



CANADIAN STROKE BEST PRACTICE RECOMMENDATIONS

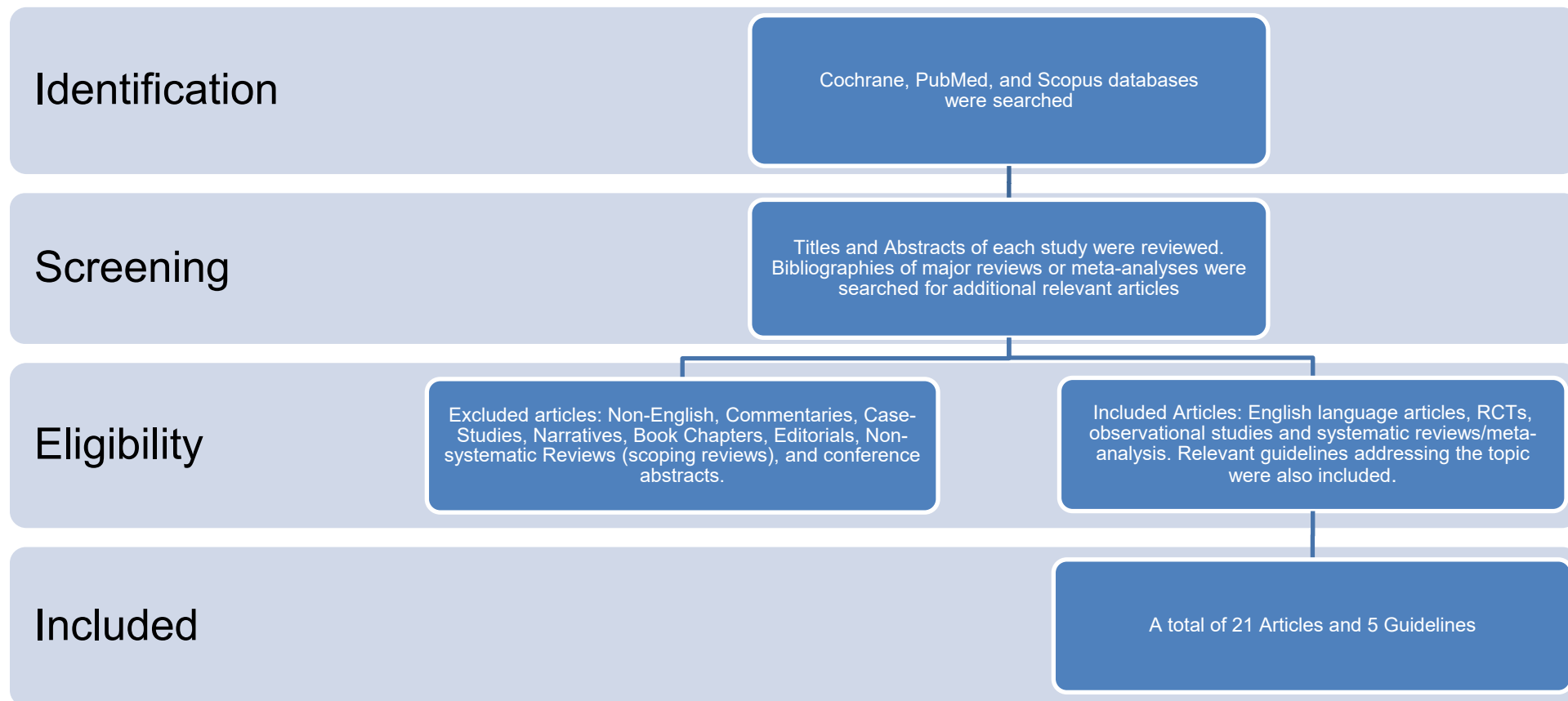
Stroke Systems of Care **7th Edition, 2026 Update** **Evidence Tables** ***Palliative & End of Life Care***

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Search Strategy



Cochrane, PubMed and Scopus database were search using terms such as “Stroke” and “palliative” or “end-of-life” or “supportive care”. Titles and abstract of each article were reviewed for relevance. Bibliographies were reviewed to find additional relevant articles. Articles were excluded if they were: non-English, commentaries, case-studies, narrative, book chapters, editorials, non-systematic review, or conference abstracts. Additional searches for relevant best practice guidelines were completed and included in a separate section of the review. A total of 21 articles and 5 guidelines were included and were separated into separate categories designed to answer specific question

Published Guidelines

Guideline	Recommendations
<p>National Clinical Guideline for Stroke for the UK and Ireland. London: Intercollegiate Stroke Working Party; 2023 May 4.</p> <p>Available at: www.strokeguideline.org.</p>	<p>A) Services providing acute and long-term care for people with stroke should provide high quality end-of-life care for those who need it. [2016]</p> <p>B) Staff caring for people dying of stroke should be trained in the principles and practice of end-of-life care, including the recognition of people who are approaching the end of life. [2016]</p> <p>C) Decisions to withhold or withdraw life-prolonging treatments after stroke including artificial nutrition and hydration should, whenever possible, take the person's prior expressed wishes and preferences into account and should be taken in the best interests of that person. When withdrawing artificial nutrition and hydration, a recognised nutrition and hydration decision-making process should be considered. [2023]</p> <p>D) End-of-life (palliative) care for people with stroke should include an explicit decision not to have burdensome restrictions that may exacerbate suffering. In particular, following assessment this may involve a decision, taken together with the person with stroke, their family/carers, and the multidisciplinary team, to allow oral food or fluids despite risks including aspiration and choking. [2023]</p> <p>E) People with stroke with limited life expectancy, and their family where appropriate, should be offered advance care planning, with access to specialist inpatient and community palliative care services when needed. The multidisciplinary team should establish whether there is any existing documentation of the patient's wishes regarding management of risks associated with continued eating and drinking and whether it remains relevant, and agree with the patient and/or family/carers an advanced care plan where appropriate. [2023]</p> <p>F) People dying of stroke should have access to specialist palliative care, including the timely transfer of care to their home or to a hospice or care home according to the wishes of the person and their family/carers. This should also include timely communication and involvement of the primary care team. [2016]</p>
<p>Clinical Guidelines for Stroke Management 2017. Melbourne (Australia): National Stroke Foundation.</p> <p>Chapter 3. Acute medical and surgical management</p>	<p>Strong Recommendation</p> <ul style="list-style-type: none"> Stroke patients and their families/carers should have access to specialist palliative care teams as needed and receive care consistent with the principles and philosophies of palliative care. <p>Consensus-based recommendations</p> <ul style="list-style-type: none"> For patients with severe stroke who are deteriorating, a considered assessment of prognosis or imminent death should be made. A pathway for stroke palliative care can be used to support stroke patients and their families/carers and improve care for people dying after stroke.
<p>Oliver DJ, Borasio GD, Caraceni A, et al.</p> <p>A consensus review on the development of palliative care for patients with chronic and progressive neurological disease.</p>	<ul style="list-style-type: none"> Palliative care should be considered early in the disease trajectory, depending on the underlying diagnosis (Level C). The assessment and care should be provided by a multidisciplinary team approach consisting of at least three different professions: physician, nurse, and social worker or psychologist/counsellor (Level C). Patients should have a multidisciplinary palliative care assessment and access to specialist palliative care for ongoing management (Level B).

Guideline	Recommendations
<p><i>Eur J Neurol.</i> 2016;23(1):30-38.</p>	<ul style="list-style-type: none"> • Communication with patients and families should be open, including the setting of goals and therapy options, and should be structured following validated models (Level C). Early advance care planning is strongly recommended, especially when impaired communication and cognitive deterioration are possible as part of disease progression (Level C). • Physical symptoms require thorough differential diagnosis, pharmacological and non-pharmacological management and regular review (Good Practice Point). Proactive assessment of physical and psychosocial issues is recommended to reduce the intensity, frequency and need for crisis intervention (unplanned care) (Level B). The principles of symptom management, as part of the wider palliative care assessment, should be applied to neurological care (Level B). • The needs of carers should be assessed on a regular basis (Level C). The support of carers – before and after death – is an indispensable part of palliative care as it may reduce complicated bereavement and improve patients' quality of life (Level C). Professionals involved in the care of progressive disease should receive education, support and supervision to reduce the risks of emotional exhaustion and burnout (Level C). • Continued and repeated discussion with patients is essential due to changes in function – physical and cognitive – and preferences (Level C). • Encourage open discussion about the dying process and explain that most patients will die peacefully with appropriate care (Level C). Encourage open discussion of wishes to restrict treatment and interventions and the wish for hastened death, and assess regularly (Level C). Recognition of deterioration over the last weeks and months is relevant for the appropriate management (Level C). The diagnosis of the start of the dying phase, although this may not always be possible, is relevant for the appropriate management, including the use of appropriate medication and intervention and care and support of families and carers (Level C).
<p>Braun LT, Grady KL, Kutner JS, Adler E, Berlinger N, Boss R et al; American Heart Association Advocacy Coordinating Committee.</p> <p>Palliative Care and Cardiovascular Disease and Stroke: A Policy Statement from the American Heart Association/American Stroke Association.</p> <p><i>Circulation.</i> 2016 Sep 13;134(11):e198-225. (selected)</p>	<ul style="list-style-type: none"> • Recommendation 5: State Medicaid agencies should ensure that palliative care is integrated into long-term services and supports • Recommendation 6: State laws should require that hospitals, nursing homes, home care agencies, special needs assisted living residences, and enhanced assisted living residences provide access to information and counseling about options for palliative care appropriate to patients with advanced life-limiting conditions. These organizations must also facilitate access to appropriate palliative care consultation and services, including associated pain management consultation and services, consistent with the patient's needs and preferences. • Recommendation 7: States should require inclusion of palliative care in health plans offered through health insurance marketplaces. • Recommendation 8: States should evaluate the effectiveness of their prescription monitoring programs, with particular regard to the impact on the availability of essential medicines.
<p>Holloway RG, Arnold RM, Creutzfeldt CJ, Lewis EF, Lutz BJ, McCann RM, et al.</p> <p>Palliative and end-of-life care in stroke: A statement for healthcare professionals</p>	<p>Primary Palliative Care: Recommendations</p> <ol style="list-style-type: none"> 1. All patients and families with a stroke that adversely affects daily functioning or will predictably reduce life expectancy or quality of life should have access to and be provided with primary palliative care services appropriate to their needs (Class I; Level of Evidence B)

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<p>from the American Heart Association/American stroke association. Stroke 2014; 45:1887-1916</p>	<p>2. Stroke systems of care should support a well-coordinated and integrated healthcare environment that enables an informed and involved patient and family and is receptive and responsive to health professionals who can focus on both the disease process and getting to know the patient and family in making decisions that are in line with their preferences. (Class I; Level of Evidence C)</p> <p>Patient and Family-Centered Care: Recommendations</p> <p>1. The stroke community of providers, researchers, educators, payers and policymakers should promote patient- and family-centred care as its own quality dimension that requires measurement and improvement (class I; Level of Evidence C).</p> <p>2. It is reasonable that the stroke community support interventions, evaluation methods, and resources to encourage providers to focus on improving and refining patient-centred communication skills through-out their careers (Class IIa; Level of Evidence C).</p> <p>Estimating Prognosis: Recommendations</p> <p>1. Before making a prognostic statement, to the extent possible, clinicians should obtain a thorough understanding of what aspects of recovery (eg, ability to walk, communicate, tolerance for disability) are most important to the individual patient and family and then frame the subsequent discussion of prognosis in these terms (Class I; Level of Evidence C).</p> <p>2. Clinicians should be aware of the inherent uncertainty, limitations, and potential for bias surrounding prognostic estimates based on either clinician experience or a prognostic model (risk score). (Class I, Level of Evidence C)</p> <p>3. In formulating a stroke prediction of survival and the spectrum of possible outcomes, it can be useful for clinicians to use the best available evidence from the literature, including relevant model-based outcome prediction, in conjunction with their clinical impression based on personal experience. (Class IIa, Level of Evidence C).</p> <p>4. Rigorously developed and externally validated prognostic models may be useful to inform an estimate of outcome after stroke. Caution is advised because the value of model-based estimates has not been established for end-of-life treatment decisions after stroke. (Class IIb, Level of Evidence B).</p> <p>5. Providers might consider asking for a second opinion about prognosis from an experienced colleague when the range of prognostic uncertainty will impact important treatment decisions. (Class IIb, Level of Evidence B)</p> <p>6. Explicit disclosure of prognostic uncertainty to patients and family members may be reasonable. (Class IIb, Level of Evidence C).</p> <p>Goal Setting Process: Recommendations</p> <p>1. Knowledge and use of effective communication techniques is a critical to improve the quality of stroke decision-making, as well as patient/family satisfaction and outcomes. (Class I, Level of Evidence B)</p> <p>2. Knowledge, skills, and competency in running an effective patient/family meeting are important in management of patients and families with stroke. (Class I, Level of Evidence B)</p>

Guideline	Recommendations
	<ol style="list-style-type: none"> 3. Providers should integrate the best available scientific evidence as well as patient values and preference when making a recommendation about continued care. (Class I, Level of Evidence B) 4. Because patient preferences change over time, it is important to periodically revisit discussions to re-affirm or revise goals and treatment preferences as needed. (Class I, Level of Evidence B) 5. A structured approach to setting patient goals in patients with stroke care may be reasonable to improve the quality of healthcare. (Class IIb, Level of Evidence C) <p>Approaches to Overcome Challenges with Decision Making in Stroke: Recommendations</p> <ol style="list-style-type: none"> 1. Providers should recognize that surrogate decision-makers use many other sources of information in addition to the doctor's expertise in understanding their loved one's prognosis. (Class I, Level of Evidence B) 2. Providers should recognize that making surrogate decisions has a lasting negative emotional impact on a sizeable minority of surrogates who should be provided access to bereavement services. (Class I, Level of Evidence B) 3. Providers should be knowledgeable and respectful of diverse cultural and religious preferences when establishing goals of care and refer to social workers and chaplains when appropriate. (Class I, Level of Evidence B) 4. It might be useful for providers to practice self-awareness strategies (prognostic time out, self-reflection) if one's own biases and emotional state to minimize errors in prognostic estimates and goal setting recommendations. (Class IIb, Level of Evidence B) 5. It might be reasonable for providers to recognize the existence of a possible self-fulfilling prophecy (ie. A prediction that might directly or indirectly cause itself to become true) when prognosticating and making end-of-life decisions in patients with stroke. (Class IIb, Level of Evidence B) 6. It might be reasonable for providers to be mindful of and to educate patients and surrogate decision-makers about possible cognitive biases (affective forecasting errors, focusing effects, and optimism bias) that might exist when discussing treatment options and establishing goals of care. (Class IIb, Level of Evidence C) 7. Providers might consider the use of time-limited treatment trials with a well-defined outcome to better understand the prognosis or to allow additional time to optimize additional aspects of decision-making. (Class IIb, Level of Evidence C). <p>Common Preference-Sensitive Decisions in Stroke: Recommendations</p> <ol style="list-style-type: none"> 1. The decision to pursue life-sustaining therapies or procedures, including CPR, intubation and mechanical ventilation, artificial nutrition, or other invasive procedures, should be based on the overall goals of care taking into account an individualized estimate of the overall benefit and risk of each treatment and the preferences and values of the patient. (Class I, Level of Evidence B) 2. DNR orders should be based on patient's pre-stroke quality of life and/or his/her view of the risks and benefits of CPR in hospitalized patients. In patients with acute ischemic stroke, ICH, or SAH (with no preexisting DNR orders), providers, patients, and families should be cautioned about making early DNR decisions or other limitations in treatment before fully understanding the prognosis, including the potential for recovery. (Class I, Level of Evidence B)

Guideline	Recommendations
	<ol style="list-style-type: none"> 3. Patients with a DNR order in place should receive all other appropriate medical and surgical interventions unless otherwise explicitly indicated. (Class I, Level of Evidence C) 4. Patients with a Do Not Intubate (DNI) order in place should receive all other appropriate medical and surgical interventions unless a Do No Resuscitation is ordered. This should be explained to the patient or surrogate. (Class IIa, Level of Evidence C) 5. Patients who cannot take solid food and liquids orally should receive NG, nasoduodenal, or PEG tube feedings to maintain hydration and nutrition while undergoing efforts to restore swallowing. (Class I, Level of Evidence B) 5. In selecting between NG and PEG tube routes of feeding it is reasonable to prefer NG tube feeding until 2 to 3 weeks after stroke onset. (Class IIa, Level of Evidence B) 6. To maintain nutrition over the longer-term, PEG tube routes of feeding are probably recommended over NG routes of feeding. (Class IIa, Level of Evidence B). 7. Patients who elect not to have artificial nutrition and hydration should be provided with safest method of natural nutrition and educated about the potential risks and benefits of this approach. (Class I, Level of Evidence B) 8. Decompressive craniectomy for hemispheric infarctions with malignant edema can be effective by reducing mortality and increasing the chances of survival with moderate disability. (Class IIa, Level of Evidence B) 9. Patients with large cerebellar hematomas or massive cerebellar infarctions who develop neurological deterioration, brainstem compression, or obstructive hydrocephalus should undergo emergent decompressive surgery. (Class I, Level of Evidence B) 10. Initial aggressive treatment is recommended for most patients with poor grade aneurysmal SAH, including ventilatory assistance, vasopressors, ventriculostomy if hydrocephalus is present, and early occlusion of the aneurysm if the patient can be stabilized. (Class I, Level of Evidence B) <p>Pain: Recommendations</p> <ol style="list-style-type: none"> 1. For the treatment of CPSP, pharmacological treatment with amitriptyline or lamotrigine is reasonable, although studies have been small. In older adults, given the side effects associated with amitriptyline, nortriptyline may be a reasonable substitute (Class IIa; Level of Evidence B). Venlafaxine and gabapentin may be considered on the basis of their efficacy in other neuropathic pain syndromes (Class IIb; Level of Evidence C). Treatment with pregabalin, carbamazepine, levetiracetam, or opioids is not effective (Class III; Level of Evidence B). 2. FO patients with poststroke HSP, ice, heat, soft tissue massage, and NSAIDs before or after exercise are reasonable for temporizing pain relief (Class IIa; Level of Evidence C). For patients with persistent HSP, interventions that may be reasonable to perform include intra-articular steroid injections (Class IIb; Level of Evidence C), intramuscular Botox injections in the base of local spasticity (Class IIb; Level of Evidence A), intramuscular electrical stimulation (Class IIb; Level of Evidence B), and slow-stroke back massage (Class IIb; Level of Evidence B).

Guideline	Recommendations
	<p>Non-pain Physical Symptoms: Recommendations</p> <ol style="list-style-type: none"> 1. In patients with primary poststroke fatigue, the usefulness of pharmacological treatment such as modafinil, amantadine, or methylphenidate is not well established (Class IIb; Level of Evidence C). 2. Poststroke epilepsy should be treated similarly to epilepsy from any other pathogenesis (Class I; Level of Evidence B). Prophylactic administration of anticonvulsants to patients with stroke but who have not had seizures is not recommended. (Class III, Level of Evidence C) 3. Post-stroke sexual dysfunction should be acknowledged and periodically screened for, and when present, a referral to necessary resources provided. (Class I, Level of Evidence C) 4. Patients with stroke who have excessive daytime somnolence should be referred to an accredited sleep center or an evaluation. (Class I, Level of Evidence B) <p>Psychological Symptoms: Recommendations</p> <ol style="list-style-type: none"> 1. Stroke survivors should be periodically screened for and evaluated for the presence of depression and, if present, treated with antidepressant therapy, especially SSRIs. (Class I, Level of Evidence B) 2. In patients with stroke and generalized anxiety, antidepressant medications can be useful. (Class IIa, Level of Evidence B) benzodiazepines are recommended only for short-term treatment, particularly in patients receiving end-of-life measures, or if symptoms are severe. (Class I, Level of Evidence C) 3. All stroke patients with delirium should be evaluated for reversible causes, such as toxic and metabolic derangements; specific treatment of the causes and behavioral approaches is recommended for management. (Class I, Level of Evidence C) Antipsychotic agents may be considered for short-term treatment (Class IIb, Level of Evidence B), but benzodiazepines are not recommended. (Class III, Level of Evidence B) 4. In stroke patients with emotional lability, the use of antidepressants may be considered if symptoms are troubling or co-exist with depression. (Class IIb, Level of Evidence B) <p>Social Suffering: Recommendations</p> <ol style="list-style-type: none"> 1. To prevent caregiver burnout, education about the nature of the stroke, stroke management, and outcome expectations, including their roles in those processes, is useful. Caregivers should be provided information on supportive resources (Class I, Level of Evidence C). Caregiver training may be considered. (Class IIb, Level of Evidence C) 2. Providers should try to anticipate, recognize, and help manage grief in patients and families with stroke. (Class I, Level of Evidence C) 3. Providers should develop self-care strategies to monitor for symptoms and to manage burnout while providing care to patients with serious and life-threatening stroke. (Class I, Level of Evidence C)

Guideline	Recommendations
	<p>Addressing Requests for Hastened Death: Recommendations</p> <ol style="list-style-type: none"> 1. Providers may consider developing a strategy for evaluating and responding to requests for hastened death in patients with stroke, including assessment of suicide and searching for remedies for the underlying problem (Class IIb; Level of Evidence C). <p>Palliative Treatments and Options at the End of Life: Recommendations</p> <ol style="list-style-type: none"> 1. In patients with severe brain injury, withdrawal of life-sustaining treatments and the institution of intensive comfort measures is an appropriate treatment plan that should be made in collaboration with identified surrogate decision makers. (Class I, Level of Evidence C) 2. Patients undergoing palliative extubation should be closely monitored for symptoms of discomfort and air hunger and treated appropriately with opioids or benzodiazepines. (Class I, Level of Evidence C) 3. Patients who have intractable physical symptoms (eg, dyspnea and pain) at the end of life should be provided with the minimally effective amount of sedation necessary to relieve refractory symptoms (proportionate palliative sedation). Only rarely will patients require progressive increases in sedation to the point of unconsciousness to achieve this goal. (Class I, Level of Evidence B) 4. Physicians should work closely with representatives from the local organ procurement agency to ensure that the option of organ donation is offered to the family of every patient declared brain dead. (Class I, Level of Evidence C). <p>Role of Palliative Care Specialists: Recommendation</p> <ol style="list-style-type: none"> 1. Although not an exhaustive list, in patients with stroke, a formal palliative care consultation may be reasonable in the following situations: (1) Management of refractory pain, dyspnea, agitation or other symptoms, particularly near the end of life. (2) Management of more complex depression, anxiety, grief, and existential distress. (3) Requests for hastened death. (4) Assistance with goals and methods of treatment, particularly pertaining to options for long-term feeding and methods of ventilation. (5) Assistance with managing the process of palliative extubation. (6) Assistance with addressing cases of near futility and in families who - want everything. (7) Assistance with conflict resolution whether it be within families, between staff and families, and among treatment teams introducing and transitioning to hospice care. (Class IIb; Level of Evidence B). <p>Role of Hospice: Recommendation</p> <ol style="list-style-type: none"> 1. In patients with stroke, referral to hospice should be considered if survival is expected to be ≤ 6 months and when the patient's goals are primarily palliative (Class I; Level of Evidence B). 2. When introducing and discussing hospice with patients and families, providers may consider adopting strategies of communication used in other —" bad news" settings, and frame the discussions around setting benefits and burdens hospice in achieving the patients and families overall goals of care. (Class IIb, Level of Evidence C)

Guideline	Recommendations
	<p>Education: Recommendation</p> <ol style="list-style-type: none"><li data-bbox="726 302 1940 383">1. The teaching of critical core competencies in palliative and end-of-life care should be integrated within training programs and continuous educational offerings for all professionals who care for patients with stroke and their families. (Class I, Level of Evidence C) <p>Quality Improvement and Research: Recommendation</p> <ol style="list-style-type: none"><li data-bbox="726 448 1978 529">1. Stakeholders with an interest in improving the quality of care and quality of life for patients and families with stroke should develop and implement an aggressive palliative and end-of-life research and quality improvement agenda for this population. (Class I, Level of Evidence C)

Evidence Tables

Characteristics of Patients Transitioned to Palliative Care

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
San Luis et al. 2013 USA Retrospective Study	NA	<p>236 patients admitted to hospital with a confirmed diagnosis of stroke (middle cerebral artery, MCA) and dysphagia.</p> <p>Exclusion criteria: pre-existing dysphagia, delayed admission to hospital or delayed dysphagia screen.</p>	<p>Patients were classified as either “not transitioned to palliative level of care” (n=157) or “early transition to palliative level of care” (n=79).</p>	<p>Primary outcome:</p> <p>Independent predictors of transition to palliative care.</p>	<p>Patients transitioned to palliative care were more likely to be older, have atrial fibrillation, have more severe dysphagia on the first swallowing evaluation, left MCA stroke, higher initial stroke severity, receive tPA, and admitted on a weekday.</p> <p>All variables remained significant in multivariable analysis except for weekday admission to hospital.</p> <p>Age: OR= 1.105, 95% CI 1.056-10155, p<0.001</p> <p>Right vs. Left MCA Stroke: OR= 0.417, 95% CI 0.182-0.956, p=0.039</p> <p>Admission NIHSS score: OR= 3.038, 95% CI 1.222-7.555, p=0.017</p> <p>Received tPA: OR= 7.106, 95% CI 2.541-19.873, p<0.001</p> <p>Assessed on first swallow: OR= 0.053, 95% CI 0.022-0.131, p<0.001</p>
Gott et al. 2013 UK Prospective Survey	NA	<p>514 inpatients from two hospitals were included. 183 patients had palliative care needs and 61 had evidence for transfer to palliative care.</p> <p>Median Age was 80 years (for those who made a transition to palliative care), 76 years (for those who had not made transition)</p> <p>Presence of stroke: 19.7% of patients had</p>	<p>Hospital case notes were reviewed for evidence of palliative care need, demographic information, medical history, and evidence for the adoption of palliative care.</p> <p>Patients were classified as having palliative care need, and if so, they were then further classified as having evidence for the transition to palliative care or having no evidence for the transition</p>	<p>Primary outcome:</p> <p>Factors associated with transition to palliative care, defined as having in a patient’s clinical notes at least one of the following: presence of a do-not-attempt resuscitation order, referral to specialist palliative care, placed on the Liverpool care pathway, long term prescription of opiates or a documented advanced care plan.</p>	<p>Patients with cancer, heart disease and stroke were more likely to be transferred to palliative care.</p> <p>Those of higher age and living in a nursing home or residential care facility were also more likely to be transferred to palliative care.</p> <p>Controlling for other factors, patients with a diagnosis of cancer (OR= 5.1, 95% CI 2.2-12.1, p<0.001), dementia (OR= 2.6, 95% CI 1.0-6.3, p=0.039) and stroke (OR= 8.0, 95% CI 2.5-25.9, p=0.001) were more likely to be transitioned to palliative care. Older patients were also more likely to receive a palliative care approach (OR= 1.03, 95% CI 1.00-1.06, p=0.038).</p>

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		stroke (for those who made a transition), 4.1% (for those who had not made the transition)	to palliative care. Logistic regression was used to assess the relationship between potential predictor variables and the transition to palliative care.		
Burton et al. 2010 UK Retrospective study	NA	191 acute stroke patients admitted to an acute care hospital. 25.7% < 65 years, 23.6% > 85 years of age. The mean time since admission was 7.8 days.	Medical records were reviewed (demographic information, medical history, and stroke related information) to estimate the need for palliative care, using the Sheffield Profile for Assessment and Referral to care (SPARC). SPARC domains include: physical, psychological, religious and spiritual, independence and activity family and social. Patients were also asked about mobility and fear of falling.	Primary outcome: Prevalence of SPARC domains and predictors of the need for palliative care	Prevalence of SPARC Domains: Communication problem – 80% Fatigue-related problem – over 50% Pain, Memory, Headache, Restlessness of Bladder problems – 50% Fear of falling (moderate to severe) – 40% Feeling that everything is an effort – 70% Psychological distress – 50% Religious and Spiritual concerns – Low Concerns about death or dying – 25% Worried about effects of stroke on others – 50% Felt that help outside of family was needed – 25% Predictors of Palliative Care Need: Patient dependence, age, gender and number of comorbidities were significant predictors of the need for palliative care among the SPARC domains. Age and dependency were independent predictors of palliative care need. The interaction between age, dependency and co-morbidities was significant (P=0.026).
Holloway et al. 2010	NA	101 stroke patients who were admitted to acute care and received a	Palliative consults for stroke patients were compared to those for	Primary outcome: Referral to palliative care	Only 6.5% of the 1551 stroke patients admitted to hospital during the study period were referred for a palliative care consult.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
US Retrospective Study		palliative care consult.	patients with other conditions, including cancer, congestive heart failure, chronic obstructive pulmonary disease, and dementia.		Compared to patients with other conditions, stroke patients who received a palliative care consult were more often referred for end-of-life issues and more likely to die in hospital (all at $p < 0.05$, as compared to all 3 other conditions). Approximately 50% of stroke patients who died in palliative care died following the withdrawal of a life-sustaining intervention.
Blacquiere et al. 2009 Canada Retrospective Study	NA	104 acute stroke patients who died in an acute care unit.	Medical records were examined for all patients who died over a 2-year period, during which time a locally developed palliative care guideline was in place on the unit.	Information abstracted from medical records included the time interval and rationale for transfers to palliative care, the cessation of feeding/intravenous fluids, and any documented family conflicts.	Of the 16% of patients who died in the acute stroke unit, 90.4% had been transferred to palliative care. Patients were palliated a median of 3.6 days and died a median of 8.5 days following admission. For the majority of patients, vital sign monitoring, non-palliative medication, investigations, nasogastric feeding, and intravenous fluids were discontinued or never begun (98.9%, 95.7%, 100%, 96.8%, 87.2%, respectively). Family conflicts most commonly related to the transfer to palliative care (19.2%) and the cessation of feeding/fluids (20.2%).

Life Sustaining Care Following Stroke

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Joundi et al. 2021 Canada Retrospective study	NA	137, 358 adult patients hospitalized for first-ever acute stroke in Ontario from 2003-2017. Mean age over the study period was approximately 74 years, women represented approximately 51% of admissions. About 5.2% of strokes were	Yearly proportions of ICU admission, mechanical ventilation, percutaneous feeding tube placement, craniotomy/craniectomy, and tracheostomy, were calculated. Age, stroke subtype (ischemic vs. hemorrhagic) and sex differences in resource utilization were also	Primary outcome: ICU admissions Secondary outcomes: Use of mechanical ventilation, percutaneous feeding tubes, tracheostomy, and craniotomy/craniectomy	<i>Overall</i> Over the study period, there was an increase in the proportion of patients receiving care in the ICU (12.4% to 17.7%, $p < 0.001$), and those and who received mechanical ventilation (4.4%–6.6%; $p < 0.001$). The proportion of patients who received enteral tube placement declined (3.7% to 2.5%; $p < 0.001$). The proportion of patients who received

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		<p>considered severe. 13.7% of strokes were intracerebral hemorrhage (ICH), the remainder were ischemic.</p>	<p>examined. Age was stratified as <60, 60–79 and ≥80 years.</p>		<p>craniotomy/craniectomy increased slightly (overall data not shown), and there was no change in the proportions of patients receiving tracheostomy, which were low (overall data not shown).</p> <p><i>Ischemic stroke</i></p> <p>In a multivariable regression model, each year after 2003 was associated with higher odds of ICU care (4%), mechanical ventilation (5%) and craniectomy/craniotomy (7%), with no change in the odds of tracheostomy and a decrease in the odds of receiving a feeding tube (4%).</p> <p>The odds of receiving ICU care and any other procedures were all significantly lower in women (23% to 50%), except for craniectomy/craniotomy. Older age (≥80 vs. <60 years) was associated with reduced odds of receiving ICU care and any other procedures, except for feeding tube placement, where the odds were significantly higher (56%).</p> <p><i>ICH</i></p> <p>In a multivariable regression model, each year after 2003 was associated with higher odds of ICU care (4%), mechanical ventilation (9%) and craniectomy/craniotomy (5%), with no change in the odds of tracheostomy, and a decrease in the odds of receiving a feeding tube (2%).</p> <p>The odds of receiving ICU care and any other procedures were all significantly lower in women (19% to 31%), except for craniectomy/craniotomy. Older age (≥80 vs. <60 years) was associated with reduced odds of receiving ICU care and any other procedures.</p>

Palliative Care Needs of Patients and Families

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Reinink et al. 2021 The Netherlands Prospective study	NA	59 relatives of patients who had died of stroke after a decision to withdraw life-sustaining measures and to start end-of-life care on a stroke unit at a single centre. Mean age of relatives was 77 years, 41% were men.	Participants were interviewed by telephone approximately 6 weeks after the patient had died.	Primary outcome: Quality of Dying Scale (0-10) Secondary outcomes: ICU version of the Quality of Death and Dying Questionnaire (QODD-ICU)(13 items)	Palliative care consultants were involved in the care of 6 patients. Median quality of dying score was 8. Median scores related to the care provided by nurses and doctors were 9 and 8 respectively. The QODD-ICU items that were most frequently scored as unsatisfactory by relatives were questions about whether or not the patient 'was able to feed him/herself' (69% unsatisfactory), 'said goodbye to loved ones' (51% unsatisfactory), 'appeared to have control over the situation' (47% unsatisfactory), 'appeared to keep dignity and self-respect' (41% unsatisfactory) or 'appeared to breath comfortably' (38% unsatisfactory).
Singh et al. 2017 USA Retrospective study	NA	395,411 patients with stroke include in the National Inpatient Sample from 2010-2012. Mean age was 70.1 years, 52% were women	Demographics, comorbidities, procedures, and outcomes between patients with and without a palliative care encounter (PCE) were compared.	Primary outcome: Palliative care utilization	Among all patients, 24,641 (6.2%) received PCE. The percentage increased from 5.4% in 2010 to 6.9% in 2012. Patient characteristics that were independently associated with the use of PCE were older age, hemorrhagic stroke, white race and female sex. Larger, teaching and nonprofit hospitals were associated with increased PCEs. In-hospital mortality was 9.2%. Of these 38% received PCE.
Ntlholang et al. 2016 Ireland Retrospective study	NA	54 consecutively admitted patients who died following acute stroke, over a 2-year period at a single hospital. Mean age was 79.3 years, 61.1% were women.	Charts were reviewed for references to symptomatology, interventions and Do Not Attempt Resuscitation (DNAR) orders	Primary outcome: Palliative care needs	Death was attributed to the brain lesion in 24 (44.4%) patients and medical complications in 20 (37.0%). Death was unrelated to stroke in 10 cases (18.5%). The median interval between stroke onset and death was 20 days. Palliative care expertise was sought in 13 cases (24.1%).

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					<p>Palliative care needs identified included pain 17 (31.5 %), respiratory secretions 17 (31.5 %), dyspnea 21 (38.9 %), agitation 14 (25.9 %), and psychological distress 1 (1.9 %).</p> <p>Do Not Attempt Resuscitation (DNAR) orders were in place in 86.8 % of patients at time of death.</p>
<p>Blacquiere et al. 2013</p> <p>Canada</p> <p>Prospective Study</p>	NA	15 patients and their families were recruited from a neurological service ward with a diagnosis of stroke or non-traumatic hemorrhage.	Patients' families were contacted 4 to 6 weeks after the patient's death. Service satisfaction surveys were conducted over the phone.	<p>Primary outcome:</p> <p>Family satisfaction with individual symptoms and specific domains were assessed (feeding, hydration and communication, coordination of care, attention to family needs, focus on individual, advanced care planning etc.). The family's satisfaction with the overall palliative care approach was also assessed.</p>	<p>Satisfaction with care received for individual symptoms and specific domains (0-1):</p> <p>Least satisfied with feeding, hydration, and communication, anxiety/depression treatment and information to family regarding analgesia. Most satisfied with the analgesia given.</p> <p>Overall satisfaction with the process of care (0-10): Highest score achieved for being satisfied with the communication with the patient. Least satisfied with symptom control and emotional support for the families.</p>
<p>Mazzocato et al. 2009</p> <p>Switzerland</p> <p>Retrospective study</p>	NA	42 patients referred to a palliative care team (PCT) from 2000-2005, following admission to hospital for stroke. Mean age was 84 years, 40% were male	Charts were reviewed and information collected related to symptoms, use of medications, ability to communicate and primary cause of death. For patients unable to communicate, evidence of pain and dyspnea were based on behavioural symptoms	<p>Primary outcome:</p> <p>Symptoms, medications, immediate causes of death</p>	<p>Median time from admission to death was 12 days.</p> <p>90% of referrals were from the stroke unit.</p> <p>The median NIHSS score on admission was 21. At the time of admission, 5 (12%) of patients had a mild deficit (NIHSS < 10).</p> <p>At the first visit by the PCT, 2 (5%) patients were able to communicate normally, 14 (33%) were aphasic or somnolent, and 26 (62%) were in stupor or coma.</p> <p>The most common symptoms were dyspnea (34, 81%), pain (29, 69%) and mouth dryness (26, 62%).</p> <p>The most commonly used drugs for management of</p>

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					dyspnea were anti-muscarinic agents and opioids. The most commonly used drugs for management of pain were opioids and acetaminophen. The main immediate causes of death were neurological complications, pneumonia, acute heart failure and ischemic heart disease.
Stevens et al. 2007 UK Review	NA	7 studies that attempted to identify the palliative care needs of stroke patients through surveys and interviews.	The palliative care needs of patients and caregivers were examined in studies that used case notes, n=1, observational studies n=1, prospective study using interviews & questionnaires, n=1, survey of symptoms n=1, postal survey, n=1 interview surveys based on proxy viewpoints, n=2.	Primary outcome: Not specified in advance	Findings: Symptoms and psychological management is insufficient for stroke patients who die in hospital. In one study, 43% of proxy respondents reported that patients required more assistance with personal care in their last year of life. Only one intervention study (n=20) was identified that described the implementation of a palliative care pathway on an acute stroke unit. Following a before and after comparison, it was reported that Implementation led to 'marked' improvement in the documentation of 6/7 areas of palliative care.
Steinhauser et al. 2000 USA Survey	NA	340 seriously ill patients, 332 recently bereaved family members, 361 physicians and 429 care providers (nurses, social workers, chaplains and volunteers)	A cross-sectional, randomly selected, stratified, nationally representative survey was conducted by mail. Respondents were asked to rate the importance of 44 attributes of the experience of end-of-life care, using a 5-point scale. Responses were also compared among the 4 groups. Respondents were also asked to rate the importance of 9 preselected attributes.	Primary outcome: Importance of 44 attributes, ranking of 9 preselected attributes	Response rates among the 4 groups varied from 71% to 96%. Of the 44 attributes, 26 were rated as important by more than 70% of all respondents. Of these, the top 10 were: to be kept clean, name a decision maker, have a nurse with whom one feels comfortable, have someone who will listen, maintain one's dignity, trust one's physician, have financial affairs in order, to be free of pain and to maintain a sense of humour. 8 attributes were rated as important by patients, but not by physicians including being mentally aware, not being a burden on family and having funeral arrangements planned. Among the preselected attributes, all groups ranked freedom from pain as #1. Patients and bereaved family members ranked being at peace with God as #2 (ranked #3 by physicians and other care providers). Physicians and other caregivers ranked

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					<p>presence of family as #2, while patients and bereaved family members ranked it as #3.</p> <p>The least important of the 9 attributes, ranked by patients, bereaved family members and physicians was dying at home.</p>

End of Life Care

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<p>Cowey et al. 2021 UK Systematic review</p>	NA	77 studies addressing the topic of stroke and palliative care, published since 2015. Studies fell into 3 categories: (a) scope and scale of palliative care needs, (b) organization of palliative care for stroke, and (c) shared decision making (SMD).	Narrative synthesis	<p>Primary outcome: None stated a priori</p>	<p>The most frequently recorded needs identified were related to dysphagia, death rattles, dyspnea, pain, anxiety, confusion, constipation, dry mouth, and seizures. Very few patients who had suffered a stroke were referred for palliative care services.</p> <p>The evidence related to individual interventions is summarized. There is insufficient evidence to guide interventions related to: dysarthria, anxiety, depression, urinary and fecal incontinence, nausea, vomiting, spiritual needs, seizures, delirium, pressure ulcers and death rattles.</p> <p>There was limited evidence regarding the use of pregabalin for neuropathic pain, and opioids for dyspnea.</p> <p>Practical ways to discuss SMD are discussed.</p>
<p>Lank et al. 2021 USA Retrospective study</p>	NA	Surrogate decision makers of 148 patients aged >45 years, admitted to hospital for ischemic (74%) stroke or intracerebral hemorrhage (26%).	<p>Interviews with surrogate decision makers were conducted to examine the association between the presence of an advance care plan (ACP) and transition to comfort measures (CMO), adjusting for age, severity, and baseline disability.</p> <p>ACP was classified as none</p>	<p>Primary outcome: Transition to comfort care</p>	<p>37% of patients transitioned to CMO during the hospitalization, after a median of 5 days.</p> <p>Days to CMO were significantly longer in patients whose surrogates had none, or informal conversions compared with those who had formal discussions (10 vs. 6 vs. 4 days, p<0.01)</p> <p>Compared with no ACP discussions, informal conversations alone and formal documentation were associated with earlier transition to CMO</p>

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			(n=27), informal conversations (n=65) and formal documentation (n=56)		(HR= 3.55; 95% CI 1.35–9.33, and HR=2.85, 95% CI 1.05–7.72, respectively).
Eriksson et al. 2016 Sweden Retrospective study	NA	1,626 patients included in a national quality register for end-of-life care who had died of stroke in a hospital or nursing home, and in which death was the expected outcome and 1,626 patients in the same register who died of cancer, matched for place of death, age and sex.	End-of-life care during the last week of life was compared between stroke and cancer patients. The registry included 30 questions, 24 of which were analyzed.	Primary outcome: Place of death, main cause of death, symptom management during last week of life	The odds of experiencing dyspnea, anxiety and severe pain were significantly lower for patients with stroke (OR=0.69, 95% CI 0.58-0.82 and 0.37, 95% CI 0.31-0.43 and OR=0.15, 95% CI 0.12-0.20, respectively). Family members of stroke patients were less likely to be offered bereavement follow-up (OR=0.67, 95% CI 0.57-0.80). Patients were less likely to be informed about transition to end-of-life care (OR=0.09, 95% CI 0.08-0.11)
Chan et al. 2016 Australia Cochrane Review	NA	Patients and families who had received care guided by an end-of-life care pathway. There were no restrictions on age of the patient, diagnosis or setting (hospital, home, nursing home).	RCTs, quasi randomized trials, or high quality controlled before and after studies that examined the use of an end-of-life care pathway vs. care as usual in the management of care for the dying were sought. One cluster RCT was included (n=16 hospital wards), comparing an Italian version of the Liverpool Care Pathway (LCP-I), a continuous quality improvement programme of end-of-life care vs. usual care. 232 family members of 308 patients who died from cancer were interviewed.	Primary Outcomes: Physical symptom severity, psychological symptom severity, QoL, adverse events Secondary outcomes: Advance care planning, communication between healthcare teams and families, carers' well-being, cost	Outcomes were assessed during face-to-face interviews of family members 2–4 months after the patient's death. Only 34% of the participants were cared for in accordance with the care pathway as planned. The odds of adequate pain control and control of nausea or vomiting were not significantly higher in the LCP-I group (OR= 1.3, 95% CI 0.7-2.6, p=0.46 and OR=1.5, 95% CI 0.7-3.2, p=0.25, respectively). The odds of control of breathlessness were significantly higher in the LCP-I group (OR= 2.0, 95% CI 1.1-3.8, p=0.026). No other outcomes of interest were assessed.
Gardiner et al. 2013	NA	66 health professionals (nurses, registrars, physiotherapists,	Focus groups and individual interviews, of which each	Primary outcome: Core themes	Three themes were identified: 1. Palliative care as a recognized component of

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UK Qualitative Study		occupational therapists etc.) from various hospital-based settings (hyper-acute, acute, rehabilitation and combined acute/rehabilitation stroke units).	were 1 hour in length.		stroke care: all professionals cited it as an important component. Designated palliative care beds existed in some cases. A marker for successful palliative care was the ability of a patient to die at home. 2. Uncertainty in making transitions to palliative care: Recognition that some patients could be identified earlier in their disease pathway as benefiting from palliative care services. 3. Issues integrating acute stroke care and palliative care: Unsure if palliative and acute care can exist simultaneously.
Jack et al. 2004 UK Retrospective Study	NA	40 patients admitted to an acute stroke unit.	A chart review was conducted before (n=20) and after (n=20) the implementation of the Liverpool Care Pathway (LCP). The LCP provides guidance in seven areas of end-of-life care.	Primary outcome: Proportion of patients for whom documentation indicated that the “standard” of care was achieved.	Following implementation of the LCP, the authors reported improved documentation for the appropriate use of comfort measures (75%-100% vs. 5%-40%), assessment of religious/spiritual needs (80% vs. 8%), and communication with family (90%-100% vs. 1%-80%) of each of the seven areas assessed.

Withdrawal of Care

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Alonso et al. 2016 Germany Retrospective study	NA	117 patients admitted to a 29 bed Stroke Unit with ischemic or hemorrhagic stroke between January 2011 and December 2014, who died during the course of hospital treatment. Mean age 81.1 years, 41.8% male. The mean NIHSS score on admission was 19.	Charts were reviewed for do-not-resuscitate-orders (DNRO), and therapy goal modifications with transition to symptom control.	Primary outcome: Factors that contributed to the decision to limit life-sustaining therapies	A DNRO was made in 101 (86.3%) patients, usually within 48 hours of admission. 40 patients were transferred to palliative care after a mean of 5 days. 38 patients were not able to communicate at the time of decision making. Following transfer, monitoring of vital parameters (95%) and diagnostic procedures (90%) were discontinued. Antibiotic therapy (86%), nutrition (98%) and oral medication (88%) were never ordered or withdrawn. Low-dose heparin was

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					<p>withdrawn in 23% cases. All patients were maintained on IV fluids until death.</p> <p>Disturbance of consciousness at presentation, dysphagia on day 1 and large supratentorial strokes were independent predictors of decisions to withdrawing/ withholding further treatment. Patient died an average of 2.6 days following therapy restrictions.</p>
<p>Helvig et al. 2015</p> <p>Norway</p> <p>Retrospective study</p>	NA	2,506 patients consecutively admitted to a stroke unit from 2006-2011 with ischemic or hemorrhagic stroke.	Chart review was conducted to determine the timing of death following stroke. Comparisons were performed between patients who died with (n=50) or without withdrawal (n=134) of life-sustaining treatment.	<p>Primary outcome:</p> <p>Number of days from withdrawing all life-sustaining treatment to death because of poor prognosis after a written joint decision with the family.</p>	<p>Among patients who died after withdrawal of life-sustaining treatments, the mean number of days from stroke onset to death was 9.8 days. The mean number of days to death after withdrawal of treatment was 4.7 days (range 1-11). Independent predictors of a shorter time to death were older age, male sex and high serum CRP.</p> <p>Among patients who died and where treatments were continued, the mean number of days from stroke onset to death was 6 days, which was significantly shorter compared with patients whose treatments were stopped (p<0.01).</p>

Abbreviations

CI: confidence interval	NIHSS: National Institutes of Health Stroke Severity scale	NNT: number needed to treat
OR: odds ratio	RCT: randomized controlled trial	

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