

# Aligning work-as-imagined and work-as-done using FRAM on a hospital ward: a roadmap

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## ABSTRACT

**Introduction** Modern safety approaches in healthcare differentiate between daily practice (work-as-done) and the written rules and guidelines (work-as-imagined) as a means to further develop patient safety. Research in this area has shown case study examples, but to date lacks hooking points as to how results can be embedded within the studied context. This study uses Functional Analysis Resonance Method (FRAM) for aligning work-as-imagined with the work-as-done. The aim of this study is to show how FRAM can effectively be applied to identify the gap between work prescriptions and practice, while subsequently showing how such findings can be transferred back to, and embedded in, the daily ward care process of nurses.

**Methods** This study was part of an action research performed among ward nurses on a 38 bed neurological and neurosurgical ward within a tertiary referral centre. Data was collected through document analysis, in-field observations, interviews and group discussions. FRAM was used as an analysis tool to model the prescribed working methods, actual practice and the gap between those two in the use of physical restraints on the ward.

**Results** This study was conducted in four parts. In the exploration phase, work-as-imagined and work-as-done were mapped. Next, a gap between the concerns named in the protocol and the actual employed methods of dealing with physical restraint on the ward was identified. Subsequently, alignment efforts led to the co-construction of a new working method with the ward nurses, which was later embedded in quality efforts by a restraint working group on the ward.

**Conclusion** The use of FRAM proved to be very effective in comparing work-as-done with work-as-imagined, contributing to a better understanding, evaluation and support of everyday performance in a ward care setting.

## INTRODUCTION

In recent years, there has been an increasing interest in the theories and methods behind the concept of Resilient Healthcare (RHC) and Safety II (S-II).<sup>1–3</sup> Although progress has been made, the exact and sustained contribution of RHC has yet to be determined.<sup>4,5</sup> The S-II perspective illustrates a renewed interest in the understanding that work can be imagined in a certain way, but in practice is often different. Dealing with the tension field

## WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Research efforts in modern patient safety approaches like Safety II and Resilient Healthcare use the Functional Resonance Analysis Method (FRAM) as a method to highlight sources of performance variability and resilience. While this is also the case for studies investigating the tension field between work-as-imagined and work-as-done, it remains unclear how FRAM can benefit the ongoing improvement of patient safety through embedding research findings into practice.

## WHAT THIS STUDY ADDS

⇒ Our study shows that FRAM is an effective tool to address the tension field between work-as-imagined and work-as-done for nurses on a hospital ward. Results illustrate how quality and safety in nursing can be addressed bottom-up together with stakeholders.

## HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study provides a roadmap for the use of FRAM as a tool to integrate research findings from a Safety II perspective into practice, offering new directions for quality improvement studies interested in further improving patient safety by expanding on practices and skills that are already present within nursing teams.

between the ideal (documented) care and the reality is important, but it is also necessary to take the strategic considerations and practical challenges<sup>6</sup> into consideration.

Ward care is no exception because the often unpredictable and busy nature of the work makes it a place where everyday care is difficult to manage or improve.<sup>7</sup> While adherence to clinical and nursing guidelines is a necessary starting point, most clinicians and nurses would agree that deviations from standards are equally important to meet the unpredictable course of events inherent in treating unstable ward patients.<sup>8–11</sup> This means that the actual performance of work can differ (significantly) from how it was intended.

The traditional approach for most hospitals in accounting for quality and patient safety is predominantly found in compliance, rules following through guidelines and protocolisation. At the same time, ward nurses are expected to deal with unexpected changes<sup>12</sup> on a day-to-day basis, at times favouring departure from the standardised and expected to meet the challenges at hand. In managing such challenges, new directions for improving patient safety could be already present in daily practice but remain undetected by conventional quality approaches.

In the literature on RHC, this dilemma is illustrated by highlighting the difference between work-as-imagined (WAI) and work-as-done (WAD).<sup>13</sup> WAI reflects the way in which we think that work is or should be performed. It reflects the desired working standards, often embodied in guidelines and protocols, improvement plans or rules. WAD, on the other hand, is the way in which these working activities take form in actual practice: it encompasses how healthcare workers give substance to the work that needs to be performed (which may or may not include desired procedures and working methods). A structural gap between WAI and WAD might have negative consequences for patient safety,<sup>14</sup> but can also be difficult to detect.<sup>15</sup> Engaging nurses in finding this gap could have positive influences on patient safety<sup>16</sup> and job satisfaction,<sup>17</sup> through which it is a promising step in operationalising S-II.<sup>18</sup>

Most studies examining WAI and WAD differences use the Functional Resonance Analysis Method<sup>19</sup> (FRAM) as a tool to map how imagined and actual performance differ. FRAM is a modelling method used to map a set of activities, instances and/or an entire process in sociotechnical systems<sup>19 20</sup> and has been used in previous research to align WAI with WAD.<sup>21–23</sup> Detecting unwanted performance variability within or between the two can highlight potential points of improvement. Consequences of this variability have to be examined in light of the current process. Targeted improvements can then be implemented and ideally sustained.

Interestingly, little attention has been paid to how narrowing the gap between WAI and WAD can be achieved for longer periods of time. This is important, since existing practices can change, with the risk of reasoning from an outdated picture. Many studies however approach WAI and WAD at an explorative angle or aid in the initial planning and design phase of quality improvement interventions.<sup>21 23</sup> Few examples exist as to how FRAM can contribute to narrowing the WAI and WAD gap in the long run.<sup>21 23</sup> The often complex processes targeted in these studies remain at an interplay between different stakeholders inside and outside the primary process itself, offering little certainty if indeed the appropriate route is taken and maintained.

Few empirical examples exist as to how FRAM as a method can directly contribute to applying and embedding WAI and WAD differences in everyday clinical work. This study aims to find an explorative but systematic

approach for pinpointing new directions in improving patient safety. By using a concrete example of a nursing intervention on a hospital ward, the objective of the study is to investigate how FRAM can effectively be applied to decrease the gap between WAI and WAD. The study also investigates how subsequent findings from an FRAM analysis can be transferred back to, and embedded in, the daily ward care process of nurses.

## METHODS

### Design

This study was part of a larger ethnographic action research project, focused on (1) increasing the discretionary space of the ward nurses and (2) understanding the dynamics of how WAI and WAD differ from the perspective of the ward nurses. The theoretical background is rooted in resilience engineering and used the WAI–WAD gap as a framework for understanding the tension field between prescribed and actual working activities. As the WAI–WAD gap is essentially influenced by the perspectives of the actors involved, the present study follows an interpretivist approach as rooted in traditional ethnographic research.

Contributing to the action research, JT performed an ethnographic inquiry between February 2020 and October 2020 aiming to get acquainted with the wards context, healthcare professionals and culture. This allowed understanding of contemporary working methods and interdisciplinary collaborations on the ward. The usage of physical restraint was observed as of notable interest by the wards' nurses and management, since neurological patients on the ward are prone to confusion and at-risk behaviour, making them a potential risk to themselves or others around them. With the larger action research in full progress during October 2020 and June 2021, the researcher JT also joined the wards' nurse-led workgroup concerned with appropriate physical restraint application on the ward. During this period, the role of the researcher changed from being an accepted spectator on the boundaries of the group to being a more engaged action researcher collaborating with the ward nurses on a daily basis.

### Setting

This study took place on a combined neurological and neurosurgical ward with 38 beds in a tertiary referral centre. Primarily ward nurses were included in the study, as well as eight members of a nurse-led physical restraint working group, one physician assistant and clinical and nursing management of the ward.

### FRAM

FRAM was used as an explorative and iterative method to map, analyse and discuss differences between WAI and WAD with stakeholders on the ward. In short, an FRAM starts with determining the tasks or activities relevant to the modelled case or process, called functions. The amount and level of detail of the functions depends

on the underlying aim of developing the FRAM. Findings during the FRAM construction can guide the level of detail necessary to arrive at greater understanding. Once a set of functions is determined, the relationships or couplings between the functions are made. Coupling between functions can be made by indicating the relevant features or dimensions of that function—called aspects. Aspects include Input (I), Output (O), Precondition (P), Resource (R), Time (T) or Control (C). These aspects help map and understand the nature of the coupling between the functions of the FRAM. Functions can thus be coupled in multiple ways, but always in such a manner that the Output (O) of a function forms a connection to at least one of the five other aspects of another function (I, P, R, T, C). See Clay-Williams *et al.*<sup>21</sup> for a detailed explanation of FRAM in a clinical setting.

### Data collection and analysis

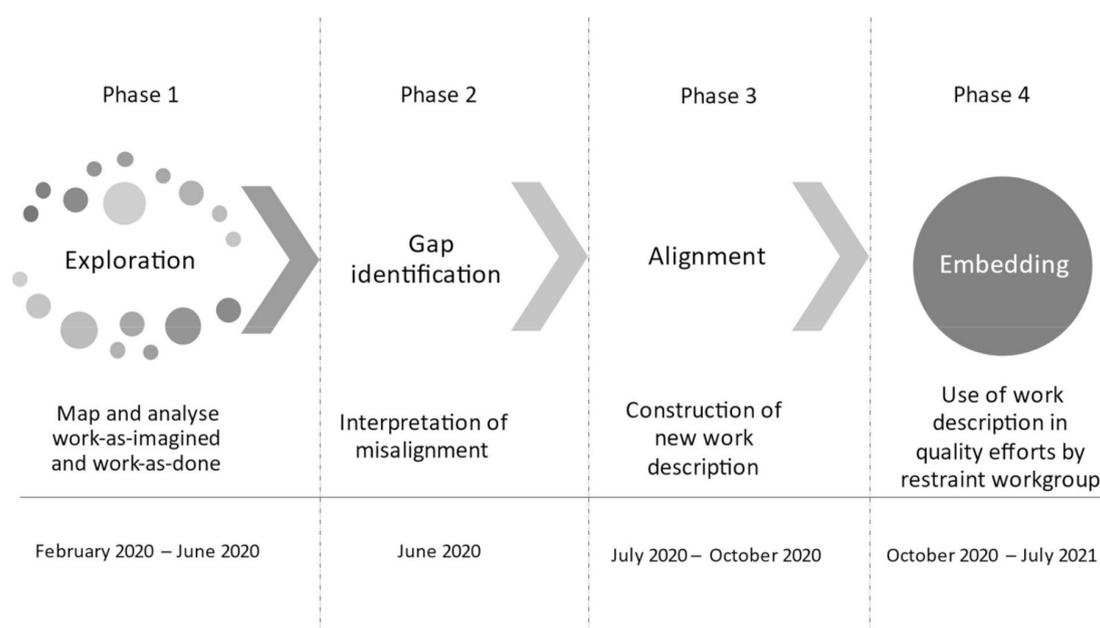
Data was collected through participant observations, both semi-structured and unstructured interviews, individual and group discussions with stakeholders on the added value of a hospital-wide protocol of physical restraints versus the actual use of restraints by nurses on the ward. During the observations, data was collected through in-field jottings later elaborated on in-field notes. Data from the interviews was collected through note-taking and writing comments in the FRAMs. All data was organised in a separate research diary, reflecting recurrently on the role of the action researcher. Modelling of the FRAM was done using the FRAM model visualiser, and the FRAMs (WAD and WAI) were printed for the interviews. The FRAMs were constructed iteratively until a clear comprehension of WAD and WAI was achieved. Data for FRAM

development and discussion was collected during the period from February 2020 to June 2020. Based on the interpretation of the gap between WAD and WAI, a three-page working method was written, printed, discussed and revised in person with ward nurses, eight members of the wards' nurse-led physical restraint working group, one physician assistant and clinical and nursing management of the ward between July 2020 and October 2020. Management gave their feedback and agreement digitally and during regular quality meetings on the ward. From October 2020 to June 2021, the researcher JT made in-field observations kept in an action research diary when engaged with the topic of physical restraints on the ward. The whole iterative process of data collection, processing and analysis is discussed in detail in the findings section. The research steps of the study are shown in figure 1.

### Reflexivity

With no background in medicine or nursing, but a masters degree in cognitive psychology and a theoretical background in (patient) safety literature, the researcher JT had little assumptions or prior experiences with ward care. JT was supported by DV, a supporting quality advisor new to the field of medicine but with extensive experience in the application of FRAM in several safety critical domains.

For the informed consent procedure, ward management regularly communicated the researchers' presence on the ward. Participation in the study and consent was obtained verbally before and during observations, interviews and discussions. Data was anonymously processed during analysis and could not be related back to



**Figure 1** Research steps. In the 'exploration' and 'gap identification' steps, work-as-imagined and work-as-done were mapped, analysed and discussed with the wards' nurses. In the 'alignment' and 'embedding' steps, action researcher JT collaborated with the nurses to make explicit their working methods in a new work description, which was later used by the restraint workgroup to address quality and safety issues concerning restraint use on the ward.

**Table 1** Research process of building FRAM models of work-as-imagined and work-as-done

Phase	Description	Methods and participants	Analytical input		Output	
			Work-as-imagined	Work-as-done	Work-as-imagined	Work-as-done
1	Initial construction of the FRAM's.	Ten days of participant observations on the ward; document analysis.	Hospital-wide protocol, adjacent step-by-step plans and protocols, national guideline.	Fieldnotes and research diary.	Initial understanding leading to develop FRAM <sup>wai1</sup> .	Initial understanding leading to develop FRAM <sup>wad1</sup> .
2	Second iteration.	Open interview with wards' nursing expert (NE).	–	NE's experiences with restraint usage on the ward; feedback on FRAM <sup>wad1</sup> .	–	Further understanding leading to developing FRAM <sup>wad2</sup> .
3	Third iteration.	Open interview with senior advisor of hospital-wide quality and patient safety department.	Feedback on FRAM <sup>wai1</sup> .	Feedback on FRAM <sup>wad2</sup> .	Findings and nuances leading to FRAM <sup>wai2</sup> .	Remarks and suggestions for further analysing FRAM <sup>wad2</sup> .
4	Fourth iteration.	Open group interview with three ward nurses with varying work experience on the ward (<1 year, 7 years, 20 years).	Nurses experience with WAI on the ward using FRAM <sup>wai2</sup> ; Nurses experience with WAD on the ward using FRAM <sup>wad2</sup> ; Reflection and discussion of FRAM <sup>wai2</sup> and FRAM <sup>wad2</sup> differences.	–	Interpretation of misalignment.	Drafted working method of actual restraint use on the ward.

Using input from different sources, the models were built iteratively and continually compared until the work-as-imagined and work-as-done gap was clearly understood.

FRAM, Functional Resonance Analysis Method; WAD, work-as-done; WAI, work-as-imagined .

individuals. Data was stored securely within a data safe folder of the participating hospital.

### Patient and public involvement

Aside from patient treatment being inseparable from participant observations on the ward, patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

## FINDINGS

### Exploration phase

During the first phase (table 1), identification of WAD started with participant observations on the ward and subsequent construction of an FRAM (FRAM<sup>wad</sup>). In turn, input for WAI was based on the current applicable hospital-wide protocol for physical and environmental restraints and the respective work documents forming the input for a separate FRAM (FRAM<sup>wai</sup>). After the initial FRAMs were developed, researchers JT and DV conducted single and group open-interviews during phase two, discussing both FRAM<sup>wad</sup> and FRAM<sup>wai</sup> until

a clear comprehension of both FRAMs and the gap was reached. The output of each interview was used to further refine both FRAMs.

The FRAM analyses not only served as input for discussions with nurses on the ward but were equally important for data capturing and analysis during the interviews, propelling deeper understanding of WAI–WAD differences. Furthermore, discussing the printed FRAMs allowed for open dialogue between the participants, reflecting on the contemporary working methods and the appropriateness of the related WAI. An important aspect of the interviews was to clarify to the participants that the researchers were not judging working methods on efficiency or adherence to the protocol per se, but were merely interested in how the participants go about their day (FRAM<sup>wad</sup>) and in what way the protocol was helpful in this respect. Presenting both process perspectives in two FRAMs on A3 paper helped to verbalise, capture, discuss and trim the FRAMs during and after the interviews. Appendix A and B show both FRAM's as used during the last group interview.

## Identification of gap

The discussions with the nurses revealed both nuances and important mismatches between protocol and actual working practices. Since physical restraints are a complex intervention, an elaborate description of the FRAMs' pointing out in more detail the fundamental differences between WAI and WAD for physical restraint use on the ward can be found in Tresfon *et al* (2022, currently submitted to *Global Qualitative Nursing Research*).

The differences could be related to practical issues (eg, protocols were hard to find) as well as substantive issues in which the protocol made no references to some activities that were important aspects of dealing with restraints on the ward. Detailed nuances could be found in, for example, informing the physician, family members and/or legal representatives after the physical restraint had been applied in acute cases. Other differences were more drastic, such as the continuous collaboration between nurses in identifying appropriate measures to take, as opposed to the upscaling step-by-step approach mentioned in the protocol. Such an example of WAD illustrated physical restraint use as both an individual and teamwork skill of nurses in an uncertain clinical process. WAI however relied heavily on the judgement of a physician whenever a physical restraint was considered.

In general, the comparison between WAI and WAD uniquely revealed that:

- ▶ The protocol was limited useful for the nurses. This was due to the multitude of documents, as well as that the protocol followed strict categorisations of environmental and physical restraint types, which were not recognised as such by the nurses.
- ▶ Consequentially, reporting and evaluation of physical restrains through separate forms within the electronic patient record was only done to a varying degree by the nurses. The ward nurses preferred to discuss the details of the patients' current situation verbally during handovers.
- ▶ The nurses engaged in several tactics to distract or comfort the patient in times of confusion, preventing subsequent at-risk behaviours from becoming unmanageable and physical restraint use from being necessary. In fact, the nurses initially try to prevent confusion from occurring by monitoring and mitigating signs of restlessness, an indicator for nurses that a patient can become confused. The protocol did not mention restlessness as such, stating none of the tactics for dealing with restlessness and just a few for dealing with confusion.
- ▶ The application of restraints is a shared process in which the nurses collaborated continuously, making use of each other's experience and skills when deciding which physical restraint to apply and during the application process in general. The importance of cooperation, nursing experience and skill was not reflected as such in the protocol, showing a greater tendency to consult the physician at given stages in the step-by-step approach.

## Alignment

The findings from the gap between FRAM<sup>wad</sup> and FRAM<sup>wai</sup> were used to construct a new description of the working methods on the ward, reducing the number of pages considerably and changing the phrasing from a directive check-and-balances tone of voice to a more friendly and helpful kind of writing. Also, five actionable questions constructed as 'steps' formed the root of the new working method (table 2).

Initially, the working method was member checked with several ward nurses. They were asked if the nurses would be confident that a new colleague whom had taken the mandatory theoretical and practical teachings, knew the appropriate actions to take based on the working method. After that, together with a nurse-led physical restraint working group on the ward, the working method was collectively refined. During this session, the concept of restlessness was untangled from confusion and highlighted by the nurses as not only something fundamentally different but also coined as a nursing indicator that a patient can become confused and develop at-risk behaviour.

## Embedding

After clinical and nursing management, as well as a physician assistant on the ward, reviewed the description minor modifications were made. While making their current working methods explicit two quality and safety issues on the ward were found by the physical restraint work group. An organisational problem was identified in the arbitrary reporting and evaluation of restraints in the electronic patient records. This reduced data reliability of the physical restraints performance indicator (see table 3). For the ward, it was believed important to refresh the working methods among contemporary nurses and educate new employees in the same manner. The working description was adopted by the physical restraints workgroup as a supplement to the protocol and used as a supporting tool during practical teachings of physical restraint usage to new colleagues on the ward. In the following months, two nursing students whom joined the restraints workgroup used the work instruction as a basis for a poster campaign on the ward. The campaign was held during the 'physical restraint week', a period with daily reminders, practical and theoretical teachings in the use of physical restraints on the ward (figure 2).

## DISCUSSION

When comparing WAI with WAD, the use of FRAM yielded meaningful results in narrowing the gap between WAI and WAD. While WAI was insufficient in addressing the challenges met in practice, handling restlessness and confusion in daily practice (WAD) was found to be a collaborative nursing skill vital for mitigating and reducing restraint application. Besides, this skill was already taught to new colleagues and students on the ward, out of sight of hospital quality structures, causing

**Table 2** Questions guiding the new work description of physical restraints on the ward

Step	Question	Description	Specific WAI–WAD gap
0	Have you taken the e-learning and successfully completed the practical test?	Since every nurse on the ward is obligated to take a theoretical and practical test before being allowed to apply physical restraints, this step was added as a reminder.	Whereas the protocol made no mention of the practical test altogether, on the ward this was seen as a requirement before restraints may be applied.
1	When does the topic of physical restraints start for us?	Bullet point summary stating how restlessness can be identified, how and why to deal with restlessness, the importance of deliberation with other nurses and the physician about the restlessness and the central tenet of physical restraint use on the ward: <i>is the patient a danger for him/herself, other patients or hospital staff?</i>	The protocol did not recognise the usefulness of identifying and dealing with restlessness in the first part of the WAD process, whereas the importance of deliberation in the latter part of the process was also neglected. These methods were however used to reduce the need for (heavy) restraints by the nurses, or to decide which type of restraint was appropriate for the patients' situation.
2	How do we deal with restlessness?	The sequence of appropriate steps in dealing with restlessness was stressed. Finding and mitigating the causes of restlessness; the use of sedative medicine prescribed by the physician; the different reasons for, ('diversion tactics' and 'low-stimulus environments') and examples of, alternative measures; being sensitive toward the situation and knowing that appropriate measures can vary daily; continuous deliberation with other nurses; consultation of restlessness during ward rounds.	In the first part of the WAD process, this was shown to be an uncertain process in which experience and knowledge about the patient matter greatly. Knowing and being able to find causes of restlessness, as well as using the appropriate tactics to mitigate these symptoms, varied between nurses. All WAI documents focused heavily on known beforehand types of at-risk behaviour, and paid scarce attention to restlessness as a first step.
3	When do we consider using physical restraints?	Again, the central tenet was stated and other important aspects were described: ask a fellow nurse for help, inform the physician, family and legal representative beforehand if possible; in acute situations inform afterwards; report the effects of the restraint; at the beginning of a shift, deliberate with fellow nurses and the physician if the restraint is still necessary.	In the last part of the process, WAI depended heavily on the judgement of the physician to decide if restraints were necessary. In practice, nurses first consulted an experienced colleague to determine what action was appropriate before looking for an available physician.
4	Summary	Here, a one-page summary of the previous two pages was given in bullet points.	

The questions prompted points of interest in the process of restraint application and were supplied with considerations and tips on how to handle the situation.

WAD, work-as-done; WAI, work-as-imagined.

the quality indicator to be misleading and the protocol of limited practical use for the nurses. Due to our iterative approach and active involvement of the ward nurses in the process of redesigning WAI itself, the quality improvement efforts in the study were directed by reflection on contemporary practices.

FRAM proved to be a helpful method, not only for understanding and comparing WAI with WAD, but also as an aid to stimulate the conversation about working practices during the interviews. FRAM provided the ward nurses with prompts to reflect on their working practices collectively. These reflections also offered a point of reference against which the prescribed (imagined)

descriptions of work could be equally weighted. The active involvement and participation of the ward nurses during the FRAM discussions was paramount. Indeed, the continuous collaboration of the researchers with the ward nurses and other stakeholders helped to understand the interests of the people performing the actual work, while also allowing for a supportive base when co-constructing the new working method. Consequently, the constructed new working method showed how insights from an FRAM analysis can be translated toward a workable form of reflection on working processes in the nursing domain.

Taking guidelines, work instructions and protocols into account when reflecting on current practices also showed

**Table 3** Overview of registered cases of physical restraint evaluation

Hospital admissions in which physical restraints were used	52	82	129	194	85
Admissions to the neurology and neurosurgery ward in which physical restraints were used	21	47	69	55	25
Proportion	40.4%	57.3%	53.5%	28.4%	29.4%
Year*	2018	2019	2020	2021	2022

Registration of digital evaluation forms were used as the prime performance indicator for physical restraint usage within the hospital-wide quality dashboard. According to the quality indicator, the neurology/neurosurgery ward had a fairly large share in the hospital-wide amount of restraint applications. Studying work-as-done however showed that the nurses used the evaluation forms sparsely, but also showed both expertise and potential room for reducing physical restraints. The template of the digital evaluation form had also been subject to change and reimplementation multiple times throughout the years, affecting data continuity, validity and reliability.

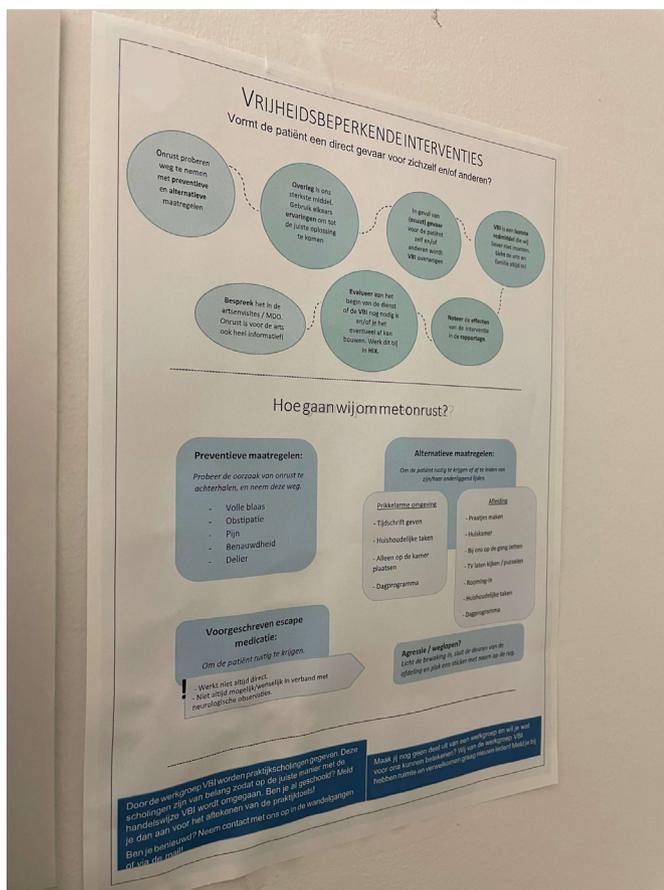
\*Data is compiled for period April 2018 to April 2022.

its value. WAI underappreciated meaningful aspects of WAD on the ward with important consequences. For instance, the monitoring done through recorded indicators was based on a skewed picture of reality as the nurses did not find the digital evaluation form helpful. This in turn limited the organisations' ability to effectively monitor performance, while missing vital aspects of the nurses work in restraining. Furthermore, since physical restraints are a potentially dangerous intervention for

patient safety,<sup>24–26</sup> the skills of managing signs of restlessness and collaboration could be further stimulated and supported as a means to decrease the total number of restraint applications. As such, restraint-related falls could potentially be reduced. Such improvements cannot be achieved by only being strictly compliant to the protocol. By making the current work agreements explicit within the nursing team, alternative directions for improving patient safety became apparent.

Our explorative approach offers a new direction for institutions seeking to understand why WAD is not in line with WAI. It can also be used for quality and patient safety improvement studies by expanding on practices and skills that are already present within nursing teams. To improve care, appreciation is needed that deviations from WAI are not exceptions to the rule, but an inherent part of work in complex sociotechnical systems.<sup>27</sup> While guidelines, protocols or work instructions can be a starting point for reflecting on WAD, this can also be a challenge in itself.<sup>28</sup> In the patient safety literature, rule-following and the deviations have frequently been examined. This suggests that pragmatic and normative causes can be identified but both remain difficult to manage in general, since the context highly influences the appropriateness of deviation or the need for strict rule-following.<sup>15 29 30</sup> Actively managing the gap between WAI and WAD could offer valuable directions for appreciating and acting on the tension between WAI and WAD.

In the S-II and RHC literature, FRAM is often used as a tool to understand the nature of adaptations in variable performance.<sup>4 31 32</sup> While it has been demonstrated how this method can contribute to detecting important adaptations within clinical processes, few examples illustrate how such recommendations can be embedded within the actual work. Other applications have specifically aimed to determine the gap between WAI and WAD using FRAM.<sup>21–23</sup> Examples indicate a need for a reassessment of practice variation and protocol compliance, or show how pre-adjustments in WAI can be made to better suit WAD. However they fail to recognise which actors within the clinical processes would benefit the most from such tasks, while our study illustrates how these stakeholders



**Figure 2** Poster campaign. Similar posters were distributed and hung up throughout the ward at ingenious spots by the nursing students (eg, next to the printer, in the changing room, on the wall of work stations on the ward). Here, the poster hangs in the wards' restroom.

can be identified and included in realignment efforts throughout.

Highlighting where adaptive behaviour exists and where it deviates from WAI is the starting point for discussion and reflection between the involved professionals. In realigning WAI with WAD using FRAM, the tension field inherent between the two conceptual viewpoints on work as such should not be limited to picking a side (ie, 'Forceful compliance vs anything-goes'), but should remain a continuous point of discussion and reflection throughout the organisation<sup>2</sup>: did the frontline professionals meet WAD as they intended? And is the WAI still helpful in this instance? Our study shows how FRAM can pinpoint such conversational topics or be used as a starting point for the conversation.

To our knowledge, this is the first study to illustrate how results from WAI–WAD comparison can be embedded in existing nursing practice. The new constructed working method reveals how FRAM can contribute to redesigning a working method in such a way that it better represents actual working practices while upholding presently existing requirements and system boundaries. Also, the description provided a useful tool for the education of nurses in appropriate working methods on site. Remarkably enough, FRAM has little value when limited to mere insights in working practices for researchers and left unattended on the drawing board. FRAM should be used as a structured conversational tool for allowing a discussion free from value judgements about the work with frontline health workers. The same goes for the continuous involvement of stakeholders in the FRAM process and for continuous reflection on the appropriateness of existing and newly derived working methods. Our explorative approach offers other institutions a roadmap for using S-II and RHC methods when struggling with a WAI–WAD gap.

### Limitations and strengths

Our study reports on directions for improving patient safety, rather than a quality improvement report per se. A limitation of the approach used in the present inquiry is that the comparison between WAI and WAD is always highly specific to the organisation: which protocol(s) are in place, as well as common working methods used on the ward under study. However this does not pertain to limit the value of comparing the WAI–WAD gap with FRAM and subsequent discussion within the team, nor the development of a new working description. What can be problematic, is the time-investment made by the researchers and nurses to detect and realign WAI and WAD. Nevertheless, the WAI–WAD gap showed that the conventional quality instruments unsuccessfully address and misinterpret important aspects of the nurses' work, which makes the time-person investment to use FRAM very worthwhile.

Although the study took place during the COVID-19 pandemic, distorting effects are believed to have been limited as the nursing team composition remained mostly intact during the study period. However, the

anti-COVID-19 measures placing a maximum number of people allowed in meeting rooms was believed to influence the effectiveness of the quality control work, and as such, the physical restraint working group on the ward.

A strength of the study can be found in including different perspectives on work toward the same process and reflecting on it with stakeholders. The conceptualisation of WAI and WAD thus does not stop at a research area of RHC and S-II. This argues for a need toward a more reflexive, explorative and case sensitive research approach as opposed to working with rigid and stale designs.<sup>33</sup> Indeed, the complexities of the clinical environments arguably call for in-depth qualitative work to understand the local norms and habits, and to ensure that meaningful differences are indeed appropriately addressed and retained.<sup>34</sup> Also, expertise in human factors and safety within the quality department could be beneficial for managing the WAI–WAD gap. To achieve this in other contexts and hospital environments, our study indicated that FRAM can be used as a starting point by comparing and aligning WAD with WAI.

### CONCLUSION

With FRAM the mismatches between WAI and WAD can be brought out effectively, and the two can be aligned and embedded in everyday ward care. Discussing common practices on the ward revealed hooking points to improve and maintain dealing with specific patient safety issues. Combined with a curious and appreciative stance toward frontline health professionals during a continuous improvement approach, FRAM proves to be a very effective technique to align WAD with WAI, contributing to a better understanding, judgement and support of everyday performance in a ward care setting.

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## REFERENCES

- Smagugus A. Safety-I, Safety-II and burnout: how complexity science can help clinician wellness. *BMJ Qual Saf* 2019;28:667–71.
- Leistikow I, Bal RA. Resilience and regulation, an odd couple? consequences of Safety-II on governmental regulation of healthcare quality. *BMJ Qual Saf* 2020;29:1.10–2.
- Braithwaite J, Wears RL, Hollnagel E. Resilient health care: turning patient safety on its head. *Int J Qual Health Care* 2015;27:418–20.
- Hollnagel E, Sujan M, Braithwaite J. Resilient health care – making steady progress. *Saf Sci* 2019;120:781–2.
- Braithwaite J. Changing how we think about healthcare improvement. *BMJ* 2018;163:k2014–k14.
- Vincent C, Amalberti R. *Safer healthcare strategies for the real world*. 1st ed. Cham: Springer International Publishing : Imprint: Springer, 2016:2016.
- Pannick S, Beveridge I, Wachter RM, et al. Improving the quality and safety of care on the medical ward: a review and synthesis of the evidence base. *Eur J Intern Med* 2014;25:874–87.
- Debono DS, Greenfield D, Travaglia JF, et al. Nurses' workarounds in acute healthcare settings: a scoping review. *BMC Health Serv Res* 2013;13:175.
- Vos J, Franklin BD, Chumbley G, et al. Nurses as a source of system-level resilience: secondary analysis of qualitative data from a study of intravenous infusion safety in English hospitals. *Int J Nurs Stud* 2020;102:103468.
- Bressers G, Wallenburg I, Stalmeijer R, et al. Patient safety in medical residency training: balancing bravery and checklists. *Health* 2021;25:1363459319899444.
- Kahol K, Vankipuram M, Patel VL, et al. Deviations from protocol in a complex trauma environment: errors or innovations? *J Biomed Inform* 2011;44:425–31.
- Klemets J, Evjemo TE. Understanding Nurses' Strategies to Handle (Un)wanted Nurse Calls: A Resilience Perspective. *Comput Inform Nurs* 2017;35:289–99.
- Braithwaite J, Wears RL, Hollnagel E. *Resilient health care: reconciling work-as-imagined and work-as-done*. CRC Press, 2016.
- Banja J. The normalization of deviance in healthcare delivery. *Bus Horiz* 2010;53:139–48.
- Amalberti R, Vincent C, Auroy Y, et al. Violations and migrations in health care: a framework for understanding and management. *Qual Saf Health Care* 2006;15 Suppl 1:i66–71.
- Janes G, Mills T, Budworth L, et al. The association between health care staff engagement and patient safety outcomes: a systematic review and meta-analysis. *J Patient Saf* 2021;17:207–16.
- Lu H, Zhao Y, While A. Job satisfaction among hospital nurses: a literature review. *Int J Nurs Stud* 2019;94:21–31.
- Homann F, Limbert C, Bell N, et al. Safety through engaged workers: the link between Safety-II and work engagement. *Saf Sci* 2022;146:105521.
- Hollnagel E. *FRAM: the functional resonance analysis method: modelling complex socio-technical systems*. 1st ed. Routledge, 2012.
- Patriarca R, Di Gravio G, Woltjer R, et al. Framing the FRAM: a literature review on the functional resonance analysis method. *Saf Sci* 2020;129:104827.
- Clay-Williams R, Hounsgaard J, Hollnagel E. Where the rubber meets the road: using FRAM to align work-as-imagined with work-as-done when implementing clinical guidelines. *Implementation Sci* 2015;10:125.
- Damen NL, de Vos MS, Moesker MJ, et al. Preoperative anticoagulation management in everyday clinical practice: an international comparative analysis of Work-as-Done using the functional resonance analysis method. *J Patient Saf* 2021;17:157–65.
- BCFM S, Jongerden IP, Klopotoska JE. Double checking injectable medication administration: does the protocol fit clinical practice? *Safety Science* 2019;118:853–60.
- Rakhmatullina M, Taub A, Jacob T. Morbidity and mortality associated with the utilization of restraints : a review of literature. *Psychiatr Q* 2013;84:499–512.
- Kontio R, Välimäki M, Putkonen H, et al. Patient restrictions: are there ethical alternatives to seclusion and restraint? *Nurs Ethics* 2010;17:65–76.
- Thomann S, Zwakhalen S, Richter D, et al. Restraint use in the acute-care hospital setting: a cross-sectional multi-centre study. *Int J Nurs Stud* 2021;114:103807.
- Dekker S. *Patient safety: a human factors approach*. Boca Raton: CRC Press, 2011.
- Pedersen KZ. Standardisation or resilience? the paradox of stability and change in patient safety. *Social Health Illn* 2016;38:1180–93.
- Carthey J, Walker S, Deelchand V, et al. Breaking the rules: understanding non-compliance with policies and guidelines. *BMJ* 2011;343:d5283–d83.
- Vincent C, Amalberti R. Safety in healthcare is a moving target. *BMJ Qual Saf* 2015;24:539–40.
- Kaya GK, Ovali HF, Ozturk F. Using the functional resonance analysis method on the drug administration process to assess performance variability. *Saf Sci* 2019;118:835–40.
- Sujan M. Muddling through in the intensive care unit - A FRAM analysis of intravenous infusion management 2021.
- Leslie M, Paradis E, Gropper MA, et al. Applying ethnography to the study of context in healthcare quality and safety. *BMJ Qual Saf* 2014;23:99–105.
- Anderson J, Ross A, Jaye P. Modelling resilience and researching the gap between Work-as-Imagined and Work-as-Done: reconciling Work-as-Imagined and Work-as-Done. In: *Resilient health care*, 2016: 133–41.