



ORIGINAL ARTICLE

Development of an acute stroke care pathway in a hospital with stroke unit

P. Martínez-Sánchez^a, B. Fuentes^a, J. Medina-Báez^a, M. Grande^b, C. Llorente^b, P. Parrilla^a, A. Fuster^c, A. Gil^a, M. Sánchez^d, C. Olguín^a, J. García-Caballero^b and E. Díez-Tejedor^{a,*}

^a Servicio de Neurología, Hospital Universitario La Paz, Universidad Autónoma de Madrid, Madrid, Spain

^b Servicio de Medicina Preventiva, Hospital Universitario La Paz, Universidad Autónoma de Madrid, Madrid, Spain

^c Servicio de Rehabilitación, Hospital Universitario La Paz, Universidad Autónoma de Madrid, Madrid, Spain

^d Servicio de Urgencias, Hospital Universitario La Paz, Universidad Autónoma de Madrid, Madrid, Spain

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KEYWORDS

Care pathways;
Stroke;
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Abstract

Introduction: Care pathways (CP) are tools for standardizing the management of patient in certain diseases with a predictable course, and they have demonstrated usefulness in clinical practice. In-hospital stroke CP have been implemented in departments of Neurology, General Medicine or Rehabilitation, however there are few studies developing an integrated CP in hospitals with an acute Stroke Unit (SU). The aim is to develop a CP capable of organizing and homogenizing the stroke assistance, and integrating the quality standards, in a hospital with an Acute Stroke Unit (SU).

Methods: Members of the Neurology, Rehabilitation, Emergency and Preventive Medicine departments established a schedule of nine fortnightly meetings. Several documents that compound the CP were elaborated following the FOCUS-PDCA model, according with the scientific evidence and the in force clinical guides.

Results: The following documents were elaborated: scientific-technical framework which integrates all processes; information document for patient/relatives on-admission; nurses protocols (social risk, disphagya, falling down risk and pressure ulcers); stroke rehabilitation guidelines for staff; treatment, care and monitoring sheets; recommendations at discharge for patient/relatives; stroke rehabilitation guidelines for patient/relatives; specific didactic units for patient/relatives; patient/relatives satisfaction survey; and quality standard document.

Conclusions: A stroke CP in a hospital with SU potentially promotes a more organized and efficient stroke care, as well as improve the patient/relatives satisfaction.

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*Author for correspondence.

E-mail: ediezt@meditex.es; ediez.hulp@salud.madrid.org (E. Díez-Tejedor)

PALABRAS CLAVE

Vía clínica;
Ictus;
Unidad de ictus;
Guías clínicas de ictus

Implantación de una vía clínica para la atención del ictus agudo en un hospital con unidad de ictus**Resumen**

Introducción: Las vías clínicas (VC) son herramientas para la asistencia estandarizada en procesos con poca variabilidad que se han demostrado útiles en la práctica clínica. Se han realizado varias VC de ictus en servicios de medicina general, rehabilitación y salas de neurología, pero no así en hospitales con unidad de ictus agudo. El objetivo es desarrollar una VC capaz de organizar y homogeneizar la atención integrando los estándares de calidad en un hospital universitario con una unidad de ictus agudo (UI).

Métodos: Miembros de los servicios de Neurología, Rehabilitación, Urgencias y Medicina Preventiva del Hospital Universitario La Paz establecieron un programa de nueve reuniones quincenales. En éstas se elaboraron los diversos documentos que integran la VC siguiendo el modelo FOCUS-PDCA, de acuerdo con la evidencia científica y las guías clínicas vigentes.

Resultados: Los documentos resultantes son: matriz temporal científico-técnica que integra todos los procesos; documento de información al ingreso para pacientes y familiares; protocolos de enfermería (riesgo social, disfagia, caídas y úlceras por presión); pautas de actuación en la rehabilitación del ictus para el personal sanitario; órdenes de tratamiento y cuidados; hoja de información al alta para pacientes y familiares; documento de información de rehabilitación para pacientes y familiares; unidades didácticas específicas; encuesta de satisfacción de la atención recibida para pacientes y familiares, y estándares de calidad.

Conclusiones: El desarrollo de una VC de ictus en un hospital con UI tiene el potencial de promover un cuidado organizado y eficiente del paciente, así como mejorar la satisfacción de éste por la atención recibida.

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Introduction

Organised care of acute stroke, integrating the medical staff of the emergency services and neurologist specialist in cerebrovascular disease, ensures prompt and efficient treatment¹⁻⁴. In addition, admitting patients into an acute stroke unit (SU) has confirmed significant reductions in death, dependency and need for institutional care with respect to patients treated in general units⁵⁻¹¹.

Clinical care pathways (CP) are tools for standardised care in processes with little variability, and have proven useful in clinical practice¹². They coordinate and assemble the dimensions of quality of care, scientific and technical quality, safety, quality of information, participation and adjustment of expectations, perceived quality and resource management, and also involve continuous evaluation¹³⁻¹⁸.

Various CP were evaluated in both the acute phase of stroke and in later stages, in most cases in internal medicine¹⁹⁻²¹, neurology²²⁻²⁵ or rehabilitation^{26,27} wards, in order to optimise the performance of resources and reduce assistance times²⁸. However, publications describing the creation and implementation of a stroke CP in a SU are anecdotal^{29,30}. Moreover, the detailed process of creating a CP for strokes has been described in very few occasions^{31,32}.

Our goal is to develop an integral CP that will permit organising and standardising care for acute strokes in a hospital with a SU and that can be implemented from the moment the patient reaches the emergency department until he/ she is discharged.

Material and methods

The comprehensive acute stroke CP was developed jointly by the medical staff involved in the treatment of stroke patients at the Hospital Universitario La Paz (HULP), a tertiary hospital care covering Health Area 5 in Madrid. These services were the Stroke Unit of the Neurology Department, the Emergency Department, the Department of Rehabilitation and the Department of Preventive Medicine.

Following the FOCUS-PDCA³³ model, a team was organised to analyse the process in order to identify problems and opportunities for improvement; the team also organised the assistance activity through a CP. Indicators and standards for its evaluation once implemented were established, so that innovations and changes can be introduced depending on the suitability to established standards, and these can in turn be reassessed later in a cycle of continuous improvement.

For its preparation, the diagnostic and treatment guidelines published were analysed, as well as other documents commonly used in the care of acute stroke patients³⁴⁻³⁸. Through the search engines Tripdatabase and Sumsearch and using *acute stroke*, *stroke unit*, *clinical guidelines* and *care pathways* as key words, information was sought on the various existing bibliographic sources (CENTRAL, MEDLINE-OVID, MEDLINE-ProQuest, MEDLINE-EIPL, EMBASE-OVID, the World Federation of Neurology ALS Page, national neurological databases, personal files of citations and bibliographies of the most outstanding articles). There was no limitation on the type of publication or the language employed.

We held a program of fortnightly 1-hour meetings between the departments of Neurology, Rehabilitation, Emergency and Preventive Medicine, and completed a total of 9 meetings between April and July 2006. Various drafts of the CP documents were presented and discussed during the meetings. The final documents were submitted to the HULP Medical Management at the last meeting and commitment was made towards the implementation and evaluation of the pathway at the HULP, according to the international recommendations^{39,42}.

The documents were designed following the recommendations derived from the previous studies. The differences at any stage of CP design were resolved by group consensus, always based on the scientific evidence available^{43,44}.

Results

The CP was composed of four sets of documents that integrate quality standards in patient care, facilitate implementation of care activities, empower and educate patients and families and verify CP impact on healthcare.

Integration of quality standards in the care of acute stroke patients in different scenarios

Scientific and technical time matrix (Fig. 1)

This is the source file for the CP and collects the sequence of activities in acute stroke care. Its purpose is to reflect, in schematic manner, all the diagnostic and therapeutic procedures, to avoid variability and to ensure comprehensive care for all patients. In columns, it lists the fundamental time locations of the patient during the process: resuscitation box in the Emergency Department, Stroke Unit and Neurology Room. It also describes the estimated number of days at each of those locations. In rows, it details the activities to be undertaken at each stage by the nursing, auxiliary and medical staff. The activities are organised in descending order as follows: a) clinical assessment of patients and constant monitoring; b) nutrition; c) bowel and bladder function; d) medical treatment and nursing care; e) additional tests and interconsultations with other services; f) patient position and mobility; g) information and health education to patients and families, and h) objectives of the process. This document is in a conspicuous place in the SU, in view of all health professionals, with a pocket version available as well. There are also some ancillary documents describing the specific details of certain procedures such as management of arterial hypertension, thrombolytic therapy, and neurosurgical or neuro-interventional procedures, etc. These documents are also in the SU.

Admission information document for patients and their relatives (Fig. 2)

This document outlines, clearly and simply, the different locations and the estimated time in each, as well as the processes to be developed. This document is provided by nursing staff when the patient is admitted to the SU.

Nursing protocols

These are kept by the nursing staff and are applicable to all patients. There are four: a) pressure ulcers; b) dysphagia; c) assessment of social risk, and d) falls.

Action guidelines in the rehabilitation of stroke in acute phase for healthcare staff

This is an attached document that was designed to improve the rehabilitation training of SU health personnel. It includes guidelines on appropriate postural changes and optimum passive mobilisation for patients with acute stroke. It is kept by the nursing staff.

Facilitating adequate and safe application of healthcare activities and leaving a written record of procedures

Care and treatment orders (Fig. 3)

This is one of the key CP documents. It collects the treatment orders by medical doctors, the procedures and monitoring carried out by the nursing staff and the patient mobilisation patterns. There is a treatment sheet for each day, which is to be completed during the same day in the Emergency Department and goes through the SU and the Neurology Room. Printed on each sheet is a template of the procedures to be implemented, making them simpler to apply and reducing the time needed to complete them.

Respecting the autonomy of patients and their families and training them in daily care and living activities

Discharge information sheet for patients and families (Fig. 4)

This collects, in a simple manner, the basic recommendations in secondary prevention of stroke, which include nutrition, exercise and drug treatment. It also gives information about the next medical examination and explains which symptoms may be a warning of a new stroke, to ensure fast arrival at the Emergency Department. This document is provided by the nursing staff upon discharge.

Rehabilitation information document for patients and families

This details basic notions on rehabilitation, mobilisation, postural changes and modifications that can be made to a home environment to adapt it to a patient with a functional deficit. This document is provided by the physiotherapist when beginning treatment with each patient.

Specific teaching units

This is a 15-min digital document, designed to be presented by the nursing staff to both patients and relatives. Its purpose is to make them aware of what a stroke is, why it occurs, what the treatment is and how it can be prevented. After the presentation, a questionnaire is handed out that assesses the degree of knowledge acquired.

URGENCIA: BOX REA/ OBSERVACIÓN	UNIDAD DE ICTUS	DIAT	UNIDAD DE ICTUS	D2 D3	SALA DE NEUROLOGÍA	D4 D5 D6 D7 D8
VALORACIÓN / MONITORIZACIÓN Identificación. Avisar al Neurologo guardia Historia clínica y exploración, Rankin previo Escala NIHSS, Canadense (EC), Glasgow (GCS) Enfermería: Medir SatO ₂ ; Monitorización ECG T ₃ y SatO ₂ ; si precisa NUTRICIÓN: Dieta absoluta excepto medicación (si distalgia sonda nasogástrica (SNG) K30)	VALORACIÓN / MONITORIZACIÓN Médica: Historia clínica, exploración física E. Barthel previo al ictus. NIHSS actual (realizar también a las 2h de inicio del ictus si rT-PA), GCS y EC actual (tb realizar si aparece deterioro neurológico) Enfermería: Acogida y Plan de cuidados EC y GCS/ 6h (Hemorragias): cada hora las 6 1 ^{as} horas y cada 3 h en las 1 ^{as} 24h) TA, T ₃ y glucemia capilar cada 6h (TA/h si hemorragia) Monitorizar: ECG y SatO ₂ NUTRICIÓN: valorar deglución según protocolo a las 24h de inicio del ictus. Dieta v.o. por SNG		VALORACIÓN / MONITORIZACIÓN Médica: Rankin: al alta de la Unidad de ictus NIHSS, GCS y EC/24 horas o si deterioro neurológico Enfermería: Plan de cuidados E. Canadense y Glasgow/ 6h TA, T ₃ y glucemia capilar / 6 h (o antes de cada comida) Monitorización: ECG/SatO ₂ NUTRICIÓN: v.o. o x SNG K30 (si distalgia moderada-severa, según protocolo)		VALORACIÓN / MONITORIZACIÓN Médica: Escalas al alta: NIHSS, Barthel, Rankin Enfermería: Plan de cuidados TA y T ₃ /8h; E. Canadense/24h Glucemia capilar antes de cada comida si precisa. NUTRICIÓN: v.o. o x SNG K30 (si distalgia según protocolo)	
FUNCIÓN VESICAL / INTESTINAL: Evitar sonda vesical. Valorar retención/turnos. Si retención urinaria cateretismos/turnos	FUNCIÓN VESICAL / INTESTINAL: Evitar sondaje vesical Valorar retención urinaria/turnos TRATAMIENTO MÉDICO Manejo de TA. Tratamiento antihipertensivos si: TA ≥ 185/110 mmHg en infartos TA ≥ 150/90 mmHg en hemorragias Oxigenoterapia (si SatO ₂ < 95%) Insulina iv (si glucemia > 150 mg/dl), s.c. si tolera v.o. Si T ₃ > 37,5°: paracetamol i.v./v.o. AAS 300 mg vo (en infartos y no rT-PA) Omeprazol 20mg v.o. o Pantoprazol i.v. Valorar: Anticoagulación Reversión anticoagulación/tratamiento de plaquetopenia en hematomas Profilaxis antitrombótica; Osmoterapia Tratamiento neuroquirúrgico Tratamiento anticomercial CUIDADOS DE ENFERMERÍA Aplicación protocolos de enfermería: Úlceras por presión, Caídas y Riesgo social Cuidado vía venosa periférica Cuidado bucal/ turnos Higiene según dependencia		FUNCIÓN VESICAL/ INTESTINAL Evitar sondaje vesical. Valorar retención/turnos y uso de laxantes TRATAMIENTO MÉDICO Antihipertensivos: prevención 2 ^a Hipolipemiantes: prevención 2 ^a Paracetamol si T ₃ > 37,5° Omeprazol 20 mg v.o. Valorar: Antiagregación: AAS (como prevención 2 ^a) Profilaxis antitrombótica Insulina s.c. Oxigenoterapia (si SatO ₂ < 95%) Erdaterotomía carotídea Angioplastia carotídea Tratamiento anticomercial CUIDADOS DE ENFERMERÍA Valorar retirada de vía venosa Valorar retirada de SNG K30 Cuidado bucal/turnos Protocolo úlceras por presión y caídas Higiene según grado de dependencia		FUNCIÓN VESICAL/INTESTINAL Evitar sonda vesical. Valorar retención/turnos y uso de laxantes TRATAMIENTO MÉDICO Antihipertensivos (prevención 2 ^a) Hipolipemiantes (prevención 2 ^a) Paracetamol si T ₃ > 37,5° Omeprazol 20 mg v.o. Valorar: Antiagregación: AAS (prevención 2 ^a) Anticoagulación Profilaxis antitrombótica Oxigenoterapia (si SatO ₂ < 95%) Erdaterotomía carotídea Angioplastia carotídea Tratamiento anticomercial CUIDADOS DE ENFERMERÍA Valorar retirada de vía venosa Valorar retirada de SNG K30 Cuidado bucal/turnos Protocolo úlceras por presión y caídas Higiene según grado de dependencia	
PRUEBAS: TAC cerebral + Rx torax + ECG Laboratorio: egasometría arterial Valorar: TC o RM de perfusión Doppler TSA-TC; AngioTC/AngioRM EEG (si sospecha de crisis) Punción lumbar (PL)	PRUEBAS ECG, Pruebas de laboratorio diferentes Valorar: Doppler TSA-TC (siempre en ictus, isquémico); TC (siempre si deterioro neurológico o sospecha HT Intracraneal)/RM craneal; Monitorización Doppler con detección shunt Dcha-Izda; Angiografía, Ecocardiograma, Punción lumbar		PRUEBAS ECG, TC (si deterioro neurológico/HTIC) Valorar: Duplex TSA Angiografía		POSTURA / REHABILITACIÓN Rehabilitación (fisioterapia) Valorar cambios posturales/4h INFORMACIÓN: Diaria al paciente y a la familia Educación sanitaria Entrega de la Encuesta de satisfacción	
POSTURA / MOVILIDAD Reposo en decubito supino, cabezera a 30° Cambios posturales 3-4h (o mayor frecuencia según signos cutáneos)	POSTURA MOVILIDAD Valorar sedestación tras 24 horas de inicio del ictus Valorar cambios posturales/3-4h		POSTURA/REHABILITACIÓN Valorar cambios posturales/3-4h Inicio Rehabilitación (Fisioterapia) INFORMACIÓN: Diaria al paciente y a la familia Educación sanitaria. Hoja Información de Rehabilitación		PROCEDIMIENTO AL ALTA: MEDICO: INFORME DE ALTA con: Información sobre el seguimiento - Recomendaciones médicas ENFERMERA: Destreza del paciente/familiar en el cuidado del enfermo. Continuidad cuidados y envío al médico de Atención Primaria	
UBICACIÓN: posibilidades 1 UNIDAD DE ICTUS (UI). Criterios de Ingreso: ictus < 24h (< 48 h si hemorragia), cualquier edad, incluye AIT. No ingreso: demencia, dependencia previa, enfermedad previa que comprometa la supervivencia, daño neurológico irreversible, TCE agudo, Glasgow < 9 3 UCI: si GCS < 8, inestabilidad hemodinámica, requiere intubación o Neurocirugía 4 HOSPITAL GERIÁTRICO: si no indicación qx, demencia, dependencia, enfermedad que comprometa supervivencia o daño neurológico irreversible INFORMACIÓN: paciente/familia OBJETIVOS: Diagnóstico rápido, tratamiento precoz y ubicación del paciente	INTERCONSULTAS: Valorar Geriatria, Nutrición, Cardiología Rehabilitación Locomotriz/Foniatría/Respiratoria Trabajador social INFORMACIÓN: Hoja de información e inicio de Educación sanitaria al paciente y a la familia OBJETIVOS: Realización del estudio cerebrovascular y continuación del tratamiento. Identificar necesidades e instaurar cuidados.		OBJETIVOS: Continuar el estudio médico, el tratamiento y los cuidados fomentando la autonomía. Planificación del destino al alta.		OBJETIVOS: Continuar tratamiento Planificar el ALTA mínimo 24 h antes Verificar las habilidades del paciente/familia en cuidados y tratamiento al alta	

Figure 1 Scientific and technical matrix. ASA: acetylsalicylic acid, BP: Blood pressure; CT: computed tomography; ECG: electrocardiogram; EEG: electroencephalogram; HT: hypertension; iv: intravenous; MRI: magnetic resonance imaging; NIHSS: National Institute of Health Stroke Scale; O: oral; Rx: radiography; SAT supra-aortic trunks; SatO₂: arterial oxygen saturation; sc: subcutaneous; sr: surgical; T₃: temperature; TC: transcranial.

Figure 2 Admittance information document for patients and their families.

Figure 3 Example of treatment sheets: days 0 (Emergency Department) and 1 (Acute Stroke Unit). BP: blood pressure; CT: computed tomography; ECG: electrocardiogram; IU: international units; iv: intravenous; NGP: nasogastric probe; NIHSS: National Institute of Health Stroke Scale; O: oral; PSS: physiological saline serum.

Figure 4 Information on discharge for patients and their families.

Verifying the impact of the CP and promoting continuous improvement

Satisfaction survey of the care provided for patients/families

This is a questionnaire that collects, in different scales, the patient's or family's degree of knowledge about the health personnel who has attended the patient, as well as the level of satisfaction. The doctor will provide it together with the release form and it is to be completed anonymously.

CP Evaluation

The CP is designed to adapt to diagnostic and therapeutic innovations derived from scientific evidence. In fact, in the first 18 months of its introduction, there have been three updates to the matrix and treatment sheets, in agreement with updates to the international guidelines^{45,46}.

On a different note, an assessment of the CP is being developed, based on the previously-established quality standards: *a*) assessment by a neurologist in the emergency department; *b*) timely results from urgent laboratory study (<1 h); *c*) results of urgent computed tomography (CT) in less than 1 h; *d*) timely administration of thrombolytic therapy; *e*) timely administration of antiplatelet therapy (< 48 h); *f*) timely evaluation of dysphagia (< 24 h); *g*) adequacy of nasogastric tube (NGT) use; *h*) posture changes every 4 h; *i*) social risk assessment; *j*) timely NGT withdrawal; *k*) skill in daily activities and rehabilitation exercises taught to the patient/family before discharge; *l*) adequacy of hospital stay (= 8 days); *m*) intra-hospital mortality; *n*) extra-hospital mortality (after 3 months), and *o*) evaluation of the degree of satisfaction with the service received.

Discussion

Standardised care through a comprehensive CP is a necessity for all patients with acute stroke that has the potential to promote organised, efficient patient care, as well as to improve satisfaction for the care received. Multiple diagnostic and therapeutic guidelines have been published with respect to acute stroke. In Spain, the Study Group of Cerebrovascular Disease of the Spanish Society of Neurology (GEECV-SEN) produces and disseminates on a regular basis the "Guide for Stroke Diagnosis and Treatment" ("*Guía para el diagnóstico y tratamiento del ictus*")³⁸. In Europe and worldwide, there are also similar guides being published and updated^{34-37,45,46}. However, clinical guidelines do not provide a plan for coordinated and homogenised action between various specialists that ensures compliance with the medical recommendations based on evidence^{39,40}.

Moreover, it has been shown that the existence of written protocols on intensive care of stroke patients can improve their development, given that (for example) they are associated with a higher recanalization rate after thrombolytic treatment⁴⁴. Similarly, the implementation of continuous quality improvement schemes can reduce intra-hospital delays^{47,48}. International stroke guidelines also recommend defining and measuring quality objectives for each institution, which have recently been established in different regions and countries. As a minimum requirement,

the door-neuroimaging and door-needle times should be monitored⁴⁶.

It is well known that communication and collaboration between emergency medical personnel, radiologists, clinical laboratories and neurologists is important in facilitating rapid treatment⁴⁹⁻⁵¹. In addition, coordinated work with the emergency services can increase the use of thrombolytic therapy⁴⁴. The evidence of the benefit of this coordinated work between the different specialties involved in the handling and treatment of stroke demands conducting a consensual CP.

To date there are few publications on the development of a stroke CP integrating the contribution of all the in-hospital medical specialties involved and defining the role of each in a single matrix. Most of the CP have been elaborated in internal medicine¹⁹⁻²¹, neurology²²⁻²⁵ or rehabilitation^{26,27} wards, while the publications describing the creation and implementation of a CP in an SJ are anecdotal^{29,30}. Moreover, CP are often applied only to patients past the acute phase, or only include cerebral strokes and exclude haemorrhagic strokes²².

All patients appear to benefit from treatment in a SJ, regardless of age, gender and stroke subtype and severity. There is also evidence that the SJ reduces the cost of intra-hospital care after the acute phase of the stroke and is therefore cost-effective^{10,11,46}. On the basis of this evidence, the need arose to create a CP that reflected in a practical document the steps to be followed in both patient diagnosis and treatment and the type of information patients should receive - all within the healthcare model that has been shown to be most effective, the SJ. The ultimate goal is to enhance the benefits of treatment in a SJ: reduce the time from symptom onset to medical therapy, offer specific treatment tailored to stroke subtype, initiate secondary prevention and evaluate both the quality of the assistance and its perception by the patients and their families.

Based on the scientific-technical matrix, a series of documents emerges covering the stroke in all its complexity. Following the published clinical guidelines, a diagnostic and therapeutic pattern has been developed that is fully compliant with the medical evidence⁴³. Points were added to this pattern that were not collected in guidelines^{34-38,45,46}, such as the handling of specific imaging techniques, nursing care, the role of non-medical staff at the start of rehabilitation, the role assigned to social workers and recommendations for adapting the patient's environment after discharge.

The acute stroke CP has been developed jointly with selected professionals from the Rehabilitation Department, as well as physiotherapists. The result has been the creation of documents with specific recommendations about rehabilitation for both the patient and the SJ staff, which promote a very early start and learning by the patient. This has led to unifying the attention in both the acute and later phase of the stroke, without separating the actions of neurology and rehabilitation, unlike what happened in the past years²²⁻²⁷.

Finally, quality standards were established and a plan of continuous improvement was initiated, because evaluating the pathway through the implementation of these standards enables proposed improvements to be extracted and

introduced in subsequent updates. Therefore, and as a conclusion, the CP for the management and treatment of acute stroke care is a systematic and organised healthcare program in a hospital environment from all aspects of the pathology. The activity reflected by the pathway not only involves the staff specific to the SU, but covers all the specialists involved in the care of acute stroke. By the development of this CP, the intention is to enable complete patient care, from the time of admission in the Emergency Department until hospital discharge, based on scientific evidence and tailored to each type of stroke.

The organisation of healthcare improves its quality, decreases variability and streamlines the use of health resources. Systematising information to patients and their families with suitable and understandable documents increases satisfaction with the care received. Furthermore, creating tools for continuous evaluation favours progressive improvement in the quality of care for acute stroke.

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