The benefits of clinical facilitators on improving stroke care in acute hospitals: a new program for Australia

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Abstract

Background: Care gaps for stroke lead to preventable disability and deaths. The Victorian State Government implemented a program of employing clinical Facilitators on a fixed-term basis for up to three years (2008-2011) in eight hospitals to improve stroke care. The Facilitators were to establish stroke units where absent, implement evidence-based management protocols and provide staff education within an agreed work plan. The aim of this study was to determine if the Facilitator role was associated with improved stroke care, and to describe factors supporting or mitigating enhancements to care.

Methods: Mixed-methods design with historical-control using patient-level audit data (pre-facilitator: n=600; post-facilitator: n=387), and qualitative data from independently conducted semi-structured interviews with hospital staff, including clinicians, executives and facilitators (n=10 focus groups; 75 respondents).

Results: Stroke units, clinical pathways and outpatient clinics for managing transient ischemic attacks (TIAs) were established. Compared with the pre-Facilitator period, significant increases in patient access to stroke unit care (53% vs 86% $p<0.001$) and intravenous thrombolysis (2% vs 9% $p<0.001$) were achieved. Hospital staff reported that the Facilitator was integral to system improvements by fostering communication, encouraging team motivation and cohesiveness, and increasing interest in stroke care. Ongoing barriers included limited resources to operate TIA clinics effectively, staff turnover requiring ongoing education, inconsistency in compliance with protocols, and in some hospitals, the need for formalised medical leadership.

Conclusion: Fixed-term employment of Facilitators was effective in positively influencing stroke care in hospitals through a range of change management strategies where stroke-specific expertise had been previously limited.

Key words: quality improvement, stroke care, health services research, health policy and outcomes research, clinical facilitators

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Overview of VSCN_figure_V3.jpg

The benefits of clinical facilitators on improving stroke care in acute hospitals: a new program for Australia

Introduction

Variable access to evidence-based care for stroke in hospitals is common around the world,¹ has unfavourable effects on patient outcomes and can lead to inefficient use of health care resources.²⁻⁴ Variation in care is particularly problematic in regional locations that have additional challenges including limited infrastructure and resources, and a lack of specialist staff.^{1,5} Despite the known benefits of stroke unit care, in 2009 only 63% of hospitals within Australia had a stroke unit, with just 49% of patients with stroke accessing stroke unit care.⁶ Successfully establishing and maintaining a stroke unit and associated evidence-based care is difficult within the complex healthcare system.⁷

In Australia in 2007, the State Government of Victoria developed the Stroke Care Strategy for Victoria (herein referred to as the Strategy) to prioritise and reduce evidence-practice gaps in acute and sub-acute stroke care.⁸ The Strategy had 28 recommendations to promote greater use of evidence-based interventions including rapid triage of patients in the emergency department and treatment in a stroke unit by an interdisciplinary team. This was to be supplemented by standardised performance monitoring, and capacity building through stroke-specific staff education and training programs. The fixed-term employment of clinical facilitators (herein referred to as Facilitators) in priority hospitals was also recommended.

In 2008, the Victorian Stroke Clinical Network (VSCN) was established. The VSCN comprised an interdisciplinary executive committee of clinicians, executives and government representatives, who provided direction for policy and to oversee implementation of the

Strategy and the Facilitator program at eight priority hospitals. The Facilitators were to develop a localised implementation plan with hospital staff to instigate agreed protocols to improve systems of care in areas where local evidence-based care was limited; including establishing a stroke unit where required, improving management of patients with transient ischemic attack (TIA), and hyper-acute stroke management including improving access to intravenous thrombolysis in eligible patients.

As explained by the Promoting Action on Research Implementation in the Health Services (PARIHS) framework, successful implementation of evidence into practice is dependent on aligning available evidence to the particular context of care through the use of facilitation.⁹ In this context, the facilitation role assists clinicians, teams or organisations apply evidence into practice, by supporting not only the achievement of the specific goal, but also creating a wider culture receptive to change and improvement.¹⁰ Sparse evidence exists for the effectiveness of Facilitator roles to improve stroke care, and primarily involves offsite external Facilitators using predominately telephone contact with clinicians with occasional on-site visits¹¹ or more permanent internal Facilitator roles that include a clinical caseload.¹² It was unknown whether a fixed-term non-clinical internal Facilitator role was effective in changing clinical practice for stroke. The aim of this study was to evaluate the Facilitator program and identify whether the fixed-term employment of Facilitators within priority hospitals improved adherence to clinical processes of care related to areas of the Strategy. A secondary aim was to describe the perceived critical success factors and barriers to improving evidence-based care as described by hospital staff involved in the Facilitator program.

Methods

Study design and context

The Facilitator program was evaluated using a mixed-methods design, which included semi-structured focus group interviews with hospital staff, executives and Facilitators, and an historical-controlled cohort study using patient-level data (Figure 1). The VSCN identified eight priority hospitals that had limited organisational infrastructure and resources for stroke. These hospitals were situated in identified population growth areas and managed approximately 150 or more stroke admissions annually. Three of the hospitals were situated in metropolitan areas and five in regional locations across Victoria.

The Facilitator program

From May 2008, Facilitators were appointed on a part-time basis (approximately 2.5 days per week) for two years. The tenure was extended to three years mid-way through the appointment based on preliminary evaluation findings.¹³ Facilitators were nursing or allied health professionals who had expertise in stroke and project management skills. The Facilitator role did not have direct patient care responsibilities, and no further external funding was provided for additional resources. The fixed-term, non-clinical position was to encourage the Facilitators to achieve sustainable change with the capacity to develop and implement project plans and provide education.

The implementation process varied across hospitals, dependant on locally identified gaps in care, and existing organisational systems within health services prior to the Facilitator program (Table 1). The first task of the Facilitator was to undertake a gap analysis and then develop a locally tailored implementation (business) plan with hospital staff, which identified necessary stroke practices for a defined level of care within the health services in relation to geographic and demographic factors.⁸ The ‘gap’ analysis was based on review of clinical performance data and also incorporated baseline qualitative data that were collected

independently by an external evaluator (DAC). The baseline qualitative evaluation was obtained in the first six months of the Facilitator positions in 2008.¹³ The process of undertaking the gap analysis assisted to prioritise areas of focus using local evidence, and then translate these into achievable goals and deliverables within the program timeframe.

The gap analysis also provided direction for establishing broader state-wide programs of service improvement including dysphagia screening and telemedicine projects. Additional responsibilities of the Facilitator included setting up steering committees and fostering communication between all stakeholders, developing and overseeing the implementation of protocols, developing and providing stroke specific education, training and support programs for hospital staff, and encouraging consumer involvement to achieve the objectives of the local business plans (Table 2).

Facilitators were actively supported by the VSCN and executives within their hospitals. The Facilitators met monthly at the Department of Health, and on alternate fortnights, via teleconference for peer support and an opportunity to share knowledge, strategies, protocols so as not to duplicate effort, and describe achievements and progress.

Data collection

Each hospital provided permission for researchers to conduct qualitative interviews and use Stroke Foundation Audit data from their site as part of this study. This study was approved by Monash University Human Research Ethics Committee (CF15/3162-2015001349).

Patient-level data: medical record audit

Quantitative data for each hospital were obtained from the Stroke Foundation Acute Services Audits.^{6, 14, 15} This biennial national audit program of acute services is used to measure adherence to Australian stroke clinical guidelines.¹⁶ Briefly, at each hospital, the medical records of up to 40 consecutive patients admitted in the June-December of the year prior with a primary diagnosis of stroke were retrospectively audited for patient demographic information, adherence to recommended processes of care and hospital-based patient outcomes. For each hospital, 2007 and 2009 audit data were combined and used as a 'pre-Facilitator' baseline historical control, which was compared to post-Facilitator (2011) data. This was feasible because although Facilitators had commenced employment prior to 2009 audits, the first six months of the role were devoted to developing the local implementation plans, and activities to change practice had not commenced.

Post-implementation qualitative feedback data

Three approaches were used to obtain qualitative feedback from stakeholders involved with the Facilitator program. The first involved focus groups that were conducted in person with staff at each hospital, using a standardised, semi-structured interview schedule that was conducted at the end of the Facilitator's employment. Using purposeful sampling methods, staff from the emergency department, stroke unit, sub-acute services and executive or management staff at each participating hospital were invited to participate in the 60 to 90 minute interview. Interviews covered each of the domains in the checklist recommended by Flottorp and colleagues¹⁷ to identify determinants of practice relevant to healthcare change. Interviews were conducted in person by researchers (DC, TP or KB), and were designed to elicit staff's perceptions about changes in stroke care following the Facilitator program. Questions focused on stroke unit access, use of pathways to guide care, provision of thrombolysis and access to specialist staff. The role of the Facilitator, perceived strengths

and barriers to the implementation of evidence-based stroke care, and future plans for each stroke service were also discussed.

The second approach was a face-to-face feedback workshop with executives from participating hospitals which was held in April 2010 and was coordinated by an independent consultant appointed by the VSCN. During this 150-minute meeting, executives provided feedback about the Facilitator program and their perceptions on the likely sustainability of system changes.

Lastly, a separate focus group with the Facilitators was conducted by researchers (DC, KB) in May 2010 which was designed to elicit their perceptions about the success factors and barriers to their role. Facilitators attended one 90 minute focus group in person (n=7) or by telephone (n=1).

All qualitative interview data were independently recorded directly on paper-based forms during each interview by at least two researchers. Attendees provided permission to audio record interviews in order to verify data. All interview data were transcribed into a formatted Excel spreadsheet (Microsoft Office Corp., 2007), and the content was verified by a nominated focus group representative prior to analysis.

Data analyses

Qualitative data were de-identified prior to analysis. An inductive approach to the thematic analysis was undertaken, whereby one researcher performed a line by line analysis of the text to identify the main themes and sub-themes, which was used to develop a coding framework.

Data were then coded and analysed systematically using the coding framework. A second researcher verified the coding to ensure consistent data classification and interpretation.

Pooled quantitative patient-level data from the Stroke Foundation audits were analysed using STATA 10.0 for Windows (Stata Corporation, 2012, Texas). The Chi-Square test for categorical variables and the Wilcoxon Mann-Whitney Rank Sum test for skewed continuous variables were used to compare differences between pre-and post-Facilitator periods. Level of significance was $p < 0.05$.

Changes in organisational attitudes and care practices following the Facilitator program were explored through triangulation, which involved the combination of data sources, data analysis methods and multiple analysts.¹⁸ Baseline qualitative data from the start of the Facilitator employment¹³ were contrasted to the post-implementation qualitative data to describe the potential success factors, on-going barriers and system-based issues to providing evidence-based care.

Results

Results are presented according to the quality improvement priority areas of the Strategy identified from the gap analyses and discussions at health services, and include hospital-based patient outcomes from the audits and the perceived influence of the Facilitators reported from hospital staff. Overall, 57 health professionals, 10 executives sponsors, and eight Facilitators contributed interview data for the qualitative component of this study (respondent characteristics are summarised in Supplemental Table I). Saturation of the issues raised in relation to each area explored was achieved.

Audit data included 600 cases from the pre-Facilitator audits; 281 cases from 2007 (hospital admissions 1/10/2006-31/3/2007) and 319 cases from 2009 (admissions 1/6/2008-31/12/2008). The 2011 post-Facilitator audits included 387 cases (admission 1/7/2010-31/12/2010). Table 3 outlines patient characteristics, stroke type and hospital discharge outcomes of the pre- and post-Facilitator audit data. Additional data from Stroke Foundation audits on changes in adherence to other important stroke care processes is provided in Supplemental Table II.

1. Access to stroke unit care

Prior to the Facilitators being employed, only three hospitals had a formalised stroke unit (Table 1). At the time of the final focus groups, all sites had an established stroke unit. Overall, staff reported that the establishment of stroke units contributed to an increased awareness and interest in stroke, and improved communication within stroke teams. A hospital-wide approach to bed management was required to co-locate and identify specific beds for people with stroke. This essential role was reported to be coordinated by the Facilitator: *“In the past, patients with stroke were sent where there were beds, there was no home base. There has been a change in the processes and the recognition that a stroke patient should go to the stroke unit. It is felt that it is not acceptable now to go to the other wards...”* (H1). However, some respondents were concerned about capacity issues with a perceived increase in stroke admissions.

Despite the overwhelming positive responses to the development of stroke units, it was reported that because the units were novel within the culture of some hospitals, there was still a *“lack of conviction regarding the necessity [of the stroke unit] even though data shows there is more consistent care [within the stroke unit]”*. The definition of a stroke unit was

also questioned by some respondents: *“For the past 18 months there have been four beds which we call a stroke unit. There were reports of just putting a sign on the door saying 'stroke unit' in response to community demand to have a stroke unit, although we have been working on stroke management for so long...”* (H3).

Data from the audits provide evidence that access to stroke unit care improved significantly (Table 4) with an almost six-fold greater odds of patients receiving care in a stroke unit in the post-Facilitator period compared with pre-Facilitator (OR 5.7, 95% CI 4.0 - 8.1). Although an overall increase in stroke unit access occurred throughout Australia over this time period (Table 4), the national improvement was less pronounced than in the eight Victorian hospitals that were involved in the Facilitator program.

2. *Use of intravenous thrombolysis*

Prior to the Facilitator program, five hospitals had administered intravenous thrombolysis, albeit infrequently. Post-Facilitators, all but one hospital had protocols and staff reported increased administration of thrombolysis. Audit data substantiated these findings, with patients having an almost four-fold increased odds of receiving thrombolysis in the post-facilitator period (OR 3.84, 95% CI 1.9-7.9). This improvement represents a greater increase than the national improvement within this time period (Table 4). In conjunction with the Facilitator led hospital-wide education and new or improved protocols for thrombolysis use, it was reported that the appointment of medical staff who supported thrombolysis provided leverage for organisational cultural change to increase its uptake. Staff reported that these factors were critical to the success of the stroke service and influenced a change in attitude of some medical (particularly within the emergency department) and radiology staff about thrombolysis which encouraged their *“buy-in”* to the service. Positive outcomes for patients

who received thrombolysis were also perceived to help overcome some of the ongoing cynicism.

“...the Facilitator initiated groundwork, discussions, documentation and education - without this resource it wouldn't have happened” (H7)

Despite the improved access to thrombolysis treatment, various ongoing barriers including organisational culture and variable medical opinions were reported to influence universal availability of this treatment and delayed the time to imbed the service in some hospitals. Additional challenges were noted including limited eligible patients because of the distance to hospital from remote locations: *“...it is difficult to gain experience with something that occurs so infrequently, so it is hard to get the systems right. Therefore the protocol is essential” (H3).*

3. Management of patients with transient ischemic attack

Staff reported that protocols and pathways to guide TIA management were available in all the hospitals after the Facilitator program, whereas only 50% of hospitals had these at baseline. Specialist TIA clinics had been established and staff education regarding TIA management was occurring across all hospitals.

Reported ongoing difficulties included a lack of compliance with the use of TIA pathways, which was felt to be compounded by difficulties in sustaining education due to high staff turnover (H4). The perceived need for more staff to run additional clinics was also raised (H7).

4. *The Facilitator role*

Benefits and challenges of the Facilitator role are outlined in Table 2. The Facilitators reported that the role was challenging due to local and systemic health service issues, particularly establishing executive support and local stroke steering committee backing, two elements considered essential for achieving change. Gaining staff support, working within existing roles and the large geographical region to cover were also reported as challenges. The VSCN and fortnightly Facilitator meetings were described as invaluable for providing ongoing support throughout the program.

Overall, the Facilitator was perceived as the clinical lead for stroke by all stakeholder groups, having a vital role in driving the majority of service improvements. They were integral in fostering enhanced communication, team motivation, cohesiveness and an increased interest in stroke care.

“The team appears to be more empowered, [with greater] commitment and enthusiasm to improve services...” (H2)

“... [there is now] more coordinated care and interdisciplinary links...” (H3)

Part of the Facilitators' role was to ensure that their implementation efforts were sustainable. Ensuring that changes were '*process-driven not person-driven*' was a means to achieving this: *“...a lot of change has been embedded in pathways and protocols...” (H1)*. However, it was considered that having other staff who could provide dedicated clinical leadership for stroke was essential for continuing the drive for stroke service improvements. Staff from hospitals that had clinical leadership support from another nurse or interdisciplinary team member

spoke about achieving more success, and the ease in which clinician behavior change was achieved.

Discussion

This study provides important evidence in support of employment of fixed-term Facilitators within hospitals as part of a package of support to positively influence the quality of evidence-based stroke care. We recommend a period of three years based on the outcomes of our program. In particular, creating an environment with more organised care, including the establishment of stroke units and processes to increase patient access, a greater provision of intravenous thrombolysis and improved management of TIAs was possible. Improvements in some evidence-based care processes could possibly be expected just with the establishment of a stroke unit.^{2, 12} However, with the inherent difficulties in successfully implementing a stroke unit, especially with staff training, cultural change, and development of systems of care⁷, our results demonstrate that investing in a Facilitator is a valuable means to achieve the end goal of improving care for patients with stroke. Our findings also highlight the ongoing issue of limited staff resources¹⁹, as well as other barriers to providing evidence-based stroke care which primarily relate to intrinsic organisational issues, including funding for equipment and the number of specific stroke unit beds.

The use of Facilitators is considered essential in the translation of evidence into practice,^{9, 20} but few examples for acute stroke exist. Much focus has been on the potential influence of internal and external Facilitators for care of various disease states.^{11, 21} Similar to other researchers,¹¹ we found that establishing rapport and effective communication within the clinical team were essential in the overall facilitation process. Benefits of a clinical Facilitator

were reported by Cadilhac et. al (2013) who undertook a multi-site study of hospital stroke care in another Australian state, demonstrating improved adherence to a variety of process measures, and an increase in direct discharges home from hospital.¹² However, in contrast to our study, their Facilitator role was not fixed-term, and included patient management responsibilities. While the focus of the current study was on the priority areas identified from the Strategy, benefits relating to other processes of care including greater access to allied health professionals were also observed. While the audit data were insufficient to detect changes in patient outcomes, our results remain important given the established associations between these aspects of care and achievement of better health outcomes.^{2, 22}

We acknowledge that the Facilitator role did not exist in isolation. Additional success factors that contributed to the 'program package' that was delivered included the appointment of neurologists or physicians with stroke specific expertise, and dedicated stroke specific allied health (at some hospitals). Additionally, there was strong executive support given the profile of the program within the hospitals that were successful in obtaining the additional resources to improve stroke care. In the literature executive support is an important driver of change.²³ Even considering the multifactorial nature of implementation research, the qualitative data from stakeholders validated the view that the Facilitator was considered the catalyst in both the capacity building elements of education and training, and in driving wider organisational change, including dedicated staffing positions. Previously, improved efficiency, quality of stroke care and in-hospital mortality have been demonstrated with the use of protocols or stroke care pathways,²⁴ and these were also important aspects implemented by Facilitators which contributed to the success of this program. Staff highlighted the importance of embedding new protocols and processes within the hospital system to ensure sustainability of improvements, rather than having changes dependent on a single person. Consistent with

previous research,^{23, 25} having an ongoing dedicated clinical leader for stroke was also considered essential, particularly given the fixed-term nature of the Facilitator position, and clinicians who are often time-poor, with limited opportunity to update pathways with new evidence or monitor compliance of use.

Given the pragmatic pre-post program evaluation design, and the leveraging of existing data from a national audit to report on differences in patient care, our results should be interpreted with caution. That is, all improvements cannot be fully attributed solely to the Facilitator role which was bolstered by additional resources at some hospitals as part of the program, and temporal trends need to also be considered. With respect to the latter issue, we have some reassurance since the results from the national audit provide evidence that the large shifts in adherence to stroke care recommendations within the eight hospitals were greater than those observed nationally over the same time period.¹⁴ While the influence of missing data from the audits is acknowledged, having standardised collection of audit data permits comparison to other regions and hospitals. The biennial audit program will also provide a valuable means to assess the sustainability of such benefits of the Facilitator program in the future.

Overall, the use of multiple data sources and triangulation of results provided a broader means of ensuring comprehensiveness and encouraged a more reflective analysis of the program. Having the initial baseline qualitative data to contrast to post-Facilitator data was informative in describing the potential success factors and issues to providing clinical change, particularly staff awareness and attitude towards stroke care, clinical leadership and communication between team members. In addition, obtaining information from staff with varying backgrounds, and achieving saturation of the issues discussed in focus groups strengthened our findings. In view of the difficulties in successfully achieving change and

embedding new processes in a complex system such as health care delivery, demonstrating that fixed-term employment of a Facilitator can improve evidence-based stroke care in hospitals with limited infrastructure and expertise in stroke is important locally. The success factors may also be relevant in other settings and countries, and could potentially be translated into the stroke rehabilitation environment.

Conclusion

Facilitators with fixed-term employment who were able to focus on a range of change management strategies and provide transition support for additional specialist resources, were able to positively influence improving stroke care in hospitals. This type of role may be effective in other areas. Further research using controlled designs to validate these findings is warranted.

Acknowledgments

We are grateful to the Stroke Foundation and the staff from hospitals for providing permission to use their audit data for this evaluation as well as the Facilitators, executive sponsors and hospital staff who participated in the focus group interviews. We acknowledge Heather Wellington who facilitated the executive workshop and the assistance of Lesley Thornton, Kathryn Whitfield, Janelle Devereux and Adele Mollo who were involved in the role of VSCN program manager.

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Disclosures

Sonia Denisenko, is currently, and was the program manager for VSCN during the time of the implementation and evaluations taking place for this study.

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Figure Legends

Figure 1: Timeline outlining the evaluation of the Facilitator program

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Table 1: Description of stroke services and resources before and after the Facilitator program

Elements of stroke care	Pre-Facilitator (2008-2009)								Post-Facilitator (2010-2011)							
	H1	H2	H3	H4	H5	H6	H7	H8	H1	H2	H3	H4	H5	H6	H7	H8
Human resources																
Specialist stroke nursing staff*		✓				✓		✓	✓	✓		✓		✓		✓
Dedicated allied health staff				✓				✓	✓**	✓		✓			✓**	✓
Neurologist	✓			✓		✓^	✓^	✓	✓	✓ ^o		✓	✓^	✓^	✓	✓
Organisational																
Annual stroke admissions [†]	818	404	246	751	171	130	240	586	1010	403	339	896	227	221	336	855
Formal stroke unit						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of beds allocated for stroke	0	0	4	0	0	3	4	12	4	4	4	4	2	3	4	12
Thrombolysis service [‡]								✓	✓	§	✓	✓	✓	✓	✓	✓
Weekly multidisciplinary team meetings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Onsite CT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Stroke specific care plan/pathway [#]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
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Sources: Clinician interview data and clinical audit data from pre¹³- and post- Facilitator Victorian Stroke Clinical Network (VSCN) evaluation, Stroke Care Strategy⁸ and personal communication with Sonia Denisenko (Manager VSCN) , unpublished data from the Department of Health and Human Services

CT= computed tomography.

*Includes stroke liaison nurses, stroke care coordinators, stroke nurse practitioners, clinical nurse specialists, stroke nurse coordinator

†Includes 2005-2006 acute admissions for pre facilitator period and 2010-2011 acute admissions for post facilitator periods

‡With formalised protocols

^ Physician with interest in stroke; ° Neurologist planned to start in next 4 months

§ Local protocols being developed. At the time of data collection, patients who presented within 3 hours of stroke onset who are appropriate for thrombolysis were transported to a partner metropolitan hospital for acute management

Stroke care pathway is a plan of care that aims to promote organised and efficient stroke care based on evidence and guidelines but is adapted to local services

** Within broader caseload often involving medical, neurology or neurosurgical patients

Table 2: Overall summary of feedback on the Facilitator role

Role	<ul style="list-style-type: none"> • Perform gap analysis; achieved through extensive consultation with local hospital staff, document reviews, and preexisting audit data • Localised implementation plans were developed with staff to address the areas of need in the gap analysis • Education; providing education and awareness of current evidence-based management to local staff through meetings, provision of education materials and hosting stroke education seminars and workshops for local staff • Internal governance structures were developed with representatives from executive staff to clinical staff, within each hospital site to oversee implementation plans • Development of local policies, procedures and protocols to drive implementation and sustainability options • Benchmarking against other hospitals and sharing of useful resources • Linking in with consumers and other state-wide programs and networks – the Facilitator role provided links to larger state-wide stroke programs where necessary
Benefits	<ul style="list-style-type: none"> • Gap analysis assisted to identify and prioritise areas of improvement • Role provided clinical leadership to stroke service • Ensured changes were embedded in pathways and protocols for sustainability • Provided staff education and increased awareness of stroke management throughout the hospital
Enablers	<ul style="list-style-type: none"> • Support and resources offered by the VSCN • Backing from the hospital executive and local steering committees • Peer support and sharing of resources with other Facilitators

Challenges	<ul style="list-style-type: none"> • Fixed-term tenure of Facilitator position • Large geographical area to cover in some regions • Local and systemic issues including funding for equipment and additional staff, and the number of stroke beds • Ability to sustain change once Facilitator employment finished- if no clinical leaders for stroke were formally appointed
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VSCN: Victorian Stroke Clinical Network

Table 3: Univariable summary of patient characteristics, stroke type and outcomes
using national audit data

	Pre-Facilitator** n (%) N=600	Post-Facilitator†† n (%) N=387
Patient characteristics		
Age, median (Q1,Q3)	76 (65, 84)	76 (68, 84)
Male	320 (53)	210 (54)
Independent prior to stroke (mRS 0-2)	420 (75) §	259 (71) §
Stroke type		
Ischemic	452 (76) ‡	320 (84) ‡ *
Intracerebral haemorrhagic	62 (10) ‡	52 (14) ‡
Undetermined	77 (13) ‡	10 (3) ‡ *
Stroke severity		
Unable to walk independently on admission	374 (65) ‡	243 (63) †
Arm weakness on admission	433 (75) ‡	259 (70) ‡
Speech disturbance on admission	363 (64) §	225 (61) ‡
Incontinence within 72 hours of admission	218 (38) §	125 (34) ‡
Hospital outcomes		
Died in-hospital	78 (13)	47 (12)
Independence on discharge (mRS 0-2)	190 (32)	123 (32)
Length of stay (all) days median (Q1,Q3)	5 (2, 9)	5 (2, 9)
Discharge destination		
Home	229 (44)	135 (40)
In-patient rehabilitation	208 (40)	137 (40)
Institutional care	30 (6)	32 (9)

Other#

55 (10) ||

36 (11) ||

Q1: 1st quartile; Q3: 3rd quartile; mRS= modified Rankin Scale; *significant $p < 0.05$; † <1% missing data; ‡ 1-5% missing data; § 6-10% missing data; || 11-13% missing data; # Transferred to another hospital/ward/unit/facility or unknown; **2007 and 2009 audit data; †† 2011 audit data

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Table 4: Changes in adherence to processes between pre-post Facilitator audit periods with comparisons from national data

Process of care	Pre-Facilitator§ n (%) N=600	Post-Facilitator** n (%) N=387	p value ††	National Audit 2009 ⁶ N =2,988*	National Audit 2011 ¹⁴ N=3,161*
Brain imaging < 24 hours of ED arrival†	274 (87)	348 (91)	0.06	89%	89%
Received care in stroke unit	314 (53) ‡	329 (86) ‡	<0.001	50%	56%
Received tPA if ischemic stroke	11 (2)	28 (9)	<0.001	3%	7%
If arrived <3hrs of symptom onset†	5 (8)	23 (24)	0.01	10%	20%

tPA= intravenous thrombolysis; ED= emergency department; ⁶ Harris et al, 2009; ¹⁴ National Stroke Foundation, 2011; *Excludes data from the 8 Victorian hospitals; †2009 audit data for pre-Facilitator; ‡<2% missing data; § 2007 and 2009 audit data from 8 hospitals; ** 2011 audit data from 8 hospitals; ††pre-post Facilitator evaluation

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