Consistency of time series in cause-specific mortality over the ICD-10 period

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Background

The cause-specific mortality trends can be disrupted due to:

ICD-revisions

ICD-updates within the same revision

New tools to certify/select CoDs

Changes in the systems of collecting information on CoD

Manipulations of CoD statistics

Introducing specific practices in some areas of the country

New tools/Changing approaches to the CoD investigation

Changes in medical knowledge about specific diseases
Updates within ICD-10 revision

"...WHO should endorse the concept of an **updating process between revisions** and give consideration as to how an effective updating mechanism could be put in place“

*International Conference for the Tenth Revision of the ICD, Geneva 1989*

ICD-10 was endorsed in 1990. The three volumes were published between 1992 and 1994. WHO members started to adopt the new classification since 1994

The first updates of the ICD-10 were approved in 1996. Since then the updates are introduced annually

**Countries implement the updates on their own schedule**
Drug overdoses in Norway

ICD update adopted by Norway in 2003

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<thead>
<tr>
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<th>4.1.12 Summary of linkages by code number</th>
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<tbody>
<tr>
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<td>Table 2. Summary of codes not to be used in underlying cause mortality coding</td>
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<td>Codes not to be used for underlying cause</td>
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<td>Mortality coding (code to item in parentheses; If no code is indicated, code to R99)</td>
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<td>F10.0</td>
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<td>F19.0</td>
<td>(code to X40-X49, X60-X69, X85-X90, or Y10-Y19)</td>
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</table>

Source: WHO; Christian L. Ellingsen, personal communication
Senile Dementia vs Cerebrovascular dis. in England and Wales

England and Wales adopted that update in 2011 when a new version of ACS software was installed. Bridge coding on an 11% sample of death certificates was performed [ONS, 2011].

Source: WHO
Introducing Automated Coding System (ACS)

Source: Eurostat
ACS improves the consistency of CoD data

Deviation from the average level (%)

Infectious and parasitic diseases
Mouth and oropharynx cancers
Esophageal cancer
Stomach cancer
Colon and rectum cancers
Liver cancer
Pancreas cancer
Cancers of other digestive organs
Trachea, bronchus and lung cancers
Cancers of other respiratory organs
Melanoma and other skin cancers
Mesothelial and soft tissue cancers
Brain cancer
Cervix uteri cancer
Corpus uteri cancer
Ovary cancer
Prostate cancer
Kidney cancer
Bladder cancer
Cancer of brain and CNS
Other cancers
Lymphomas and multiple myeloma
Leukemia
Other neoplasms
Diabetes mellitus
Oth endocrine,nutritional/metabolic dis.
Alcohol abuse
Other mental and behavioral disorders
Diseases of the nervous system
Rheumatic diseases
Hypertensive diseases
Myocardial infarction
Other forms of ischemic heart diseases
Pulmonary heart and circulation dis.
Other heart diseases
Subarachnoid hemorrhage
Nontraumatic intracranial hemorrhage
Cerebral infarction
Stroke, not specified
Other cerebrovascular disorders
Atherosclerosis
Oth dis. of arteries, arterioles, capillaries
Dis. of veins and lymphatic vessels
Pneumonia
Chronic obstructive pulmonary disease
Other respiratory diseases
Peptic ulcer disease
Alcoholic liver disease
Fibrosis and cirrhosis of the liver
Other diseases of liver
Diseases of pancreas
Other digestive diseases
Dis. of skin, musculoskeletal system
Nephritis and nephrosis
Other urinary diseases
Renal conditions
Congenital malformations
Sepsis
Oth ill-defined and unspecified causes
Road traffic accidents
Accidental poisonings
Falls
Accidental inhalation
Other unintentional injuries
Suicide
Homicide
Injuries with undetermined intent

RUSSIA
non-centralized, mostly manual coding

GERMANY
half-centralized manual coding

FRANCE
centralized coding with ACS
In 2013, Netherlands switched to automated coding. Before coding was done manually.

Bridge coding study was performed [Harteloh, 2017; 2018]
Changes in the system of collecting CoD data

Case of Alcohol poisonings in two regions of Russia

An agreement on replacing initial death certificates with the corrected ones in statistics

In 2014, in Moscow oblast

In 2016, in the city of Moscow

Mortality from alcohol poisonings

Source: RusFMDB
Changes in the system of collecting CoD data

Case of Accidental falls in Norway

**Before 2004:** unspecified femur fractures are coded as falls

**Since 2005:** ... as exposures to unspecified factor

**In 2015-2016:** querying the certifying doctors about the circumstances

**In 2017:** that practice stopped due to the lack of resources

*Source: WHO; Christian L. Ellingsen, personal communication*
Manipulations of CoD statistics

Exchange between CVD, Senility and other CoDs in Russia

May, 2012

(in 2011, CDR from CVD was 753.0 per 100 000)

УКАЗ

ПРЕЗИДЕНТА РОССИЙСКОЙ ФЕДЕРАЦИИ

О совершенствовании государственной политики в сфере здравоохранения

В целях дальнейшего совершенствования государственной политики в сфере здравоохранения, направленной на сохранение и укрепление здоровья граждан Российской Федерации, увеличение продолжительности их жизни, постановляю:

1. Правительству Российской Федерации:
   а) обеспечить к 2018 году:
   снижение смертности от болезней системы кровообращения до 649,4 случая на 100 тыс. населения;
   снижение смертности от новообразований (в том числе от рака) до 192,9 случая на 100 тыс. населения;

   ... reduction in mortality from circulatory diseases up to 649.4 cases per 100 thousand of population

   до 7,5 на 1 тыс. родившихся живыми;

   доведение объема производства отечественных лекарственных

   ...
Some solutions to overcome the problem

1. **Bridge coding**

   Double-coding according to both old and new systems

   The comparability ratios can be used to reconstruct the trend

2. **Reconstruction**

   Vallin and Meslé, 1988; Meslé and Vallin, 1996

   Painstaking comparison between old (before changes) and new (after changes) data

   Mostly known for performing reconstruction between different ICD-classifications

   Also can be used to overcome the problem of trends inconsistencies caused by other changes
Temporal + Subnational inconsistency

Russia, Diseases of Nervous System

Germany, Dementia (F01, F03)

Source: RusFMDB; WHOMDB
Temporal + Subnational inconsistency

Change in mortality from **Diseases of Nervous System in Russia** between 2007 and 2017 by regions

Change in mortality from **Dementia in Germany** between 1998, 2005 and 2013 by lands

**Source:** RusFMDB; Pavel Grigoriev, personal communication
Conclusion

The disruptions occur not only due to transition to a new classification but also within the same classification.

The problem has, probably, escalated within the ICD-10.

Improving the data quality and consistency may cause disagreements in a short-run context.

The balance should be found.

Simultaneous changes → to ensure subnational consistency
                  → to enable further reconstruction.
References


THANK YOU FOR YOUR ATTENTION!