

Stroke Pathways

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Abstract

Stroke pathways are task-orientated structured multidisciplinary care plans which detail essential steps and interventions during the period of care of a "typical" stroke patient. Pathway development and implementation are best achieved by an appointed champion leading a multidisciplinary team of health care workers and administrators, who will also be the end users of the pathway. Pathway development involves reviews of existing clinical practice guidelines and pathways, followed by documentation, interdigitation and prioritisation of care requirements at different time points in the various spheres, taking into consideration local philosophies and practices. These spheres could include investigations, pharmacologic treatment, rehabilitative therapy, nursing measures, and patient education. This would result in evidence-based holistic quality care, wide support base, efficient service provision, reduced costs and length of stay, less practice variation, improved communication among disciplines, enhanced patient-staff relationship, ease of audit and research opportunities. Components of the pathway could include a patient summary sheet, multidisciplinary record of the various activities structured on a day-to-day basis, sign-off columns for staff responsible for performing those activity, variance sheet, and separate protocols for specific issues. Implementation requires training of users, pilot runs, feedback, regular revisions, monitoring of compliance, and analysis of variances. Widespread implementation of pathways may be hindered by lack of support, and concerns about increased time requirements and costs, stifling of innovation, restriction of application of clinical judgement, lack of applicability to all patients, misuse and legal issues. However, a well-designed pathway will ensure quality care in a cost-efficient manner, benefiting the patient, carer and the health care service.

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Key words: Care map, Carepath, Cerebrovascular disease, Clinical pathway, Critical pathway

Introduction

Stroke has been Singapore's third leading cause of death for most years of the last 3 decades, accounting for 10% to 12% of all deaths, and a crude death rate of 50 to 60 per 100,000. While age and sex-standardised stroke mortality rates have been falling since the mid-1970s, the number of admissions to our hospitals for stroke has been rising, with 10,000 estimated admissions in year 2000. With the rapidly ageing population, stroke can be expected to pose a major challenge to the Singapore health care system in the years ahead.¹

Organised in-patient care of stroke patients in a ward or by a multidisciplinary team that exclusively manages stroke patients (a dedicated stroke unit) or a ward or team that provides a generic disability service (a mixed assessment or rehabilitation unit) has been shown to reduce unfavourable stroke outcomes at a median of 1-year follow-up.² The odds ratio of death was 0.83 (95% confidence interval, 0.71 to 0.97), of death or institutionalised care was

0.76 (95% confidence interval, 0.65 to 0.90), of death or dependency at final review was 0.75 (95% confidence interval, 0.65 to 0.87). Subgroup analyses showed that the observed benefits were independent of patient age, sex, stroke severity and types of stroke unit organisation. One of the important components of this care system is the stroke pathway.

What is a Stroke Pathway?

Care pathways are task-orientated structured multidisciplinary care plans which detail essential steps in the care of patients with a specific clinical problem.³⁻⁵ Other terms used to describe the same concept include carepath, clinical pathway, critical pathway, coordinated care pathway, integrated care pathway, care map and anticipated recovery pathway. They are a way of translating national clinical practice guidelines into local protocols and clinical practice.⁶ The various interventions required at various time points are derived using evidence-based

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medicine, which are then standardised, documented and sequenced in a logical and efficient manner for implementation.

An acute stroke pathway would thus chart the expected clinical course of a “typical” stroke patient during his hospital stay. Pathways should include the Emergency Room, In-patient Ward and Rehabilitation Ward stays, as well as the phase when the patient has returned to Community Living. Thus, the pathway would cover the spectrum of essential activities occurring along the stroke patient’s road to recovery.

Importance of a Stroke Pathway

Pathways serve the following important functions:^{3,7,8}

1. Operationalisation of clinical practice guidelines: The Ministry of Health, Singapore, published the national stroke management guidelines in 1999. Guidelines aim to improve patient care by critically reviewing and documenting the available evidence, and providing appropriate recommendations for care. Guidelines are usually prepared bearing in mind the broad range of practices in the country. They do not usually demand specific interventions, but would strongly encourage proven or discourage unhelpful or dangerous investigations or treatments. To have an impact on daily clinical practice, these guidelines will need to be translated in the context of local requirements and limitations of the practice environment into which they are being applied, be they in staffing numbers, equipment, building structure, or corporate philosophy.
2. Documentation of care plans, holistic care provision: A stroke patient may need to undergo certain investigations, commence specific pharmacologic therapies, receive education about his disease, and commence rehabilitative therapy. Simultaneously, he will need his nutrition, elimination, skin care and other nursing issues attended to. Discharge planning activities will also need to be conducted. To avoid gaps in care provision in a busy health care environment, the multitude of activities thus need to be reviewed and carefully documented. This results in an integrated and comprehensive care delivery system.
3. Resolution of conflicts, prioritisation of care: There may be competition for patient time for the various activities. The pathway will thus prioritise the activities in a timely and logical manner, e.g., swallowing assessment needs to be done before starting to feed the patient.
4. Improvement of efficiency of services: Stroke care is both time- and labour-intensive. It is conceivable that some aspects of care may be inadvertently omitted, only to be discovered at the time of discharge, or even later, e.g., echocardiography for investigation of presumed embolic stroke. There may be time gaps where no activities seem to be occurring. Unnecessary or repetitious actions may also occur. A pathway would help ensure that all the various activities are completed in an efficient and timely manner. This can be expected to reduce unnecessary prolongation of hospital stay and health care costs.^{9,10} In a casemix-funded environment, stroke pathways would serve to help clinicians manage resources more efficiently, reducing health care costs.
5. Discharge planning: The patient’s length of stay may be estimated, and the Team work with the patient and family within it. Discharge planning commences on day 1. However, it is recognised that complications and other issues may delay discharge. Certain activities peculiar to the 1 to 2 days pre-discharge can be planned, for example, medication counselling, home assessment.
6. Reduction of practice variation: Each health care worker may have his interpretation of how certain activities are to be carried out, or if they are to be carried out at all. Thus, different patients may receive differing care, or worse, the same patient attended to by different members of the same specialty may receive differing or even conflicting care. Pathways serve as a means of reducing this variation, with a consensus of opinion among specialists in each area, e.g., the management of high blood pressure within the first few days after stroke.
7. Improvement of communication between disciplines:¹¹ The development and implementation of stroke pathways necessarily require interaction among team members of various specialties that does not always occur in a busy clinical environment. The intensive communication translates to greater cohesion and team-building.
8. Enhancement of patient-staff relationship: The smoothly running pathway goes a long way to enhancing patient satisfaction¹² and the relationship between patient, family and the health care team. Communication is also improved as any member of the team could update the patient on expected activities in the coming hours to days.
9. Ensuring quality care, allowing audit:^{13,14} Close monitoring and audit of adherence to the pathway would allow quality care to be provided, with fewer complications and lower mortality.¹⁰ An audit of variances from the planned outcomes could detect problems in the flow of activities or provision of care. New initiatives can be started to meet these needs, e.g., a high frequency of aspiration pneumonia may signal a need for review of feeding practice. Quality standards

can be attained, or even exceeded. New services can be developed to meet these needs.¹¹

10. Research: New areas requiring research can be uncovered. A robust system of care delivery may attract the interest of international clinical trials, as has been the experience of the 3 large neurology departments in Singapore.

Components of a Stroke Pathway

The following are suggested components of a stroke pathway:

1. Patient summary sheet (Appendix I): This could contain patient demographics, diagnosis, co-morbidities, and clinical indicators such as length of stay, complications during stay, outcomes to be attained before discharge, e.g., caregiver competence attainment. The names of the principle Team members caring for the patients may also be listed here.
2. Multidisciplinary record of the various activities, grouped on a daily basis, e.g., investigations, dietician review, stroke education, etc (Appendix II): The flow of activities will need to be sequential and logical, with the spectrum of care carefully divided among the various days, with each intervention dovetailing with the other activities.
3. Sign-off column for staff responsible for performing that activity: This ensures that the duties to be performed are in fact carried out. Team members may be able to alert each other should one member fail to attend to the patient as planned.
4. Variance sheet (Appendix III): This is to document variances from the expected plan and the reasons, e.g., prolonged length of stay because of medical complications such as urinary infection. This will assist in audit of causes for deviation from pathway plans, and reveal recurring problems that could signal a need to review the pathway or clinical practices.
5. Separate protocols for specific issues: These would supplement the pathway, e.g., what to do for constipation, how to feed via a nasogastric tube. This will avoid crowding the pathway pages with these details.

The various fields should be easy to use, with minimum free text. However, adequate space should be provided to allow entry of important information into the appropriate place in the pathway if these are needed.

The components are best determined by those developing the pathway, so that local philosophies and practices can be considered. These components will need to be reviewed regularly to assess the usefulness and applicability of the various components.

Development and Implementation of a Stroke Pathway

The following steps would ease the development and implementation of a pathway:^{3,10,15}

1. Pathway champion: Someone should head the development and implementation of the pathway. The champion may need to negotiate with other health care workers and administrators to gain support for the pathway, both in the phases of development and implementation. This may be particularly important for stroke, where there is a long history of nihilism and scepticism about effective treatments.
2. Development by a Team, Users: It would be inappropriate for a single individual to develop and enforce a multidisciplinary pathway on other health care workers. It is preferred that those who will be using the pathway be involved in pathway development from its inception—this will instil a sense of ownership, and will also avoid subsequent conflicts. It will also ease implementation of the pathway. Involving the administrators will also ensure their support.
3. Review of national clinical practice guidelines: Operationalisation of guidelines will ensure consistency and validity of the pathway. It will certainly avoid the scenario where pathway measures contradict what is recommended for clinical practice. The evidence-based recommendation that all stroke patients be managed in stroke units by a stroke team is an endorsement of the need for organised care delivery.
4. Study of other pathways: This will avoid “reinventing the wheel”. Much can be learnt from reviewing existing stroke pathways already in place in other institutions, as well as pathways for other disorders in the same institution. This will reduce the time needed to design and select components needed for the pathway, while simultaneously keeping it consistent with other pathways.
5. Keeping the pathway “local”: There is no pathway that fits all institutions. The pathway will need to be developed in a manner consistent with the current and past practices and philosophies of the environment in which it is to be implemented. For example, it would be unwise to require a speech therapist to assess swallowing of every patient before feeding the patient if there are too few speech therapists on staff; one solution would be for the nurses to do this.
6. Pilot, feedback, revision: Pathways should be piloted to assess its applicability and acceptance by staff. Feedback should be actively encouraged particularly from the users, and revisions performed. Each revision should be piloted and further revised till the pathway

runs smoothly. Pathways may also need to be revised in the light of new knowledge that impacts on patient care and outcome so that the interventions remain effective.

7. **Training of users:** As pathways are new to many staff members, proper training on the appropriate use of the pathway is crucial. Staff would need to be convinced that the pathway is a tool to improve care, and not to increase their paperwork. This will avoid errors, misinterpretation and resistance to the use of the pathway.
8. **Compliance:** For a pathway to work, it must be used. Staff may omit certain steps in the pathway out of carelessness, or even wilfully omitted. Regular and frequent review of patients presently on a pathway will avoid this, and instil discipline among health care professionals to comply with the pathway. Errant staff would need to be identified and corrected.
9. **Analysis of variances and outcome data:** This will identify common variations from agreed practice, alert staff to patients who do not progress as to be expected, and uncover deficiencies in the pathway that require upgrading. The use of this data for audit should translate into improvement of the quality of care, and may even identify research issues.
10. **Incorporation into clinical records:**^{5,16} The pathway should be made part of the patient's records, and not kept in a separate file. Only then will it serve as a tool for monitoring patient progress and communication among members. It will also reduce redundant recording of information, build-up teamwork, and improve the understanding of roles of the other disciplines.

How clinical pathways based on evidence result in improved quality of care is illustrated in Figure 1. The use of evidence from research and published guidelines can be translated into pathways that ultimately improve quality of care. Continual audit, outcome review and feedback will lead to a series of events that positively influence pathway development and implementation.

Development Team

The following health care workers would form the Team: doctors, nurses, physical therapists, occupational therapists, speech therapists, medical social workers, case managers, dieticians, pharmacists, patients educators, administrators, as well as other persons interested and required in the pathways. Regular meetings and open discussions would encourage teamwork and build team spirit during the long and arduous path of stroke pathway development and implementation.

Approach to Variances^{3,17}

Variances from agreed practice need to be identified, recorded and acted upon. Variances may be avoidable or unavoidable. Avoidable variances include failure to perform a particular test resulting in unnecessary prolongation of hospital stay, e.g., ultrasonography to detect severe carotid stenosis in a patient with minor stroke who could be a candidate for endarterectomy. Unavoidable variances include co-morbidities and other clinical conditions, e.g., a pneumonia complicating a stroke that results in a longer stay for treatment before the patient may be safely transferred to a rehabilitation unit, or a social circumstance, e.g., lack of a suitable caregiver for a disabled destitute stroke patient.

Appropriate action must be taken when a patient is seen to make slower progress along the pathway than expected. This occurrence may reflect a rather ill patient or even an unexpected social scenario. Prompt attention would reduce further variance and prolongation of length of stay.

Another source of variance is the clinician's decision to ignore critical steps in the pathway, or completely refuse to use it. This situation may be avoided by involving him early in the developmental stages of the pathway. Such refusal could lead to confusion among the other users as to whether the pathway is to be followed at all. However, deviations from the pathway should be allowed as the clinical situation demands—the reasons should be documented and justified.

The use of newer techniques or technology may also cause variances from the pathway. Limitations of other inter-related systems may result in variances. The wait for a specialist from another discipline to see the stroke patient is an example of an internal system failure. The lack of transportation services on a weekend, or the non-availability

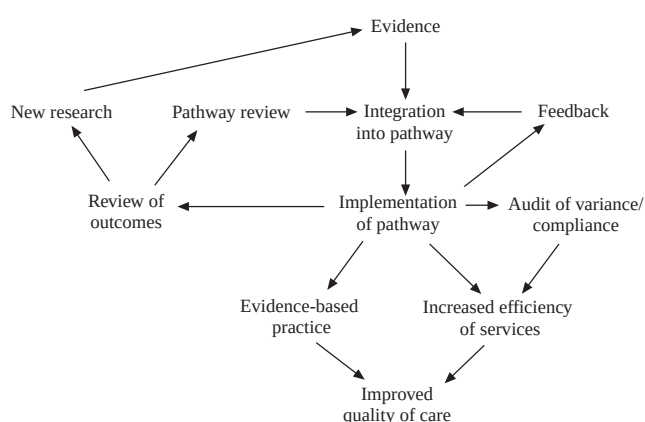


Fig. 1. Evidence-based pathways and improvement of quality of care.

of rehabilitation or community hospital beds are examples of external system failures. Early anticipation of these failures would result in anticipatory planning so that variance is reduced.

Variances should be viewed as a way of auditing the efficiency and acceptability of the pathway. The information so gained should be used to further improve services so that patient care is enhanced, and service provision optimised. Keeping the variance sheets as a separate sheet will allow easy extraction for audit purposes. The variances should be discussed by the team and the pathway modified if needed. Some key questions on variance analysis may revolve around data collection, data entry and analysis, data reporting, and organisational support.¹⁸

Barriers to Implementation, Concerns of Users

The following issues may hinder widespread implementation of pathways:^{3,19}

1. Time: Documentation in pathways may be seen as more paperwork. In a well-designed pathway, however, all the essential steps would have been included, and the need for writing long prose would be significantly reduced as a mere “tick” would be all that is needed.
2. Stifling of innovation, restriction of application of clinical judgement:^{11,20} The pathway should be seen as a tool for providing best medical care. The health care worker is always free to introduce interventions that are in the best interest of the patient. Pathways serve as a guide, and are not a tool to limit progress or good patient care. Care can still be individualised, within the broader framework of the pathway.
3. Lack of applicability to all patients: This would be true when unusual situations arise, e.g., a rare cause of stroke such as CADASIL may require counselling and screening of the family. As pathways address general issues applicable to most stroke patients, this situation would not arise too often.
4. Lack of support: Reluctance to change is understandable and expected. Some personalities may seek to block pathway development, or fail to acknowledge the benefits of the pathway. With good and consultative leadership by a well-chosen and knowledgeable champion supported by an enthusiastic team, this may be overcome in time. Support locally from health care workers and nationally from user groups may also be helpful.
5. Misuse: It is possible that pathways may be used by overenthusiastic administrators to inappropriately reduce hospitalisation costs. This should be actively resisted. A smoothly-running pathway will itself improve efficiency of care delivery and reduce costs.

6. High running costs: Money and time will need to be expended to develop the pathway, e.g., printing forms, training staff in its use, employing additional staff for variance handling, etc. However, these expenses will be more than met by the savings from inefficient services and litigation from poor patient care. In fact, pathways may help determine the cost of providing care.²¹

7. Legal issues:²² Pathways identify where clinical care falls short of acceptable standards. There is at present no evidence of increased litigation in countries where pathways have been in-use for longer periods of time.

Future Developments

Pathways are presently widely used in hospital settings. Their use may be extended to outpatient and primary care settings, and even to the community. The case manager in the community may find such a pathway useful to coordinate services for the disabled stroke patient such as home nursing services, meal delivery, day care, therapy and medical requirements.

The development of user-friendly computer interfaces would encourage widespread use. Information networks would allow sharing of information throughout the health care system, be it in hospital or community. Audit and research needs identification would be made easier as a large database can be quickly analysed. Automated care plans serve as a documentation tool that will benefit the caregiver and patient, while decreasing the risk of liability.²³

Conclusions

A successful pathway requires strong administrative and medical staff leadership, active participation of the various disciplines involved in the care of the patient, and sufficient resources if it is to be used as a tool for provision of quality care and cost containment. Pathways should generate a pressure on every member of the health care team, a sense of negative entropy constantly urging a move toward a higher level of excellence and quality care.¹¹ As part of a wider disease management programme,²⁴ it serves as a mode of streamlining care in the sector in which it is employed, be it in the emergency room, acute care hospital, rehabilitation department, or community, so that optimal care is provided in a cost-efficient manner, as the patient journeys along the path to recovery.

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APPENDIX I. PATIENT SUMMARY SHEET FOR ISCHAEMIC STROKE

NNI / TTSH CO-ORDINATED CARE PATH			Patient's Sticky Label			
Case Type	Length of stay					
Ischaemic Stroke	10 Days		Diagnosis :			
Team Members Consultant-in-charge : _____ Principal Nurse : _____ Physiotherapist : _____ Occupational Therapist : _____ Speech Therapist : _____ Dietitian : _____ Medical Social Worker : _____			Unit	Ward	Bed No	Class status
				Date	Time	Location
			Admission			
			Transfer In			
			Transfer Out			
Comorbid Conditions	Complications during stay		Drug Allergy			
☐ Hypertension ☐ Diabetes Mellitus ☐ Hyperlipidaemia ☐ Pneumonia ☐ Heart Disease	☐ Pneumonia ☐ DVT ☐ UTI ☐ Pressure Sores ☐ Sepsis ☐ Constipation					
DISCHARGE PLAN			Discharge Criteria			
Patient will be discharged on : _____ Actual date of discharge : _____ To: ☐ Home ☐ Rehab ☐ Community Hospital ☐ Nursing Homes ☐ Others (specify) _____		Equipment Needed Prescribed ☐ Wheelchair ☐ Bedside commode ☐ Walking Aid ☐ Oxygen ☐ Others (specify) e.g., feeding supplies	1. Vital signs stable for 24 hrs before discharge. ☐ 2. Patient is tolerating diet; feeding method established. ☐ 3. Show potential for inpatient rehab if discharge to rehab services. ☐ 4. Post discharge appointments made. ☐ 5. Patient/carer knows resources to provide safe care outside the hospital, e.g., HNF, SCHCC, Day Care Centres. ☐ 6. Patient/carer able to provide safe care outside hospital. ☐			

The care path serves as a guide for health care professionals to coordinate and communicate patient care;

It is not intended to be construed as the standard of medical care;

It may be modified to meet individual patient's needs;

It is also a part of the hospital's effort to improve patient care continuously.

Instructions:

Initial
R

Done / Achieved

Report needed

X
-

Not done/Not Achieved (explain in progress notes)

Not Applicable

Key Indicators:

1. Length of stay

2. Complications during stay

AY/Stroke(Haem)CPNov2000Front

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DVT: deep venous thrombosis; HNF: Home Nursing Foundation; SCHCC: Senior Citizens' Health Care Centre; UTI: urinary tract infection.

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APPENDIX II. DAY 3 OF ISCHAEMIC STROKE PATHWAY

NNI / TAN TOCK SENG HOSPITAL—DAILY CO-ORDINATED CARE PATH Case Type : Ischaemic Stroke		Patient's Sticky label			
DATE	DAY 3	Team	Nurses' Shift		
TIME FRAME		Initial	AM	PM	ND
CONSULTS	Refer rehab. physician for assessment if patient has potential	Dr			
TEST	PT/PTT if patient receives anticoagulant therapy				
TREATMENT	Review oxygen therapy if patient is still on O ₂ therapy				
MEDICATION	Intravenous therapy	Refer to IMR			
	Antiplatelets/Anticoagulants				
	Antihypertensive/Hypoglycaemic/Lipid lowering drugs				
	Neuroprotectants				
ACTIVITY	Sit out of bed / Mobilise	Nurse / PT			
	Continue physiotherapy intervention	PT			
	Continue occupational therapy intervention	OT			
	Continue ST communication intervention, if appropriate	ST			
	Begin pre-discharge management, if appropriate	Team			
NUTRITION	Continue dysphagia management	ST			
	Continue nutritional care plan	Dietitian			
	Continue diet/feed regimes as ordered/monitor adequacy	Nurse			
	Care of feeding tube if in place				
HYGIENE	Skin assessment and prevention of skin breakdown				
	Oral care/personal hygiene care if required				
ELIMINATION	Review urinary catheter if in place				
	Bladder care if appropriate				
	Monitor bowel movement (if BNO refer to bowel protocol)				
OBSERVATIONS	Review CLC	Dr			
	Weight and height if fit	Nurse			
	Monitor intake & output				
	Aspiration precaution				
	Fall risk precaution				
	TPR bd/BP tds/take weight & height if required				
EDUCATION	Medical nutritional therapy counselling	Dietitian			
	Information re:care and other issues discussed	Nurse			
DISCHARGE PLANNING	Refer community hospital if required	Dr/NC			
	Ensure multi-disciplinary team members are aware of any potential discharge problems/discharge plans	Nurse/NC			
DESIRED OUTCOMES	Skin integrity is maintained	Nurse			
	Patient is safe from injury				
	Optimal nutritional status is maintained				
	Patient participates in self care				

APPENDIX III. VARIANCE RECORD FOR PATHWAYS

NNI / TAN TOCK SENG HOSPITAL

VARIANCE RECORD

Patient's Sticky Label

Instruction:

Identify factors that will prolong length of stay
and/or affect patient's outcome

Diagnosis on Care Path: _____

Medically fit for discharge

Date : _____

Name of Dr : _____

Ward Number : _____

DATE	DAY OF STAY	VARIANCE CODE	DESCRIPTION	ACTION TAKEN	SIGNATURE

A. PATIENT	B. HEALTH CARE PROVIDER	C. HOSPITAL/SYSTEM	D. COMMUNITY/FAMILY
A001 Too ill cardio-pulmonary	B001 Action	C001 OT delay/cancellation	D001 Transport availability
A002 Refuses to sign consent	B002 Dr's decision to postpone op/procedure	C002 Diagnostic Test (to specify)	D002 Rehabilitation availability
A003 Abnormal blood result	B003 Response Time (Surgeon)	C004 Others	D003 Nursing Home availability
A004 Medical condition requires treatment	B004 Response Time (Referral)		D004 Caregiver/s availability
A005 Pressure sore	B005 Response Time (Therapist)		D005 Community Hospital availability
A006 Infection	B008 Others		D006 Financial Barrier
A007 DVT/Pulmonary embolism			D007 Patient /Family Decision
A008 Pre-existing disease	DISCHARGE ON: _____		D008 Patient/Family Conflict
A009 Non compliant	DISCHARGE TO: _____		D013 Others
A010 Surgical complication	Home ☐		
A011 Neurologically unstable	Rehab ☐		
A012 Infection: UTI	AMKCH ☐		
A023 Others	Nursing Home ☐		
	Others ☐		

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