From ICD10 to ICD11
Proposal for a general approach and incorporation of rare diseases

Ségoënè Aymé,
COMP meeting - 1 April 2009
The Revision Steering Group

Chair of the RSG

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The Revision Steering Group

Rare Diseases

Chair: Ségolène Aymé

Orphanet

Rare Diseases Platform

Broussais Hospital, Paris, France
Role of TAG

• Advise WHO in all steps leading to the revision
• Establish workgroups and partners to involve
  – Generation of necessary evidence
  – Develop proposals for changes
  – Establish procedures
  – Facilitate cross fertilization of ideas and reducing redundant efforts
• Advise in developing various drafts of topic segments in line with the overall production timeline of ICD11
• Advise in developing protocols for and in implementing field trials
Composition of TAG Rare Diseases

- Europe:
  - Ségolène Aymé, Ana Rath (Orphanet)
- USA:
  - Stephen Groft, Roberta Pagon (Office of RD-NIH)
- Korea:
  - Hyun-Young Park (CDC-Information Center, Seoul)
- Brazil:
  - Eduardo Castilla
- Argentina:
  - Monica Rittler
- Mexico:
  - Osvaldo Mutchinick
- Russia:
  - Evgeny Ginter
- China:
  - Yiming Wang
Experts for peer-review

• Experts identified by Orphanet
  – Editorial board members
  – Orphanet scientific advisory board at country level
  – European networks / Learned societies

• Same process in each region
  – Decided by each TAG member
ICD-10 Plus

- Proposals
- Comments
- Discussions
- Evidence

ICD-11

- Comments
- Discussions
- Evidence

ICD Ontology

- Entities
- Attributes
- Linkages

Application

ICD-10 +

WEB Application

Joint-authoring Tool

WIKI like application

Protégé/OWL LEXGRID

Key Tasks

• Clinical Modification Owners enter their CM version Codes
• TAG and Workgroups enter proposals

• TAG Experts for ICD-11
• WHO editors
  - Taxonomic rules
  - Definitions
  - Diagnostic criteria

• ALL USERS can see drafts and comment.
• ALL USERS can see drafts and comment

Access

• ANY USER can POST proposals or comments.
• ANY USER can REVIEW other proposals and discuss.

Technical Layer

ICD-10 +
- Proposals
- Comments
- Discussions
- Evidence

ICD-11
- Comments
- Discussions
- Evidence

ICD Ontology
- Entities
- Attributes
- Linkages

• Ontology Model
• Linkages between ICD and:
  - SNOMED
  - Other ontology & terminologies
• Clinical interface algorithms

Orphanet
Change Proposal Generation

- Implicit creation of change proposal by changing local view
- Can be extracted into machinable format
- Editors and reviewers can see changes in context  
  - What would it look like if adopted
- User can write explicit proposal
Hierarchy of Hiki Authority by ICD Domain

0 Revision Steering Committee
1 Revision Domain/Topic Working Groups
2 Accredited Experts
   - Designated by Working Group Members
3 Accredited Persons
   - Designated by Experts
4 Registered Interested Persons (Public)
Tentative Timeline

• **2010**: Alpha version (ICD 10+ → ICD 11 draft)
  – +1 YR: Commentaries and consultations
• **2011**: Beta version & Field Trials Version
  – 20+2 YR: Field trials
• **2013**: Final version for public viewing
  – 2014: WHA Approval
• **2015+**: Implementation
Preparatory work at Orphanet

Step 1: collect published classifications and build a clinical one
Since 2006
Classification of rare diseases

• Methodology:
  – Collection of published classifications of specific groups of rare diseases
    • Clinical classifications
    • By mechanism or by aetiology
  – Building up of a comprehensive classification of Orphanet entries to serve the needs of Health Care information systems: the Orphanet classification of rare diseases
    • Based on
      – Literature (reference texts, scientific publications)
      – Experts working groups
    • Validated by the scientific advisory board of Orphanet
    • Regularly updated
Rationale for a clinical classification

- Criterion: medical/surgical specialties involved in the management of the different manifestations of a disease
- Stick to medical specialties organised by system, then by group of age (pediatrics/adults), then by subspecialty (i.e. epileptology)
- Etiological/physiopathological criteria were further applied, when relevant for diagnosis/management
MULTI-CLASSIFICATION SYSTEM

**Etiological classification**
Metabolic diseases
Peroxisomal diseases

**Inheritance mode classification**
X-linked diseases

**Therapeutical classification**
Diseases needing
Bone marrow transplantation

**Neurological diseases**
Neurodegenerative disease

**Pathological classification**
Myelodystrophies

**Histopathological classification**
Myelinizing disease

**Endocrine diseases**
Adrenal insufficiency

**Male infertility with normal virilization**
Testicular abnormalities
Orpha nomenclature

- Comprehensive list of rare diseases (<5,850)
  - Identity card + genes
  - Unique Orpha number
    - Stable whatever is the evolution of knowledge
    - Linked to parent and child disease in every classification
  - Files available on request
    - for use in information systems
    - For research purpose
    - At running cost for non-profit use + Material Transfer Agreement

- Classifications of rare diseases (by September 08)
  - List of all published classifications
  - Visualisation of each classification
  - Possibility to click at any level to have the detailed information
SEARCH A DISEASE

Disease name: gaucher

OTHER SEARCH OPTION(S)

> Search a group of diseases

Classification of rare forms of dementia

Orphanet classification of rare neurological diseases

Orphanet classification of rare eye diseases

Classification of sucking/swallowing disorders

Orphanet classification of inborn errors of metabolism

Orphanet classification of genetic diseases
Orphanet classification of inborn errors of metabolism

Metabolic disease, rare

- Metabolic disease involving complex molecules
  - Lysosomal disease
    - Sphingolipidosis
      - Gaucher disease
        - Gaucher disease type 1

return to list of classifications
Orphanet classification of rare neurological diseases

Source [^]

- Neurological disease, adult, rare
  - Ataxia, adult [+]
  - Central nervous system and retinal vascular disease, rare [+] [1]
  - Complex regional pain syndrome [1]
  - Dementia, rare [+]
  - Encephalitis [+]
  - Epilepsy, adult, rare [+]
  - Headache, rare [+]
  - Idiopathic orthostatic hypotension [+]
  - Komar syndrome [+]
  - Leukodystrophy, adult [+]
  - Locked-in syndrome [+]
  - Medullar disease, adult, rare [+] [1]
  - Movement disease, adult, rare [+]
  - Nervous system tumour, adult [+]
  - Neurodegenerative disease, adult, rare [+]
  - Neuroimmunological disease, adult [+] [1]
  - Neuroleptic malignant syndrome [+]
  - Neurometabolic disease [+] [1]
**Orphanet classification of rare neurological diseases**

Source [↗]

- **Neurological disease, adult, rare** [↩]
  - Leukodystrophy, adult
    - Adrenomyeloneuropathy [+]  
    - CACH syndrome, juvenile or adult form [+]  
    - Leukodystrophy, unknown [+]  
    - Leukoencephalopathy - dystonia - motor neuropathy [+]  
    - Metachromatic leukodystrophy [+]  

return to list of classifications
Preparatory work at Orphanet

Step 2: Analyse ICD10 and identify problems
Since 2007
Identification of coding difficulties

• Preliminary study on ICD-10 coding for rare diseases
  – Identification of specific codes: 240 ONLY
  – Identification of rare diseases listed under a category
  – Cross-matching with other datasets (CINEAS, UKGTN, Veneto register)
  – Typology of problems for coding rare diseases with ICD-10
Matching incorrect specific codes

- Marfan syndrome
  - Q87.4
    - In: Q87 Other specified congenital malformation syndromes affecting multiple systems

Could have been included in
- M30-M36 Systemic connective tissue disorders
Problematic groups of diseases

- Skin diseases
  - Some skin diseases are coded as malformations
    - Q80 Congenital ichthyosis
    - Q81 Epidermolysis bullosa
    - Q82.1 Xeroderma pigmentosum
    - etc.
Coding according to the cause or the consequence?

- Alkaptonuria  E70.2
- Tyrosinemia type 1  E70.2
  - E 70.2: Disorders of tyrosine metabolism
    - Alkaptonuria
    - Tyrosinemia
    - ...

  - Both diseases are coded to the cause but phenotypes are quite different
    - Alkaptonuria: pigmentation disorders, muscular-skeletal symptoms, arthropathy… or asymptomatic
    - Tyrosinemia: severe hepatocellular necrosis (early onset form), renal tubulopathy (late onset form)
How to code hereditary forms of diseases?

- Melanoma, familial
  - C43 Melanoma, malignant
    - A Z80 code should be added to familial forms of cancers?
- What about familial forms of not rare diseases?
  - Parkinson disease, familial form
    - G20 Parkinson disease
First conclusions

• Lack of systematic approach
  – Classification according to major symptom
  – Classification according to etiology / mechanism

• Confusion between anatomy / organs and Systems
  Respiratory system, cardiovascular system, immunological system……

• Confusion between « malformation » and « congenital » and « genetic »
Preparatory work at Orphanet

Step 3: Contribute to ICD10+ and ICD11
Since January 2009
Process at Orphanet

- Chapter by chapter comparison between
  - ICD-10
  - Orphanet classification
  - Published classifications (when available)
- List of proposals for ICD-10+
- Proposal for ICD-11 for the chapter
  - An information scientist was recruited to assist submitting proposals (contract RDTF secretariat 2009-2011)
ICD10+ proposals

• Each proposal is
  – qualified following the WHO revision tool
  – justified (literature)

• Orphanet input on the ICD10 revision
  – based on already validated subclassifications

• Experts for the specialty (Official networks / Societies / Associations)
  – informed in order to add their contributions to the revision process
ICD-11 proposals

• A dossier with the rationale for proposals is established
• The definitional items chart (WHO) is fulfilled for each disease
• The dossier is submitted
  – to identified best experts by Orphanet and by NIH
• A final proposal will be sent to WHO, chapter by chapter, one every month
Proposal for general principles

Based on published classifications and on past experience in using codes at Orphanet
Rare diseases and biological systems

- Biological systems are networks
  - Hierarchy of networks
  - Higher nodes are limited in numbers: Minority of nodes account for a large amount of connections:
    - Metabolic, signalling, immunity, repair, stress....
  - Common Diseases: extreme values at one upper node
  - Rare Diseases: extreme values at lower nodes
Organisation of Chapters

• By system
  – based on physiology
  – Etiology/mechanism being the final level
  – From the « upper level » to the « lower level »

• Addition of a chapter for multisystemic diseases
  – Ex: Marfan syndrome is a multisystemic disease

• Chapter for prenatal developmental defects (not only malformation) as in utero development is a process - a « system »}
Conclusions

• Possibility to propose a profound evolution of the organisation of chapters II to XVIII
  – With a possible migration of almost all existing codes
  – With a common logics applied to all chapters
  – Putting rare diseases where they should be
    • Everywhere as a lower node
• Chapter on Haematology is already available and under review by experts
• Production of one chapter per month
  – Endocrinology (April), Immunology (May)....