What is the National Institute of Neurological Disorders and Stroke (NINDS) Common Data Element Project?

- NINDS initiated the development of CDEs as part of a project to develop data standards for funded clinical research in neuroscience.

- The CDEs are content standards that can be applied to various data collection models and are intended to be dynamic and may evolve over time.

- CDEs are not a database.

What are the goals of the CDE Project?

- Develop common definitions and standardize case report forms (CRFs) and other instruments

- Help investigators conduct clinical research through the development of these uniform formats by which clinical data can be systematically collected, analyzed and shared across the research community
What are the objectives of the CDE Project?

- Identify or develop CDEs used in clinical research
  - (age, gender, race, etc.)
  - Present data elements in a standard format available to all
  - Identify common definitions
- (including permissible values, range checks, etc.)
- Standardize CRFs and other data collection instruments
- Provide information to researchers for clinical data collection and sharing

Overall Impact of the CDE Project

- Reduce the time and cost needed to develop data collection tools
- Promote standardized, consistent and universal data collection
- Improve data quality and facilitate data sharing
- Improve opportunities for meta-analysis and comparison of results from various studies

NINDS' Collaborative Effort for CDE Development and Implementation

- Expertise from hundreds of disease specialists worldwide
- Other NIH institutes and federal agencies such as the National Library of Medicine
- International data standards (e.g., ISO)
- Clinical Data Interchange Standards Consortium (CDISC)
- Non-profits / Foundations
- Pharmaceuticals

NINDS CDE Current Diseases

- Amyotrophic Lateral Sclerosis
- Cerebral Palsy
- Chiari Malformation
- Congenital Muscular Dystrophy
- Duchenne Muscular Dystrophy/Becker Muscular Dystrophy
- Epilepsy
- Facioscapulohumeral Muscular Dystrophy
- Friedreich's Ataxia
- Headache Version 2.0
- Huntington's Disease
- Mitochondrial Disease
- Multiple Sclerosis
- Myasthenia Gravis
- Myotonic Dystrophy
- Neuromuscular Diseases
- Parkinson's Disease
- Spinal Cord Injury and Pediatric SCI
- Spinal Muscular Atrophy
- Sports Related Concussion
- Stroke
- Traumatic Brain Injury
- Unruptured Cerebral Aneurysms and Subarachnoid Hemorrhage

NINDS CDE Collaboration and Partnerships

- Cerebral Palsy–American Academy for Cerebral Palsy and Developmental Medicine (AACPDM)
- Chiari I Malformation–Chiari & Syringomyelia Foundation
- Unruptured Cerebral Aneurysms and Subarachnoid Hemorrhage (SAH)–National Library of Medicine
- Sports-Related Concussion (SRC)–U.S. Department of Defense

What is a CDE?

- Standardized question and potential answers
- Semantic value with a CDE name, definition and permissible values
- Example:
  - CDE name: "Clinical event or milestone type"
  - Question Text: "Milestone"
  - Definition: "Type of clinical event or milestone pertinent to the disease or disorder"
  - Data Type: "Alphanumeric"
  - Input Restriction: "Multiple Pre-Defined Values Selected"
CDE Development Process

• CDEs are identified, developed, and vetted by experts in the scientific community
• Development is transparent and inclusive
• NINDS and NINDS CDE Team provide continuous support and guidance
• Oversight Committee (OC) will be formed to help maintain disease-specific CDEs
• Process is iterative – Steering Committee meets to annually review and update CDEs

CDE Development: Process (cont.)

<table>
<thead>
<tr>
<th>Development Step</th>
<th>Typical Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>NINDS invites Working Group (WG) members and WG Chair(s)</td>
<td>2 - 4 weeks</td>
</tr>
<tr>
<td>NINDS works with Chair(s) to divide WG into subgroups and to nominate subgroup Chair(s)</td>
<td>2 - 4 weeks</td>
</tr>
<tr>
<td>Introductory meeting of WG at national conference or via web conference</td>
<td>1 - 2 hours</td>
</tr>
<tr>
<td>Subgroups meet every 3 - 5 weeks via conference call to develop CDEs for assigned areas</td>
<td>6 - 9 months</td>
</tr>
<tr>
<td>Internal WG Review of all subgroups' CDEs</td>
<td>1 month</td>
</tr>
<tr>
<td>Subgroups review CDEs based on feedback from internal WG review</td>
<td>1 - 2 months</td>
</tr>
<tr>
<td>Public Review of WG's CDEs</td>
<td>6 - 8 weeks</td>
</tr>
<tr>
<td>Subgroups review CDEs based on feedback from Public Review</td>
<td>1 month</td>
</tr>
<tr>
<td>Post version 1.0 of CDEs on the website</td>
<td>2 - 4 weeks</td>
</tr>
<tr>
<td>Total</td>
<td>12 - 18 months</td>
</tr>
</tbody>
</table>

CDE Terminology – Classifications

- Exploratory
- Supplemental
- Supplemental - Highly Recommended
- Disease Core
- General Core

* Classification term of “Basic” used for Traumatic Brain Injury CDEs

NINDS CDE Disease Areas – over 13,000 CDEs & 900 Instruments

<table>
<thead>
<tr>
<th>Disease Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chiari I Malformation (new)</td>
</tr>
<tr>
<td>Cerebral palsy (new)</td>
</tr>
<tr>
<td>Epilepsy*</td>
</tr>
<tr>
<td>Headache (version 2.0 new)</td>
</tr>
<tr>
<td>Mitochondrial disorders*</td>
</tr>
<tr>
<td>Movement disorders</td>
</tr>
<tr>
<td>Parkinson’s disease</td>
</tr>
<tr>
<td>Huntington’s disease</td>
</tr>
<tr>
<td>Multiple sclerosis</td>
</tr>
<tr>
<td>Spinal cord injury (SCI)*</td>
</tr>
<tr>
<td>Stroke*</td>
</tr>
<tr>
<td>Unruptured Cerebral Aneurysms and Subarachnoid hemorrhage (new)</td>
</tr>
<tr>
<td>Traumatic brain injury*</td>
</tr>
<tr>
<td>– Sports-Related Concussion (new)</td>
</tr>
<tr>
<td>– Neurovascular disorders*</td>
</tr>
<tr>
<td>– Amyotrophic lateral sclerosis</td>
</tr>
<tr>
<td>– Friedreich’s ataxia</td>
</tr>
<tr>
<td>– Muscular dystrophies</td>
</tr>
<tr>
<td>– Congenital, Duchenne/Becker, Friedreich’s ataxia, Myotonic</td>
</tr>
<tr>
<td>– Myasthenia gravis</td>
</tr>
<tr>
<td>– Spinal muscular atrophy</td>
</tr>
<tr>
<td>Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS) (in development)</td>
</tr>
<tr>
<td>Biomechanical Sensors in Traumatic Brain Injury (in development)</td>
</tr>
</tbody>
</table>

* Includes pediatric-specific recommendations
**How were the CP CDEs developed?**

**CP CDE DEVELOPMENT PROCESS**

Initial CP CDE Project meeting held in October 2015

Individual working groups met via teleconference monthly for 6–9 months

CP CDE working groups internally reviewed all the working groups in June 2016

CP CDEs posted to NINDS CDE Website for public review from September 2016 to October 2016

Version 1.0 CP CDEs were posted on NINDS CDE website (www.commondataelements.ninds.nih.gov) on December 15, 2016

**CEREBRAL PALSY CDE PROJECT**

Collaboration between the National Institutes of Neurological Disorders and Stroke (NINDS) and the American Academy of Cerebral Palsy and Developmental Medicine (AACPDM)

Seven Working Groups and a Steering Committee

- Participant Characteristics and Disease/Injury Related Events
- Health, Growth, Genetics, Comorbidities, and Labs
- Neuroimaging Diagnostics
- Neuromotor Skill and Functional Assessments
- Neurocognitive, Social, and Emotional Assessments
- Engagement and Quality of Life Assessments
- Integrated Across WGs

**CP CDE PROJECT OVERALL PURPOSE**

Standardize data collection and assessment in studies of children and youth by:

- Identify valid and reliable measures – including assessment and evaluative tools – to be recommended for routine use in research studies and clinical practice in all types of studies
- Recommend a set of CDEs and measures that comprehensively represent functional profiles across all domains of the International Classification of Functioning, Disability and Health (ICF)
- Identify CDEs/ measurement gaps that could be addressed in future research initiatives

**CEREBRAL PALSY SELECTION CRITERIA**

Selection criteria applied by all the working groups:

- Applicable to children and youth aged 0 to 18 years
- Represents a relevant areas of study in CP
- Has documented validity and reliability testing

CDEs and instruments had to meet all selection criteria in order to be included in the CP CDEs set
NINDS CP CDE CLASSIFICATION CRITERIA

<table>
<thead>
<tr>
<th>CDEs Classification</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>A data element for recording essential information applicable to any CP study including therapeutic areas and study designs. Consistent with all NINDS disease-specific CDE sets.</td>
</tr>
<tr>
<td>Supplemental – Highly Recommended</td>
<td>A data element which is recommended for use whenever applicable.</td>
</tr>
<tr>
<td>Supplemental</td>
<td>A data element that has some evidence of validity and is commonly collected in clinical studies in CP. Use depends upon the study design.</td>
</tr>
<tr>
<td>Exploratory</td>
<td>A data element that is emerging or that requires further validation in CP.</td>
</tr>
</tbody>
</table>

CEREBRAL PALSY DOMAIN WORKING GROUPS DEVELOPMENT PROCESS

All WGs reviewed existing CDEs and instruments defined from other diagnostic groups in the NINDS CDE project including:
- Friedrich’s Ataxia
- Stroke
- Epilepsy
- Spinal Muscular Atrophy
- Duchenne Muscular Dystrophy/Becker Muscular Dystrophy
- Traumatic Brain Injury

INTEGRATED ACROSS WORKING GROUPS

Reviewed all the instruments recommended by the six domain Working Groups recommended:

- 226 measures were identified by the Working Groups 122 (54%) were proposed for inclusion in Version 1.0 CP CDEs.
  - 34 classified as Supplemental – Highly Recommended
  - 61 classified as Supplemental
  - 31 classified as Exploratory

NUMBER OF INSTRUMENTS AND CRFS REVIEWED AND RECOMMENDED BY WORKING GROUPS

<table>
<thead>
<tr>
<th>Working Group</th>
<th>Standardized Instruments (Number)</th>
<th>Number of CRFs (Number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Characteristics and Disease/Injury Related Events</td>
<td>98</td>
<td>20</td>
</tr>
<tr>
<td>Health, Growth, Genetics, Comorbidities, and Labs</td>
<td>48</td>
<td>11</td>
</tr>
<tr>
<td>Neuromotor Skill and Functional Assessments</td>
<td>62</td>
<td>6</td>
</tr>
<tr>
<td>Neurocognitive, Social, and Emotional Assessments</td>
<td>56</td>
<td>N/A</td>
</tr>
<tr>
<td>Engagement and Quality of Life Assessments</td>
<td>34</td>
<td>N/A</td>
</tr>
<tr>
<td>Neuroimaging</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>226</td>
<td>20</td>
</tr>
</tbody>
</table>
At the end of this month, there will be more than 20 disease areas with over 13,000 CDEs and 900 CRFs available for use through the NINDS CDE project website.

Questions?
NINDSCDE@emmes.com

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