IMPLEMENTATION OF A CLINICAL PATHWAY:

A PROSPECTIVE CASE STUDY

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Abstract

Title

Implementation of a clinical pathway: a prospective case study

Background

Clinical pathways are increasingly being used to improve the effectiveness and efficiency of patient care. Numerous studies have been conducted on the effectiveness of clinical pathways in the last two decades. However there is limited evidence of innovation effectiveness. The Innovation Contingency model (IC-model) proposes that implementation effectiveness is necessary for innovation effectiveness.

Aim and research questions

The knowledge and insights acquired can be used to provide evidence-based implementation decisions in the future. This study also contributes to the further development of the IC-model.

This study contains two main questions: 'Is there, from the perspective of the theoretical framework of the IC-model, a relation between the fit of the innovation 'clinical pathway' and the context 'organization' and implementation effectiveness?' and 'How does the multidisciplinary team experience the implementation process?'

Method

The research presented in this paper is a prospective case study with a mixed method design.

Results

Baseline measurement: The configuration of the innovation is mainly perceived as rule focused and to some extent team and result focused. The configuration of the organization is perceived by nurses as mainly team and to some extent development focused. Physicians can be described as mainly team and to some extent rule focused.
Follow up measurement: Higher configuration scores of both innovation and organization, goes together with higher implementation effectiveness.

In the implementation process the multidisciplinary team experienced barriers and facilitators of implementation. An important barrier was the resistance within the team of physicians. An important facilitator was the introduction of the clinical pathway owner and coordinator.

Conclusions
This study showed that higher configuration scores of the innovation and organization goes together with higher implementation effectiveness.

The multidisciplinary team experienced barriers and facilitators during the implementation process.

Recommendations
Determination of characteristics of the context in relation to the innovation in the beginning of the implementation process will help to search for specific implementation interventions. Tailored interventions favour implementation effectiveness.

Keywords: Clinical Pathway, Implementation Effectiveness, Fit, Innovation Contingency model.

Nederlandse samenvatting

Titel

'Implementation of a clinical pathway: a prospective case study'

Achtergrond

Klinische zorgpaden worden steeds vaker ingezet om de effectiviteit en de efficiëntie van patiëntenzorg te verbeteren. Er is veel onderzoek uitgevoerd naar de effectiviteit van klinische zorgpaden, maar de resultaten zijn sterk uiteenlopend. Eén van de mogelijke oorzaken voor het ontbreken van innovatie-effectiviteit is het ontbreken van implementatie-effectiviteit. Het Innovatie-contingentiemodel (IC-model) is een theoretisch kader voor implementatie onderzoek.

Doel en onderzoeksvragen

Kennis verkregen kan gebruikt worden als onderbouwing van evidence-based besluitvorming rond implementatie processen in de toekomst. Daarnaast wil deze studie bijdragen aan de voortdurende ontwikkeling van het IC-model.

De studie beoogt een tweetal hoofdvragen te beantwoorden, namelijk 'Is er, vanuit het IC-model, enerzijds een relatie tussen de innovatie klinisch zorgpad en de organisatie en anderzijds implementatie effectiviteit?' en 'Wat zijn de ervaringen van het multidisciplinaire team van zorgverleners met betrekking tot het implementatie proces van het klinisch zorgpad?'

Methode

Een prospectieve case studie met een 'mixed method design'.

Resultaten

Baseline meting: De configuratie van de innovatie wordt voornamelijk ervaren als regelgericht georiënteerd en enigszins als team- en resultaatgericht. De configuratie van de organisatie wordt door verpleegkundigen voornamelijk als teamgericht ervaren en enigszins ontwikkelingsgericht. Artsen zien hun team als met name teamgericht en enigszins regelgericht.

Follow up meting: Hogere configuratiescores van zowel de innovatie als de organisatie gaat samen met een hogere implementatie effectiviteit.

Het multidisciplinaire team ervaart belemmerende en bevorderende factoren tijdens het implementatieproces. Belangrijke belemmerende factor is de weerstand onder medici. Een belangrijke bevorderende factor is het inzetten van een 'eigenaar' en een 'coördinator klinisch zorgpad'.

Conclusie

Hogere configuratiescores van zowel de innovatie als de organisatie gaat samen met een hogere implementatie effectiviteit en daardoor tot implementatie succes.

Tijdens het implementatieproces zijn door het multidisciplinaire team belemmerende en bevorderende factoren ervaren.

Aanbevelingen

Het uitvoeren van een analyse en het vaststellen van een diagnose van de configuratie van de context in relatie tot de configuratie van de innovatie kan bijdragen aan het opzetten van specifieke implementatie interventies. Specifieke interventies leiden tot een hogere implementatie effectiviteit.

Trefwoorden: Klinisch zorgpad, Implementatie effectiviteit, Fit, Innovatie Contingentiemodel

Background

Clinical pathways are introduced in the late eighties in the United Kingdom [1]. A clinical pathway is defined as 'a documented sequence of clinical interventions, placed in an appropriate timeframe, written and agreed by a multidisciplinary team. They help a patient with a specific condition or diagnosis move progressively through a clinical experience to a desired outcome' [2]. A multidisciplinary team consists of physicians, nurses and depending on the clinical pathway other (para)medical health professionals. In the implementation process of a clinical pathway the nurse plays often a central role. In several studies the nurse is within the multidisciplinary setting the 'implementation coordinator' [3, 4].

Clinical pathways are increasingly being used to improve the effectiveness and efficiency of patient care by shortening length of stay, cost reduction [5, 6], improving patient safety and clinical outcome (lowering mortality rates) [7]. Also one of the common objectives to introduce clinical pathways is the implementation of evidence based guidelines in practice.

There is still limited evidence of the impact of pathways on length of stay, hospital costs and patient outcomes [2, 8, 9, 10]. Evaluation of pathway effectiveness must consider two kinds of complexity: the complexity of the intervention (the pathway itself) and the complexity of the context into which pathways are introduced (implementation) [11]. Literature is mainly focused on the innovation 'clinical pathway' without considering the implementation process [5, 6, 7, 9, 10].

Implementation studies on clinical pathways are mainly focused on barriers and facilitators associated with implementation of clinical pathways [4, 12, 13, 14]. No reports of studies on implementation effectiveness of clinical pathways could be found. Implementation effectiveness, defined as 'the degree of success of a chosen implementation strategy', should be a necessary requirement for innovation-effectiveness [15]. In the implementation studies on clinical pathways no theoretical framework was used. Theoretical and conceptual frameworks make research findings meaningful and generalizable [16].

In implementation research a theoretical framework is the Innovation-Contingency model (IC-model) [15]. This model is designed and tested in the research line 'implementing nursing innovations'. According to the IC-model successful change is based on the congruence or fit between an innovation and the context (organization). Innovations and organizations can be

seen as configurations; systems with consistent characteristics. These configurations are based on two dimensions; external versus internal oriented and flexible versus control oriented. The four configurations are: rule, result, team and development focused (figure 1). Fit between the configuration of the innovation and the organization is a requirement for implementation effectiveness or implementation success. If fit is absent (misfit) an implementation-strategy with specific interventions should be carried out to obtain congruence and thus implementation effectiveness [15].

Another concept in the IC-model is layering of an innovation and the implementing organization in operational features, explicit values and basic assumptions. In other words there can be a difference in how someone acts, what someone says and what someone thinks [15]. There is an internal fit if the configuration scores are at least 50% on the three different layers [15].

Insert Figure 1 about here

Congruence between the configuration of the innovation and the organization depends on the interpretation of the concept of fit. Venkatraman (1989) proposed a framework that comprises six different perspectives from which fit can be defined; these are fit as moderation, mediation, matching, covariation, profile deviation, and gestalts [17]. Because the IC- model consists of a system and a configuration approach, the perspective of fit as gestalt will be applied [18, 19]. In this perspective, fit is based on an internal congruence conceptualization whereby fit is seen as a pattern [19].

Problem statement

Several unpublished studies showed a relation in the fit between an organization and innovation on implementation effectiveness. These studies have been done within monodisciplinary teams [20, 21, 22]. The problem however is, if this is also true in a multidisciplinary context and the innovation ‘clinical pathway’.

Aim

The current paper aims to acquire knowledge and insights that can be used to provide evidence-based implementation decisions in the future. In addition, the findings of this study will contribute towards the further development of the IC-model.

Research questions

The following research questions were examined:

1. Is there, from the perspective of the theoretical framework of the IC-model, a relation between the fit of the innovation 'clinical pathway' and the context 'organization' and implementation effectiveness?
2. How does the multidisciplinary team experience the implementation process?

The applied study model in figure 2 illustrates the relation between organization and innovation on implementation effectiveness.

Insert Figure 2 about here

Method

Study design

The study presented in this paper is a prospective case study with a mixed method design. A quantitative design is applied on research question one. Research question two is answered by a qualitative descriptive design.

The study was performed in an academic hospital in the centre of the Netherlands and lasted three months after the start of the implementation of the clinical pathway (January till March 2011).

Participants, sampling and sample size

The target population consisted of multidisciplinary teams of caregivers which are involved in the implementation of the innovation 'clinical pathway' in academic hospitals in the Netherlands. The accessible population was the multidisciplinary team of caregivers involved in the 'nose and ear' clinical pathway in an academic hospital in the centre of the Netherlands. The multidisciplinary team consisted of doctors (resident physicians,

physicians, surgeons), ward nurses, out-patient department nurses and secretaries including management staff. The following inclusion criteria were applied: multidisciplinary team members implementing a clinical pathway and team members of the 'nose and ear' clinical pathway reading Dutch.

Sampling was divided in convenience sampling in the quantitative part of the study (research question one) and purposive sampling in the qualitative part of the study (research question two). The whole multidisciplinary team (N = 72) was included in the convenience sample.

To estimate the necessary sample size a power analysis was used. Because an effect size wasn't known a conventional effect size for a small/medium effect is 0.3 [23]. With a significance criterion (α) of 5%, a desired level of power (1-β) of 80% and an effect size of 0.3 the desired sample size had to be 138 [23]. However, the choice of a convenience sample ensured that the required sample size would not be achieved.

The purposive sample (N = 4), with maximum variation in professions in the multidisciplinary team, was interviewed between baseline and follow up measurement.

Recruitment

In the academic hospital two contributors were introduced to promote the clinical pathway development and maintenance. The first, the 'clinical pathway *owner*' was responsible for the medical content. The second, the 'clinical pathway *coordinator*' (a nurse) was, next to the clinical pathway owner, responsible for the development and implementation progress and maintenance. Names, professions and email addresses of the clinical pathway team members were offered by the clinical pathway coordinator.

Ethical considerations

The study was conducted according to the principles of the Declaration of Helsinki (version 2008). Although formal ethics approval wasn't necessary, confirmation from the medical ethical committee was acquired. Before the start of the study oral informed consent was asked by the investigator from the 'clinical pathway owner'. Next oral informed consent of the multidisciplinary team was asked in a letter guided with the questionnaires and in person with the interviewees.

Data collection: quantitative

Three questionnaires (configuration of the innovation, organization and implementation effectiveness, abbreviated version 4) are based on the IC-model [15] and were designed in the 'Implementing Nursing Innovations' research line of the Nursing Science discipline group at Utrecht University. Several unpublished studies in the recent past used these questionnaires, so knowledge of validity on the construct of innovation and organization on implementation effectiveness was obtained.

The questionnaire at baseline measurement

The variables which were measured were: socio-demographic information (profession, highest level of education, percentage of employment, age and gender), four configuration scores of the innovation and four configuration scores of the organization (degree of team focused, degree of development focused, degree of rule focused en degree of result focused).

The configuration scores of the innovation and the organization were measured by the questionnaire 'characteristics of the innovation' and 'characteristics of the organization'. Both questionnaires consisted of 12 propositions which had to be answered on a five-point Likert scale from 'I totally disagree' (1) till 'I totally agree' (5). Each proposition is related to one level of each of the four configurations.

The topics in the questionnaire 'characteristics of the innovation' contained the method of use, purpose and perceived image of the innovation. Earlier unpublished studies for the questionnaire 'characteristics of the innovation' resulted in a Cronbach's Alpha between 0.70 en 0.75 for the four configuration subscales [24].

The topics in the questionnaire 'characteristics of the organization' contained organization-structure, policy and culture. Earlier unpublished studies for this questionnaire resulted in a Cronbach's Alpha between 0.70 en 0.81 for the four configuration subscales [24, 25].

The questionnaire at follow up measurement

The variables which were measured were: socio-demographic information and implementation effectiveness.

The questionnaire 'implementation effectiveness' consisted of 22 propositions which had to be answered on a five-point Likert scale from 'I totally disagree' (1) till 'I totally agree' (5).

This questionnaire contained items on knowledge, motivation, satisfaction, communication, support and solving problems. The questionnaire can be divided in a subscale on perception of 'own' effectiveness and perceptions on implementation effectiveness in relation to other disciplines. An earlier unpublished study for this questionnaire resulted in a Cronbach's alpha of 0.90 [26].

All data was obtained and analysed by using Microsoft EXCEL and Statistical Packages or Social Sciences (SPSS), version 17.0. In the perspective of 'fit as gestalt' an inductive approach was applied to obtain clusters of internal consistent characteristics [19]. The statistical technique of cluster analysis by K means was applied. K-means cluster analysis is a tool designed to assign cases to a fixed number of groups (clusters) whose characteristics are not yet known, but are based on a set of specified variables [27].

Baseline measurement (T1) took place just at the start of the implementation. Follow up measurement (T2) took place three months after baseline measurement.

Data collection: qualitative

To gain insight in the perception of the innovation (clinical pathway) from the multidisciplinary team, the accompanying implementation process and the perceived facilitators and barriers of the implementation, a qualitative study design was applied by interviewing.
These semi structured interviews contained the following topics: perception of the clinical pathway, perception of the implementation process, perceived purpose of implementing the clinical pathway, involvement in the development process, barriers and facilitators of implementation and expectations of the implementation outcome.

The interviews were held by the investigator face-to-face with a doctor (the clinical pathway owner), a ward nurse (the clinical pathway coordinator), the manager of the out-patient department nurses and a secretary. These persons, with thorough knowledge of the development process of the 'nose and ear' clinical pathway, were chosen to obtain person triangulation [16]. The semi-structured interviews lasted between 15 and 40 minutes per interviewee. During the interviews, field notes were made.

Each interview was tape recorded and transcribed verbatim by the investigator using software program F4 [28]. The topics used in the interviews were used as a framework to structure the coding-process. For coding and clustering software program MaxQDA was

applied [29]. To establish credibility of the qualitative data, member checking was applied two times; during the interview through oral summaries by the investigator and after the interview when table 4 was presented to the interviewees. To obtain reliability and increase validity the information of the interviews was set in a category scheme.

Results

Quantitative part

Participants

The questionnaires were send to all 72 members of the multidisciplinary team of the clinical pathway. Thirty-eight (52.8%) returned a questionnaire. Thirty four of the 38 individuals returned a completed questionnaire. In the follow up measurement 31 individuals (43.1%) returned the questionnaire. Twenty-nine of the 31 returned a completed questionnaire. The missing values (17 of 1594 items) are excludes in calculations of the mean configuration scores. In the cluster analysis no missing values were present.

Socio-demographic characteristics

Because the participants at baseline aren't necessarily the same as at follow up measurement, the socio-demographic characteristics of the participants at baseline as well as at follow up measurement are reported with descriptive statistics and described in table 1.

Insert Table 1 about here

The characteristics of the respondents between baseline and follow up measurement are rather similar. Mean age of respondents was between 33.2 (SD 9.0) and 36.8 years (SD 11.6) and the majority of the respondents were women (> 76.3%). Mainly physicians and ward nurses returned the questionnaires (> 90.3%).

Baseline measurement (T1): Configuration scores of the innovation and organization

For descriptive purposes data from the questionnaires were converted to percentages with a minimal level of -100% (corresponding with Likertscale: score 1) till a maximum level of 100% (corresponding with Likertscale: score 5) and configuration profiles (rule, result, development en team focused). Because of small input from management, outpatient

department nurses and secretary only total configuration scores and configuration scores from physicians and ward nurses are considered (figure 3).

Regarding the innovation, characteristics of all configurations are present. In summary: none of the configurations show an internal fit. Only the layers of the explicit values of the team, rule and development focused configuration score > 50%. There is no difference in the perception of the innovation by nurses and physicians. The innovation is mainly perceived as rule focused and to some extent team and result focused.

Insert Figure 3 about here

In table 2 the means and standard deviations of the configurations are presented by profession. All configurations are scored between 3.2 and 4.3 (I don't disagree/I don't agree till I agree) meaning characteristics of all configurations are perceived in the innovation. Overall more consensus is perceived in the configurations with the highest mean values. The physicians have a stronger perception of all configurations, except the development focused configuration compared to the perception of the ward nurses.

Regarding the organization characteristics, again all configurations are present (figure 4). In summary: none of the configurations show an internal fit. Only the nurses score > 50% on several layers of the team and development focused configurations. Nurses can be described as mainly team and to some extent development focused. Physicians can be described as mainly team and to some extent rule focused.

Insert Figure 4 about here

Comparison showed that the high score of the explicit values of the rule focused configuration (68%) of the perceived innovation isn't in line in with the explicit values of the rule focused configuration of the organisation (22%). Or, the innovation is perceived as rule focused, but they are not used to work rule focused.

All configurations of the organization are scored between 3.3 and 4.3 (I don't disagree/I don't agree till I agree) meaning characteristics of all configurations are perceived (Table 2). The

physicians and ward nurses have in terms of strength a rather similar perception of their organization although the focus is slightly different.

Follow up measurement (T2): Implementation Effectiveness
In the second half of table 2 scores of implementation effectiveness are presented.

Insert Table 2 about here

All items have means between a small range, from 3.1 (I don't disagree and I don't agree) till 3.6 (I rather agree). Overall the subscale of the individual implementation effectiveness is scored stronger then the subscale of the group implementation effectiveness.

Only 20 respondents filled in the questionnaires at baseline and follow up measurement and could be used for K-means clusteranalysis. A scatterplot was used to get insight in outliers per variable but no outliers were reported. Given the relatively low number of respondents there was chosen for a cluster analysis with two and three clusters. Analysis with two clusters showed the most consistent results and are presented in table 3.

Insert Table 3 about here

Cluster 1 consists of thirteen cases, cluster 2 of seven cases. In both clusters physicians and ward nurses are present.

Because of the small differences in means of the configurations of the innovation, the innovation is perceived as hybrid with a focus on the rule oriented configuration. The organization is also perceived as hybrid but the focus on a specific configuration is perceived different in cluster 1 and 2. In cluster 1, with the lower mean values, the organization perceived themselves as mainly team and rule focused, in cluster 2 mainly team and development focused.

The mean values of all variables, both configurations and implementation effectiveness, have a higher score in cluster 2 compared to cluster 1. In cluster 2 two configurations show an internal fit (mean score > 4 corresponds with > 50%), namely the team and result focused

configurations of the organization and innovation. A stronger hybrid configuration goes together with a better outcome, implementation effectiveness. All variables, except the rule focused variable of the organization, differ significantly between the two clusters ($p < 0,05$).

Qualitative part

The experience of the multidisciplinary team with the implementation process can be divided and described in several categories. These categories are presented in table 4.

Insert Table 4 about here

Purpose of implementing the 'Nose and ear' Clinical Pathway

All interviewees stressed the patient friendliness of the clinical pathway. Before implementation patient admission took place in a clinical setting one day before the planned surgery. After implementation the patient comes to outpatient visit on an empty stomach and thereafter is directly admitted to hospital on the day of surgery. Only the pathway owner and pathway coordinator mentioned the financial purposes of implementing the pathway, namely a reduced length of stay and therefore cost reduction.

Because the operating physician wants to meet the patient in person before the surgery, the number of patient visits to the hospital is not (yet) reduced.

Influencing factors on implementation (barriers and facilitators)

Barriers can be divided in resistance and practical issues encountered during implementation. Resistance was encountered mainly in the medical team. Next to the secretaries the clinical pathway has the main impact on daily practice of the medical discipline.

Practical issues were encountered by the secretary and the ward nurse. De secretary is responsible for planning and managing the appointments whereas she isn't authorized for planning the diagnostic tests. Next there is a limited space for the clinical pathway patient in the physician's schedule.

An important learning experience is to focus in the implementation process not only on the optimal process, but also on solving unexpected problems.

Facilitators were only put forward by the physician and ward nurse (table 4). Important facilitators were the introduction of the clinical pathway owner and coordinator, the support of two Masters in Business Administration during the implementation process and sufficient available time.

Implementation interventions

The implementation process was guided by two Masters in Business Administration with experience in the implementation of clinical pathways. A thirty step roadmap prepared by the Dutch/Flemish Network Clinical pathways was used [30]. This roadmap is based on the Plan-Do-Check-Act-Cycle.

Interventions consist of activities carried out in order to introduce or implement an innovation. All interviewees mentioned the kick-off meeting and the multidisciplinary collaboration with frequent consultation of each discipline by the representative in the collaboration. The introduction of a pathway owner and a pathway coordinator has created a close relationship between the implementing group and their colleagues. Questionnaires among patients and nurses were distributed by the clinical pathway coordinator to gain insight in their wishes relevant to the pathway. Management support was present in all disciplines.

Changes in daily practice

The impact on daily practice varies between disciplines. The ward nurses experience only an organizational change. The content of patient admission is the same, only place and time is different. The out-patient department nurses encounter some additional tasks; responsibility of post-operative appointments, facilitation of outpatient department visits and they have to keep track of the patient after medical visit and before nursing visit.

The greatest impact of the pathway is focused on physicians and secretaries. The operating physician is responsible to check up to date diagnostics tests during outpatient clinic visit instead of the resident physician one day before surgery. The secretary is responsible for the planning of the hospital stay and outpatient clinic visit. The most important change is the additional task to gain insight in planning problems after intervening emergency surgery. After a feedback meeting the check and solution of this kind of planning problems has become the responsibility of the secretaries.

Expectations of the 'Nose and Ear' Clinical Pathway

Results (including financial results) of the clinical pathway aren't yet available. Innovation effectiveness will take place based on financial indicators and patient questionnaires.
All interviewees expect that the intended goals will be reached. During conversations with patients, patients indicate that they appreciate the one day shortening of the hospital stay. In the beginning of the implementation process only the ward nurse had some doubts. During the implementation process these doubts disappeared because of the accurate approach.

Perception on organization and innovation

In the quantitative questionnaire at baseline measurement the perceived perception of the organization and the innovation were identified. In the interviews the perceived perceptions were checked. The investigator briefly explained the differences between the four configurations. Each interviewee indicated how the organization of her discipline and the innovation was perceived.

All disciplines recognised different characteristics in their organization. The physicians identified themselves as result focused, the clinic nurses as team focused and the out-patient department nurses as rule focused. The secretary wasn't able to characterize her discipline

The innovation is perceived as rule focused except by the secretary. She characterized the clinical pathway as development focused.

Discussion

Findings

The results of this study suggests that there is a relation between the fit of the innovation clinical pathway' and the context 'organization' and implementation effectiveness. The fit analysis by K-means clustering showed that higher configuration scores of both innovation and organization, goes together with higher implementation effectiveness. This result is consistent with the proposition of the theoretical framework of the IC-model 'A high mutual fit between the characteristics of organizations and innovations is beneficial for effective implementation' [15].

The multidisciplinary team experienced the Nose and Ear clinical pathway as an improvement in patient friendly care. The financial benefits were only recognized by the

pathway owner and coordinator, whereas this was the main purpose for management introducing this clinical pathway. Apparently management didn't succeed in transferring the purpose of implementation to the multidisciplinary team.

Several influencing factors were signalled during implementation. Important barriers were the resistance within the team of physicians and the lack of an Electronic Patient File. Important facilitators were the introduction of the clinical pathway owner and coordinator and the support of two Masters in Business Administration during the implementation process.

The perception of the organization as mentioned by the ward nurse in the interview corresponds with the measured perception according the questionnaires. Ward nurses are mainly flexible oriented (team and to some extent development focused). Physicians claim to be result focused, but they don't act result focused. The overall configuration of the organization, according to the questionnaires, is more or less hybrid with an internal orientation (team and rule focused).

The perception of the innovation during the interview corresponds with the perception according the questionnaires. Although the innovation can be described as weak hybrid, the main configuration is rule focused.

Strengths and limitations

Strength of this study is the use of a theoretical framework on implementation. This study adds to previous studies in the collected information with a mixed method design. The qualitative part provides background information to the implementation process. In implementation studies using the IC-model, the innovation clinical pathway was a new topic.

Previous implementation studies within the IC-model framework focused on a mono-disciplinary team, this study focused on a multidisciplinary context which is in favour of external validity.

Limitation of this study was a low response rate of only 53% at baseline and 43% at follow up. Cluster analysis can only be conducted if all variables are measured. This was only true for twenty respondents (28%), which limits the conclusions that can be drawn from the results. The low response rate may be due to the fact that many respondents considered that the questions were difficult and formulated in complicated language, which was mentioned

by several of the respondents in the remarks section of the questionnaire. This may also have led to frequently awarding the score 3 'I don't disagree/ I don't agree' to the propositions in the questionnaires. Which may have led to relative low configuration scores.

Next to low response, the study was focused on one clinical pathway in one hospital, therefore external validity and therefore generalizability is low.

During this study the actual implementation of the innovation was still in the beginning of the process. Not all respondents worked with the innovation and results of evaluations of financial indicators were not yet available. This could have influenced the perception on the innovation.

Findings related to other studies

The findings of this study show similar results with previous, unpublished, studies on the concept of fit within implementation studies. A study on the influence of fit between characteristics of an organization and the innovation blame-free incident reporting on implementation effectiveness showed that implementation effectiveness is higher in organizations with higher configuration scores [20].

An unpublished study studied the influence of fit among characteristics of an organization, the innovation Electronic Patient File and team-learning on the degree of adoption of this innovation. It showed that an internal fit between the innovation and organizational configuration seems to predict a high degree of adoption. The impact of team learning on the degree of adoption however remains unclear [22].

Several influencing factors were signalled during implementation (Table 4). These factors are also found in other studies [3, 14, 31, 32, 33, 34]. Remarkable facilitators that are mentioned only in this study are support from Masters in Business Administration and sufficient available time. In previous studies lack of available time was a barrier [3, 12,33, 35]. Whereas training, a facilitator described in other studies, wasn't provided in this implementation process [12, 14, 36, 37, 38].

Conclusion

In this study the theoretical framework of the IC-model was used to study the relation between the fit of the innovation clinical pathway' and the context 'organization' and

implementation effectiveness. This study showed that higher configuration scores of the innovation and the organization, goes together with higher implementation effectiveness.

The multidisciplinary team experienced barriers and facilitators during the implementation process. An important barrier was the resistance within the team of physicians. An important facilitator was the introduction of the clinical pathway owner and coordinator.

Recommendations

In this study the multidisciplinary organization and the innovation can be described as weak hybrid; meaning more than one configuration is present (internal fit < 50%). Strong hybrid organizations (internal fit > 50%) are capable of implementing versatile innovations, but hybrid organizations have difficulty remaining this strong ability to implement [15]. If the multidisciplinary team wants to increase their ability to innovate, the weaker configurations (rule and result focused configuration) should be strengthened. This can be done by application of an implementation strategy with interventions to improve the characteristics of the weaker configurations within the team [15].

Determination of characteristics of the context in relation to the innovation in the beginning of the implementation process will help to search for specific interventions. Tailored interventions may favour implementation effectiveness [39].

Future investigation should focus on implementation of different multidisciplinary clinical pathways in several hospitals with a more longitudinal approach, concerning a longer period of time. Then comparisons between clinical pathways and hospitals can be taken into consideration as well as evaluation and maintenance of the implementation process.
Next to promote external validity future studies should increase power and thus internal validity, by stimulating participation by respondents in the study.

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Competing interests

No conflict of interest has been declared by the author.

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Tables

Table 1

Socio-demographic Characteristics of the Multidisciplinary Team at Baseline (T1) and Follow Up Measurement (T2)

		T1 (*n* = 38)		T2 (*n* = 31)		
Characteristic		*n*	%	*n*	%	*p-value*
Profession						
	Management	1	2.6	2	6.5	
	Physician	16	42.1	13	41.9	
	Ward Nurse	20	52.6	14	48.4	
	Outpatient Department Nurse	1	2.6	0	0	
	Secretary	0	0.0	1	3.2	
Age in years[1]		36.8 ± 11.6		33.2 ± 9.0		0.15[3]
Gender						
	Male	9	23.7	6	19.4	
	Female	29	76.3	25	80.6	
Highest degree held						
	Masters	17	44.7	14	45.2	
	Bachelors	15	39.5	9	29.0	
	Certificate/Diploma	5	13.2	6	19.4	
	Other	1	2.6	1	3.2	
	Missing			1	3.2	
Hours worked per week [1, 2]						
	Physician	45.4 ± 2.3		45.3 ± 2.6		0.88[4]
	Other employees	29.4 ± 5.4		27.3 ± 6.1		0.86[4]
	Overall	35.7 ± 9.4		36.8 ± 11.6		0.86[3]

[1] Characteristic is presented as mean ± SD
[2] Physicians fulltime contract: 46 - 48 hours per week; Other employees fulltime contract: 36 hours per week
[3] Independent-samples T-test
[4] Mann-Whitney test

Table 2

Configuration scores (Baseline) and Implementation Effectiveness (Follow Up) by Profession (M ± SD)

	Total	Management	Physician	Ward Nurse	Outpatient Department Nurse	Secretary
	***n* = 38**	***n* = 1**	***n* = 16**	***n* = 20**	***n* = 1**	***n* = 0**
Configuration Organization[1]:						
Team focused	3.9 ± 0.811	4.0 ± 1.000	3.8 ± 0.881	3.9 ± 0.839	4.0 ± -	-
Rule focused	3.5 ± 1.032	4.3 ± 0.577	3.7 ± 0.824	3.3 ± 1.256	3.7 ± 0.577	-
Development focused	3.6 ± 0.989	4.3 ± 0.577	3.4 ± 0.942	3.6 ± 1.036	3.7 ± 0.577	-
Result focused	3.5 ± 0.884	3.3 ± 0.577	3.5 ± 0.922	3.5 ± 1.005	3.3 ± 0.577	-
Configuration Innovation[1]:						
Team focused	3.7 ± 1.127	5.0 ± -	3.8 ± 0.898	3.6 ± 1.353	3.7 ± 0.577	-
Rule focused	4.0 ± 0.849	4.3 ± 0.577	4.2 ± 0.753	3.9 ± 0.908	3.3 ± 0.577	-
Development focused	3.2 ± 1.293	3.7 ± 1.155	3.2 ± 1.276	3.3 ± 1.430	3.3 ± 1.155	-
Result focused	3.5 ± 1.177	4.0 ± -	3.7 ± 0.903	3.3 ± 1.414	3.3 ± 1.155	-

[1] Mean score 1: 'I totally disagree' till 5: 'I totally agree'

	Total	Management	Physician	Ward Nurse	Outpatient Department Nurse	Secretary
	***n* = 31**	***n* = 2**	***n* = 13**	***n* = 15**	***n* = 0**	***n* = 1**
Implementation Effectiveness[1]:						
Individual	3.6 ± 0.773	3.6 ± 0.598	3.4 ± 0.788	3.4 ± 0.749	-	3.2 ± 1.033
Group	3.3 ± 0.560	3.7 ± 0.637	3.1 ± 0.812	3.4 ± 0.864	-	3.2 ± 1.115
Overall	3.4 ± 0.825	3.6 ± 0.613	3.3 ± 0.815	3.5 ± 0.823	-	3.2 ± 1.053

[1] Mean score 1: 'I totally disagree' till 5: 'I totally agree'

Table 3

K-means Cluster Analysis with Two Clusters

	Cluster 1	**Cluster 2**	**Sig.**
	***n* = 13**	***n* = 7**	
Composition of clusters according to variable			
Innovation - Team focused	3.40	4.14	0.004
Innovation - Rule focused	3.69	4.48	0.005
Innovation - Development focused	2.76	3.90	0.000
Innovation - Result focused	3.22	4.24	0.002
Organization -Team focused	3.64	4.62	0.000
Organization - Rule focused	3.62	3.71	0.710 *
Organization - Development focused	3.28	4.24	0.002
Organization - Result focused	3.44	4.05	0.014
Implementation effectiveness - Individual	3.28	4.07	0.002
Implementation effectiveness - Group	2.97	3.63	0.013
Implementation effectiveness - overall	3.11	3.83	0.004
Composition of clusters according to profession			
Physicians	7 (53.8%)	3 (42.9%)	
Ward nurses	6 (46.2%)	4 (57.1%)	

* Not significant

Table 4

Experiences with the Multidisciplinary Implementation Process

<table>
<tr><th colspan="2">Purpose of implementing the Clinical Pathway</th></tr>
<tr><td><u>Intended/achieved</u>:
▪ Hospital cost reduction
▪ Reduced length of stay
▪ Improve patient-friendly approach
▪ Improve efficiency of patient care
▪ Ease nursing load</td><td><u>Not (yet) achieved</u>:
▪ Reduction of out clinic patient visits</td></tr>
<tr><th colspan="2">Influencing factors on implementation</th></tr>
<tr><td><u>Barriers</u>:
▪ Resistance within the medical team: not meeting expectations
▪ Lack of an Electronic Patient File
▪ Central planner isn't authorized for planning audiological tests and X-ray diagnostics
▪ Inflexible schedule of out clinic physician visits
▪ Combination of clinical pathway coordinator ship and carrying out nursing care
▪ In the beginning uncertain expectations of the clinical pathway coordinator</td><td><u>Facilitators</u>:
▪ Support from Masters in Business Administration
▪ Introduction of a pathway owner and coordinator
▪ Multidisciplinary approach
▪ Available time (approximately 1 year)
▪ Dynamic cyclic approach (PDCA cycle)
▪ Management support</td></tr>
<tr><th colspan="2">Interventions</th></tr>
<tr><td colspan="2">▪ Application of a roadmap (30 steps) based on the PDCA cycle (Plan – Do – Check – Act)
▪ Multidisciplinary collaboration with monodisciplinary alignment
▪ Support from Masters in Business Administration
▪ Introduction of a 'clinical pathway owner' and a 'clinical pathway coordinator'
▪ Questionnaires among patients and nurses
▪ Multidisciplinary kick-of meeting</td></tr>
<tr><th colspan="2">Changes in daily practice (according to discipline)</th></tr>
<tr><td><u>Planned changes</u>:
▪ Physicians: High:
  ▪ The operator physician is responsible to check up to date diagnostics tests
  ▪ Out clinic patient visit instead of clinical patient visit one day before surgery
▪ Ward Nurses: Small:
  ▪ Only organizational, not substantive: nursing history takes place during out clinic patient visit instead of clinic visit one day before surgery
▪ Outpatient Department Nurses: Medium:
  ▪ Three after-surgery appointments have to be made
  ▪ Facilitation of out clinic visit
▪ Secretaries: High
  ▪ Complete planning with out clinic visit and clinical visit (surgery)</td><td><u>Unplanned changes</u>:
▪ Outpatient Department Nurses: Medium:
  ▪ Keep track of the patient after medical visit en before nursing visit
▪ Secretaries: High
  ▪ Check and change planning of elective patients in case of intervening emergency surgery</td></tr>
</table>

Figures

Figure 1

Four configurations in the IC-model (Van Linge, 2006)

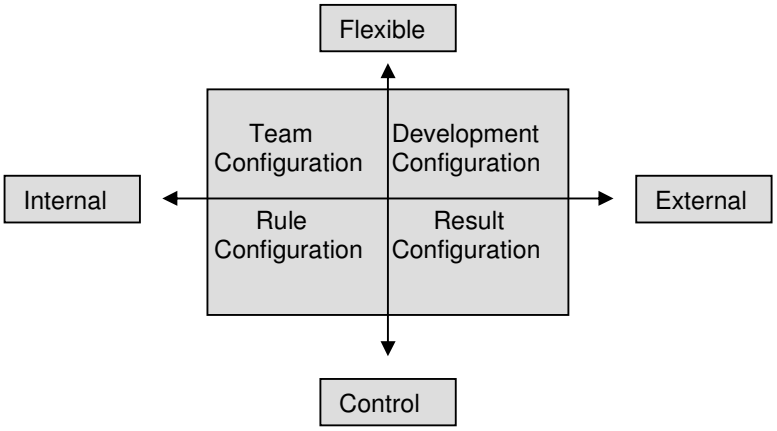


Figure 2

Study model

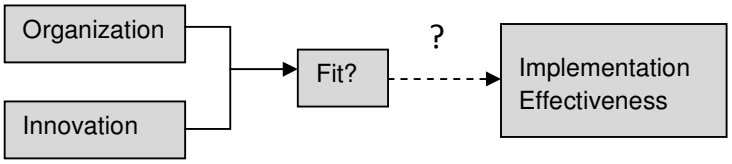
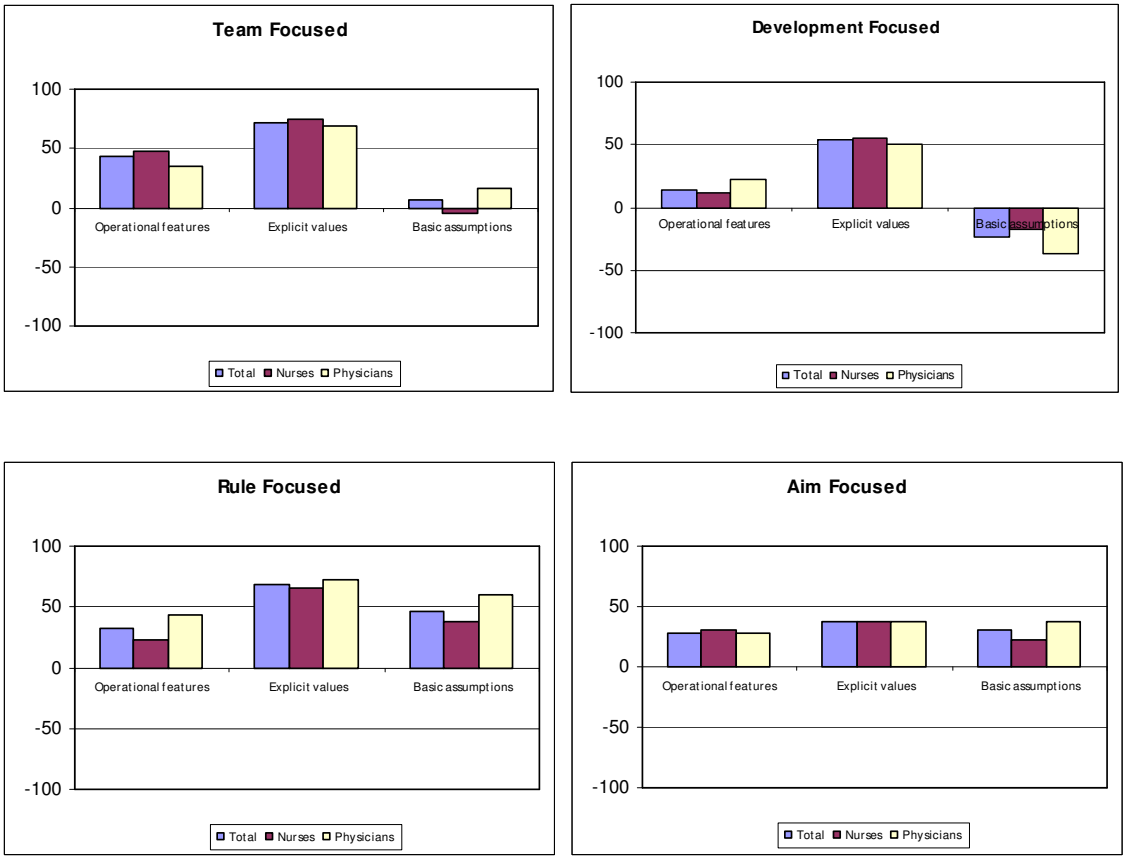


Figure 3

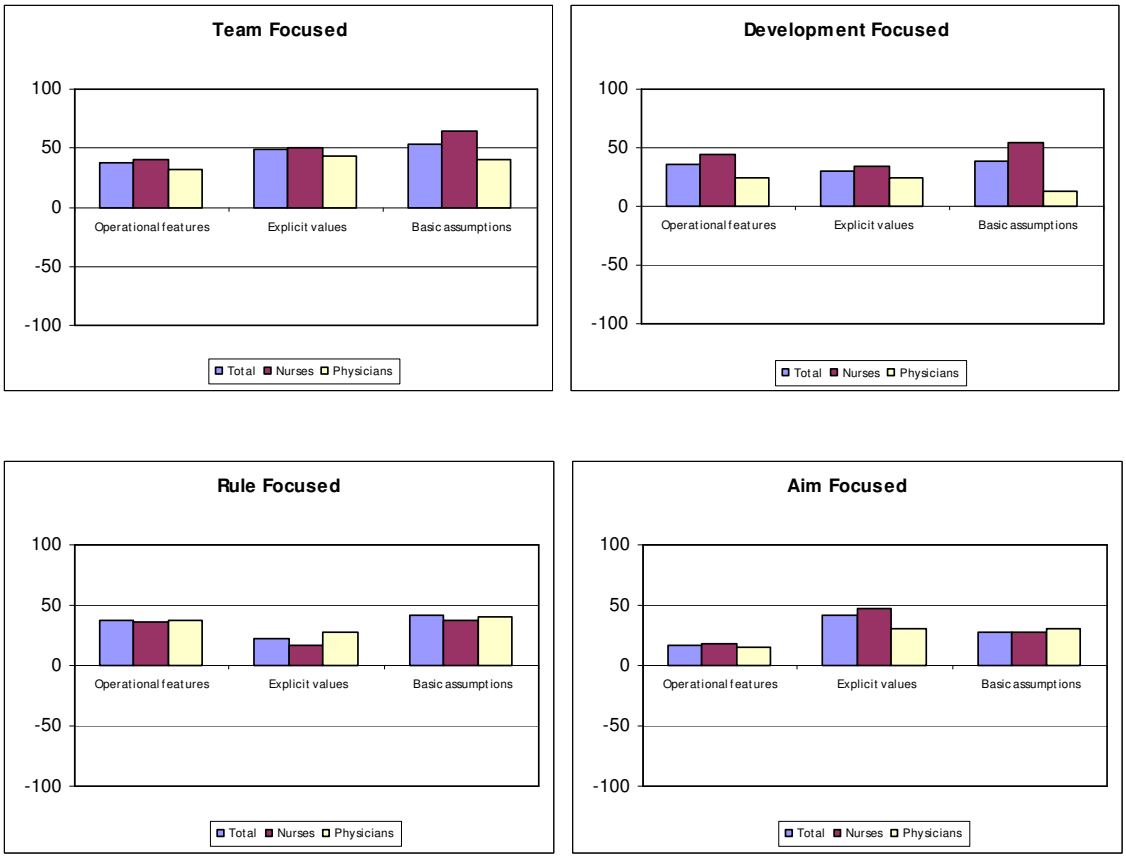
Configuration of the Innovation 'Clinical Pathway' [1]



[1] Management and secretary are excluded because of low response.

Figure 4

Configuration of the multidisciplinary organization [1]



[1] Management and secretary are excluded because of low response.