CANADIAN STROKE BEST PRACTICE RECOMMENDATIONS

Acute Stroke Management Evidence Tables

Seventh Edition, Update 2022

Section 9: Inpatient Prevention and Management of Complications Following Stroke

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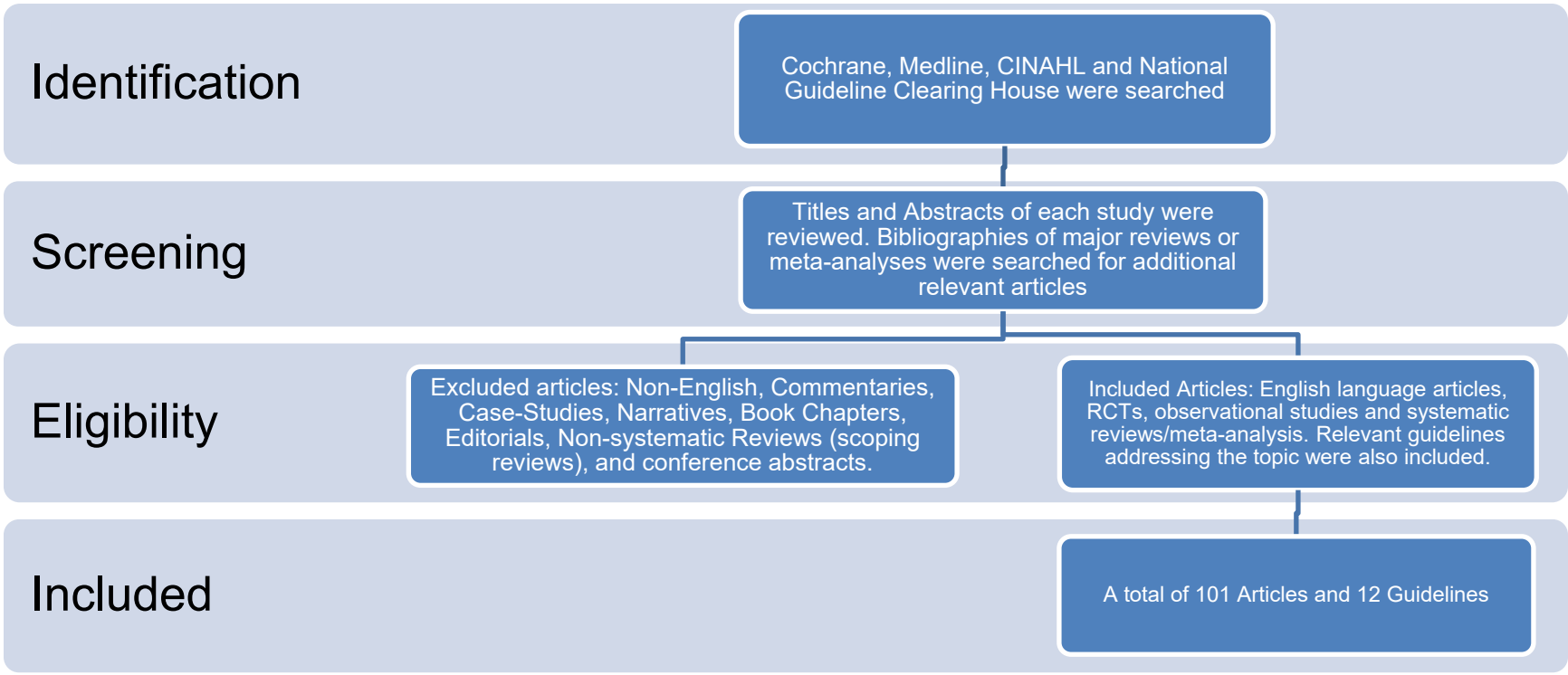
Acute Stroke Management Writing Group and in collaboration with the
Canadian Stroke Consortium

Table of Contents

Search Strategy



Pubmed, EMBASE and the Cochrane Database were search using the medical subject heading (“stroke” And Venous Thromboembolism/ *Temperature/mobilization/*Fecal Incontinence/ or *Urinary Incontinence/*Nutrition Assessment/ or *Nutrition Therapy/ or *Enteral Nutrition/*Dental Care/ or *Oral Health or cardiac investigation n or electrocardiogram). 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 101 articles and 12 guidelines were included and were separated into separate categories designed to answer specific questions.

Published Guidelines

Guideline	Recommendations
Liu L, Chen W, Zhou H, et al. **Chinese Stroke Association guidelines for clinical management of cerebrovascular disorders: executive summary and 2019 update of clinical management of ischaemic cerebrovascular diseases.** ***Stroke and Vascular Neurology* 2020; 5(2): 159-176.** **(selected)**	**Temperature** 1. Sources of hyperthermia (temperature >38°C) should be identified and treated, and antipyretic medications should be administered to lower temperature in hyperthermic patients with stroke (class I, level of evidence C). 2. The benefit of induced hypothermia for treating patients with ischaemic stroke is not well established. Hypothermia should be offered only in the ongoing clinical trials (class IIb, level of evidence B). **Nutrition** 1. Enteral diet should be started within 7 days of admission after an AIS (class I, level of evidence B). 2. For patients with dysphagia, it is reasonable to initially use nasogastric tube for feeding in the early phase of stroke (starting within the first 7 days) and to place percutaneous gastrostomy tubes in patients with longer anticipated persistent inability to swallow safely (>2–3 weeks) (class IIa, level of evidence C). 3. Nutritional supplements are reasonable to consider for patients who are malnourished or at risk of malnourishment (class IIa, level of evidence B). 4. Implementing oral hygiene protocols to reduce the risk of pneumonia after stroke may be reasonable (class IIb, level of evidence B). **Deep vein thrombosis prophylaxis** 1. In immobile patients with stroke without contraindications, intermittent pneumatic compression in addition to routine care (aspirin and hydration) is recommended over routine care to reduce the risk of deep vein thrombosis (class I, level of evidence B). 2. The benefit of prophylactic-dose subcutaneous heparin (unfractionated heparin (UFH or LMWH) in immobile patients with AIS is not well established (class IIb, level of evidence A). 3. When prophylactic anticoagulation is used, the benefit of prophylactic-dose LMWH over prophylactic-dose UFH is uncertain (class IIb, level of evidence B). 4. In ischaemic stroke, elastic compression stockings should not be used (class III, level of evidence B). **Rehabilitation** 1. It is recommended that early rehabilitation for hospitalised patients with stroke be provided in environments with organised, multidisciplinary stroke care (class I, level of evidence A). 2. It is recommended that stroke survivors receive rehabilitation at an intensity commensurate with anticipated benefit and tolerance (class I, level of evidence B). 3. High-dose, very early mobilisation within 24hours of stroke onset should not be performed because it can reduce the odds of a favourable outcome at 3 months (class III, level of evidence B). 4. It is recommended that all individuals with stroke be provided a formal assessment of their activities of daily living and instrumental activities of daily living, communication abilities and functional mobility before discharge from acute care hospitalisation and the findings be incorporated into the care transition and the discharge planning process (class I, level of evidence B). 5. A functional assessment by a clinician with expertise in rehabilitation is recommended for patients with an acute stroke with residual functional deficits (class I, level of evidence C).

Guideline	Recommendations
	Seizures after AIS 1. Recurrent seizures after stroke should be treated in a manner similar to when they occur with other acute neurological conditions, and antiseizure drugs should be selected based on specific patient characteristics (class I, level of evidence C). 2. Prophylactic use of antiseizure drugs is not recommended (class III, level of evidence B).
Powers WJ, Rabinstein AA, Ackerson T, Adeoye OM, Bambakidis NC, Becker K, Biller J, Brown M, Demaerschalk BM, Hoh B, Jauch EC, Kidwell CS, Leslie-Mazwi TM, Ovbiagele B, Scott PA, Sheth KN, Southerland AM, Summers DV, Tirschwell DL; on behalf of the American Heart Association Stroke Council. **Guidelines for the early management of patients with acute ischemic stroke: 2019 Update to the 2018 Guidelines for the Early Management of Acute Ischemic Stroke: A Guideline for Healthcare Professionals from the American Heart Association/American Stroke Association** ***Stroke* 2019;50:e344–e418.** **(selected)**	**4.4. Temperature** 1. Sources of hyperthermia (temperature >38°C) should be identified and treated. Antipyretic medications should be administered to lower temperature in hyperthermic patients with stroke. Class I; LOE C-LD 2. The benefit of induced hypothermia for treating patients with ischemic stroke is not well established. Hypothermia should be offered only in the context of ongoing clinical trials. Class IIb; LOE B-R. **4.6. Dysphagia Screening** 1. Dysphagia screening before the patient begins eating, drinking, or receiving oral medications is reasonable to identify patients at increased risk for aspiration. Class I; LOE C-LD. 2. An endoscopic evaluation is reasonable for those patients suspected of aspiration to verify the presence/absence of aspiration and to determine the physiological reasons for the dysphagia to guide the treatment plan. Class IIa; LOE B-NR 3. It is reasonable for dysphagia screening to be performed by a speech-language pathologist or other trained healthcare provider. Class IIa; C-LD. 4. It is not well-established which instrument to choose for evaluation of swallowing with sensory testing, but the choice may be based on instrument availability or other considerations (ie, fiberoptic endoscopic evaluation of swallowing, videofluoroscopy, fiberoptic endoscopic evaluation). Class IIb; LOE C-LD. **4.7. Nutrition** 1. Enteral diet should be started within 7 days of admission after an acute stroke. Class I; LOE B-R. 2. For patients with dysphagia, it is reasonable to initially use nasogastric tubes for feeding in the early phase of stroke (starting within the first 7 days) and to place percutaneous gastrostomy tubes in patients with longer anticipated persistent inability to swallow safely (>2–3 weeks). Class IIa; LOE C-EO. 3. Nutritional supplements are reasonable to consider for patients who are malnourished or at risk of malnourishment. Class IIa; LOE B-R. **4.8. Deep Vein Thrombosis Prophylaxis** 1. In immobile stroke patients without contraindications, intermittent pneumatic compression (IPC) in addition to routine care (aspirin and hydration) is recommended over routine care to reduce the risk of deep vein thrombosis (DVT). Class I; LOE B-R. 2. The benefit of prophylactic-dose subcutaneous heparin (unfractionated heparin [UFH] or LMWH) in immobile patients with AIS is not well established. Class IIb; LOE A. 3. When prophylactic anticoagulation is used, the benefit of prophylactic-dose LMWH over prophylactic-dose UFH is uncertain. IIb B-R. 4. In ischemic stroke, elastic compression stockings should not be used. Class III: Harm; LOE B-R. **4.12 Rehabilitation** 3. 6. High-dose, very early mobilization within 24 hours of stroke onset should not be performed because it can reduce the odds of

Guideline	Recommendations
	a favorable outcome at 3 months. Class III: Harm; LOE B-R. **5.2. Seizures** 1. Recurrent seizures after stroke should be treated in a manner similar to when they occur with other acute neurological conditions, and anti-seizure drugs should be selected based upon specific patient characteristics. Class I; LOE C-LD. 2. Prophylactic use of anti-seizure drugs is not recommended. Class III: No Benefit; LOE B-R. **6.3 Cardiac Evaluation** 1. Cardiac monitoring is recommended to screen for atrial fibrillation and other potentially serious cardiac arrhythmias that would necessitate emergency cardiac interventions. Cardiac monitoring should be performed for at least the first 24 hours. Class I; LOE B-NR. 2. The clinical benefit of prolonged cardiac monitoring to detect atrial fibrillation after AIS is uncertain. Class IIb; LOE B-R 3. In some patients with AIS, prolonged cardiac monitoring to provide additional information to plan subsequent secondary preventive treatment may be reasonable, although the effect on outcomes is uncertain. Class IIb; LOE C-EO.
Burgos R, Bretón I, Cereda E, et al. **ESPEN guideline clinical nutrition in Neurology.** ***Clin Nutr* 2018; 37: 354–96.** **(selected)**	*Dysphagia* Recommendation 52: A formalized screening for dysphagia should be performed in all stroke patients as early as possible and before oral intake. Grade of recommendation B strong consensus (95% agreement) Recommendation 53: All stroke patients failing the dysphagia screening or demonstrating symptoms of or risk factors for dysphagia should be evaluated with a more thorough assessment of swallowing function as early as possible. Grade of recommendation B strong consensus (100% agreement). Recommendation 58: Texture modified diets and thickened liquids may reduce the incidence of aspiration pneumonia in stroke patients with dysphagia. Data on the effect of modified diets and thickened liquids on mortality of stroke patients is insufficient. Texture modified diets and thickened liquids should be ordered only following an assessment of swallowing function including assessment of the risk of aspiration according to a standardized protocol (clinical and, if feasible, instrumental) by professionals trained and experienced in the assessment and treatment of dysphagia. This assessment should be repeated at regular intervals until normal swallowing function is regained. Grade of recommendation: GPP e strong consensus (95% agreement). *Nutrition* Recommendation 63: Patients with prolonged severe dysphagia after stroke that presumably last for more than 7 days should receive early (not more than 72 h) enteral tube feeding. Grade of recommendation: GPP e strong consensus (100% agreement). Recommendation 65: If a sufficient oral food intake is not possible during the acute phase of stroke, enteral nutrition should be preferably given via a nasogastric tube. Grade of recommendation: A e strong consensus (100% agreement) Recommendation 66: If enteral feeding is likely necessary for a longer period of time (>28 days), a PEG should be chosen and placed in a stable clinical phase (after 14e28 days). Grade of recommendation: A e strong consensus (95% agreement)
Fuentes B, Ntaios G, Putaala J, Thomas B, Turc G, Díez-Tejedor E. **European Stroke Organisation (ESO)**	In patients with acute IS, we suggest against the routine use of IV insulin to achieve a tight glycaemic control as a means to improve functional outcome, survival or infarct growth. Quality of evidence: Low Strength of recommendation: Weak In patients with acute haemorrhagic stroke, we suggest against the routine use of IV insulin to achieve a tight glycaemic control as

Guideline	Recommendations
guidelines on glycaemia management in acute stroke. ***Eur Stroke J.* 2018, Vol. 3(1) 5–21.**	a means to improve functional outcome or survival. Quality of evidence: Very low Strength of recommendation: Weak
Holtkamp M, Beghi E, Benninger F, Kälviäinen R, Rocamora R, Christensen H et al. **European Stroke Organisation guidelines for the management of post-stroke seizures and epilepsy.** ***Euro Stroke J.* 2017;2(2):103-15.** **(selected)**	In the presence of only one underpowered RCT, there is no evidence if immediate primary prophylaxis with an antiepileptic drug compared to no treatment prevents occurrence of acute symptomatic seizure (ASS); in ischaemic stroke or intracranial (intracerebral or subarachnoidal) haemorrhage. Based on low incidence of ASS in observational studies, we make a weak recommendation against primary AED prophylaxis. Quality of evidence: Very low; Strength of Recommendation: Weak against strong intervention (↓?) In the absence of RCTs, we cannot make strong recommendations when and in whom to treat ASS with immediate secondary AED prophylaxis compared to no treatment for prevention of further ASS. Low incidence of ASS recurrence suggests not implementing secondary prophylaxis. Quality of evidence: Very low; Strength of Recommendation: Weak against intervention (↓?). In the absence of RCTs, we cannot make strong recommendations when to start immediate primary prophylaxis with an AED to prevent occurrence of post-stroke US. Low incidence of US occurrence suggests not implementing secondary prophylaxis. Quality of evidence: Very low; Strength of Recommendation: Weak against intervention (↓?). In the absence of RCTs but on the basis of observation study finding we cannot make strong recommendations. Due to high seizure recurrence risk, we suggest considering secondary AED prophylaxis. Quality of evidence: Very low; Strength of Recommendation: Weak against intervention (↑?)
Clinical Guidelines for Stroke Management 2017. Melbourne (Australia): National Stroke Foundation.	**Nutrition and Hydration** Strong recommendation Updated • All stroke patients should have their hydration status assessed, monitored, and managed throughout their hospital admission. • Where fluid support is required, crystalloid solution should be used in preference to colloid solutions as the first option to treat or prevent dehydration. Strong recommendation Updated All stroke patients should be screened for malnutrition at admission and on an ongoing basis (at least weekly) while in hospital Strong recommendation For stroke patients whose nutrition status is poor or deteriorating, nutrition supplementation should be offered. Weak recommendation Updated • For stroke patients who do not recover a functional swallow, nasogastric tube feeding is the preferred method of feeding in the short term. • For stroke patients, there is no preference with regard to continuous pump (meaning using a pump for greater than or equal to 16hrs out of 24hrs for less than or equal to 80ml/hr) feeding versus intermittent bolus feeding (meaning 250-400mls/hr for 4-5times/day) therefore practical issues, cost and patient preferences should guide practice. Weak recommendation AGAINST New

Guideline	Recommendations
	For stroke patients who are adequately nourished, routine oral nutrition supplements are not recommended. **Poor Oral Hygiene** Strong recommendation All stroke patients, particularly those with swallowing difficulties, should have assistance and/or education to maintain good oral and dental (including dentures) hygiene Strong recommendation Staff and carers of stroke patients (in hospital, in residential care and home settings) should be trained in assessment and management of oral hygiene. Weak recommendation New For stroke patients, chlorhexidine in combination with oral hygiene instruction, and/or assisted brushing may be used to decrease dental plaque and gingiva bleeding. Caution should be taken, however, for patients with dysphagia. **Incontinence** Weak recommendation • All stroke survivors with suspected urinary continence difficulties should be assessed by trained personnel using a structured functional assessment For stroke survivors, a portable bladder ultrasound scan should be used to assist in diagnosis and management of urinary incontinence. Weak recommendation • Stroke patients in hospital with confirmed continence difficulties, should have a structured continence management plan formulated, documented, implemented and monitored. • A community continence management plan should be developed with the stroke survivor and family/carer prior to discharge, and should include information on accessing continence resources and appropriate review in the community. • If incontinence persists the stroke survivor should be re-assessed and referred for specialist review. Weak recommendation For stroke survivors with urge incontinence: • anticholinergic drugs can be tried • a prompted or scheduled voiding regime program/ bladder retraining can be trialled • if continence is unachievable, containment aids can assist with social continence. **Faecal Incontinence** Weak recommendation • All stroke survivors with suspected faecal continence difficulties should be assessed by trained personnel using a structured functional assessment. • For stroke survivors with constipation or faecal incontinence, a full assessment (including a rectal examination) should be carried out and appropriate management of constipation, faecal overflow or bowel incontinence established and targeted education

Guideline	Recommendations
	provided. Weak recommendation For stroke survivors with bowel dysfunction, bowel habit retraining using type and timing of diet and exploiting the gastro-colic reflex should be used **Deep Venous Thrombosis (DVT) or Pulmonary Embolism (PE)** Early mobilisation and adequate hydration should be encouraged in all acute stroke patients to help prevent DVT and PE. (GPP) Antiplatelet therapy should be used for people with ischaemic stroke to help prevent DVT/PE. (Grade A) Low molecular weight heparin or heparin in prophylactic doses can be used with caution for selected patients with acute ischaemic stroke at high risk of DVT/PE. If low molecular weight heparin is contraindicated or not available, unfractionated heparin should be used. (Grade B) Antithrombotic therapy is NOT recommended for the prevention of DVT/PE in haemorrhagic stroke patients. (GPP) Thigh-length antithrombotic stockings are NOT recommended for the prevention of DVT/PE post-stroke. (Grade B) **Pressure Care** All stroke survivors at risk (e.g., stroke severity, reduced mobility, diabetes, incontinence and nutritional status) should have a pressure care risk assessment and regular evaluation completed by trained personnel. (GPP) All stroke survivors assessed as high risk should be provided with appropriate pressure-relieving aids and strategies, including a pressure-relieving mattress as an alternative to a standard hospital mattress. (Grade B)
Intercollegiate Stroke Working Party. National clinical guideline for stroke, 5th edition. London: Royal College of Physicians, 2016. **(selected)**	**DVT** • Patients with immobility after acute stroke should be offered intermittent pneumatic compression within 3 days of admission to hospital for the prevention of deep vein thrombosis. Treatment should be continuous for 30 days or until the patient is mobile or discharged, whichever is sooner. • Patients with immobility after acute stroke should not be routinely given low molecular weight heparin or graduated compression stockings (either full-length or below-knee) for the prevention of deep vein thrombosis. • Patients with ischaemic stroke and symptomatic deep vein thrombosis or pulmonary embolism should receive anticoagulant treatment provided there are no contraindications. D Patients with intracerebral haemorrhage and symptomatic deep vein thrombosis or pulmonary embolism should receive treatment with a vena caval filter. **Mobilization** • Patients with difficulty moving after stroke should be assessed as soon as possible within the first 24 hours of onset by an appropriately trained healthcare professional to determine the most appropriate and safe methods of transfer and mobilisation. • Patients with difficulty moving early after stroke who are medically stable should be offered frequent, short daily mobilisations (sitting out of bed, standing or walking) by appropriately trained staff with access to appropriate equipment, typically beginning between 24 and 48 hours of stroke onset. Mobilisation within 24 hours of onset should only be for patients who require little or no assistance to mobilise.

Guideline	Recommendations
	Nutrition/Dysphagia • Patients with acute stroke should have their swallowing screened, using a validated screening tool, by a trained healthcare professional within four hours of arrival at hospital and before being given any oral food, fluid or medication. • Until a safe swallowing method is established, patients with dysphagia after acute stroke should: – be immediately considered for alternative fluids; – have a comprehensive specialist assessment of their swallowing; – be considered for nasogastric tube feeding within 24 hours; – be referred to a dietitian for specialist nutritional assessment, advice and monitoring; – receive adequate hydration, nutrition and medication by alternative means. • Patients with swallowing difficulties after acute stroke should only be given food, fluids and medications in a form that can be swallowed without aspiration. • Patients with acute stroke should have their hydration assessed using multiple methods within four hours of arrival at hospital, and should be reviewed regularly and managed so that normal hydration is maintained. • Patients with acute stroke should be screened for the risk of malnutrition on admission and at least weekly thereafter. Screening should be conducted by trained staff using a structured tool. • Patients with acute stroke who are adequately nourished on admission and are able to meet their nutritional needs orally should not routinely receive oral nutritional supplements. • Patients with acute stroke who are at risk of malnutrition or who require tube feeding or dietary modification should be referred to a dietitian for specialist nutritional assessment, advice and monitoring. • Patients with stroke who are at risk of malnutrition should be offered nutritional support. This may include oral nutritional supplements, specialist dietary advice and/or tube feeding in accordance with their expressed wishes or, if the patient lacks mental capacity, in their best interests. • Patients with stroke who are unable to maintain adequate nutrition and fluids orally should be: – referred to a dietitian for specialist nutritional assessment, advice and monitoring; – be considered for nasogastric tube feeding within 24 hours of admission; – assessed for a nasal bridle if the nasogastric tube needs frequent replacement, using locally agreed protocols; – assessed for gastrostomy if they are unable to tolerate a nasogastric tube with nasal bridle. • People with stroke who require food or fluid of a modified consistency should: – be referred to a dietitian for specialist nutritional assessment, advice and monitoring; – have the texture of modified food or fluids prescribed using nationally agreed descriptors. • People with stroke should be considered for gastrostomy feeding if they: – need but are unable to tolerate nasogastric tube feeding; – are unable to swallow adequate food and fluids orally by four weeks from the onset of stroke; – are at high long-term risk of malnutrition. • People with difficulties self-feeding after stroke should be assessed and provided with the appropriate equipment and assistance (including physical help and verbal encouragement) to promote independent and safe feeding. • People with stroke discharged from specialist care services with continuing problems meeting their nutritional needs should have their dietary intake and nutritional status monitored regularly. • People with stroke receiving end-of-life (palliative) care should not have burdensome restrictions imposed on oral food and/or fluid intake if those restrictions would exacerbate suffering. **Urinary/fecal incontinence**

Guideline	Recommendations
	• Stroke unit staff should be trained in the use of standardised assessment and management protocols for urinary and faecal incontinence and constipation in people with stroke. • People with stroke should not have an indwelling (urethral) catheter inserted unless indicated to relieve urinary retention or when fluid balance is critical. • People with stroke who have continued loss of bladder and/or bowel control 2 weeks after onset should be reassessed to identify the cause of incontinence, and be involved in deriving a treatment plan (with their family/carers if appropriate). The treatment plan should include: – treatment of any identified cause of incontinence; – training for the person with stroke and/or their family/carers in the management of incontinence; – referral for specialist treatments and behavioural adaptations if the person is able to participate; – adequate arrangements for the continued supply of continence aids and services. • People with stroke with continued loss of urinary continence should be offered behavioural interventions and adaptations such as: timed toileting; prompted voiding; review of caffeine intake; bladder retraining; pelvic floor exercises; external equipment prior to considering pharmaceutical and long-term catheter options. • People with stroke with constipation should be offered: advice on diet, fluid intake and exercise; a regulated routine of toileting; a prescribed drug review to minimise use of constipating drugs; oral laxatives; a structured bowel management programme which includes nurse-led bowel care interventions; education and information for the person with stroke and their family/carers; rectal laxatives if severe problems persist. **Oral Care** • People with stroke, especially those who have difficulty swallowing or are tube fed, should have mouth care at least 3 times a day including: brushing of teeth and cleaning of gums with a suitable cleaning agent (toothpaste and/or chlorhexidine dental gel), for which an electric toothbrush should be considered; removal of excess secretions; application of lip balm. • People with stroke who have dentures should have their dentures: put in during the day; cleaned regularly using a toothbrush, toothpaste and/or chlorhexidine dental gel; checked and replaced if ill-fitting, damaged or lost. • People in hospital or living in a care home after stroke should receive mouth care from staff who have been trained in: assessment of oral hygiene; selection and use of appropriate oral hygiene equipment and cleaning agents; provision of oral care routines; awareness and recognition of swallowing difficulties. • People with stroke and their family/carers should receive information and training in mouth care and maintaining good oral hygiene before transfer of their care from hospital.
Dennis M, Caso V, Kappelle J et al. For the European Stroke Organisation **European Stroke Organisation (ESO) guidelines for prophylaxis for venous**	We recommend that intermittent pneumatic compression (IPC) (thigh-length, sequential) should be used for immobile patients with ischaemic stroke. It should not be used in patients with open wounds on the legs and should be used with caution in those with existing DVT, heart failure, severe peripheral vascular disease or confusion where attempts to mobilise when unsupervised could lead to falls and injury. Quality of evidence: Moderate; Strength of recommendation: Strong

Guideline	Recommendations
thromboembolism in immobile patients with acute ischaemic stroke ***Eur Stroke J* 2016; 1(1):6-19.**	Prophylactic anticoagulation with unfractionated heparin (UFH) (5000U 2, or 3 daily) or low molecular weight heparin (LMWH) or heparinoid should be considered in immobile patients with ischaemic stroke in whom the benefits of reducing the risk of venous thromboembolism is high enough to offset the increased risks of intracranial and extracranial bleeding associated with their use. Quality of evidence: Moderate; Strength of recommendation: Weak Where a judgement has been made that prophylactic anticoagulation is indicated LMWH or heparinoid should be considered instead of UFH because of its greater reduction in risk of DVT, the greater convenience, reduced staff costs and patient comfort associated single daily dose vs. multiple daily injections but these advantages should be weighed against the higher risk of extracranial bleeding, higher drug costs and risks in elderly patients with poor renal function. Quality of evidence: Moderate; Strength of recommendation: Weak
Ntaios G, Dziedzic T, Michel P, et al. **European Stroke Organisation (ESO) guidelines for the management of temperature in patients with acute ischemic stroke.** ***Int J Stroke* 2015;10(6):941-949.**	**PICO1:** In hyperthermic patient with acute ischemic stroke, does treatment of hyperthermia compared with no treatment of hyperthermia improve functional outcome and/or survival? In patients with acute ischemic stroke and hyperthermia, we cannot make any recommendation for treating hyperthermia as a means to improve functional outcome and/or survival. Quality of evidence: Low/⊕⊕ Strength of recommendation: Weak **PICO2**: In normothermic patients with acute ischemic stroke, does prevention of hyperthermia with antipyretics compared with no prevention of hyperthermia improve functional outcome and/or survival? In patients with acute ischemic stroke and normothermia, we do not recommend routine prevention of hyperthermia with antipyretics as a means to improve functional outcome and/or survival. Quality of evidence: Moderate/⊕⊕⊕ Strength of recommendation: Weak/↓? **PICO3**: In patients with acute ischemic stroke, does induction of hypothermia compared with no induction of hypothermia improve functional outcome and/or survival? In patients with acute ischemic stroke, we do not recommend induction of hypothermia as a means to improve functional outcome and/or survival. Quality of evidence: Very low/⊕ Strength of recommendation: Weak/↓?
Qaseem A, Chou R, Humphrey LL, Starkey M, Shekelle P, for the Clinical Guidelines Committee of the American College of Physician. **Venous thromboembolism prophylaxis in hospitalized patients: a clinical practice guideline from the American college of physicians.**	Recommendation 1: ACP recommends assessment of the risk for thromboembolism and bleeding in medical (including stroke) patients prior to initiation of prophylaxis of venous thromboembolism (Grade: strong recommendation, moderate-quality evidence). Recommendation 2: ACP recommends pharmacologic prophylaxis with heparin or a related drug for venous thromboembolism in medical (including stroke) patients unless the assessed risk for bleeding outweighs the likely benefits (Grade: strong recommendation, moderate-quality evidence). Recommendation 3: ACP recommends against the use of mechanical prophylaxis with graduated compression stockings for prevention of venous thromboembolism (Grade: strong recommendation, moderate-quality evidence).

Guideline	Recommendations
***Ann Intern Med* 2011;155:625-632.**	
Scottish Intercollegiate Guidelines Network (SIGN). Management of patients with stroke: rehabilitation, prevention and management of complications, and discharge planning. A national clinical guideline. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network (SIGN); 2010 Jun. 101 p.	**Early Mobilization** B: Stroke patients should be mobilised as early as possible after stroke. **Nutrition and Swallowing** **Nutritional Screening and Assessment** D: Assessment of nutritional risk should be carried out within the first 48 hours with regular reassessment thereafter during the patient's recovery and be recorded prior to discharge. D: Assessment of a patient's nutritional risk should include an assessment of their ability to eat independently and a periodic record of their food consumption. D: Ongoing monitoring of nutritional status after a stroke should include a combination of the following parameters: • Biochemical measures (i.e., low prealbumin, impaired glucose metabolism) • Swallowing status • Unintentional weight loss • Eating assessment and dependence • Nutritional intake **Nutritional Interventions** C: Following nutritional screening, those identified as undernourished, and those at risk of becoming undernourished, should be referred to a dietitian and considered for prescription of oral nutritional supplements as part of their overall nutritional care plan. **Continence** **Urinary Incontinence** D: All stroke patients should be assessed, investigated and treated for urinary incontinence. D: The presence or absence of incontinence of urine should be documented for all patients after a stroke. D: Behavioural therapies for incontinence should be trialled on an individual basis after stroke. **Pressure Ulcer Prevention** D: • Hospital managers should ensure that nursing expertise, staffing and equipment levels are sufficient to prevent pressure ulcers. • Hospitals should have up-to-date policies on risk assessment, pressure ulcer prevention and treatment. Venous Thromboembolism

Guideline	Recommendations
	Early Medication Treatment A: Aspirin (300 mg/day) should be given to all patients with acute ischaemic stroke in the first two weeks following stroke onset to help prevent deep vein thrombosis and pulmonary embolism (provided there are no known contraindications to aspirin therapy). **Graduated Elastic Compression Stockings** A: Above-knee graduated elastic compression stockings to reduce the risk of deep vein thrombosis after acute stroke are not recommended.
Summers D, Leonard A, Wentworth D, Saver JL, Simpson J, Spilker JA, Hock N, Miller E, Mitchell PH; on behalf of the American Heart Association Council on Cardiovascular Nursing and the Stroke Council. **Comprehensive overview of nursing and interdisciplinary care of the acute ischemic stroke patient: a scientific statement from the American Heart Association.** ***Stroke* 2009;40:2911–2944.**	1. Stroke neurological assessments should be performed every 4 hours after the hyperacute phase of stroke, and then frequency should be based on the patient's stability and other comorbid conditions (Class I, Level of Evidence B). 2. Temperatures >99.6°F should be managed aggressively (Class I, Level of Evidence C). 3. Continuous cardiac monitoring of the stroke patient should be provided for at least 24 to 48 hours after stroke to detect potential cardiac problems (Class I, Level of Evidence B). 4. Careful, frequent monitoring and assessment for worsening of neurological deficits or bleeding should be performed for up to 24 hours after thrombolytic therapy (Class I, Level of Evidence B). 5. Hyperglycemia should be treated in patients with a serum glucose concentration >140 mg/dL (Class I, Level of Evidence C). 6. Management of arterial hypertension in the acute phase should be approached with caution because of the lack of data available to guide management (Class I, Level of Evidence C). 7. Oxygenation should be evaluated with an oxygen saturation monitor (Class I, Level of Evidence C). 8. To prevent aspiration pneumonia, the patient's lungs should be auscultated, and the patient should be evaluated for signs of respiratory compromise and dysphagia (Class I, Level of Evidence C). Nurses should report seizure activity, and treatment should begin immediately (Class I, Level of Evidence B). Prophylactic treatment of seizures should not be given. Class IIa 9. It is reasonable to use clinical pathways, protocols, or preprinted stroke order sets to organize care of the stroke patient (Class IIa, Level of Evidence B). 10. Infections, such as pneumonia and UTI, should be identified and treated immediately with antibiotics (Class I, Level of Evidence B). 11. Early bowel and bladder care should be instituted to prevent complications such as constipation and urinary retention or infection (Class I, Level of Evidence A). Use of indwelling catheters should be avoided if possible because of the risk of UTI (Class I, Level of Evidence A). 12. Early implementation of anticoagulant therapy or physical compression modalities should be considered for all stroke patients who cannot ambulate at 2 days and who are at risk for DVT or pulmonary embolus (Class I, Level of Evidence A). 13. Early mobility should always be attempted if safe for the patient (Class I, Level of Evidence B). 14. Fall precautions should be initiated, and the stroke patient should be told not to ambulate without assistance (Class I, Level of Evidence B).

Guideline	Recommendations
	15. Frequent turning should be instituted in bedridden patients to prevent skin breakdown (Class I, Level of Evidence A). Use of the Braden Scale in nursing practice can assist in the prediction of stroke patients at high risk of developing pressure ulcers (Class I, Level of Evidence A). Range-of-motion exercises should start in the early phase of acute stroke care once risk has been assessed (Class I, Level of Evidence C). 16. A swallow screen should be performed in the first 24 hours after stroke, preferably by the speech language pathologist (Class I, Level of Evidence B). Nurses should be familiar with bedside swallow assessment if a formal evaluation cannot be done within the specified period. Stroke patients should be kept NPO until the screen has been performed (Class I, Level of Evidence B). Further studies of dysphagia in the setting of acute stroke should be performed. 17. Patients who cannot swallow should have a nasogastric tube placed, or if severity warrants, a percutaneous endoscopic gastrostomy tube should be placed (Class I, Level of Evidence B). Assessment of proper hydration is included in this recommendation. Class IIa 18. If an indwelling catheter is required, excellent pericare and prevention of infection modalities should be instituted to prevent complications (Class IIa, Level of Evidence C). 19. The stroke patient can be fed either by intravenous infusion or through nasogastric or percutaneous endoscopic gastrostomy tubes (Class IIa, Level of Evidence B). Class IIb 20. Nurses may provide passive range-of-motion exercises between physical therapy visits to help patients maintain joint mobility and prevent complications of immobility (Class IIb, Level of Evidence C).

Evidence Tables

Prevalence of In-Hospital Medical Complications

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Otite et al. 2017 **USA** **Retrospective study**	NA	575,211 patients included in the Nationwide Inpatient Sample from 2004-2013 admitted to hospital with intracerebral hemorrhage. Mean age was 68.9 years, 49.7% were women.	The frequencies of medical complications including UTI, DVT, PE, pneumonia and MI were retrieved.	In-hospital medical complications	29.3% of all patients experienced at least 1 complication. Mortality was 23.8% The most frequently reported medical complication was UTI (14.8%). Frequencies of other complications were: pneumonia 7.8%, sepsis 4.1%, DVT 2.7%, PE 0.7% and MI 2.0% Medical complications were associated with increased lengths of hospital stays and increased costs.
Westendorp et al. 2011 **Systematic review & meta-analysis**	NA	87 studies including included 137,817 patients. 8 studies were restricted to patients admitted in the ICU.	Post-stroke infection rates from individual studies were pooled. Associations between population- and study characteristics and infection rates were also examined	Pooled percentage of infections (total, pneumonia and UTI)	The overall pooled percentage of infections was 30% (95% CI 24%-36%). For pneumonia and UTI the pooled prevalences were 10% (95% CI 9-10%) and 10% (95%CI 9-12%), respectively. The percentage of patients with infection was higher in ICU studies (45% vs. 28%). The risk of death in patients with pneumonia was significantly increased (OR=3.62, 95% CI 2.80-4.68). Results from 4 studies included.
Ingeman et al. 2011 **Denmark** **Retrospective study**	NA	13,721 patients admitted to 10 stroke units from 2003-2009. Mean age: 72 years, 79.4% ischemic stroke, 16.6% had severe or very severe stroke, 15.5% moderate stroke and	Medical complications including pneumonia, UTI, DVT, pressure ulcer, falls and severe constipation, were retrieved through chart review. Associations between complications	30 day and 1-year mortality rate and LOS	3,453 (25.2%) patients experienced at least one medical complication during hospitalization. UTI-15.4%, pneumonia-9.0%, constipation-6.8%, falls-2.1%, DVT-0.6%, pressure ulcer-1.2%. The median LOS for all patients was 13 days but was higher for patients with any complication (median=33 days). Any medical complication was

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		38.9% mild (the stroke severity of the remaining patients was not assessed).	and stroke outcome were explored using regression analysis controlling for age, sex, Scandinavian Stroke Scale score, type of stroke and processes of care received)		associated with an increased LOS (adj relative LOS extension=2.48, 95% CI 2.01-3.06). Any complication was associated with significant increases in mortality rate ratios. Adj MMR for 1-year mortality=1.20, 95% CI 1.04-1.39. Pneumonia was associated with the highest MMR: 30-day mortality=1.59, 95% CI 1.31-1.93 1-year mortality=1.76, 95% CI 1.45-2.14
Indredavik et al. 2008 **Rohweder et al. 2015** **Norway** **Additional reporting from RCT**	NA	256 patients admitted to a stroke unit within 24 hours of symptom onset. Mean age was 77.2 years, 52.4% were female, 90% of strokes were ischemic.	The frequency of 16 complication types that developed during the first week of admission were documented. Complications continued to be recorded in 50% patients during the next 3 months, by weekly telephone calls.	Frequency of medical complications at 1 week and during 90 days follow-up, independent predictors of complications and poor outcome (mRS 3-4) at 90 days	63.8% of patients experienced ≥1 complication during the first week of admission. Increased stroke severity was an independent predictor of the occurrence of complications. The 5 most frequently reported complications were diffuse pain (23.9%), fever (23.7%), stroke progression (18.4%), UTI (16.0%) and Troponin T elevation without MI (11.7%). The onset of most complications occurred during the first 24 hours of admission. During 3-month follow-up, 82.4% experienced ≥1 complication. Pain, UTIs, non-serious falls and chest infections were the most commonly reported. After controlling for age, sex, pre-stroke mRS, and Stroke severity, the odds of a poor outcome at 3 months were significantly increased given: recurrent stroke (OR=7.45, 95% CI 2.83-20.96, p<0.0001), chest infection (OR=3.28, 95% CI 1.16-9.29, p=0.025) or a fall (OR=1.43, 95% CI 1.06-1.93, p=0.021).
Roth et al. 2001 **USA** **Retrospective**	NA	1,029 patients consecutively admitted to a single hospital for stroke rehabilitation from 1993-1997, associated	83 possible medical complications were recorded from the medical chart. Examination of clinical	Factors associated with the development of medical complications.	Mean stroke onset to rehab admission was 17.4 days. Mean rehab LOS was 28 days. 773 patients (75%) experienced at least one medical complication. The most commonly cited

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study		with a recent (within 3 months) stroke. Mean age was 63.4 years, 53% were female, 71% ischemic stroke.	factors associated with the development of a medical complication and factors associated with the development of a complication requiring transfer back to acute care. Analyses were adjusted for stroke severity.		were: UTI (30.5%), soft tissue pain (14.2%), depression (13.0%), falls (10.5%), and dehydration (10.0%). DVT- 4.1%, pneumonia-4.0%, seizures-1.5% and PE-1.1%. 19% of patients experienced a complication requiring transfer to an acute care facility. The presence of hypoalbuminemia, a history of HTN and moderate to severe stroke were independent predictors of the development of a medical complication. Elevated WBC count, low hemoglobin levels, moderate-to-severe stroke and a history of cardiac arrhythmia were independent predictors of the development of a medical complication requiring transfer to acute care. Medical complications were more prevalent among patients with increasing severity of stroke.
Langhorne et al. 2000 **UK** **Retrospective study**	NA	311 consecutive patients admitted to 3 stroke units within 7 days of stroke onset, over a 7-month period. The mean age was 76 years, 52% were male. 89% of strokes were ischemic. 74% of patients were independent prior to stroke	Complications were noted during the acute stroke admission and at 6, 18 and 30 months of stroke. Complications were classified as: neurological, infections, complications associated with immobility, thromboembolism, pain, psychological and misc.	Complications that developed during hospital stay and up to 30 months following stroke.	265 patients (85%) experienced at least 1 complication during hospital stay: UTI: 23%, chest infections: 22%, pressure sores: 21%, falls (total): 25%, DVT: 2%, PE:1%. During the acute and rehabilitation period increasing dependency was associated with an increased frequency of infections, pressure sores and anxiety. The majority of complications occurred within the first 6 weeks of stroke Of 148 patients who were alive and available for follow-up at 30 months, the number of complications reported were: UTI: 22%, chest infections: 29%, pressure sores: 11%, falls (total):

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					45%, DVT: 0%, PE:0%.
Johnston et al. 1998 **USA** **Additional reporting from RCT**	NA	279 patients included in the Randomized Trial of Tirilazad Meslyate in Patients with Acute Stroke (RANTTAS) study. Patients were recruited from 27 participating acute care centres from 1993-1994. The mean age was 69 years. Median admission NIHSS score was 9.0.	Data related to neurological and medical complications that occurred in patients in the placebo arm of the trial during 3 months were collected. Associations between medical complications and poor outcome were examined.	Poor outcome, defined as severe disability (Barthel Index [BI] score <60 or Glasgow Outcome Scale [GOS] of severe disability or vegetative survival) or death at 3 months	32% of patients had at least one serious event. The most common medical complications were: congestive heart failure (11%), UTIs (11%), pneumonia (10%), aspiration pneumonia (6%), angina (6%) and gastrointestinal bleed (5%). 3-month mortality was 14%, 51% of which were related to medical complications. The odds of a poor outcome were increased significantly for patients with any serious medical complication (adj OR=6.4, 95% CI 2.5-15 using BI criteria and adj OR=11.6, 95% CI 4.3-30.9, using GOS criteria).

Cardiovascular Investigations

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i) Detection of Atrial Fibrillation & Other Arrhythmias					
Haeusler et al. 2021 **Germany** **RCT** ***Systematic MONitoring for Detection of Atrial Fibrillation in patients with acute Ischaemic Stroke***	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☑	3,465 adult patients admitted to 38 stroke units within 72 hours of acute ischemic stroke or TIA and with no history of atrial fibrillation (AF). Mean age was 66 years, 39% were women. Stroke was the index event in 69.5% of admissions.	Patients were randomly assigned (1:1) to usual diagnostic procedures for AF detection, which included a baseline 12-lead ECG on admission and at least 24 h of ECG monitoring (control group) or additional Holter-ECG recording for up to 7 days in hospital (intervention group).	**Primary outcome:** Patients on oral anticoagulants (OAC) at 12 months after the index event **Secondary outcomes:** Patients with newly diagnosed AF in hospital and the composite of recurrent stroke, major bleeding, MI, or death after 6 months, 12 months, and 24 months	At 12 months, there was no significant difference between groups in the number of patients on OACs. There were 203 (13·7%) patients in the intervention group vs.169 (1·8%) in the control group (OR=1·2, 95% CI 0·9–1·5). AF was newly detected in significantly more patients in hospital in the intervention group (97 [5·8%] vs. 68 [4·0%]; HR=1·4, 95% CI 1·0–2·0). There were no significant differences in the risk of the composite outcome between groups at 6, 12 or 24 months. The risk of all-cause mortality was significantly

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(MonDAFIS)					higher in the control group (6·0% vs. 4.3%; OR=0·7, 95% CI 0·5–0·9).
Wachter et al. 2017 **Germany** **RCT** ***Finding Atrial Fibrillation in Stroke - Evaluation of Enhanced and Prolonged Holter Monitoring (FIND-AF)***	CA: ☑ Blinding: Patient ☒ Assessor ☒ ITT: ☑	398 patients, >60 years admitted with acute ischemic stroke within 7 days of symptom onset, in sinus rhythm at admission and without history of AF, and a premorbid mRS score ≤2. Mean age was 73 years, 40.2% were female.	Patients were randomized to receive prolonged Holter ECG monitoring (10-days) and repeated at 3 and 6 months (n=200) vs. standard care (minimum of 24 hours of cardiac monitoring, n=198)	**Primary outcome:** Detection of newly diagnosed AF/flutter (≥30 sec) within 6 months and before stroke recurrence **Secondary outcomes:** Detection of newly diagnosed AF/flutter within 12 months, recurrent stroke or systemic embolism, and death	At 6 months, detection of AF was significantly higher in the prolonged monitoring group (13.5% vs. 4.5%; absolute difference 9%, 95% CI 3.5-14.6, p=0.002; NNS=11). At 12 months, detection of AF was significantly higher in the prolonged monitoring group (13.5% vs. 6.1%; absolute difference 7.4%, 95% CI 1.6-13.2; p=0.02; NNS=13). There were no differences between groups in stroke recurrence (2.5 vs. 4.5%, p=0.28) or death (3.0 vs. 4.5%, p=0.45). There were no interactions based on subgroup analyses based on age, sex, baseline NIHSS, CHADS-2 score, symptoms at admission and imaging (lacunar vs. non-lacunar)
Edwards et al. 2016 **Canada** **Retrospective study**	NA	17,398 consecutive patients presenting with first-ever stroke or TIA with motor or speech deficits to the ED of 12 designated stroke centres from 2003-2013 without a known history of AF in sinus rhythm. Mean age was 69 years, 54% were men, 75% of patients presented with a stroke, 25%, a TIA. 79% of patients hospitalized had a mRS score of 0-3.	The use of ambulatory ECG (Holter monitoring and 14-day loop recorders) to detect episodes of AF, was assessed.	**Primary outcome:** The number of patients who received a minimum of 24-hour Holter monitoring within 30 days of index event **Secondary outcomes:** The number of patients receiving single or multiple Holter studies for a maximum cumulative ECG monitoring duration of 24, 48, or >60 hours within 7, 30, or 90 days after index event, the number of patients receiving prolonged ECG monitoring with an event loop recorder within 7, 30, or 90 days after index event	5,318 patients (30.6%, 95% CI 29.8-31.4%) received at least 24-hour Holter monitoring within 30 days of the index event. 2,253 patients (12.9%, 95% CI 12.4-13.5%) underwent 48-hr Holter monitoring within 90 days of the index event. 25 patients (0.1%, 95% CI 0.0-0.3%) underwent >60-hr Holter monitoring within 90 days of the index event. 139 patients (0.8%) underwent monitoring with event loop recording within 90 days of the index event. Factors associated with lower odds of undergoing Holter monitoring within 30 days of index event were: age <75 years, rural residence, moderately disabling stroke (mRS 4-5) and TIA as index

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					event. Factors associated with increased odds of undergoing Holter monitoring within 30 days of index event were: pre-morbid independence and admission to a registry hospital
Sposato et al. 2015 **Canada** **Systematic review & meta-analysis**	NA	50 studies, estimating the proportion of patients diagnosed with atrial fibrillation (AF) following stroke or TIA, using 8 diagnostic methods: admission ECG, serial ECG, continuous inpatient ECG monitoring, continuous inpatient cardiac telemetry, Holter monitoring, mobile cardiac outpatient telemetry, external loop recording, and implantable loop recording. Mean age of included patients was 67 years, 57% were men.	Subgroups of studies were formed based on 4 phases of cardiac monitoring: emergency room, in-hospital, first ambulatory period and second ambulatory period.	Proportion of patients diagnosed with post-stroke AF	The detection of AF between the 4 methods used during the inpatient phase (phase 2), including serial electrocardiography, continuous inpatient electrocardiographic monitoring, continuous inpatient cardiac telemetry and In-hospital Holter monitoring did not differ. Overall, the proportion of patients diagnosed with AF was 5.1%, 95% CI 3.8-6.5%.
Kishore et al. 2014 **UK** **Systematic review & meta-analysis**	NA	32 studies (RCTs and prospective cohort) including the results from 5038 patients with acute ischemic stroke or TIA had undergone invasive or noninvasive cardiac monitoring for a minimum of 12 hours following event. The mean age of all patients was 68.4 years.	Forms of cardiac monitoring evaluated included inpatient cardiac monitoring (IP), 24, 48 & 72hr and 7-day Holter, external loop recorder (n=3), invasive cardiac monitoring (n=4), and mobile cardiac outpatient telemonitoring (n=1). Maximum duration of monitoring was 30days (n=1).	**Primary outcome:** Detection of all AF (could not isolate paroxysmal AF as a separate outcome due to lack of reporting detail) **Secondary outcome:** Detection rates in subgroups including selected and unselected patients, latency between event and detection of AF and detection of AF in different stroke subtypes	The overall detection rate of AF was 11.5% (95% CI 8.9%-14.3%). The detection rate of AF in unselected patients was 6.2% (95% CI 4.4%-8.3%). The detection rate of AF in selected patients was 13.4% (95% CI 9.0%-18.4%). The detection rate of AF in cryptogenic stroke was 15.9% (95% CI 10.9%-21.6%). In unselected patients, the detection rates associated with monitoring type were:

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			Time of event to initiation of monitoring ranged from 0 hrs to 3 months.		IP 5.5% (95% CI 4.2%-6.9%) n=9 24 hr Holter 5.0% (95% CI 2.0%-9.0%) n=6 >24 hr monitoring 14.1% (95% CI 1.5%-36.4%) n=3 In selected patients, the detection rates associated with monitoring type were: IP 15.0% (95% CI 7.0%-25.0%) n=3 24 hr Holter 10.7% (95% CI 3.4%-21.5%) n=8 >24 hr monitoring 14.7% (95% CI 10.7%-19.3%) n=12 There was insufficient data to explore AF detection rates related to latency period, or among stroke subtypes.
Ground et al. 2013 **Germany** **Prospective Cohort Study**	NA	1,135 unselected patients from 9 stroke units admitted with stroke (71%) or TIA (29%) without a previous diagnosis of atrial fibrillation (AF). Mean age was 67 years, 45% women.	All patients underwent 72-hour Holter ECG monitoring using a 3-lead device.	**Primary outcome:** Detection of AF during observation period	Median time to onset of monitoring was 1 day. AF was detected in 49 new cases (4.3%, 95% CI 3.4%-5.2%). AF was detected in 29 patients within the first 24 hours of monitoring and in additional 20 patients by the end of 72 hours.
Higgins et al. 2013 **UK** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☒ ITT: ☒	100 patients admitted from 2 acute stroke services with ischemic stroke or TIA within 7 days of onset of symptoms without a history of AF and who demonstrated a normal sinus rhythm. Mean age was 65.8 years, 56% male.	Patients were randomized to receive noninvasive investigation to detect AF in accordance with standard practice (SP, n=50), or to received SP + additional cardiac event monitoring with the Novacor R-test Evolution device.	**Primary outcome:** Detection of sustained (20 sec) and unsustained paroxysmal AF (PAF) at 14 and 90 days.	At 14 days, sustained PAF was detected in 2% (95% CI 0%-10.6%) of patients in the SP group compared with 8% (95% CI 2.2%-19.2%) of patients in the SP+AM group (p=0.36). At 90 days, sustained PAF was detected in 8% (95% CI 2.2%-19.26%) of patients in the SP group compared with 16% (95% CI 7.2%-29.1 %) of patients in the SP+AM group (p=0.36). At 14 days, PAF of any duration was detected in 4% (95% CI 0%-13.7%) of patients in the SP group compared with 12% (95% CI 4.5%-24.3%) of patients in the SP+AM group (p=0.27). At 90 days, PAF of any duration was detected in 10% (95% CI3.3%-21.8%) of patients in the SP

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					group compared with 22% (95% CI 11.5%-36.0%) of patients in the SP+AM group (p=0.10). Anticoagulation therapy was initiated significantly more frequently among patients in the SP+AM group.
Flint et al. 2012 **USA** ***Stroke Monitoring for PAF in Real Time (SMART)* Registry**	NA	239 patients with cryptogenic ischemic stroke. Mean age was 64.6 years, 39.5% female	All patients underwent 30-day outpatient monitoring with an external loop recorder.	**Primary outcome:** Detection of paroxysmal AF during observation period	The average time from stroke event to initiation of monitoring was 29 days. Patients wore the monitors for an average of 24.5 days. PAF was detected in 26 of 236 patients (11.0%, 95% CI, 7.6%-15.7%). The first episode was detected an average of 11.4 days following the initiation of monitoring. The median number of events was 2/patient. Most PAFs were asymptomatic.
Lazzaro et al. 2012 **USA**	NA	113 consecutive patients admitted to a single institution from 2007-2008, following acute ischemic stroke or TIA, who had received cardiac investigations using continuous cardiac telemetry (CCT) and Holter monitoring. Mean age was 63.1 years, 50% were male. Patients with AF detected at baseline were excluded.	The detection of atrial fibrillation (AF) using Holter Monitoring and CCT, was compared.	**Primary outcome:** Detection of AF during observation period	Mean durations of monitoring were 29.8 hours (Holter) and 73.6 hours (CCT). Holter monitoring was initiated an average of 27.5 hours after initiation of CCT. Overall, the detection of AF was significantly higher using Holter monitoring (6.0%, 95% CI 2.9-11.6% vs. 0%, 95% CI, 0-3.4%, p=0 .008). Among 101 patients with stroke, the detection of AF was significantly higher using Holter monitoring (6.9%, 95% CI 3.2-13.9% vs. 0%, 95% CI, 0-4.4%, p=0 .016).
Rizos et al. 2012 **Germany** **Prospective Cohort Study**	NA	496 patients admitted to a single stroke unit with stroke (79%) or TIA (21%) without a previous diagnosis of atrial fibrillation (AF). Mean age was 69 years, 61.5% male.	All patients underwent both 24 hr Holter monitoring initiated within 48 hours of stroke and continuous ECG monitoring (CEM) initiated immediately following admission. CEM data were also monitored	**Primary outcome:** Detection of AF and paroxysmal AF during stroke unit admission.	CEM continued for a median duration of 64 hours. Median length of time spent on stroke unit was 89 hours. AF was newly detected during stroke unit admission in 68 patients (13.7%). Of these, paroxysmal AF was identified in 41 patients. The

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		Median NIHSS score was 3.	using an automated system (aCEM).		overall rate of newly detected paroxysmal AF was 8.3%. aCEM detected significantly more cases of paroxysmal AF compared with CEM or 24 hr Holter monitoring (92.7% vs. 65.9% vs. 34.1%)
Suissa et al. 2012 **France** **Prospective cohort study**	NA	946 patients with acute ischemic stroke and previously undiagnosed with AF were included. Mean age was 62.6 years.	Patients were enrolled into either intensive stroke unit care (with continuous cardiac monitoring initiated on admission, n=592) or conventional stroke unit care (baseline ECG, 24-hour Holter monitor and additional ECGs when necessary, n=352) (admission to either unit was based on neurologist evaluation).	**Primary outcome:** Detection of AF	New cases of AF were found in 8 patients (2.26%) with routine cardiac monitoring while 88 (14.86%) patients were diagnosed with AF in the continuous cardiac monitoring group. In the adjusted analysis, patients in the continuous cardiac monitoring group had greater odds of being diagnosed with AF (OR=5.29; 95% CI 2.43 to 11.55). The odds of detection were greatest within the first 24 hours (OR=9.82; 95% CI 3.01 to 32.07).
Douen et al. 2008 **Canada** **Prospective cohort study**	NA	144 patients with acute ischemic stroke were included (143 patients had serial ECGs completed; 126 patients had Holter monitoring).	Rates of AF detection were compared between the use of serial ECGs (up to 72 hours after admission) and a Holter monitor in an inpatient stroke unit setting.	**Primary outcome**: Detection of AF	No statistically significant difference in detection of AF was found between Holter and serial ECG monitoring (p=0.25). AF was identified in 15 new patients using serial ECG compared to baseline; a statistically significantly greater rate of diagnosis compared to baseline ECG findings (p=0.001). AF was identified in 9 new patients from baseline assessment using a Holter monitor. Together, serial ECG's and Holter monitoring identified 18 new cases of AF after baseline ECG assessment. The majority of these cases were identified within 72 hours (83%).
Liao et al. 2007 **Canada** **Systematic**	NA	5 prospective cohort studies (n=736) including patients without a previous diagnosis of atrial fibrillation (AF), who were	Evaluation of forms of non-invasive cardiac monitoring.	**Primary outcome**: Detection of AF	No RCTs were identified in the review. Cardiac monitoring was initiated at variable time points, but ranged between admission to a ward, and 55 days after admission to hospital.

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Review		diagnosed with ischemic stroke or TIA, and received cardiac monitoring for at least 12 hours.			All cardiac monitoring involved the use of a Holter monitor. Some studies also used an event loop recorder. **Detection of AF**: Combined detection of AF in 4.6% (95% CI 0% to 12.7%) of patients. The use of a Holter monitor for variable durations following acute stroke (ischemic or hemorrhagic) appear to identify new cases of atrial fibrillation or atrial flutter even months following stroke.
ii) Use of Transesophageal Echocardiography					
Marino et al. 2016 **USA** **Retrospective study**	NA	263 patients ≥50 years, consecutively admitted over a 4-year period (2009-2012) to a single institution with acute ischemic stroke, with a normal transthoracic echocardiogram (TTE), were included. Patients with pre-existing atrial fibrillation/flutter or those taking anticoagulants, were excluded. Mean age was 66.7 years, 42.5% were female.	All patients underwent transesophageal echocardiography (TEE), to detect potential sources of stroke etiology.	Cardiac abnormalities	Overall, 42.6% of patients had a TEE finding which could explain the etiology of stroke/TIA One patient (0.4%) had a finding that changed therapy. TEE findings: Atrial septal aneurysm 25 (5.3%) Patent foramen ovale 18 (2.7%) Atrial septal aneurysm and PFO 11 (4.2%) Complex aortic plaque 44 (16.7%) Spontaneous contrast 13 (4.9%) Left atrial appendage thrombus* 1 (0.4%) Total 112 (42.6%) At 6 months, follow-up was available for 85 patients, during which time 13 (15%) had developed AF.
Katsanos et al. 2015 **Greece** **Systematic review & meta-analysis**	NA	35 studies including 5,772 participants with cryptogenic ischemic stroke or TIA who had undergone TEE investigations. Mean age was 54 years, 57% were male.	Cardiac conditions known to be associated with cerebral ischemia were identified using ASCOD criteria, including atherosclerosis, small-vessel disease, cardiac pathology, other causes and dissection	Prevalence of cardioembolic causes	The most common TEE findings were: Atheromatosis in the ascending aorta/aortic arch (51.2%) PFO (43.2%) Complex aortic plaques (14%) Large PFO (19.5%) Atrial septal aneurysm (12.3%) ASA +PFO (14.5%)

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					Conditions associated with cryptogenic ischemia were low including left atrial thrombus (3.0%), spontaneous echo contrast (3.8%) and intracardiac tumors (0.2%).
McGrath et al. 2014 **Ireland/Canada** **Systematic review**	NA	27 studies (n=5,653) including patients who had transthoracic echocardiogram (TTE), following cryptogenic ischemic stroke, following routine investigations	TEE findings of interest (atrial septal aneurysm, ASA, patent foramen ovale PFO, left atrial thrombus, spontaneous echo contrast (SEC) and aortic arch), were grouped by age (< 55 and ≥ 55 years)	**Primary outcome:** TEE cardiac findings **Secondary outcomes:** Initiation of anticoagulation following TEE	There was significant heterogeneity among studies, with wide ranges of prevalences of cardiac disorders. Standardized definitions/criteria of cardiac abnormalities were not provided in many studies **PFO Prevalence** <55 years: 35.0%, 95% CI 28.1-42.5% (16 studies) ≥55 years: 19.3%, 95% CI 15.1-24.2% (17 studies) **ASA Prevalence** <55 years: 12.9%, 95% CI 7.4%-21.3% (11 studies) ≥55 years: 11.2%, 95% CI 8.4%-14.8% (16 studies) **Prevalence of left atrial thrombus** <55 years: 2.5%, 95% CI 0.9%-7.0% (7 studies) ≥55 years: 4.0%, 95% CI 2.1%-7.4% (15 studies) **Prevalence of SEC** <55 years: 4.5%, 95% CI 2.1%-9.3% (7 studies) ≥55 years: 6.9%, 95% CI 4.3%-10.7%, (15 studies) **Prevalence of aortic atheroma** <55 years: (3.5%, 95% CI 1.5%-7.9% (6 studies) ≥55 years: 18.6%, 95% CI 14.1%-24.3% (13 studies) The proportion of patients who were initiated on oral anticoagulant therapy following the results of TEE, was 0%, 2.3%, 6.0%, 11.0%, and 30.7% (5

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					studies)
Zhang et al. 2012 **USA** **Retrospective study**	NA	186 patients admitted consecutively with ischemic stroke or TIA to a single stroke unit, previously undiagnosed with AF. Mean age was 62.9 years, 53% male.	All patients received a transthoracic echocardiography (TTE) within 48 hours of symptom onset. 30 patients also received a transthoracic echocardiography (TEE) at the discretion of the treating physician, 28 of which were conducted within 2-7 days of symptom onset.	**Primary outcome:** Identification of high and medium risk sources of cardiogenic emboli **Secondary outcomes:** Patterns of TEE use	Abnormal results were found in 35 (18.8%) of patients with TTEs and in 9 patients who had also received TEEs. TEEs did not identify additional major sources of cardiogenic embolism in any patient with a normal TTE but did clarify the type of atrial defect present in 3 patients. Of the 151 patients with a normal TTE, 21 also received a TEE. Of these patients, 9 had abnormal findings. TEEs did not identify additional major sources of cardiogenic embolism in any patient with a normal TTE but did detect intraarterial septal abnormality in 7 patients. Based on TTE results, patient management was changed in 10.8% of cases (5.4% long-term management). Of the 30 patients who received TEE, the results of that test alone changed management in 10 patients (7 long-term management). TEE was used in patients with abnormal TTE results to: confirm TTE findings (n=4), exclude left ventricular thrombus (n=2) and evaluate atrial septal anatomy (n=3). Of the patients with normal TTEs, additional TEEs were performed in: 6 cases of young (cryptogenic) stroke, 9 with ‘‘embolic’’ imaging, 1 case suggestive of complex aortic plaque, 3 cases of illicit drug use and in 2 cases with technically inadequate TTEs.
de Bruijn et al. 2006 **Netherlands** **Prospective study**	NA	231 patients with recent stroke (all types) or TIA were enrolled. 83% of patients were aged ≥ 45 years. Only patients whose stroke etiology remained in questions following initial	All patients had a transesophageal echocardiography (TEE) followed by a transthoracic echocardiography (TTE). Identification of major and	**Outcomes**: Potential and major cardiac sources of embolism	**Prevalence of potential sources of embolism**: A potential cardiac source of embolism was detected in 55% (127/ 231) of the patients. Among all patients, a potential cardiac source was identified in 16% of patients (TTE+, TEE+) and a major risk factor was identified in 3% of patients

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		ECG, ultrasound assessments and blood tests were included.	minor cardiac sources of embolism were compared between the two diagnostic tools. Subgroup analysis also performed separately for patients older than 45 years and younger than 45 years of age.		(TTE+, TEE+). Significantly more abnormalities were identified using TEE Cardiac source: 39% (90/231) where TEE +, TTE- Major risk factor: 16% (38/231) where TEE +, TTE- The detection of possible cardiac sources of embolism was statistically significantly greater using TEE compared to TTE in both age groups (≤45 years; 10/39; P=0.002) (>45 years; 80/192; P<0.004).
Harloff et al. 2006 **Germany** **Prospective study**	NA	503 admitted patients acutely to a single stroke unit following ischemic stroke.	Stroke etiology was determined in 276 cases. In the remaining 227 cases, stroke etiology was unknown following routine diagnostic procedures. Of these, 15 patients had contradictions for oral anticoagulation therapy and did not receive a TEE. The remaining 212 patients received a TEE a median of 2 days following stroke onset. These patients also received a TEE, ECG and in some cases, 24 hrs. Holter monitoring.	**Primary outcome:** Detection of high-risk cardiac sources (aortic thrombus, left atrial cavity/appendage thrombus, spontaneous echo contrast, LAA flow <30cm/sec, aortic atheroma ≥4mm) and potential sources (patent foramen ovale, atrial septal aneurysm, both PFO+ASA)	Among patients who received a TEE, a high-risk cardiac source was identified in 42 patients (19.85), leading to oral anticoagulation therapy in 17 cases (8.1%). An additional 71 patients (33.5%) were identified with a potential risk cardiac source. Of these, 48 patients (22.6%) were discharged on some form of oral anticoagulation therapy.

Venous Thromboembolism Prophylaxis

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
i) Efficacy of Low Molecular Weight Heparin (LMWH) vs. Unfractionated Heparin (UFH) following Acute Ischemic Stroke					
Sandercock et	NA	9 RCTs (n= 3,137)	Treatment contrasts examined	**Primary outcome:**	The odds of DVT occurrence during treatment

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
al. 2017 **UK** **Cochrane review**		including patients with acute ischemic stroke who were randomized within 14 days of stroke onset.	were LMWHs or heparinoids vs. UFH. Four trials compared a heparinoid with UFH and 5 compared LMWH with UFH. The control condition in 8 trials was heparin (5,000U sc, q 8 or 12 hours). Average duration of treatment was 10-12 days.	The incidence of DVT during the treatment period. **Secondary outcomes:** Incidence of PE during follow-up, all-cause mortality during treatment and follow-up, vascular death during follow-up, bleeding events during follow-up. Duration of follow-up was 3 months in all trials except one, in which it was 14 days.	period were lower in the LMWH/heparinoid group (OR=0.55, 95% CI 0.44 -0.70, p<0.0001). Results from 7 trials included. There was no difference between groups in the odds of death during the treatment period (OR= 1.06, 95% CI 0.78- 1.46, p=0.70) or follow-up (OR= 0.98, 95% CI 0.79-1.23, p=0.89). Results from 8 trials included. There was no difference between groups in the odds of any ICH/hemorrhagic transformation during treatment (OR= 0.75, 95% CI 0.46- 1.23, p=0.25). Results from 9 trials included. There was no difference between groups in the odds of PE during follow-up (OR= 0.57, 95% CI 0.23- 1.41, p=0.23). Results from 6 trials included. The odds of major extracranial hemorrhage were higher in the UHF group (OR= 3.79, 95% CI 1.30-11.06, p=0.015). Results from 7 trials included.
Lederle et al. 2011 **USA** **Systematic Review & Meta-analysis**	N/A	A subset of 19 trials, which included patients with acute stroke were identified from the total pool of 40 trials. The trials evaluated treatments for the prophylaxis of VTE for all medical patients. Eligibility criteria for most trials included high risk for DVT. The mean age of patients in most of the studies was >70 years. Patients with definitive indications/contra-indications were	Treatment contrasts examined were: i) heparin vs. placebo (n=8), ii) LMWH vs. UFH (n=5) and iii) mechanical vs. no mechanical prophylaxis (n=3). Treatment periods ranged from 6-14 days for pharmacological trials and 10 & 30 days for mechanical devices. (treatment period not specified in third trial)	**Primary outcomes:** Incidence of DVT, DVT, PE, bleeding events. Outcomes were assessed at points ranging from 10 days to 6 months.	All results include only trials restricted to diagnosis of stroke. Heparin vs. no heparin: There were no significant differences between groups for any of the outcomes except an increase in the incidence of bleeding events associated with heparin use. Death: OR=0.91, 95% CI 0.70-1.18. Results from 9 trials included. Symptomatic DVT: OR=0.14, 95% CI 0.0-7.09. Results from a single trial included. Fatal PE: OR=1.25, 95% CI 0.74-2.09. Results from 2 trials included. Major bleeding events: OR=1.66, 95% CI 1.20-2.28. Results from 8 trials included. LMWH vs. UFH

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		excluded.			There were no significant differences between groups on any of the outcomes. Death: OR=1.00, 95% CI 0.81-1.22. Results from 5 trials included. Symptomatic DVT: OR=0.34, 95% CI 0.11-1.00. Results from 2 trials included. Fatal PE: OR=1.25, 95% CI 0.74-2.09. Results from 2 trials included. Major bleeding events: OR=1.49, 95% CI 0.73-3.06. Results from 5 trials included. Mechanical vs. no mechanical Death: OR=1.13, 95% CI 0.89-1.13. Results from 3 trials included. PE: OR=0.65, 95% CI 0.33-1.31. Results from 2 trials included. Skin damage: Use of mechanical devices was associated with an increase in skin breakdown. OR=4.02, 95% CI 2.34-6.91. Results from a single trial included.
Sherman et al. 2007 **USA** **RCT (PREVAIL)** **Pineo et al. 2011** **Canada** **Economic Analysis**	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☒	1,762 patients who had experienced an ischemic stroke within the previous 48 hours and who were immobile with NIHSS motor scores of ≥2 (leg).	Patients were randomized to receive 40 mg enoxaparin subcutaneously once daily (n=877) or 5000U UFH q12 hours (n=872) with UFH, for 10 days.	**Primary outcome:** Cumulative incidence of VTE including symptomatic or asymptomatic DVT or symptomatic or fatal PE during the study treatment (up to day 14). **Secondary outcomes:** Incidence of symptomatic VTE or PE at 30, 60, and 90 days from randomization, stroke recurrence (up to 90 days), stroke progression during the study treatment period (≥4 points in NIHSS score), NIHSS and mRS scores up to 90 days after treatment.	Mean duration of treatment was 10.5 days. The incidence of all VTE at 14 days was lower among patients receiving enoxaparin (10% vs. 18%, RR= 0.57, 95% CI 0.44 to 0.76, p<0.0001). The incidences of all proximal and distal DVT at 14 days were lower among patients receiving enoxaparin (5% vs. 10%, RR= 0.47, 95% CI 0.31 to 0.72, p=0.0003) and 7% vs. 13%, RR= 0.52, 95% CI 0.37 to 0.74, p=0.0002, respectively). There were no differences between groups in the incidence of symptomatic DVT or PE at 14 days (DVT: <1% vs. 1%, RR=0.29, 95% CI 0.06-1.38, p=0.096; PE: <1% vs. 1%, RR= 0.29, 95% CI 0.02-1.39, p=0.059). The protective effects were maintained at day 30, 60 and 90, p<0.0001. There were no significant differences between

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
				Safety outcomes: All bleeding events, thrombocytopenia, adverse events	groups in any of the bleeding outcomes: total bleeding events, symptomatic ICH, major extracranial hemorrhage, all-cause mortality at days 14 or 90. No significant interactions were detected in subgroup analysis: time to initiation of prophylaxis, diabetes, obesity, previous stroke, stroke severity (NIHSS score ≥14 vs.< 14), gender or age. **Economic evaluation:** Estimated cost saving associated with use of enoxaparin (over heparin) was USD$1,096/patient.
Diener et al. 2006 **Germany** **RCT (non-inferiority)** ***PROphylaxis of Thromboembolic Events by Certoparin Trial (PROTECT)***	CA: ☑ Blinding: Patient ☑ Assessor ☑ ITT: ☑	545 patients aged 18-85 years with a clinical diagnosis of ischemic stroke, who could be treated within 24 hours of symptom onset and who presented with paresis of the leg and a baseline NIHSS score of 4-30.	Patients were randomized to certoparin 3000 U anti-Xa sc once daily + 2 placebo injections (n=272) or UFH 5000 tid (n=273). Duration of treatment was 12-16 days.	**Primary outcome:** Composite outcome of symptomatic or asymptomatic proximal DVT, symptomatic PE, or death related to VTE occurring during treatment period. **Secondary outcomes:** Bleeding complications, mortality at 3 months	The incidence of the primary outcome was similar between groups during the treatment period (certoparin: 6.6% vs. UHF 8.8%). During the treatment period 17 patients in the certoparin group experienced DVT compared with 24 in the UFH group (p=0.29). No patient in either group experienced a PE. Bleeding complications were similar between Groups (3.7% vs. 3.7%). At the end of 3 months there was a non-significant increase in mortality in the certoparin group (5.1% vs. 2.9%).
iv) Physical Methods to Prevent DVT					
Naccarato et al. 2010 **UK** **Cochrane review**	NA	4 RCTs (n= 2,792) including patients with ischemic stroke or ICH who were randomized within 7 days of stroke onset. Patients in 3 of the trials were immobile at baseline. Patients in one	Treatment contrasts included thigh-length graduated compression stockings (GCS) vs. no stockings (n=2) and pneumatic compression (IPC) + GCS vs. no IPC +GCS (n=1) and IPC vs. no IPC (n=1). Duration of treatment was 10 days (n=2), not specified (n=1)	**Primary outcomes:** Deaths from any cause, DVT or fatal or non-fatal PE that occurred during the study period. **Secondary outcomes:** Deaths from any cause, DVT or fatal or non-fatal PE that occurred during the	Physical methods (GCS or IPC) were not associated with reductions in death during treatment period (OR= 1.12, 95% CI 0.87-1.45, p=0.38), the incidence of DVT (OR= 0.85, 95% CI 0.70-1.04, p=0.12), or death/DVT (OR= 0.94, 95% CI 0.79-1.11, p=0.48). Results from 4 trials were included. Physical methods were not associated with reductions in symptomatic PE during scheduled

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		of the trials included only those with traumatic or spontaneous ICH with or without SAH	and continued until death/discharge/mobile/refused (n=1)	follow-up period, adverse events.	treatment period (OR=0.94, 95% CI 0.79-1.11, p=0.23). Results from a single study included. Pooled analyses of secondary outcomes were not performed.
Dennis et al. 2009 **UK** **RCT** ***Clots in Legs Or sTockings after Stroke (CLOTS) I***	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☑	2,518 patients, admitted to hospital within 1 week of acute ischemic stroke or ICH and who were immobile were enrolled from 64 centres in the UK, Italy, and Australia	Patients were randomized to either routine care plus thigh-length GCS (n=1,256) or to routine care plus avoidance of GCS (n=1262). Patients wore the garments day and night until they became mobile, were discharged, or there were concerns with skin breakdown.	**Primary outcome:** Symptomatic or asymptomatic DVT detected by Doppler u/s in the popliteal or femoral veins within 30 days of randomization **Secondary outcomes:** Death, any DVT, PE, complications and compliance with treatment (2 scans were performed between days 7-10 and 25-30, when possible)	At 30 days there was no significant difference between groups in the incidence of proximal DVT (GCS 10.0% vs. avoid GCS 10.5%). GCS was associated with a non-significant absolute reduction in risk of 0.5% (95% CI -1.9% to 2.9%). There were no significant differences between groups on any of the secondary outcome. The incidence of any DVT or PE was non-significantly lower in the GCS group (17.0% vs.18.4%, OR=0.91, 95% CI 0.74-1.11). The odds of skin ulcers or breakdown were significant higher in the GCS group (5.1% vs. 1.3%, OR=4.18, 95% CI 2.40-7.27)
Dennis et al. 2010 **UK** **RCT** ***Clots in Legs Or sTockings after Stroke (CLOTS) 2***	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☑	3,114 patients, admitted to hospital within 1 week of acute ischemic stroke or ICH and who were immobile, were recruited from 112 centres. 100 additional patients were included in CLOTS Lite in which a single scan was performed at 7-10 days.	Patients were randomized to wear thigh-length stockings (n=1,552) or below-knee stockings (n=1,562) while they were in the hospital, in addition to routine care, which could have included early mobilization, hydration, and/or the use of anticoagulants/antiplatelets. Patients wore the garments day and night until they became mobile, were discharged, or there were concerns with skin breakdown.	**Primary outcome:** Symptomatic or asymptomatic DVT detected by Doppler u/s in the popliteal or femoral veins within 30 days of randomization **Secondary outcomes:** Death, any DVT, PE, complications and compliance with treatment (2 scans were performed between days 7-10 and 25-30, when possible)	At 30 days, there was a significant reduction in the odds of proximal DVT associated with thigh-length GCS (6.3% vs. 8.8%, adj OR=0.69, 95% CI 0.53-0.91, p=0.008). There were no significant differences between groups for the outcomes of death by 30 days, symptomatic proximal DVT, symptomatic proximal or distal DVT, any DVT, PE or any DVT or PE. The odds of asymptomatic DVT were lower in the thigh length GCS group (3.2% vs. 4.8%, adj OR=0.64, 95% CI 0.44-0.93, p=0.02). The odds of any skin breakdown were significant higher in the thigh-length GCS group 9.0% vs. 6.9%, OR=1.33, 95% CI 1.031.73, p=0.03).
Dennis et al. 2013	CA: ☑	2,876 patients admitted to 105 hospitals in the	Patients were randomized to wear thigh length intermittent	**Primary outcome:** Symptomatic or	Mean duration of IPC use was 12.5 days. 100%

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
UK **RCT** ***Clots in Legs Or sTockings after Stroke (CLOTS) 3***	Blinding: Patient ☒ Assessor ☑ ITT: ☑ (Primary outcome)	UK within 3 days of acute stroke, who were immobile.	pneumatic compression (IPC) device (n=1,438) or to no IPC (n=1,438) at all times except for washing and therapy, for a minimum of 30 days, or until the patient became mobile, was discharged from hospital, or declined to continue to IPC.	asymptomatic DVT detected by Doppler u/s in the popliteal or femoral veins within 30 days of randomization. **Secondary outcomes:** Death, any DVT, PE, complications and compliance with treatment within 30 days (2 scans were performed between days 7-10 and 25-30, when possible) 6-month outcomes: Death from any cause, any symptomatic or asymptomatic DVT or PE.	adherence to treatment was 31% in IPC group. The incidence of proximal DVT within 30 days was lower for IPC group (8.5% vs. 12.1%, OR=0.65, 95% CI 0.51-0.84, p=0.001, ARR=3.6%, 95% CI 1.4%-5.8%). There were no significant differences between groups for the outcomes of: death at 30 days (10.8% vs. 13.1%, p=0.057), symptomatic proximal DVT (2.7% vs. 3.4%, p=0.269), or PE (2.0% vs. 2.4%, p=0.453). The incidence of any DVT (symptomatic, asymptomatic, proximal or calf) was significantly lower for IPC group (16.2% vs. 21.1%, OR=0.72, 95% CI 0.60-0.87, p=0.001). The incidence of any DVT, death or PE was significantly lower for IPC group (27.2% vs. 34.1%, OR=0.72, 95% CI 0.61-0.84, p<0.0001). Skin breakdown was more common in IPC group (3.1% vs. 1.4%, OR=2.23, 95% CI 1.31-3.81, p=0.002). At 6 months, the incidence of any DVT remained significantly lower in the IPC group (16.7% vs. 21.7%, OR=0.72, 95% CI 0.60-0.87, p=0.001). The incidence of any DVT, death or PE also remained significantly lower for IPC group (36.6% vs. 43.5%, OR=0.74, 95% CI 0.63-0.86, p<0.0001). There were no significant interactions found in sub-group analyses including: time to initiation of treatment (days), concurrent use of anticoagulants, or antithrombotics, baseline prognosis, baseline risk for DVT, stroke type (ischemic vs. hemorrhagic) or type of sleeve used.

Temperature Management

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
De Ridder et al. 2017 **Netherlands** **RCT** ***Paracetamol (Acetaminophen) in Stroke 2 (PAIS 2)***	CA: ☑ Blinding: Patient ☑ Assessor ☑ ITT: ☑	256 patients ≥18 years, recruited from 12 sites, with ischemic or hemorrhagic stroke, temp of ≥ 36.5º C, treated within 12 hours of symptom onset. Mean age was 69 years, 56% were male. Median NIHSS score was 5.5.	Patients were randomized to receive high-dose paracetamol (6 grams, n=136) or placebo (n=118) for 3 days.	**Primary outcome:** Shift in distribution of mRS scores at day 90. **Secondary outcomes:** Favourable outcome (mRS 0-2), Barthel index, Telephone Interview for Cognitive Status score, and Euroqol 5D at 3 months, body temperature and markers of inflammation at 24 h after start of treatment	Recruitment was stopped early due to lack of funding. Sample size of 1,500 patients was planned. There was no significant shift in mRS scores at 90 days associated with paracetamol (common adj OR=1.15, 95% CI 0.74-1.79) The odds of a favourable outcome or a BI score >100 at 90 days were not significantly increased with paracetamol (adj OR=1.01, 95% CI 0.55-1.78 and adj OR=1.02, 95% CI 0.58-1.80, respectively).
Frank et al. 2013 **Germany** **Retrospective study**	NA	6,015 ischemic stroke patients who were registered in Virtual International Stroke Trials Archive (VISTA) and who had received paracetamol for the treatment of pain or fever. Patients who were started on paracetamol 1 day before the diagnosis of pneumonia were excluded. Mean age was 69 years.	Patients who received paracetamol for the management of pain (n=1626) or fever (n=809) were compared to those who had not received the medication.	**Primary outcome:** Distribution of mRS scores at day 90. **Secondary outcomes:** Pneumonia and pneumonia-related mortality, death within 30 days of admission.	The median daily dose of paracetamol was 650 mg. In patients treated with paracetamol for fever or pain, there was no difference in the distribution of mRS scores at 90 days, compared with patients who did not receive treatment. In this same group, the odds of pneumonia were significantly reduced (OR=0.73, 95% CI 0.56-0.94, p=0.017). Among patients without pain or fever who were treated with paracetamol, the odds of poor outcome were increased (mortality at 90 days: OR=1.59, 95% CI 1.13-2.23, p=0.008, mRS score 0-2: OR=0.55, 95% CI 0.41-0.74, p<0.001 and recurrent stroke within 7 days: OR=3.57, 95% CI 1.37-9.32, p=0.009).
Kallmunzer et al. 2011 **Germany** **Controlled trial**	NA	77 patients with acute cerebral ischemia, hemorrhage or sinus thrombosis who experienced a body temperature ≥37.5ºC during the first 6 days of	The use of a 4-step standardized antipyretic procedure, was examined by comparing the results with a historic control group that underwent conventional treatment.	**Primary outcome:** Course of body temperature, duration of fever and achievement of normothermia.	Indications for antipyretic treatment occurred 251 times. Treatments used were paracetamol (n = 219), metamizole (n = 71), calf packing (n = 24), cooled saline (n=9). The use of all sequential elements of the protocol resulted in significantly reduced temps (p<0.002) with the exception of cooled saline (p=0.062). Concomitant antibiotics

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		admission. Mean age 70 years, 58% female. Median baseline NIHSS score was 6.5. The control group consisted of 77 patients admitted to the same unit one year previously who had developed a fever ≥37.5ºC within the first 6 days of admission and were treated without adherence to a standardized protocol	The protocol included sequential administration of 1g paracetamol, 1g metamizole, calf packing (if patient was non-responsive to medications), and 500 ml cooled saline (0.9% NaCl), infused over 30 minutes, if patients was not responsive to prior therapies.		were used in 74% of cases. Compared to the control group, the overall duration of body temperature ≥37.5ºC was significantly shorter in the study group during the first 4 days after admission (p≤0.001). Normothermia was achieved in more than 90% of cases within 120 minutes and 100% of patients within 30 minutes following initiation of the protocol.
Middleton et al. 2011, 2017 **Australia** **Cluster RCT** ***Quality in Acute Stroke Care (QASC)***	CA: ☑ Blinding: Patient ☑ Assessor ☑ ITT: ☑	19 large tertiary care facilities with acute stroke units. Patients were eligible if they had been admitted to one of these facilities with a diagnosis of stroke (ischemic or hemorrhagic) within 48 hours. Age was evenly distributed among 3 groups, age 65 to 85. 60% male. 41% mild stroke.	4,198 patients were randomized to receive care at institutions that had adopted nursing protocols to identify and manage 3 complications-hyperglycemia, fever and swallowing dysfunction or to a control facility. Clinicians at the participating control institutions received abridged guidelines only. The protocol for monitoring/management of temperature control included: temperature monitored and charted every 4 hours after admission to the acute stroke unit for the first 72 hours. Temperatures ≥37.5°C were treated with paracetamol (intravenous, per rectum, or oral), unless clinically contraindicated.	**Primary outcome:** Death or dependency at 90 days (mRS score of ≥2), BI, SF-36 (mental component summary score), physical component summary score. **Secondary outcomes:** Mean temperature for first 72 hours, proportion of swallowing screenings completed within the first 24 hours of admission, pneumonia diagnosis, LOS.	Intervention was associated with a decreased frequency of death or dependency at 90 days (42% vs. 58%, p=0.002). The % of patients with BI scores ≥95 was non-significantly higher in the intervention group (69% vs. 60%, p=0.07). **Fever outcomes:** Mean temperature of patients in the intervention hospitals was significantly lower compared with control hospitals during the first 72 hours after admission (36.5 vs. 36.6 degrees, p=0.02, absolute difference =0.09, 95% CI 0.04-0.15). Significantly fewer patients at intervention hospitals had at least one temperature ≥37·5ºC in first 72 hours after admission (17% vs. 27%, p<0.001, absolute difference=16.4%, 95% CI 8.3-24.6). **Long-term follow-up (2017)** Median duration of follow-up was 4.1 years. There were 264 (24.5%) deaths during study follow-up, most of which were attributed to cardiovascular disease.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					There were fewer deaths in the intervention group (22.3% vs. 27.3%). In an adjusted analysis (age, sex, marital status, education, and stroke severity (Los Angeles Motor Scale), assignment to the intervention group was associated with a significantly decreased risk of death (HR=0.77; 95% CI, 0.59–0.99, p=0.045).
den Hertog et al. 2009 **Netherlands** **Cochrane review**	NA	8 RCTs (n=423 patients) including patients ≥18 years, within 24 hours of a cerebral infarction or primary intracerebral hemorrhage.	Treatment contrasts evaluated included pharmacological agents (paracetamol vs. placebo, n=3, metamizole vs. placebo, n=1, ibuprofen vs. placebo n=1). Maximum duration of treatment was 5 days. Physical methods included endovascular cooling (n=1), cooling using forced air (n=1) and a cooling blanket (n=1). All control conditions were standard care or absence of treatment condition. Duration of treatment for physical methods ranged from 6-72 hours.	**Primary outcome:** Death and dependency at follow-up of 1-3 months, defined as mRS ≥3. **Secondary outcomes:** Death from all causes, mean body temp 24 hours following treatment	Treatment was not associated with a reduction in the odds of death or dependency at follow-up (OR= 0.92, 95% CI 0.59- 1.42, p=0.69) Treatment was not associated with a reduction in the odds of death at follow-up (OR=0.86, 95% CI 0.48-1.54, p=0.62). Pharmacological treatment significantly reduced temperature at 24 hours following treatment (MD= -0.21° C, 95% CI -0.28, -0.15, p<0.0001).
den Hertog et al. 2009 **Netherlands** **RCT** ***Paracetamol (Acetaminophen) In Stroke (PAIS) trial***	CA: ☑ Blinding: Patient ☑ Assessor ☑ ITT: ☑	1400 patients, previously independent, admitted to one of 60 participating centres with ischemic or hemorrhagic stroke, who were able to receive the study drug within 12 hours of symptom onset. Mean age was 70 years, 56% men.	Patients were randomized to receive 1 g paracetamol, 6x daily for 3 days (n=697) or placebo (n=703).	**Primary outcome:** The odds of improvement beyond expectation at 3 months (changed from unfavourable outcome, defined as mRS score 3-6). **Secondary outcomes:** Improvement of 1 category in mRS score, favourable outcome (mRS ≤2 or≤3 or Barthel Index score of 20),	21 patients assigned to paracetamol and 34 assigned to placebo discontinued treatment within 24 hours. 30% of all patients did not complete the 3-day treatment. Treatment with paracetamol was not associated with improvement beyond expectation (adjusted OR=1.20, 95% CI 0.96-1.50). No evidence of benefit was reported in any of the pre-planned subgroup analyses (stroke type, time to treatment, treatment with alteplase, or baseline body temperature). Treatment with paracetamol was not associated

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
				EuroQol-5D and body temperature. Outcomes were assessed at 14 days and 3 months following enrolment.	with increased odds of a favourable outcome, and did not result in significant differences in QoL. Treatment with paracetamol did significantly lower body temperature by a mean of 0.26 °C, 95% CI 0.18-0.31). Treatment with paracetamol was associated with a decrease in 14-day mortality (OR=0.60, 95% CI 0.36-0.90), with no difference at 3 months (OR=0.90, 95% CI 0.68-1.18).
Dippel et al. 2003 **Netherlands** **RCT** ***effect of Paracetamol (acetaminophen) and Ibuprofen on body temperature in Acute ischemic Stroke PISA***	CA: ☑ Blinding: Patient ☑ Assessor ☑ ITT: ☑	75 patients with acute ischemic stroke, confined to the anterior circulation and a body temperature of 36-39º C, who were able to start treatment within 24 hours of symptom onset. Mean age was 67 years, 65% were male, mean NIHSS score was 14. Mean baseline body temp was 37.2º C	Patients were randomized to receive either 1,000 mg acetaminophen (n=26), 400 mg ibuprofen (n=24), or placebo (n=25), 6x/day for 5 days. Treatment was started within 24 hours from the onset of symptoms.	**Primary outcome:** Body temperature at 24 hours from start of treatment **Secondary outcomes:** Change from baseline temperature at 1 and 5 days from start of treatment, time with elevated body temperature (> 37.0°C) during the first 24 hours and the first five days, and functional outcome at 1 month (assessed using mRS and BI)	Mean changes from baseline body temp during the first 24 hours were: Acetaminophen -0.1°C, Ibuprofen 0.1°C Placebo 0.2 Compared with placebo, treatment with acetaminophen resulted in a 0.3°C (95% CI: 0.0 to 0.6°C) larger reduction in body temperature in the first 24 hours. Only about half of the patients were still taking treatment at day 5. There were no significant differences between groups in any of the secondary outcomes.
Kasner et al. 2002 **USA** **RCT**	CA: ☑ Blinding: Patient ☑ ☒ Assessor ☑☒ (open label at 1 site) ITT: ☒	39 patients admitted to one of two centres following acute ischemic or hemorrhagic stroke, within 24 hours of symptoms onset, NIHSS score ≥5, admission body temp <38.5°C, and admission WBC< 12.6 x 10^3 cells/mm^3. Mean age was 68 years, 41% male, mean NIHSS score 12.5.	Patients were randomized to receive either acetaminophen 650 mg (n=20) or a placebo (n=19) every 4 hours for the initial 24 hours after admission (total of 7 doses, 4550 mg).	**Primary outcome:** The difference in mean core body temperature (CBT) between groups during the first 24 hours. **Secondary outcomes:** The proportion of time spent hyperthermic (>37.5°C) and time spent hypothermic (<36.5°C),	Mean baseline temps were similar between groups (36.96 vs. 46.95, p=0.96). During the study period, CBT was non-significantly lower in the acetaminophen group (37.13°C vs. 37.35°C). Mean difference between groups was 0.22°C, 95% CI 0.08°C to 0.51°C, p=0.14). The effect of acetaminophen did not differ significantly by stroke type. 13 patients in each group had ≥1 hyperthermic

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					episode. The odds of hyperthermia/hypothermia associated with acetaminophen treatment were non-significantly decreased/increased, respectively (OR=0.52, 95% CI 0.19-1.44, p=0.22 and OR=3.4, 95% CI 0.83-14.2, p=0.09).
Body Temperature Cooling					
Oversen et al. 2013 **Denmark** **RCT** ***COOLAID***	CA: ☑ Blinding: Patient ☒ Assessor ☒ ITT: ☒	31 patients admitted to one of two stroke units with acute ischemic stroke within 24 hours of onset of symptoms, with NIHSS scores 6-17. 14 patients were treated with rtPA but did not show signs of improvement at 3 hrs. Mean age was 64 years.	Patients were randomized to receive therapeutic hypothermia (TH) in the ICU (n=17) using endovascular or surface methods, or standard supportive care in the stroke unit (n=14). Patients in the TH group had body temperature lowered to 33 degrees C and maintained for 24 hours. Patients in the standard care group received acetaminophen if body temp exceeded 37.5 degrees C.	**Primary outcome:** Adverse events (AE) and serious AEs within 30 days of treatment. **Secondary outcomes:** Functional outcome	Patients in the TH group had significantly more episodes of bradycardia (11 vs. 0, p<0.0001). There were no significant differences between groups in other cardiac AEs (atrial fibrillation, hypotensive episodes, MI or DVT), pulmonary AEs (pneumonia, pneumothorax, sinusitis, respiratory failure or acidosis), Hemorrhagic AEs or death. Mean duration of hospital stay was 25 days for patients in TH group and 22.5 days for patients in control group. There were no differences between groups in median baseline NIHHS scores, or at 48 hours, 7 and 90 days. There was no significant difference in median mRS score at 90 days (3 vs. 1.5, p=0.15)
Harris et al. 2012 **UK** **Health Technology Assessment**	NA	High-quality RCTs examining the use of any form of non-invasive head cooling in adults following TBI or stroke of any severity, and following cardiac arrest, were sought. 46 studies were identified, none of which were considered to be of high quality.	Of the studies identified, 2 studies included patients with stroke were included. COOL BRAIN-stroke trial, (Wang et al. 2004) and Giada et al. 2008, (abstract). In the COOL-Brain trial (n=14), the active treatment condition was head and neck cooling with water-circulating cooling helmet vs. standard care. Target temperatures were > 33 °C and > 35 °C if age > 45 years. The second	**Primary outcomes:** Intracranial temperature, All-cause mortality by end of follow-up, functional outcome **Secondary outcomes:** Reduction in ICP, Improvement in biochemical markers of injury, adverse events	12 studies reported on the effect of head cooling on intracranial and/or core trunk temperature. Within this group, 99 patients with stroke/TBI were included. The most effective techniques for which there were adequate data (nasal coolant and liquid cooling helmets) indicated that intracranial temperature could be reduced by 1 °C in 1 hour. No studies that included stroke/TBI patients assessed functional outcome.

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			study included 6 patients recovering from aneurysmal SAH who received standard treatment for elevated temps consisting of paracetamol, metamizole, alcohol washing, and ice packs plus head and neck cooling. Duration of treatment was 6 hours.		
Lakhan & Pamplona 2012 **USA** **Systematic review & meta-analysis**	NA	17 studies, (4 observational studies and 13 clinical trials). Patients included in these studies were admitted acutely to hospital with ischemic and hemorrhagic stroke and intracranial aneurysm. Patients in 2 trials underwent hemicraniectomy.	4 observational trials examined the relationship between body temperature and mortality following stroke. There were 5 single group intervention studies (no control). There were 8 controlled trials (3 RCTs). In these studies, mild hypothermia was induced using external cooling (n=3), endovascular devices (n=3), or both (n=2).	**Primary outcomes:** Mortality, stroke severity (assessed using NIHSS or mRS). Timing of outcome not stated.	There was no significant difference in stroke severity associated with hypothermia treatment (SMD=-0.17, 955 CI -0.42-0.08, p=0.19). Hypothermia was not associated with a reduced risk of death (RR=1.6, 95% CI 0.93-2.78, p=0.09).

Early Mobilization

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Langhorne et al. 2018 **UK** **Cochrane review**	3 trials were deemed to be at low risk of bias. The remainder were at high or unclear	9 RCTs (n= 2,958), including participants who had sustained an acute stroke and could be mobilized within 48 hours. Median age was 68 years, 52% were men.	Trials that started out-of-bed mobilization within 48 hours of stroke, and aimed to reduce time-to-first mobilization, with or without an increase in the amount or frequency (or both) of mobilization activities (VEM	**Primary outcome:** Death or poor outcome (dependency or institutionalization) at the end of follow up. **Secondary outcomes:**	The median delay to starting mobilization after stroke onset was 18.5 hours in the VEM group and 33.3 hours in the usual care group. The median difference within trials was 12.7 hours. There were no significant differences in the odds of primary outcome at 3 months between groups

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
	risk of bias.	Baseline stroke severity was moderate in most trials. A median of 12% had ICH.	group), were compared with usual care, where time-to-first mobilization was commenced later. Trials included SEVEL, AVERT (phases II and III), Langhorne 2010, Chippala & Sharma 2016, Morreale et al. 2016, Poletto 2015, and AKEMIS et al. 2014	Death, dependency, institutionalization, activities of daily living (ADL), extended ADL, quality of life, walking ability, complications (e.g. DVT), patient mood, and length of hospital stay	(51% vs. 49%; OR= 1.08, 95% CI 0.92 to 1.26, p = 0.36), or the odds of death (7% vs. 8.5%; OR=1.27, 95% CI 0.95 to 1.70; p = 0.11). Mean 20-point Barthel Index was significantly higher in the VEM group (MD= 1.94, 95% CI 0.75 to 3.13, p = 0.001). Mean length of stay was significantly shorter in the VEM group (MD= -1.44, 95% CI -2.28 to - 0.60, p = 0.0008).
Li et al. 2018 **China** **Systematic review & meta-analysis**	NA	6 RCTs including patients admitted to hospital following acute ischemic or hemorrhagic stroke	Trials compared early mobilization (within 24 hours of stroke) vs. usual care. Trials included SEVEL, AVERT (phases II and III), Chippala & Sharma 2016, and Sundseth et al. 2014, all described below)	**Primary outcomes:** mRS (0-2), mortality at 3 months **Secondary outcomes:** Barthel Index (BI) scores at 3 months, LOS	There was no significant difference between groups in the proportion of patients with mRS score of 0-2 at 3 months (RR=0.80, 95% CI 0.58-1.02). The results from 5 trials were included (n=1,646). Early mobilization was not associated with an increased risk of mortality (RR=1.21, 95% CI 0.76-1.75). The results from 4 trials were included. Early mobilization was associated with higher BI scores at 3 months (SMD=0.66, 95% CI 0.0-1.31). The results from 4 trials were included (n=285). Early mobilization was associated with a significantly reduced LOS (WMD=-1.97, 95% CI -2.63 to -1.32). The results from 3 trials were included (n=236).
Chippala & Sharma 2016 **India** **RCT**	CA: ☑ Blinding: Patient:☒ assessor ☑ ITT:☒	86 patients ≥18 years with acute onset of ischemic stroke who were able to react to verbal commands, had SBP 120-180 mm Hg, oxygen saturation >92%, a heart rate of 40-100 bpm and temperature <38.5°C. Mean age was 60 years, 53% were male. 52% of patients	Within 24 hours of stroke onset, patients were randomized 1:1 to either the Very Early Mobilization group or a standard care group for 7 days or until discharge. The treatment protocol for the Early mobilization group was similar to the AVERT protocol. Patients were out of bed within 24 hours, and received passive and active mobilization. Patients in the	**Primary outcome:** Barthel Index (BI) at day 7 and 3 months **Secondary outcomes:** LOS	The were 6 losses to follow-up (3 in each group). Median BI scores at baseline, discharge and 3 months were: 50, 85 and 90 (intervention) and 52.5, 70 and 75 (control). There was significantly greater improvement in median BI scores from admission to discharge (p<0.001) and from admission to 3-months in the intervention group (p<0.001) Median LOS was significantly shorter in the early

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		had moderately disabling strokes (NIHSS 8-16).	standard care groups received routine stroke unit care.		mobilization group (8 vs. 10, p<0.001.
Herisson et al. 2016 **France** **RCT** ***Stroke and Early VErticaL positioning (SEVEL)***	CA: ☑ Blinding: Patient:☒ assessor ☒ ITT: ☒	167 patients ≥18 years with acute onset of ischemic stroke were recruited from 11 centres. Patients with severe stroke (NIHSS ≥22 were excluded). Mean ages were 68.1 (early group), 71.2 years (progressive group). Mean NIHSS scores were 7.2 (early) and 7.8 (progressive).	Patients were randomized 1:1 to early and progressive sitting arms. Patients in the early sitting arm were seated out of bed as soon as possible, within the first day of stroke. Patients in the progressive group sat in bed for days 1-2 post stroke, and then seating out of bed on day 3. For both protocols, minimal duration of the first sitting was 15 minutes in both groups; maximum duration was 60 minutes. Duration of treatment was 7 days, or until discharge.	**Primary outcome:** Favourable outcome (mRS 0-2) at 3 months **Secondary outcomes:** Medical complications, LOS, tolerance at 7 days and 3 months	The study was terminated early due to slow enrollment. There were 24 losses to follow-up (17 early group, 7 progressive group). The percentage of patients with mRS scores of 0-2 at 3 months was similar (76.2% vs. 77.3%, p=0.52). There were no significant differences between groups on any of the secondary outcomes (medical infections: pulmonary infection, UTI, dysphagia, DVT, pressure ulcer). Mean LOS was 9.8 (early) vs. 10.5 (progressive) days, p=0.27. The procedure was well-tolerated in both groups. There were no significant changes in SBP, DBP or heart rate immediately after the procedure, or 5 minutes later.
Bernhardt et al. 2015, 2016, 2021 **Australia** **RCT** ***A Very Early Rehabilitation Trial for stroke (AVERT III)***	CA: ☑ Blinding: Patient:☒ assessor ☑ ITT: ☑	2,104 patients ≥18 years, recruited from 56 stroke units, located in 5 countries, within 24 hours of ischemic or hemorrhagic stroke without pre-morbid disability. Mean age was 72 years, 55% of patients were admitted with mild stroke (NIHSS score 1-7)	Patients were randomized to receive usual care (n=1,050) or early mobilization (n=1,054), a task-specific intervention focused on sitting, standing, and walking activity, initiated within 24 hrs. of stroke onset. Four pre-specified levels of out-of-bed activity were used, depending on functional recovery. The duration of treatment was 14 days, or until discharge from the stroke unit.	**Primary outcome:** Favourable outcome (mRS 0-2) at 3 months **Secondary outcomes:** Shift in distribution of mRS, time to achieve assisted- free walking over 50m, proportion of patients able to walk unassisted at 3 months, death, serious adverse events	**Main Results (2015)** Significantly fewer patients in the very early mobilization group had a favourable outcome (46% vs. 50%; adjusted OR=0.73, 95% CI 0.59-0.90, p=0.004). There was no significant shift in the distribution of mRS between groups (adjusted OR=0.94, 95% CI 0.85-1.03, p=0.193). Significantly more patients in the very early mobilization group were mobilized within 12 and 24 hrs (23% vs. 14% and 92% vs. 59%, respectively). The median time to first mobilization was significant sooner in the early mobilization group (18.5 vs. 22.4 hrs, p<0.0001). Patients in the early

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					mobilization group received significantly more out of bed sessions (median of 6.5 vs. 3, p<0.0001) and more daily therapy (31 vs. 10 min, p<0.0001). The odds of walking for 50 m independently were not significantly increased in the early mobilization group (adjusted OR=1.04, 95% CI 0.94-1.15, p=0.46). The odds of death non-serious adverse events and neurological serious adverse events were not significantly increased in the early mobilization group. **Subgroup analysis (2016)** Regardless of group assignment, keeping time to first mobilization and frequency constant, every extra 5 minutes of out-of-bed activity per day reduced the odds of a favorable outcome (OR=0.94, 95% CI 0.91-0.97, p<0.001) and reduced the odds of walking unassisted for 50 m (OR=0.85, 95% CI 0.81-0.89, p<0.001), after controlling for age and stroke severity. Regardless of group assignment, increasing the frequency of out-of-bed sessions improved the odds of favorable outcome by 13% (OR for each additional session =1.13, 95% CI 1.09-1.18, p <0.001) and improved the odds of walking 50 meters unassisted by 66% (OR for each additional session =1.66, 95% CI 1.53–1.80, p< 0.001), after controlling for age and stroke severity. Increased frequency of out-of-bed sessions also reduced the odds of death and fatal and nonfatal neurological serious adverse events. **Mortality (2021)** By day 14, the risk of mortality was significantly higher in the VEM group (48 vs. 32, OR=1.76, 95%

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					CI 1.06-2.92). Median time from stroke onset to death was 4 (VEM) and 5 (UC) days.
Sundseth et al. 2012 **Norway** **RCT** **Akerhus Early *Mobilization in Stroke Study (AKEMIS)***	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☑	65 patients admitted to a single stroke unit with ischemic stroke or ICH within 24 hours of onset of symptoms were included. Mean age was 77 years, 45% male.	Patients were randomized to a very early mobilization (VEM) group (n=32) or to a control group (n=33). Patients in both groups received standard stroke unit care. Patients in the VEM group were mobilized as soon as possible (within 24 hours post stroke). The control group were mobilized between 24 and 48 hours.	**Primary Outcomes:** Poor outcome at 3 months, defined as mRS score of 3-6. **Secondary Outcomes:** Independence (BI score of ≥18), death and number of complications at 3 months.	The median time to first mobilization from stroke onset was significantly shorter for patients in the VEM group (13.1 vs. 33.3 hours, p<0.001). More patients in the VEM group had poorer outcomes compared with control participants, although this difference was not statistically significant (OR= 2.70, 95% CI: 0.78-9.34; p=0.12). The odds of death or dependency, or dependency at 3 months were not significantly reduced in the VEM group (OR= 5.26, 95% CI: 0.84-32.88; p=0.08; OR= 1.25; 95% CI: 0.36-4.34; p=0.73, respectively). The improvement in mean NIHSS scores from baseline to 3 months was significantly greater for patients in the VEM group (7.2-3.9 vs. 7.5-5.5, p=0.02). The proportion of patients with at least 1 complication within 3 months was the same in the 2 groups (67% vs. 66%, p=0.93).
Diserens et al. 2011 **Switzerland** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☒ ITT: ☒	50 patients with ischemic stroke admitted to a single stroke unit within 12 hours of onset of symptoms, with an NIHSS score >6. Mean age was 71.5 years.	Participants were randomized to either an “early mobilization” group (n=25) in which they were mobilized out of bed after 52 hour or “delayed mobilization” group (n=25) where they were mobilized after 7 days.	**Primary Outcomes:** Severe complications during hospitalization (i.e. complications having vital consequences). **Secondary Outcome:** Minor complications, differences in neurological deficits, and modifications in	8 patients in the delayed group were transferred to other hospitals and were not included in the analysis. There were significantly fewer severe complications among patients in the early mobilization group: 2/25 (8%) vs. 8/17 (47%) in the delayed mobilization group (p < 0.006). No significant differences were found in the numbers of minor complications, neurological deficits, or blood flow modifications.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
				cerebral blood flow.	
Bernhardt et al. 2008, Sorbello et al. 2009, Cumming et al. 2011 **Australia** **RCT** ***A Very Early Rehabilitation Trial for stroke (AVERT II)***	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☑	71 patients with stroke admitted to hospital within 24 hours of symptom onset, who could react to verbal commands and who were independent in ADL prior to stroke. Mean age was 75 years, 46% male.	Participants were randomized to receive either very early and frequent mobilization (upright, out of bed, activity – 2x/day, for 6 days a week until discharge beginning within 24 hours of stroke (n=38), or usual multi-disciplinary stroke team care (n=33).	**Primary Outcomes:** Safety (deaths at 3 months) and feasibility (significant difference in dose of mobilization) **Secondary outcomes:** Serious adverse events at 3 months, good outcome (mRS score of 0-2) at 3, 6 and 12 months, number of days from stroke to return to unassisted walking (50 meters), functional outcome at 3 months, motor impairment at 3 and 12 months.	*Main results* There was a non-significant increase in the number of patient deaths in the early mobilization vs. delayed mobilization group at 3 months (21% vs. 9%, absolute risk difference = 12.0%, 95% CI, 4.3% to 28.2%, p=0.20). After adjusting for age, baseline NIHSS score and premorbid mRS score, the odds of experiencing a good outcome were significantly higher at 12 months for the VEM group (OR= 8.15, 95% CI 1.61-41.2, p<0.01), although not at 3 or 6 months. *Complications (Sorbello et al. 2009)* There were no differences in the total number of complications, severe complications or stroke-related complications between groups. Patients in the control group experienced a total of 91 complications while patients in the VEM group experienced 87. *Further analysis (Cumming et al. 2011)* Patients in the VEM group returned to walking significantly sooner (Median of 3.5 vs. 7 days, p=0.032). There were no differences in proportions of patients who were independent on the BI (score of 20) or who had achieved a good outcome on the Rivermead Motor Assessment Scale (score of 10-13) at either 3 or 12 months. VEM group assignment was a significant, independent predictor of independence on the BI at 3 months, but not at 6 months. VEM group assignment was a significant, independent predictor of good outcome on RMA at both 3 and 12 months.
Craig et al. 2010	NA	103 patients included in	In both studies, patients were	**Primary Outcome:**	The median time to first mobilization in AVERT was

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UK **Systematic Review & meta-Analysis**		the AVERT (n=71) and VERITAS (n=32) trials. The baseline characteristics of patients in both trials were similar. Participants with severe pre-stroke disability were excluded from both studies.	randomized to early mobilization within 24 hours of stroke onset groups or to standard care. The duration of the intervention in the AVERT study implemented was 14 days, whereas the VERITAS trials lasted 7 days.	Independence at 3 months, defined as mRS score of 0-2. **Secondary Outcome:** Early complications of immobility and independence in ADL s at 3 months (BI score 18-20).	significantly shorter in the VEM group in the AVERT trial, but not in VERITAS (18.1 vs. 30.8 hrs, p<0.001; 27.3 vs. 31.8 hrs, p>0.05). In pooled analysis, median time to first mobilization was shorter in VEM group (21 vs. 31 hrs). The odds of independence (mRS criteria) at 3 months were significantly higher for VEM patients (adjusted OR= 3.11, 95% CI 1.03-9.33). VEM patients were more likely to be independent in ADL at 3 months (adjusted OR= 4.41, 95% CI 1.36-14.32). More standard care patients experienced at least one complication (51%) compared with the treatment group (35.3%). The risk of experiencing immobility related complications was significantly lower in VEM patients (adjusted OR= 0.20, 95%CI 0.10-0.70).

Management of Bowel and Bladder Incontinence

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
i) Methods of assessment of urinary incontinence					
Martin et al. 2006 **UK** **Health Technology Assessment**	NA	121 studies that compared a diagnostic technique with multichannel urodynamics, considered the gold standard for urinary incontinence. Studies included both men and women, most frequently with symptoms	Quantitative comparisons between two or more methods of assessing urinary incontinence were conducted. Diagnostic techniques under study included clinical history, validated scales, pad test	**Primary outcomes:** Sensitivity (SN), specificity (SP)	Only a limited number of studies could be used in pooled analyses. Clinical history for diagnosing urinary incontinence in women: SN= 0.92, SP=0.56. The results from 15 studies were included. Clinical history for diagnosing detrusor over activity in women: SN=0.61, SP=0.87. The results from 8 studies were included.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		of UI. No studies were stroke specific.			
ii) Management of urinary incontinence					
Cruz et al. 2022 **Australia** **Systematic review & meta-analysis**	PEDro scores ranged from 5-8	10 RCTs including 894 persons with post-stroke urinary (n=9) or fecal incontinence (n=1). Mean ages ranged from 38 to 67 years. The ratio of men to women was 6:5. Mean time from stroke onset to treatment ranged from 10 days to >5 years.	Trials compared non-implantable electrical stimulation with sham stimulation, alternative treatments or no treatment. Interventions included TENS (n=6), electroacupuncture (n=4). The frequencies ranged from 10 to 75 Hz for TENS, and 1 to 85 Hz for electroacupuncture. Duration and frequency of therapy ranged from 2-7 x/week provided for 1.4-10 weeks	**Primary outcome:** Incontinence severity measures	Treatment with TENS was associated with significantly greater improvements in urinary incontinence measures (SMD=-1.99, 95% CI -3.48 to -0.49, n=4 trials). Treatment started <3 months since stroke was associated with greater benefit, as was greater frequency of treatment (>5 sessions/week vs. ≤5).
Thomas et al. 2019 **UK** **Cochrane Review**	One trial was judged to be at low risk of bias. All others were judged to have an unclear risk of bias.	20 RCTs (n=1338) including participants from a mixture of settings, age groups, and phases of stroke recovery. Five trials enrolled only women or men.	Trials comparing usual treatment vs. active treatment included behavioral interventions (n=1), specialized professional input (n=1), complementary medicine (n=5), and physical therapy (n=2). Trials comparing active treatment vs. placebo included physical therapy (n=1) and pharmacotherapy (n=1) Trials comparing active intervention vs. another intervention included behavioral therapy (n=1) and complimentary	**Primary outcome:** Incontinence **Secondary outcomes:** Symptom scores, physical measures, health status	Compared with usual care or no intervention, behavioral interventions resulted in fewer incontinence episodes per 24 hours period (0.2 vs. 1.2; MD= -1.00, 95% CI -2.74 to 0.74. Results of a single trial included) but was not associated with improvements in QoL (SMD= -0.99, 95% CI -2.83 to 0.86). Compared with usual care, complimentary medicine (acupuncture, moxibustion) increases the likelihood of achieving continence after treatment (RR=2.82, 95% CI 1.57 to 5.07. Results from 5 trials included). Compared with usual care, physical therapy (TENS) reduces the number of incontinent episodes (MD= -4.76, 95% CI -8.10 to -1.41. Results from 2 trials included) and improved functional ability based on Barthel Index scores (MD= 8.97, 955 CI 1.27 to 16.68).

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
			therapy (n=1). One trial compared dual interventions vs. one intervention. One trial compared behavioral therapy vs. an attention control.		All other treatment comparisons were associated with very small or non-significant differences between groups. The authors concluded there is insufficient evidence to guide continence care of adults in the rehabilitative phase after stroke.
Thomas et al. 2014 **UK** **RCT (feasibility)** ***Identifying Continence Options after Stroke (ICONS)***	CA: ☑☒ Blinding: Patient ☒ Assessor ☒ ITT: ☑	413 patients ≥18 years, admitted to one of 12 specialized units with urinary incontinence (UI) secondary to stroke. Median age was 79 years, 46% were male, 82% of patients had mRS score of 0-2 prior to stroke	Centres were randomized to participate in a systematic voiding program (SVP; n=4 centres, 164 patients), SVP + supported implementation (n=4 centres, 125 patients) or usual care (n=4 centres, 124 patients)	**Primary outcome:** Urinary continence at 6 and 12 weeks post stroke	At 6 weeks, compared with usual care, the odds of being continent were not significantly increased with SVP (OR=0.94, 95% CI 0.46-1.94) or SVP+ supported implementation (OR=0.62, 95% CI 0.28-1.37). The response rate was 85%. At 12 weeks, compared with usual care, the odds of being continent were not significantly increased with SVP (OR=1.02, 95% CI 0.54-1.93) or SVP+ supported implementation (OR=1.06, 95% CI 0.54-2.09). The response rate was 88%.
Cournan et al. 2012 **USA** **Controlled trial**	NA	70 females with impaired bladder management admitted to a rehabilitation unit following stroke and who had been continent prior to stroke. The mean age was 72 years. Patients were admitted a mean of 12 days following stroke.	The outcomes of patients who had been admitted to the unit prior to the implementation of a standardized bladder management program (n=35) were compared with those admitted following the establishment of the program (n=35) during hospital stay. Bladder management strategies included timed/prompted voiding, bathroom training, and pelvic floor exercises).	**Primary outcome:** Admission and discharge scores of the 2 FIM bladder items.	The average length of stay was 21 days. Women who received the interventions experienced a significantly greater improvement in mean FIM bladder scores (2.83±2.23 vs. 1.6±2.17, p=0.01).
Moon et al. 2012 **South Korea**	CA: ☑ Blinding:	60 patients admitted to a stroke rehabilitation unit following ischemic (n=25)	Patients were randomized to 1 of 3 groups evaluating	**Primary outcome:** Time to first void, first voided volume, voiding method (self-	Indwelling catheters had remained in place prior to removal for an average of 33-41 days.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
RCT	Patient ☒ Assessor ☒ ITT: ☒	or ICH (n=35). Mean age was 63 yrs, 50% male.	indwelling urethral catheter (IUC) clamping prior to removal: no clamping (n=20), and clamping for 4hrs followed by 5 min of urinary drainage, for 24 hrs (n=20) or 72-hrs (n=20).	voiding (SV) or intermittent catheterization (IC) and residual urine volume following first void. **Secondary outcomes:** Symptomatic urinary tract infections (UTI)	There were no significant differences between groups on any of the outcomes. No clamping vs. clamping groups combined Mean time to first void: 308 vs. 273 min, p=0.17 Mean volume of first void: 216 vs. 239 mL, p=0.37 Mean residual volume: 79 vs. 60, p=0.26 Method of first void (SV/IC): 15/5 vs. 24/16, p=0.39 Number of UTIs: 0 vs. 3, p=0.54
Eustice et al 2000 **Australia** **Cochrane Review**	NA	9 RCTs (n= 674), including elderly men and women with urinary incontinence of any etiology. Setting included home (n=1), nursing home (n=7) and not stated (n=1). Patients in some of the studies were cognitively impaired. No studies were specific to stroke.	The treatment comparison under study was prompted voiding vs. no prompted voiding. Duration of treatment varied (10 days-13 weeks).	**Primary outcome:** Urinary symptoms (improvement in wet episode, number of incontinent episodes in 24 hours) and Health status (measures of ADL). Outcomes assessed before and after treatment. Maximum follow-up period was 3 months.	Prompted voiding was associated with a reduction in the number of incontinent episodes in 24 hours (MD= -0.92, 95% CI -1.32 to -0.53, p<0.0001). Results from 2 trials were included. For all other planned outcomes, results were available for 0 or 1 studies.
Chan 1997 **Australia** **Single group evaluation (pre/post-test)**	NA	42 patients admitted to a single acute stroke unit between May and August 1995. 62% female.	Each patient was prescribed an individualized bladder program consisting of bladder scanning, intermittent catheterizations/ post-void residual regimen, non-invasive voiding strategies (e.g., pelvic muscle exercises) and/or drug therapy. The regimen was continued until the post-void urine residual was below 100 ml for three consecutive days	**Primary outcome:** Bladder function was assessed on admission using a 5-point Bladder score, where 1=total urinary retention to 5= residual volume of <100 ml.	37 patients participated in the bladder management program. Average duration of IMC/PVR was 8 days. 84% of all stroke patients achieved urinary continence within the first month of stroke (all females became continent, while 23% of the male patients did not).
iii) Treatment of Fecal Incontinence					
Harari et al.	CA: ☑	146 stroke patients with	Patients were	**Primary outcome:**	The mean number of BMs/week was significantly

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
2004 **UK** **RCT**	Blinding: Patient ☒ Assessor ☒ ITT: ☒	constipation or fecal incontinence (122 community, 24 stroke rehabilitation inpatients). Mean age was 72 years, 41% female. The average time from stroke onset to study entry was 2 years.	randomized to an intervention (n=73) or routine care group (n=73). The intervention consisted of a 1-time nursing assessment (history and rectal examination), followed by patient/carer education (booklet) and provision of diagnostic summary and treatment recommendations.	Number of bowel movements (BM)/week. **Secondary outcomes:** Percentage of BM graded as normal by the patient, episodes of fecal incontinence. Assessments were conducted at 1, 3, 6, and 12 month, using postal prospective 7-day stool diaries.	higher in the intervention group at 1 month (5.5 vs. 4.1, p=0.011) and 6 months (5.2 vs. 3.6, p=0.005). There were no differences between groups on any of the other outcomes, at any of the assessment points. Persons in the intervention group had an average of 5 episodes of FI at 1 and 6 months, compared with 12 and 6 episodes, respectively among persons in the control group.

Dysphagia Screening & Assessment to Prevent Pneumonia & Management

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
i) Increased Risk of Pneumonia Following Stroke					
Ho et al. 2018 **Taiwan** **Retrospective study**	NA	Patients included in a national database, ≥18 years who had been admitted from 2006-2010 for rehabilitation following first-ever stroke.	The outcomes of patients who had dysphagia (identified by the placement of ≥2 NG feeding tubes, n=5,032) were compared with those without dysphagia (n=52,323).	**Primary outcomes:** Readmission to hospital within one year for chest infection (including pneumonia) and mortality at one-year post stroke **Secondary outcomes:** Same as primary, but assessed at 5 years	One-year post stroke: The risks of chest infection and death were significantly higher among the patients with dysphagia (adjusted HR= 1.73, 95% CI 1.61-1.85 and HR=1.61, 95% CI 1.46-1.79, respectively). Five-years post stroke: The risks of chest infection and death were significantly higher among the patients with dysphagia (adjusted HR= 1.53, 95% CI 1.45-1.62 and HR=1.54, 95% CI 1.41-1.68, respectively).
Bray et al. 2017 **UK** **Retrospective study**	NA	63,650 patients included in a nation register, ≥16 years admitted to 199 hospitals, following an acute ischaemic stroke or primary intracerebral haemorrhage, between	The risk of stroke-associated pneumonia in relation to timing of dysphagia screening and comprehensive assessment was examined using multivariable models adjusted for age, sex, stroke	**Primary outcome:** Stroke-associated pneumonia (SAP) **Secondary outcome:** 30-day mortality	55, 838 (87.7%) patients had a dysphagia screen, of which 24,542 (38.6%) proceeded to a comprehensive assessment by a SLP. The overall incidence of SAP was 8.7% (13.8% for patients not screened, 8.0% for patients who were screened and 14.7% for patients who received a

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		2013 and 2014. Median age was 77 years, 50.4% were female, 88.2% of strokes were ischemic	subtype, pre-stroke functional level (mRS), place of stroke (out of hospital vs. inpatient), vascular comorbidity and either NIHSS score or level of consciousness on admission. Timing of screening and assessment was arranged into quartiles.		comprehensive assessment). The median time from admission to dysphagia screening was 2.9 hours. The median time from admission to dysphagia assessment was 22.9 hours. The odds of SAP associated with timing of screening including data from 55,838 patients were: Q1 (0-79 min): OR=1.00 (ref) Q2 (80-176 min): OR=0.92, 95% CI 0.83-1.01, p=0.08 Q3 (177-344 min): OR=0.89, 95% CI 0.81-0.99, p=0.03 Q4 (≥345 min): OR=1.14, 95% CI 1.03-1.24, p=0.008 The odds of SAP associated with timing of dysphagia assessment including data from 24,542 patients were: Q1 (0-369 min): OR=1.00 (ref) Q2 (370-1371 min): OR=1.40, 95% CI 1.22-1.06, p<0.0001 Q3 (1372-2961 min): OR=1.60, 95% CI 1.41-1.84, p<0.0001 Q4 (≥2962 min): OR=2.01, 95% CI 1.76-2.30, p<0.0001 The odds of 30-day mortality, excluding patients dying or who started palliative care in the first 72 hours after admission, were associated with increased delays in dysphagia assessment (Q1: ref, Q2 OR= 1.31, Q3 OR= 1.54, Q$4OR=1.39, all p<0.0001)
Joundi et al. 2017 **Canada**	NA	6,677 patients ≥18 years, included in the Canadian Stroke Registry from 2010-2013 who were	The association between formal dysphagia outcome and stroke outcomes was examined.	**Primary outcome:** In-hospital pneumonia within 30 days of admission, severe	19.2% of patients did not receive a dysphagia screen within 72 hours of admission. Independent predictors of receiving a dysphagia

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Retrospective study		eligible for dysphagia screening within 72 hours of admission following acute ischemic stroke. 78.7% of patients suffered a mild stroke (CNS score >7), 9.5% had moderately severe stroke (CNS 5-7) and 6.3% had a severe stroke (CNS <5)		disability (mRS 4-5) and all-cause mortality at 1 year	screen included older age, admission to specialized units, the presence of weakness, speech difficulties and treatment with thrombolysis. Patients with mild strokes were less likely to be screened compared with those with moderate strokes (adj OR=0.51, 95% CI 0.41-0.64). Of the patients who were screened, 47.8% failed. Compared with patients who passed the screen, those who failed were at significantly higher risk of pneumonia (adj OR=4.71, 95% CI 3.43-6.47), severe disability (adj OR=5.19, 95% CI 4.48-6.02) and death (adj OR=2.42, 95% CI 2.09-2.80)
Masrur et al. 2013 **USA & Canada** **Retrospective study**	NA	Records of 314,007 patients with ischemic stroke admitted to GWTG–Stroke hospitals between April 2003 and March 2009 were reviewed. Median age was 73 years, 48% male. Median NIHSS score was 4.	The outcomes of patients who had received a standardized swallowing screen by any method that was accepted by individual institutions (including bedside or instrumental methods) were compared with those of patients who had not been screened.	**Primary outcome:** The incidence of pneumonia occurring after 48 hours of admission.	216,372 (68.9%) patients were screened for dysphagia, 97,656 (31.1%) were not screened. 17,906 patients (5.7%) developed post-stroke pneumonia. Patients who were screened for dysphagia were more likely to develop pneumonia compared with those who did not develop pneumonia (7.5% vs. 68.5%, p<0.001). Significant predictors of whether a dysphagia screen was completed were increasing age, increasing NIHSS score, admission to an academic hospital, atrial fibrillation and dyslipidemia.
Screening & Assessment of Dysphagia					
Boaden et al. 2021 **UK** **Cochrane review**	Using the QUADAS-2 tool, the quality of the studies was generally considered to be of poor quality – only 6 studies	25 studies including 3,953 participants with acute stroke. 4 included studies did not contain quantitative data and were excluded from analyses.	The test characteristics of 37 screening tests were evaluate. The reference criterion included the results from the Mann Assessment of Swallowing Ability (MASA, n=20) fibreoptic endoscopic evaluation of swallowing (FEES, n=6), and videofluoroscopy (VF, n=11).	**Primary outcomes:** Diagnostic accuracy, sensitivity, specificity	Statistical pooling of diagnostic accuracy data was not possible. The best performing test using water only was the Toronto Bedside Swallowing Screening Test with a sensitivity of 1.00 (95% CI, 0.75–1.00) and specificity of 0.64 (95% CI, 0.31–0.89). The best performing test that used water, semisolids, and solid trials and management plan

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	were at low risk across all 4 risk of bias domains, and 2 studies were at low risk of bias for 3 domains		24 (65%) tests used water only, 6 (16%) used a combination of water and other consistencies, and 7 (19%) used other methods		was the Gugging Swallowing Screen with a sensitivity of 1.00 (95% CI, 0.77–1.00) and specificity of 0.69 (95% CI, 0.41–0.89). The best performing test that was the Bedside Aspiration test (combined) with a sensitivity of 1.00 (95% CI, 0.87–1.00) and specificity of 0.71 (95% CI, 0.49–0.87). Screening tools that used a combination of water and other consistencies as testing materials were more accurate than screening tests that used only water. Test that used methods other than water only and water and other consistencies had mixed results; some performed as well as the water-only tests, while others performed worse. Screening tests with dysphagia as the primary outcome generally performed better than screening tests for which the primary outcome was aspiration. Screening tools carried out by nurses performed consistently better than those carried out by other healthcare providers.
Ouyang et al. 2020 **Australia/UK** **Prospective study**	NA	11,093 patients with acute stroke included in the HeadPoST trial, which examined the effect of head position (flat vs. elevated) on stroke outcome. Patients were recruited from 114 hospitals in 9 countries. Mean age was 68 years, 40% were women. Median NIHSS score was 4.	The association between dysphagia screening and assessment and outcome, was assessed.	**Primary outcomes:** Pneumonia **Secondary outcome:** Poor outcome (mRS score of 3–6) at 90 days	8,784 (79.2%) patients were screened and 3,917 (35.3%) patients received an assessment for dysphagia. 22.8% of patients who were screened, failed. 362 (3.3%) patients developed pneumonia. There was no significant association between the use of dysphagia screen and pneumonia (adj OR=1.20, 95% CI0.82– 1.75), but compared to those who passed a dysphagia screen, screen-fail patients had a significantly higher risk of pneumonia (1.5% vs. 10.0%; adj OR= 3.00, 95% CI 2.19–4.10).

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					There was no significant association between the use of dysphagia screen and pneumonia (adj OR=1.20, 95% CI0.82– 1.75), but a significantly higher percentage of screen-fail patients had a poor outcome compared with screen-pass patients (68.1% vs. 30.8%, adj OR= 1.66, 95% CI 1.41–2.95). Failing a dysphagia assessment significantly increased the risks of pneumonia (adj OR=3.04, 95% CI 2.11–4.39) and poor outcome (adj OR= 2.22, 95% CI 1.76–2.80).
Smith et al. 2018 **Canada/US/UK** **Systematic review**	NA	3 RCTs including persons ≥18 years, hospitalized for stroke (ischemic or hemorrhagic)	Trials compared dysphagia screening protocols or quality improvement interventions designed to improve screening rates vs. no screening, alternative screening, usual care or gold standard	**Primary outcomes:** ≥1 of death, dependency, or pneumonia	3 trials (Rai et al. 2016, Miles et al. 2013 and Middleton et al. 2011), are all described below. The percentage of patients who received dysphagia screening and developed pneumonia was not significantly lower, compared with patients in a control group, in any of the trials. The authors highlight the lack of evidence from RCTs and state that *"no conclusions can be drawn about the clinical effectiveness of dysphagia screening protocols."*
Rai et al. 2016 **India** **Cluster RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☒ ITT: ☒	162 patients, ≥18 years admitted to 2 wards within 72 hours of stroke onset. Mean age was 55.7 years, 73.5% were men. Median NIHSS score was 6	Patients were randomized by ward to an intervention (n=77) or control group (n=85). Patients in the intervention group were managed by a stroke care pathway consisting of nurse education, care checklist, swallow assessment flowchart, swallow screen conducted by a physician, and patient and caregiver education. Patients in the control group were treated with conventional care. There was no dysphagia assessment, and	**Primary outcome:** Aspiration pneumonia **Secondary outcomes:** 3-month mortality, BI and mRS at 3 months	Non-significantly fewer patients in the intervention group developed aspiration pneumonia during hospitalization (6.5% vs. 15.3%, RR = 0.42, 95% CI 0.16-1.14, *p*= 0.062). Fewer patients in the intervention group required mechanical ventilation during hospital stay (7.8% vs. 17.6%, p=0.05). There were significantly fewer deaths in the intervention group at 90 days (7.8% vs. 20%, p=0.02). There were no significant differences between groups in median mRS or BI scores at discharge or 3 months.

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			feeding was started by the resident doctor based on clinical judgment.		
Sorensen et al. 2013 **Denmark** **Controlled trial**	NA	146 patients admitted to a hospital following acute stroke (ischemic, ICH or SAH), diagnosed with moderate or severe dysphagia were included. Median age was 84 years, 64% female.	Three groups of patients were studied: intervention group (n=58), internal historic control group, including patients from the same institution (n=58) and external control group, including patients admitted to another hospital (n=30). Patients in the intervention group were screened using the Gugging Swallowing Screen prior to initiating oral intake and also received heightened oral hygiene (mechanical tooth brushing and chlorhexidine rinses following meals). Dysphagia screening was performed in 72% of patients in the internal historical control group and was not performed in the external control group.	**Primary outcome:** Incidence of hospital-acquired pneumonia. **Secondary outcomes:** 30 and 180-day mortality	The incidence of x-ray confirmed pneumonia was significantly lower in the intervention group (7% vs. 28% & 27%, p<0.01). The incidence or confirmed or probable pneumonia was also significantly lower in the intervention group (34% vs. 43% & 43%, p<0.05). 30-day mortality was significantly lower in the intervention group (12% vs. 22% & 30%), as was 180-day mortality (33% vs. 43% & 57%).
Titsworth et al. 2013 **USA** **Controlled study**	NA	Patients admitted to a single institution with acute stroke (ischemic, ICH, SAH)	The outcomes of 1,686 patients collected prior to the initiation of a dysphagia protocol were compared with those following its establishment in 2010 (n=648). The dysphagia protocol, including a screen (Modified Nursing Dysphagia Screen, which does not include an oral challenge) and prompt referral to an SLP when the patients failed the	**Primary outcome:** Incidence of pneumonia during hospitalization **Secondary outcome:** Discharge destination	The percentage of patients screened following initiation of the new protocol increased significantly (39% to 74%, p<0.001). The incidence of hospital-acquired pneumonia fell significantly following the dysphagia initiative (6.5% to 2.85, p<0.001, adjusted OR=0.43, 95% CI 0.26-0.71, p=0.001). The dysphagia initiative was a significant independent predictor of pneumonia. Use of the MNDS tool did not result in lower pneumonia incidence (2.4% vs. 3.1%, p=0.57), although the patients with more severe stroke were

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			screen.		screened more frequently (NIHSS 10.7 vs. 5.3, p<0.001). There were significantly more SLP referrals following the dysphagia initiative (153 to 179/month, p<0.01).
Miles et al. 2013 **New Zealand** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☒ ITT: ☑	311 patients recruited from 4 hospitals who were referred to SLP following stroke for swallowing assessment. Mean age was 78 years, 47% were men.	Patients were randomized to an experimental (n=149) or control group (n=163). Patients in the control group were assessed using local protocols. Patients in the experimental group used a cough reflex test (CFT), using nebulized citric acid, delivered by face mask, prior to the standard assessment	**Primary outcome:** Pneumonia at 3 months following recruitment **Secondary outcome:** 3-month mortality	Within the experimental group, 61% of patients passed the CRT with a strong cough, 21% passed with a weak cough (21%) and 18% failed the test. There were no significant differences between groups in the number of patients who developed pneumonia (experimental 26% vs. control 21%, p=0.38), or who were dead at 3 months (experimental 20% vs. control 14%, p=0.23).
Middleton et al. 2011 **Australia** **Cluster RCT** ***Quality in Acute Stroke Care (QASC)***	CA: ☑ Blinding: Patient ☑ Assessor ☑ ITT: ☑	19 large tertiary care facilities with acute stroke units. Patients were eligible if they had been admitted to one of these facilities with a diagnosis of stroke (ischemic or hemorrhagic) within 48 hours. Age was evenly distributed among 3 groups, age 65 to 85. 60% male. 41% mild stroke.	4,198 patients were randomized to receive care at institutions that had adopted nursing protocols to identify and manage 3 complications-hyperglycemia, fever and swallowing dysfunction or to a control facility. Clinicians at the participating control institutions received abridged guidelines only. The dysphagia component included education and training in the use of the ASSIST screening tool. Nurses were required to pass a clinical competency test prior to conducting swallowing screening. Patients who failed the screen were referred to an SLP for assessment.	**Primary outcome:** Death or dependency at 90 days (mRS score of ≥2), BI, SF-36 (mental component summary score), physical component summary score **Secondary outcomes:** Mean temperature for first 72 hours, proportion of swallowing screenings completed within the first 24 hours of admission, pneumonia diagnosis, LOS	Intervention was associated with a decreased frequency of death or dependency at 90 days (42% vs. 58%, p=0.002). The % of patients with BI scores ≥95 was non-significantly higher in the intervention group (69% vs. 60%, p=0.07). **Dysphagia outcomes:** Swallowing screening was performed more frequently in the intervention group (46% vs. 7%, p<0.0001). There was no difference between groups in the incidence of pneumonia (2% vs. 3%, p=0.82).

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Lakshminarayan et al. 2010 **USA** **Audit of National Stroke Registry**	NA	Records of 18,017 patients admitted and discharged for stroke from 222 hospitals in 6 states from March 1 to Dec 31, 2009, were reviewed.	Patients were classified according to their dysphagia screening status: unscreened vs. screen/pass vs. screen/fail and associations between screening status and incidence of pneumonia was explored.	**Primary outcome:** Pneumonia	Number (%) of patients: Unscreened: 4509 (25%) Screened/pass: 8406 (46.6%) Screened/fail: 5099 (28.3%) Adjusting for age, gender, race, weakness, aphasia and altered level of consciousness, unscreened patients were at higher risk of developing pneumonia compared to patients who passed screening (OR=2.2, 95% CI 1.7 to 2.7).
Hinchey et al. 2005 **USA** **Observational**	NA	15 institutions in the US (73% with dedicated stroke units) collected data prospectively on patients discharged with a diagnosis of ischemic stroke.	Adherence rates between sites with formal dysphagia screening protocols and those without formal protocols were examined for differences in pneumonia rates.	**Primary outcomes:** Pneumonia, mortality	6 of the 15 sites had formal dysphagia screening protocols. Screens were conducted more frequently at sites with a formal screening protocol (78% vs. 56%, p<0.0001. Pneumonia occurred less frequently at sites with formal screening protocols (2.4% vs. 5.4%). Mortality was higher among patients who developed pneumonia (21% vs. 4.8%, p<0.0001).
ii) Dysphagia Management					
Bath et al. 2018 **UK** **Cochrane review**	The quality of the evidence was generally very low, low, or moderate	41 RCTs (2,660) including persons with post stroke dysphagia within 6 months of onset.	Treatment interventions included acupuncture (11 studies), behavioural interventions (9 studies), drug therapy (3 studies), neuromuscular electrical stimulation (NMES; 6 studies), pharyngeal electrical stimulation (PES; 4 studies), physical stimulation (3 studies), transcranial direct current stimulation (tDCS; 2 studies), and transcranial magnetic stimulation (TMS; 9 studies).	**Primary outcome:** Death or dependency **Secondary outcomes:** Case fatality at the end of the trial, length of inpatient stay (LOS), proportion of participants with dysphagia at the end of the trial, swallowing ability, penetration aspiration score, chest infection or pneumonia, pharyngeal transit time, institutionalization, and nutrition.	Based on the results of a single trial, swallowing therapy (behavioral intervention) did not decrease the odds of the primary outcome (OR=1.05, 95% CI 0.63 to 1.75: 306 participants). Swallowing therapy (behavioral interventions, drug therapy, PES, physical stimulation, TMS) did not reduce the odds of case fatality at end-of-trial (OR= 1.00; 95% CI, 0.66–1.52; n=766; 14 studies). Swallowing therapy (behavioral interventions, PES) significantly reduced mean LOS (MD -2.9, 95% CI -5.65 to -0.15; 577 participants; 8 studies). Swallowing therapy (acupuncture, behavioral interventions, drug therapy, NMES, PES, physical stimulation, tDCS) significantly reduced the

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					proportion of participants with dysphagia at the end of the trial (OR= 0.42, 95% CI 0.32 to 0.55; 1487 participants; 23 studies). Swallowing therapy (behavioral intervention, PES, NMES, TMS) did not reduce the mean penetration aspiration score, identified on radiological examination (SMD -0.37, 95% CI -0.74 to -0.00; 303 participants; 11 studies). Swallowing therapy (behavioral interventions, drug therapy, NMES, PES) significantly reduced the incidence of chest infection or pneumonia (OR 0.36, 95% CI 0.16 to 0.78; 618 participants; 9 studies).
Geeganage et al. 2012 **UK** **Cochrane Review**	NA	33 RCTs (6,779 subjects) examining a variety of interventions associated with dysphagia and nutrition provided within the first 6 months of stroke onset.	Treatment interventions examined included: **Dysphagia** Acupuncture (5 RCTs), behavioral interventions (5 RCTs), drug therapy (2 RCTs), neuromuscular electrical stimulation (NMES) (1 RCT), pharyngeal electrical stimulation (PES) (1 RCT), physical stimulation (thermal, tactile) (2 RCTs), transcranial direct current stimulation (TDCS) (1 RCT), transcranial magnetic stimulation (1 RCT). Nutrition Interventions and results reported in nutrition section (below**)**	**Primary outcomes:** Death or dependency, death of disability (BI score of 0 to 55 or Rankin Scale score of 3 to 5) **Secondary outcomes:** Case fatality at the end of the trial, neurological deterioration, late disability or dependency at the end of the trial, proportion with dysphagia at the end of the trial, improvement in dysphagia (assessed by videofluoroscopy, pharyngeal transit time, swallowing time, normal water swallow test, improvement in swallow function scales, functional oral intake scale (FOIS), Watian swallow scale, return to normal diet and	**Dysphagia outcomes** Case fatality at end of trial: No overall OR reported No significant treatment effect was associated with subgroup analysis by therapy type. Death or dependency at end of trial: OR=1.05, 95% CI 0.63 to 1.75, p=0.86. Results from 2 trials included. LOS: MD=-2.70, -5.68 to 0.28. p=0.076. Results from 4 trials included. Chest infections or pneumonia: No overall OR reported. No significant treatment effect was associated with subgroup analysis by therapy type (behavioral interventions, drug therapy, and electrical stimulation). Dysphagia at end of trail: No overall OR reported. Significant treatment effect was associated with acupuncture and behavioral interventions.

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				fluids), aspiration: clinical, videofluoroscopy, pneumonia, gastrointestinal bleeding, LOS, pressure sores.	
Carnaby et al. 2006 **USA** **RCT** **(Behavioral intervention)**	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☑	306 patients with clinical-identified dysphagia admitted to hospital within 7 days of acute stroke, with no previous history of dysphagia	Patients were randomly assigned to receive usual care (supervision for feeding and precautions for safe swallowing; n=102), standard low-intensity intervention (composed of environmental modifications, safe swallowing advice and appropriate dietary modifications; n=102), or standard high-intensity intervention and dietary prescription (daily direct swallowing exercises, dietary modification; n=102). Treatment continued for up to a month.	**Primary outcome:** Proportion of patients who had returned to their pre-stroke diet by 6 months. **Secondary outcomes:** Time to return to a normal diet, recovery of functional swallowing, number of dysphagia-related medical complications, death, need for institutionalization, dependency in ADL by 6 months after stroke.	Combining high-intensity and low-intensity groups into a single treatment group and comparing with the usual care group: Normal diet at 6 months: RR=1.19, 95% CI 0.98 to 1.45, p>0.05 Return to functional swallow: RR=1.41, 95% CI 1.03 to 1.94, p<0.05. Chest infection: RR=0.56, 95% CI 0.41 to 0.76, p<0.05 Death: RR=0.80, 95% CI 0.49 to 1.3, p>0.05 Institutionalization: RR=0.69, 95% CI 0.43 to 1.1, p>0.05 Dependency (Rankin ≥3) RR=1.05, 95% CI 0.82 to 1.3, p>0.05 Death or institutionalization: RR=0.73 95% CI 0.55 to 0.97, p<0.05 Dropouts and losses to follow-up: usual care n=23, low-intensity group n=21, high-intensity group n=19 Adverse events: No reporting

Nutritional Supplementation & Enteral Feeding

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Cochrane reviews					
Geeganage et al. 2012 **UK** **Cochrane Review**	NA	33 RCTs (6,779 subjects) examining a variety of interventions associated with dysphagia and nutrition provided within the first 6 months of stroke onset.	Treatment interventions examined included: **Nutrition** Routes of feeding (5 RCTs), Timing of feeding (1 RCT), fluid supplementation (1 RCT), nutritional supplementation (8 RCTs). Dysphagia interventions and outcomes reported above in dysphagia section	**Primary outcomes:** Death or dependency, death of disability (BI score of 0 to 55 or Rankin Scale score of 3 to 5). **Secondary outcomes:** Case fatality at the end of the trial, neurological deterioration, late disability or dependency at the end of the trial, proportion with dysphagia at the end of the trial, improvement in dysphagia (assessed by videofluoroscopy, pharyngeal transit time, swallowing time, normal water swallow test, improvement in swallow function scales, functional oral intake scale (FOIS), Watian swallow scale, return to normal diet and fluids), aspiration: clinical, videofluoroscopy, pneumonia, gastrointestinal bleeding, feeding tube failures, nutritional measures (weight, albumin, mid-arm circumference (MAC)), LOS, pressure sores.	**Nutritional outcomes** Case fatality at end of trial (PEG vs. nasogastric tube): OR=0.81, 0.42 to 1.56, p=0.53. Results from 5 trials included. Death or dependency at end of trial (PEG vs. nasogastric tube): OR=0.80, 95% CI 0.12 to 5.55, p=0.82. Results from 3 trials included. Pressure sores (PEG vs. NG): OR=3.10, 95% CI 0.98 to 9.83, p=0.055. Results from a single trial included. Chest infection or pneumonia (PEG vs. NG): OR=0.65, 95% CI 0.23 to 1.86, p=0.42. Results from 2 trials included. Case fatality at end of trial (initiation of feeding <7 days vs. ≥7 days): OR=0.79, 95% CI 0.61 to 1.01, p=0.093. Results from 1 trial included. Death or dependency at end of trial (initiation of feeding <7 days vs. ≥7 days): OR=0.94, 95% CI 0.68 to 1.31, p=0.72 Results from 1 trial included. Case fatality at end of trial (nutritional supplementation vs. no supplementation): OR=0.58, 95% CI 0.28 to 1.21, p=0.14. Results from 7 trials included. Death or dependency at end of trial (nutritional supplementation vs. no supplementation): OR=1.06, 95% CI 0.94 to 1.20, p=0.33. Results

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
					from 1 trial included. LOS (nutritional supplementation vs. no supplementation): MD=1.40, 95% CI -0.81 to 3.6, p=0.21. Results from 2 trials included.
Milne et al. 2009 **UK** **Cochrane Review**	N/A	62 RCTs (10,187 elderly subjects). Most participants (71%) were hospitalized in-patients admitted for acute conditions. 40 studies included older people with no specified disease or condition; other studies included patients with hip fracture, stroke patients (n=2), congestive heart failure, chronic obstructive pulmonary disease, older surgical patients and patients at home with diabetic foot ulcer.	Interventions included commercial oral supplements or fortification of normal food with the intention of improving protein and energy intake using only the normal oral route. The control condition was usually routine feed (no supplement). The trials aimed to provide between 175 and 1350 additional kcal/day and an additional 10-50 grams of protein/day. Therapy lasted from 10 days to 18 months (< 35 days in 17 trials, ≥ 35 days in 37 trials, from admission to discharge in 5 trials).	**Primary outcomes:** All-cause mortality, morbidity, number of people with complications, functional status.	Supplementation was not associated with a reduction in the risk of mortality: RR=0.92, 95% CI 0.81 to 1.04, p=0.20. Results from 40 trials included). Supplementation was associated with a reduction in mortality when patients were malnourished at study entrance (subgroup): RR=0.79, 95% CI 0.64 to 0.97, p=0.025. Results from 25 trials included. Supplementation was associated with a reduction in complications: RR=0.86, 95% CI 0.75 to 0.99, p=0.029. Results from 24 trials included. Supplementation was associated with an increase in weight: % wt change: MD=2.15, 95% CI 1.80 to 2.49, p<0.0001. Results from 45 trials included. Supplementation was associated with an increase in arm muscle circumference: MD=1.20 cm, 95% CI 0.45 to 1.96, p= 0.0019. Results from 16 trials included. Supplementation was not associated with a decreased LOS: MD= -0.75, 95% CI -2.84 to 1.34, p=0.48. Results from 14 trials included.
Trials					
Zhao et al. 2022 **China** **RCT** ***Optimizing Early Enteral Nutrition***	CA: ☑ Blinding: Patient ☒ Assessor ☑	321 adult patients with acute severe ischaemic or haemorrhagic stroke (Glasgow Coma Scale score ≤12 or NIHSS score ≥11 on admission), recruited from 16 acute	Patients were randomized (1:1:1) to receive full enteral nutrition (70–100% of estimated caloric requirements), modified full enteral nutrition (full	**Primary outcome:** Poor outcome (mRS score ≥3) at day 90 **Secondary outcomes:** Barthel Index (BI) at 90 days, NIHSS score at discharge,	The trial was stopped prematurely, due to excess deaths. The percentage of patients with the primary outcome was 80% (full enteral nutrition), 82% (modified full enteral nutrition) and 73% (hypocaloric).

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
in Severe Stroke (OPENS) study	ITT: ☑	care centres who were expected to receive enteral nutrition for more than 7 days. Median age was 71 years, 58% were men. Median NIHSS score was 17.	enteral nutrition plus prokinetic agents), or hypocaloric enteral nutrition (40–60% of estimated caloric requirements), initiated within 24 hours and maintained for 7 days.	90-day mortality	There were no significant differences in pair-wise comparisons between groups, in adjusted analysis. Modified full enteral nutrition vs. full enteral nutrition OR=0·87, 95% CI 0·41−1·86 Hypocaloric enteral nutrition vs. full enteral nutrition OR=0·61, 95% CI 0·30−1·27). Hypocaloric enteral nutrition vs modified full enteral nutrition OR=0·70, 95% CI 0·34−1·46. Median 90-day BI scores were 35 (full enteral nutrition), 30 (modified full enteral nutrition) and 20 (hypocaloric). There were no significant differences in pair-wise comparisons between groups, in adjusted analysis. Median discharge NIHSS scores were 13 (full enteral nutrition), 14 (modified full enteral nutrition) and 15 (hypocaloric). The percentage of patients who were dead at 90 days was 23% (full enteral nutrition), 17% (modified full enteral nutrition) and 34% (hypocaloric). In pair-wise comparisons, the odds of death were increased significantly in hypocaloric enteral nutrition group vs full enteral nutrition group (OR=1·92, 95% CI 1·00−3·69) and modified full enteral nutrition group (OR=2·89, 95% CI 1·46−5·72).
Dennis et al. 2005 **UK** **RCT** ***The FOOD trial*** **(part I- timing and method of**	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☑	1,210 patients admitted within 7 days of first or recurrent stroke, from 47 hospitals in 11 countries.	i) Patients were randomized to receive either a PEG (n=162) or NG feeding tube (n=159) within 3 days of enrolment into the study. ii) Patients were randomized to receive	**Primary outcome:** Death and poor outcome (defined as a Modified Rankin Score of 4-5) was assessed at 6 months.	Early vs. avoid groups: Early tube feeding was associated with a 1.2% (-4.2 to 6.6, p=0.7) absolute reduction in the risk of death or poor outcome at 6 months. Early tube feeding was associated with a 15.8% (-0.8 to 12.5, p=0.09) absolute reduction in the risk of death at 6 months.

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
feeding)			feeds as early as possible (n=429) or to avoid feeding for 7 days (n=460) using either a PEG or NG feeding tube.		PEG vs. NG group: PEG feeding was associated with an absolute increase in risk of death of 1.0% (–10.0 to 11.9, p=0.9). PEG feeding was associated with and an increased risk of death or poor outcome of 7.8% (0.0 to 15.5, p=0.05). Dropouts and losses to follow-up: n=545. Adverse events: Gastro-intestinal bleeds occurred more frequently in the early feeding group compared with the late group (22 vs. 11, p=0.04) and with NG tubes compared with PEG (18 vs. 5, p=0.005). There were more pressure sores in the PEG group compared with NG (12 vs. 4, p=0·04).
Dennis et al. 2005 **UK** **RCT** **The FOOD Trial** **part 2- oral supplementation**	CA: ☑ Blinding: Patient ☒ Assessor ☑ ITT: ☑	4,023 non-dysphagic patients admitted within 7 days of first or recurrent stroke. Clinician unsure whether to provide supplements (8% of patients malnourished at baseline).	Patients were randomized to receive an oral nutritional supplement (540 Kcals) in addition to a regular hospital diet (n=2016), provided for the duration of their entire hospital stay (median duration of hospital stay was 34 days- 28% of patients stopped taking supplements before discharge), or to a normal hospital diet only (n=2007).	**Primary outcome:** Death or disability (mRS score of 3-5) at 6 months. **Secondary outcomes:** mRS, EURO QoL, place of residence at 6 months.	Routine supplementation was not associated with benefit on any of the outcomes assessed. Death: OR=0.94, 95% CI 0.78 to 1.17, p, p>0.05 Absolute difference in risk of death: 0.7%, 95% CI -1.4 to 2.7. Death or poor outcome: OR=1.03, 95% CI 0.91 to 1.17, p>0.05. Absolute risk of death or poor outcome; 0.7%, 95% CI -2.3 to 3.8. Mean difference in EURO QoL scores between groups: 0.001, 95% CI -0.23 to 0.025, p>0.05. Losses to follow-up and drop-outs: n=260 (regular diet), n=245 (supplement). Adverse events: no significant differences in complications (pneumonia, urinary tract infections etc) between groups.

Oral Hygiene

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Kim et al. 2014 **Korea** **RCT**	CA: ☒ Blinding: Patient ☒ Assessor ☒ ITT: ☒	90 patients consecutively admitted to a neurosurgical ICU following first-ever stroke, who had ≥6 teeth, and with no sign of infection with any contagious pathogen	Patients were randomized to an intervention (n=45) or control group (n=45). Patients in the intervention group received daily oral hygiene including tooth brushing, tongue cleaning and chlorhexidine application, performed by a dentist. Unclear what treatment patients in the control group received.	**Primary outcomes:** Plaque Index (PI), Silness & Loe, 1964; Scores range from 0-3 with lower scores indicating better oral hygiene status; Gingival Index (GI) (Loe 1967). Scores range from 0-3 with lower scores indicating less gingival inflammation; Clinical Attachment Loss (CAL) **Secondary outcomes:** Candida colony counts of tongue and saliva	34 patients dropped out during the first week. Data from 56 patients were used for analysis. Mean duration of treatment in the intervention group was 2.2 weeks. There was a significant decrease in mean PI scores from baseline to follow-up (mean 2.2 weeks) in both groups, although the decline was significantly greater in the intervention group (-1.24 vs. -0.25, p=0.001). There was a significant decrease in mean GI scores from baseline to follow-up (mean 2.2 weeks) in the intervention group (1.54 to 0.47, p=0.018, and a significant increase in the control group (1.3 to 1.60, p=0.023). There was no significant difference between groups in mean CAL change scores from baseline to follow-up. A significantly greater proportion of patients with no Candida colonization in the saliva increased from baseline to follow-up among patients in the intervention group
Lam et al. 2013 **China** **RCT**	CA: ☑ Blinding: Patient ☒ Assessor ☒ ITT: ☒	102 dentate patients admitted to a rehabilitation unit following ischemic stroke or ICH within the previous 7 days, with a Barthel index score of <70. Mean age was 70 years.	Patients were randomized to receive oral hygiene instruction (OHI, n=33), OHI + chlorhexidine (CHI) mouth rinse, (n=34), or OHI + CHI + assisted tooth brushing (n=35) twice daily for 3 weeks	**Primary outcomes:** Plaque Index (PI) (Silness & Loe, 1964). Scores range from 0-3 with lower scores indicating better oral hygiene status. Gingival Bleeding Index (GBI, Carter & Barnes, 1974). The presence or absence of gingival inflammation is noted after passing unwaxed dental floss at 6 sites into the	At baseline, only 33% of patients reported brushing their teeth daily. The mean PI scores of patients in the OHI+CHX and OHI+CHX+assisted brushing groups were improved significantly more than patients in the OHI group (p<0.001) Mean before/after treatment scores OHI: 2.0 to 1.2, OHI+CHX: 1.9 to 0.6, OHI+CHX+ assisted brushing: 1.9 to 0.5. The mean GBI score of patients in the OHI+CHX

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
				proximal sulci. Bleeding is recorded as present or absent (0,1). **Secondary outcomes:** Pneumonia, treatment satisfaction. Outcomes were assessed before and after treatment	group was improved significantly more than patients in the OHI group (p<0.032) Mean before/after treatment scores OHI: 16.7 to 17.7, OHI+CHX: 18.8 to 10.0, OHI+CHX+ assisted brushing: 16.7 to 7.6. No patient in either group developed pneumonia during the treatment period. Only 1 patient dropped out of the study due to non-compliance with CHX treatment.
Lam et al. 2011 **China** **Systematic review**	NA	8 studies that aimed to assess the effectiveness of oral health promotion activities in patients with cardiovascular disease. Patients included in these studies were diagnosed with hypertension (n=2), coronary artery disease and/or a previous coronary event (n=3) or were recovering from heart transplants (n=1). In one study, 67 patients residing in 20 nursing homes following stroke, were included.	Most interventions evaluated included cleaning, scaling, root planing and/or extractions. In the single RCT that included patients following stroke, an oral health care education program (OHCE) was provided to nursing home care assistants vs. delayed intervention.	**Primary outcome:** Periodontal health	Results from stroke-specific study There were no differences between groups in dental plaque, gingivitis, or denture-induced stomatitis at 1 and 6 months. The experimental group exhibited significantly less denture plaque than the control group at 1 and 6 months (p<0.0001) Nursing staff receiving OHCE program exhibited higher knowledge scores (p<0.005) at 1 month, and 6 months (p<0.001) and significantly better attitudes to oral care (p= 0.001)
Brady et al. 2006 **UK** **Cochrane review**	NA	3 RCTs (n=470) that included patients with a diagnosis of stroke receiving some form of assisted oral health care (OHC) within a healthcare facility. Patients included in these trials had been	Treatment contrasts included: OHC + timed tooth brushing in care bundle vs. standard care (n=1), OHC health care education session vs. delayed session (n=1) and selective decontamination of digestive tract using	**Primary outcomes:** Dental plaque (Plaque scale), Denture plaque (Denture Cleanliness Scale) **Secondary outcomes:** Patient satisfaction with care received, oral comfort and appearance, presence of oral disease: gingivitis; denture-	Pooled analyses were not possible. Use of decontamination gel was associated with a reduction in the incidence of pneumonia: (OR=0.20, CI 95% 0.05 to 0.84, p = 0.03). Education session was not associated with a reduction in dental plaque tooth coverage, the presence of gingivitis, or denture-induced stomatitis at one or 6 months following training, but was

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		admitted to a neurological ICU (n=1), an acute stroke unit (n=1) and nursing homes (n=1).	Orabase 500 mg gel applied to the mucous membranes of the mouth four times daily for 2-3 weeks (n=1).	induced stomatitis; periodontal disease and staff oral health knowledge and attitude**s**	associated with a significant reduction in denture plaque at both assessment points. One month after the educational session, care assistants that received the training had higher knowledge scores than the delayed group.

Seizure Management

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Chang et al. 2022 **China** **Cochrane review**	The overall risk of bias was assessed as low	2 trials including 856 patients with ischemic or hemorrhagic stroke who did not undergo neurosurgical procedures.	Treatment contrasts evaluated included antiepileptic drugs (AED) compared vs. placebo or no drug for the primary and secondary prevention of post stroke seizures. In one trial (Giliad et al. 2011) oral valproic acid 400 mg twice daily or placebo was given for one month. In the second trial, an abstract by van Tujil et al. 2021, which included 784 patients, 10 mg diazepam or placebo was given within 12 hours after stroke onset, followed by oral 10 mg tablets twice daily for three days. Both trials were for primary prevention.	**Primary Outcome:** Occurrence and timing of seizures during the follow up period. **Secondary Outcomes:** Seizure remission, death or dependency at end of scheduled follow up period.	The risk of seizures was not reduced significantly in the AEDs group (RR= 0.65, 95% CI 0.34 to 1.26; 2 studies, 856 participants; moderate-certainty evidence). The risk of death or dependency were not reduced significantly in the AED group (RR=0.97, 95% CI 0.73 to 1.27, 2 studies, 856 participants; moderate-certainty evidence).
Gilad et al. 2011	CA: ☑	84 patients with	For seizure prophylaxis,	**Primary outcome:**	At 1 year, there were 15 (21%) cases of new

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
Israel **RCT**	Blinding: Patient ☑ Assessor ☑ ITT: ☒	spontaneous non-traumatic and non-aneurysmatic ICH. Mean age was 70 years. Patients with a history of epilepsy, primary Intraventricular hemorrhage, SAH, infratentorial hemorrhage or SICH due to brain tumor, vascular malformation, brain surgery or infection, were excluded.	72 patients were randomized to receive 800 mg/day valproic acid (VA)(n=36) or placebo (n=36) daily for one month and followed for one year. The time to the start of the dosing after randomization was 14 ± 4 hours in the treatment group and 16 ± 5 hours in the placebo group.	Witnessed seizure within the one-year study period **Secondary outcomes:** Neurological recover, assessed using NIHSS at one year.	seizure. There were no differences in seizure occurrence between treatment group: All seizures: 7 vs. 8, p=0.8 Early seizure, within 14 days of randomization: 1 vs. 4, p=0.4 Late seizure, occurring >14 days: 6 vs. 4, p=0.5) Mortality: 6 vs. 5, p=0.7. Mean NIHSS scores were lower among patients in the VA group (4.4 vs. 8.6, p=0.002)
Van Tuijl et al. 2011 **UK** **RCT**	CA: ☑ Blinding: Patient ☑ Assessor ☑ ITT: ☒	Patients with lobar ICH or ischemic stroke, with a cortical syndrome and mRS≥3 or NIHSS ≥6 recruited from a single neurology department. Participants with previous history of epilepsy or history of antiepileptic medication were excluded.	Patients were randomized to receive either levetiracetam 1500mg daily divided in two doses or placebo, within 2 to 7 days following acute stroke. Treatment was scheduled to continue for 12 weeks.	**Primary Endpoint:** First late epileptic seizure (>1-week post stroke). **Secondary Endpoint:** Time to event (time between stroke and seizure), occurrence of early seizure (<7 days post stroke), seizure severity, neurological and neurocognitive function, handicap score, quality of life, and medication side effects. Follow-up assessments were conducted by telephone at 1, 6, 16, and 52 weeks after enrollment	The trial was stopped prematurely due to a failure to recruit sufficient numbers of patients. Planned sample size was 200 patients/group. At the point the trial was stopped, only 16 patients, recruited over a period of 16 months had been recruited. The authors concluded that a trial assessing the efficacy of prophylactic antiepileptics is not feasible.
Gilad et al. 2007 **Israel** **RCT**	CA: ☒ Blinding: Patient ☒ Assessor ☒ ITT: ☑	64 elderly patients admitted to a neurological department after stroke who had experienced a first seizure. Mean age was 72 years. 78% were	Participants were randomized to receive either lamotrigine (100mg BID) or carbamazepine (300mg BID) in a 1:1 ratio (both open labeled).	**Primary Outcome:** Appearance of a second seizure under treatment, or completion of the study period without a seizure. **Secondary Outcome:**	The number of patients who were seizure free at the end of the study period was non-significantly higher in the lamotrigine group (23 vs. 14, p=0.06). The total number of adverse events was significantly higher in the carbamazepine group (n=2, lamotrigine and n=12, carbamazepine;

Study/Type	Quality Rating	Sample Description	Method	Outcomes	Key Findings and Recommendations
		male.		Tolerability of study medications and withdrawal rate as a result of adverse side effects. Assessments were conducted at baseline and every three months for a period of 12 months	p=0.05), as was the number of withdrawals for adverse events (n=1, lamotrigine and n=10, carbamazepine; p=0.02).
Rowan et al. 2005 **USA** **RCT**	CA: ☑ Blinding: Patient ☑ Assessor ☑ ITT: ☑	593 adults over the age of 60 with a first diagnosed seizure of any type within the last 3 months. Cerebral infarction was the most common seizure etiology (29.9% of sample).	Participants were randomized to receive one of three medications: gabapentin (1500mg/day, n=195), lamotrigine (150mg/day, n=200), and carbamazepine (600mg/day, n=198). Medication doses were titrated over a 6-week period.	**Primary Outcome:** Determination of efficacy and tolerability through retention in the trial for 12 months. **Secondary Outcome:** Seizure freedom at 12 months, time to first seizure, and drug toxicity. Evaluations were conducted at baseline, biweekly to week 8, monthly to week 28, and bimonthly to week 52. Patients were given the option to remain in the study for an additional 12 months, and were evaluated every three months.	276 participants completed the trial. At 3, 6 and 12 months, 63.2%, 58.6% and 53.3% patients remained seizure free. Among those remaining in the study, there were no significant differences between treatment groups in the proportions of patients who remained seizure free (3 months, p=0.93; 6 months, p=0.39; and 12 months, p=0.09). Significantly more early terminating participants received carbamazepine than either lamotrigine (p<0.0001) or gabapentin (p=0.008). Lamotrigine patients terminated due to adverse events significantly less frequently than either carbamazepine (<0.0001) or gabapentin (p=0.015). Time to first, second, fifth, and tenth seizure during a 12-month period was not significantly different between the 3 treatment groups (p=0.12, 0.13, 0.74, and 0.96 respectively). Side effects included weight gain (significantly more in carbamazepine group) and water retention (significantly more in gabapentin). Skin irritations were more common in the carbamazepine group compared with lamotrigine (p=0.007). There were no significant between group differences for drug toxicities of any type.

Abbreviations

ARR: absolute risk reduction	CA: concealed allocation	CI: confidence interval
DVT: deep vein thrombosis	HR: hazard ratio	ITT: intention-to-treat
NA: not assessed	NIHSS: National Institute of Health Stroke Scale	NNS: number needed to screen
mRS: modified Rankin Scale	PE: pulmonary embolism	PEDro: Physiotherapy Evidence Database
OR: odds ratio	RR: relative risk	SMD: standardized mean difference
TENS: transcutaneous electrical nerve stimulation	UTI: urinary tract infection	

Reference List

AVERT Trial Collaboration Group. Efficacy and safety of very early mobilisation within 24 h of stroke onset (AVERT): A randomised controlled trial. *Lancet* 2015; 386(9988):46-55.

CLOTS Trials Collaboration, Dennis M, Sandercock PA, Reid J, Graham C, Murray G, Venables G, Rudd A, Bowler G. Effectiveness of thigh-length graduated compression stockings to reduce the risk of deep vein thrombosis after stroke (CLOTS trial 1): A multicentre, randomised controlled trial. *Lancet* 2009;373:1958-1965.

CLOTS (Clots in Legs Or sTockings after Stroke) Trial Collaboration. Thigh-length versus below-knee stockings for deep venous thrombosis prophylaxis after stroke: a randomized trial. *Ann Intern Med*. 2010 Nov 2;153(9):553-62.

CLOTS (Clots in Legs Or sTockings after Stroke) Trials Collaboration, Dennis M, Sandercock P, Reid J, Graham C, Forbes J, Murray G. Effectiveness of intermittent pneumatic compression in reduction of risk of deep vein thrombosis in patients who have had a stroke (CLOTS 3): A multicentre randomised controlled trial. *Lancet* 2013;382:516-524.

Bath PM, Lee HS, Everton LF. Swallowing therapy for dysphagia in acute and subacute stroke. *Cochrane Database Syst Rev* 2018, Issue 10. Art. No.: CD000323. DOI: 10.1002/14651858.CD000323.pub3.

Bernhardt J, Dewey H, Thrift A, Collier J, Donnan G. A very early rehabilitation trial for stroke (AVERT): Phase II safety and feasibility. *Stroke* 2008;39:390-396.

Bernhardt J, Churilov L, Ellery F, Collier J, Chamberlain J, Langhorne P, Lindley RI, Moodie M, Dewey H, Thrift AG, Donnan G. Prespecified dose-response analysis for a very early rehabilitation trial (AVERT). *Neurol* 2016 ;86(23):2138-45.

Bernhardt J, Borschmann K, Collier JM, Thrift AG, Langhorne P, Middleton S et al; AVERT Trialists Collaboration Group. Fatal and non-fatal events within 14 days after early, intensive mobilization post stroke. *Neurology* 2021;96:e1156-e1166. **NEW**

Boaden E, Burnell J, Hives L, Dey P, Clegg A, Lyons MW, Lightbody CE, Hurley MA, Roddam H, McInnes E, et al. Screening for aspiration risk associated with dysphagia in acute stroke. *Cochrane Database of Syst Rev*. 2021;10:CD012679 **NEW**

Brady M, Furlanetto D, Hunter RV, Lewis S, Milne V. Staff-led interventions for improving oral hygiene in patients following stroke. *Cochrane Database Syst Rev* 2006 Issue 4. Art. No.: CD003864. DOI: 10.1002/14651858.CD003864.pub2.

Bray BD, Smith CJ, Cloud GC, et al. The association between delays in screening for and assessing dysphagia after acute stroke, and the risk of stroke-associated pneumonia. *J Neurol Neurosurg Pschyiatry* 2017;88:25-30.

Carnaby G, Hankey GJ, Pizzi J. Behavioural intervention for dysphagia in acute stroke: A randomised controlled trial. *Lancet Neurol* 2006;5: 31-37.

Chan, H. Bladder management in acute care of stroke patients: A quality improvement project. *J Neurosci Nurs* 1997; *29:*187-190.

Chang RS, Leung WCY, Vassallo M, Sykes L, Battersby Wood E, Kwan J.Antiepileptic drugs for the primary and secondary prevention of seizures after stroke. *Cochrane Database of Systematic Reviews* 2022, Issue 2. Art. No.: CD005398. **NEW**

Chippala P, Sharma R. Effect of very early mobilisation on functional status in patients with acute stroke: A single-blind, randomized controlled trail. *Clin Rehabil* 2016;30(7):669-675.

Cournan, M. Bladder management in female stroke survivors: translating research into practice. *Rehabil Nurs* 2012;37: 220-230.

Craig LE, Bernhardt J, Langhorne P, & Wu O. Early mobilization after stroke: an example of an individual patient data meta-analysis of a complex intervention. *Stroke* 2010;41:2632-2636.

Cruz EM, Miller C, Zhang W, Rogers K, Lee HJ, Wells Y, Cloud G, Lannin NA. EXPRESS: Does non-implanted electrical stimulation reduce post-stroke urinary or fecal incontinence? A systematic review with meta-analysis. *Int J Stroke*.2022, Vol. 17(4) 378–388 . **NEW**

Cumming TB, Thrift AG, Collier JM, Churilov L, Dewey HM, Donnan GA et al. Very early mobilization after stroke fast-tracks return to walking: further results from the phase II AVERT randomized controlled trial. *Stroke* 2011;42: 153-158.

de Bruijn SF, Agema WR, Lammers GJ, van der Wall EE, Wolterbeek R, Holman ER, Bollen EL, Bax JJ. Transesophageal echocardiography is superior to transthoracic echocardiography in management of patients of any age with transient ischemic attack or stroke. *Stroke* 2006;37: 2531-2534.

de Ridder IR, den Hertog HM, van Gemert HM, et al. PAIS 2 (Paracetamol [Acetaminophen] in Stroke 2): Results of a Randomized, Double-Blind Placebo-Controlled Clinical Trial. *Stroke* 2017;48(4):977-982.

den Hertog HM, van der Worp HB, Tseng MC, Dippel DWJ. Cooling therapy for acute stroke. *Cochrane Database of Syst Rev* 2009, Issue 1. Art. No.: CD001247. DOI: 10.1002/14651858.CD001247.pub2.

den Hertog HM, van der Worp HB, van Gemert HM et al. The Paracetamol (Acetaminophen) In Stroke (PAIS) trial: A multicentre, randomised, placebo-controlled, phase III trial. *Lancet Neurol* 2009;8:434-440.

Dennis MS, Lewis SC, Warlow C; FOOD Trial Collaboration. Effect of timing and method of enteral tube feeding for dysphagic stroke patients (FOOD): A multicentre randomised controlled trial. *Lancet* 2005a*;*365: 764-772.

Dennis MS, Lewis SC, Warlow C; FOOD Trial Collaboration. Routine oral nutritional supplementation for stroke patients in hospital (FOOD): a multicentre randomised controlled trial. *Lancet* 2005b;365: 755-763.

Diener HC, Ringelstein EB, von KR et al. Prophylaxis of thrombotic and embolic events in acute ischemic stroke with the low-molecular-weight heparin certoparin: results of the PROTECT Trial. *Stroke* 2006;37:139-144.

Dippel DW, van Breda EJ, van der Worp HB, et al. Effect of paracetamol (acetaminophen) and ibuprofen on body temperature in acute ischemic stroke PISA, a phase II double-blind, randomized, placebo-controlled trial [ISRCTN98608690]. *BMC Ccardiovasc Dis* 2003;3:2.

Diserens K, Moriera T, Hirt L, Faouzi M, Grujic J, Bieler G et al. Early mobilization out of bed after ischaemic stroke reduces several complications but not cerebral blood flow: a randomized controlled pilot trial. *Clinical Rehabil* 2011; 26: 451-459.

Douen AG, Pageau N, Medic S. Serial electrocardiographic assessments significantly improve detection of atrial fibrillation 2.6-fold in patients with acute stroke. *Stroke* 2008; 39*:*480-482.

Edwards JD, Kapral MK, Fang J, Saposnik G, Gladstone DJ. Underutilization of mmbulatory ECG monitoring after stroke and transient ischemic attack: Missed opportunities for atrial fibrillation detection. *Stroke* 2016;47(8):1982-1989.

Ersoz M, Ulusoy H, Oktar MA, et al. Urinary tract infection and bacteriurua in stroke patients: frequencies, pathogen microorganisms, and risk factors. *Am J Phys Med Rehabil* 2007;86:734-41

Eustice S, Roe B, Paterson J. Prompted voiding for the management of urinary incontinence in adults. *Cochrane Database of Syst Rev* 2000, Issue 2. Art. No.: CD002113. DOI: 10.1002/14651858.CD002113

Flint AC, Banki NM, Ren X, Rao VA, Go AS. Detection of paroxysmal atrial fibrillation by 30-day event monitoring in cryptogenic ischemic stroke: the Stroke and Monitoring for PAF in Real Time (SMART) Registry. *Stroke* 2012;43:2788-2790.

Frank B, Fulton RL, Weimar C, Lees KR, Sanders RD; VISTA Collaborators. Use of paracetamol in ischaemic stroke patients: evidence from VISTA. *Acta Neuro Scand* 2013:128:172-177.

Geeganage C, Beavan J, Ellender S, Bath PM. M. Interventions for dysphagia and nutritional support in acute and subacute stroke. *Cochrane Database Syst Rev* 2012 10:CD000323. doi: 10.1002/14651858.CD000323.pub2., CD000323.

Gilad R, Boaz M, Dabby R, Sadeh M, Lampl Y. Are post intracerebral hemorrhage seizures prevented by anti-epileptic treatment? *Epilepsy Res* 2011;95:227-231.

Gilad R, Sadeh M, Rapoport A, Dabby R, Boaz M, & Lampl Y. Monotherapy of lamotrigine versus carbamazepine in patients with poststroke seizure. *Clin Neuropharmacol* 2007; 30:189-195.

Grond M, Jauss M, Hamann G et al. Improved detection of silent atrial fibrillation using 72-hour Holter ECG in patients with ischemic stroke: a prospective multicenter cohort study. *Stroke* 2013;44:3357-3364.

Harari D, Norton C, Lockwood L, Swift C. Treatment of constipation and fecal incontinence in stroke patients: randomized controlled trial. *Stroke* 2004;35:2549-2555.

Harloff A, Handke M, Reinhard M, Geibel A, Hetzel A. Therapeutic strategies after examination by transesophageal echocardiography in 503 patients with ischemic stroke. *Stroke* 2006;37:859-864.

Harris B, Andrews PJD, Murray GD, Forbes J, Moseley O. Systematic review of head cooling in adults after traumatic brain injury and stroke. *Health Technol Assess* 2012;16(45).

Haeusler KG, Kirchhof P, Kunze C, Tütüncü S, Fiessler C, Malsch C et al; MonDAFIS Investigators. Systematic monitoring for detection of atrial fibrillation in patients with acute ischaemic stroke (MonDAFIS): A randomised, open-label, multicentre study. *Lancet Neurol*. 2021 Jun;20(6):426-436. **NEW**

Herisson F, Godard S, Volteau C, Le Blanc E, Guillon B, Gaudron M. Early Sitting in Ischemic Stroke Patients (SEVEL): A Randomized Controlled Trial. *PLoS One* 2016;11(3):e0149466.

Higgins P, MacFarlane PW, Dawson J, McInnes GT, Langhorne P, Lees KR. Noninvasive cardiac event monitoring to detect atrial fibrillation after ischemic stroke: a randomized, controlled trial. *Stroke* 2013;44:2525-2531.

Hinchey JA, Shephard T, Furie K, Smith D, Wang D, Tonn S; Stroke Practice Improvement Network Investigators. Formal dysphagia screening protocols prevent pneumonia. *Stroke* 2005; 36: 1972-1976.

Ho CH, Lin WC, Hsu YF, Lee IH, Hung YC. One-Year Risk of Pneumonia and Mortality in Patients with Poststroke Dysphagia: A Nationwide Population-Based Study. *J Stroke Cerebrovasc Dis* 2018;27(5):1311-1317.

Indredavik B, Rohweder G, Naalsund E, Lydersen S. Medical complications in a comprehensive stroke unit and an early supported discharge service. *Stroke 2008*;39(2):414-420.

Ingeman A, Andersen G, Hundborg HH, et al. In-hospital medical complications, length of stay, and mortality among stroke unit patients. *Stroke 2011*;42:3214-18.

Johnston KC, Li JY, Lyden PD, Hanson SK, Feasby TE, Adams RJ, Faught RE Jr, Haley EC Jr. Medical and neurological complications of ischemic stroke: experience from the RANTTAS trial. RANTTAS Investigators. *Stroke* 1998;29:447-53.

Joundi RA, Martino R, Saposnik G, Giannakeas V, Fang J, Kapral MK. Predictors and outcomes of dysphagia screening after acute ischemic stroke. *Stroke* 2017;48(4):900-906.

Kallmünzer B, Krause C, Pauli E, Beck A, Breuer L, Köhrmann M, Kollmar R. Standardized antipyretic treatment in stroke: a pilot study. *Cerebrovasc Dis* 2011;31:382-389.

Kasner SE, Wein T, Piriyawat P, et al. Acetaminophen for altering body temperature in acute stroke: a randomized clinical trial. *Stroke* 2002;33(1):130-134.

Katsanos AH, Giannopoulos S, Frogoudaki A, Vrettou, AR, Ikonomidis I, Paraskevaidis I et al. The diagnostic yield of transesophageal echocardiography in patients with cryptogenic cerebral ischaemia: a meta-analysis. *Eur J Neurol* 2016; 23(3): 569-579.

Kim E, Jang S, Choi YH Lee K, et al. Effect of an oral hygienic care program for stroke patients in the intensive care unit. *Yonsei Medical Journal* 2014;55: 240-6.

Kishore A, Vail A, Majid A et al. Detection of atrial fibrillation after ischemic stroke or transient ischemic attack: a systematic review and meta-analysis. *Stroke* 2014;45:520-526.

Lakhan, S. E. & Pamplona, F. Application of mild therapeutic hypothermia on stroke: a systematic review and meta-analysis. *Stroke Res Treat* 2012;295906.

Lakshminarayan K, Tsai AW, Tong X, Vazquez G, Peacock JM, George MG, Luepker RV, Anderson DC Utility of dysphagia screening results in predicting poststroke pneumonia. *Stroke* 2010; 41: 2849-2854.

Lam OL, McMillan AS, Samaranayake LP, Li LS, McGrath C. Randomized clinical trial of oral health promotion interventions among patients following stroke. *Arch Phys Med Rehabil* 2013;94:435-443.

Lam OL, Zhang W, Samaranayake LP, Li LS, McGrath C. A systematic review of the effectiveness of oral health promotion activities among patients with cardiovascular disease. *Int J Cardiol* 2011;151:261-267.

Langhorne P, Stott DJ, Robertson L, MacDonald J, Jones L, McAlpine C et al. Medical complications after stroke: a multicenter study. *Stroke* 2000;31:1223-29.

Langhorne P, Collier JM, Bate PJ, Thuy MNT, Bernhardt J. Very early versus delayed mobilisation after stroke. *Cochrane Database of Systematic Reviews* 2018, Issue 10. Art. No.: CD006187.

Lazzaro MA, Krishnan K, Prabhakaran S. Detection of atrial fibrillation with concurrent holter monitoring and continuous cardiac telemetry following ischemic stroke and transient ischemic attack. *J Stroke Cerebrovasc Dis* 2012;21(2):89-93.

Lederle FA, Zylla D, MacDonald R, Wilt TJ. Venous thromboembolism prophylaxis in hospitalized medical patients and those with stroke: a background review for an American College of Physicians Clinical Practice Guideline. *Ann Intern Med* 2011;155: 602-615.

Li Z, Zhang X, Wang K, Wen J. Effects of early mobilization after acute stroke: A meta-analysis of randomized control trials. *J Stroke Cerebrovasc Dis* 2018;27(5):1326-1337.

Liao J, Khalid Z, Scallan C, Morillo C, O'Donnell M. Noninvasive cardiac monitoring for detecting paroxysmal atrial fibrillation or flutter after acute ischemic stroke: a systematic review. *Stroke* 2007; 38: 2935-2940.

Marino B, Jaiswal A, Goldbarg S, Bernardini GL, Kerwin T. Impact of transesophageal echocardiography on clinical management of patients over age 50 with cryptogenic stroke and normal transthoracic echocardiogram. *J Hosp Med* 2016;11(2):95-98.

Martin JL, Williams KS, Abrams KR et al. Systematic review and evaluation of methods of assessing urinary incontinence. *Health Technol Assess* 2006;10:1-iv.

Masrur S, Smith EE, Saver JL, Reeves MJ, Bhatt DL, Zhao X, Olson D, Pan W, Hernandez AF, Fonarow GC, Schwamm LH. Dysphagia screening and hospital-acquired pneumonia in patients with acute ischemic stroke: Findings from Get with the Guidelines-Stroke. *J Stroke Cerebrovasc Dis.* 2013;22:e301-309.

McGrath ER, Paikin JS, Motlagh B, Salehian O, Kapral MK, O'Donnell MJ. Transesophageal echocardiography in patients with cryptogenic ischemic stroke: a systematic review. *Am Heart J* 2014;168(5):706-712.

Middleton S, Coughlan K, Mnatzaganian G, et al. Mortality reduction for fever, hyperglycemia, and swallowing nurse-initiated stroke intervention: QASC Trial (Quality in Acute Stroke Care) Follow-Up. *Stroke* 2017; 48:1331-1336.

Middleton S, McElduff P, Ward J, Grimshaw JM, Dale S, D'Este C, Drury P, Griffiths R, Cheung NW, Quinn C, Evans M, Cadilhac D, Levi C; QASC Trialists Group. Implementation of evidence-based treatment protocols to manage fever, hyperglycaemia, and swallowing dysfunction in acute stroke (QASC): A cluster randomised controlled trial. *Lancet* 2011; 378*:* 1699-1706.

Miles A, Zeng IS, McLauchlan H, Huckabee ML. Cough reflex testing in dysphagia following stroke: a randomized controlled trial. *J Clin Med Res* 2013;5(3):222-233.

Milne AC, Potter J, Vivanti A, Avenell A. Protein and energy supplementation in elderly people at risk from malnutrition. *Cochrane Database Syst Rev* 2009, Issue 2. Art. No.: CD003288.

Moon HJ, Chun MH, Lee SJ, Kim BR. The usefulness of bladder reconditioning before indwelling urethral catheter removal from stroke patients. *Am J Phys Med Rehabil* 2012;91:681-688.

Naccarato M, Chiodo Grandi F, Dennis M, Sandercock PA. Physical methods for preventing deep vein thrombosis in stroke. *Cochrane Database Syst Rev*. 2010 Aug 4;(8):CD001922..

Otite FO, Khandelwal P, Malik AM, Chaturvedi S, Sacco RL, Romano JG. Ten-year temporal trends in medical complications after acute intracerebral hemorrhage in the United States. *Stroke* 2017;48(3):596-603.

Ouyang M, Boaden E, Arima H, Lavados PM, Billot L, Hackett M et al. Dysphagia screening and risks of pneumonia and adverse outcomes after acute stroke: An international multicenter study. *Int J Stroke* 2020; 15: 206-215.**NEW**

Pineo G, Lin J, Stern L, Subrahmanian T, Annemans L. Economic impact of enoxaparin after acute ischemic stroke based on PREVAIL. *Clin Appl Thromb Hemost* 2011*;17:* 150-157.

Prasad K, Krishnan PR. Fever is associated with doubling of odds of short-term mortality in ischemic stroke: An updated meta-analysis. *Acta Neurol Scand* 2010;122: 404-408.

Rai N, Prasad K, Bhatia R, Vibha D, Singh MB, Rai VK, Kumar A. Development and implementation of acute stroke care pathway in a tertiary care hospital in India: A cluster-randomized study. *Neurol India* 2016;64, Suppl S1:39-45.

Rizos T, Guntner J, Jenetzky E et al. Continuous stroke unit electrocardiographic monitoring versus 24-hour Holter electrocardiography for detection of paroxysmal atrial fibrillation after stroke. *Stroke* 2012;43:2689-2694.

Rohweder G, Ellekjaer H, Salvesen O, Naalsund E, Indredavik B. Functional outcome after common poststroke complications occurring in the first 90 days. *Stroke* 2015;46(1):65-70.

Roth EJ, Lovell L, Harvey RL, et al. Incidence of and risk factors for medical complications during stroke rehabilitation. *Stroke* 2001;32:523-29.

Rowan AJ, Ramsay RE, Collins JF, Pryor F, Boardman KD, Uthman BM et al. New onset geriatric epilepsy: a randomized study of gabapentin, lamotrigine, and carbamazepine. *Neurol* 2005; 64:1868-1873.

Sandercock PA, Leong TS. Low-molecular-weight heparins or heparinoids versus standard unfractionated heparin for acute ischaemic stroke. *Cochrane Database Syst Rev*. 2017 Apr 4;4(4):CD000119.

Schimmel M, Leemann B, Christou P, et al. Oral health-related quality of life in hospitalised stroke patients. *Gerodontology* 2011;28:3-11

Sherman DG, Albers GW, Bladin C, Fieschi C, Gabbai AA, Kase CS, O'Riordan W, Pineo GF; PREVAIL Investigators. The efficacy and safety of enoxaparin versus unfractionated heparin for the prevention of venous thromboembolism after acute ischaemic stroke (PREVAIL Study): an open-label randomised comparison. *Lancet* 2007;369*:* 1347-1355.

Smith EE, Kent DM, Bulsara KR, Leung LY, Lichtman JH, Reeves MJ, Towfighi A, Whiteley WN, Zahuranec DB; on behalf of the American Heart Association Stroke Council. Effect of dysphagia screening strategies on clinical outcomes after stroke: a systematic review for the 2018 guidelines for the early management of patients with acute ischemic stroke. *Stroke*. 2018;49(3):e123-e128.

Sorbello D, Dewey HM, Churilov L, Thrift AG, Collier JM, Donnan G et al. Very early mobilisation and complications in the first 3 months after stroke: further results from phase II of a very early rehabilitation trial (AVERT). *Cerebrovasc Dis* 2009;2: 378-383.

Sorensen RT, Rasmussen RS, Overgaard K, Lerche A, Johansen AM, Lindhardt T. Dysphagia screening and intensified oral hygiene reduce pneumonia after stroke. *J Neurosci Nurs* 2013;45:139-146.

Sposato LA, Cipriano LE, Saposnik G, Vargas ER, Riccio PM, Hachinski V. Diagnosis of atrial fibrillation after stroke and transient ischaemic attack: a systematic review and meta-analysis*. Lancet Neurol* 2015; 14(4):377-387.

Suissa L, Lachaud S, Mahagne MH. Optimal timing and duration of continuous electrocardiographic monitoring for detecting atrial fibrillation in stroke patients. *J Stroke Cerebrovasc Dis* 2013;22:991-995.

Sundseth A, Thommessen B, & Ronning OM. Outcome after mobilization within 24 hours of acute stroke: a randomizaed controlled trial. *Stroke* 2012;43: 2389-2394.

Thomas LH, Watkins CL, Sutton CJ, et al. Identifying continence options after stroke (ICONS): a cluster randomised controlled feasibility trial. *Trials* 2014;15:509.

Thomas LH, Coupe J, Cross LD, Tan AL, Watkins CL. Interventions for treating urinary incontinence after stroke in adults. *Cochrane Database Syst Rev*. 2019 Feb 1;2(2):CD004462.

Titsworth WL, Abram J, Fullerton A et al. Prospective quality initiative to maximize dysphagia screening reduces hospital-acquired pneumonia prevalence in patients with stroke. *Stroke* 2013;44:3154-3160.

van Tuijl JH, van Raak EP, de Krom MC, Lodder J, & Aldenkamp AP. Early treatment after stroke for the prevention of late epileptic seizures: a report on the problems performing a randomised placebo-controlled double-blind trial aimed at anti-epileptogenesis. *Seizure* 2011; 20 :285-291.

Wachter R, Groschel K, Gelbrich G, Hamann GF, Kermer P, Liman J, Seegers J, Wasser K, Schulte A, Jurries F et al. Holter-electrocardiogram-monitoring in patients with acute ischaemic stroke (find-afrandomised): An open-label randomised controlled trial. *Lancet Neurol* 2017;16(4):282–290

Westendorp WF, Nederkoorn PJ, Vermeij JD, et al. Post-stroke infection: a systematic review and meta-analysis. *BMC Neurol* 2011;11:110.

Zhang L, Harrison JK, Goldstein LB. Echocardiography for the detection of cardiac sources of embolism in patients with stroke or transient ischemic attack. *J Stroke Cerebrovasc Dis* 2012;21:577-582.

Zhao J, Yuan F, Song C, Yin R, Chang M, Zhang W. et al; OPENS Trial Investigators. Safety and efficacy of three enteral feeding strategies in patients with severe stroke in China (OPENS): A multicentre, prospective, randomised, open-label, blinded-endpoint trial. *Lancet Neurol*. 2022;319-328. **NEW**