

Supplemental material

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Appendix 1: sections and items

Domains	Subdomains	Working basis (n)	Add-ons (n)	Total number of items (n)	Proportion of add-ons (%)
Patient characteristics	Demographics	9	4	13	30·8
	Comorbidities	6	6	12	50
	Initial scoring	4	21	25	84
	Treatment	5	0	5	0
Practice	Clinical	11	6	17	35·3
	Surgical	11	0	11	0
	Technical	10	0	10	0
Outcomes	iMMM use	7	2	9	22·2
	Surgical	4	1	5	20
	Clinical	·	10	10	100
	Complications	7	0	7	0
	Adverse events	3	0	3	0
Total		77	50	127	39·4

Item definitions

Term	Definition
Drug use	<i>Systematic use of any non-prescribed psychoactive substance within 3 months before admission</i>
Socioeconomic status	<i>Composite measure of income, education, and occupation standardized to national references</i>
Coagulation/platelet disorders	<i>Laboratory-confirmed abnormalities in platelets (<150,000/μL or >450,000/μL), PT/INR (>1.2), aPTT (>40s) or diagnosed bleeding disorder</i>
Neurological condition	<i>Documented diagnosis of central or peripheral nervous system disease requiring ongoing medical attention</i>
Cardiovascular diseases	<i>Documented diagnosis of cardiac or vascular conditions requiring medical management</i>
Organ failure	<i>Acute or chronic organ dysfunction defined by standardized criteria (e.g., KDIGO, MELD, NYHA, P/F ratio)</i>
Stroke history	<i>Documented prior ischemic or hemorrhagic stroke regardless of residual disability</i>
Active infections	<i>Microbiologically confirmed or clinically diagnosed infection requiring antimicrobial therapy within 72h of iMMM placement</i>
Immunosuppression	<i>Quantifiable immune function impairment from therapy, disease, or congenital conditions with documented infection risk</i>
Active malignancy	<i>Histologically confirmed neoplasm requiring therapy within 6 months of iMMM placement</i>
iMMM implantation indication	<i>Primary neurological condition necessitating multimodal monitoring with documented severity criteria</i>

Term	Definition
iMMM-guided interventions	<i>Medical or surgical interventions directly prompted by iMMM data exceeding predefined thresholds</i>
Data review protocol	<i>Standardized assessment of iMMM data with predefined thresholds for clinical interventions</i>
Monitoring approach	<i>Classification of iMMM use as either observational (data collection) or interventional (treatment guidance)</i>
Secondary brain injury definition	<i>Specific iMMM thresholds used to define secondary neurological deterioration</i>
iMMM-related imaging protocol	<i>Specified imaging modalities and timing for probe placement verification</i>
iMMM recording protocol	<i>Standardized parameters for data acquisition including software, thresholds, and recording intervals</i>
Anti-seizure therapy initiation	<i>Implementation of antiepileptic medication due to iMMM complications or findings</i>
Local caseload	<i>Annual number of iMMM placements performed at the institution</i>
Targeting strategy	<i>Anatomical placement plan including hemisphere, region, and relationship to lesion</i>
Probe fixation method	<i>Technical specification of anchoring technique (tunneling, bolt system, or other)</i>
Implantation depth	<i>Distance in millimeters from probe tip to inner skull table</i>
Craniotomy dimension	<i>Burr hole diameter in millimeters</i>
Calibration protocol	<i>Standardized procedure and timing for iMMM sensor recalibration</i>
Time-specific patterns	<i>Characteristic monitoring waveforms associated with specific pathophysiological states</i>

Term	Definition
Probe repeated insertion	<i>Number of placement attempts required for final probe position</i>
Primary/secondary neurosurgery	<i>Classification of iMMM placement as initial or subsequent surgical intervention</i>
Postoperative hemorrhage	<i>Imaging-confirmed bleeding directly attributable to probe placement</i>
CNS infection	<i>Microbiologically confirmed infection in brain tissue or CSF post-implantation</i>
Probe misplacement	<i>Deviation from intended probe position on post-implantation imaging</i>
Intracranial bone fragments	<i>Imaging-confirmed bone debris from probe placement procedure</i>
Accidental dislodgement	<i>Unplanned probe displacement during active monitoring period</i>



iMMM — consensus study

Round 1: comprehensive report

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This open report details results and additional propositions from each round, ensuring transparency and informing subsequent rounds.

Inclusion: endorsed by $\geq 75\%$ of participants are immediately added to the core outcome set (COS) ✅

Exclusion: with $< 50\%$ endorsement are removed — a call can be made by any participant ❌

Reevaluation: with more than 50 and less than 75% endorsement are reconsidered in the next round 🔄

Note that propositions

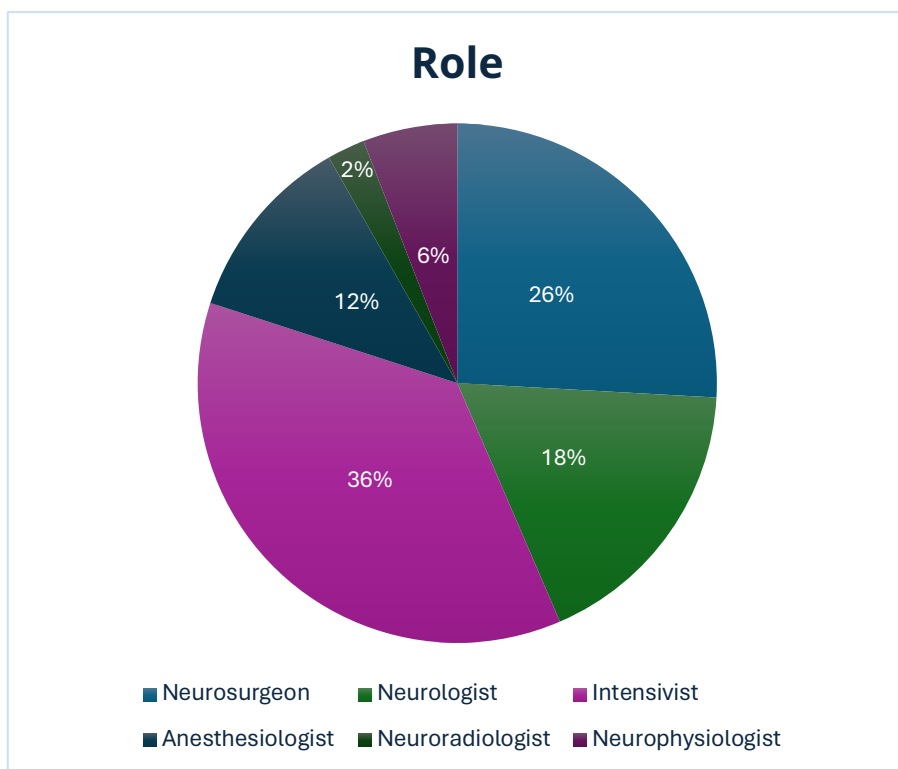
- are submitted for consideration a maximum of two rounds.
- not meeting COS criteria may still inform fork projects of dedicated working groups.

Concerning our treatment of additional propositions or insights, 'add-ons', they can be either

- directly added to the next round ➕
- covered or integrated with others ⬇️
- considered valuable insights not forming direct propositions 💡



Country of practice	N°
Austria	3
Belgium	4
Canada	2
Chile	1
Finland	2
France	11
Germany	3
Greece	1
Italy	4
Latvia	1
Nepal	1
Netherlands	1
Serbia	1
Spain	2
Sweden	2
Switzerland	6
United Kingdom	1
USA	12

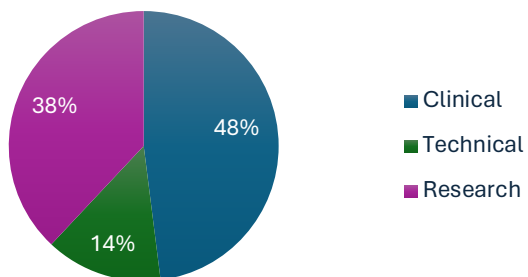


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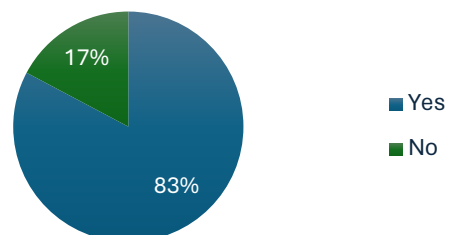
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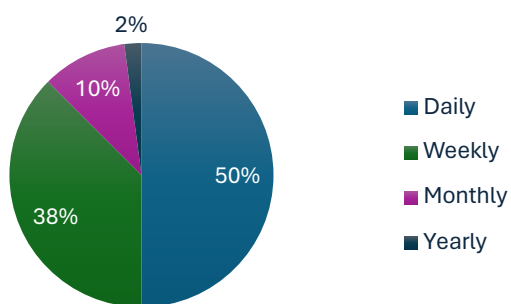
Type of involmment



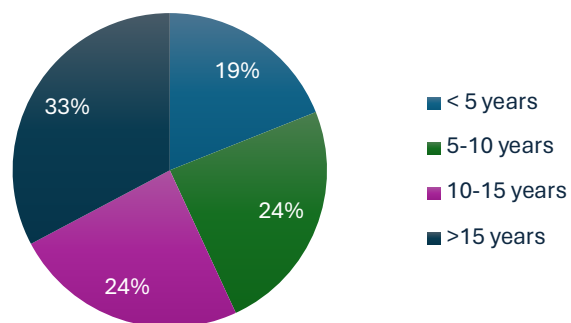
Current involvement in iMMM practice



Managing iMMM



Experience of iMMM practice



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Demographics:

58 responses

age	98% ✓	57 responses
sex/gender	90% ✓	52 responses
drug use	57% ↻	33 responses
tobacco consumption	40% ✗	23 responses
alcohol consumption	57% ↻	33 responses
hand dominance	55% ↻	32 responses
insurance cover	5% ✗	3 responses
marital status	17% ✗	10 responses
socioeconomic status	36% ✗	21 responses
no opinion	2%	1 response

Add-ons

- BMI ↓
- Race +
- Frailty index ↓
- Time (days) from admission to initiation of iMMM ↓
- Premorbid mRS ↓, years of education +, employment status +

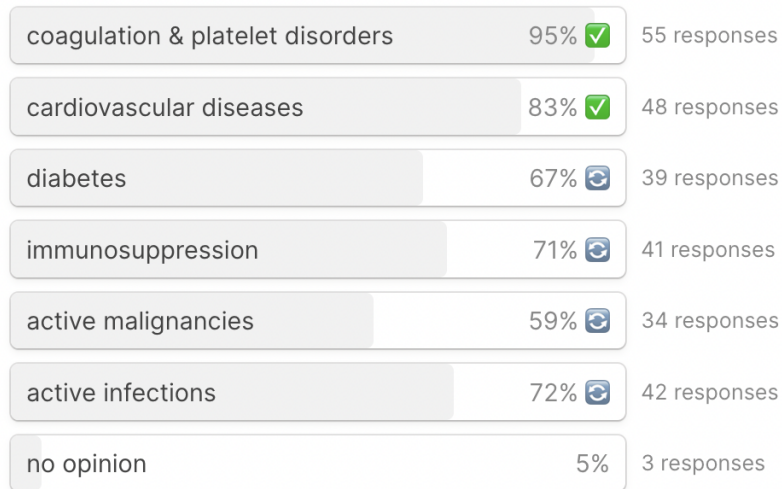
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Comorbidities:

58 responses



Add-ons

- Organ failure (renal, hepatic, pulmonary) +
- Epilepsy +
- Variables of Charlson Comorbidity index ↓
- IMPACT score 💡
- History of stroke or seizure +
- Previous independence status 💡
- Head/skull trauma +
- Recent or prior neurosurgery +
- Other neurological illnesses +

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Initial scoring systems:

58 responses

Glasgow(-Liège) Coma Scale	97% 	56 responses
pathology-specific (e.g., WFNS for SAH)	90% 	52 responses
APACHE Scores (II to IV)	45% 	26 responses
ASA	22% 	13 responses
no opinion	0%	No responses yet

Add-ons

- Marshall score 
- Rotterdam score 
- Stockholm score 
- GCS-P score 
- SAPS II score 
- SOFA score 
- FOUR score 
- NIHSS score 
- Modified Fisher score 

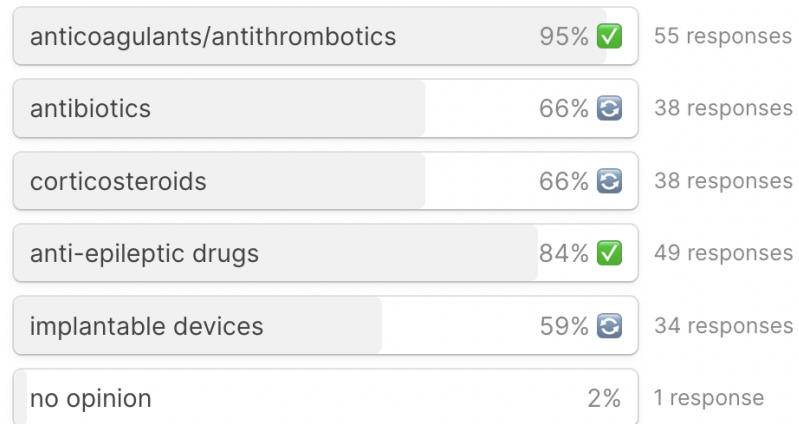
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Active treatments:

58 responses



Add-ons

- Sedative agents ↴

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Clinical

58 responses

iMMM indications (e.g., TBI, SAH, etc.)	98% ✓	57 responses
iMMM use (i.e. observational or interventional)	86% ✓	50 responses
iMMM-derived definitions of secondary brain injuries	79% ✓	46 responses
iMMM-guided interventions	91% ✓	53 responses
iMMM use according to recognized guidelines (e.g., Seattle International Severe Traumatic Brain Injury Consensus Conference)	69% 🔄	40 responses
iMMM-related imaging protocol (e.g., routine postplacement imaging)	78% ✓	45 responses
pre-operative reversal (e.g., anticoagulant)	74% 🔄	43 responses
pre-operative prophylaxis drug treatment (e.g., antibiotics, anti-epileptic drugs)	67% 🔄	39 responses
iMMM recording protocol (e.g. expected duration, end of monitoring indication)	74% 🔄	43 responses
suspicion of iMMM-related infection documentation protocol (e.g., the systematic culture of withdrawn material)	76% ✓	44 responses
iMMM dressing	33% ✗	19 responses
no opinion	2%	1 response

Add-ons

- Arterial line leveling site (ear or heart) ↓
- iMMM protocol and treatment algorithm 💡
- Individuals placing devices (attending, resident/fellow, midlevel) ↓
- Protocol for data review (2x daily, continuous, etc) +
- Providers responsible for reviewing data (residents/fellow, attendings, midlevels, nurses) 💡
- Presence of standardized clinical response to observed iMMM changes by clinical group 💡
- Probe location of each sonde (perilesional, healthy brain tissue, intralesional) ↓

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Surgical ...

58 responses

placement settings (e.g., OR vs. bedside)	88% ✓	51 responses
iMMM targeting strategy* (e.g., right hemisphere, least-injured hemisphere)	97% ✓	56 responses
procedure details (e.g., duration, craniotomy dimension)	62% ↻	36 responses
no opinion	2%	1 response

Add-ons

- Tunnelized or bolted ↓
- Placement relative to injury (perilesional, uninjured, within hematoma or contusion) ↓
- Targeting strategy ↓

Procedure details

36 responses

device used for implantation accuracy (e.g., neuronavigation)	0% ✗	No responses yet
cranial drill used for the burr-hole	69% ↻	25 responses
craniotomy dimension	67% ↻	24 responses
concomitant EVD	97% ✓	35 responses
number of burr-hole	61% ↻	22 responses
implantation depth of probes	67% ↻	24 responses
probes surgical fixation method	72% ↻	26 responses
closure technique	42% ✗	15 responses
no opinion	0%	No responses yet

Add-ons

- Durotomy technique (incisional, dural laceration, cutting needle, etc) +

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Technical

58 responses

type of probes used (e.g., PbtO2, microdialysis, etc.)	98%	57 responses
iMMM (re)calibration protocol	72%	42 responses
tech specs of probes	50%	29 responses
tech specs of fixation device (e.g., number of lumen, MRI-compatibility, etc.)	48%	28 responses
tech specs of iMMM data recording systems	64%	37 responses
iMMM time recording (i.e. continuous or punctual) for each modality	86%	50 responses
iMMM bedside presentation for neurocritical caregivers	50%	29 responses
manufacturer's details (e.g., models identifiers)	52%	30 responses
device regulatory details (e.g., CE/FDA-approval)	43%	25 responses
no opinion	2%	1 response
device/method used for probes fixation	3%	2 responses

Add-ons

- Meta-data for all devices (sampling frequency, accurate/valid measures made [e.g., PbtO2 response, first microdialysis sample after wasted sample, etc] and when valid data begins [if EEG starts after other devices, for instance]). Model-specific identifiers would be very difficult to get particularly with retrospective datasets. → protocol 💡
- iMMM clinical volume/experience at local site (high/medium/low etc) +

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iMMM use

58 responses

monitoring duration	97%	56 responses
iMMM guided interventions	95%	55 responses
indications of early iMMM withdrawn	84%	49 responses
time-specific monitoring patterns related to presumed pathophysiological changes	66%	38 responses
no opinion	2%	1 response

Add-ons

- Neurological outcome
- Cumulative intervals of abnormal recording
- Indications for withdrawal in general
- Daily clinical reporting associated with recorded parameters
- Noise-to-signal ratio of recording
- Local treatment preference
- Time from ICU admission to initiation of iMMM

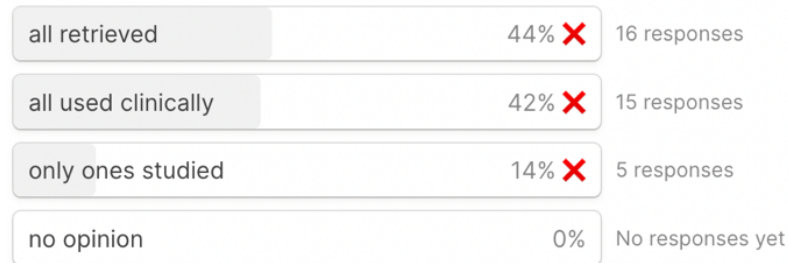
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Which time-specific iMMM patterns? ...

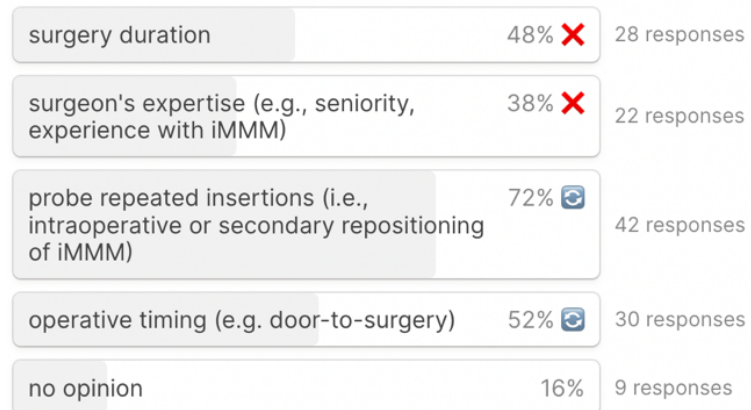
36 responses



→ section reshaped

Surgical

58 responses



Add-ons

- Primary or secondary craniectomy +
- Primary or secondary probe insertion ⬇️
- Technique (bolt, free-hand, navigation) ⬇️

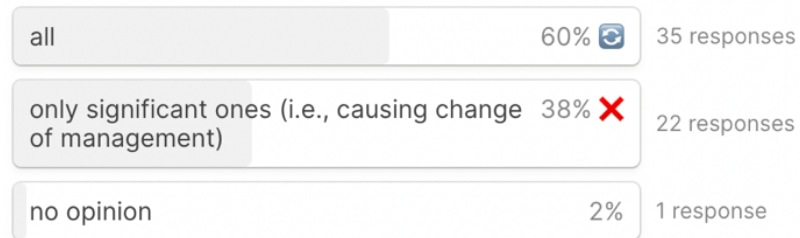
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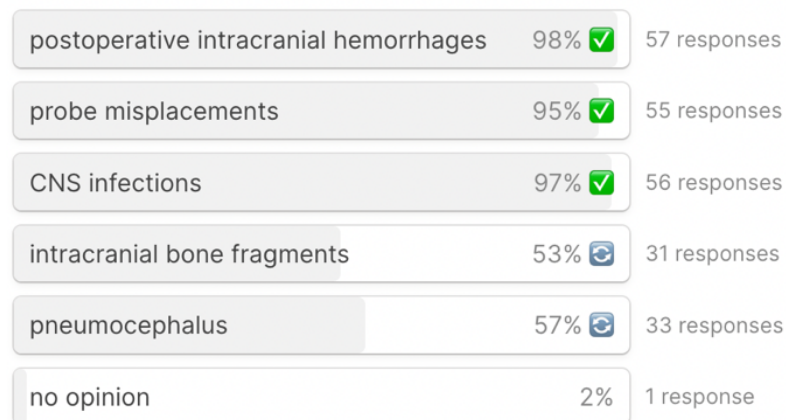
iMMM-related complications:

58 responses



Surgical complications of iMMM:

58 responses



Add-ons

- Strict definitions and significance of the items 💡
- Probe dysfunction data misinterpretation ⬇️

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Adverse events of iMMM ...

58 responses

accidental dislodgement	93% 	54 responses
breaking (of probes and/or fixation method)	91% 	53 responses
technical/hardware malfunction	91% 	53 responses
no opinion	3%	2 responses

Add-ons

- Systemic complications related to targeted interventions +
- Decide if "invalid" measurements physiologically or by design count - e.g., the Hemedex probe recalibrates and does NOT measure if there is pulsatility in order to ensure validity of the measurements. Would a lack of measurement be a hardware malfunction? Its part of the function to do this technically but DOES limit data often. 💡

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iMMM — consensus study

Round 2: comprehensive report

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1° Reassessed propositions

Inclusion: endorsed by $\geq 66\%$ of participants are added ✅ and $> 75\%$ considered strongly agreed on ✅✅

Exclusion: with $<66\%$ endorsement are removed — a call can be made by any participant

2° Addons from the 1st round (new propositions)

Inclusion: endorsed by $\geq 75\%$ of participants are immediately added ✅

Exclusion: with $<50\%$ endorsement are removed — a call can be made by any participant

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Note that propositions

- are submitted for consideration a maximum of two rounds.
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- covered or integrated with others ⬇️
- considered valuable insights not forming direct propositions 💡

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Demographics:

57 responses

drug use	48%	28 responses
alcohol consumption	46%	27 responses
hand dominance	48%	28 responses
+ BMI	51%	29 responses
+ race	46%	27 responses
+ years of education	27%	16 responses
+ employment status	31%	18 responses
no opinion	11%	7 responses

Add-ons

- None

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Comorbidities

57 responses

diabetes	76%  	44 responses
immunosuppression	62% 	36 responses
active malignancies	59% 	34 responses
active infections	67% 	39 responses
+ epilepsy history	83% 	48 responses
+ stroke history	78% 	45 responses
+ TBI history	85% 	49 responses
+ neurosurgical history	80% 	46 responses
+ neurological conditions	88% 	51 responses
+ organ failures	73% 	42 responses
no opinion	1%	1 response

Add-ons

- None

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Initial scoring systems:

57 responses

+ premorbid mRS	71% 	41 responses
+ Frailty Index	52% 	30 responses
+ Charlson Comorbidity Index	41% 	24 responses
no opinion	17%	10 responses

Add-ons

- Injury severity score +
- Karnofsky Performance Status +
- Elixhauser Comorbidity Index +
- SAPS 2 score +

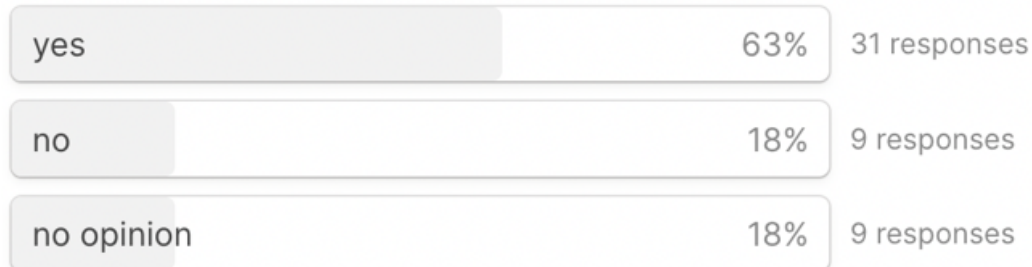
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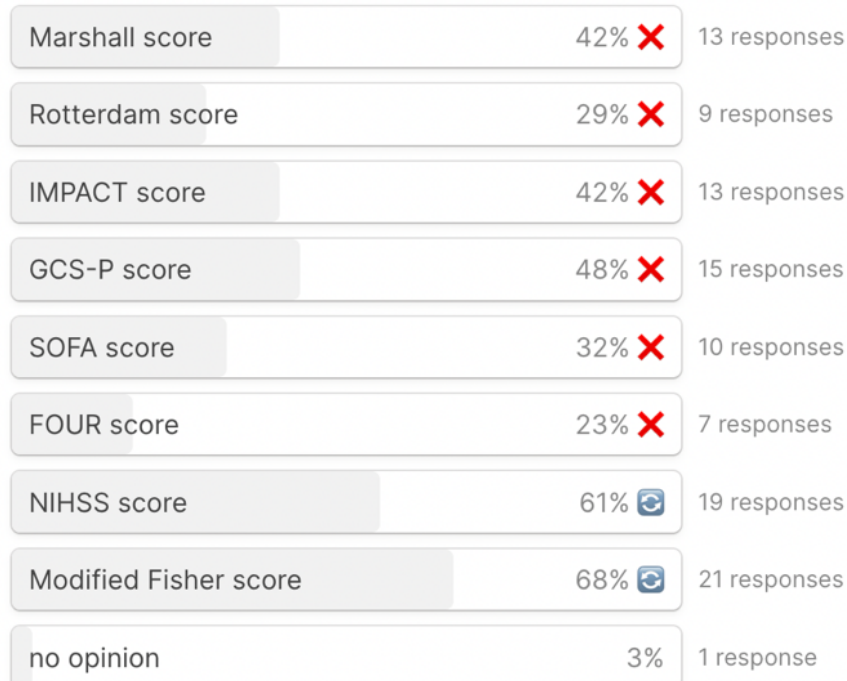
Should we recommend pathology-specific scoring systems?

49 responses



Which ones ?

31 responses



Add-ons

- ICH score (ICH) +
- Hunt & Hess score (SAH) +
- WFNS score (SAH) +
- BNI score (SAH) +
- rCAST score +
- Markwalder scale (CSDH) +

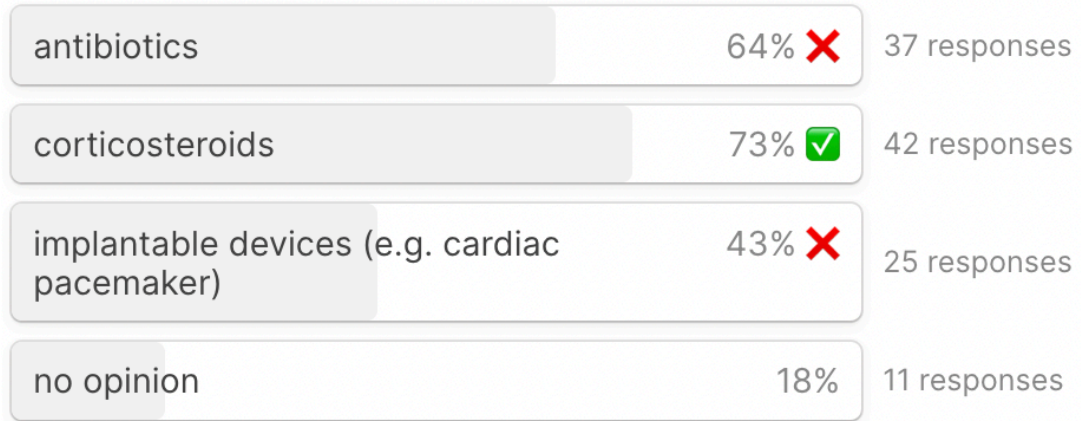
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Active treatments:

57 responses



Add-ons

- None

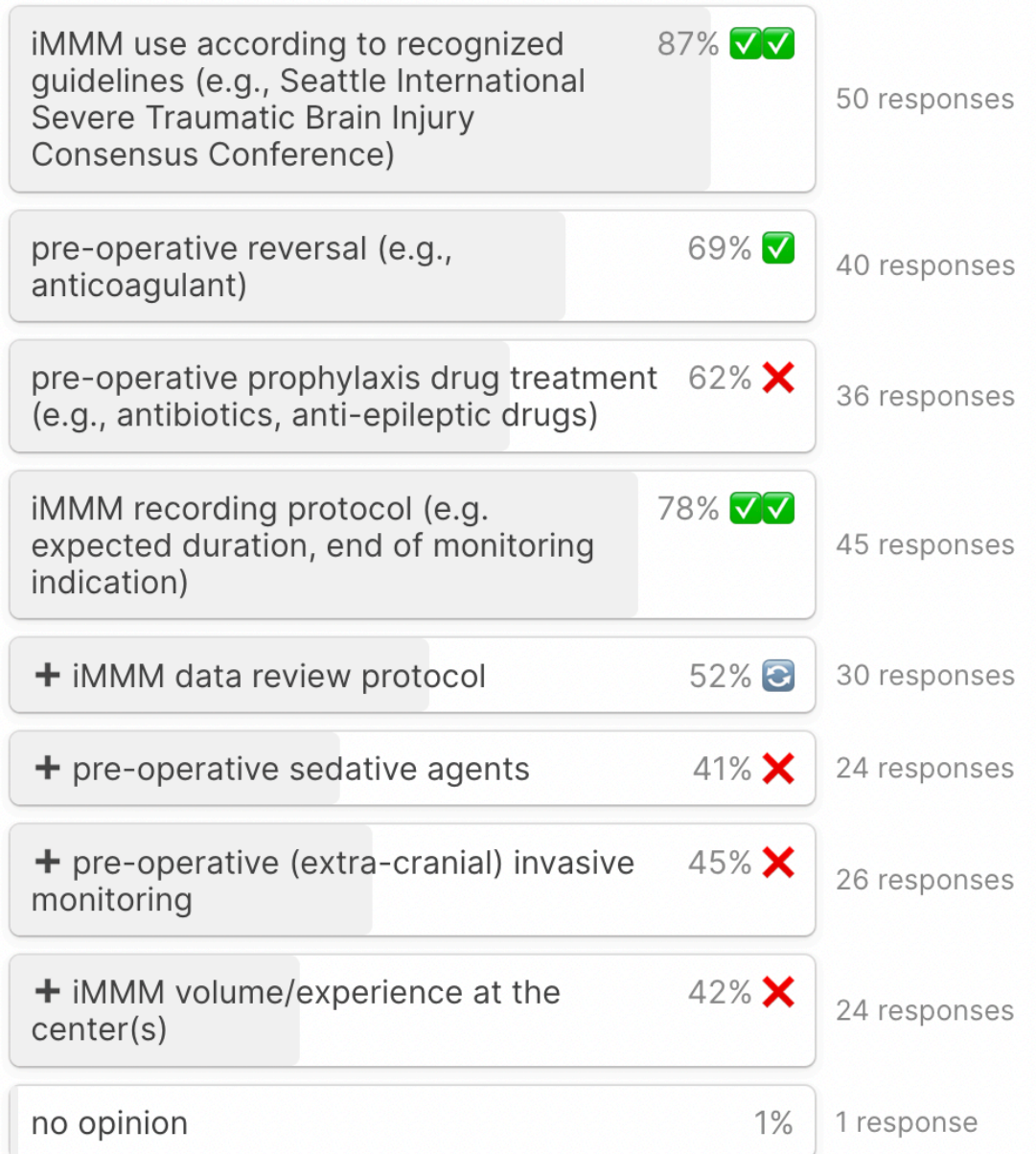
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Clinical ...

57 responses



Add-ons

- Concomitant antiepileptic therapy +

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Surgical

57 responses

cranial drill used for the burr-hole	31% ❌	18 responses
craniotomy dimension	46% ❌	27 responses
number of burr-hole	46% ❌	27 responses
implantation depth of probes	64% ❌	37 responses
probes surgical fixation method (e.g. bolt or tunnelized)	66% ✅	38 responses
+ durotomy technique	31% ❌	18 responses
no opinion	8%	5 responses

Technical

57 responses

iMMM (re)calibration protocol	73% ✅	42 responses
tech specs of probes	59% ❌	34 responses
tech specs of iMMM data recording systems	55% ❌	32 responses
iMMM bedside presentation for neurocritical caregivers	55% ❌	32 responses
manufacturer's details (e.g., models identifiers)	55% ❌	32 responses
no opinion	4%	3 responses

Add-ons

- None

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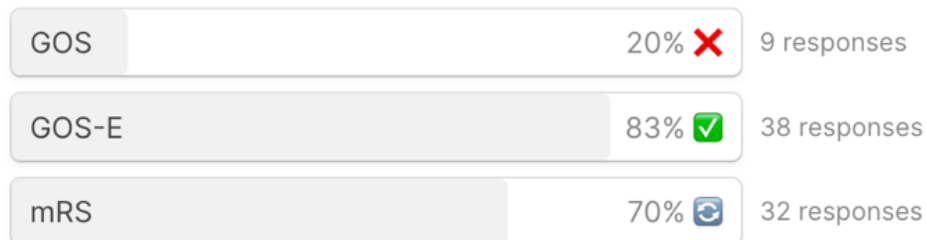
Should we recommend reporting neurological outcomes in a standardized way?

49 responses



Which ones ? ...

46 responses



Add-ons

- CRSR-Fast (coma recovery) +
- FSE: Functional Status Examination +
- Pediatric GOS-E revision +
- Pediatric Cerebral Performance Category Scale +

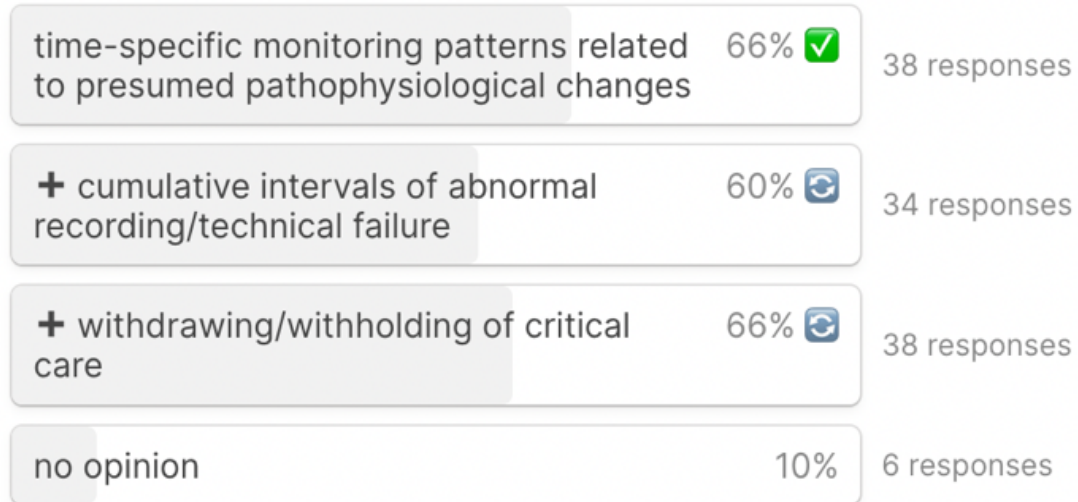
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iMMM use

57 responses



Add-ons

- None

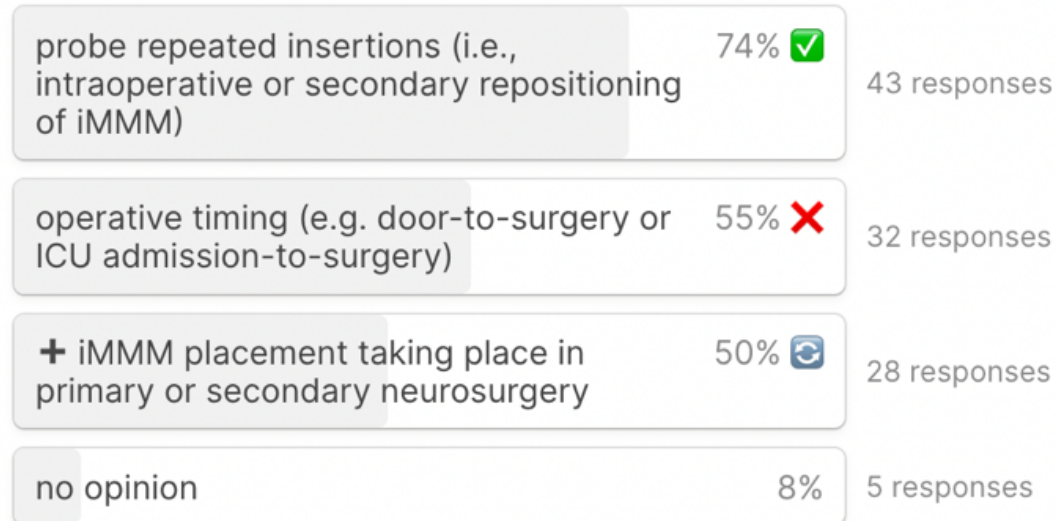
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Surgical

57 responses



Add-ons

- None

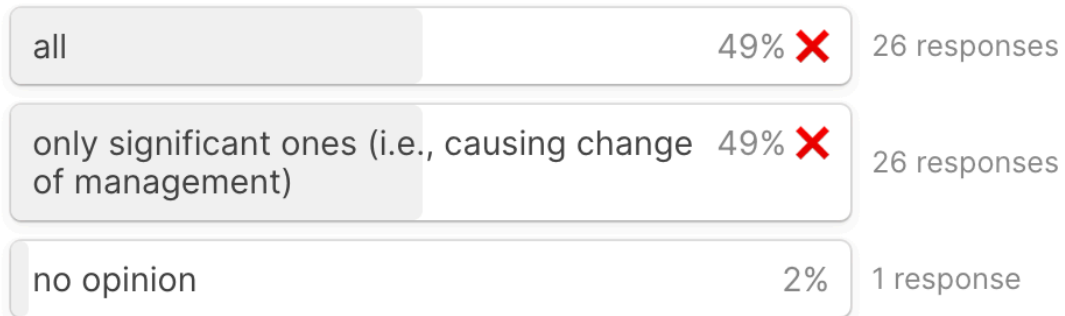
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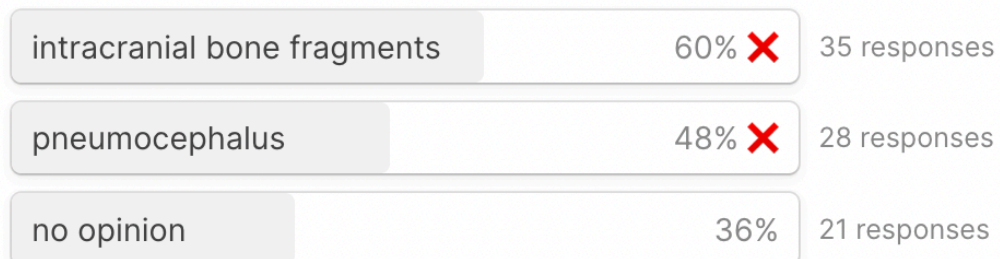
iMMM-related complications:

53 responses



Should we consider these as surgical complications of iMMM:

57 responses

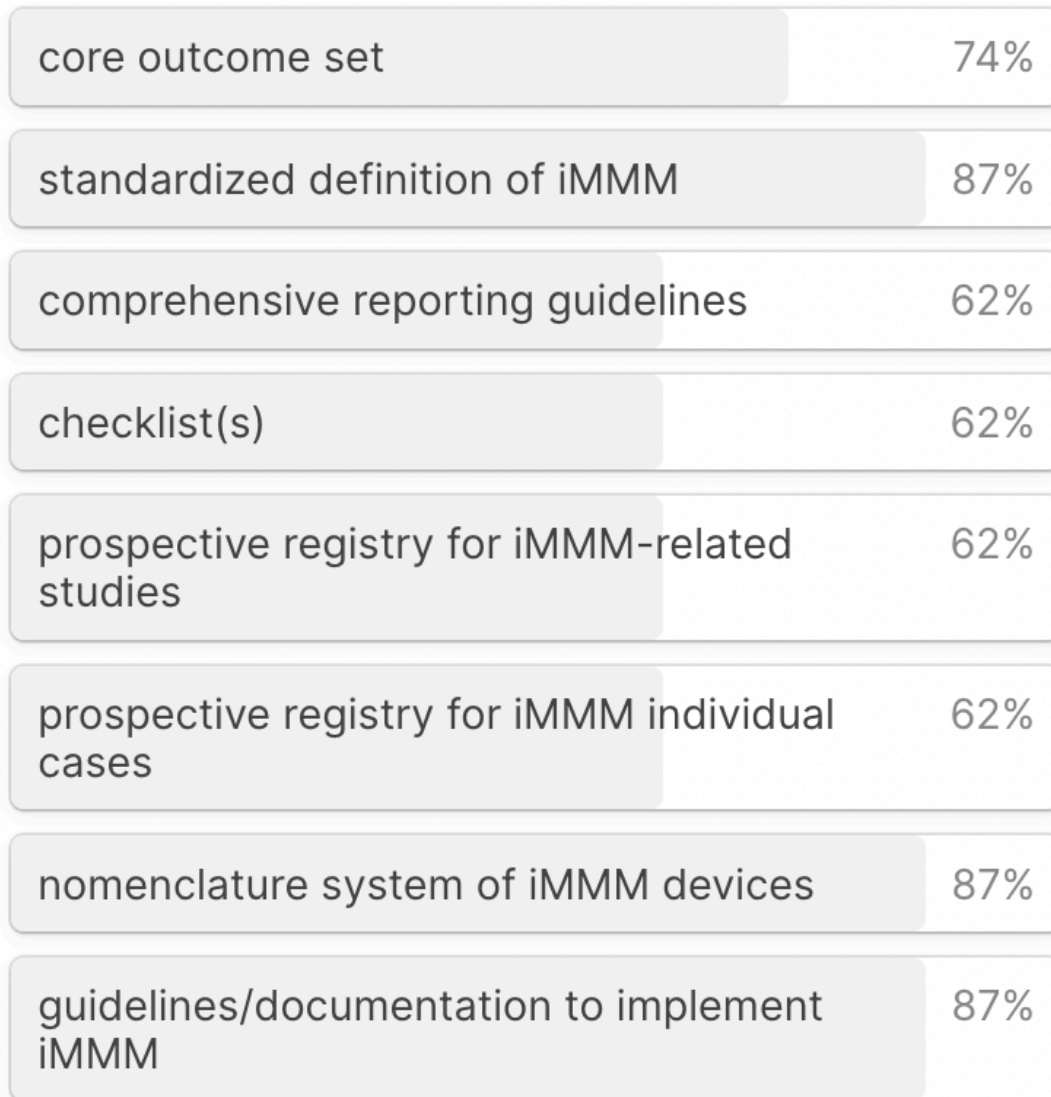


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Which tools would be useful regarding iMMM?



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iMMM — consensus study

Round 3: comprehensive report

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Inclusion: endorsed by $\geq 66\%$ of participants are added ✅ and $> 75\%$ considered strongly agreed on ✅✅

Exclusion: with $<66\%$ endorsement are removed — a call can be made by any participant

2° Addons from the 2nd round (new propositions)

Inclusion: endorsed by $\geq 75\%$ of participants are immediately added ✅ and $> 90\%$ considered strongly agreed on ✅✅

Exclusion: with $<75\%$ endorsement are removed — a call can be made by any participant

Note that propositions

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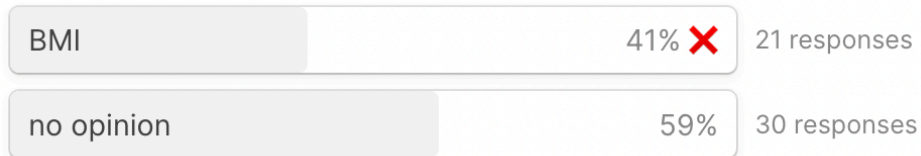
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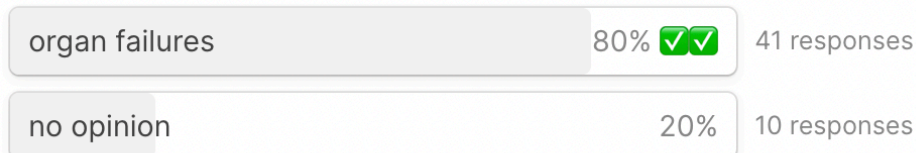
Demographics:

51 responses



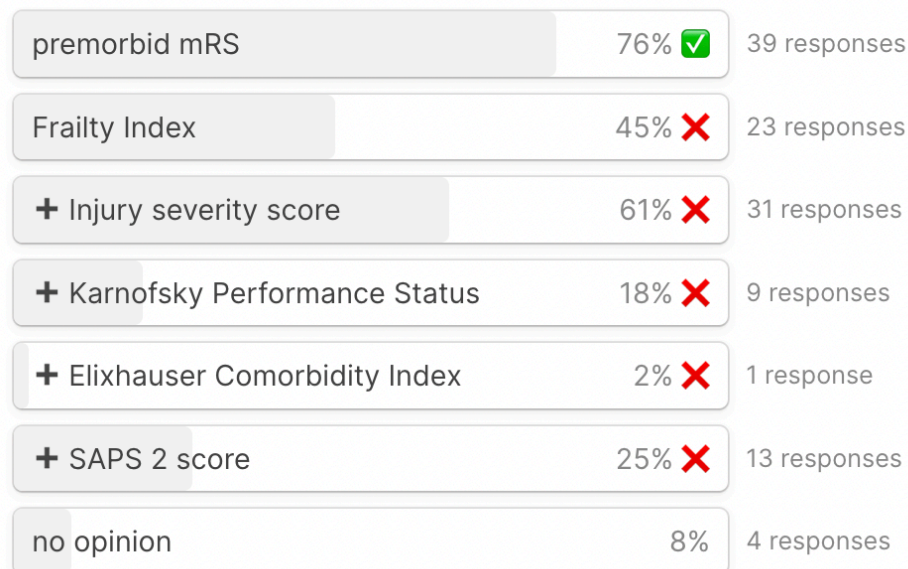
Comorbidities:

51 responses



Initial scoring systems:

51 responses



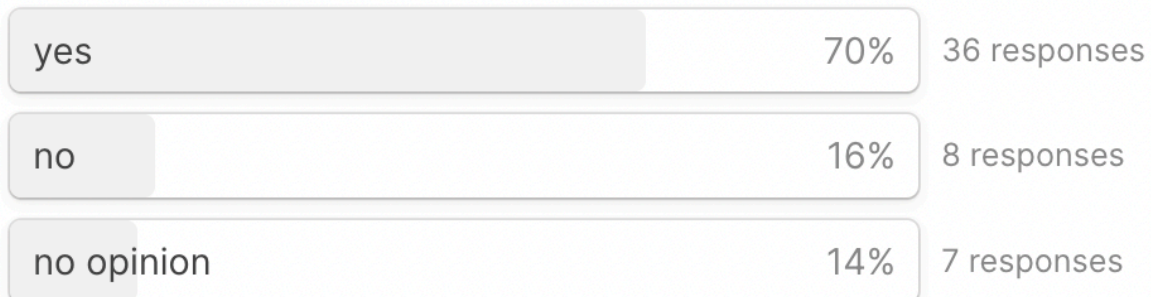
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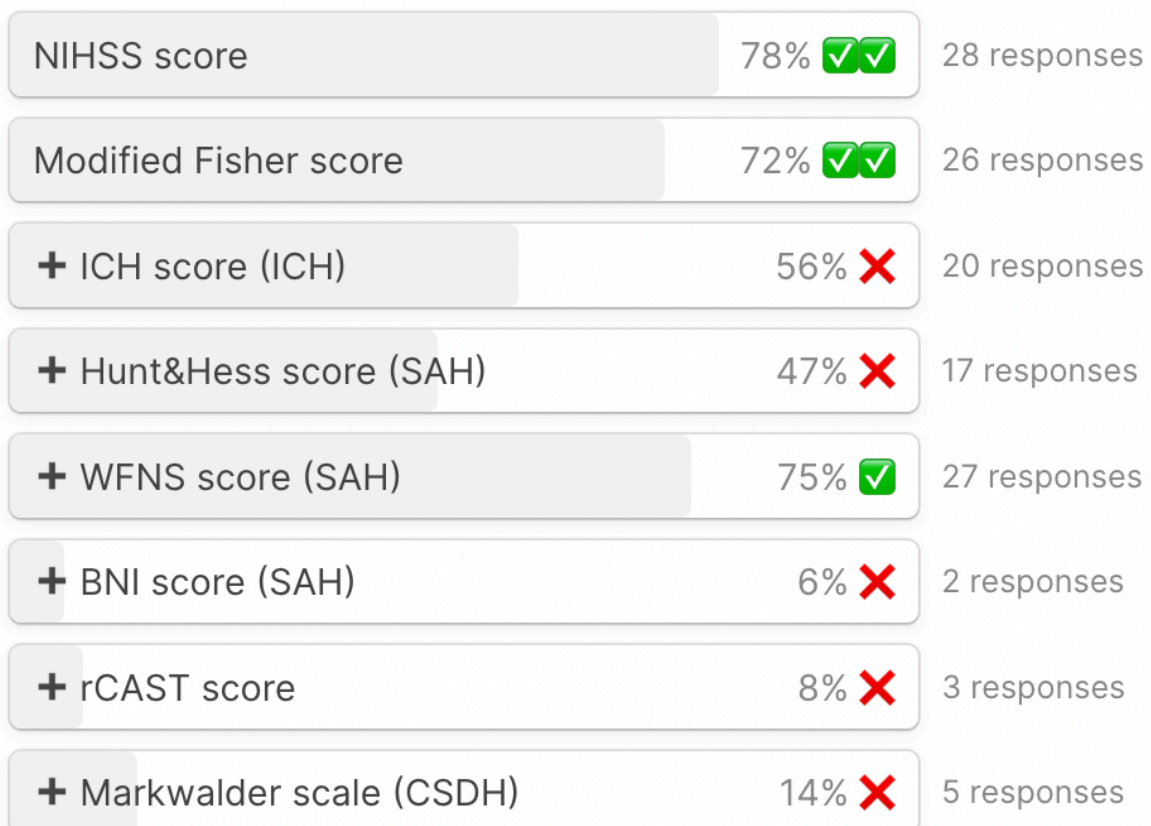
Should we recommend pathology-specific scoring systems?

51 responses



Which ones ?

36 responses



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iMMM use

51 responses

cumulative intervals of abnormal recording/technical failure 63% ❌ 32 responses

withdrawing/withholding of critical care 82% ✅✅ 42 responses

no opinion 2% 1 response

Clinical

51 responses

iMMM data review protocol 88% ✅✅ 45 responses

+ Concomitant antiepileptic therapy 61% ❌ 31 responses

no opinion 4% 2 responses

Surgical

51 responses

iMMM placement taking place in primary or secondary neurosurgery 63% ❌ 32 responses

no opinion 37% 19 responses

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Should we recommend reporting neurological outcomes in a standardized way?

51 responses

yes	94%  	48 responses
no	4% 	2 responses
no opinion	2%	1 response

Which ones ?

46 responses

mRS	89%  	41 responses
+ CRSR-Fast (coma recovery)	26% 	12 responses
+ FSE: Functional Status Examination	20% 	9 responses
+ Pediatric GOS-E revision	35% 	16 responses
+ Pediatric Cerebral Performance Category Scale	17% 	8 responses

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We would like to thank you for your participation in this initiative and for your involvement in these 3 rounds, which have enabled us to refine the consensus.

We will come back to you soon with an analysis of the 3 rounds for discussion.

If you would like to get involved in another stage of this study, please let us know.

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Appendix 3: core outcome set

Domain 1: Patient characteristics

Outcomes	Measures/instruments	Related NIH CDE
Age	years	https://cde.nlm.nih.gov/deView?tinyId=fmMMaUGpKS
Sex	biological sex at birth	https://cde.nlm.nih.gov/deView?tinyId=ezelurehr2
Gender	social construct	https://cde.nlm.nih.gov/deView?tinyId=NKwM4gsfXS
Coagulation and platelet disorders	Platelet count Prothrombin time (PT) Activated partial thromboplastin time (aPTT)	https://cde.nlm.nih.gov/deView?tinyId=MGUVlcwIDl https://cde.nlm.nih.gov/deView?tinyId=rxx90ldJXP https://cde.nlm.nih.gov/deView?tinyId=FhHW4_BWK9
Neurological condition	Diagnosis	https://cde.nlm.nih.gov/deView?tinyId=QJv3f3IHJP
Traumatic brain injury history	Mechanism Place Management Intensity of treatment	https://cde.nlm.nih.gov/deView?tinyId=X1b66qcT6I https://cde.nlm.nih.gov/deView?tinyId=UjFBp2sPx_4 https://cde.nlm.nih.gov/deView?tinyId=InJAQxmDraW https://cde.nlm.nih.gov/deView?tinyId=tYhj6DDs5Ed
Cardiovascular diseases	Yes/no Specify	https://cde.nlm.nih.gov/deView?tinyId=9cVbhAr2vdG https://cde.nlm.nih.gov/deView?tinyId=VZ3FkCz9FEQ
Seizure history	Yes/No	https://cde.nlm.nih.gov/deView?tinyId=TFzSCDPwwcC
Past neurosurgical procedure	Yes/No Type	https://cde.nlm.nih.gov/deView?tinyId=Xk3lxQ50qX https://cde.nlm.nih.gov/deView?tinyId=BUABmnt0VM4
Organ failures	Yes/No Specify	..
Stroke history	Yes/No	https://cde.nlm.nih.gov/deView?tinyId=XkiU_o6TI
Diabetes	Yes/No	https://cde.nlm.nih.gov/deView?tinyId=m1ONxEVqiBA
Active infections	Yes/No	https://cde.nlm.nih.gov/deView?tinyId=RoYaWfIdv
Glasgow Coma Scale	Score (3-15)	https://cde.nlm.nih.gov/deView?tinyId=G265ZshGXob
Pathology-specific scores	E.g. Stroke	https://cde.nlm.nih.gov/deView?tinyId=hTBW7kUQRwk

Premorbid mRS	Score 0-6	https://cde.nlm.nih.gov/deView?tinyId=1Ff4qmrHH1C
NIHSS score	Score 0-42	https://cde.nlm.nih.gov/deView?tinyId=hTBW7kUQRwk
WFNS score	Grade 1-5	https://cde.nlm.nih.gov/deView?tinyId=1F_rkZ588GA
Modified Fisher score	Grade 1-4	https://cde.nlm.nih.gov/deView?tinyId=kc51TSSdK0Y
Anticoagulants/antithrombotics	Category (anticoagulant) Category (antiplatelet)	https://cde.nlm.nih.gov/deView?tinyId=Qk0q_u509m https://cde.nlm.nih.gov/deView?tinyId=XkwxtbdcRqX
Antiepileptics	Yes/No	https://cde.nlm.nih.gov/deView?tinyId=8Af9YZWkaNt
Corticosteroids	Yes/No	https://cde.nlm.nih.gov/deView?tinyId=cZreh3d8e

Domain 2: Practices

Outcomes	Measures/instruments	Related NIH CDE
iMMM implantation indication	Type (ABI/TBI/SAH/stroke/other)	..
iMMM-guided interventions	Modality (EEG-PbtO ₂ -CBF-ICP) Mean (treatment type, duration, thresholds,...)	..
Use of established iMMM guidelines	Yes/No	..
Data review protocol	Yes/No	https://cde.nlm.nih.gov/deView?tinyId=4Sy8lukurOC
Monitoring approach: Observational vs. interventional	Type	..
iMMM-derived definition of secondary brain injury	PbtO ₂ under threshold EEG ictal patterns Intracranial pressure over threshold CBF under threshold	https://cde.nlm.nih.gov/deView?tinyId=7yEgdxu9RcX https://cde.nlm.nih.gov/deView?tinyId=baD8U9YwOM https://cde.nlm.nih.gov/deView?tinyId=56LujfB6Pk ..
iMMM-related imaging protocol	Modality (MRI/CT/...) Results Location if abnormal	https://cde.nlm.nih.gov/deView?tinyId=xsc_0vv9Q3E https://cde.nlm.nih.gov/deView?tinyId=RN7U7gnDaOj https://cde.nlm.nih.gov/deView?tinyId=71B7Zem5R9X
Use of iMMM recording protocol	Duration (days) Modalities (EEG, ICP, PbtO ₂ , CBF) Software (name) Threshold (values)	..
Protocol for documenting a suspected iMMM-related infection	Diagnosis status (confirmed or not) Date of suspicion Type of microbial agent Date of obtained suspicious sample	https://cde.nlm.nih.gov/deView?tinyId=6ONGpfD6i https://cde.nlm.nih.gov/deView?tinyId=KYLA0Yw_8S https://cde.nlm.nih.gov/deView?tinyId=_9spDhOdOW https://cde.nlm.nih.gov/deView?tinyId=VvP2ss7Yyj
Arterial leveling site	Heart (phlebostatic) or ear (tragus) or external auditory meatus	..
Pre-operative medication reversal	Yes/No Technique (Fresh-frozen plasma, platelets transfusion, activated coagulation factors,...)	..
Targeting strategy	Type (dominant hemisphere, lesioned or healthy hemisphere, bilateral)	..
Concomitant EVD implantation	Type of ventricular drain	https://cde.nlm.nih.gov/deView?tinyId=KIW7ayvoye
Implantation settings (OR vs. bedside)	Location	..

Probe fixation method	Bolt or Tunneled	..
Modalities recorded	Type (EEG/PbtO ₂ /CBF/ICP)	https://cde.nlm.nih.gov/deView?tinyId=XyP4mDxSCz https://cde.nlm.nih.gov/deView?tinyId=BKZ2X8MuqfJ https://cde.nlm.nih.gov/deView?tinyId=rNnU4hz1z4W
iMMM time recording (i.e. continuous or punctual) for each modality	Duration: minutes Type: continuous or punctual	..
iMMM (re)calibration protocol	Yes/No For which modality(ies)? Frequency?	..

Domain 3: Outcomes

Outcomes	Measures/instruments	Related NIH CDE
Duration of monitoring	Minutes/days	..
Triggered interventions	Antiseizure medication Yes/no PbtO ₂ increase ICP decrease CBF increase	https://cde.nlm.nih.gov/deView?tinyId=8Af9YZWKaNt
Indication of early withdrawn	Cessation reason	https://cde.nlm.nih.gov/deView?tinyId=5Ym0r9rMCpe
Withdrawing/withholding of critical care	Comfort care (yes/no)	https://cde.nlm.nih.gov/deView?tinyId=FAEyrmBYn7
Time-specific monitoring patterns related to presumed pathophysiological changes	Yes/No For which modality(ies)? Meaning and clinical impact?	..
Probe repeated insertion	Yes/No	..
Standardized outcome	mRS GOS-E	https://cde.nlm.nih.gov/deView?tinyId=1Ff4qmrHH1C https://cde.nlm.nih.gov/deView?tinyId=hBkr_3_KNGM
Postoperative intracranial hemorrhages	Yes/No Location	https://cde.nlm.nih.gov/deView?tinyId=7kXfW17cC9m https://cde.nlm.nih.gov/deView?tinyId=71B7Zem5R9X
Infection of CNS	Yes/No	https://cde.nlm.nih.gov/deView?tinyId=qaO09ne7A8h
Probe(s) misplacement	Yes/No	..
Accidental dislodgement	Yes/No	..
Breaking of probes and/or fixation method	Breaking: Yes/No Complications	.. https://cde.nlm.nih.gov/deView?tinyId=6y2fLalFq
Technical/hardware malfunction	Yes/No Impact on monitoring: Yes/No	..



Neurocore-iMMM — Reporting Checklist v1.2024

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Checklist description	Reporting criteria	Page #
Patient characteristics		
1. Provide demographic information of the patients to whom the guideline applies.	☐ Age ☐ Sex and/or gender	
2. List and describe all relevant comorbidities.	☐ Coagulation and/or platelet condition ☐ Neurological comorbidities ☐ Traumatic brain injury history ☐ Cardiovascular diseases ☐ Epilepsy history ☐ Past neurosurgical procedures ☐ Organ failures ☐ Stroke history ☐ Diabetes ☐ Active infections	
3. Describe initial scoring systems used to classify patient severity and/or and prognostic outcomes.	☐ Glasgow Coma Scale ☐ Pathology-specific scores ☐ NIHSS score ☐ WFNS score ☐ Modified Fisher score ☐ Premorbid mRS	
4. Specify any ongoing treatments and associated details (dosage, frequency).	☐ Anticoagulants/antithrombotics ☐ Antiepileptics ☐ Corticosteroids	

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Neurocore-iMMM — Reporting Checklist v1.2024

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Checklist description	Reporting criteria	Page #
Practices		
5. Describe clinical practice items related to iMMM usage.	☐ iMMM implantation indication ☐ iMMM-guided interventions ☐ Use of established iMMM guidelines ☐ Data review protocol ☐ Monitoring approach (observational vs. interventional) ☐ iMMM-derived definition of secondary brain injury ☐ iMMM-related imaging protocol ☐ Use of iMMM recording protocol ☐ Protocol for documenting a suspected iMMM-related infection ☐ Pre-operative medication reversal	
6. Describe surgical features related to iMMM implantation.	☐ Targeting strategy (i.e., dominant hemisphere, lesioned or healthy hemisphere, bilateral, ...) ☐ Concomitant EVD implantation ☐ Implantation settings (OR vs. bedside) ☐ Probes surgical fixation method	
7. Describe technical details related to iMMM implantation.	☐ Modalities recorded ☐ iMMM time recording (continuous or punctual) for each modality ☐ iMMM (re)calibration protocol	

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Checklist description	Reporting criteria	Page #
Outcomes		
8. Describe notable characteristics/events during monitoring.	☐ Duration of monitoring ☐ Triggered interventions ☐ Indication of early withdrawn ☐ Withdrawing/withholding of critical care ☐ Time-specific monitoring patterns related to presumed pathophysiological changes	
9. Report outcomes related to surgical procedures.	☐ Probe repeated insertion	
10. Describe clinical outcomes in a standardized way.	☐ mRS ☐ GOS-E	
11. Describe complications related to iMMM implantation.	☐ Postoperative intracranial hemorrhages ☐ Infection of CNS ☐ Probe(s) misplacement	
12. Describe adverse events related to iMMM.	☐ Accidental dislodgement ☐ Breaking of probes and/or fixation method ☐ Technical/hardware malfunction	

Abbreviations: NIHSS: *National Institutes of Health Stroke Scale*; WFNS: *World Federation of Neurosurgical Societies*; mRS: *modified Rankin Scale*; ABI: *Acute Brain Injury*; TBI: *Traumatic Brain Injury*; SAH: *Subarachnoid Hemorrhage*; EVD: *External Ventricular Drain*; PbtO₂: *brain tissue oxygen tension*; EEG: *Electroencephalography*; OR: *Operating Room*; GOS-E: *Glasgow Outcome Scale-Extended*; CNS: *central nervous system*.

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