

Integrated care for patients with a stroke in the Netherlands: results and experiences from a national Breakthrough Collaborative Improvement project

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Abstract

Purpose: This article considers the question if measurable improvements are achieved in the quality of care in stroke services by using a Breakthrough collaborative quality improvement model.

Context of case: Despite the availability of explicit criteria, evidence based guidelines, national protocols and examples of best practices; stroke care in the Netherlands did not improve substantially yet. For that reason a national collaborative started in 2002 to improve integrated stroke care in 23 self selected stroke services.

Data sources: Characteristics of sites, teams, aims and changes were assessed by using a questionnaire and monthly self-reports of teams. Progress in achieving significant quality improvement has been assessed on a five point Likert scale (IHI score).

Case description: The stroke services (n=23) formed multidisciplinary teams, which worked together in a collaborative based on the IHI Breakthrough Series Model. Teams received instruction in quality improvement, reviewed self reported performance data, identified bottlenecks and improvement goals, and implemented "potentially better practices" based on criteria from the Edisse study, evidence based guidelines, own ideas and expert opinion.

Conclusion and discussion: Quality of care has been improved in most participating stroke services. Eighty-seven percent of the teams have improved their care significantly on at least one topic. About 34% of the teams have achieved significant improvement on all aims within the time frame of the project. The project has contributed to the further development and spread of integrated stroke care in the Netherlands.

Keywords

stroke service, integrated care, quality of care

Introduction

Stroke is a severe health care problem. In all ageing populations, stroke is a major and growing cause of death, long-term disability and health care costs [1, 2]. In the Netherlands, every year 30,000 people are hit by a stroke. Ageing of the Dutch population will increase the incidence of stroke by 30% in 2015 [3]. Presently, one third of patients with a first stroke die within 36 months and about 60% survive with moderate or severe handicaps [4]. In 1999, stroke has been the third leading cause of death in the Netherlands [5] and responsible for 2.9% of its total health care costs,

and for 6.0% in the population aged 75 and over. Therewith stroke ranks second on the list of most costly diseases for the elderly, after dementia [6].

Stroke services

Stroke care can be divided into three phases; acute care, rehabilitation and long term support. In the past decade, studies showed that stroke survivors, in addition to physical health effects, suffer from many psychological and social problems. A large number of disciplines and types of organisations, like hospitals, nursing homes, rehabilitation centres, general

practitioners and home care providers, are involved in the provision of appropriate stroke care in the different phases. Intensive cooperation of these health care providers in a region can be the base of a 'stroke service' [7–10]. A stroke service can be defined as a network of service providers working together in an organised way to provide adequate services in all stages of the follow-up of stroke patients [11]. It requires a regional setting with all relevant institutions, working together to provide multidisciplinary, coordinated care through organised patient transfers and protocols.

Bottlenecks

The local implementation of the concept of stroke services varies considerably [30]. Many patients do not receive the care they require, from the appropriate professional; at the time and place they need it. In particular, many patients stay in hospital without medical necessity, waiting for discharge to a nursing home, rehabilitation centre or waiting for professional home support or home adaptations [8–10]. When figures of the average hospital length of stay of stroke patients are compared internationally, length of stay is relatively long in the Netherlands; 21 days (Australia 10 days, Canada 9 days) [12]. Other bottlenecks for providing good stroke care concern the transfer of information between professionals, the provision of evidence based treatment like thrombolysis, the lack of patient information and education, the shortage of services in the after care phase and the monitoring of outcomes of the care process.

Available knowledge

Given the size of the individual, societal and organisational problems, it is clear why the literature is currently paying considerable attention to the question how stroke patients may receive more effective and efficient care, especially within a better integrated care continuum [1, 8, 11, 13–25]. Several studies have reported that integrated stroke services with comprehensive disease management strategies improve the quality of care and the outcomes for patients [26–35].

In a prospective non-randomised controlled trial to Evaluate Dutch Integrated Stroke Services (Edisse), hospitalised stroke patients in three experimental stroke service settings (n=411) were compared with concurrent patients receiving usual stroke care (n=187) in a six months follow-up. The results showed that integrating stroke services may lead to organisational improvements, improved patient and professional satisfaction,

higher efficiency and better patient outcomes by reducing hospital length of stay (down to 10–11 days) and inappropriate hospital days. The Edisse research has resulted in a set of criteria for stroke services, to be used for optimising the quality of care and the outcomes for patients with a stroke and for their central caregivers [26, 27].

Complex changes

Despite the availability of existing knowledge [26, 27], evidence based guidelines [20, 21], national protocols and examples of best practices stroke care in the Netherlands did not improve substantially yet. It can be argued that because of the multiple organisations and professionals involved in stroke care, optimal care requires a complex mix of interventions on professional, organizational and patient levels aiming at coordination and integration of care [6, 30]. Referring to this complexity, the Ministry of Health commissioned a national project on implementing available knowledge to improve stroke care [36].

As a result of a national consultation among research institutes, the Institute for Healthcare Improvement CBO started in 2002 the Breakthrough Series on stroke service.

The aim of the project was to improve stroke care substantially in at least 10 stroke service regions in the Netherlands within one and a half year. The Dutch Organisation for Health Care Research and Development (ZonMw) sponsored the project. The project became the largest national collaborative on integrated care in the Netherlands, with more than 140 health care organisations involved.

Questions

This article describes the experiences and results of this national Breakthrough project on stroke services. The question to be answered is:

'Did this Breakthrough project contribute to the improvement of integrated stroke care in the participating regions?'

- What are the characteristics of the participating stroke services and improvement teams?
- What are the most frequent improvement topics worked on and changes implemented in the stroke services?
- What is the achieved level of improvement regarding these topics and changes?
- What can be learned from applying the Breakthrough methodology to improve integrated (stroke) care?

Methodology

Participants

Before the start of the project, written descriptions of the proposed Breakthrough project and application forms to participate were posted to all Stroke Services in the Netherlands. In addition, two informational meetings were organised to inform services about the overall goals and structure of the project. More than 30 stroke services applied and finally 23 participated. Seven stroke services were not accepted or withdrew because of organisational problems or funding difficulties. All 23 participants were willing to improve stroke care and had available project management resources at the start. The first group of stroke services (n=14) started in October 2002 and participated in the project up until February 2004, the second group (n=9) started five months later in March 2003 up until July 2004.

Quality improvement intervention

The participating stroke services formed multidisciplinary teams, which worked together to undertake a collaborative improvement effort based on the Breakthrough Series Model, as developed by the Institute for Healthcare Improvement in Boston [37]. The purpose of this model is to implement existing knowledge and best practices to improve health care and solve health care problems in their own regular practices.

During a Breakthrough Collaborative multiple (8–15) multidisciplinary teams work on achieving substantial improvements on a specific subject like medication safety, intensive care or stroke, in their own organization or region. During the project the teams are supported by national experts on the specific topic and experts in quality improvement [37–39].

For a more detailed description of the quality improvement intervention see [Figure 1](#).

Measures

To assess the impact of the Breakthrough Collaborative to improve stroke care we explored site characteristics as well as characteristics of aims and changes and related these characteristics on the progress of improvement.

Site characteristics

Data on site characteristics involved the characteristics of stroke services (size, number of stroke patients treated per year, number of health care organisations involved and complexity of the regional health care system) and the characteristics of teams (size, composition).

To assess stroke service characteristics all teams were asked to complete a questionnaire at the start of the project. Data on team characteristics were obtained from project documentation.

Characteristics of aims and changes

In addition, data on the topics and numbers of aims and changes implemented over the course of the collaborative by each site have been examined, summarised and ranked. Data have been extracted from written project reports from each stroke service that contained brief descriptions of the monthly progress on activities during the course of the collaborative.

Progress of improvement

During the project each team set measurable targets and collect data on the process and the outcomes of care. To establish the progress in improvement, a five-point Likert scale from 1 (no activity yet) to 5 (outstanding progress) based on the IHI score was used. This score is a measure for the statistical significance of a change and indicates whether a change is based on normal variation or the result of a significant improvement (see [Table 1](#)). Scoring was performed by the national expert group, both during the project to monitor progress and at the end of the project to establish improvements achieved. Scores are based on self-reported measures of the teams concerning actual outcome measures, for instance length of stay in days, percentages of thrombolysis patients or numbers of patients receiving after care. Teams reported their data in a prepared structured format, like an excel sheet including definitions of requested measures for monitoring length of stay.

Results

Site characteristics: teams

All 23 stroke services formed a multidisciplinary improvement team with professional, management and supporting staff members. The composition of teams differed in both groups. In the first group (n=14) 64% of the teams mainly represented managers and

Table 1. Meaning of IHI-scores

| Score | Definition |
|-------|--|
| 1 | No activity yet (non-starter) |
| 2 | Activities implemented, no improvement yet |
| 3 | Modest improvement |
| 4 | Significant improvement |
| 5 | Outstanding progress ('best practice') |

| |
|--|
| <p>In the project the following Breakthrough elements were applied:</p> <p>Intake procedure</p> <p>Check on requested starting conditions (project leadership for 0.4 fte, commitment of professionals and management, financial contribution);</p> <p>Team representing stroke service partners</p> <p>Participation with all crucial stroke service partners, forming a multidisciplinary team (hospital, rehabilitation clinic if present, nursing homes and home care organizations);</p> <p>Expert team</p> <p>National expert team, led by an independent chair and consisting of neurologists, a nursing home doctor, experienced stroke project leaders, researchers, a representative from an insurance company and experts on quality improvement from CBO. The team clustered the available evidence and best practices and supported the teams during the project;</p> <p>Preparatory work</p> <p>Team inventory of the major bottlenecks and facts and figures of the characteristics and outcomes of the current stroke service (for instance available beds and services, patient routing, length of stay);</p> <p>Structured improvement plan</p> <p>Improvement plan for each stroke service based on the model for improvement [19]. Three questions of this model had to be answered. First, which aims to achieve? Second, how to measure results? And at last, which actions and changes are planned to take? [15,19,28]</p> <p>Rapid cycle improvement</p> <p>Small scale testing, measuring and learning by doing, involving that a change is first tested by for instance two professionals before it gets fully implemented. The results of the test are the input to adjust the intervention (plan-do-study-act cycle) [15,19,28];</p> <p>Measurement and statistical process control</p> <p>Techniques for measurement of results (such as percent thrombolysis treatment, length of stay, inappropriate days), based on statistical process control [28]. Results of small scale testing were assessed and served as input to further action and testing. Pragmatic tools for measurement were developed by the teams themselves. For length of stay measurements teams could use a prepared excel format.</p> <p>Learning sessions</p> <p>Four national learning sessions. The sessions focus on critical changes per topic. Also the adaptation of the improvement model, measurement techniques and findings on assessing progress are taught. Teams solidified their plans and exchanged ideas and results. Multiple project leader meetings were organised to support project leaders and discuss progress.</p> <p>Network</p> <p>Teams took part in a network, where information could be exchanged. A closed e-mail system (list serve), phone contact and a website with examples of documents and protocols were available.</p> <p>Reporting progress</p> <p>Teams reported their progress every six weeks. Progress was monitored and fed back on learning sessions and to teams individually.</p> |
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Figure 1. Elements of the quality improvement intervention.

staff. Based on this observation, stroke services of the second group (n=9) were encouraged to compose a more 'mixed' team, resulting in 6 teams (67%) with both professional and managerial representatives (29% in the first group, see [Table 2](#)). During the project 32 project leaders were involved in 23 teams, due to changes in project leadership (3 times in the first group, 6 in the second group). Because of a change in

project leadership, one team switched from the first to the second group. No teams dropped out.

Site characteristics: stroke services

[Table 2a](#) shows the characteristics of the stroke services. The 23 teams represented about 140 health care organisations, with an average of 6 health care

Table 2a. Characteristics of participating stroke services

| Characteristics of participating stroke services | | % of regions | | |
|--|--|--------------|-----|------|
| | | n=9 | n=9 | n=23 |
| 1. | Size of stroke service region | | | |
| | – <125,000 inhabitants | 3 | 2 | 22 |
| | – between 125,000 and 250,000 | 9 | 4 | 56 |
| | – >250,000 inhabitants | 2 | 3 | 22 |
| 2. | Number of stroke patients per year | | | |
| | – <125 patients | 2 | 1 | 13 |
| | – between 125 and 350 | 8 | 7 | 65 |
| | – >350 patients | 4 | 1 | 22 |
| 3. | Number of health care organizations | | | |
| | – <5 organisations | 4 | 2 | 26 |
| | – 5 or 6 organisations | 7 | 3 | 43 |
| | – >6 organisations | 3 | 2 | 30 |
| 4. | Complexity of the stroke services | | | |
| | – >1 hospital | 1 | 3 | 17 |
| | – >2 nursing homes | 9 | 4 | 48 |
| | – >2 home care organisations | 4 | 2 | 26 |
| 5. | Team composition | | | |
| | – mainly professional (>60%) | 1 | 1 | 9 |
| | – mix of professional and managerial/staff | 4 | 6 | 43 |
| | – mainly managerial/staff (>60%) | 9 | 2 | 48 |

Table 2b. Most frequent bottlenecks

| Most frequent bottlenecks mentioned | % of regions | | |
|--------------------------------------|--------------|-----|------|
| | n=9 | n=9 | n=23 |
| – Length of stay, inappropriate days | 93 | 100 | 96 |
| – Inadequate transfer of information | 57 | 89 | 70 |
| – Cooperation and knowledge | 64 | 89 | 74 |
| – Missing after care facilities | 57 | 55 | 56 |
| – No outcome monitoring | 29 | 55 | 39 |

organisations per stroke service region. In both groups the participating stroke services represented a mix of some larger stroke services (22% >250,000 inhabitants), multiple stroke services of average size (56% between 125,000 and 250,000) and some smaller (22% <125,000) stroke services.

Improvement topics

At the start of the project teams were asked to report the main bottlenecks in their current stroke care. The most frequent bottlenecks mentioned are summarised in [Table 2b](#).

Regarding these bottlenecks all teams set improvement aims on different topics, taken into account existing knowledge about effective interventions [10, 11] and evidence based guidelines. Instead of freely choosing any improvement topic, the teams in the second group were ‘obliged’ to work on at least four pre-specified topics: length of stay in hospitals, transfer of patient care information between professionals, thrombolysis and monitoring. Although the main improvement topics didn’t differ between the first and second group, the second group clearly followed up the obligation to work on the four pre-specified topics ([Table 3](#)). Within each topic the teams

Table 3. Overview of topics and percentage of teams working on topics

| Topics | % of teams working on | |
|-----------------------------------|-----------------------|-----------------------|
| | Total | (1st group/2nd group) |
| Length of stay/inappropriate days | 87 | (79/100) |
| Transfer of information | 87 | (79/100) |
| After care | 56 | (57/55) |
| Thrombolysis treatment | 52 | (36/78) |
| Protocols and cooperation | 43 | (57/22) |
| Monitoring and management | 39 | (21/67) |
| Patient education | 30 | (29/33) |
| Education/expertise | 17 | (14/22) |

could work on different and multiple aims. For example, a couple of teams aimed to improve the length of stay in both the hospital and nursing homes (one topic, two different aims). Teams set about 6–7 aims at average (range: 4–9).

Improvement changes

Table 4 gives an overview of activities the stroke services worked on during the collaborative. For example a lot of teams worked on improving the transfer of professional information between organisations. Agreements on the content and the moment of transfer, more focus on the information needs of the receiving party, often resulted in the use of new forms or the development of a transmural patient file.

The results of such changes were measured and when needed, adjusted.

The set of interventions teams used in reducing length of stay varied widely, but often focused on a pro-active discharge policy, redefining admission criteria and agreements between organisations about the maximum length of stay and the transfer procedures. When focusing on nursing homes, more intensive rehabilitation and implementing latest guidelines were the most important interventions. Often rehabilitation programs between nursing homes of the same stroke service differed enormously. The differences were discussed in the project and the teams tried to make their rehabilitation programs more uniform. Teams also applied the simple rule to let capacity (free beds) prefer above the patients preference for a specific nursing home.

Table 4. Most frequent changes per topic

| Topics | Changes tested and implemented |
|----------------------------------|--|
| Length of stay, hospital | <ul style="list-style-type: none"> – indication procedure (18x) – discharge criteria hospital (15x) – agreements on maximum transfer times (12x) – proactive discharge policy (9) – patients preference not leading (7x) |
| Length of stay, nursing homes | <ul style="list-style-type: none"> – uniform rehabilitation policy between nursing homes (11x) – guidelines on rehabilitation (8x) – admission criteria (6x) – reconsidering needed nursing home capacity (5x) – indication procedure (4x) – uniform multidisciplinary consultation procedure (4x) |
| Transfer of information | <ul style="list-style-type: none"> – new dossiers/forms (16x) – agreements on content (12x) – procedure of information (12x) – agreements on timeliness (11x) – allocate responsibilities (8x) |
| After care | <ul style="list-style-type: none"> – structured home visits (7x) – coordinators for after care (5x) – consults by specialised nurses in hospital (5x) – after care facilities (4x) – regular meetings for patients family (3x) |
| Trombolysis | <ul style="list-style-type: none"> – education of nurses, paramedics, ED (12x) – protocols ED, paramedics (9x) – inform general practitioners (9x) – education neurologists (7x) – inform the public (6x) |
| Protocols and cooperation | <ul style="list-style-type: none"> – restructuring multidisciplinary consultation (6x) – checklist for cognitive screening (4x) – integration of guidelines in local protocols (3x) – standardising the treatment protocols in different organisations (3x) |
| Monitoring/management | <ul style="list-style-type: none"> – implementing registration system (11x) – allocate responsibilities (8x) – sustainability plan (8x) – monitoring policy (6x) – change of management (3x) |
| Patient education | <ul style="list-style-type: none"> – protocol for patient education (7x) – folder material (4x) – checklist (4x) – professional information conversation (2x) |
| Professional education/expertise | <ul style="list-style-type: none"> – education programs (5x) – education policy (4x) – exchange of professionals between organisations (3x) |

Progress of improvement

Teams

Teams set about 6–7 different improvement aims in the timeframe of the collaborative. Eighty-seven percent of the teams have achieved significant improvement (score=4) on at least one improvement aim. To assess the impact of each teams implemented changes we use the median IHI scores of the total number of aims per team (Table 5). About 34% of the teams were able to show significant improvement using this measure, whereas another 43 and 67% showed modest improvement on all aims.

The percentage of teams, which were able to show significant improvement in the second group roughly corresponds with the percentage of teams in the first group (36% against 33% of the teams). However, in the second project group there were no teams scoring no improvements at all, while 21% of the teams in the first group did.

Topics

Table 6 gives an overview of the progress of improvement regarding the different topics. Half of the teams (42–50%) achieved significant improvement (IHI=4) on thrombolysis treatment and length of stay. To illustrate the effect of these improvements in outcome measures some figures can be given. The reduction of average hospital length of stay in the participating stroke services in the first group dropped from 19.2 days to 12.0 and in the second group from 25.1 to 12.8. On average this is a reduction of more than 40%. The percentage of thrombolysis patients in all stroke services has doubled, from an average of 2.7 to 5.4% of all hospital stroke patients. The numbers of hospitals, which made arrangements for thrombolysis treatment went up from 12 to 19 of 23 hospitals [43].

A high number of teams have achieved significant improvements on the monitoring and management of their stroke service and on professional expertise

Table 5. Team results in IHI scores, median score per team at the end of the project phase

| IHI scores | Number of teams (n=14) | | Number of teams (n=9) | |
|-----------------------------------|------------------------|----|-----------------------|----|
| | | % | | % |
| Activity, but no improvement (<3) | 3 | 21 | 0 | 0 |
| Modest improvement (3–≤4) | 6 | 43 | 6 | 67 |
| Significant improvement (≥4) | 5 | 36 | 3 | 33 |

(75–100%). About 75% of the teams have achieved modest to significant improvement (IHI-score of 3 or more) on the topics after care, protocols & cooperation and transfer of information. The IHI-scores also reflect that for these three topics, between 15 to 30% of the teams are still busy implementing changes. Most teams working on patient education could not show significant improvement yet (14%), but changes are still being implemented (57% IHI<3).

When comparing the first and the second project group, some remarks can be made. Taking the different topics into account, more teams in the first group were able to show significant improvements in the transfer of information and the monitoring and management of their stroke service. The second project group achieved better scores in after care and protocols and cooperation. For the length of stay, thrombolysis and professional education no specific differences between the two groups can be seen.

Lessons learned and analysis of results

The Breakthrough methodology has been developed in reaction to the persistently disappointing results with standard educational methods such as lecture-style conferences, which seldom result in sustainable health care improvements. Although most health care providers are highly motivated to provide the highest quality of care, a decade of experiences with improvement projects did not show a great impact in health-care outcomes [15]. Apparently the Breakthrough method stimulated teams to work on improving their stroke service. Teams are working on multiple aims (average 6–7) on different topics, often spread over time. IHI scores reflect changes being made on all topics.

Corresponding to the most frequent bottlenecks in the stroke services, most teams worked on topics as reducing length of stay and transfer of information. These topics reflect the typical complexity of a trans-mural care setting: adequate transfer of patients, information, logistics and continuity of treatment through all the steps in the care chain. Within the timeframe of the project, 36% of the first and 33% of the second project group have achieved significant improvements on all aims. According to the teams, making more improvements visible needs more time in a complex integrated care project.

Lessons learned

During the project lessons learned in the first project group could be used to improve the second project. In

Table 6. Overview of percentage of teams achieving improvement per topic, (Total group n=23, 1st group (n=14) and 2nd group (n=9) in brackets)

| Topics | Total (1st group, 2nd group) | | |
|-----------------------------------|------------------------------|------------------------------------|----------------------------------|
| | no improvement yet (IHI <3) | modest improvement (IHI >3 and <4) | significant improvement (IHI >4) |
| Length of stay/inappropriate days | 20 (17/22) | 30 (33/22) | 50 (50/56) |
| Transfer of information | 30 (45/11) | 40 (10/78) | 30 (45/11) |
| Thrombolysis treatment | 16 (0/29) | 42 (60/29) | 42 (40/42) |
| After care | 15 (11/20) | 54 (67/40) | 31 (22/40) |
| Protocols and cooperation | 25 (38/0) | 50 (50/50) | 25 (12/50) |
| Monitoring and management | 0 (0/0) | 27 (0/50) | 73 (100/50) |
| Patient education | 29 (50/0) | 57 (25/100) | 14 (25/0) |
| Education/expertise | 0 (0/0) | 0 (0/0) | 100 (100/100) |

the first group teams were fully free to choose their topics for improvement. As a result of that, some teams started changes on improving after care facilities and transfer of information, neglecting patients getting the right care at the right place in earlier phases. During the project the expert team concluded that the topics length of stay, thrombolysis, transfer of information and monitoring results of stroke service are key components for good stroke care. Because of this, teams of the second group were obliged to work on those topics. Surprisingly, this more top down approach didn't receive any resistance from the teams. Because of the complexity of a system like a stroke service, it can be argued that focusing on essential topics is necessary and helpful in achieving results in the given time frame of a Breakthrough Collaborative. The request to focus on a limited number of topics in the second group didn't result in a less average number of aims neither.

The experience that focusing helps to improve complex care settings, could be an argument for also setting pre-specified aims for teams to work on (for example an average rehabilitation period for stroke patients in nursing homes of 70 days), besides the obligation to work on four or more main topics. The available experiences with breakthrough projects in the Netherlands point out that specifying aims could be useful and help teams in complex improvement areas like integrated care. The price to pay, less influence for teams, could probably be compromised for teams by choosing the changes that fit in their context and own creative ideas to reach the aim

Summarising, the following changes in project structure were made based on lessons learned:

The 'obligation' to work on at least length of stay, transfer of information, thrombolysis and care chain monitoring;

- More focus on mixed team composition of professionals and management;
- Additional project leaders meetings;
- Improved content of learning sessions;
- A collection of examples of documents and protocols from teams on a website;
- Earlier focus on sustainability of improvements and management of integrated stroke services;
- More frequent contact between the teams and experts.

Because the lessons learned seem to be not specific for stroke care, other projects to improve integrated care could probably benefit from them too. Although time is short and results on a topic often require changes on the structure, process and outcome levels as well, teams show it is possible to achieve results. The structure and methods used in the project seem to accelerate changes, movement and improvement in the participating regions.

Analysis of results

There is heterogeneity in progress of improvement within the two groups and between topics. This is not surprising, given the multitude of factors that contribute to a successful quality improvement intervention. In line with the existing literature and evidence [40–42], the mixed effects can be attributed to differences in the organisational context of the stroke services, differences in team characteristics, the ability to implement changes or available resources.

When comparing the results of the first and second group, the average IHI scores of teams in the second group are a little, but not significantly, higher than the first group (3.2 for the first group, 3.4 for the second group). The lessons learned in the first group resulted in some changes for the second project group, which may

have contributed to the achieved levels of improvement. However, for most topics the IHI scores show similarities between both groups. Also the estimated effect of the obligation to work on the four pre-specified topics is not reflected in significantly better scores on these topics.

One of the factors expected to influence the results in these projects is project leadership. Well equipped (available time and skills), dedicated project leaders can accelerate improvement by stimulating and co-ordinating the multiple project activities. Surprisingly, changes in project leadership are not visible in IHI-scores. Median IHI-scores in both groups were almost exactly the same for teams with and without a change in project leaders (3.2 vs. 3.2 and 3.3 vs. 3.5). All stroke services kept participating in the project until the end. However, some of them experienced a loss or change of team member or project leaders and others needed time and energy for problems in their organisations (for instance mergers or cost reduction programs).

During the first project, teams composed of a mix of professionals and management seem to be more able to implement improvements and make decisions. Therefore, teams of the second group were explicitly stimulated to set up mixed teams. Although this resulted in more mixed teams (from 29 to 67%), the influence of team composition is not reflected in better IHI-scores. Mixed teams score about the same (median IHI 3.3 group 1; 3.4 group 2) as teams composed of mainly managers/staff members (median IHI 3.3 group 1; 3.5 group 2). Median IHI scores of teams of mainly professionals are lower (IHI scores of 3 and 2), but these results are based on only two teams and, therefore, not representative. During the project meetings, the teams themselves emphasised that the more health care organisations involved, the more time and efforts have to be made to set up an integrated stroke service. However, at this moment IHI scores don't show obvious differences between larger and smaller stroke services either.

Reducing the length of stay both in hospitals and nursing homes pointed out to be a topic that can be influenced significantly using the model of improvement. Clear aims can be set (for example, 'In June 2004 the average length of hospital stay for stroke patients in region X is 10 days'), results can be measured and proven to be significant with Statistical Process Control techniques. Fifty percent of the teams made significant improvement in the given time frame.

Improving after care facilities, transfer of information apparently exceeds the time frame of the project. One explanation can be that at the start of the project there were no best practices in after care and often new structures (like structured home visits) had to set up.

Improving the content and timely transfer of information is a complex topic. The high number of professionals and disciplines involved probably contributes to this.

Before both aspects are improved, often changes with an impact on the structure of the stroke service (new patient file), the care processes (agreements on procedure) and the outcomes (satisfaction with the effect of the change) are necessary.

The high numbers of teams who successfully implemented educational programmes and tools for monitoring and management of their stroke services, could be explained by the characteristics of these interventions. As summed up in [Table 4](#), interventions often consist of clear actions like a registration system or a professional training. Interventions can be organised and executed well, and the effect (for instance number of staff trained) can be measured easily.

Discussion

This article provides some of the information available on a Breakthrough Collaborative Improvement project on integrated stroke care in the Netherlands. Altogether more than 140 hospitals, rehabilitation clinics, nursing homes and home care organisations participated. The project on stroke services was the first transmural project in the Netherlands based on the breakthrough methodology. Other breakthrough projects focused on only (a part of) one organisation like a hospital. Based on the five-point Likert scores the method seems to appear capable of catalysing change in most participating stroke services. To do so, the teams had to implement particularly complex interventions that involved many people, departments, organisations and processes within their stroke service.

The evaluation of this Breakthrough Collaborative had to deal with several limitations. First, our analysis is based on stroke services that were willing to improve. The stroke services in our breakthrough project were a self-selected group of services that were highly motivated. The participating stroke services may differ on behalf of these differences in enthusiasm and motivation. Because of this, caution should be applied in generalising the findings to other sites. Also, our evaluation did not compare intervention sites with non-intervention sites, making it difficult to give a sound conclusion whether improvement can be attributed to the Breakthrough collaborative improvement approach or are just the result of more general local and global forces. Hence, we are limited in our ability to draw sound conclusions on potential factors enhancing success. Whether our conclusions apply to other stroke services, teams or integrated care sites is not known.

Another limitation of this study is that it provides no quantitative information on the extent to which the changes made by the teams actually have influenced the patients and their central caregivers. The process improvements carried out clearly improved the extent of integrated stroke care, but we lack information on patient outcomes. For patient outcomes like patient satisfaction and quality adjusted life years we relied on preliminary research, existing knowledge and national guidelines.

Furthermore, our analysis was based on self report of the teams and progress was scored using a five-point Likert scale applied on all types of aims, independent of the clinical relevance or impact of an aim nor the complexity of the change (for example 'reducing length of stay with 15% or 60%' as no consequences in score). The scores were based on consensus in the expert team. Rigorous assessment of inter-raters reliability was not performed. The choice for the IHI-score as a measure can be argued. The score gives insight if improvement occurred, not in the reached level of quality. For instance, an improvement of 30% in reducing length of stay can be significant, but can reflect an average length of stay of 20 days while best practices point out that less than 10 days is achievable. When benchmarking and spotting new best practices are also aims of the improvement project, measuring absolute outcome scores as has been done by the teams is also necessary.

Nevertheless, the Breakthrough approach was a success in the eyes of the participants. For some, the less quantifiable benefits were even more significant than those, which can be reflected in terms of IHI scores or outcome measures. During eight group interviews with teams of the second project group, factors for success and failure have been discussed. An important factor for success was the structured project

approach, as well for the national as the regional projects. The stepwise methodology, focusing on measured outcomes contributing to improved patient care stimulated collaboration and actual action. The time pressure build in the project structure, as well the possibility for exchanging ideas and results with other regions were stimulating factors, which emphasised on achieving results. Also the team composition and personal characteristics of team members are important factors for failure or success. Most teams judge the Breakthrough methodology suitable for integrated care arrangements. Although they recommend enlarging the time frame slightly because of the number of regional organisations involved, the methodology especially contributes to regional collaboration. Constructive collaboration as an important prejudice for delivering effective integrated care, was achieved by the project elements focusing on teambuilding, national conferences and taking part in the learning network.

A lot of teams reported improved cooperation between professionals and organisations, growing awareness of being part of a chain of care and an ongoing emphasis and effort to improve the service. Although we did not assess outcome measures on quality of live or adjusted live years nor interviewed patients and their central care givers, the assumption is that stroke care did improve because changes were based on evidence based guidelines and existing knowledge [10, 11] stating that integrated stroke care leads to better outcomes. For the sponsoring and hosting organisations the project also was a learning process and lessons learned help to design future Breakthrough projects on integrated care.

For the participating stroke teams and their organisations the challenge remains to sustain improvements and to maintain momentum to build towards significant improvement across the whole stroke service.

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