	Budget	Actual Expenditure	Invoices still to be received/costs still to be allocated	Total Forecast Expenditure
Northumbria University	A Steven 3%	3,527.00			
	G Wilson Research Associate 40%	23,100.00			
	Travel/Consumables	300.00			
	Total for Northumbria	**29,113.00**	**14,995.00**	**14,118.00**	**29,113.00**
Safr Ltd	J Eden	17,100.00	17,000.00	0.00	17,000.00
Mercury Writing		0.00	188.43	0.00	188.43
Nuth costs	N Redfern 3%	3,397.00		3,397.00	3,397.00

	H Dawson 1%	1,132.00		1,132.00	1,132.00
	E Murphy 0.6%	680.00		680.00	680.00
	S Anderson 1%	1,132.00		1,132.00	1,132.00
	Clinical Project Management (I Powell & Roopa McCrossan)	1,087.00		1,087.00	1,087.00
	C Sutherland (S Tees)	1,699.00		1,699.00	1,699.00
	Travel Costs	2,618.00	692.55	0.00	692.55
	Interviews/data collection	1,048.00		1,048.00	1,048.00
	Set up costs	814.00		814.00	814.00
Total		**59,820.00**	**32,875.98**	**25,107.00**	**57,982.98**

Total Remaining	**1,837.02**

Commentary on variations to the budget
We spent less than expected on travel. The budget covered 3 people coming to London 3 times, but one meeting was done via Zoom and one meeting was held in Liverpool for which we incurred fewer travel costs. We have the permission of the Health Foundation to use the money saved to fund • A projector/TV screen in the midwife teaching room making it quicker and easier to do 'ad hoc' training on the impacts of fatigue • Interview transcription costs, incurred as we changed our data collection because if the impacts of Covid-19 • Staff time in writing the academic papers emanating from the research

Authorisation from finance department or authorised individual	
Signed	
Name	
Role	

Appendix 14 References

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