

European Stroke Organisation (ESO) guidelines on the management of space-occupying brain infarction

2021 online supplement

Supplemental Table 1: Intellectual and financial disclosures of the module working group members

Author	Discipline and affiliation	Intellectual and financial disclosures
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Patrik Michel	Neurologist, Lausanne University Hospital	Intellectual disclosures: Author of the recommendation "Decompressive craniectomy for space occupying hemispheric and cerebellar ischemic strokes: Swiss recommendations", Int J Stroke 2009

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H. Bart van der Worp	Neurologist, University medical Center Utrecht, the Netherlands	Intellectual disclosures: Chief Investigator of HAMLET; co-author of Vahedi 2007 and corresponding author of Reinink 2021 Financial disclosures: Consultancy for Bayer and LivaNova

Literature search strategy

The following search terms and their corresponding Medical Subject Heading (MeSH) terms were used to identify the articles and these searches varied with the PICOs.

Decompression:

((brain ischemia) OR (brain infarction) OR (brain hypoxia) OR (carotid artery disease*) OR (carotid artery thrombosis) OR (carotid artery dissection) OR (intracranial arterial diseases) OR (cerebral arterial diseases) OR (cerebral arterial infarction) OR (anterior cerebral artery infarction) OR (middle cerebral artery infarction) OR (posterior cerebral artery infarction) OR (intracranial embolism) OR (intracranial thrombosis) OR (stroke) OR (vertebral artery dissection) OR (brain edema) OR (((brain OR cerebr* OR cerebell* OR vertebrobasil* OR hemispher* OR intracran* OR intracerebral OR infratentorial OR supratentorial) OR (middle cerebral artery) OR MCA* OR (anterior circulation) OR (posterior circulation) OR (basilar artery) OR (vertebral artery) OR (space-occupying)) AND (ischemic OR infarct* OR thrombo* OR emboli* OR occlus* OR hypoxi* OR oedema OR odema OR edema OR swell* OR swollen OR herniation)))
decompression, surgical/ or decompressive craniectomy/

(decompress\$ or craniectom\$ or hemicraniect\$ or hemi-craniect\$).tw.
(Randomized Controlled Trials) OR (random allocation) OR (Controlled Clinical Trial*) OR
(clinical trials) OR (double-blind method) OR (single-blind method) OR (randomized
controlled trial) OR (RCT*) OR (random*) OR (quasi-random*) OR (pseudo-random*)

Drainage:

((brain ischemia) OR (brain infarction) OR (brain hypoxia) OR (carotid artery disease*) OR
(carotid artery thrombosis) OR (carotid artery dissection) OR (intracranial arterial diseases) OR
(cerebral arterial diseases) OR (cerebral arterial infarction) OR (anterior cerebral artery
infarction) OR (middle cerebral artery infarction) OR (posterior cerebral artery infarction) OR
(intracranial embolism) OR (intracranial thrombosis) OR (stroke) OR (vertebral artery
dissection) OR (brain edema) OR (((brain OR cerebr* OR cerebell* OR vertebrobasil* OR
hemispher* OR intracran* OR intracerebral OR infratentorial OR supratentorial) OR (middle
cerebral artery) OR MCA* OR (anterior circulation) OR (posterior circulation) OR (basilar
artery) OR (vertebral artery) OR (space-occupying)) AND (ischemic OR infarct* OR thrombo*
OR emboli* OR occlus* OR hypoxi* OR oedema OR odema OR edema OR swell* OR swollen
OR herniation)))

cerebrospinal fluid shunts/ or ventriculoperitoneal shunt/ or ventriculostomy/

1.exp cerebral ventricles/ or cerebrospinal fluid/

2. drainage/ or drain\$.tw.

3. 1 and 2

(external ventricular drain\$ or extraventricular drain\$ or EVD or intraventricular catheter\$ or
IVC or ventriculostom\$).tw.

((cerebrospinal fluid\$ or CSF or ventric\$) adj5 (drain\$ or divert or diversion or catheter or
shunt\$)).tw.

(Randomized Controlled Trials) OR (random allocation) OR (Controlled Clinical Trial*) OR
(clinical trials) OR (double-blind method) OR (single-blind method) OR (randomized
controlled trial) OR (RCT*) OR (random*) OR (quasi-random*) OR (pseudo-random*)

Glyburide:

((brain ischemia) OR (brain infarction) OR (brain hypoxia) OR (carotid artery disease*) OR
(carotid artery thrombosis) OR (carotid artery dissection) OR (intracranial arterial diseases) OR
(cerebral arterial diseases) OR (cerebral arterial infarction) OR (anterior cerebral artery
infarction) OR (middle cerebral artery infarction) OR (posterior cerebral artery infarction) OR
(intracranial embolism) OR (intracranial thrombosis) OR (stroke) OR (vertebral artery
dissection) OR (brain edema) OR (((brain OR cerebr* OR cerebell* OR vertebrobasil* OR
hemispher* OR intracran* OR intracerebral OR infratentorial OR supratentorial) OR (middle
cerebral artery) OR MCA* OR (anterior circulation) OR (posterior circulation) OR (basilar
artery) OR (vertebral artery) OR (space-occupying)) AND (ischemic OR infarct* OR thrombo*
OR emboli* OR occlus* OR hypoxi* OR oedema OR odema OR edema OR swell* OR swollen
OR herniation)))

Diabeta OR Glynase OR (Glynase PresTab) OR Flycron OR Glibenclamide OR sulfonylurea OR
Glibenclamida OR Glibenclamidu OR glyburide OR Diabeta OR Glynase OR (Glynase PresTab)
OR Flycron OR Glibenclamide OR (sulfonylurea) OR Glibenclamida OR Glibenclamidu

(Randomized Controlled Trials) OR (random allocation) OR (Controlled Clinical Trial*) OR (clinical trials) OR (double-blind method) OR (single-blind method) OR (randomized controlled trial) OR (RCT*) OR (random*) OR (quasi-random*) OR (pseudo-random*)

Intracranial pressure:

((brain ischemia) OR (brain infarction) OR (brain hypoxia) OR (carotid artery disease*) OR (carotid artery thrombosis) OR (carotid artery dissection) OR (intracranial arterial diseases) OR (cerebral arterial diseases) OR (cerebral arterial infarction) OR (anterior cerebral artery infarction) OR (middle cerebral artery infarction) OR (posterior cerebral artery infarction) OR (intracranial embolism) OR (intracranial thrombosis) OR (stroke) OR (vertebral artery dissection) OR (brain edema) OR (((brain OR cerebr* OR cerebell* OR vertebrobasil* OR hemispher* OR intracran* OR intracerebral OR infratentorial OR supratentorial) OR (middle cerebral artery) OR MCA* OR (anterior circulation) OR (posterior circulation) OR (basilar artery) OR (vertebral artery) OR (space-occupying)) AND (ischemic OR infarct* OR thrombo* OR emboli* OR occlus* OR hypoxi* OR oedema OR odema OR edema OR swell* OR swollen OR herniation)))

(intracranial pressure.mp.) OR (intracranial pressure.tw.) OR (intracranial pressure monitoring.mp.) OR (intracranial pressure monitoring.tw.) OR (intracranial pressure monitor.mp.) OR (intracranial pressure monitor.tw.) OR (intracranial hypertension.mp.) OR (intracranial hypertension.tw.)

(Randomized Controlled Trials) OR (random allocation) OR (Controlled Clinical Trial*) OR (clinical trials) OR (double-blind method) OR (single-blind method) OR (randomized controlled trial) OR (RCT*) OR (random*) OR (quasi-random*) OR (pseudo-random*)

Mechanical ventilation:

((brain ischemia) OR (brain infarction) OR (brain hypoxia) OR (carotid artery disease*) OR (carotid artery thrombosis) OR (carotid artery dissection) OR (intracranial arterial diseases) OR (cerebral arterial diseases) OR (cerebral arterial infarction) OR (anterior cerebral artery infarction) OR (middle cerebral artery infarction) OR (posterior cerebral artery infarction) OR (intracranial embolism) OR (intracranial thrombosis) OR (stroke) OR (vertebral artery dissection) OR (brain edema) OR (((brain OR cerebr* OR cerebell* OR vertebrobasil* OR hemispher* OR intracran* OR intracerebral OR infratentorial OR supratentorial) OR (middle cerebral artery) OR MCA* OR (anterior circulation) OR (posterior circulation) OR (basilar artery) OR (vertebral artery) OR (space-occupying)) AND (ischemic OR infarct* OR thrombo* OR emboli* OR occlus* OR hypoxi* OR oedema OR odema OR edema OR swell* OR swollen OR herniation)))

(mechanical ventilation) OR (mechanically ventilat*) OR (mechanical intubation) OR (intubation) OR (intubat*) OR (Respiration, Artificial) OR (artificial ventilation) OR (ventilators, mechanical*) OR (ventilator*) OR (continuous positive airway pressure) OR (bilevel positive airway pressure) OR (mechanical ventilators) OR (CPAP OR BPAP) OR (Artificial Respiration) OR (Respiratory Mechanics) OR (Positive-Pressure Respiration) (mechanic* or artificial* or assist* or control*) adj3 (respirat* or breathing).mp.

(Randomized Controlled Trials) OR (random allocation) OR (Controlled Clinical Trial*) OR (clinical trials) OR (double-blind method) OR (single-blind method) OR (randomized controlled trial) OR (RCT*) OR (random*) OR (quasi-random*) OR (pseudo-random*).

Osmotic:

((brain ischemia) OR (brain infarction) OR (brain hypoxia) OR (carotid artery disease*) OR (carotid artery thrombosis) OR (carotid artery dissection) OR (intracranial arterial diseases) OR (cerebral arterial diseases) OR (cerebral arterial infarction) OR (anterior cerebral artery infarction) OR (middle cerebral artery infarction) OR (posterior cerebral artery infarction) OR (intracranial embolism) OR (intracranial thrombosis) OR (stroke) OR (vertebral artery dissection) OR (brain edema) OR (((brain OR cerebr* OR cerebell* OR vertebrobasil* OR hemispher* OR intracran* OR intracerebral OR infratentorial OR supratentorial) OR (middle cerebral artery) OR MCA* OR (anterior circulation) OR (posterior circulation) OR (basilar artery) OR (vertebral artery) OR (space-occupying)) AND (ischemic OR infarct* OR thrombo* OR emboli* OR occlus* OR hypoxi* OR oedema OR odema OR edema OR swell* OR swollen OR herniation)))

diuretics, osmotic/ or isosorbide/ or mannitol/ hypertonic solutions/ or glucose solution, hypertonic/ or saline solution, hypertonic/ or glycerol/ or sorbitol exp diuretics/ or furosemide/

Hydroxyethyl Starch Derivatives/

osmosis/de

(osmo\$ adj5 (therap\$ or agent\$ or substance\$ or diuretic\$ or drug\$)).tw.

(osmotherap\$ or osmo-therap\$).tw.

(mannitol or osmitrol or osmofundin or isosorbide or dianhydrosorbitol or glycerol or glycerin\$ or sorbitol or furosemide or frusemid\$ or fusid or salix or lasix).tw,nm.

(hypertonic adj3 (saline or sodium chloride or glucose)).tw,nm.

(hydroxyethyl starch or HAES or hetastarch or pentastarch).tw,nm

(Randomized Controlled Trials) OR (random allocation) OR (Controlled Clinical Trial*) OR (clinical trials) OR (double-blind method) OR (single-blind method) OR (randomized controlled trial) OR (RCT*) OR (random*) OR (quasi-random*) OR (pseudo-random*)

Corticosteroids:

((brain ischemia) OR (brain infarction) OR (brain hypoxia) OR (carotid artery disease*) OR (carotid artery thrombosis) OR (carotid artery dissection) OR (intracranial arterial diseases) OR (cerebral arterial diseases) OR (cerebral arterial infarction) OR (anterior cerebral artery infarction) OR (middle cerebral artery infarction) OR (posterior cerebral artery infarction) OR (intracranial embolism) OR (intracranial thrombosis) OR (stroke) OR (vertebral artery dissection) OR (brain edema) OR (((brain OR cerebr* OR cerebell* OR vertebrobasil* OR hemispher* OR intracran* OR intracerebral OR infratentorial OR supratentorial) OR (middle cerebral artery) OR MCA* OR (anterior circulation) OR (posterior circulation) OR (basilar artery) OR (vertebral artery) OR (space-occupying)) AND (ischemic OR infarct* OR thrombo* OR emboli* OR occlus* OR hypoxi* OR oedema OR odema OR edema OR swell* OR swollen OR herniation)))

(exp Adrenal Cortex Hormones/ or exp Glucocorticoids/ or exp Mineralocorticoids/ (steroid\$ or corticosteroid\$ or corticoid\$ or glucocorticoid\$ or glucocorticosteroid\$ or mineralocorticoid\$ or adrenal cortex hormone\$).tw.

(betamethasone or beclometasone or dexamethasone or meprednisone or methylprednisolone or prednisolone or triamcinolone or fludrocortisone or cortisone or corticosterone or hydrocortisone or hydroxyhydrocortisone or hydrocorticosteroid\$ or tetrahydrocort\$ or desoxycorticosterone).tw,nm.)

(Randomized Controlled Trials) OR (random allocation) OR (Controlled Clinical Trial*) OR (clinical trials) OR (double-blind method) OR (single-blind method) OR (randomized controlled trial) OR (RCT*) OR (random*) OR (quasi-random*) OR (pseudo-random*)

Hyperventilation:

((brain ischemia) OR (brain infarction) OR (brain hypoxia) OR (carotid artery disease*) OR (carotid artery thrombosis) OR (carotid artery dissection) OR (intracranial arterial diseases) OR (cerebral arterial diseases) OR (cerebral arterial infarction) OR (anterior cerebral artery infarction) OR (middle cerebral artery infarction) OR (posterior cerebral artery infarction) OR (intracranial embolism) OR (intracranial thrombosis) OR (stroke) OR (vertebral artery dissection) OR (brain edema) OR (((brain OR cerebr* OR cerebell* OR vertebrobasil* OR hemispher* OR intracran* OR intracerebral OR infratentorial OR supratentorial) OR (middle cerebral artery) OR MCA* OR (anterior circulation) OR (posterior circulation) OR (basilar artery) OR (vertebral artery) OR (space-occupying)) AND (ischemic OR infarct* OR thrombo* OR emboli* OR occlus* OR hypoxi* OR oedema OR odema OR edema OR swell* OR swollen OR herniation)))

(exp hyperventilation/ or hypocapnia/ or carbon dioxide/)

(hyperventilat\$ or hypocapn\$ or hypocarbi\$ or alkalosis or alkaloses).tw.

carbon dioxide/ and (low\$ or decreas\$ or reduc\$ or drop\$ or fall\$ or deficien\$ or blood).tw.

((carbon dioxide or CO2) adj5 (low\$ or decreas\$ or reduc\$ or drop\$ or fall\$ or deficien\$ or blood)).tw. OR PaCO2.tw.

(Randomized Controlled Trials) OR (random allocation) OR (Controlled Clinical Trial*) OR (clinical trials) OR (double-blind method) OR (single-blind method) OR (randomized controlled trial) OR (RCT*) OR (random*) OR (quasi-random*) OR (pseudo-random*)

Sedation:

((brain ischemia) OR (brain infarction) OR (brain hypoxia) OR (carotid artery disease*) OR (carotid artery thrombosis) OR (carotid artery dissection) OR (intracranial arterial diseases) OR (cerebral arterial diseases) OR (cerebral arterial infarction) OR (anterior cerebral artery infarction) OR (middle cerebral artery infarction) OR (posterior cerebral artery infarction) OR (intracranial embolism) OR (intracranial thrombosis) OR (stroke) OR (vertebral artery dissection) OR (brain edema) OR (((brain OR cerebr* OR cerebell* OR vertebrobasil* OR hemispher* OR intracran* OR intracerebral OR infratentorial OR supratentorial) OR (middle cerebral artery) OR MCA* OR (anterior circulation) OR (posterior circulation) OR (basilar artery) OR (vertebral artery) OR (space-occupying)) AND (ischemic OR infarct* OR thrombo* OR emboli* OR occlus* OR hypoxi* OR oedema OR odema OR edema OR swell* OR swollen OR herniation)))

((sedat\$ or hypnotic\$ or barbiturate\$ or soporific\$ or alprazolam or amobarbital or azaperone or barbital or bromisovalum or chloral hydrate or chloralose or chlordiazepoxide or chlormethiazole or clonazepam or clorazepate or dexmedetomidine or diazepam or diphenhydramine or ethchlorvynol or etomidate or etorphine or flunitrazepam or flurazepam or glutethimide or hexobarbital or lorazepam or lormetazepam or medazepam or medetomidine or mephobarbital or meprobamate or methapyrilene or methaqualone or midazolam or nitrazepam or oxazepam or paraldehyde or pentobarbital or phenobarbital or promethazine or propofol or secobarbital or temazepam or thiamylal or thiopental or xylazine or zolpidem or zopiclone).tw,nm.)

(Randomized Controlled Trials) OR (random allocation) OR (Controlled Clinical Trial*) OR (clinical trials) OR (double-blind method) OR (single-blind method) OR (randomized controlled trial) OR (RCT*) OR (random*) OR (quasi-random*) OR (pseudo-random*)

Hypothermia:

((brain ischemia) OR (brain infarction) OR (brain hypoxia) OR (carotid artery disease*) OR (carotid artery thrombosis) OR (carotid artery dissection) OR (intracranial arterial diseases) OR (cerebral arterial diseases) OR (cerebral arterial infarction) OR (anterior cerebral artery infarction) OR (middle cerebral artery infarction) OR (posterior cerebral artery infarction) OR (intracranial embolism) OR (intracranial thrombosis) OR (stroke) OR (vertebral artery dissection) OR (brain edema) OR (((brain OR cerebr* OR cerebell* OR vertebrobasil* OR hemispher* OR intracran* OR intracerebral OR infratentorial OR supratentorial) OR (middle cerebral artery) OR MCA* OR (anterior circulation) OR (posterior circulation) OR (basilar artery) OR (vertebral artery) OR (space-occupying)) AND (ischemic OR infarct* OR thrombo* OR emboli* OR occlus* OR hypoxi* OR oedema OR odema OR edema OR swell* OR swollen OR herniation)))

(Hypothermia, induced/ cryotherapy/ cool/ cold temperature/ or ice/ or extreme cold/ or shivering/) OR

(hypothermi\$ adj5 (therapeutic or artificial or induce or induced or induction or intentional or therap\$ or process or protocol\$ or protective or neuroprotect\$ or cap or caps or helmet\$ or scalp)).tw.

hypothermia/ and (therapeutic or artificial or induce or induced or induction or intentional or therap\$ or process or protocol\$ or protective or neuroprotect\$ or cap or caps or helmet\$ or scalp).tw.

(temperature\$ adj5 (lower\$ or decreas\$ or reduc\$ or drop\$)).tw.

(body temperature/ or temperature/ or skin temperature/) AND (lower\$ or decreas\$ or reduc\$ or drop\$).tw.

((cool or cold or ice-cold) adj5 (therap\$ or temperature\$ or device\$ or equipment or fluid or catheter\$ or bath\$ or air)).tw.

(cryother\$ or cryogen\$ or cryotreat\$ or shiver\$).tw.

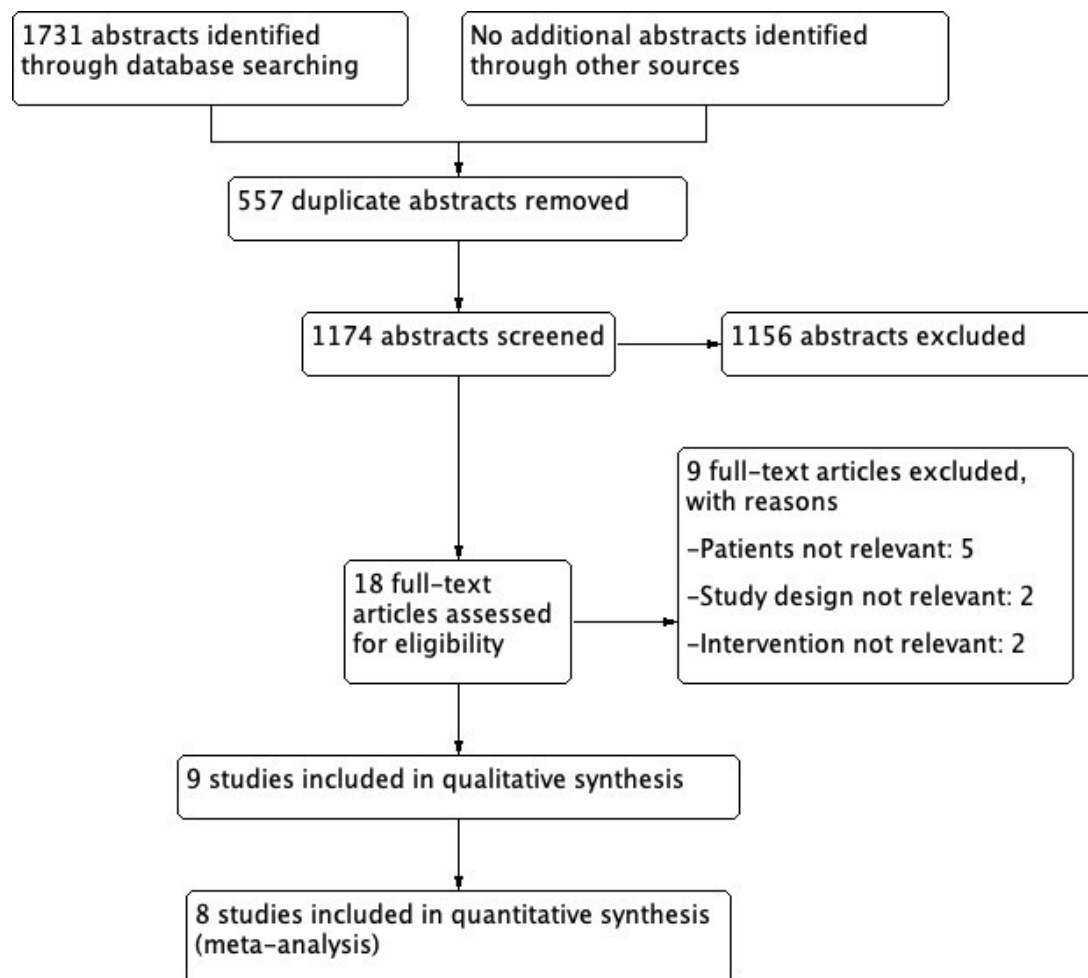
(cooling or cooled or chilling or chilled or cools or coolcap or coolant or ice or icepack\$ or cold water or iced water or water blanket or sponging or bathing or fan or fanning or coolgard).tw.

((cool or cold or ice-cold) adj5 (blanket\$ or collar or helmet or hood)).tw.

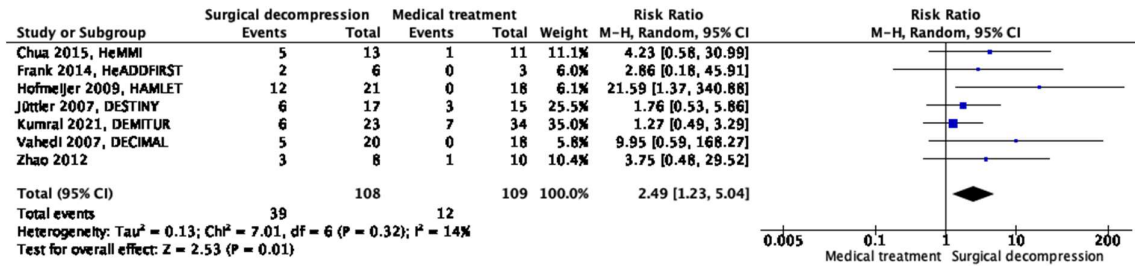
(Randomized Controlled Trials) OR (random allocation) OR (Controlled Clinical Trial*) OR (clinical trials) OR (double-blind method) OR (single-blind method) OR (randomized controlled trial) OR (RCT*) OR (random*) OR (quasi-random*) OR (pseudo-random*)

Figures

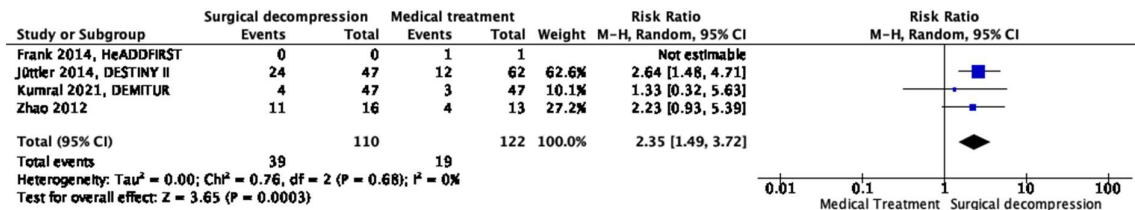
Supplemental figure 1: results of search for PICOs 1, 2 and 3



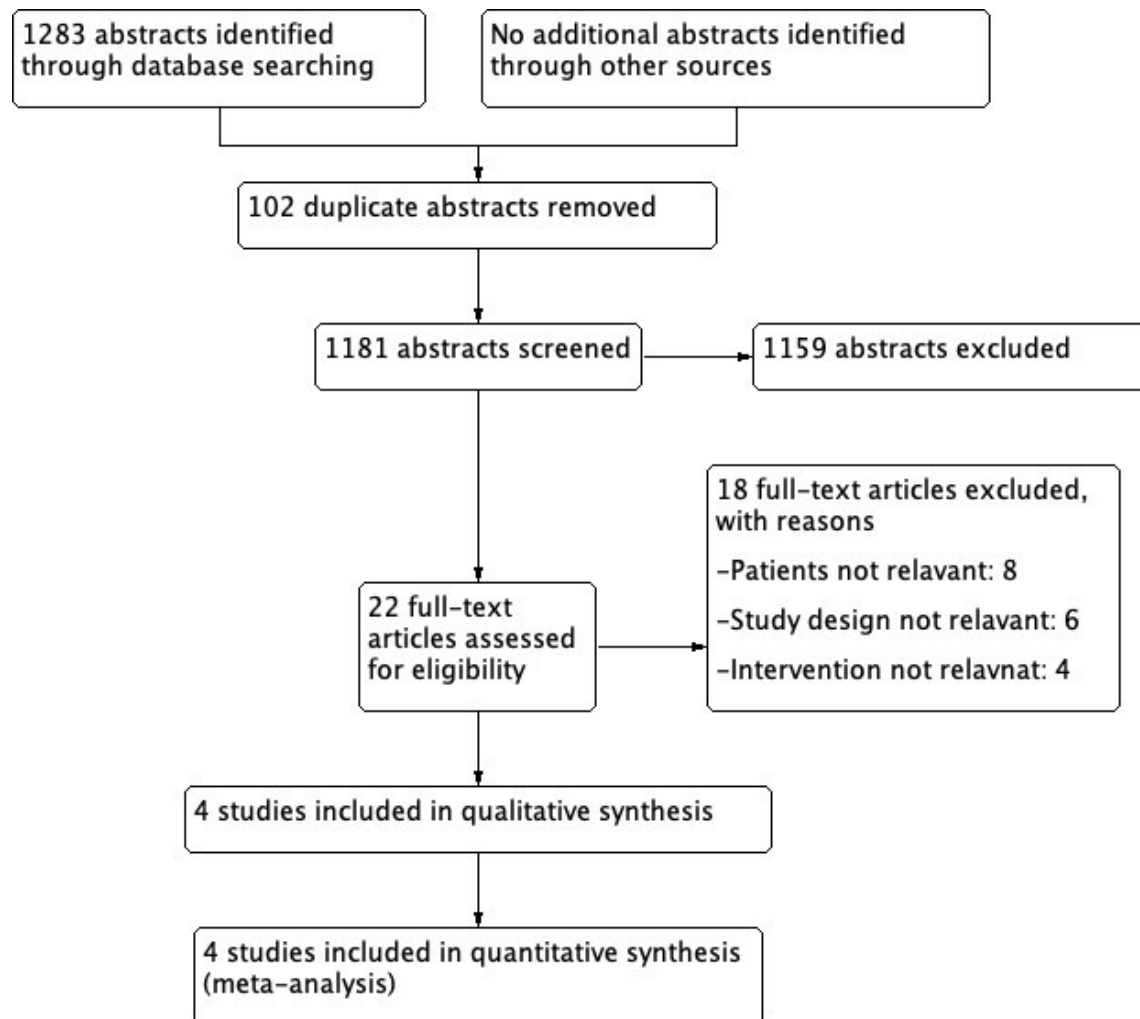
Supplemental Figure 2. Risk of moderately severe to severe disability (mRS 4, 5) with surgical decompression vs. medical treatment in patients aged 18 up to and including 60 years with space-occupying hemispheric infarction who can be treated within 48 hours of stroke onset.



Supplemental Figure 3. Risk of moderately severe to severe disability (mRS 4, 5) with surgical decompression vs. medical treatment in patients aged 61 years or older with space-occupying hemispheric infarction who can be treated within 48 hours of stroke onset.



Supplemental figure 4. results of search for PICO 12



Supplemental figure 5: results of search for PICO 13

