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# ESO Guideline on Mobile Stroke Units for Prehospital Stroke Management

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Guideline Webinar – 3rd February 2022

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# Disclosures of the MWG
(listed in Supplementary Table 1 of the publication)

## 1. Intellectual disclosures:

*Karianne Larsen:* MSU study investigator, PRESTO Board member

*Simona Sacco:* Co-chair of the Guideline Board of the European Stroke Organization

*Thorsten Steiner:* ATACH-2

*Guillaume Turc:* Chairman ESO Guideline board, Co-chairman 2019 ESO-ESMINT Guidelines on mechanical thrombectomy, Co-chairman 2021 ESO Guidelines on IVT

*Georgios Tsivgoulis:* Section Editor: “Stroke” journal, Associate Editor: “Therapeutics advances in Neurological Disorders” journal, Chair ESO Industry Roundtable

*Silke Walter:* Investigator of MSU studies, PRESTO Board member, Co-Chair of WISE, Co-Chair of ESOTA

## 2. Financial disclosures:

*Heinrich Audebert:* Speaker honoraria from Lundbeck, Boehringer Ingelheim (<€10,000 within last 3 years); Principal investigator INSPiRE-TMS project (co-funded by Pfizer); employed by the Charité Universitätsmedizin Berlin (receives institutional share from the STEMO manufacturer (Meytec GmbH), no personal/team access to this money)

*Simona Sacco:* Personal fees as speaker or advisor: Abbott, Allergan, AstraZeneca, Eli Lilly, Novartis, Teva. Research grants: Allergan, Novartis. Non-financial support: Abbott, Allergan, Bayer, Bristol-Myers Squibb, Daiichi-Sankyo, Eli Lilly, Medtronic, Novartis, Pfizer, Starmed, Teva. Fees for CME/education: Medscape

*Thorsten Steiner:* Personal fees: Bayer, Boehringer, BMS-Pfizer, Daiichy Sankyo, Alexion

*Guillaume Turc:* Lecturing fees for Guerbet France, Travel support by Samsung Electronics France

*Georgios Tsivgoulis:* Participation in advisory meetings & satellite symposia for Boehringer-Ingelheim; Novartis, Sanofi, Biogen, Genesis Pharma, Teva, Merck-Serono, Bayer, Daichii-Sankyo, Allergan, Specifar, Actavis, Shire, Medtronic, CSL Behring, Abbvie, Abbott, Takeda, Biomarin, Abbvie, Ipsen, Abbott, Takeda, Roche. Unrestricted research grants from Novartis, Genesis Pharma, Teva, Shire, Merck-Serono, Medtronic, Boehringer-Ingelheim, Allergan, Abbott, Amicus, Abbvie, Ipsen, Abbott, Sanofi, Bayer, Roche

# Background

## Mobile Stroke Units for prehospital acute stroke patient management

- Multiple publications indicate
  - earlier treatment
  - increased numbers of patients receiving treatment
  - optimised triage to the individually required level of care
  - 2 recent studies add data to clinical outcome

Walter et al., 2012; Ebinger et al., 2014; Bowry et al., 2015; Ebinger et al., 2015; Gomes et al., 2015; Wendt et al., 2015; Taqui et al., 2017; Shuaib et al., 2018; Helwig et al., 2019; Czap et al., 2020; Zhao et al., 2020; Cooley et al., 2021; Ebinger er al., 2021; Grotta et al., 2021; Larsen et al., 2021; Zhou et al., 2021

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# Methods

- ESO Standard operating Procedure for Guidelines with GRADE methodology

(Steiner et al., 2021)

- 3 PICO questions
- 14 outcomes
- RCTs and observational studies considered

- in case of overlapping populations: disentangling by personal communication with authors (Turc et al., 2022)

| | Intervention and Comparator | |
|---|---|---|
| **Population** | **Mobile Stroke Unit** | **Conventional management** |
| **Suspected stroke patients (PICO1)** | Outcomes | **Clinical outcomes:**<br>• mRS<br>• Time to treatment<br>• Triage<br>• Proportion treated<br>**Safety outcomes**<br>• All-cause mortality<br>• Bleeding complications<br>• Mimics treated<br>• Haematoma growth |
| **Confirmed acute ischaemic stroke patients (PICO 2)** | | |
| **Confirmed acute ICH patients (PICO 3)** | | |

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# Methods: Importance of outcomes (Delphi votes):

1. Suspected stroke patients:

mortality (90/7 days): 7.9 and 7.6,
sICH: 7.5,
mimics treated (IVT): 6.4,
major extracranial bleeding: 6.1

2. AIS:

functional outcomes: excellent: 8.9, any better: 8.8, good: 8.4,
proportion receiving treatment: 7.5, time to therapy: 7.3,
mortality (90/7 days): 8.0 and 7.0, “Golden hour” IVT: 7.1,
sICH: 7.3, LVO triaged to tertiary care: 6.8,
major extracranial bleeding: 6.0

3. ICH:

functional outcomes: good 8.5, any better 8.3, excellent 7.6,
mortality (90/7 days): 8.1 and 7.5
ICH triaged to tertiary care: 6.3,
size of haematoma expansion: 6.0

→ 23 sets of analysis and additional sensitivity analysis with further 3 sets of analysis

→ **1 combined recommendation**

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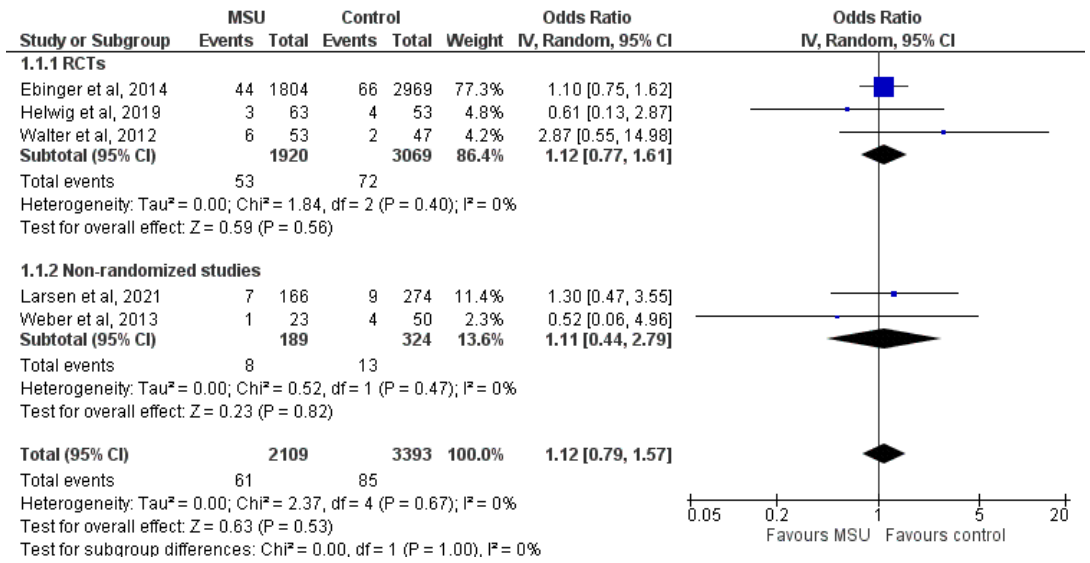
# Suspected Stroke Patients

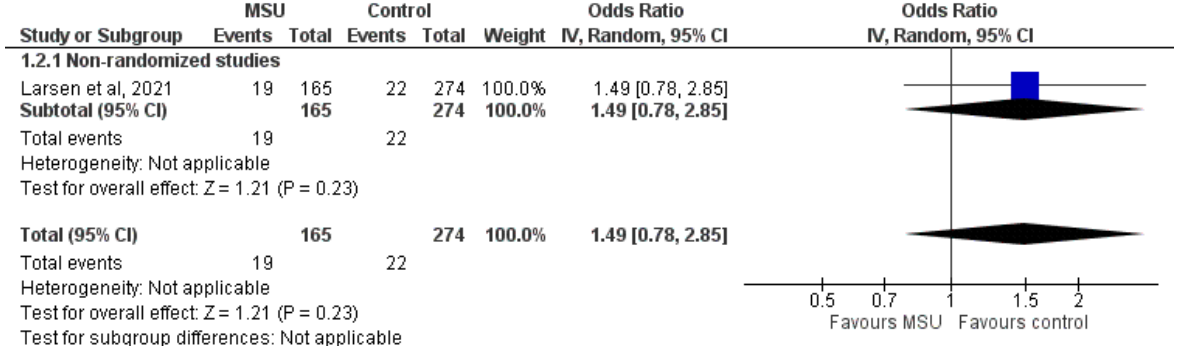
## MSU vs conventional management

### Safety outcome: all-cause mortality 7/90 days



| Study or Subgroup | MSU Events | MSU Total | Control Events | Control Total | Weight | Odds Ratio IV, Random, 95% CI |
|---|---|---|---|---|---|---|
| **1.1.1 RCTs** | | | | | | |
| Ebinger et al, 2014 | 44 | 1804 | 66 | 2969 | 77.3% | 1.10 [0.75, 1.62] |
| Helwig et al, 2019 | 3 | 63 | 4 | 53 | 4.8% | 0.61 [0.13, 2.87] |
| Walter et al, 2012 | 6 | 53 | 2 | 47 | 4.2% | 2.87 [0.55, 14.98] |
| **Subtotal (95% CI)** | | **1920** | | **3069** | **86.4%** | **1.12 [0.77, 1.61]** |
| Total events | 53 | | 72 | | | |
| Heterogeneity: Tau² = 0.00; Chi² = 1.84, df = 2 (P = 0.40); I² = 0% | | | | | | |
| Test for overall effect: Z = 0.59 (P = 0.56) | | | | | | |
| **1.1.2 Non-randomized studies** | | | | | | |
| Larsen et al, 2021 | 7 | 166 | 9 | 274 | 11.4% | 1.30 [0.47, 3.55] |
| Weber et al, 2013 | 1 | 23 | 4 | 50 | 2.3% | 0.52 [0.06, 4.96] |
| **Subtotal (95% CI)** | | **189** | | **324** | **13.6%** | **1.11 [0.44, 2.79]** |
| Total events | 8 | | 13 | | | |
| Heterogeneity: Tau² = 0.00; Chi² = 0.52, df = 1 (P = 0.47); I² = 0% | | | | | | |
| Test for overall effect: Z = 0.23 (P = 0.82) | | | | | | |
| **Total (95% CI)** | | **2109** | | **3393** | **100.0%** | **1.12 [0.79, 1.57]** |
| Total events | 61 | | 85 | | | |
| Heterogeneity: Tau² = 0.00; Chi² = 2.37, df = 4 (P = 0.67); I² = 0% | | | | | | |
| Test for overall effect: Z = 0.63 (P = 0.53) | | | | | | |
| Test for subgroup differences: Chi² = 0.00, df = 1 (P = 1.00), I² = 0% | | | | | | |





| Study or Subgroup | MSU Events | MSU Total | Control Events | Control Total | Weight | Odds Ratio IV, Random, 95% CI |
|---|---|---|---|---|---|---|
| **1.2.1 Non-randomized studies** | | | | | | |
| Larsen et al, 2021 | 19 | 165 | 22 | 274 | 100.0% | 1.49 [0.78, 2.85] |
| **Subtotal (95% CI)** | | **165** | | **274** | **100.0%** | **1.49 [0.78, 2.85]** |
| Total events | 19 | | 22 | | | |
| Heterogeneity: Not applicable | | | | | | |
| Test for overall effect: Z = 1.21 (P = 0.23) | | | | | | |
| **Total (95% CI)** | | **165** | | **274** | **100.0%** | **1.49 [0.78, 2.85]** |
| Total events | 19 | | 22 | | | |
| Heterogeneity: Not applicable | | | | | | |
| Test for overall effect: Z = 1.21 (P = 0.23) | | | | | | |
| Test for subgroup differences: Not applicable | | | | | | |



Quality: Low ⊕⊕
(Bias)

Quality: Very low ⊕
(Imprecision)

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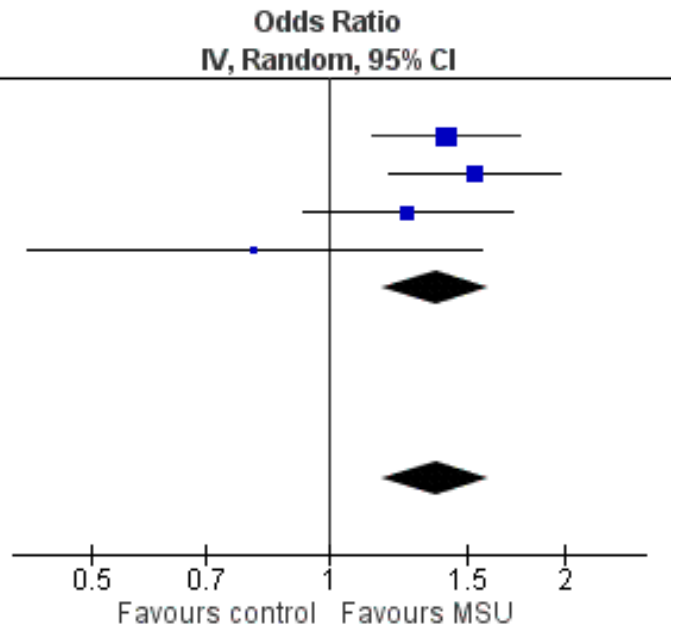
# Acute Ischaemic Stroke Patients

## MSU vs conventional management

### Excellent functional outcome (mRS 0-1)

| Study or Subgroup | MSU Events | MSU Total | Control Events | Control Total | Weight | Odds Ratio IV, Random, 95% CI |
|---|---|---|---|---|---|---|
| **2.1.2 Non-randomized studies** | | | | | | |
| Ebinger et al, 2021 | 333 | 654 | 289 | 683 | 40.1% | 1.41 [1.14, 1.75] |
| Grotta et al, 2021 | 329 | 598 | 185 | 417 | 31.7% | 1.53 [1.19, 1.97] |
| Kunz et al, 2016 | 161 | 305 | 166 | 353 | 22.8% | 1.26 [0.93, 1.71] |
| Larsen et al, 2021 | 39 | 66 | 52 | 81 | 5.5% | 0.81 [0.41, 1.57] |
| **Subtotal (95% CI)** | | **1623** | | **1534** | **100.0%** | **1.37 [1.17, 1.61]** |
| Total events | 862 | | 692 | | | |
| Heterogeneity: Tau² = 0.00; Chi² = 3.56, df = 3 (P = 0.31); I² = 16% | | | | | | |
| Test for overall effect: Z = 3.88 (P = 0.0001) | | | | | | |
| **Total (95% CI)** | | **1623** | | **1534** | **100.0%** | **1.37 [1.17, 1.61]** |
| Total events | 862 | | 692 | | | |
| Heterogeneity: Tau² = 0.00; Chi² = 3.56, df = 3 (P = 0.31); I² = 16% | | | | | | |
| Test for overall effect: Z = 3.88 (P = 0.0001) | | | | | | |




Quality: Moderate ⊕⊕⊕

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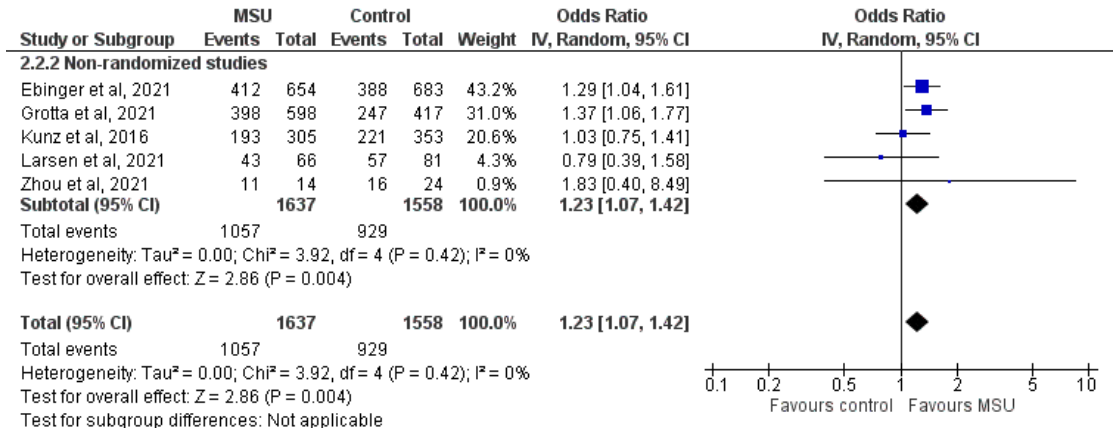
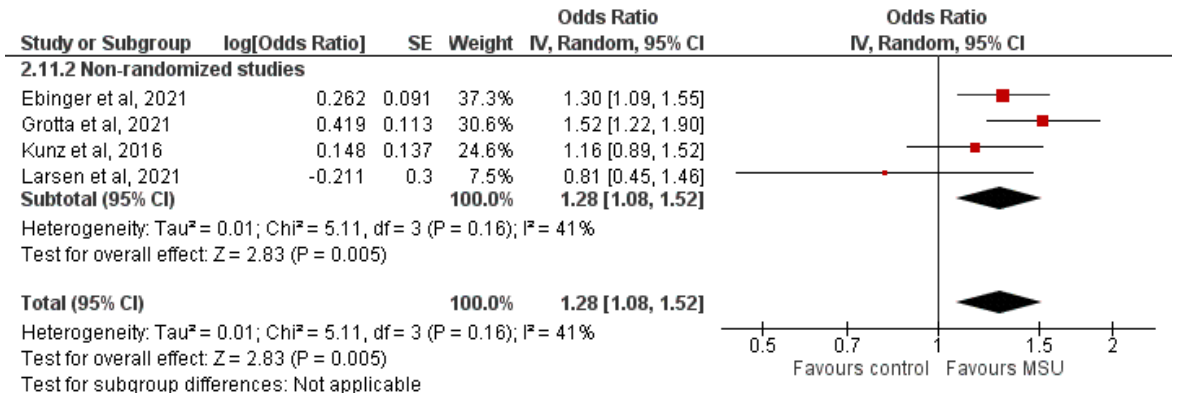
# Acute Ischaemic Stroke Patients

## MSU vs conventional management

Good (mRS 0-2) and any better functional outcome

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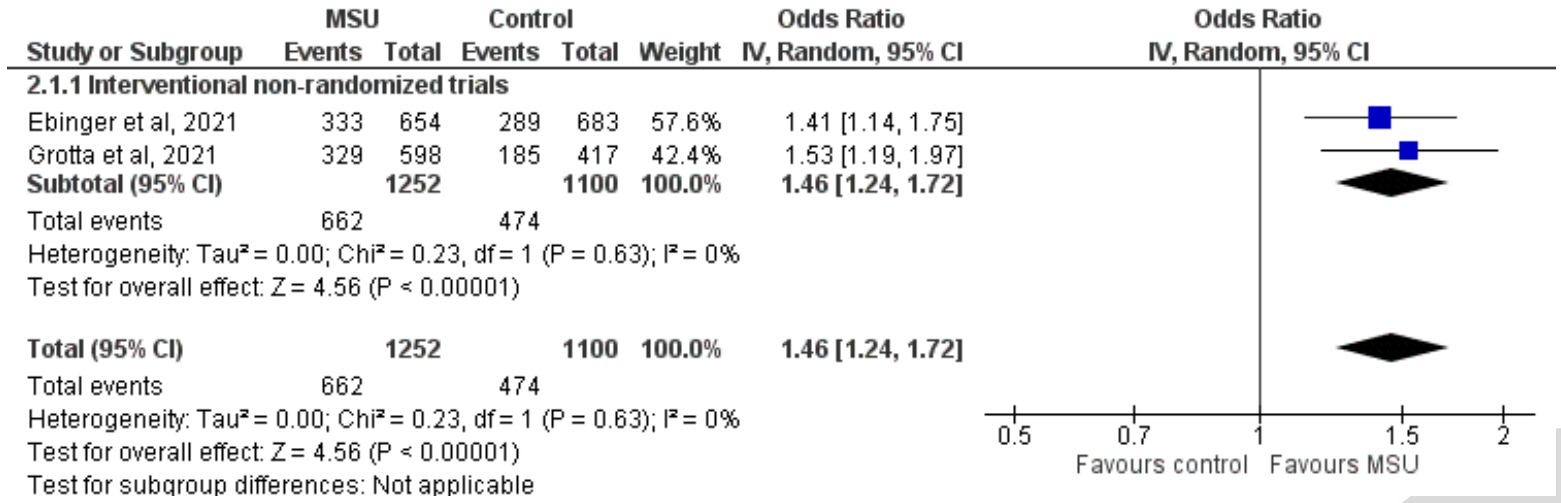
# Additional information for Acute Ischaemic Stroke Patients: Sensitivity analysis

## MSU vs conventional management

### Excellent functional outcome (mRS 0-1)

B_PROUD/BEST-MSU: prospective interventional studies with blinded endpoint



| Study or Subgroup | MSU Events | MSU Total | Control Events | Control Total | Weight | Odds Ratio IV, Random, 95% CI |
|---|---|---|---|---|---|---|
| **2.1.1 Interventional non-randomized trials** | | | | | | |
| Ebinger et al, 2021 | 333 | 654 | 289 | 683 | 57.6% | 1.41 [1.14, 1.75] |
| Grotta et al, 2021 | 329 | 598 | 185 | 417 | 42.4% | 1.53 [1.19, 1.97] |
| **Subtotal (95% CI)** | | **1252** | | **1100** | **100.0%** | **1.46 [1.24, 1.72]** |
| Total events | 662 | | 474 | | | |
| Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.23$, df = 1 (P = 0.63); $I^2 = 0\%$ | | | | | | |
| Test for overall effect: Z = 4.56 (P < 0.00001) | | | | | | |
| **Total (95% CI)** | | **1252** | | **1100** | **100.0%** | **1.46 [1.24, 1.72]** |
| Total events | 662 | | 474 | | | |
| Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.23$, df = 1 (P = 0.63); $I^2 = 0\%$ | | | | | | |
| Test for overall effect: Z = 4.56 (P < 0.00001) | | | | | | |
| Test for subgroup differences: Not applicable | | | | | | |



Quality: Moderate ⊕⊕⊕

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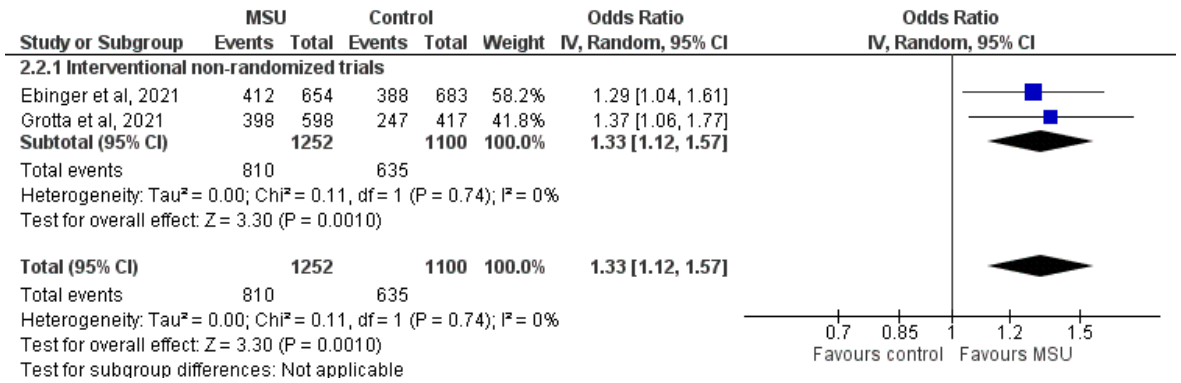
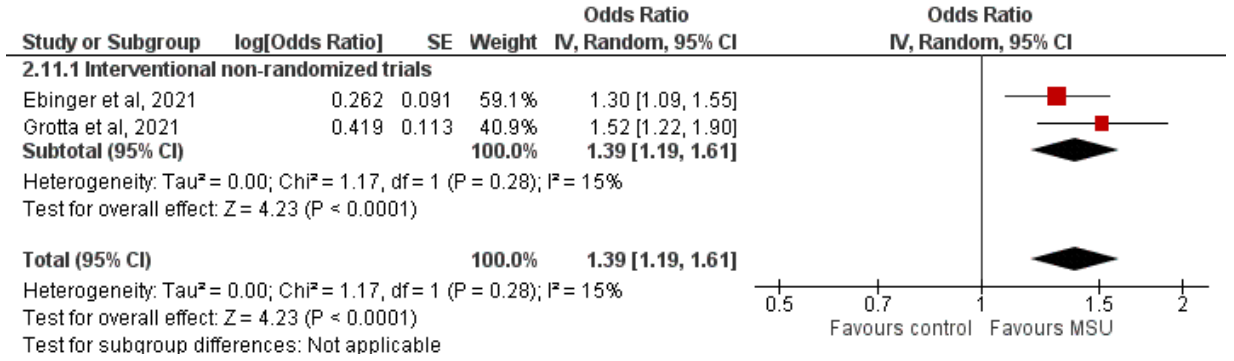
# Additional information for Acute Ischaemic Stroke Patients: Sensitivity analysis: B_PROUD/BEST-MSU

## MSU vs conventional management

### Good (mRS 0-2) and any better functional outcome




Quality: Moderate ⊕⊕⊕

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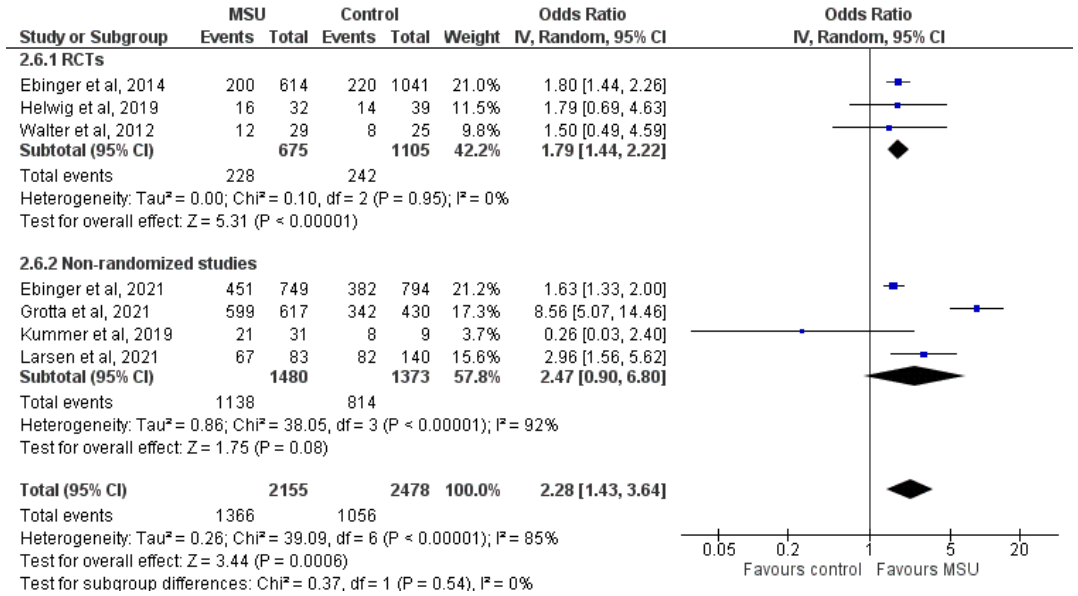
# Acute Ischaemic Stroke Patients

## MSU vs conventional management

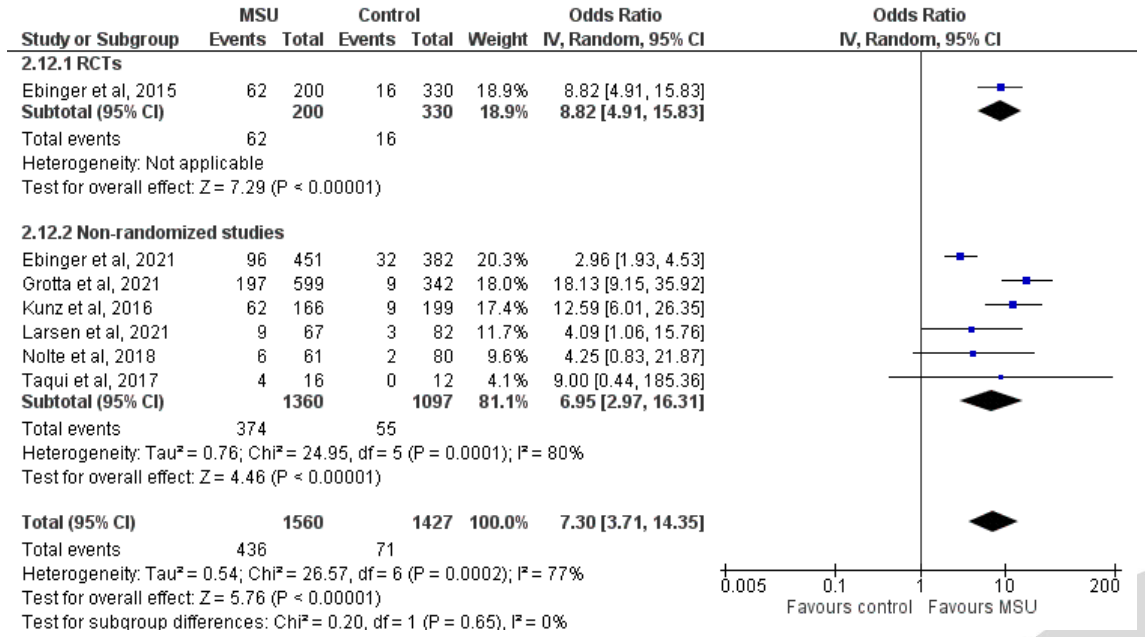
### Proportion of patients receiving IVT and of patients with “Golden hour” IVT



| Study or Subgroup | MSU Events | MSU Total | Control Events | Control Total | Weight | Odds Ratio IV, Random, 95% CI |
|---|---|---|---|---|---|---|
| **2.6.1 RCTs** | | | | | | |
| Ebinger et al, 2014 | 200 | 614 | 220 | 1041 | 21.0% | 1.80 [1.44, 2.26] |
| Helwig et al, 2019 | 16 | 32 | 14 | 39 | 11.5% | 1.79 [0.69, 4.63] |
| Walter et al, 2012 | 12 | 29 | 8 | 25 | 9.8% | 1.50 [0.49, 4.59] |
| **Subtotal (95% CI)** | | **675** | | **1105** | **42.2%** | **1.79 [1.44, 2.22]** |
| Total events | 228 | | 242 | | | |
| Heterogeneity: Tau² = 0.00; Chi² = 0.10, df = 2 (P = 0.95); I² = 0% | | | | | | |
| Test for overall effect: Z = 5.31 (P < 0.00001) | | | | | | |
| **2.6.2 Non-randomized studies** | | | | | | |
| Ebinger et al, 2021 | 451 | 749 | 382 | 794 | 21.2% | 1.63 [1.33, 2.00] |
| Grotta et al, 2021 | 599 | 617 | 342 | 430 | 17.3% | 8.56 [5.07, 14.46] |
| Kummer et al, 2019 | 21 | 31 | 8 | 9 | 3.7% | 0.26 [0.03, 2.40] |
| Larsen et al, 2021 | 67 | 83 | 82 | 140 | 15.6% | 2.96 [1.56, 5.62] |
| **Subtotal (95% CI)** | | **1480** | | **1373** | **57.8%** | **2.47 [0.90, 6.80]** |
| Total events | 1138 | | 814 | | | |
| Heterogeneity: Tau² = 0.86; Chi² = 38.05, df = 3 (P < 0.00001); I² = 92% | | | | | | |
| Test for overall effect: Z = 1.75 (P = 0.08) | | | | | | |
| **Total (95% CI)** | | **2155** | | **2478** | **100.0%** | **2.28 [1.43, 3.64]** |
| Total events | 1366 | | 1056 | | | |
| Heterogeneity: Tau² = 0.26; Chi² = 39.09, df = 6 (P < 0.00001); I² = 85% | | | | | | |
| Test for overall effect: Z = 3.44 (P = 0.0006) | | | | | | |
| Test for subgroup differences: Chi² = 0.37, df = 1 (P = 0.54), I² = 0% | | | | | | |



Quality: Low ⊕⊕ (Bias, Inconsistency)



| Study or Subgroup | MSU Events | MSU Total | Control Events | Control Total | Weight | Odds Ratio IV, Random, 95% CI |
|---|---|---|---|---|---|---|
| **2.12.1 RCTs** | | | | | | |
| Ebinger et al, 2015 | 62 | 200 | 16 | 330 | 18.9% | 8.82 [4.91, 15.83] |
| **Subtotal (95% CI)** | | **200** | | **330** | **18.9%** | **8.82 [4.91, 15.83]** |
| Total events | 62 | | 16 | | | |
| Heterogeneity: Not applicable | | | | | | |
| Test for overall effect: Z = 7.29 (P < 0.00001) | | | | | | |
| **2.12.2 Non-randomized studies** | | | | | | |
| Ebinger et al, 2021 | 96 | 451 | 32 | 382 | 20.3% | 2.96 [1.93, 4.53] |
| Grotta et al, 2021 | 197 | 599 | 9 | 342 | 18.0% | 18.13 [9.15, 35.92] |
| Kunz et al, 2016 | 62 | 166 | 9 | 199 | 17.4% | 12.59 [6.01, 26.35] |
| Larsen et al, 2021 | 9 | 67 | 3 | 82 | 11.7% | 4.09 [1.06, 15.76] |
| Nolte et al, 2018 | 6 | 61 | 2 | 80 | 9.6% | 4.25 [0.83, 21.87] |
| Taqui et al, 2017 | 4 | 16 | 0 | 12 | 4.1% | 9.00 [0.44, 185.36] |
| **Subtotal (95% CI)** | | **1360** | | **1097** | **81.1%** | **6.95 [2.97, 16.31]** |
| Total events | 374 | | 55 | | | |
| Heterogeneity: Tau² = 0.76; Chi² = 24.95, df = 5 (P = 0.0001); I² = 80% | | | | | | |
| Test for overall effect: Z = 4.46 (P < 0.00001) | | | | | | |
| **Total (95% CI)** | | **1560** | | **1427** | **100.0%** | **7.30 [3.71, 14.35]** |
| Total events | 436 | | 71 | | | |
| Heterogeneity: Tau² = 0.54; Chi² = 26.57, df = 6 (P = 0.0002); I² = 77% | | | | | | |
| Test for overall effect: Z = 5.76 (P < 0.00001) | | | | | | |
| Test for subgroup differences: Chi² = 0.20, df = 1 (P = 0.65), I² = 0% | | | | | | |



Quality: Moderate ⊕⊕⊕

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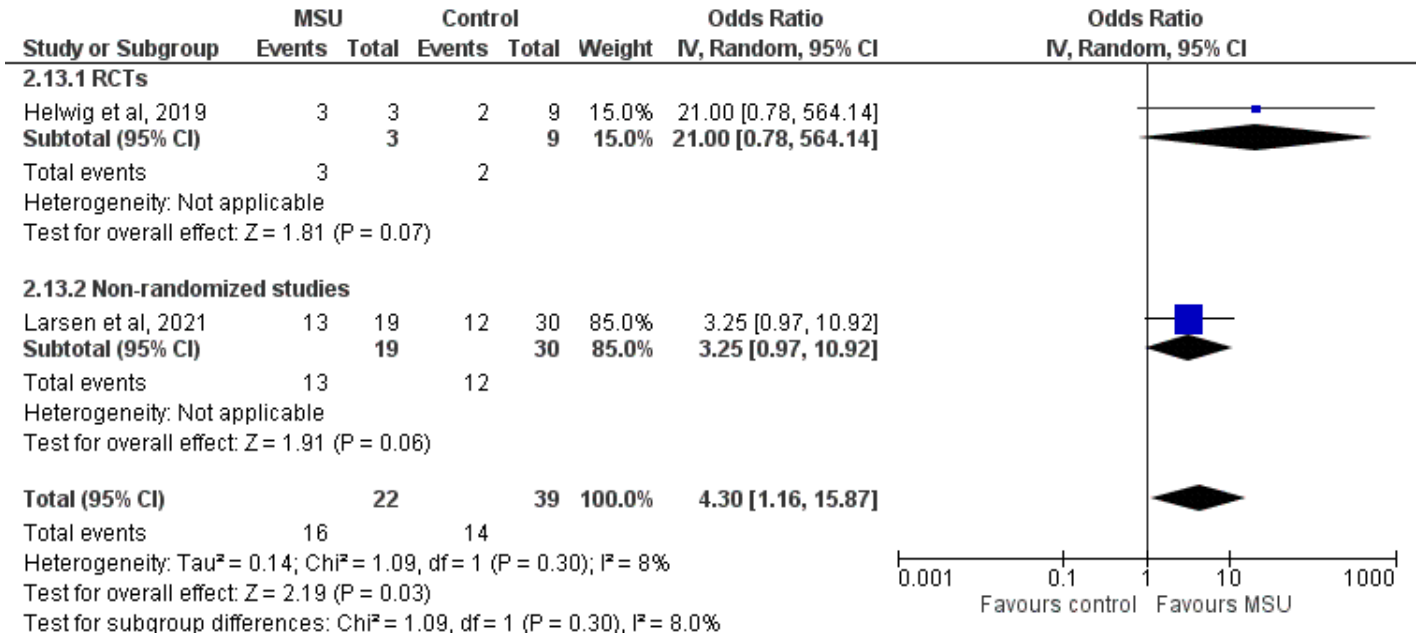
# Acute Ischaemic Stroke Patients – subgroup LVO patients

## MSU vs conventional management

### Proportion of patients primarily transferred to MT capable centres




Quality: Low ⊕⊕ (Bias, Imprecision)

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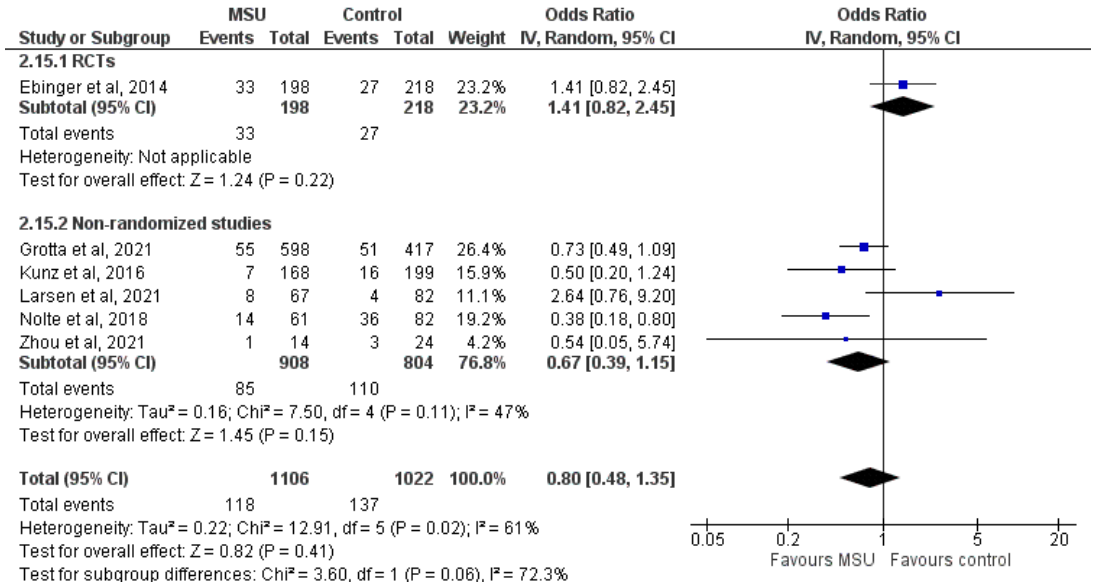
# Acute Ischaemic Stroke Patients

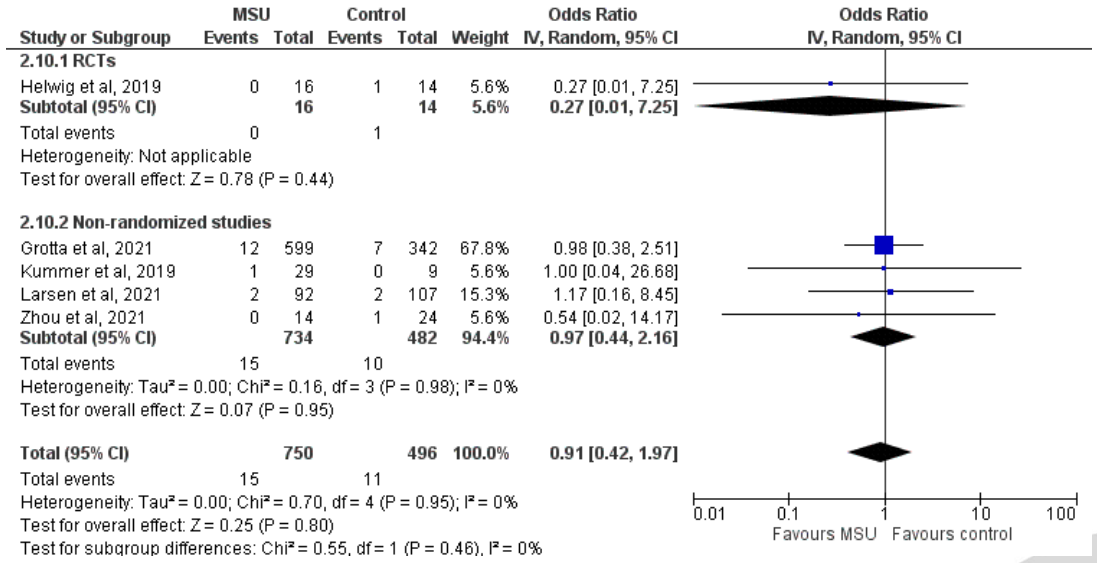
## MSU vs conventional management

### All-cause mortality (90 days) and sICH among IVT-treated patients



| Study or Subgroup | MSU Events | MSU Total | Control Events | Control Total | Weight | Odds Ratio IV, Random, 95% CI |
|---|---|---|---|---|---|---|
| **2.15.1 RCTs** | | | | | | |
| Ebinger et al, 2014 | 33 | 198 | 27 | 218 | 23.2% | 1.41 [0.82, 2.45] |
| **Subtotal (95% CI)** | | **198** | | **218** | **23.2%** | **1.41 [0.82, 2.45]** |
| Total events | 33 | | 27 | | | |
| Heterogeneity: Not applicable | | | | | | |
| Test for overall effect: Z = 1.24 (P = 0.22) | | | | | | |
| **2.15.2 Non-randomized studies** | | | | | | |
| Grotta et al, 2021 | 55 | 598 | 51 | 417 | 26.4% | 0.73 [0.49, 1.09] |
| Kunz et al, 2016 | 7 | 168 | 16 | 199 | 15.9% | 0.50 [0.20, 1.24] |
| Larsen et al, 2021 | 8 | 67 | 4 | 82 | 11.1% | 2.64 [0.76, 9.20] |
| Nolte et al, 2018 | 14 | 61 | 36 | 82 | 19.2% | 0.38 [0.18, 0.80] |
| Zhou et al, 2021 | 1 | 14 | 3 | 24 | 4.2% | 0.54 [0.05, 5.74] |
| **Subtotal (95% CI)** | | **908** | | **804** | **76.8%** | **0.67 [0.39, 1.15]** |
| Total events | 85 | | 110 | | | |
| Heterogeneity: Tau² = 0.16; Chi² = 7.50, df = 4 (P = 0.11); I² = 47% | | | | | | |
| Test for overall effect: Z = 1.45 (P = 0.15) | | | | | | |
| **Total (95% CI)** | | **1106** | | **1022** | **100.0%** | **0.80 [0.48, 1.35]** |
| Total events | 118 | | 137 | | | |
| Heterogeneity: Tau² = 0.22; Chi² = 12.91, df = 5 (P = 0.02); I² = 61% | | | | | | |
| Test for overall effect: Z = 0.82 (P = 0.41) | | | | | | |
| Test for subgroup differences: Chi² = 3.60, df = 1 (P = 0.06), I² = 72.3% | | | | | | |





| Study or Subgroup | MSU Events | MSU Total | Control Events | Control Total | Weight | Odds Ratio IV, Random, 95% CI |
|---|---|---|---|---|---|---|
| **2.10.1 RCTs** | | | | | | |
| Helwig et al, 2019 | 0 | 16 | 1 | 14 | 5.6% | 0.27 [0.01, 7.25] |
| **Subtotal (95% CI)** | | **16** | | **14** | **5.6%** | **0.27 [0.01, 7.25]** |
| Total events | 0 | | 1 | | | |
| Heterogeneity: Not applicable | | | | | | |
| Test for overall effect: Z = 0.78 (P = 0.44) | | | | | | |
| **2.10.2 Non-randomized studies** | | | | | | |
| Grotta et al, 2021 | 12 | 599 | 7 | 342 | 67.8% | 0.98 [0.38, 2.51] |
| Kummer et al, 2019 | 1 | 29 | 0 | 9 | 5.6% | 1.00 [0.04, 26.68] |
| Larsen et al, 2021 | 2 | 92 | 2 | 107 | 15.3% | 1.17 [0.16, 8.45] |
| Zhou et al, 2021 | 0 | 14 | 1 | 24 | 5.6% | 0.54 [0.02, 14.17] |
| **Subtotal (95% CI)** | | **734** | | **482** | **94.4%** | **0.97 [0.44, 2.16]** |
| Total events | 15 | | 10 | | | |
| Heterogeneity: Tau² = 0.00; Chi² = 0.16, df = 3 (P = 0.98); I² = 0% | | | | | | |
| Test for overall effect: Z = 0.07 (P = 0.95) | | | | | | |
| **Total (95% CI)** | | **750** | | **496** | **100.0%** | **0.91 [0.42, 1.97]** |
| Total events | 15 | | 11 | | | |
| Heterogeneity: Tau² = 0.00; Chi² = 0.70, df = 4 (P = 0.95); I² = 0% | | | | | | |
| Test for overall effect: Z = 0.25 (P = 0.80) | | | | | | |
| Test for subgroup differences: Chi² = 0.55, df = 1 (P = 0.46), I² = 0% | | | | | | |



Quality: Very low ⊕ (Imprecision)

Quality: Very low ⊕ (Bias, Indirectness, Imprecision)

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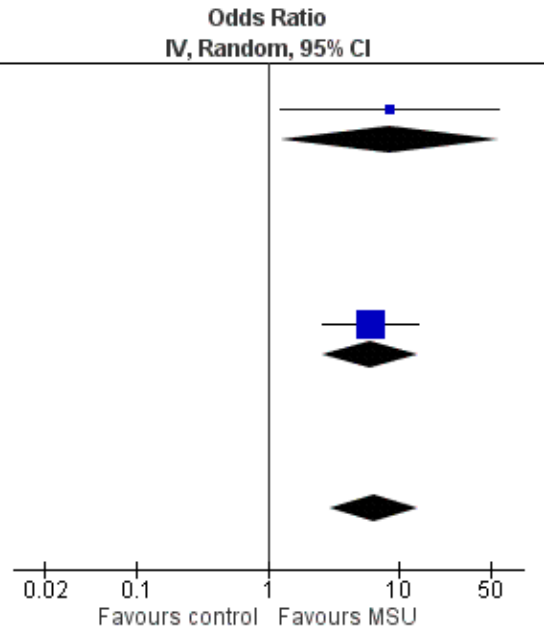
# Acute Intracerebral Haemorrhage Patients

## MSU vs conventional management

### Proportion primarily transported to tertiary stroke centres

| Study or Subgroup | MSU Events | MSU Total | Control Events | Control Total | Weight | Odds Ratio IV, Random, 95% CI |
|---|---|---|---|---|---|---|
| **3.1.1 Non-randomized studies** | | | | | | |
| Larsen et al, 2021 | 5 | 10 | 2 | 19 | 16.4% | 8.50 [1.25, 57.93] |
| **Subtotal (95% CI)** | | **10** | | **19** | **16.4%** | **8.50 [1.25, 57.93]** |
| Total events | 5 | | 2 | | | |
| Heterogeneity: Not applicable | | | | | | |
| Test for overall effect: Z = 2.19 (P = 0.03) | | | | | | |
| **3.1.2 RCTs** | | | | | | |
| Wendt et al, 2015 | 55 | 62 | 85 | 151 | 83.6% | 6.10 [2.61, 14.27] |
| **Subtotal (95% CI)** | | **62** | | **151** | **83.6%** | **6.10 [2.61, 14.27]** |
| Total events | 55 | | 85 | | | |
| Heterogeneity: Not applicable | | | | | | |
| Test for overall effect: Z = 4.17 (P < 0.0001) | | | | | | |
| **Total (95% CI)** | | **72** | | **170** | **100.0%** | **6.44 [2.96, 14.01]** |
| Total events | 60 | | 87 | | | |
| Heterogeneity: Tau² = 0.00; Chi² = 0.10, df = 1 (P = 0.76); I² = 0% | | | | | | |
| Test for overall effect: Z = 4.70 (P < 0.00001) | | | | | | |
| Test for subgroup differences: Chi² = 0.10, df = 1 (P = 0.76), I² = 0% | | | | | | |




**Quality:** Low ⊕⊕
(Imprecision)

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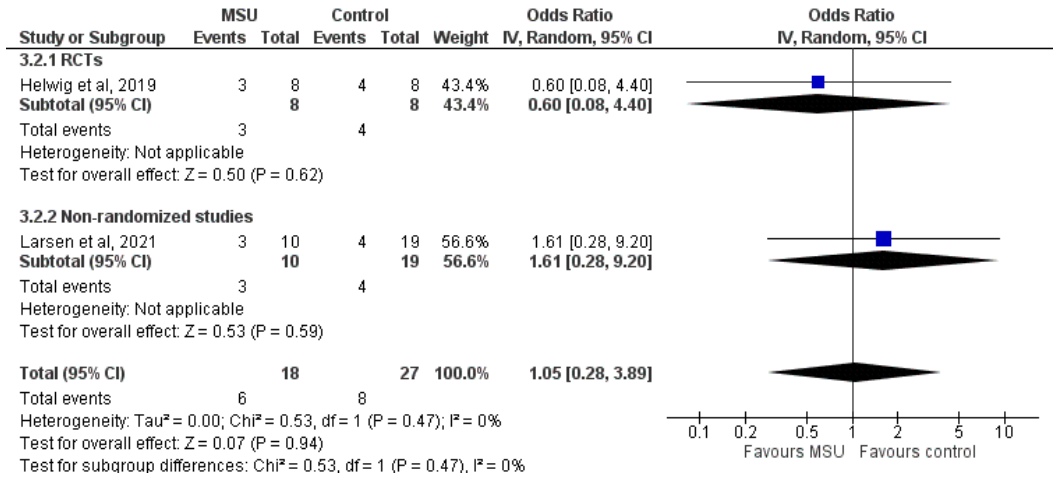
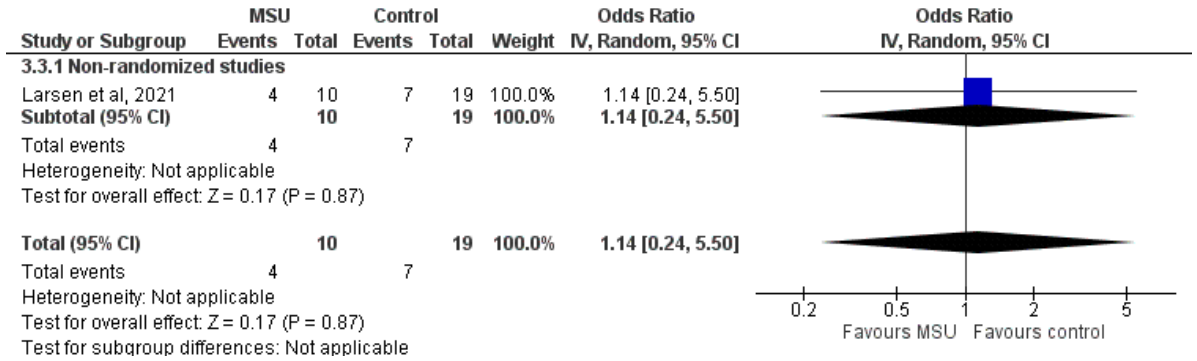
# Acute Intracranial Haemorrhage Patients

## MSU vs conventional management

### Safety outcome: all-cause mortality (7/90 days)




Quality: Very low ⊕
(Bias, Imprecision)

Quality: Very low ⊕
(Imprecision)

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# Expert Consensus Statement

## Acute Intracranial Haemorrhage Patients

In confirmed **acute intracerebral haemorrhage** patients, we **suggest** prehospital **management with Mobile Stroke Units** over conventional management because the **timely transport** of these patients **to tertiary stroke centres** is crucial for optimal therapeutic management.

Delphi voting result: 6/8 for and 2/8 against the statement

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# Evidence-based Recommendation

## MSU care vs conventional management

We **suggest** the use of Mobile Stroke Units over conventional care for the prehospital management of patients with suspected stroke, for the following reasons:

- In patients with **acute ischaemic stroke**, prehospital management with a MSU **improves functional outcomes**, **increases** the **rates of treatment** with intravenous thrombolysis, **including** the rates of thrombolysis within the **golden hour** and **shortens onset to treatment** time without any safety concerns.

Quality of evidence: **Moderate** ⊕⊕⊕

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# Evidence-based Recommendation *(continued)*

## MSU care vs conventional management

- In patients with **intracranial haemorrhage**, prehospital management with a MSU **increases** the proportion of **primary transport to tertiary care stroke** centres, without concerns on short-term mortality.
Quality of evidence: **Low** ⊕⊕

- In **other patients** (e.g. stroke mimics), **no signal of safety concerns** was identified.
Quality of evidence: **Very low** ⊕

**Overall strength of recommendation: Weak ↑**

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# Expert Consensus Statement

## MSU staffing

When considering **MSU care**, to maintain the same benefits of clinical studies in routine practice and based on the current evidence, **including specialist neurological expertise** either by an in-person stroke expert or by remote consultation and a streamlined process of care **are essential**.

Delphi voting result: 8/8 for the statement

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# Conclusion

- Prehospital stroke management has evolved
- Evidence-based recommendation to manage suspected stroke patients in the prehospital setting

- Further research needed in:
  - Dispatch accuracy
  - Different geographical settings (rural)
  - Cost-effectiveness
  - Novel diagnostic equipment

- Ongoing studies will add more evidence (e.g. STOP-MSU, TASTEa, B_PROUD 2.0, ASPHALT)

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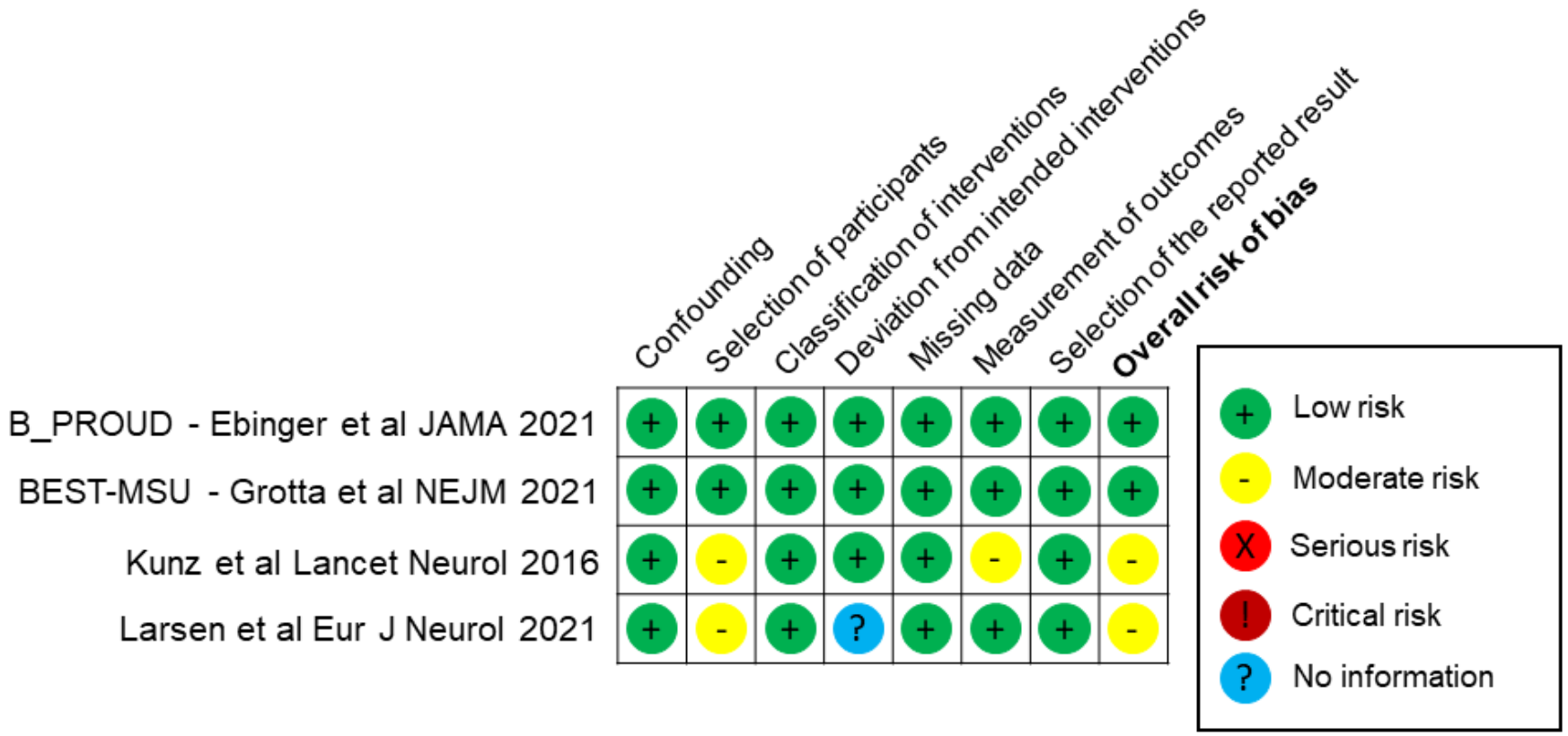
# Risk of bias in each study reporting data on excellent functional outcome (mRS 0-1 at 90 days)




according to the ROBINS-I tool

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