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Research Article

Unveiling the Mechanisms of Change: An Explanatory Case Study of Improving Hip Fracture Rehabilitation in Sweden

Abstract

Background: Hip fracture has a high risk of mortality and puts a large financial burden on the health care system.

Context and Purpose: A successful hip fracture rehabilitation project at a Swedish university hospital resulted in reduced length of hospital stay, earlier returns to pre-accident housing, and decreased costs. The purpose was to identify promoters and obstacles of change in the improvement project.

Methods: This is an explanatory case study of a hip fracture improvement project. Pettigrew and Whipp's framework was used for describing the four strategic dimensions of change in the case: context, content, process, and outcomes. Mixed methods data was used to identify promoters and obstacles.

Findings: Promoters: a dedicated project leader, empowerment educated rehabilitation staff, the combination of planned and emergent change; co-location of orthopaedic surgery and geriatric rehabilitation ward. Obstacles: organizational complexity, resistance to change.

Conclusions: A dedicated project leader supported by top management and the use of empowerment in the rehabilitation in combination with planned and emergent change can lead to improvement, despite organizational complexity and resistance to change.

Potential implications: This study provides a better understanding of promoters and obstacles of change that influenced the success of a hip fracture improvement project in a large health care organization. This knowledge may support decision makers when planning large-scale improvement projects in complex organizations.

Introduction

To identify and use the most effective methods for improving clinical practice is a challenge. The current study is an explanatory case study [1], of a research and development project. The aim of the project was to empower the patients in their post-operative rehabilitation and to decrease length of hospital stay, as well as to improve patients' post-hospital quality of life.

There is a frighteningly high mortality risk for hip fracture [2,3]. Therefore it is essential that the care of this fragile patient group is well organized and conducted by competent personnel. Moreover, from a societal perspective, this patient group places a heavy burden on the health care system. In 2007, the Public Health Report for Stockholm County indicated an increasing number of hip fracture patients in the population [4], which in turn would increase pressure on hospitals. Osteoporosis-related hip fractures lead to more hospital days than ischemic heart disease, breast cancer and prostate cancer combined [2].

Many methods and approaches have been proposed to make changes in health care to improve patient care, rehabilitation and organization [5-14], e.g., Kotter's 8-steps change model, Total Quality

Management (TQM), Continuous Quality Improvement (CQI), Business Process Re-engineering (BPR), the Breakthrough Model, and lean manufacturing. However, it is unclear if any one of these approaches is more effective than others [6].

Health care quality improvement projects are complex social interventions. It has been argued that such interventions can only be properly understood if the interplay between the context, content, process and outcome of the intervention is well described and evaluated [15,16]. In-depth analysis is required to discover mechanisms that can tie the interventions to contextual factors and outcomes. Pawson and Tilley studied complex interventions in health and social care [17-19]. They state that whether the ideas in change projects have sustainable effects or not depends on i) the individual capacities of the change agents and/or project leader, ii) the interpersonal relationship among individuals in the intervention group, and iii) the institutional balance between the organization and the wider infrastructural system.

The aim of this study was to identify explanatory mechanisms of change in the context of a hip fracture rehabilitation project. The goal was to carry out an evaluation in order to produce a new

and integrative interpretation of the findings to provide a holistic perspective, increased understanding and insight into longitudinal change processes.

Methods

Study design

An explanatory case study design was used (Yin, 2009). It provides a framework that extends beyond the traditional descriptive and exploratory case study approaches. Therefore, it is suitable to describe complex interventions in a specific context, as well as to identify mechanisms that can explain observed outcomes of the intervention [1,19,20]. The case that is analysed, the reorganization of hip fracture rehabilitation, is complex because it has an influence on both clinical rehabilitation processes and hospital organization at large.

The case is described according to Pettigrew and Whipp's framework of strategic change [15], which highlights change as an interplay between context, content, process, and outcomes. The context dimension concerns the question "where" the change is implemented, i.e. the internal and external environment. The content dimension concerns the question "what" is to be developed and achieved. The process dimension concerns the question "how" the intervention is implemented, i.e. the procedures and methods that are used to achieve the goal. The reporting of outcomes is important in the analysis of the process. Pettigrew and Whipp argued that the implementation of change is an iterative and cumulative reformulation process [15].

The case is analysed using mixed methods data. We used both qualitative and quantitative methods to capture as many aspects as possible of this complex case. We collected both quantitative and qualitative data to get a complete picture of what affected the outcome of the project. Understanding the connections, relationships between the Context (C) and related Mechanisms (M) and how they affect the Outcome (O) of the intervention is the strategy used in a realist evaluation. According to the framework, context is an important factor when researchers want to understand what works during an intervention, for whom it works and under which circumstances [19]. The underlying mechanisms of change – processes and behaviours through which the intervention is implemented – are nested in the context [21]. Hence, the aim is to understand mechanisms of change in a context where an intervention is implemented. The realist framework uses a qualitative approach to synthesize "qualitative, quantitative, and mix-methods evidence from programme interventions" [22].

The new research question addressed in this explanatory case study was: What can support and help change initiatives in a large hospital organization and which counter forces can be expected.

Data were collected using quantitative data about the patients, performance statistics and cost data and qualitative data, as interviews and archive data as well as data from meetings with the intention of getting a grip on how the actors involved experienced the change process. To use both quantitative and qualitative methods improves the consistency of the data [23,24]. Candidate explanatory mechanisms of change were identified by analysing these data and the

findings from previous studies that have reported other aspects of the hip fracture project: the context [25], the content and the processes and the outcomes [26-28]. A triangulation approach was used to compare data from the different sources and to establish patterns and find out consistency in data (cross-data validation).

Preliminary thematic summaries were produced by triangulation first individually and then discussed and negotiated within the research team, resulting in a final consensus. Data were organized into two main perspectives, promoters and obstacles of change.

An overall interpretation of the data was then performed to understand how and under what circumstances the project operated. Throughout the study, all documents and interviews were stored [26] and protected according to research ethics' regulations. Audiotape content was deleted after the analysis was performed.

Case Description

Below follows a description of the case in four sub-sections (context, content, process, outcomes), according to the strategic model of change [15].

Context

The project took place at a university hospital in Stockholm, Sweden with two sites. At the study site a geriatric rehabilitation ward was co-located with the orthopaedic department that was responsible for the hip fracture operations. The geriatric ward was specially organized for rehabilitation of elderly and often frail patients with multiple conditions. The patient pathway for hip fracture patients was as follows: first diagnosis at the emergency department, then admission to the geriatric ward, then surgery at the operation theatre, and finally rehabilitation at the geriatric ward.

At the control site the pathway for hip fracture patients was as follows: first diagnosis at the emergency department, then admission to the orthopaedic ward, then surgery at the operation theatre, then back to the orthopaedic ward and finally rehabilitation at a rehabilitation unit outside the hospital. These rehabilitation units had no connection to the hospital organisation. Neither the orthopaedic ward nor the rehabilitation units outside the hospital used empowerment in their rehabilitation programs.

The project leader of the project was a dedicated physician who was actively involved in planning and implementing the change. After the hip fracture improvement project had started, the hospital CEO launched a hospital-wide "flow project". The flow project aimed at improving all patient care processes, beginning with the emergency department. After both the hip fracture project and the flow project had already been initiated, it was discovered that there were a total of five different hospital-wide improvement initiatives that were being carried out simultaneously. All of them aimed at improving care for the same patient groups, which resulted in difficulties managing these competing projects.

Content

The content of the hip fracture rehabilitation project consisted of a planned and an emergent change initiative.

The planned change was an intervention with three distinct parts introduced at the study site: 1) a programme for patient empowerment, 2) a coordinated care process which introduced a new rehabilitation programme with personalised care tracks, and 3) the distribution of an information package to patients and their relatives. During the implementation of the project, the project leader noted that the waiting time from emergency ward admission to surgery exceeded the time limit recommended by the national guideline for hip fracture care at that time. In the hope of shortening the waiting time, he therefore decided to redesign the patient pathway.

The redesign of the patient pathway became an emergent change in the project. The project leader formed a team of nurses and clinicians from all departments involved in the hip fracture care process. This was to ensure that all stakeholders were represented when problems were discussed and new decisions were made to change processes that would shorten the waiting time to surgery. The intention was to create a smoother patient flow through the hospital. It was also expected to serve as a means for all groups of professionals around the patients to focus more on the needs of this fragile patient group.

Process

The process— how the interventions were performed — had three main parts. The first part was the empowerment programme, which was carefully planned and implemented. It consisted of a 3-month educational programme, including training sessions on four non-consecutive days, as well as supervision for the nursing and rehabilitation staff at the geriatric rehabilitation ward. The aim of the empowerment programme was to provide training in interaction and caring behaviours. After the training, the nursing and rehabilitation staff members became a motivated group that was engaged in patient education and support. The second part was the rehabilitation programme with four rehabilitation care tracks at the geriatric department. On hospital admission, patients were screened first by an occupational therapist and then by a geriatrician to assess physical and cognitive function, as well as housing support needs. The most suitable care track was selected in discussion with the patient. The third part was the information package for patients and relatives. After a suitable care track had been selected, the nurse distributed a customized information package to the patient and their relatives that was adapted to both the patient and the selected care track.

The emergent part of the improvement initiative was implemented in the form of weekly team meetings. The team members included representatives from the four departments (emergency, radiology, surgery, orthopaedics, and geriatrics). The regular meetings enabled the different stakeholders in the improvement project to quickly detect problems that evolved in the process and solve them in collaboration.

Outcomes of the case

The outcomes from the project showed reduced length of hospital stay, earlier returns to pre-accident housing [29], decreased costs, and no significant effect on health-related quality of life [30], compared to a fragmented care model at the hospital's other site, the control site.

The emergent change initiative, resulted in a redesigned patient pathway that significantly decreased time to diagnosis and waiting

time at the emergency department as well as the waiting time for surgery: 62% of the patients were operated within 24 hours compared to only 7% before the project started [31]. Interestingly enough, staff reported fewer problems with lower back pain. The waiting time to diagnosis in the emergency department was reduced mostly because the nurses were given the opportunity to write the referral to radiology (Tables 1,2,3).

Findings

The aim of this study was to identify explanatory mechanisms of change in a hip fracture project. The starting point was that hip fractures constitute a huge burden on the patient and the care system. The intervention showed positive results; the patients had shorter

Table 1: Length of hospital stays for the intervention and the control groups

	Mean*	SD	Median	25 th percentile	75 th percentile
Site 1 Intervention group(n=285)	13.0	6.4	12	8.7	16.0
Site 2 Control group (n=218)	16.9	12.3	14	7.0	22.0

*Levine's test of the whole care episode at site 1 and site 2 was significant and the p-value for unequal variance was 0.04

Table 2: Calculation of average costs (in Swedish crowns) per patient for the whole care episode at site 1 and at site 2

Type of cost	Site 1 (n=285)	Site 2 (n=218)
Cost Per Bed-day	76 288	130 699
Diagnosis Related Group	92 028	126 163
Cost Per Patient	115 163	124 879

(Bank of Sweden 2009 average exchange rate: 1 euro = SEK 10.62)

Table 3: Analysis of observations in EQ-5D groups at the two sites, respondents (n=115+78=193). Descriptive and bivariate analysis of gender and age of the patients at the two sites.

Variables	Respondents				
	Site 1 (n=115)		Site 2 (n=78)		t/χ ² , df, p-value
Gender					0.04 1 0.83
Female	78	67.8%	54	69.2%	
Male	37	32.2%	24	20.8%	
Age, years					
Age, mean (SD)	81 (8.7)		80.1 (7.7)		0.72 191 0.47
Age group 65-74 years	29	25.2%	19	24.4%	0.07
Age group 75-84 years	46	40%	29	37.1%	
Age group 85-94 years	31	30%	30	38.5%	
Age group ≥95 years	9	7.8%	0	0	
HRQoL (EQ-5Dindex score)					0.26 1 0.60
Baseline (at enrolment)	0.664		0.648		
4 month	0.520		0.472		
12 month	0.563		0.528		

T-test for continuous variables, and chi-square test for nominal and categorical, chi-square for trend for ordinal variables

length of hospital stay, which led to earlier returns to pre-accident housing. Costs were reduced, and the waiting time to surgery decreased.

The evaluation resulted in identification of mechanisms, which became classified as promoters and obstacles of change that could explain the observed outcomes. The identified mechanisms were illustrated as links between the context, content, process, and outcomes of the studied improvement project (Figure 1).

Promoters of change

A dedicated project leader and empowerment to the patients:

The most important promoting factor that was identified in the case study was the dedication and strong commitment of the project leader, as well as his seniority and the respect that he was shown by care personnel on all levels. The project leader's high profile as a change agent was central to both the planned and emergent change initiatives in the project, which was expressed in interviews with care staff at all, involved departments. He managed to inspire the staff at the geriatric ward, as well as the other involved departments

The changes in the caring behaviors of the nurses and rehabilitation staff that could enable patient empowerment contributed to engage patients in their own rehabilitation. The nursing and rehabilitation staff as well as the geriatrician became a motivated group that was engaged in patient education and support.

Combination of planned and emergent change: The project with its three distinct parts was a *planned* approach to change [32]. In contrast, the decision to launch the care process improvement effort at the five involved departments was made during the project. The initiative is best described as an *emergent* approach to change [32]. The positive outcomes of the intervention were likely due to synergistic effects of combining planned and emergent approaches to change.

Co-location of orthopaedic surgery and the geriatric unit: The co-location of the orthopaedic surgery and the geriatric rehabilitation

unit facilitated the coordination of surgery, geriatric care and rehabilitation. There was no need to transfer patients to any other department within the hospital or a rehabilitation unit outside the hospital. The personnel reported that the patients experienced a sense of security because they did not have to change clinicians, nurses, rehabilitation staff or accommodation throughout the hospital stay.

Obstacles of change

Organizational complexity: The major obstacle that was identified in the case study was organizational complexity. Hip fracture patients at this hospital were handled by 5 departments and 3 divisions, each with their own budgets and agendas. The organization of this big hospital in departments and divisions created borders between organizational silos that challenged collaboration.

Resistance to change: Another main obstacle was the resistance among some influential orthopaedic surgeons to the Swedish recommended 24-hour guideline for the time from hip fracture diagnosis to operation. The surgeons expressed three main reasons for resistance: the guideline recommendation was not grounded in international evidence; other patient groups had higher or equal needs that had to be met; and they experienced a lack of emergency surgery resources in the hospital.

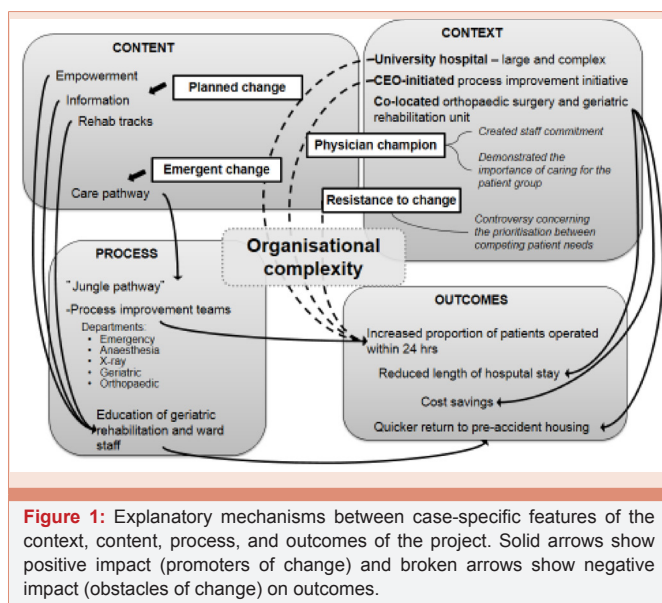
Discussion

In this explanatory case study, an evaluation framework was applied to identify promoters and obstacles of change. Three main promoters (a dedicated project leader as well as dedicated nursing and rehabilitation staff; the combination of planned and emergent change, and the co-location of orthopaedic surgery and the geriatric rehabilitation unit) and two main obstacles (organizational complexity, and resistance to change) were identified. Despite obstacles, the overall findings showed that a coordinated health care organization for hip fracture patients compared to a fragmented care model, resulted in shorter length-of-stay, lower costs, and a greater number of patients were able to return to their pre-accident housing.

Promoters

Pawson and Tilley stated that if the ideas in a change project have sustainable effects or not depend on the individual capacities of the change agents [18,39]. Our findings indicate that a "bottom-up" change strategy, implemented by an enthusiastic project leader who acts as a clinical "champion", can draw attention to a neglected group of patients and improve the care in a remarkable way. The importance of champions for success of improvement attempts in professional organizations has been described by Damschroder et al. [33].

Like a previous study by Gholve et al., we could see the benefits of using a multidisciplinary integrated care pathway [34]. In this study, the project leader successfully assembled a group of clinical members, nurses and clinicians, from different departments who were willing to work toward the same goal – a better care for an elderly, fragile patient group. The project leaders' personal engagement in this patient group was a driving force to success. For example, he managed to successfully bring about a change that gave nurses authorization to order radiology referrals, which was a disruptive change that resulted in a more rapid process to diagnosis. The efforts to improve and adapt





the pathway reduced waiting time to surgery significantly. Moreover, patients appreciated the new personalised rehabilitation programme that was administered by nursing and rehabilitation staff members who had been trained to empower the patients.

The project leader also managed to combine planned and emergent change. According to Pettigrew and Whipp there are no universal rules with regard to leading change [15]. It is about getting people at all levels of the organization to collaborate and to make sure that the initiative is well adapted to the organization. According to Schein, small and isolated change initiatives can be planned [35]. The assumption of the planned approach is that a project will succeed if everyone in the concerned organization agrees to work in the planned direction. However, if the goal is to achieve a radical organizational change, an emergent approach is needed [35]. The emergent change process is sensitive to what happens ‘in real time’ ((Burns, 2006:363) in [36]). This allows for continuous adaptation to new conditions in the environment.

To be a successful change agent in a complex organization one needs to be able to combine planned and emergent change. Planning involves the identification and use of existing opportunities. However, one also needs to be flexible and able to take new initiatives as the change process evolves. “Leaders should no longer be considered... solely as initiators and implementers of pre-planned organizational change; nor should they be seen...solely as reactive agents to emergent change. Rather they should develop the ability to connect the two to create synergy” (Livne-Tarandach and Bartunek, 2009:1-35 in [37]). Previous research has also reported that an overall consensus for change is necessary for the successful management of change [15].

The co-location of the orthopaedic surgery and the geriatric rehabilitation ward was beneficial for the coordination of care and affected the length of stay in a positive way. Previous research has shown that a separation of the care unit and rehabilitation unit may be associated with increased hospital stay [38,39]. It has also been reported that patients 65 years and older who got transferred to a separate rehabilitation care facility after an acute hip fracture surgery had worse outcomes than non-transfer patients [40].

Obstacles

One of the identified obstacles was organizational complexity. Research suggests that the size of the hospital can be a complicating factor. Shortell et al. [10], report that larger hospitals are less likely to have group-oriented cultures that emphasise teamwork. Teamwork is known to promote staff involvement in change processes and contribute to their success [10]. Insufficient top management commitment was another factor related to organizational complexity. Several competing development activities took place in parallel, which indicates a lack of top management coordination of different improvement initiatives. When this was discovered, the project leader, who practiced on an operational level, handed over parts of the improvement project to the CEO for integration in the hospital-wide initiative. This suggests that change initiatives can be developed and progressed by personnel on an operational level. Top management should support and create good conditions for change initiatives, but does not need to be the driving force. If clinical practice should be

changed, clinical leaders devoted to developing care have to lead the work. The support of top management is mainly needed to prevent conflicts with parallel projects and to optimize the coordination of development work in large-scale improvement projects.

Another obstacle was resistance to change among clinicians. Oreg argues that resistance to change is a multidimensional concept which can include affective, cognitive and behavioural domains [41]. In this study the resistance was partly rooted in a conflict between Swedish guidelines and international standards of care, which resulted in a lack of consensus among experts. Swedish guidelines recommended surgery within 24 hours after diagnosis [42], whereas the international standard of care accepted surgery within 48 hours. Resistance to change was also rooted in a disagreement about which patient groups were in most urgent need of surgery. Some clinicians did not agree with the prioritization of hip fracture patients in the rehabilitation project.

Conclusion

In conclusion, in an organization of high complexity, both planned and emergent changes may occur. The successes are greatly enhanced by a dedicated project leader who adapts to changing contextual factors together with nursing and rehabilitation staff empowering the patients. This can optimise the organization of care and could be further strengthened by top management support. Through careful planning, it may be possible to overcome some of the obstacles of change, in particular resistance to change. Organizational complexity may not be easily overcome, but it can be managed by good coordination and collaboration between all stakeholders involved. This requires active participation and interplay across both horizontal and vertical levels.

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