

# 'Handing over to the patient': A FRAM analysis of transitional care combining multiple stakeholder perspectives

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## ABSTRACT

**Introduction:** The period following discharge can present risks for older adults. Most research has focused on hospital discharge with less attention paid to on-going care needs. Despite evidence that patients undertake 'invisible work' to improve care safety, their reported willingness to be involved in care, and the consensus that successful transitions interventions include patient involvement, in reality, this is variable. Further, little research has viewed transitional care as a 'system', with gaps, interdependencies and variability across settings, nor the role of patients and families in supporting the system resilience.

**Research objectives:** 1) model transitional care from multiple perspectives using the Functional Resonance Analysis Method (FRAM); 2) use the model to develop a theory of change to support intervention development.

**Method:** We drew data from two studies: i) exploring the perspective of older adults across transitional care, and ii) exploring how health services experience transitional care. We employed the FRAM to develop a model of transitional care, with a system boundary spanning an older patient's admission to hospital, through to thirty days post-discharge.

**Findings:** Modelling transitional care from multiple perspectives was challenging. 27 functions were identified with interdependencies between hospital-based functions and patient-led functions once home, the success of which may impact on transitions 'outcomes' (e.g. safety events, readmissions). The model supported development of a theory of change, to guide future intervention development.

**Conclusions:** Supporting certain patient-facing upstream hospital functions (e.g. encouraging mobility, supporting a better understanding of medication and condition), may lead to improved outcomes for patients following hospital discharge.

## 1. Introduction

### 1.1. Transitional care for older adults

The transition for a patient from hospital care back to their home, can be a risky period, with estimates suggesting in the region of 20% of patients experiencing an adverse event post-discharge, with around two-thirds of these regarded as preventable (Forster et al., 2003). Despite an increasing research focus on transitions (Burke et al., 2014; Hesselink et al., 2012; Hansen et al., 2011) and 'bridging' interventions to support vulnerable patients, strategies to improve patient safety at discharge and transition remain largely undefined (Rennke et al., 2013), and the evidence is currently equivocal (Leppin et al., 2014; Damery et al., 2016). Most research to date has focused specifically on the hospital discharge

process and the immediate post-discharge period (Arbaje et al., 2014), neglecting the on-going nature of potential care needs. However, it is arguable that due to the reduction in the average length of stay in recent years (NHS Digital, 2016), and the increasing delivery of healthcare within community settings (NHS England, 2013), the on-going care needs of patients are increasing in frequency and complexity. This is particularly true for older adults, who account for the majority of NHS admissions, have complex health and social care needs, and have an increased likelihood of being readmitted to hospital (NHS Digital, 2016), making them a particular focus of 'transitions interventions' to date (Baillie et al., 2014; Leppin et al., 2014; National Audit Office, 2016).

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## 1.2. The role of patients and families in transitional care

Reviews of interventions to improve transitional care and reduce readmissions in older adults have identified a set of success factors, which underline the need to involve patients and families (Burke et al., 2014; Leppin et al., 2014). Despite this emergent consensus and the reported willingness of patients to be involved in their care, the degree to which this happens remains variable (e.g. Jeffs et al., 2012; Andreasen et al., 2015; Rustad et al., 2016; Allen et al., 2017). Furthermore, this variability seems in contrast to our increasing understanding of the role of patients in undertaking 'invisible labour' to achieve better outcomes in transitional care, for example checking medication lists following discharge, contacting their GP or community pharmacy about their medications, or changing routines and creating checklists to improve adherence to new medication regimens (Furniss et al., 2014; Fylan et al., 2018; Eliasson et al., 2011).

## 1.3. Understanding transitional care through a resilience engineering lens

Care at transitions creates a unique set of patient safety problems. First, the tension between keeping a patient in hospital – which arguably increases the risk of hospital acquired infections and deconditioning (Krumholz, 2013) – versus sending them home with ongoing care needs, and with continuing treatment. Further, the structural gaps between services and staff both within and between acute, community and primary care settings, in effect create 'safety gaps' (O'Hara et al., 2018). Staff and patients are required to 'bridge' these gaps systematically, for example through discharge planning, or through *ad hoc* activity such as hospital staff phoning the GP before a discharge to alert them to follow up the patient. The concept of these gaps in our services, and the risks they pose, as well as the work done by staff to reduce these risks, is not new (e.g. Cook et al., 2000). However, very little empirical work to date has conceived the transitional care process as a system, with gaps, interdependencies and variability across all settings. Thus, the emergence of 'Safety II' theory with its associated methods of analysis and ways of conceptualising complex systems (e.g. Hollnagel et al., 2015), represents an exciting opportunity to examine and understand the process of care at transitions in new, and potentially powerful ways.

Whilst this has also been a feature of earlier safety theories (e.g. Rasmussen, 1985; Leveson, 2004), a central tenet of 'Safety II' has been that systems should be described not in terms of their components (their system architecture), but rather how they function – "not by what it is, but by what is done" (Hollnagel, 2012, p.6). Further, a fundamental assumption of this approach is that it is this work 'as done' that creates safety outcomes and system resilience (or lack thereof). Thus, exploring – from the perspectives of all actors within a system, including patients and families – what functional activity within the transitional care system is undertaken, and by whom, is crucial both to understand the safety of transitional care, and to be in a position to improve it.

## 1.4. The present study

In early 2017, the authors commenced a five-year programme of research seeking to develop and test an intervention to support patients and families to improve the safety and experience of their discharge from hospital to home, and reduce readmission to hospital. The first two qualitative studies in this programme of research explored the complexity of the transitional care process, from two key perspectives: that of healthcare professionals across healthcare settings, and patients and families. The present study builds on this qualitative work, to draw these important perspectives together within one integrated model of what actually happens to patients moving through a hospital admission, from treatment through to discharge, and back to their community dwelling. It extends the current evidence base by documenting this movement using a method of analysis that supports examination of 'work-as-done' – the Functional Resonance Analysis Method (FRAM:

Hollnagel, 2012). This method explicitly recognises, and seeks to model, the variability in the system and the role of different actors in creating, or compromising patient safety. In seeking to model 'work-as-done' including the patient and family perspective, we are explicitly exploring the functional activity in the movement from hospital to home, recognising that some of this activity may involve, or be undertaken by patients and families.

With the wider programme of research concerned with developing an intervention to improve transitional care for older adults, we were also keen to explore if the FRAM approach could be used as a basis for the development of an explicit 'theory of change'. Identifying the hypothesised ways in which complex interventions will achieve their desired outcomes, is a key requirement of all intervention development research (e.g. Skivington et al., 2018; Davidoff et al., 2015). However, whilst the literature discussing the nature of intervening in complex systems increasingly recognises the need to standardise by function rather than form (Hawe, 2015), the FRAM approach – with its emphasis of functional activity over tasks – has not to date, been used for this express purpose.

Therefore, in this study we had the following specific research objectives:

- (1) using the FRAM, to describe the process of care at transitions by integrating perspectives of key stakeholders (healthcare professional, patient and families), to explore how functional activity is related, and how patients and families both introduce, and reduce variability;
- (2) explore the use of the FRAM model as a basis for developing a logic model to guide future intervention development.

## 2. Methods

### 2.1. Setting and sample

This study drew on data from two previously conducted research studies (conducted by the authors) examining the transitional care process for older adults, the full methods for which have been published previously (Hardacre et al., 2017; Baxter et al., 2018).

#### 2.1.1. Data source 1: Exploring the perspective of older adults across transitional care (Hardacre et al., 2017)

This study used a focused ethnographic methodology (Knoblauch, 2005) comprising observations, 'go-along' and semi-structured interviews, to capture patient and carer experiences across the care transition from hospital admission to 90 days after discharge. Thirty two patients (aged 76–99 years old) and 18 family members were recruited to the study. 160 patient-oriented field visits were conducted, comprising of interviews, observations and more informal discussions with patients and their family members. These field visits focused on understanding the patient and family experience of being in hospital, discharge, and being at home (or in intermediate care in some cases), and the degree to which people had been involved in their own care (or the care of a relative). In addition, two weeks of more generalised hospital-based observation work was undertaken, to understand the work that is done by staff to facilitate care in hospital, especially at the point of discharge, and the context within which care is delivered. Patients were recruited from multiple hospital wards across four specialties (care of the elderly, orthopaedic care of the elderly, respiratory, and stroke), within three hospitals in two NHS Trusts. Most patients were recruited at admission and were followed up shortly before or at discharge; shortly after discharge; 2–3 weeks post-discharge; and three-months post-discharge. Patients were also followed up if they were readmitted to hospital during the three-month post-discharge period.

### 2.1.2. Data source 2: Exploring how services experience transitional care (Baxter et al., 2018)

This qualitative study explored how high performing health care teams successfully deliver safe care to older people and overcome the challenges faced during transitions of care from hospital to home. High performing hospital specialities and general practices were identified using 30-day emergency readmission rates for patients aged 75 years and over, and purposively sampled to represent diverse healthcare contexts (e.g. different specialties and demographics). A total of four hospital specialties (two care of the elderly, one cardiology, and one respiratory), and six general practices agreed to participate in the study. Within each general practice or hospital ward, purposive and opportunity sampling were used to recruit multidisciplinary staff to participate in a focus group and/or interview. Participants included doctors, nurses, healthcare assistants, allied health professionals, discharge co-ordinators, and administrative staff. Transitions of care often involve a variety of healthcare teams (Waring et al., 2014), therefore, community staff (e.g. community matrons, district nurses, and specialist care nurses) that worked with or into the high performing sites to support patients as they move from hospital to home were also recruited. In total, 20 multidisciplinary focus groups and 12 one or two person interviews were conducted involving 157 hospital, general practice and community staff. In secondary care, nine staff meetings relating to discharge or transitions (e.g. board rounds and Length of Stay meetings) were also observed by the researcher and field notes were taken to gather contextual information about how discharge and transitions of care are planned. Observations were not conducted in primary care as specific meetings about transitions of care are rare.

## 2.2. Functional Resonance Analysis Method (FRAM)

We used the FRAM (Hollnagel, 2012) to model the transitional care process from hospital admission through to receiving post-discharge follow-up care at home. Using the FRAM allowed us to describe the activities that are undertaken by staff, patients, families and carers, in the process of being admitted to hospital, through to the immediate (30-day) post-discharge period within the community. Further, this analytical approach supported the description of everyday variability in this process, and how, through resonance in interdependent functional activity, variability in 'upstream' activities (in hospital) may impact on outcomes of 'downstream' activities (post-discharge).

## 2.3. Modelling and analysis

To develop the FRAM model of transitional care from our two data sources, we used an iterative process of immersion within the qualitative data sets, interpretation, and discussion. First, the data were analysed independently by two of the authors (RB and NH), to draw out the chronology of events and types of activity that typify the movement of a patient from hospital admission, through to discharge and the post-discharge period. Second, the authors met seven times across seven days (total hours = 35), to discuss this identified chronology, and how the work processes presented might be constructed into discrete functions that describe activity. The modelling process was supported through the use of the 'FRAM Model Visualizer' (Hollnagel, 2016).

### 2.3.1. Identifying the functions

Our building of the FRAM model to represent the transitional care process drew upon data relating to: the experience of the patient and family across their care journey; the involvement of different individuals, teams, and organisations; the activities and tasks that staff complete; the challenges that staff face in their everyday work; and the cultural contexts that facilitate or hinder them. These data provided a multidisciplinary, cross-service perspective of the functions required to support transitions from hospital to home, the performance variability that exists within each function, the coupling between functions, and the

functional resonance that emerges as a result.

We began by describing the boundary of the system under exploration. It was agreed by the authors that for our purposes, the transitional care process began with admission to hospital, and moved through discharge from hospital and all referrals to services outside of the setting, up to 30 days post-discharge, or on escalation back into an acute care setting via a readmission to hospital. Functions were then identified from the point of admission to the 'base' (i.e. specialty) ward from which a patient would be discharged, to describe the activity that is undertaken within this defined system boundary. As the functions were built up, they often started with the a more granular description, but due to the scale of this system, were often collapsed together into a necessary higher level of abstraction, before being described in the language of FRAM, as 'to do X' activity (Hollnagel, 2012). The identification and description of functions was an iterative process, with multiple revisions and additions occurring across the analysis period. The FRAM model was built up by discussing the discrete functions, before linking them using the six 'aspects' of these functions (Fig. 1): time (T), control (C), resources (R), pre-conditions (P), input (I) and output (O).

### 2.3.2. Finalising the FRAM model

Whilst it is recognised that a FRAM model is by definition non-linear, we did effectively add a sense of temporality into our modelling, with functional activity at the 'start' of the transitional process (admission to a base ward) located at the left of the model, and functional activity at the 'end' of the transitional process (escalation back into acute care settings) located at the right of the model. This supported a visualisation of the temporal nature of transitional care, and the ease of identifying the 'gaps' between functions accounted for by different services, settings or people. Once the foreground functions (those that represent the main activities in the transitional care process) had been agreed, we sought to model the background functions (those that introduce variability into the main functions, but themselves are considered to be more 'stable') (Hollnagel, 2012). However, due to the scale of the developed FRAM model, we did not include links from the background functions to the foreground functions, as this would have rendered the model effectively over-specified and unusable.

The finalised draft FRAM model was 'sense checked' by members of the wider research team, which included clinical staff, patient representatives, improvement scientists, and academics. Following these consultations, the final version of the model was agreed.

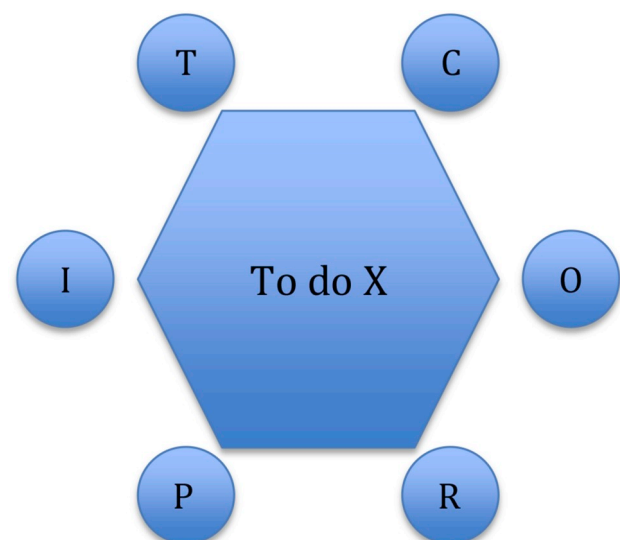


Fig. 1. Basic FRAM function and aspects (adapted from Hollnagel, 2012).

### 3. Findings

The full FRAM model describing transitional care for older adults is presented in Fig. 2 with further detail available in Supplementary File 1. Compared to previously published applications of FRAM, this model was substantial. Due to the level of granularity - which was necessarily 'abstracted upwards' as a result of the scale the system boundary, and our focus across all hospital services - we chose not to use certain aspects of the functional description, in particular, timing and control. Further, due to this scope and scale, it would have been difficult to estimate the variability of individual functions, or explore variability introduced by background functions.

#### 3.1. Research objective 1

*Using the FRAM, to describe the process of care at transitions by integrating perspectives of key stakeholders (healthcare professional, patient and families), to explore how functional activity is related, and how patients and families both introduce, and reduce variability.*

Due to our focus on transitional care, we chose to assign the start of our system boundary on admission to a 'base' (i.e. specialty) ward from which a patient would be discharged, rather than on admission to the hospital. The functions have been colour coded according to the healthcare team that predominantly conducts the functional activity. All activity that is conducted within the hospital to admit, treat and plan a patient's discharge is coloured red. Activity completed by general practice teams is coloured blue, activity conducted by the community nursing teams is purple, and that of the community pharmacists is grey. The yellow functions represent the activity that patients are responsible for following discharge from hospital. The points at which there is a handover of responsibility between services and/or patients are represented in green.

Following admission to a hospital ward, staff assess, plan, and deliver care to patients in order to treat their medical condition(s) and address their nursing needs (washing, dressing, toileting etc.). Due to our level of abstraction, these functions subsume a variety of different tasks and

represent a large proportion of 'delivering' patient care. Throughout this process, multidisciplinary staff start planning and preparing the patient discharge; they liaise with family and carers, assess patient needs (e.g. functional ability and home support or equipment required), and start discharge paperwork and referrals. Following an iterative process of assessment and treatment, patients are declared 'medically fit for discharge' whereby their care can be continued within a non-acute setting. Patients are also declared 'ready' for discharge, although these two functions may not occur simultaneously as staff put support in place at home and/or patients deteriorate clinically.

Once patients are both medically fit and ready, all discharge processes are finalised. Paper work is completed, patient notes are finished, and formal handovers (e.g. discharge letters and referrals) are sent to general practice and community teams. At the point of discharge, staff have conversations with patients and/or their family during which they are given a supply of ToTakeOut medications (TTOs) and a copy of the GP discharge letter. Although this function represents the point at which patients are handed back 'responsibility' for their care, this activity is generally not conceived by staff or patients to be a formal 'handover' of care and the quality of this conversation varies depending on the individual, workload, and ward.

Following discharge, general practices and community health care teams receive and interpret discharge letters or referrals, and assess what action is required. Through self-management and the delivery of community health (and social) care, staff and patients seek to reach an appropriate state of ongoing monitoring, assessment and care delivery. Perturbations and variability within these activities may disrupt this equilibrium causing patients, their family, or staff members to 'reach into' healthcare services for additional support. At times, this escalation is contained within a community setting, but it can also lead to appropriate - or inappropriate - hospital readmissions.

Including patient and family perspectives in the FRAM model helped to identify safety gaps within the transitions system. These gaps predominantly existed between teams, services, and settings. One of the key safety gaps was the lack of patient 'handover'. Discharge represents the point at which community dwelling patients are handed back

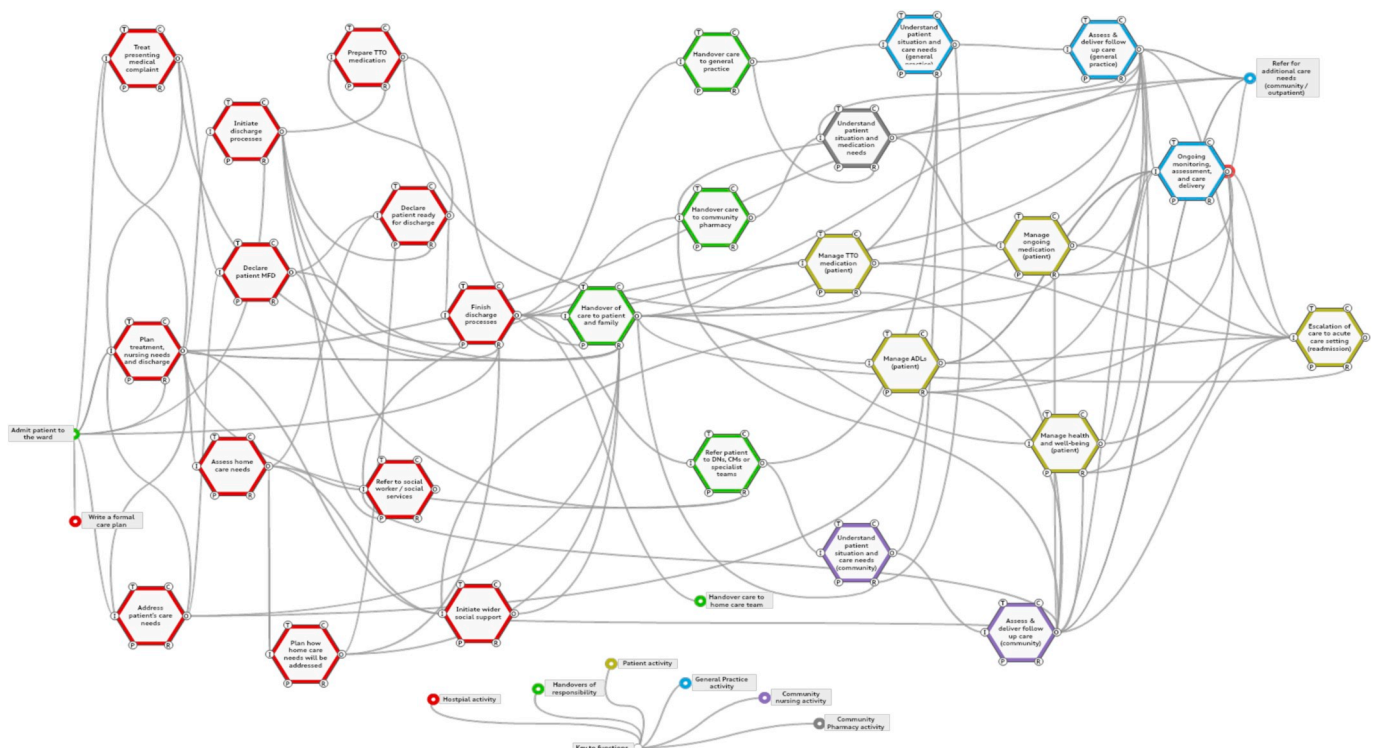


Fig. 2. FRAM model of the transitional care process.



responsibility (to varying degrees) for the management of their health condition, medicines, daily activities and escalation of care (the yellow patient activities in Fig. 2). Variable patient handovers mean that patients are often discharged without knowing what they have been treated for, how their medications have changed, and what to expect at home. This hinders their ability to take on responsibility and self-management of their care. Patients also experience safety gaps as they transition from TTO to routine medications, and at the point of escalating care. For staff, safety gaps predominantly exist at handovers whereby discharge letters and referrals are delayed and/or lack clarity or detail. Although this hampers their ability to deliver safe care, healthcare professionals are better placed than patients or family to navigate the healthcare system and resolve issues.

Transition interventions and improvement work often seeks to address these safety gaps by reducing unwanted variability within the specific functions, e.g. by improving the quality of GP discharge letters or introducing discharge checklists (Andreassen et al., 2015; Dossa et al., 2012). However, the FRAM model highlighted interdependency between functional activities and demonstrate how variability within a function or set of functions, can amplify outcomes (positively or negatively) further downstream. For example, variability in patients' ability to correctly take and manage medications at home, is not only impacted by the quality of the discharge conversation. It is also linked to the extent to which patients are informed of medication changes and given the opportunity to retain and practice the skills required to take their medications during the hospital stay (part of the 'treat presenting medical complaint' function in Fig. 2). Furthermore, knowing what ongoing care and treatment to expect at home depends on patient involvement in conversations and decisions about treatment, care needs, and discharge plans during the hospital stay. Positive resonance describes how functions resonate to enables system success (Furniss et al., 2016). Our model suggests that, where patients are involved and supported to retain independence during the hospital stay, this will resource their 'handover of care' and enabled them to dampen variability more effectively once they got home.

### 3.1.1. Illustrative cases

To illuminate the key findings described above we examine exemplar 'cases', drawn from our data from patients, families and healthcare professionals across settings (Table 1). As our wider programme of research seeks to develop an intervention to support patient and family involvement in transitional care, we have chosen to illustrate this functional resonance through the five key functions that we aim to support following discharge from hospital, namely i) 'managing totake-out (TTO) medication', ii) 'managing on-going medication', (iii) 'managing activities of daily living (ADLs)', (iv) 'managing health and well-being', and v) 'appropriate escalation' (patient activities in Fig. 2). For the purposes of providing exemplar cases, we have merged the two functions relating to managing medication post-discharge. We describe the four functions and synthesise our data to provide examples of how positive and negative variation resonates across functions to influence post-discharge outcomes.

### 3.2. Research objective 2

*Explore the use of the FRAM model as a basis for developing a logic model to guide future intervention development*

Following the sense-checking exercise with clinical staff, patient representatives, improvement scientists and researchers, it was clear that the FRAM model in its final form had face validity, but in order to support intervention development to improve transitional care, we needed to simplify it, and use it to describe our underlying 'theory of change'. This simplification was driven by the nature of the intervention we aim to develop - a primarily patient-facing intervention designed to support patients and their families to improve the safety and quality of their transitional care (O'Hara et al., 2018). To this end, and in keeping

**Table 1**  
Detail of four illustrative 'cases'.

Function	Function description	Variation causing negative post-discharge patient outcomes (negative resonance)	Variation causing positive post-discharge patient outcomes (positive resonance)
Manage To-Take-Out (TTO) medications AND Manage ongoing medications	Most patients leave hospital with some to-take-out (TTO) medications. These medications may be new, may have changed (e.g. dose) and/or some may have been stopped. On discharge, patients are responsible for taking their own medications (with or without help) and getting repeat prescriptions once their supply of TTOs runs out. Following this, patients have to manage all of the ongoing medications needed to treat their health condition (related to the hospital admission and any wider health concerns).	As staff dispense and administer medication in hospital, patients don't have the opportunity to practice taking them and/or they lose the skills required to do so. Minimal discussions about why medications are prescribed (e.g. during medication rounds) mean that when patients get home they don't understand why they are on certain medications, which of them have changed, or what the potential side effects are. Patients don't always know how to get new prescriptions once their TTOs have run out, or how to resolve problems that they encounter. This can lead to medication errors or patients not taking medicines as prescribed. <i>CASE EXAMPLE: Mary (92) wanted to contact her pharmacy to chase up her medication once her TTOs were finished, but she couldn't read the pharmacy details on her medication box because the text was too small. She didn't know who to contact because nobody had told her. Consequently, she felt she had little ability to solve the problem she had identified.</i>	Staff advise patients to throw away old medications that they have at home to minimise risks of medication errors (e.g. taking medications at an old dose, stopped medicines, or duplicating medicines). Staff provide medication aids to help patients correctly take their medicines at home (e.g. doset boxes or documents stating what to take and when). Patients take their discharge letter/old medication boxes to their GP to ensure they get the correct/a new prescription. GPs/Pharmacists ring patients following discharge to review their medications and to check they understand their new regime. <i>CASE EXAMPLE: Katherine (84) didn't realise a new medication was for her because she hadn't remembered being told about it in hospital. She took the medication to her GP and this enabled her to take her medication correctly.</i>
Manage health and well-being	Almost all patients require some level of ongoing recovery in a community setting. Some patients will, in time, recover to their baseline, while others may	Patients often don't understand why they have been in hospital, what their diagnosis or condition is, and/or what treatment they have	Staff involve patients and family and/or patients and family seek to involve themselves in their care, treatment, and discharge

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Table 1 (continued)

Function	Function description	Variation causing negative post-discharge patient outcomes (negative resonance)	Variation causing positive post-discharge patient outcomes (positive resonance)
	need to adjust to a new 'normal'. Following discharge, patients take responsibility (with or without help) for managing their ongoing recovery and health. They monitor symptoms, moderate activity, escalate or seek help, or change behaviours as necessary (e.g. stopping smoking). This relates to their specific reason for admission, but also to any wider health and psycho-social problems which can sometimes lead to inappropriate escalation of care and readmission.	received. Lots of activity that supports the delivery of patient care and discharge planning happens away from the patient bedside (e.g. at board rounds, MDT meetings and informal discussions). In combination, this makes it difficult for patients to manage their health at home. <i>CASE EXAMPLE: Frank (94) had very little understanding of what had happened in hospital or what follow up care he was due to receive post-discharge. He also felt 'ejected' from the hospital because his discharge date had been brought forward suddenly and he didn't know why. This made him feel anxious and worried that he had been discharged too soon. Frank was meant to have a time-sensitive repeat blood test at his GP practice 7 days post-discharge. The GP practice was meant to arrange this. Because Frank didn't know about this he wasn't able to chase this up with the practice and it was missed.</i>	planning by asking questions and 'digging' for information. Through this, patients have a better understanding of what has happened to them and what to expect at home by the time they leave hospital. <i>CASE EXAMPLE: Ray (76) made notes of questions he had, and also recorded details of discussions that he had with health care professionals in the hospital and once he returned home. Alongside being able to self-manage his ongoing care and complete his therapy exercises as prescribed, he was able to provide community therapists with details of the discussions he had had with clinical staff in hospital that they didn't yet have access to.</i>
Manage Activities of Daily Living (ADLs)	On discharge, patients resume responsibility for their everyday activities (with or without help). This may include mobilising, feeding, washing, toileting, household tasks, socialising etc. Patients are required to seek help for these activities as needed. Some patients resume responsibility for their ADLs with no	In hospital patients adopt a patient role which, at times, is reinforced by staff and families. There are expectations that a lot of nursing care (including ADLs) will be 'done for' patients instead of staff supporting patients to do things themselves. Patients also have limited opportunity to practice and maintain the skills	Staff engage in campaigns (e.g. End PJ Paralysis), conduct ward-based activities, and promote the use of communal areas to help minimise deconditioning in hospital. Patients seek to retain as much independence as possible by actively working against hospital processes e.g. by mobilising around the ward despite

Table 1 (continued)

Function	Function description	Variation causing negative post-discharge patient outcomes (negative resonance)	Variation causing positive post-discharge patient outcomes (positive resonance)
	problem and welcome the opportunity to do so. Other patients assume that they will be able to manage but struggle in reality, and others do less than they actually can. The ability to manage ADLs impacts patients' quality of life.	that they need to complete normal daily activities, e.g. washing, dressing, feeding, and toileting. As a result, patients can lose the skills and confidence required to complete these activities for themselves at home. Patients spend a lot of time in hospital being sedentary (usually as part of falls prevention strategies). Unfortunately, this can lead to deconditioning making people more likely to fall once out of hospital. <i>CASE EXAMPLE: Mary (92) was admitted to hospital after a fall at home. During her five-day hospital admission, she was told she was not allowed to get out of bed at all, just in case she fell – despite wanting to walk to the toilet and use the shower, she was told she must use a bed pan and was washed in bed by staff. She spent an additional eight days in a community intermediate care bed, where she remained largely sedentary because care home staff discouraged her from walking. When she returned home, she found that she didn't have the strength to walk around her flat or stand and cook a meal and she fell in the kitchen. This resulted in another admission. During this second admission Mary was again told that she was not allowed to get out of bed and required a package</i>	being told not to. Staff consider the patient's holistic situations and account for their wider social circumstances when planning discharge. This helps patients get the support they need for ADLs once home. <i>CASE EXAMPLES: Trevor (84) was discouraged from moving around the ward in case he fell. Trevor felt confident about his ability to mobilise safely and so chose to get out of bed and walk around the ward regularly. Trevor experienced no loss of strength or confidence during his three-day hospital stay. When Pearl (92) first came in to hospital she wanted to stay in bed and be 'looked after' by staff (for example, requesting to use a bed pan instead of walking to the toilet). Ward staff continued to encourage Pearl to get up and mobilise, making sure her pain was managed to enable her to move around. After a few days Pearl was mobilising around the ward with her walking aid and was using the toilet independently.</i>

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Table 1 (continued)

Function	Function description	Variation causing negative post-discharge patient outcomes (negative resonance)	Variation causing positive post-discharge patient outcomes (positive resonance)
Appropriately escalate care to acute care setting	As part of the four functions above patients have responsibility to escalate aspects of their care at home e.g. by getting additional prescriptions, seeking advice or referrals for unexpected symptoms and non-urgent deterioration etc. These actions are all part of routine, post-discharge follow up. However, an additional outcome of this is that patients, family and staff will sometimes appropriately or inappropriately escalate the patient's care back into an acute care setting triggering a readmission. Certain escalations to acute care are completely appropriate.	of care to help her manage at home. Before her first hospital admission Mary had received no formal help from carers and mobilised independently with walking aids. After two hospital admissions, Mary required visits from carers four times a day and very rarely mobilised without assistance.	
		Due to a limited understanding of their health, wellbeing, and what has happened during their hospital admission, patients do not know what to expect or look out for as part of their continued treatment at home. This can create anxiety and means they are not always able to appropriately escalate their care when needed. A lack of understanding about health and social care services means that patients and staff are not always able to navigate or signpost available support. <i>CASE EXAMPLE: Patricia (77) was told to 'contact someone' if she felt 'unwell' but was given little guidance on how and when to escalate appropriately. NHS 111 was mentioned to her in hospital and Patricia thought that this was the recommended route of escalation. Consequently, when Patricia had an exacerbation of her COPD she phoned NHS 111 who called an ambulance and took</i>	Staff educate patients and support them to self-manage their conditions so that they know what signs and symptoms to look out for at home and how to get help. GPs and community staff actively 'receive' patients back into the community. This means that problems are identified quickly and potential readmissions avoided. <i>CASE EXAMPLE: Doris (99) felt very fatigued after a hospital stay and her family thought that she may have been discharged too soon. They considered taking her back into hospital via A&amp;E. However, Doris' GP was proactive in providing follow up care to Doris when she returned home. He investigated the cause of the fatigue and treated the cause without Doris returning to hospital.</i>

Table 1 (continued)

Function	Function description	Variation causing negative post-discharge patient outcomes (negative resonance)	Variation causing positive post-discharge patient outcomes (positive resonance)
		her to hospital. Patricia had a hospital stay, which clinical staff said could have been avoided if she had contacted her GP instead of NHS 111.	

with the findings outlined above, we were keen to demonstrate how focusing on the upstream functional activity might lead to better patient outcomes following discharge from hospital.

Fig. 3 details the working logic model developed from the FRAM, which will guide subsequent intervention development. In using FRAM to model the system in terms of 'work-as-done', we are developing this intervention in line with emergent approaches to complex intervention development (Lilford, 2018; Hawe, 2015; Shiell et al., 2008; May et al., 2016). Such approaches move us away from tightly controlled interventions, and towards recognising the self-organising properties of 'communities' around similar problems.

Our theory of change posits that to improve patients' ability to undertake the four functional activities that they resume responsibility for after discharge, we must where possible, support these same activities in hospital. Essentially, patients need to 'practice being at home' while they are in hospital. In keeping with the emergent approaches to intervention development, our intervention will support services to achieve the *functional aims* (Hawe, 2015) of successfully 'handing over' responsibility to patients for medications, ADLs, health and well-being, and escalation. Exactly *how* services achieve these functional aims will be context dependent.

#### 4. Discussion

This study used FRAM to develop a model of the transitional care process that integrates multiple stakeholder perspectives. This model was then used to develop an underlying theory of change, as a foundation for intervention development. Whilst we found that modelling transitional care through combining multiple perspectives was challenging, it was possible. Indeed, it almost certainly led to different conclusions about the nature of, and responsibility for, functional activity undertaken post-discharge by patients and families. Further, through the FRAM model we identified a number of key interdependencies between functional activities that straddle hospital admission and post-discharge. Due to these interdependencies, we conclude that patients and families can be further supported to achieve more successful 'outcomes' after being discharged, by reducing 'negative resonance' from unwanted variability in upstream hospital-based functional activity.

##### 4.1. Implications for transitional care research

This study is, to the authors' knowledge, the first to apply the FRAM approach to the transitional care process. Previous work has successfully used FRAM to model the activities associated with the day of discharge (Laugaland et al., 2014). However, our work builds on this by understanding how patients and families manage the movement from hospital, back into the community, and the safety gaps that arise as a result. One key finding worth exploring here is that in using the FRAM, we have highlighted activity, and in particular responsibility for activity, that has prompted us to think differently about how we can intervene to improve

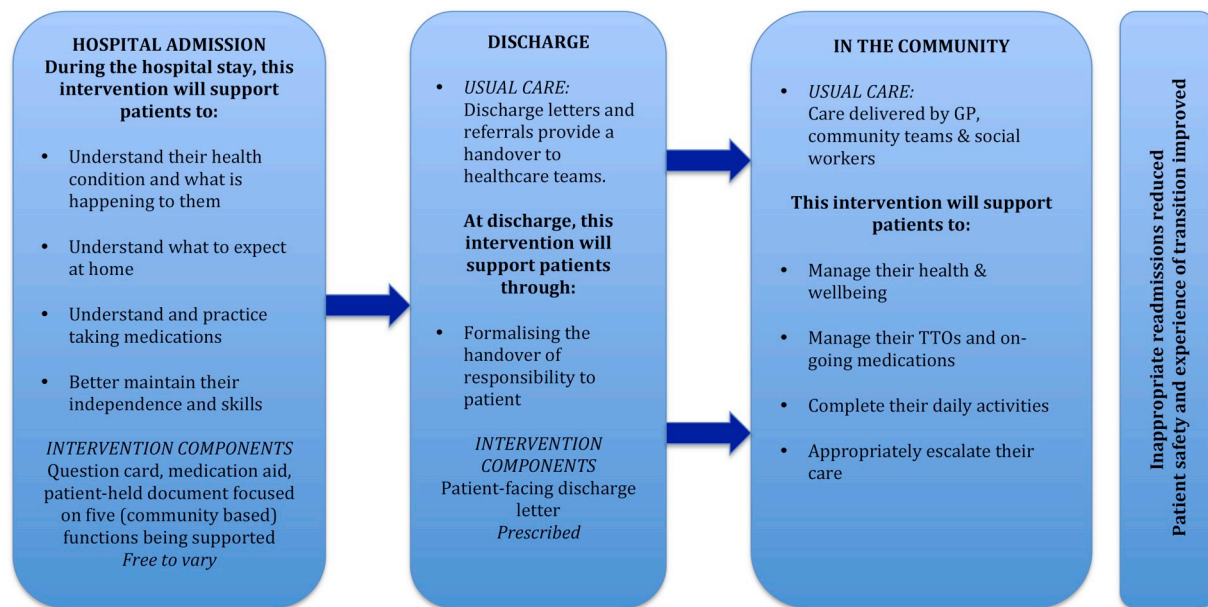


Fig. 3. Logic model for further intervention development.

transitions. This has not been articulated in such terms within prior research which focuses on discharge, the immediate post-discharge period, and interventions that ‘bridge’ this transitional gap (Burke et al., 2014; Hesselink et al., 2012; Hansen et al., 2011).

We have conceptualised a critical ‘pivot point’ in the system, through integrating patient perspectives on transitional care alongside staff perspectives across settings. We found that upon hospital admission, patients relinquish control for many of the functions that they are usually responsible for in the community (self-medication, self-care, management of condition(s), escalation of care). At discharge, patients are then – often hastily – handed back responsibility for these same functions. We conceive this as a ‘handover to the patient’. We use the term handover purposefully, aware of its common understanding within clinical settings. This is because much of what is handed back to the patient is, in reality, responsibility for clinical activity that was previously managed by staff in hospital.

This conceptualisation of a ‘handover to the patient’, is in contrast to much of how discharge has been conceptualised previously (e.g. Andreasen et al., 2015; Dossa et al., 2012; McKeown, 2007). Whilst it is recognised that discharge is a complex, multi-faceted, multi-disciplinary process (Laugaland et al., 2014; Waring et al., 2014), it is arguable that the handover of responsibility to patients and families at the point of leaving the hospital has hitherto not been given such a focus, with the main aspect of handover of ‘responsibility’ seen as the referrals to primary care, community services or social care (Dossa et al., 2012). Therefore, the lack of recognition for this ‘handover to the patient’ seems to be a fundamental misunderstanding of how patients function after leaving hospital. Further, given that variation in most, or all of these community-based patient activities may lead to a readmission to hospital, it seems sensible to seek to understand how they are interdependent with upstream activities within a hospital setting. Using the FRAM has supported our attempts to understand and model these interdependencies.

In addition to supporting the development of a patient-facing intervention to support safer transitions, it is likely that the FRAM model will in and of itself have utility for supporting identification of system variability. The model could provide healthcare professionals and managers with a ‘roadmap’, to understand where unwanted and/or positive variability is within their local systems, and identify what the consequences of that variability are for patients and the system as a whole. This presents a very different approach from traditional safety

management, whereby examinations of systems usually occur in the aftermath of an incident, and an investigation to find the ‘root cause’ of an event (Hollnagel et al., 2015). Indeed, Raben et al. (2018) specifically propose the use of FRAM to identify leading indicators for safety in healthcare systems (indicators that provide feedback on performance before an incident occurs). We suggest that by exploring how patients and families are prepared by hospital-based healthcare professionals to take responsibility for key activity post-discharge, may provide organisations with leading indicators to better understand the safety, efficiency and experience of the transitional care process.

#### 4.2. Implications for resilient healthcare research and theory

Our findings also have relevance to the wider literature on resilient healthcare and resilience engineering. This study represents the first to use the FRAM approach to explicitly engage with patients and families, as both sources of information about how the system works, and also identifying them as ‘co-creators of resilience’ (O’Hara et al., 2019). There are a number of previously published empirical studies that have identified the potential role for patients and families as contributing to the resilience of healthcare systems (Furniss et al., 2014; Fylan et al., 2018, 2019; Eliasson et al., 2011). However, none of these specifically used the FRAM, or sought to model the system visually in ways that integrated the perspectives of all stakeholders. Our findings do echo those of a recently published paper by Fylan et al. (2019), who conceptualised medicines management systems in terms of ‘gaps, traps, bridges, and props’. The authors describe how patients and families manage their medication across transitional care, and how they negotiate around ‘gaps’ in the structure of services, and ‘traps’ that can make problems with medication more likely. This study is of particular relevance, however, because they describe how patients and families effectively ‘prop’ up failings in the system through their actions. This supports our findings, and underlines that patients and families represent a relatively under recognised source of resilience in healthcare transitions, with their activity effectively amounting to everyday ‘performance adjustments’.

#### 4.3. Implications for improvement and implementation science

The specific use of FRAM as the basis for developing an articulated ‘theory of change’ represents a novel contribution to the field of



improvement science. Our study builds on the extant literature by using the FRAM to support the development of a theory of change, to guide intervention development. The FRAM has only been used once previously with the specific aim of intervention development. Ross et al. (2018), in their analysis of fluoride varnish application for children within dental practice, concluded that FRAM was an appropriate method for creating a system model that could identify 'target' functions that may create undesirable resonance in downstream functions. Thus, Ross et al. (2018) used the FRAM explicitly to identify where to intervene, and hypothesise how the intervention might lead to the desired outcomes. Identifying the hypothesised mechanisms through which an intervention will have its effect, is now regarded as a foundation of all improvement work (Davidoff et al., 2015). However, given that parsimony has been argued to be one of the key factors for theories describing behaviour change (Michie et al., 2014), we felt it important to translate the FRAM model into a simpler, more accessible logic model. Whilst logic models have recently been criticised for being reductive, and not sensitive enough to capture the nuances of context required to understand complex interventions (Mills et al., 2019), they do serve as a useful heuristic device with which to share complex information quickly with stakeholders, something that a FRAM model is unlikely to achieve.

#### 4.4. Implications for policy

Finally, it is perhaps worth reflecting on the process of, and benefits for, bringing together multiple perspectives in modelling systems of transitional care. Whilst we initially conceived the perspectives we were modelling as a dichotomy between healthcare professionals, and patients and families, we quickly realised that our modelling in fact encompassed multiple perspectives. It became clear that healthcare professionals largely see only the functional activity within the boundaries of the immediate system within which they work. Thus, staff across primary care, secondary care, and community care all provided one 'piece of the puzzle' representing some part of within-service activity. It was only by combining these different perspectives that we generated greater insight into the variability and resonance that was created through the coupling of functions within the system. Patients and families, who were present across the whole system, were able to illuminate safety gaps that may not have been identified through the perspective of healthcare staff alone.

Additionally, that we found the process of modelling the transitional care system through a patient-centred lens a challenging endeavour, is noteworthy. Patient-centredness is almost universally regarded as a cornerstone of health care globally. However, when actually tracing the pathway that a patient takes through the system, it became abundantly clear that the way in which we set up health services, not only often fails to support patient-centredness, but actually obscures it for most healthcare professionals. An example of this in our modelling was the juxtaposition of viewpoints of the same phenomenon. To illustrate this juxtaposition, we can consider the concept of 'discharge', and the different meanings this held from different perspectives.

Patients often reported feeling 'ejected' from the hospital – relieved, but also anxious about leaving the acute care environment. Staff within an acute care setting viewed discharge as an overarching priority, with patient flow policies dictating the conduct of discharge to primarily achieve efficiency in moving patients through the system. Conversely, staff from primary and community settings viewed discharge generally through the lens of inadequacies in information sharing across a system boundary. What is evident from this juxtaposition, is a general lack of recognition of the specific needs of this important transitional period. These boundaries between services are an artefact of our system design, effectively obscuring the path trodden by a patient through their care journey. They also obscure some of the safety gaps, that through taking a patient perspective, we feel we have been able to illuminate.

#### 4.5. Study limitations

There are a number of limitations to this work. First, due to the scale of the transitional care system as we have modelled it, we have necessarily had to identify functions at a higher level of abstraction than has generally been seen in previous research using FRAM. An obvious criticism, therefore, might be that in doing so, we have lost meaning in some functional activity, and that variability cannot be modelled reliably. However, we contend that for our purposes, the FRAM has been used as intended – to visualise what might otherwise have been a narrative of the patient's journey through the transitional care process, and how services organise around it. Further, Hollnagel (2012; p.22) states that FRAM as an approach is a 'method-sine-model' rather than a 'model-cum-method', meaning that it was designed to model how things happen, rather than impose a model upon our interpretations of a system. Put simply, our model represents our best guess about how the transitional care system operates from multiple perspectives. The FRAM approach allowed us to visualise our qualitative data with reference to rules for describing the system (functional activity, interdependencies etc.), but without prescribing how that system might look, or the level of abstraction required for the system components.

The second key limitation, linked to the first, relates to our not being in a position to undertake the modelling with individuals representing the multiple perspectives. However, we believe we have mitigated the risk of misrepresenting the final model through two key ways: i) undertaking a 'sense-checking' exercise with the wider programme team comprising clinical staff, patient representatives and researchers in the field of transitions and resilient healthcare studies; and, ii) working closely with a panel of patient representatives aligned to the research to check our developing ideas and support our interpretation.

#### 5. Conclusions

Whilst there has been a longstanding recognition of the need for, and success of, patient and family involvement in ensuring the safety of transitional care and reducing readmissions, the degree to which this has been achieved is variable. This study represents the first to use an approach that explicitly recognises the 'work-as-done' from the perspective of patients and families, as well as healthcare professionals. In doing so, we have conceptualised a critical 'pivot point' in the transitional care process – that discharge represents a 'handover to the patient' in terms of the responsibility for key clinical activity, that they resume once home. We have demonstrated that focusing on supporting certain upstream activity within hospital (e.g. encouraging patients to retain mobility, supporting a better understanding of medications and condition), may lead to improved outcomes for patients and their families following discharge from hospital.

#### Ethical approval

The data for the analysis presented here was drawn from two studies, each with ethical approval. Exploring transitions of care from a staff perspective: University of Leeds ethical approval reference 17-0202 and 17-0234; Partners at Care Transitions (PACT) - exploring older peoples' experiences of transitioning from hospital to home in the UK: Wales REC 7, 17/WA/0057.

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## Contributorship

JKO conceived the idea for the publication and drafted the manuscript. JKO, RB and NH all conducted the analysis. RB and NH both contributed content to the manuscript, and all authors approved the final version.

## Guarantor

JKO acts as guarantor for this publication.

## Declaration of competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.apergo.2020.103060>.

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