

NINDS CDE Project

Working group: Outcomes and Endpoints

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Please answer the following questions below.

- 1. Approach for selection of elements** (How did you go about drafting the recommendations and/or reviewing the current tools/instruments, and did you have any criteria for selection and classification?)

We started with reviewing all existing Outcome and Endpoint CDEs for Stroke, TBI and Epilepsy and generated a list that included all CDEs. We then reviewed the literature on subarachnoid hemorrhage (SAH), looked in particular at the key studies in the field, to include other outcomes and endpoints that might have been missed. Personal experience of some of the group members added to the list. Then, especially for some of the outcome metrics where more than one or two measured about the same quality (e.g. depression or quality of life), we selected from the list those metrics that all group members considered most appropriate and relevant. The metrics considered less appropriate and relevant were dropped, in order to restrict too much diversity of outcome assessment (one of the goals of the CDE project).

- 2. Differential application to types of subarachnoid hemorrhage** (*Do the instruments/elements you recommended differ between the types of subarachnoid hemorrhage?*)

In general, all CDEs were developed to study aneurysmal SAH in adult patients. The CDEs might also be of value for less frequent types of spontaneous SAH, namely non-aneurysmal (perimesencephalic) SAH or SAH secondary to AVM bleeding, etc. but they were not developed for this purpose. Also, the group did not design the CDEs for traumatic SAH; here, researchers designing a study should look at the TBI CDEs.

- 3. Summary recommendations** (*We could consider a summary table OR each group could summarize their recommendations*).

Outcomes and Endpoints WG Recommendations			
Instrument / Scale / CRF Name <i>Name and acronym of the instrument/measure that is recommended for inclusion in the CDEs</i>	Domain	Subdomain	Classification (e.g., Core, Supplemental - Highly Recommended, Supplemental, Exploratory)
Aneurysm Recanalization CRF	Outcomes and Endpoints	Treatment Variables	Supplemental

Aneurysm Retreatment and Re-rupture CRF	Outcomes and Endpoints	Treatment Variables	Exploratory
Cranial Nerve Function CRF	Outcomes and Endpoints	Physical Impairment	Exploratory
Death CRF	Outcomes and Endpoints	Case fatality/Survival	Supplemental
Disability-Adjusted Life Years (DALY) CRF	Outcomes and Endpoints	Disability	Exploratory
Headache Pain CRF	Outcomes and Endpoints	Physical Impairment	Exploratory
Home Time CRF	Outcomes and Endpoints	Participation Restriction/Return to Work	Exploratory
Return to Work CRF	Outcomes and Endpoints	Participation Restriction/Return to Work	Exploratory
Shunt Dependency CRF	Outcomes and Endpoints	Treatment Variables	Exploratory
Barthel Index	Outcomes and Endpoints	Disability	Exploratory
Beck Anxiety Inventory	Outcomes and Endpoints	Emotional Impairment	Exploratory
Beck Depression Inventory	Outcomes and Endpoints	Emotional Impairment	Exploratory
Boston Naming Test	Outcomes and Endpoints	Cognitive Impairment: Language	Exploratory
Brief Symptom Inventory-18	Outcomes and Endpoints	Emotional Impairment	Exploratory
Center for Epidemiologic Studies Depression Rating Scale	Outcomes and Endpoints	Emotional Impairment	Exploratory
Clinician-Administered PTSD Scale	Outcomes and Endpoints	Emotional Impairment	Exploratory
Color-Word Interference Test of the Delis-Kaplan Executive Function System	Outcomes and Endpoints	Cognitive Impairment: Executive Functions	Exploratory
Computerized Test of Attentional Performance (TAP 2.3) - Alertness	Outcomes and Endpoints	Cognitive Impairment: Attention	Exploratory

subtest			
Computerized Test of Attentional Performance (TAP 2.3) - Divided Attention subtest	Outcomes and Endpoints	Cognitive Impairment: Attention	Exploratory
Computerized Test of Attentional Performance (TAP 2.3) - Go/NoGo subtest	Outcomes and Endpoints	Cognitive Impairment: Attention	Exploratory
Computerized Test of Attentional Performance (TAP 2.3) - Neglect subtest	Outcomes and Endpoints	Cognitive Impairment: Attention	Exploratory
Digit Span Subtest of the WAIS-IV	Outcomes and Endpoints	Cognitive Impairment: Working Memory	Exploratory
Euro-QoL 5 Dimension Questionnaire	Outcomes and Endpoints	Health-Related Quality of Life Outcome	Exploratory
Five Point Test	Outcomes and Endpoints	Cognitive Impairment: Executive Functions	Exploratory
Frontal Systems Behavioral Scale	Outcomes and Endpoints	Cognitive Impairment: Behavior	Exploratory
Generalized Anxiety Disorder - 7	Outcomes and Endpoints	Emotional Impairment	Exploratory
Glasgow Outcomes Scale	Outcomes and Endpoints	Disability	Supplemental
Glasgow Outcome Scale - Extended	Outcomes and Endpoints	Disability	Supplemental
Grooved Pegboard Test	Outcomes and Endpoints	Cognitive Impairment: Eye-Hand Coordination	Exploratory
Hospital Anxiety and Depression Scale	Outcomes and Endpoints	Emotional Impairment	Exploratory
Impact of Event Scale	Outcomes and Endpoints	Emotional Impairment	Exploratory
Mini-Mental State Examination	Outcomes and Endpoints	Cognitive Impairment: Screening	Exploratory
Modified Rankin Scale	Outcomes and Endpoints	Disability	Supplemental - Highly Recommended

Montreal Cognitive Assessment	Outcomes and Endpoints	Cognitive Impairment: Screening	Supplemental - Highly Recommended
Multidimensional Assessment of Fatigue	Outcomes and Endpoints	Physical Impairment	Exploratory
Neuro-QoL	NIH Resources and Outcomes and Endpoints	NIH Resources and Health-Related Quality of Life Outcome	Exploratory
Neuropsychiatric Inventory Questionnaire	Outcomes and Endpoints	Emotional Impairment	Exploratory
Patient Health Questionnaire - 9	Outcomes and Endpoints	Emotional Impairment	Exploratory
PROMIS	NIH Resources and Outcomes and Endpoints	NIH Resources and Health-Related Quality of Life Outcome	Exploratory
PTSD Checklist - Civilian	Outcomes and Endpoints	Emotional Impairment	Exploratory
Rey Auditory Verbal Learning Test	Outcomes and Endpoints	Cognitive Impairment: Memory	Exploratory
Rey-Osterrieth Complex Figure Test	Outcomes and Endpoints	Delayed Recall trial-Cognitive Impairment: Memory Copy trial-Cognitive Impairment: Visuoception	Exploratory
Short-Form 36	Outcomes and Endpoints	Health-Related Quality of Life Outcome	Exploratory
Short-Form Health Survey 12	Outcomes and Endpoints	Health-Related Quality of Life Outcome	Exploratory
Similarities Subtest of the WAIS-IV	Outcomes and Endpoints	Cognitive Impairment: Premorbid Intelligence	Exploratory
Standardized Link's Probe	Outcomes and Endpoints	Cognitive Impairment: Executive Functions	Exploratory

Stroke Impact Scale version 3.0	Outcomes and Endpoints	Health-related Quality of Life Outcome	Exploratory
Stroke-Specific Quality of Life Scale	Outcomes and Endpoints	Health-related Quality of Life Outcome	Exploratory
Telephone Interview for Cognitive Status	Outcomes and Endpoints	Cognitive Impairment: Screening	Exploratory
Token Test	Outcomes and Endpoints	Cognitive Impairment: Language	Exploratory
Trail Making Test Parts A and B	Outcomes and Endpoints	Part A: Cognitive Impairment: Cognitive Speed Part B: Cognitive Impairment: Executive Functions	Exploratory: Trail Making Test Part A (Cognitive Speed) Trail Making Test Part B (Executive Function)
Utrecht Scale for Evaluation of Rehabilitation-Participation	Outcomes and Endpoints	Participation Restriction/Return to Work	Exploratory
Visual Span Forward (WISC)	Outcomes and Endpoints	Cognitive Impairment: Visuospatial Short-term Memory	Exploratory
Written Verbal Fluency Test	Outcomes and Endpoints	Cognitive Impairment: Executive Functions	Exploratory

4. Comparison to other subarachnoid hemorrhage standards (Are there any notable similarities/differences in the CDE recommendations as compared with other standards?)

The CDEs assess those outcomes and endpoints that are usually considered relevant by the SAH guidelines and key articles in the field of SAH research. A special focus, however, has been laid on neuropsychological outcomes after SAH, in accordance with special interest in this aspect of outcome in the last years.

5. Issues unique to subarachnoid hemorrhage disease (Were there any issues encountered when developing the CDE standards which are unique to subarachnoid hemorrhage or which highlight a unique concern about subarachnoid hemorrhage data collection?)

No particular issues were encountered. As SAH is a form of stroke, many of the outcomes and endpoints resemble those of the Stroke CDEs. Some differences exist in terms of CDEs that

record the treatment results of surgical or endovascular treatment of the aneurysm; long-term occlusion and re-treatment, for example, is unique to SAH and does not apply to ischemic stroke.

We intentionally kept a lot of measures as Exploratory, as their use in SAH research has been limited to few articles as of yet. The ones that have been used frequently (Modified Rankin Scale, Montreal Cognitive Assessment) we classified as Supplemental or Supplemental – Highly Recommended. We refrained from labeling too many outcomes as Core or Supplemental in order to keep some freedom to future SAH researchers.

In general, the paradigm of SAH outcome measures is changing right now; more focus is being paid to neuropsychological aspects of outcome. This kind of outcome is complex and requires a considerable number of instruments to measure. On the other side, available data is sparse. This might explain why we came up with a lot of Exploratory measures.

6. Unmet needs; unanswered questions (*What unmet need / unanswered questions were identified via the CDE process in subarachnoid hemorrhage? What areas are in need of further research and development?*)

We identified many outcome scales / metrics that measured similar qualities of outcome. In absence of studies addressing the question which outcome metric is best in the setting of SAH, some of the decisions for or against one or another outcome scale had to be made based on “expert opinion” of members of the CDE group. We hope that the selected CDEs will be approved and used by clinicians and researchers in the field.