Codification practices of drug related deaths following the WHO revision of ICD coding guidelines related to DRDs

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Part I

DRAWN UP ON BEHALF OF THE EUROPEAN MONITORING CENTRE FOR DRUGS AND DRUG ADDICTION

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Abbreviations

DRD	Drug related death
EMCDDA	European Monitoring Centre for Drugs and Drug Addiction
GMR	General Mortality Register
ICD	International Statistical Classification of Diseases and Related Health Problems
SR	Special Register
WHO	World Health Organisation

Executive summary

- The aim of this project was to review drug-induced deaths data mainly from the general mortality registers (GMRs), including the codification practices of drug related deaths (DRDs) following the World Health Organisation (WHO) revision of ICD -10 coding guidelines related to DRDs.

- The project was divided into three parts and this part, based on aggregated data reported by the countries to the EMCDDA, aimed to review coding practices and trends in DRDs in countries following the WHO ICD-10 updates.

- In 2002/2003 the World Health Organisation developed a set of ICD-10 updates which had a direct impact on the DRDs indicator according to selection B and which were implemented in 2006. The EMCDDA protocol was updated accordingly.

- Data on drug related deaths is reported according to selection B as their main source in 14 countries, according to selection D in 11 countries and according to other specific definition in 5 countries. Many countries have established long time trends in the reporting of DRDs.

- Eight countries include non-residents in the data submitted to EMCDDA, while the rest do not.

- Countries follow four major trends in DRDs: those showing an upward trend (Finland, Ireland, Lithuania, Romania, Sweden, Turkey and United Kingdom), those showing a downward trend (Czech Republic, Italy, Germany, Poland and Spain, Latvia, Hungary (however recent upward trend) Luxembourg and short term downward trend in Cyprus and somewhat in Portugal). Those showing a stable trend (Denmark, Netherlands and Slovakia) and those showing an upward trend which is now being followed by a downward trend (Austria, Belgium, Bulgaria, Croatia, Estonia, France, Malta, Norway).

- When comparing data according to selection B and D, in most countries while discrepancies between the two sources may be quite large, however most show the same trend direction in deaths over the years. Also for most countries (8/12) the main source of data on DRDs, reports more DRDs on average than the other source.

- Reporting according to selection B ICD-10 codes:

F codes: Most countries for which reporting of ICD codes is possible have relatively low levels of F codes. Countries which report more than half of their cases with F codes do not have T codes e.g. Austria (100%) and France (53%).

X41/X61/Y11 and corresponding T code: Reporting of these codes varies according to the drug profile of the country, however usually does not account for a large percentage of drug related deaths (usually less than 10%). However in countries which cannot report these

codes as they do not have T codes, this will lead to a certain degree of under-reporting of stimulant related cases.

X42/X62/Y12 codes: These codes, combined with T-codes capture most of the DRDs and as expected they account for the largest percentage of DRDs.

X44/X64/Y14 codes: These codes are used mainly in countries who have fully implemented the ICD updates and the main impact would be on a shift in the coding. However in countries with T codes this would not result in any loss in deaths according to selection B. In countries like Spain which saw a shift to these codes but do not have T codes, this would result in a fall in the number of DRDs according to selection B. Infact Spain now report according to another definition which includes X44/X64/Y14 codes.

- Only 5 countries have fully implemented the ICD-10 updates however implementation of updates is multi-factorial and coding issues are only part of the problem.

- A comparison of earlier versus recent ICD-10 coding in countries where this data was available showed a decrease in the use of F codes mainly in Belgium and United Kingdom, as well as Lithuania (other specific definition). Use of X44 was reported in Belgium, Denmark, Malta, Norway and Sweden in their latest available data compared to no countries reporting X44 except for Norway previous to the ICD-10 updates. The use of X44 in Poland and Spain is not according to EMCDDA definition.

- ICD coding by countries varies and depends on a variety of factors which include availability of information on the death certificate, availability of toxicological results, database options (e.g. how many codes one is permitted to enter) and coding practices including the uptake of WHO revisions.

- A number of recommendations are being proposed to improve the level of accuracy and coverage of reporting on drug related deaths. These include training and detailed guidelines for coding, inclusion of new T codes for a number of drugs, discussion with WHO regarding ICD-11 and its impact on the DRD protocol, inclusion of all T codes into national databases, further analysis of drugs coded under T50.9 and other non-specific codes, develop methodologies to estimate DRDs in countries with underestimates are large and collaboration between EMCDDA, Eurostat and the European Council of Legal Medicine[7] regarding access to autopsy and toxicology reports.

1. Introduction

Drug related deaths (DRDs) indicator was established as one of the five epidemiological indicators to be monitored on an annual basis by the European Monitoring Centre for Drug and Drug Addiction (EMCDDA) in 2001. The DRDs indicator has two components, one related to deaths directly caused by illegal drugs and the other component: mortality rate amongst problem drug users. This report will be focusing on deaths directly caused by illegal drugs. A feasibility study[1] carried out in 1990's which amongst other things established, for deaths directly caused by illegal drugs, which ICD codes were to be used for this important indicator. The establishment of this indicator was the first of its kind in monitoring drug related deaths due to illicit drugs and today 30 European countries provide DRD data to the EMCDDA.

As described in the EMCDDA standard protocol version 3.2[2], there are two main sources of data for this indicator, namely the general mortality register (GMR) which report according to selection B and are based on mortality data coded using the International Classification of Diseases and Related Health Problems (ICD) of the World Health Organisation[3] and the special register (SR) which report according to selection D and are based on purposely built drug registers which often obtain information from multiple sources including mainly forensic and police sources.

1.1 Rational

The present study takes place nearly 15 years following the introduction of this indicator and **aims to review drug-induced deaths data mainly from the GMRs, including the codification practices of DRDs following the WHO revision of ICD-10 coding guidelines related to DRDs.** This is triggered by concerns about systematic underestimation in some countries and concerns about differences in coding issues and therefore the impact on comparability of data between countries.[4]

This project which is divided into three parts includes:

a) Reviewing coding practices and trends in DRDs in countries following the WHO ICD-10 updates;
b) Reviewing of the Inventory of the national Special Mortality Registries in Europe with a focus on information flow to the General Mortality Registries;
c) Identifying examples of good practice and collaboration between the GMR and SR;
d) Analysing data on DRDs in a subset of countries to evaluate the use of specific codes such as X44/X64/Y14 codes, non specific codes such as R99, X49 and X69 and the use or non use of T codes.

This report will focus on reviewing coding practices and trends in DRDs following the WHO ICD-10 updates.

1.2 ICD-10 codes and the DRD indicator according to selection B

The DRD indicator according to selection B includes cases were the underlying cause of death is mental and behavioural disorders due to psychoactive substance use (harmful use, dependence, and other mental and behavioural disorders — F-codes) due to a number of drugs of abuse, or the underlying cause of death was poisoning (accidental, intentional or of undetermined intent — X- and Y-codes) due to a number of drugs of abuse. T-codes (coding for substances mentioned in the death certificate) are to be selected in combination with the respective X-codes and Y-codes (Table 1).[2] Previous to the implementation of this indicator by EMCDDA, countries were used to reporting mainly the F, X and Y codes to international organisations, as the underlying cause of death and the addition of the T codes as requested by the EMCDDA, added another dimension making the indicator more specific, accurate and comparable. Though T codes were codes which were included in the ICD coding system and should have always been used, they are not uniformly used or collected by all countries, also because this requires additional information to be available to countries to be able to code at this level. However for those countries who use these codes and have this information the EMCDDA helped to develop an indicator that was more accurate and comparable then just looking at the main underlying cause of death.

Table 1: EMCDDA protocol for reporting drds according to selection B[2]

Underlying cause of death	Selected ICD-10 codes
Disorders	F11-F12, F14-F16, F19
Accidental poisoning	X42[1], X41[2]
Intentional poisoning	X62[1], X61[2]
Poisoning undetermined intent	Y12[1], Y11[2]
Exposure to other and unspecified drugs	X44[3],X64[3], Y14[3]

[1] in combination with T codes: T40.0-T40.9
[2] in combination with T code: T43.6
[3] in combination with T codes: T40.0-T40.9 or T43.6

1.3 ICD-10 updates

The World Health Organisation provides new updates to the current ICD version on a yearly basis. In 2002/2003 a set of updates were developed which had a direct impact on the DRDs indicator[5].

The 3 main ICD updates in DRDs in 2002/2003 were:

1. Giving **priority to codes X and Y over F** when there was a poisoning;
2. In selecting the **underlying cause of death** when no component is specified as the main cause of death, clarification should be sought from the certifier. When no such clarification can be obtained, code combinations of alcohol with a drug to the drug. For other multi-drug combination deaths, code to the appropriate category for "Other" combination.

3. **Identifying the most dangerous drug:** A priority rule for identification of the most dangerous substance (and respective T code) if not identified by certifier and if no appropriate combination category is available (see appendix 1 for hierarchical order).

The first update implies that countries who implement these updates should see a shift in coding from F codes to X and Y codes as the update gives priority to these codes. This will be seen especially in countries which used F codes frequently but have additional information which would allow them to code to X and Y codes.
The second update refers to multi-drug combination when no component is specified as the main cause of death. In cases where the drugs are from different categories and it is not possible to seek clarification from the certifier as to the main cause of death X44 or X64 or Y14 should be used. X44 refers to '**Accidental poisoning by and exposure to other and unspecified drugs, medicaments and biological substances'.**[3] In countries who implemented this update one should except to see a shift in cases previously coded as F codes to X44 codes or from X42 or X41 codes to X44 codes, especially if previous to the update this code was used solely for 'other and unspecified drugs, medicaments and biological substances' and not for multi-drug combination.
The third update created a hierarchy from the most dangerous to the least dangerous drug; however this should only be coded by countries following updates one and two. This may allow identifying some additional relevant DRD cases that previously might have been unrecognised (e.g. deaths due to combination of substances where it was not possible to know the main substance and were possibly coded as T50.9 (Other and unspecified drugs, medicaments and biological substances) and therefore not selected by selection B. However these updates can only be implemented fully in countries who also code using T codes.

In order to accommodate for these updates, EMCDDA updated its protocol[2] and included codes X44, X64 and Y14 (in combination with the relevant T-Codes). However these codes were only included for those countries where coding using T codes was done. The reasoning behind this is that X44, X64 and Y14 are very non specific and could include in particular medicines and biological substances which are not collected in the DRD indicator. In cases where no T codes are stated this would be over-inclusive. In countries that do not have T codes and therefore only report F, X42/X62/Y12 codes to EMCCDA, it is not known whether this ICD update resulted in a shift of DRDs from F and X42 codes to X44 codes which would result in loss of cases reported to EMCDDA.

Previous work carried out by the EMCDDA and presented at the 2015 September 21-22 Annual expert meeting[4] has shown how and to which extent coding of drug related deaths varies between countries, and the adoption of the ICD-updates in DRDs of 2002/03 (to be implemented in 2006 and as described in the EMCDDA DRD protocol[2]) has not been uniform across countries.

2. Aims and objectives

2.1 Main Aim

The overall aim of this part of the project is, based on aggregated data reported by the countries to the EMCDDA, to analyse the codification practices and the changes in the codes of the reported cases, in the different countries before and following the WHO updates in 2002/2003.

The analyses of the national figures will be interpreted in view of replies given by countries to the questionnaire on coding done by EMCCDA in 2015 and presented at the 2015 September 21-22 Annual expert meeting.[4]

2.2 Objectives

The objectives of this part of the study will be to:

1. Analyse overall trends since 2000 in the DRDs numbers and breakdowns by code, for the country's main source of data.

2. Report on the level of agreement between GMR and SR numbers and trends in the various countries.

3. Analyse the codes and trends (before and after adoption of WHO guidelines) of the respective contribution of each main code (F, the 'classical' X/Y- X41,X42, X61,X62, Y11, Y12 – and the 'new' codes X44, X64/Y14) to the total amount of cases in Selection B in the countries where this is possible.

4. Interpret the ICD codes breakdown and trends at country level based on country replies to EMCDDA questionnaire in 2015.

3. Methodology

The main sources of information used to draw up this report are:

- EMCDDA website, statistical bulletin 2016, section on data and statistics: overdose deaths;[6]
- Data extracted from EMCDDA database of previous years;
- Replies to questionnaires on coding practices reported to EMCDDA in 2015

Analysis of overall trends as well as trends according to selection B and D and finally by ICD-10 codes as per EMCDDA protocol for selection B was undertaken.

4. Main Findings

4.1 Data availability

Data on drug related deaths according to selection B, selection D or other selection varies among the EU 28, Norway and Turkey that provide data to EMCDDA, however as seen in table 1 below, most countries have established long time trends in DRDs data. Data on drug related deaths is reported according to selection B as their main source in 14 countries, according to selection D in 11 countries and according to other specific definition in 5 countries. Also eight countries include non-residents in the data submitted to EMCDDA, while the rest do not.

Table 2: Availability of DRD data according to selection B, selection D or other specific definition. Source EMCDDA Statistical bulletin 2016. DRD Key indicator[6]

Country	Data availability according to Selection B	Data availability according to Selection D	Data availability according to national definition if different from sel B or D
Austria	1998-2014	**1995-2014**	Same as selection D
Belgium	**1995-2012**	-	Same as selection D
Bulgaria*	**1995-2014**	2001-2014	Same as selection B
Croatia	**1995-2014**	-	Same as selection B
Cyprus	-	**2004-2014**	Same as selection D
Czech Republic	1999-2014	**1998-2011**	National definition is broader than selection D
Denmark	**1995-2001; 2005-2013**	1997; 2001-2014	Same as selection B
Estonia	**1997-2014**	-	Same as selection B
Finland	**1996-2014**	1995-2013	Same as selection B
France	**1995-2012**	1996-2002	Same as selection B but excludes opioid medications used as pain killers
Germany	1995-2013	-	**Other specific definition (1995-2014)**
Greece		**1995-2014 (except 2012)**	Different (in agreement with selection D up to 2002)
Hungary	2004-2014	**1996-2014 (except 2002)**	Same as selection D
Ireland	1995-2004	**1998-2013**	Same as selection D however for local

			use may include a wider selection of cases
Italy	1995-2003; 2006-2012	**1995-2013**	Same as selection D
Latvia	**1996-2014**	1999-2014	Same as selection B
Lithuania		1999-2003	**Other specific definition (1995-2014)**
Luxembourg	1998-2014	1995-2004	**Other specific definition (1995-2014)**
Malta	**1995-2014**	1995-2004	Same as selection B
Netherlands	**1995-2014**	-	Same as selection B
Norway	**1996-2013**	1995-2009	Same as selection B since 2003
Poland	-	-	**Other specific definition (1995-2013)**
Portugal	2002-2013	**2008-2014**	Same as selection D
Romania	-	**2001-2014**	Same as selection D
Slovakia	**-**	**2004-2014**	Same as selection D
Slovenia	**1997-2014**	-	Same as selection B
Spain	1999-2013 (except 2001)	1995-2013	**Other specific definition (1995-2013)**
Sweden	**1995-2014**	-	Same as selection B
Turkey	-	**2005-2014**	Same as selection D
United Kingdom*	**2004-2013**		Same as selection B

* data from these countries was not always according to selection B

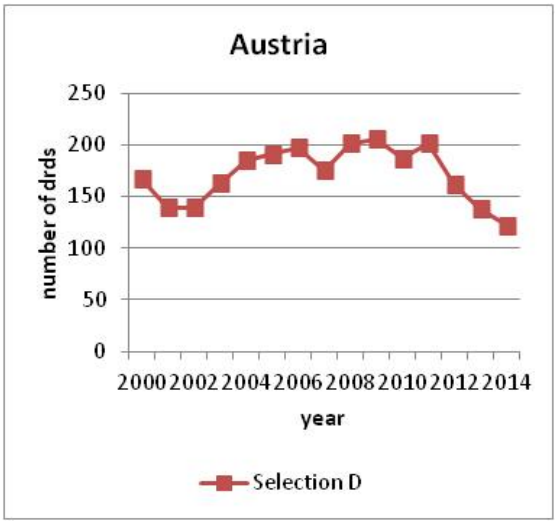
4.2 Trends in DRDs

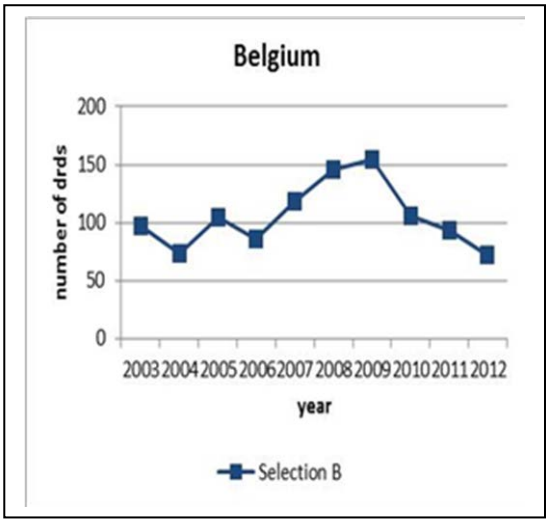
Comparing mortality rates from DRDs may be difficult due to some differences in reporting and in the coverage between countries; however trend analysis may be more informative. Trend analysis was performed from the year 2000 to the latest year available in those countries for which the data was available. The trend analysis was based on the countries' main source of data.

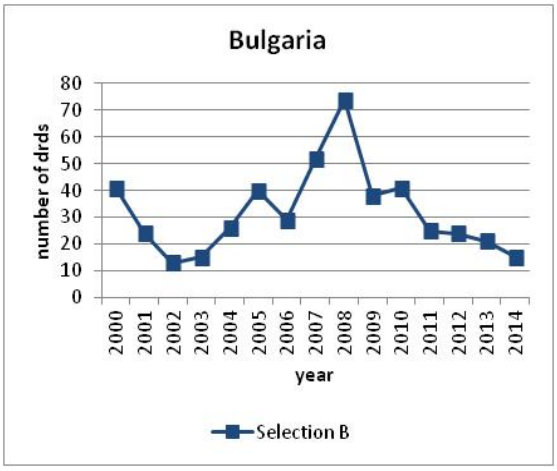
Countries fall into four major groups:

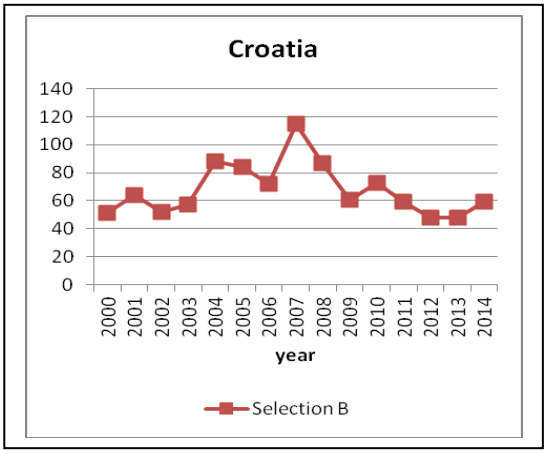
a) Countries which showed an increasing trend but are now experiencing a downward trend. These countries include: Austria, Belgium, Bulgaria, Croatia, Estonia, France, Malta and Norway.

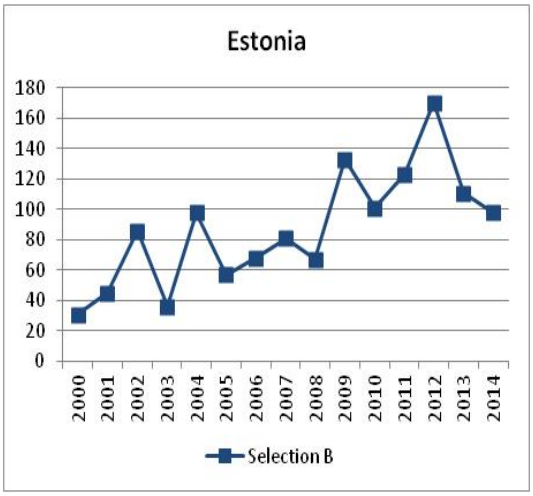
Figure 1: Trends in DRDs in countries showing an upward followed by downward trend

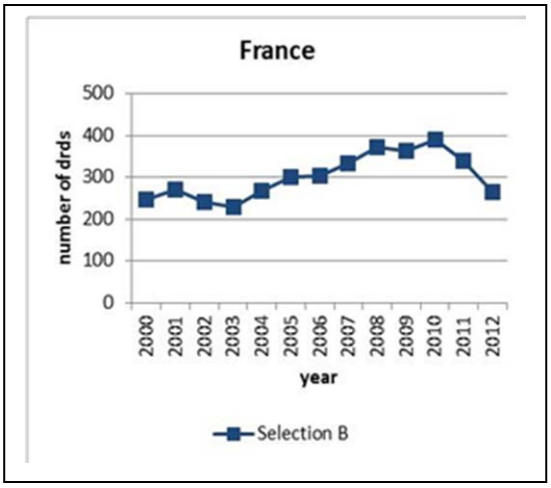


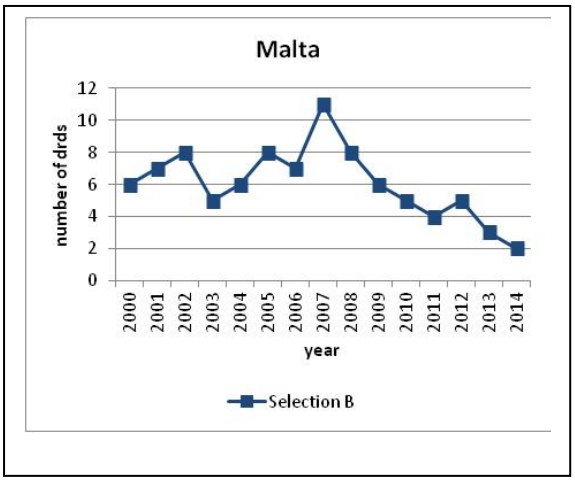


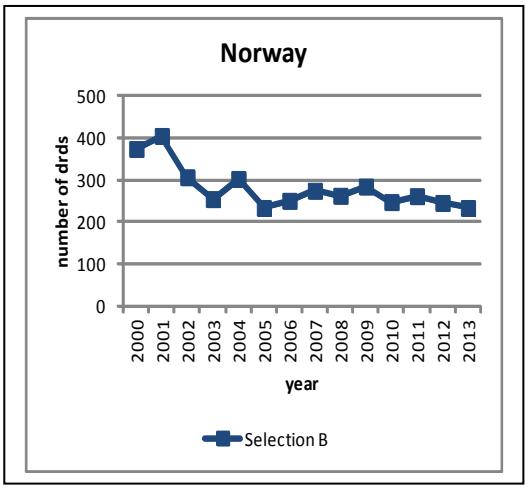






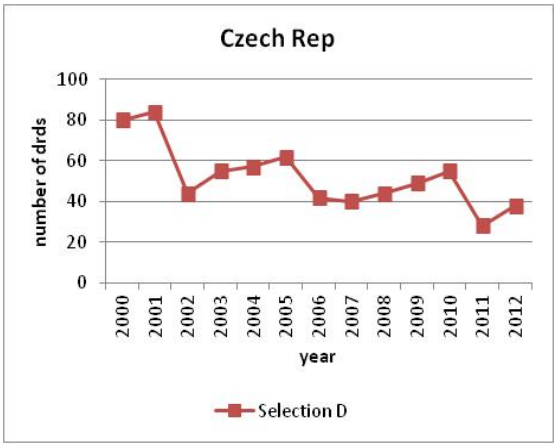


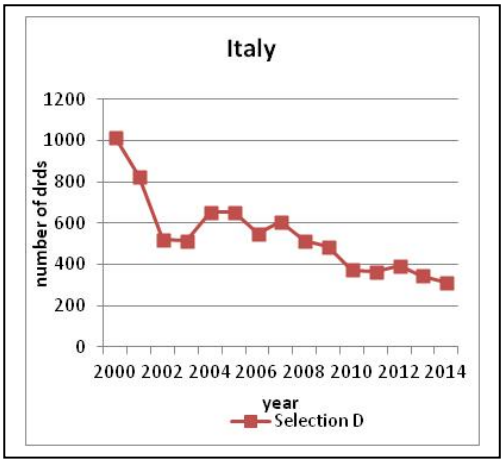


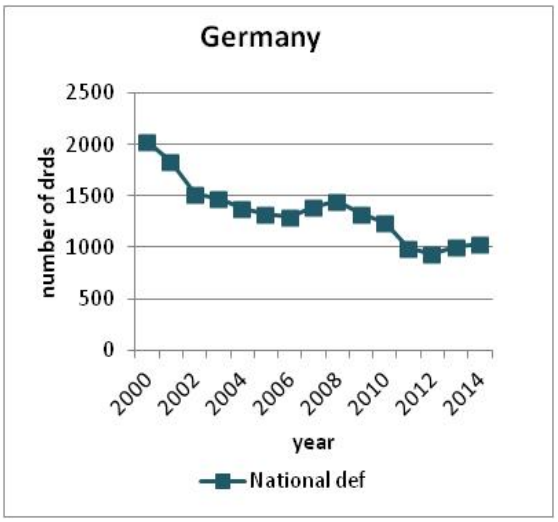


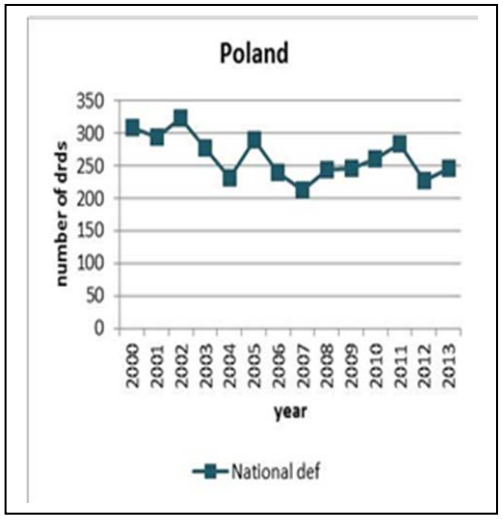
b) Countries showing a long term downward trend: Czech Republic, Italy, Germany, Poland and Spain. In Latvia a small downward trend was followed by a stable trend (although it should be noted that DRD data are notoriously underestimated there), while in Hungary a downward trend was followed by an upward trend. Luxembourg is mainly showing a downward trend. Short term trends showing a downward trend were also observed in Cyprus and somewhat in Portugal however this was difficult to interpret, due to small number in Cyprus, but also to the changes in definition in Portugal.

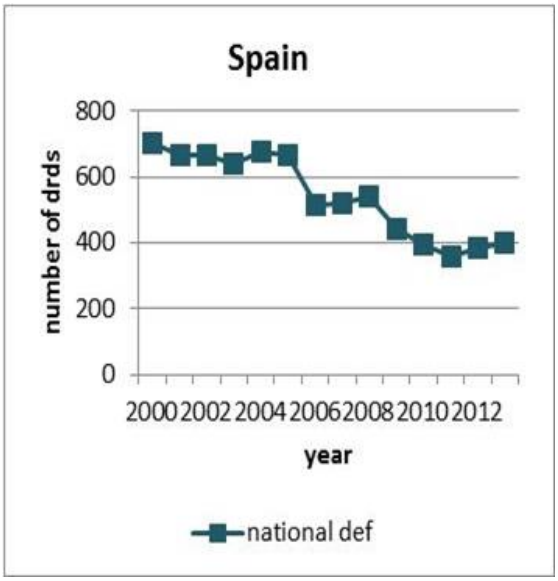
Figure 2: Trends in DRDs in countries showing a long term downward trend

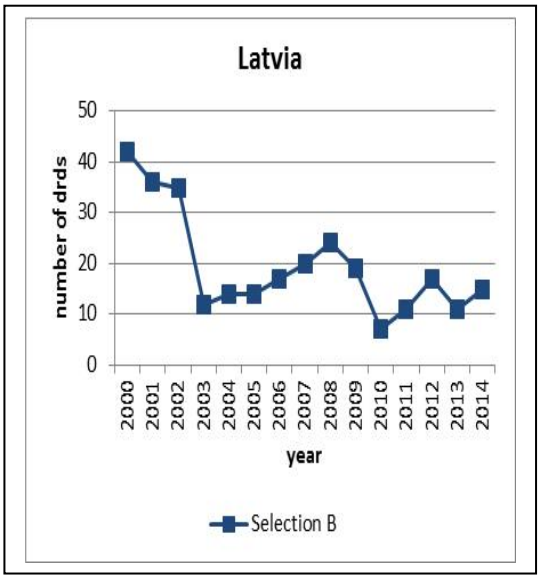


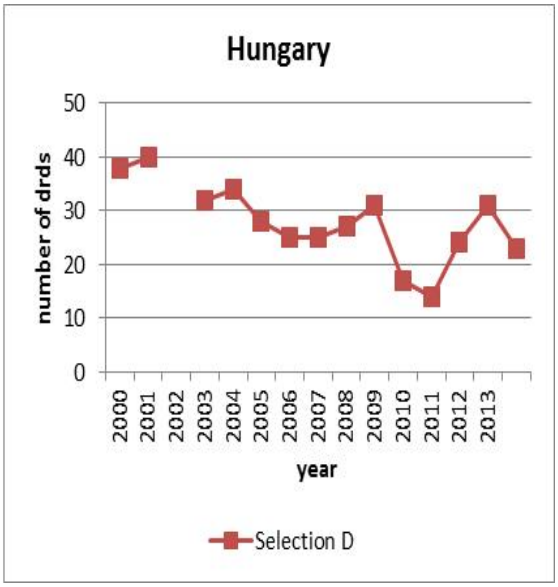


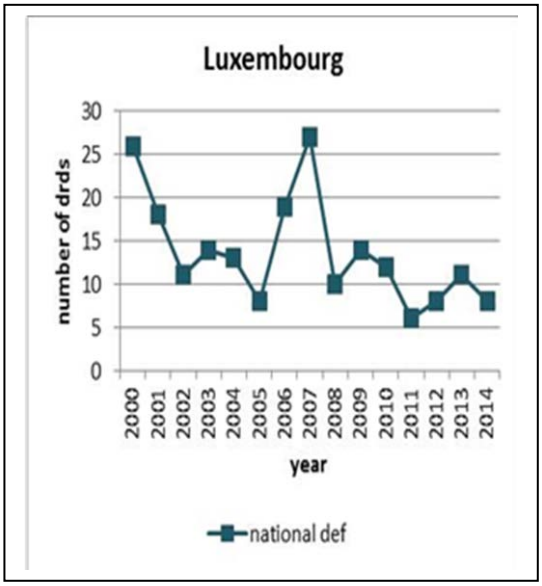

Germany
number of drds
2500
2000
1500
1000
500
0
2000
2002
2004
2006
2008
2010
2012
2014
year
National def

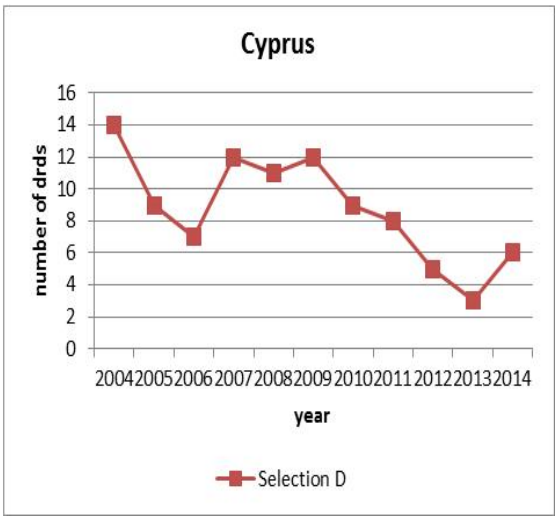

Poland
number of drds
350
300
250
200
150
100
50
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
year
National def

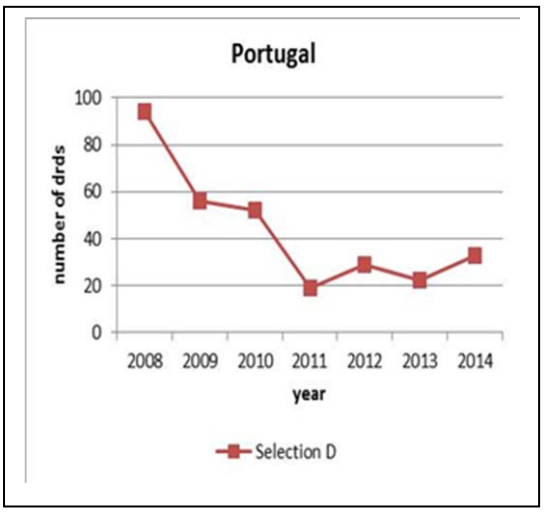

Spain
number of drds
800
600
400
200
0
2000 2002 2004 2006 2008 2010 2012
year
national def


Latvia
number of drds
50
40
30
20
10
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
year
Selection B


Hungary
number of drds
50
40
30
20
10
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
year
Selection D

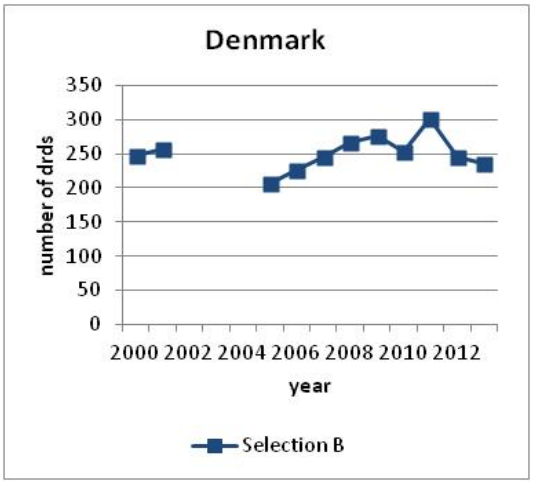

Luxembourg
number of drds
30
25
20
15
10
5
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
year
national def

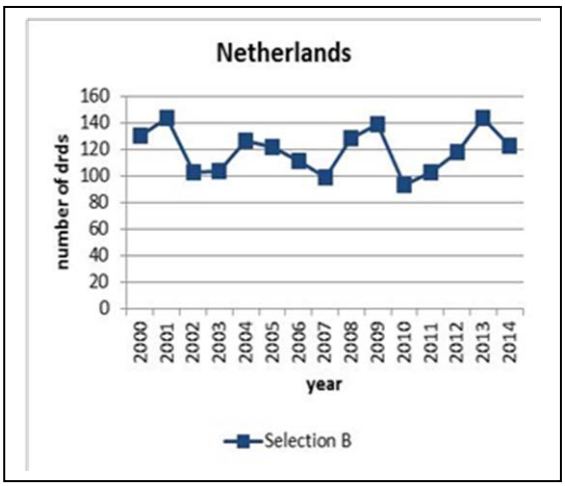


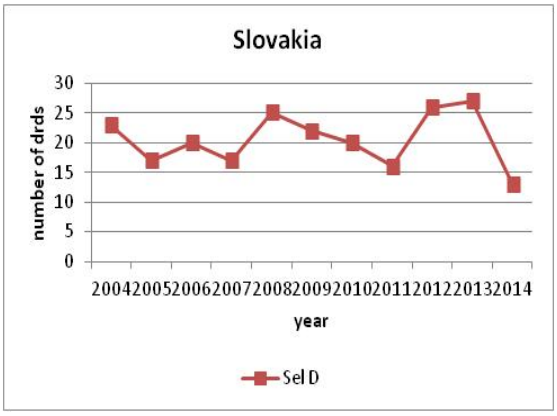


c) **Countries showing a long term stable trend: Denmark**, Netherlands and Slovakia.

Figure 3: Trends in DRDs in countries showing a stable trend

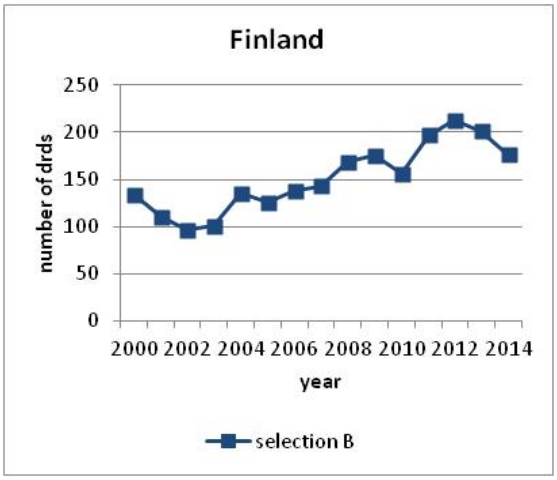


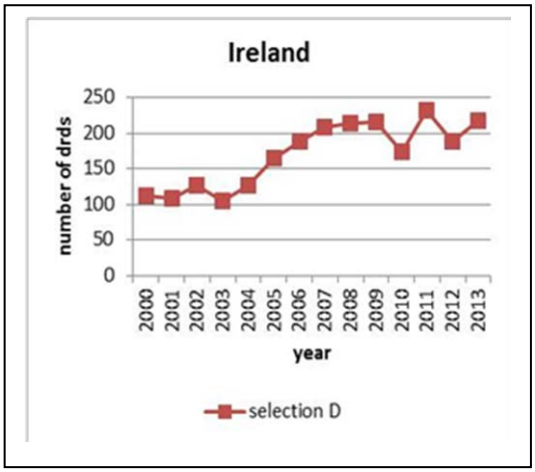


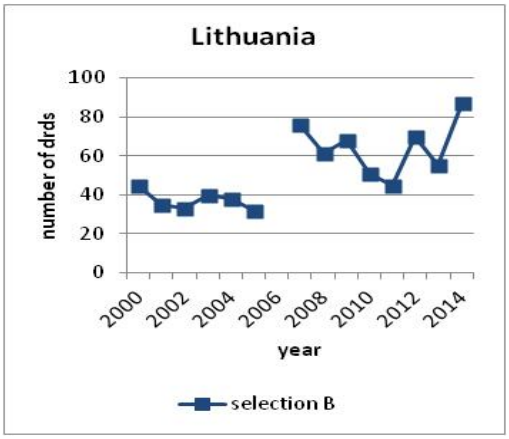


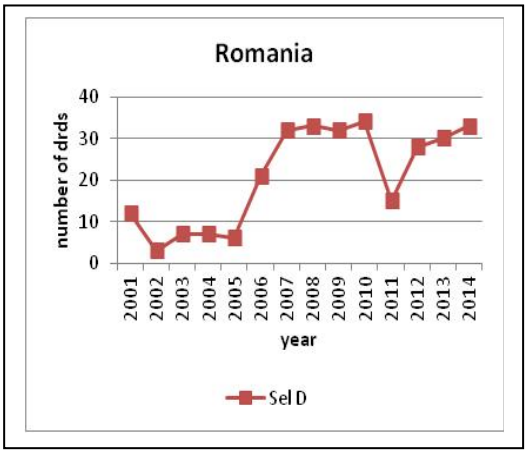
d) Countries showing an upward trend: Finland, Ireland, Lithuania, Romania, Sweden, Turkey. United Kingdom is not showing a stable upward trend though.

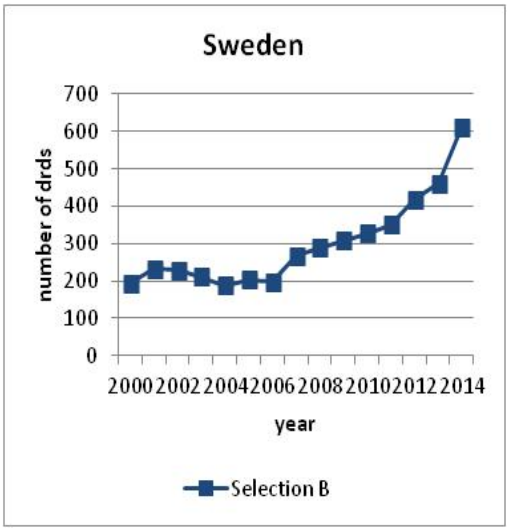
Figure 4: Trends in DRDs in countries showing an upward trend

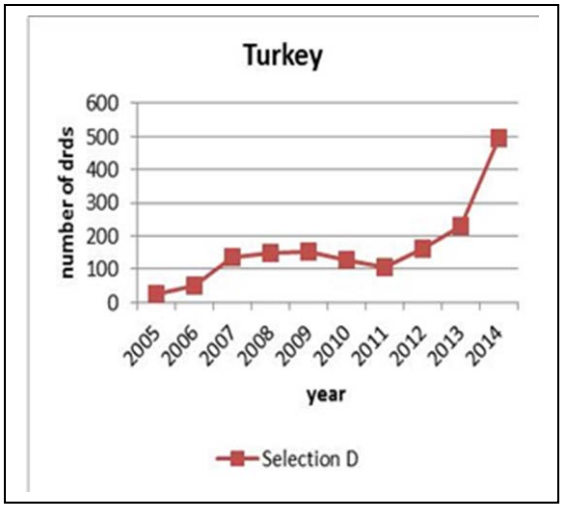


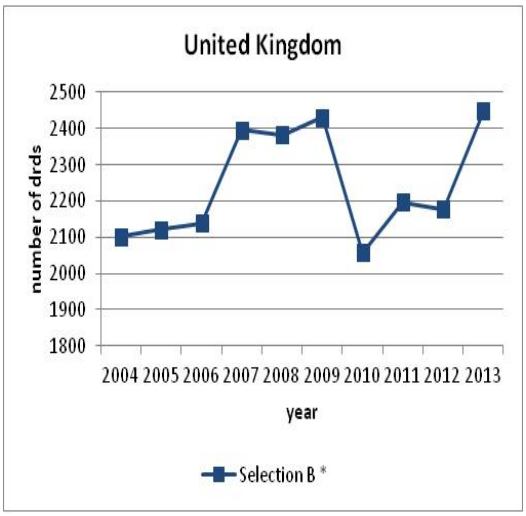












4.3 Discrepancies between selection B, selection D and/or national definition

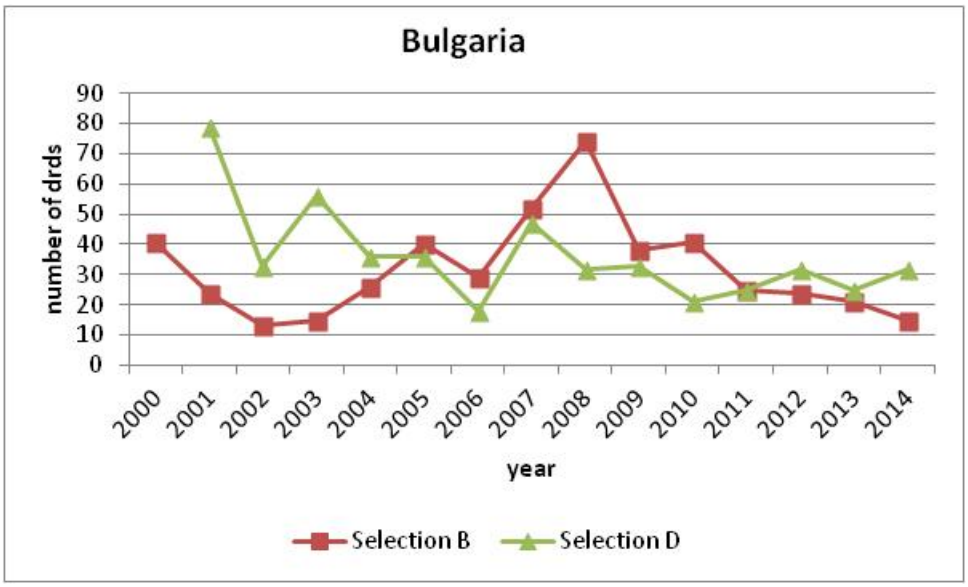
In countries which are able to provide data according to selection B, selection D and or national definition, this often represent different sources of information and also coverage, which lead to discrepancies in the figures between the sources as shown in table 3 below. Average percentage difference between the main source of data and the other source of data from the year 2000 to when last available was calculated for those countries which provided data on DRDs from selection B, selection D and/or national definition for some years. In most countries while discrepancies between the sources may be quite large, however most show the same trend direction in deaths over the years with the exception of Czech Republic. Also for most countries (8/12) the main source of data on DRDs reports more DRDs on average than the other source (Table 3 and Figure 5).

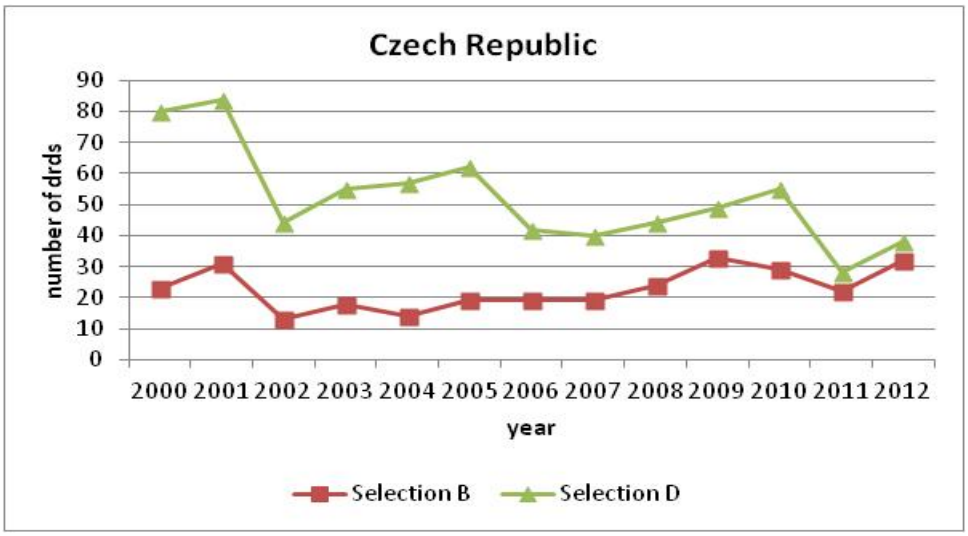
Table 3: Discrepancies between main source of data and other source for reporting DRDs for the latest year with available data, and trend direction between 2000 and 2016. Source EMCDDA Statistical bulletin 2016 DRD Key indicator[6]

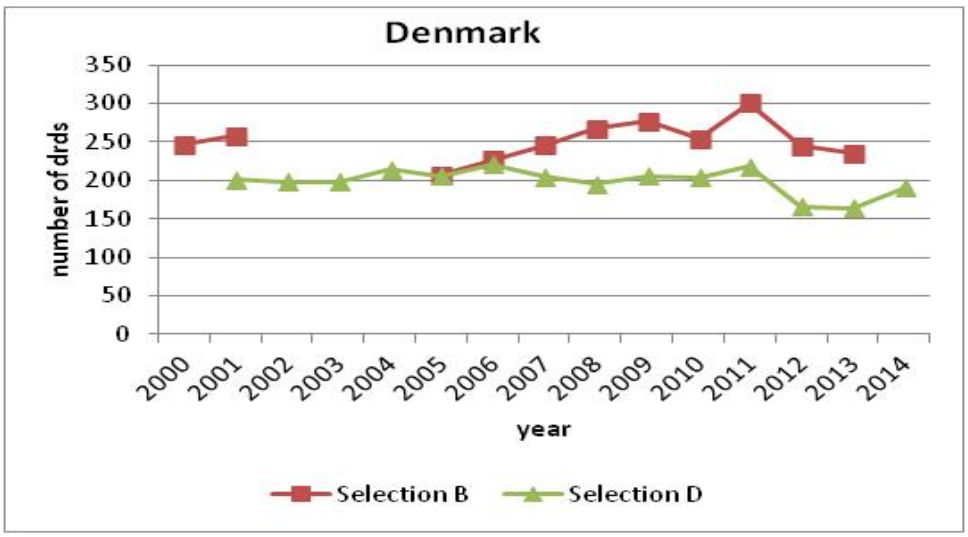
Country	Difference between main source and other source	Average % difference between sources	Trend direction in sel B, sel D and/or national def
Austria	less	9.1	same
Bulgaria	less	15.6	mostly same
Czech Republic	more	56.3	different
Denmark	more	21	same
Finland	more	31.1	same
Hungary	less	22.2	same

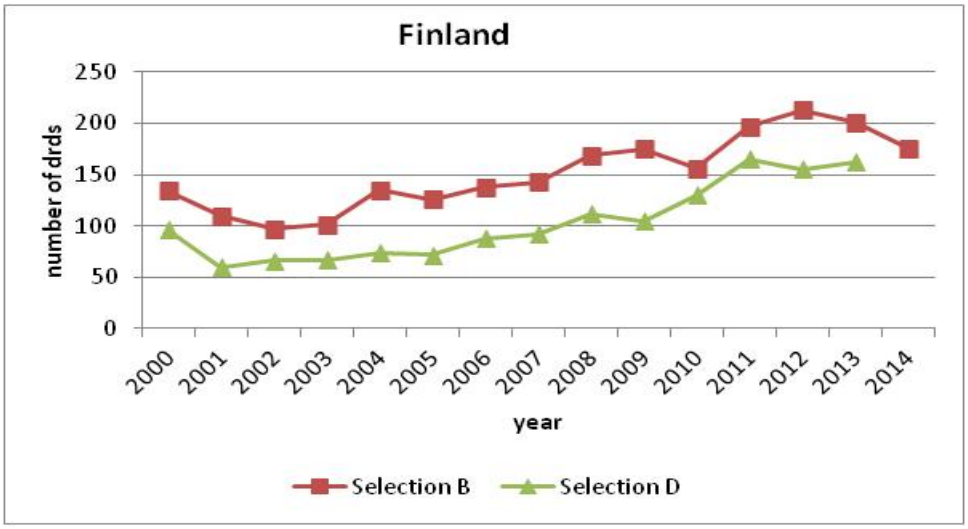
Italy	more	19.4	same
Latvia	less	100.6	same
Malta	more	10.6	same
Norway	more	25.1	same
Portugal	more	53.3	same
Spain	more	48.0	same

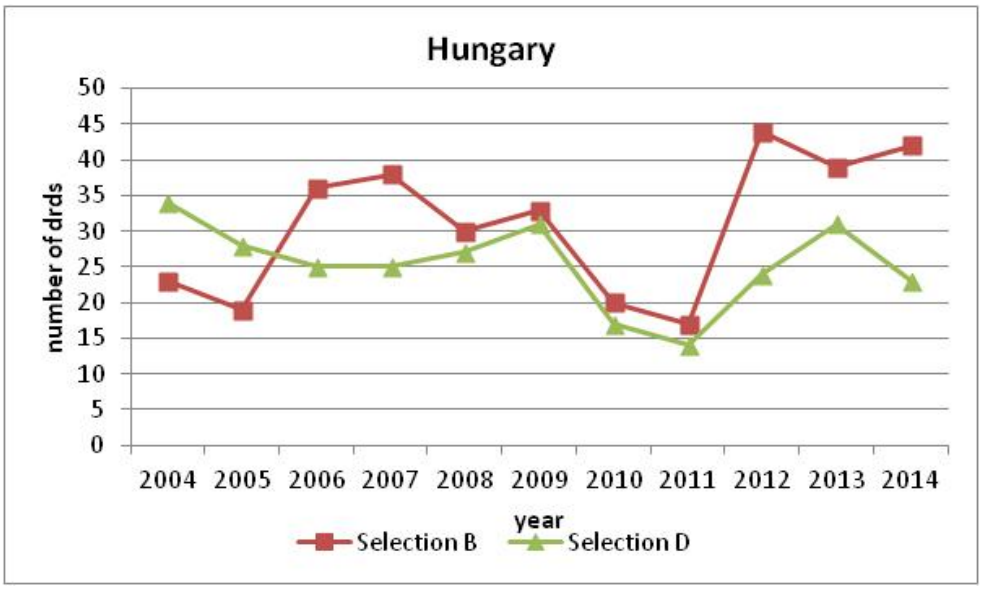
Figure 5: Trends in DRDs according to selection B, selection D and/or national definition

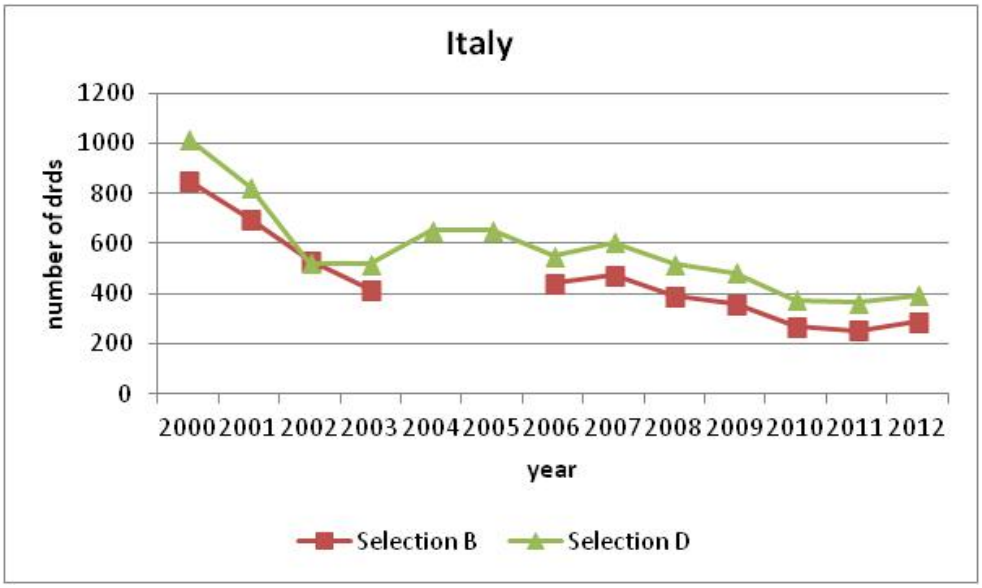


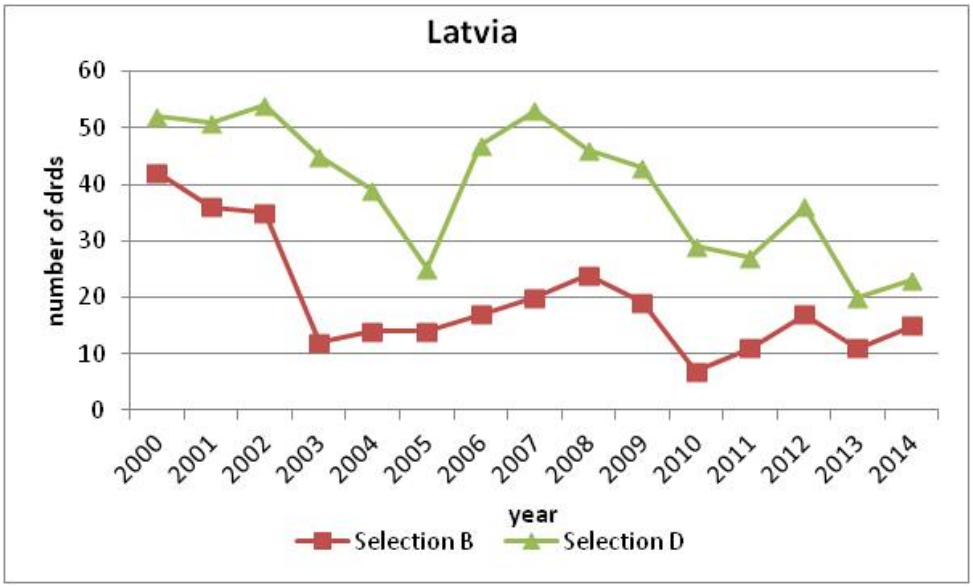

Czech Republic
number of drds
90
80
70
60
50
40
30
20
10
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
year
Selection B
Selection D

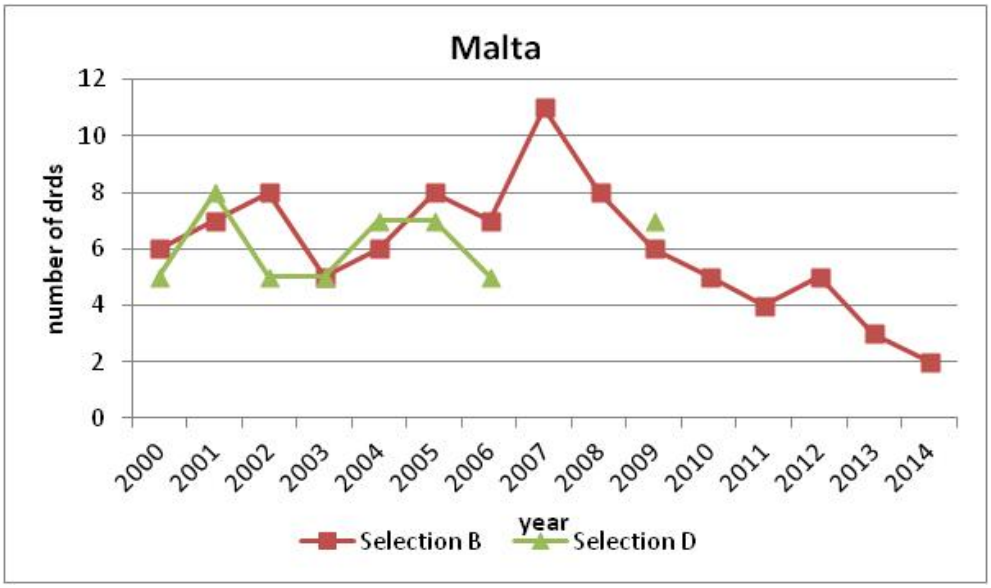

Denmark
number of drds
350
300
250
200
150
100
50
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014
year
Selection B
Selection D

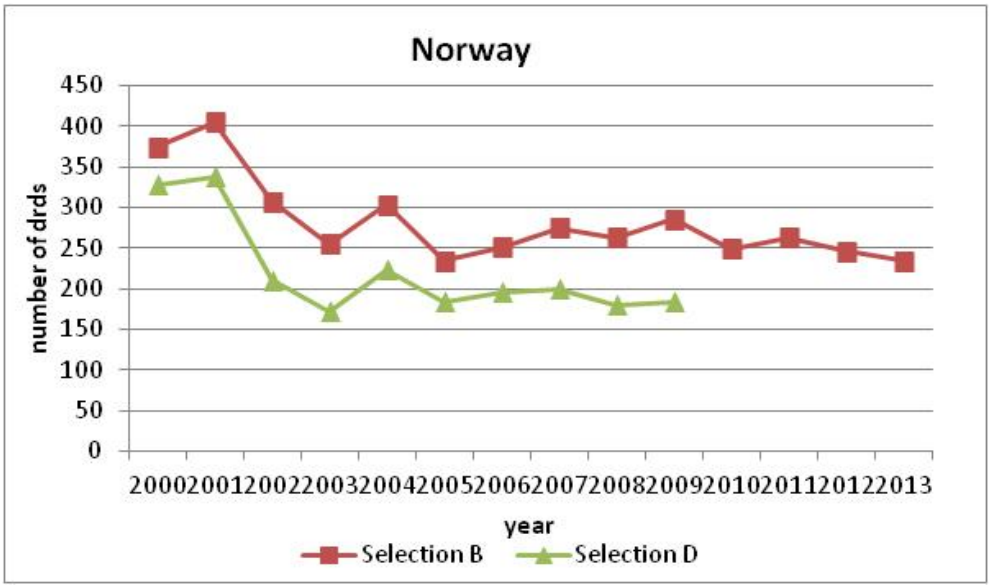

Finland
number of drds
250
200
150
100
50
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014
year
Selection B
Selection D

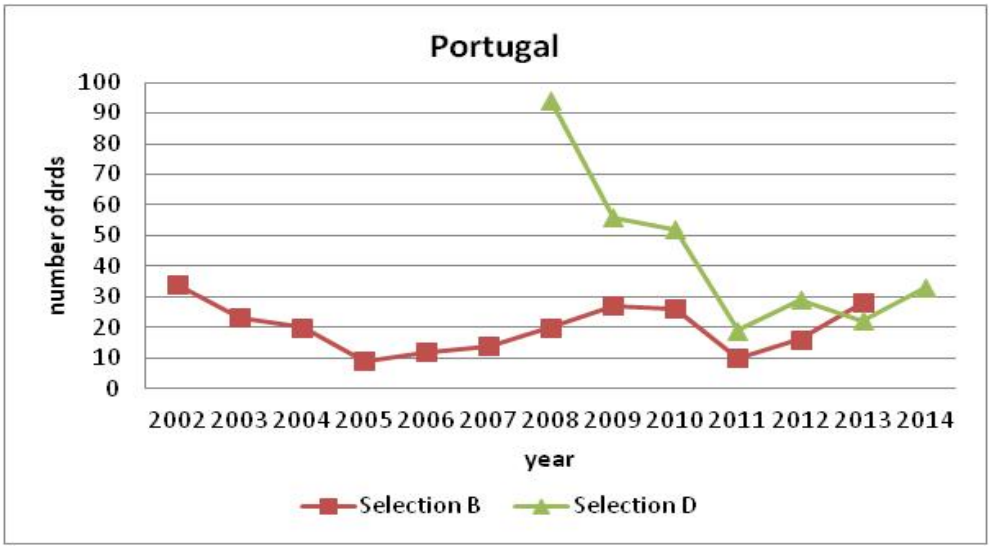

Hungary
number of drds
50
45
40
35
30
25
20
15
10
5
0
2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014
year
Selection B
Selection D

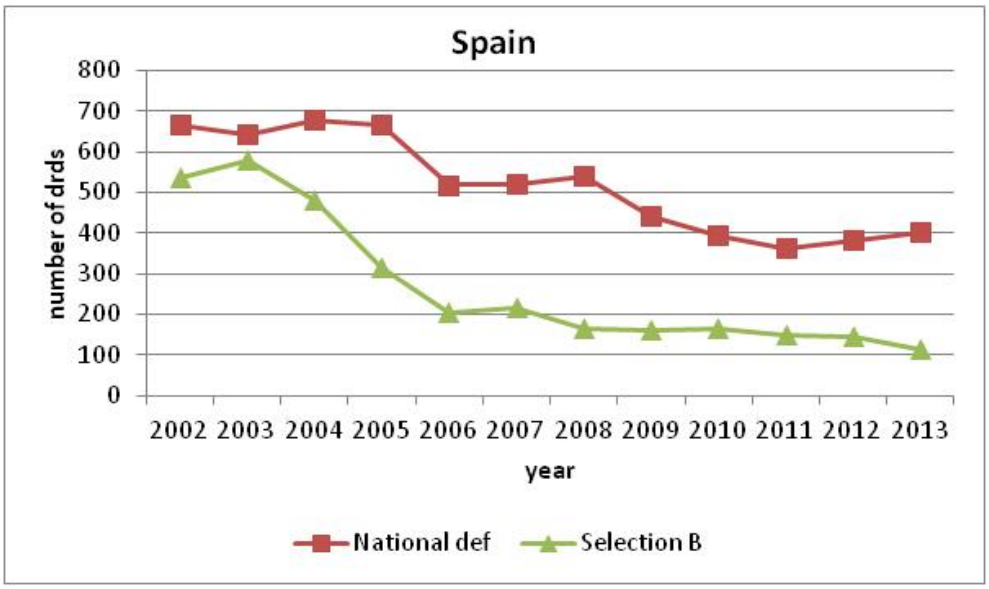

Italy
number of drds
1200
1000
800
600
400
200
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
year
Selection B
Selection D


Latvia
number of drds
60
50
40
30
20
10
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014
year
Selection B
Selection D


Malta
number of drds
0
2
4
6
8
10
12
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
year
Selection B
Selection D


Norway
number of drds
0
50
100
150
200
250
300
350
400
450
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
year
Selection B
Selection D

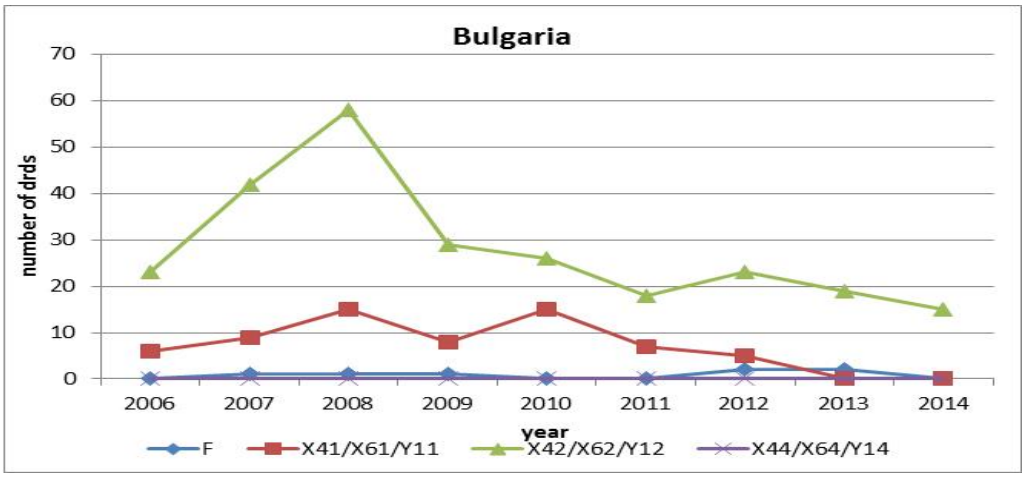

Portugal
number of drds
0
10
20
30
40
50
60
70
80
90
100
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
year
Selection B
Selection D

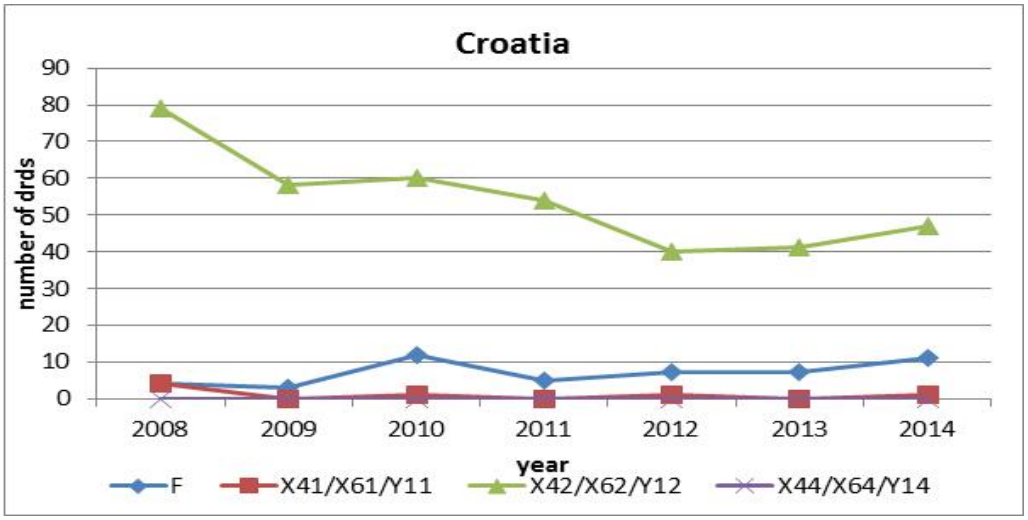


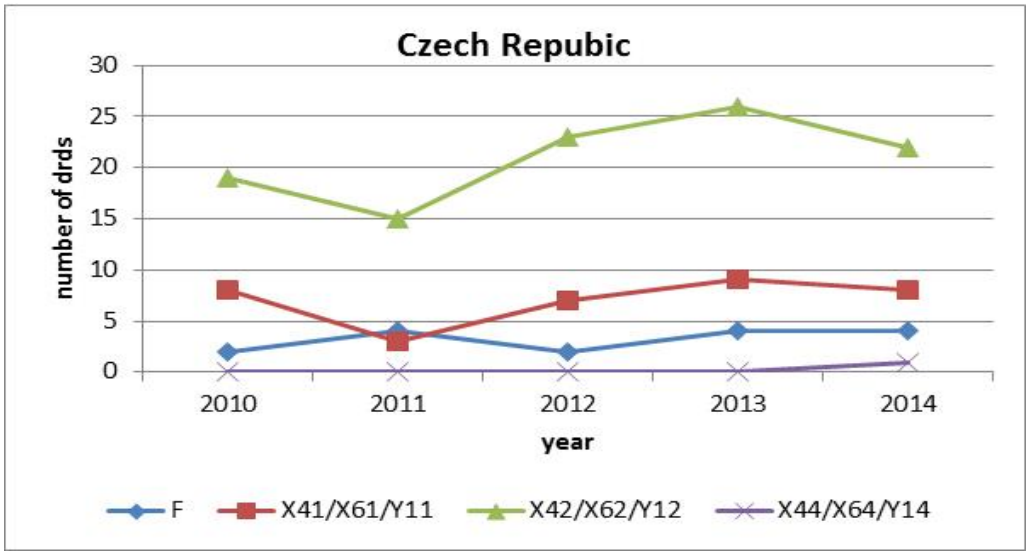
4.4 Analysis by ICD code

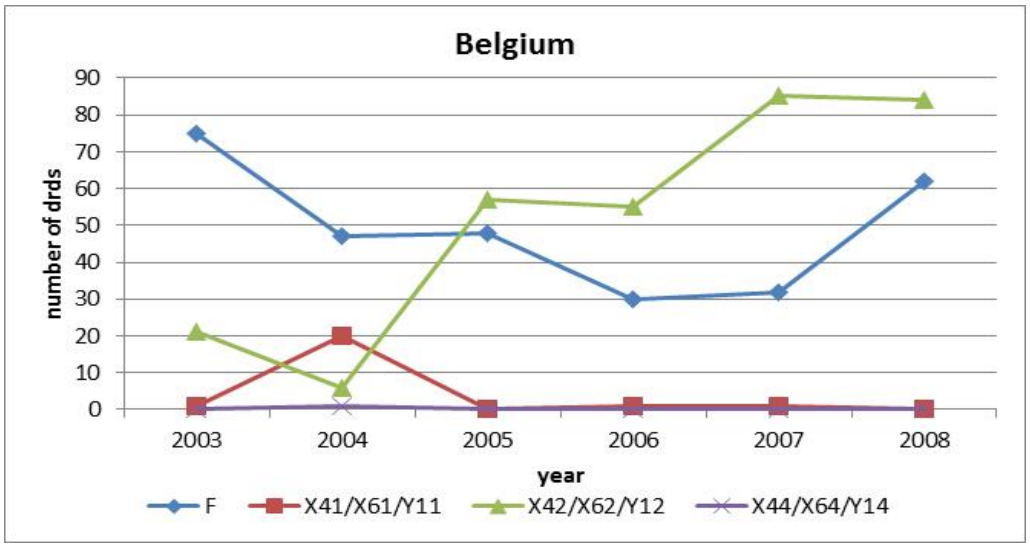
The EMCDDA definition of a DRD according to selection B is as per protocol described in table 1 previously and its full application implies the availability of T-codes, as these need to be combined with the respective X or Y codes. Codes X44, X64 and Y14 have been added since WHO ICD-10 update in 2006. In countries which do not have T-codes, codes X41, X61, Y11, X44, X64 and Y14 should not be reported according to selection B. The figures below describe trends in ICD-10 codes used to report DRDs according to selection B in a number of countries were this data was available according to EMCDDA database.

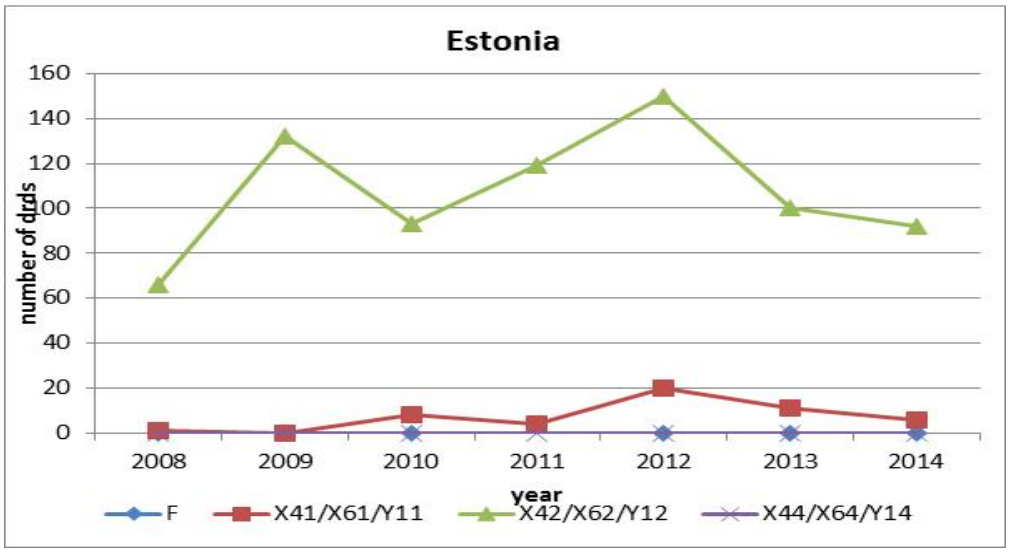
Figure 6: Trends in DRDs according to ICD-10 codes used to report DRDs according to selection B in various countries

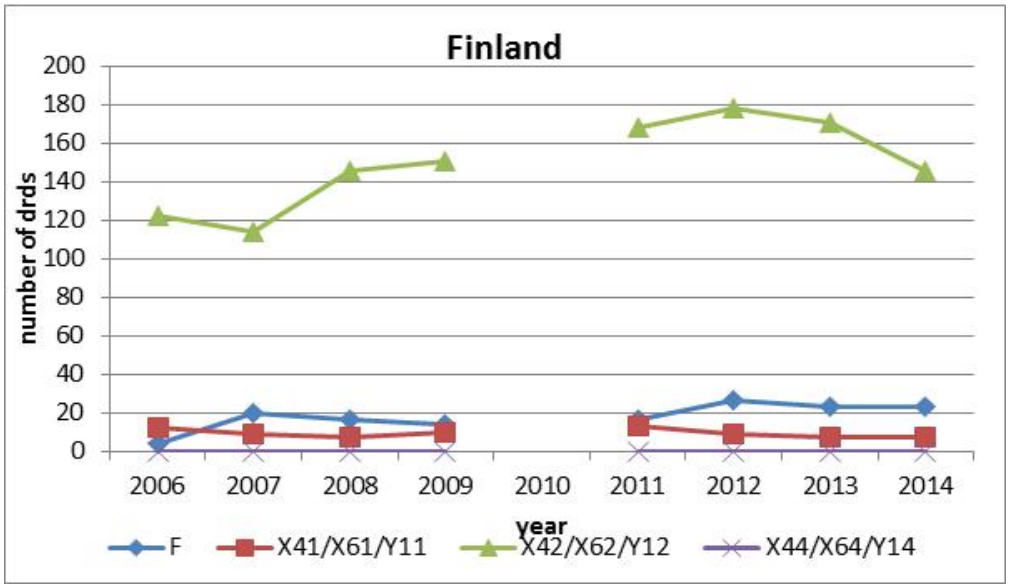


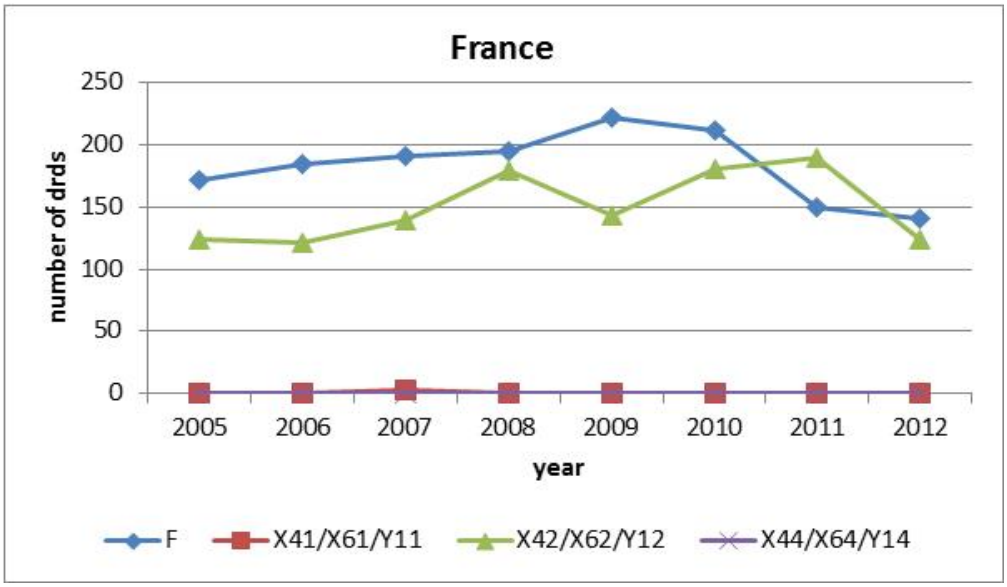

Croatia
number of drds
90
80
70
60
50
40
30
20
10
0
2008
2009
2010
2011
2012
2013
2014
year
F
X41/X61/Y11
X42/X62/Y12
X44/X64/Y14

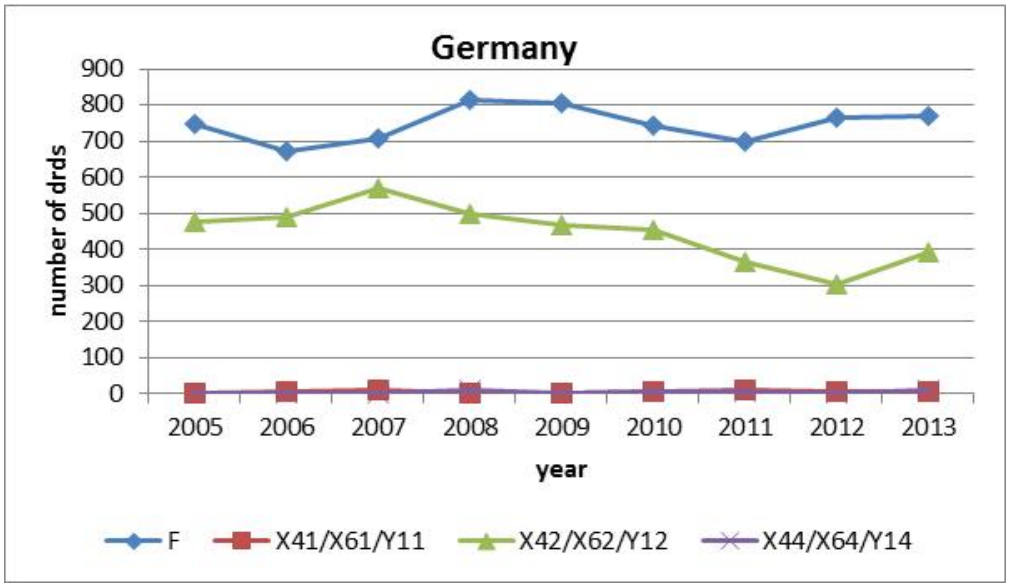

Czech Republic
number of drds
30
25
20
15
10
5
0
2010
2011
2012
2013
2014
year
F
X41/X61/Y11
X42/X62/Y12
X44/X64/Y14

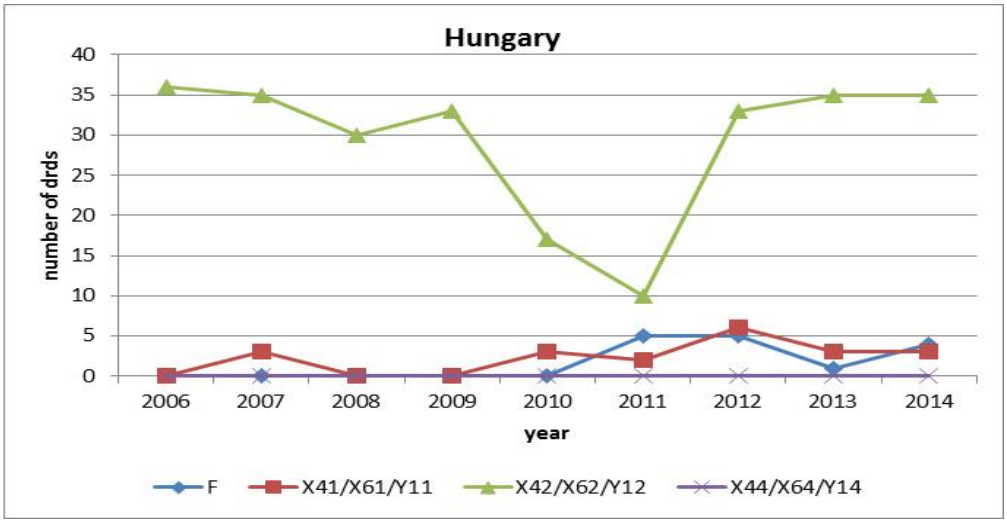

Belgium
number of drds
90
80
70
60
50
40
30
20
10
0
2003
2004
2005
2006
2007
2008
year
F
X41/X61/Y11
X42/X62/Y12
X44/X64/Y14

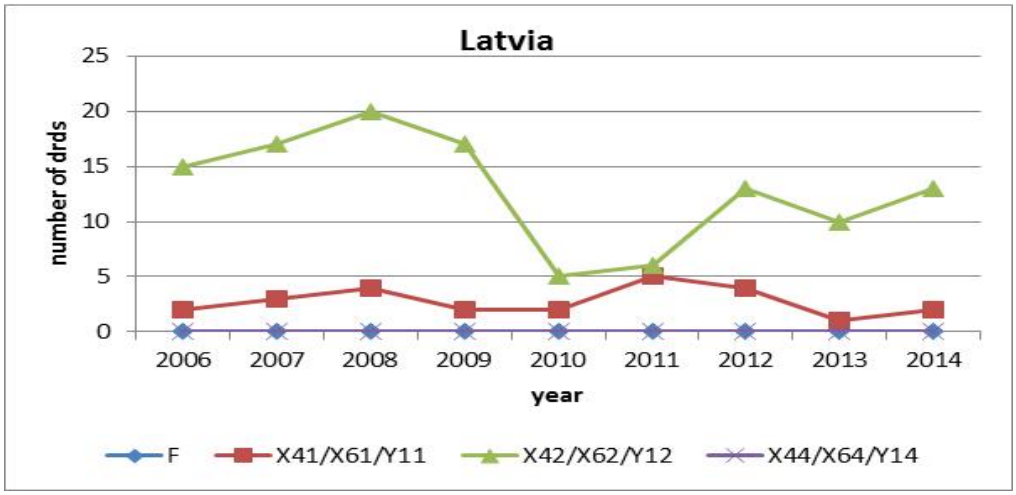

Estonia
160
140
120
100
80
60
40
20
0
number of drds
2008
2009
2010
2011
2012
2013
2014
year
F
X41/X61/Y11
X42/X62/Y12
X44/X64/Y14

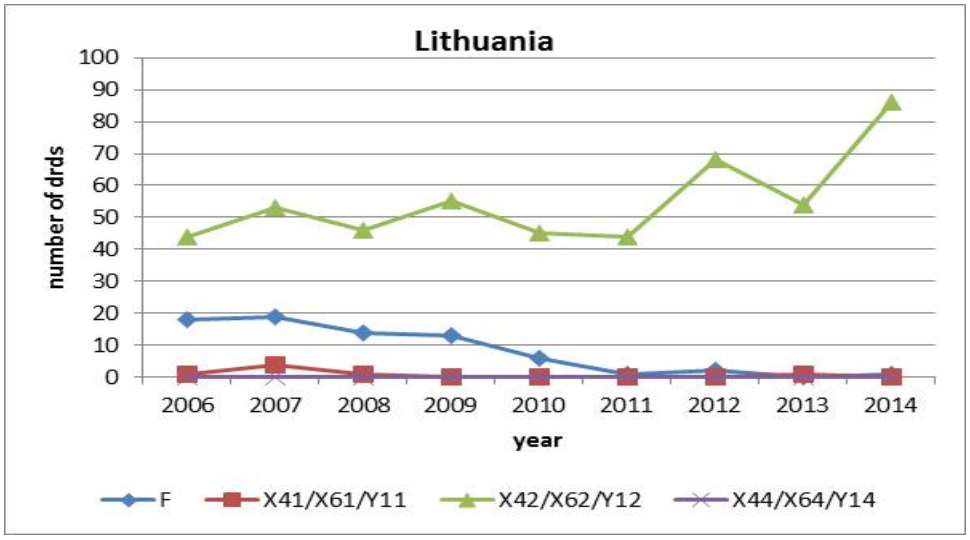

Finland
200
180
160
140
120
100
80
60
40
20
0
number of drds
2006
2007
2008
2009
2010
2011
2012
2013
2014
year
F
X41/X61/Y11
X42/X62/Y12
X44/X64/Y14

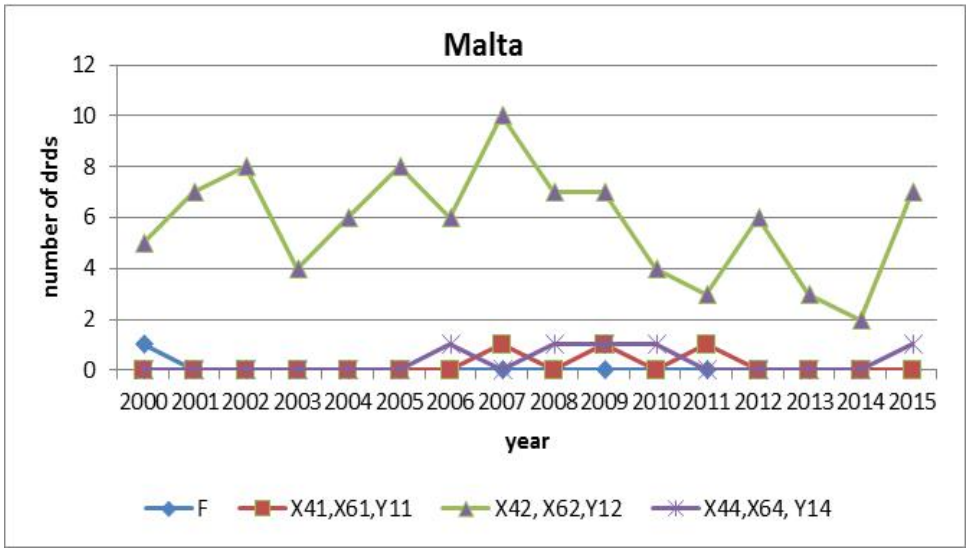

France
250
200
150
100
50
0
number of drds
2005
2006
2007
2008
2009
2010
2011
2012
year
F
X41/X61/Y11
X42/X62/Y12
X44/X64/Y14

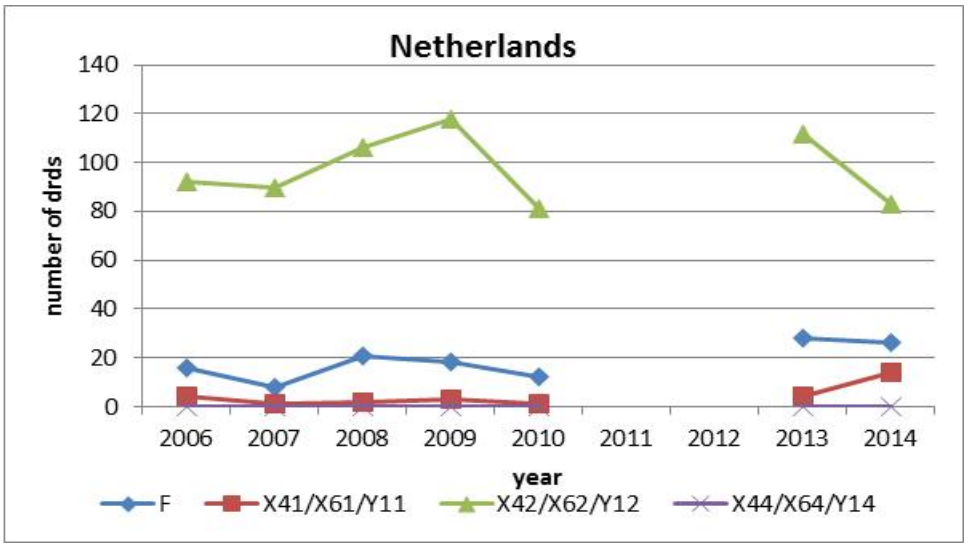

Germany
number of drds
900
800
700
600
500
400
300
200
100
0
2005
2006
2007
2008
2009
2010
2011
2012
2013
year
F
X41/X61/Y11
X42/X62/Y12
X44/X64/Y14

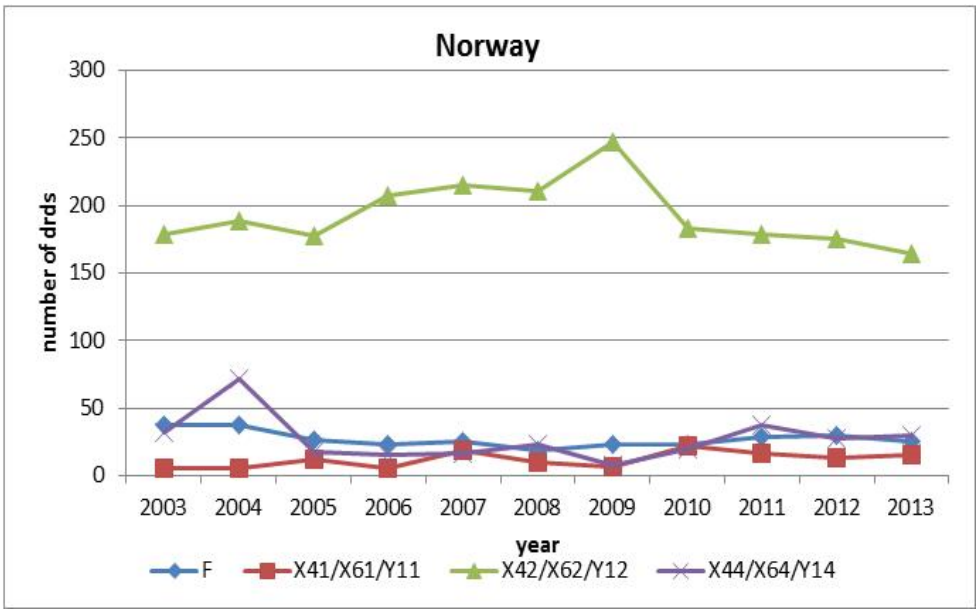

Hungary
number of drds
40
35
30
25
20
15
10
5
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
year
F
X41/X61/Y11
X42/X62/Y12
X44/X64/Y14

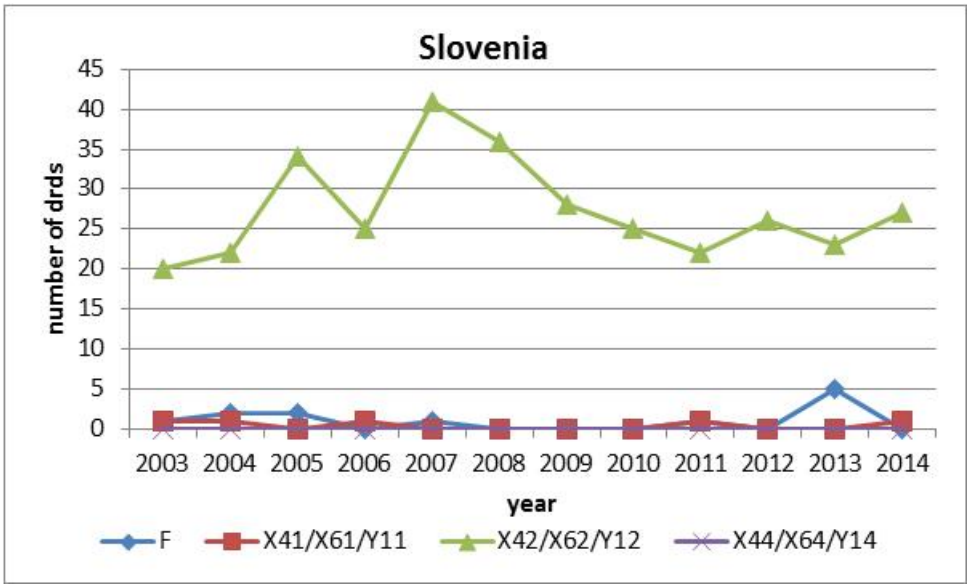

Latvia
number of drds
25
20
15
10
5
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
year
F
X41/X61/Y11
X42/X62/Y12
X44/X64/Y14

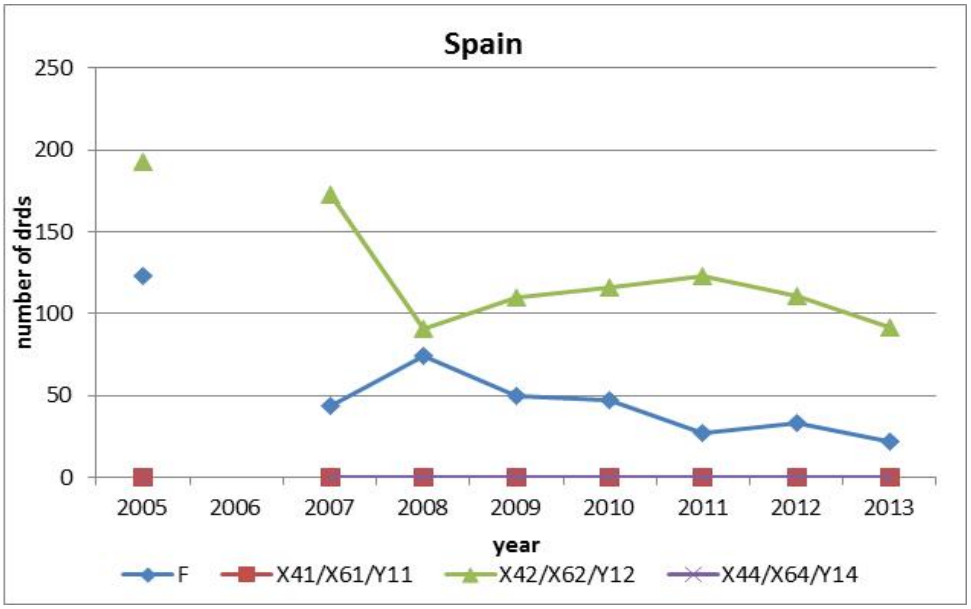

Lithuania
number of drds
100
90
80
70
60
50
40
30
20
10
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
year
F
X41/X61/Y11
X42/X62/Y12
X44/X64/Y14


Malta
number of drds
12
10
8
6
4
2
0
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
year
F
X41,X61,Y11
X42, X62,Y12
X44,X64, Y14


Netherlands
number of drds
140
120
100
80
60
40
20
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
year
F
X41/X61/Y11
X42/X62/Y12
X44/X64/Y14


Norway
300
250
200
150
100
50
0
number of drds
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
year
F
X41/X61/Y11
X42/X62/Y12
X44/X64/Y14


Slovenia
45
40
35
30
25
20
15
10
5
0
number of drds
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
year
F
X41/X61/Y11
X42/X62/Y12
X44/X64/Y14


Spain
250
200
150
100
50
0
number of drds
2005
2006
2007
2008
2009
2010
2011
2012
2013
year
F
X41/X61/Y11
X42/X62/Y12
X44/X64/Y14

In the country graphs described above, the majority of deaths are found in X42/X62/Y12 code in most countries. The use of F codes is limited in most countries except for France, Germany, Belgium and Spain. Often this is related to the unavailability of T codes. It is difficult to interpret if the ICD-10 updates to be implemented in 2006 had any impact on coding practices due to the unavailability of long term trends. However in most countries there was minor or no impact and the use of X44/X64/Y14 is very limited. The only exception is Spain which saw a reduction in X42 and F codes. There was a corresponding increase in X44 code, however since T codes are not available, this is not included in selection B, creating an artificial fall in the number of DRDs according to selection B.

4.5 Latest available DRD data in various countries by ICD-10 breakdown

Table 4 below describes the latest available data according to ICD-10 codes used for countries reporting according to selection B or other specified definition. Countries which are shaded do not use or no longer use selection B as the primary source of data extraction and national definition.

Table 4: Percentage of DRDs according to ICD-10 code. Source EMCDDA Statistical bulletin 2016. DRD Key indicator

		% of deaths in the different ICD groups			
ICD code groups Country (latest year with available data)	**Definition**	**F codes**	**X41, X61, Y11**	**X42, X62, Y12**	**X44, X64, Y14**
Austria (2013)	Selection B	100.0 (n=139)			
Belgium (2012)	Selection B	27.8 (n=20)	4.2 (n=3)	62.5 (n=45)	5.6 (n=4)
Bulgaria (2014)	Selection B	0.0	0.0	100.0 (n=15)	0.0
Croatia (2014)	Selection B	18.6 (n=11)	1.7 (n=1)	79.7 (n=47)	0.0
Denmark (2013)	Selection B	11.3 (n=25)	0.9(n=2)	44.6 (n=99)	43.2(96)
Estonia (2014)	Selection B	0.0	6.1 (n=6)	93.9 (n=92)	0.0
Finland (2014)	Selection B	13.1 (n=23)	4.0 (n=7)	83.0 (n=146)	0.0
France (2012)	Selection B	53.0 (n=140)	0.0	47.0 (n=124)	0.0
Latvia (2014)	Selection B	0.0	13.3 (n=2)	86.7 (n=13)	0.0
Lithuania (2014)	Other (Specific Definition)	1.1 (n=1)	0.0	98.9 (n=86)	0.0

Malta (2014)	Selection B	0.0	0.0	50.0 (n=1)	50.0 (n=1)
Netherlands (2014)	Selection B	21.1 (n=26)	11.4 (n=14)	67.5 (n=83)_	0.0
Norway (2013)	Selection B	10.7 (n=25)	6.4 (n=15)	70.1 (n=164)	12.8 (n=30)
Poland (2013)	Other (Specific Definition)	2.0 (n=5)	0.0 (n=0)	48.6 (n=120)	49.4 (n=122)
Slovenia (2014)	Selection B	0.0	3.6 (n=1)	96.4 (n=27)	0.0
Spain (2013)	Other (Specific Definition)	5.5 (n=22)	0.0	22.8 (n=92)	71.7 (n=289)
Sweden (2014)	Selection B	3.6 (n=22)	6.2 (n=38)	47.9 (n=292)	42.2 (n=257)
United Kingdom (2013)	Selection B	5.8 (n=142)	5.8 (n=141)	77.7 (n=1902)	10.8 (n=264)

F codes

According to the ICD updates priority should be given to X or a Y code over F codes when there is poisoning, therefore we should be seeing less of this code. Most countries for which reporting of ICD codes is possible (Table 4) have relatively low levels of F codes. Countries which report more than half of their cases with F codes do not have T codes e.g. Austria (100% of the cases coded F) and France (53%). In the case of Austria GMR is not their main source of information on DRDs.

X41, X61, Y11 coding

These codes, combined with T43.6 capture only stimulant related cases, and therefore are relatively marginal. According to the EMCDDA protocol in countries which do not have T codes, these codes should not be reported as otherwise it would lead to other drugs not in the EMCDDA definition being included in particular antidepressants and neuroleptics. In countries who do report these codes the highest percentage being reported is for Latvia where these codes account for 13.3% of DRDs, however the actual number is small (n=2) (bearing in mind the limitations of the data in Latvia). However this varies according to the drug profile of the country. However in countries which cannot report these codes as they do not have T codes, this will lead to a certain degree of under-reporting of stimulant related cases.

X42, X62, Y12 coding

These codes, combined with T-codes for other main drugs (in particular heroin) capture most of the DRD and as expected they account for the largest percentage of DRDs. However in some countries this accounts for less than 50% of all DRDs. The main reasons for this are that either due to the absence or low levels of T codes available, some countries report more F codes as previously described or in countries where there is relatively high levels of X44 codes such as Denmark, Malta, Sweden which have implemented ICD-10 updates and Spain and Poland which report according to another definition.

X44, X64, Y14 coding

In countries who have fully implemented the ICD updates, the main impact would be on a shift in the coding. In countries with T codes this would not result in any loss in deaths according to selection B. However few countries have fully implemented the ICD-10 updates.
In countries like Spain which saw a shift to these codes but do not have T codes, this would result in a fall in the number of DRDs according to selection B. Infact Spain now report according to another definition which includes X44/X64/Y14 codes.

The main reasons stated by countries who answered the EMCDDA questionnaire sent and presented in 2015[4] as to why ICD-10 updates were not implemented or only partially implemented are:

1) T codes are not always available. When a high percentage of death certificates do not have T codes, implementation of ICD updates is very limited, as is, the full application of the protocol.
2) Interpretation of X44 as 'substances listed under X44'only.
3) Only one T code included in database, therefore if there are multiple drugs responsible for the death, this information is lost.
4) T code only coded if it is the second cause of death.

Therefore the implementation or otherwise of ICD updates is multi-factorial and coding issues are only part of the problem. The main areas where improvement would be relatively simple to implement is in the training and encouragement to include all T codes in countries when these are available.

There are five countries who have fully implemented the ICD-10 updates as per table 5 below. The use of X44 varies between countries and again in countries which do not have T codes, X44 is not to be reported according to EMCDDA protocol. The shaded countries do not use the GMR as their main source of information for DRDs.

Table 5: Implementation or otherwise of ICD-10 updates according to countries response to EMCDDA 2015 questionnaire[4]

Country	Implementation of ICD-10 updates	Comments
Austria	No	No T codes available
Belgium	Partial	Lack of T codes in one region
Bulgaria	No	
Croatia	Full	X44 code never used however for DRD
Czech Republic	Partial	GMR not main reporting system and lack of T codes
Denmark	Full	
Estonia	Partial	Different interpretation of X44 i.e. 'substances listed under X44'
Finland	Partial	Different interpretation of X44 i.e.' Perhaps unknown toxicology, but in Finland forensic toxicological registry can normally identify all drugs'
France	Partial	No T codes available
Germany	Partial	Low levels of T codes
Italy	Partial	GMR not main reporting system and different interpretation to X44
Ireland	Partial	GMR not main reporting system and limited number of T codes entered on computer system
Latvia	Partial	Different interpretation of X44 i.e. 'The code X44 is set for cases with unknown toxicology but not for cases related to DRD'
Lithuania	Partial	Different interpretation of X44 i.e. "Accidental poisoning by and exposure to other and unspecified drugs, medicaments and biological substances"
Malta	Full	
Netherlands	Partial	No feedback on X44
Norway	Full	
Portugal	Partial	GMR not main reporting system and different interpretation to X44
Slovenia	No	only one T code included, no ICD 10 updates
Spain	Partial	GMR not main reporting system. No T codes available
Sweden	Full	
United Kingdom	Partial	only refer to the second cause of death to identify a T code

4.6 Loss of reporting of drug related deaths according to EMCDDA protocol

The use of T codes in the EMCDDA definition adds specificity and accuracy when reporting on DRDs. Not specifying the substances would lead to considerable overestimation as the underlying cause only would yield cases related to e.g. alcohol and medicines. The current selection B is the balanced choice between specificity and sensitivity, which was done by the European experts and the EMCDDA, and is currently explained in the DRD protocol. However it also has its limitations. In countries which do not have T codes the EMCDDA protocol does not include X41, X61, Y11, X44, X64 and Y14 codes due to the over inclusive nature of these codes. This means that countries who do not report these codes would have a certain degree of under-reporting. In the replies to the EMCDDA questionnaire done in 2015[4], a number of countries stated that DRDs were under-reported. Reasons were related to both certification and codification issues.
Other codification issues not mentioned above include:

1) T50.9 (i.e. Other and unspecified drugs, medicaments and biological substances) used to code cases where no T codes are available and in poly-drug cases.
2) X42/X62/Y12/T43.9 used to code unspecified description “intoxication by drugs” on the death certificate.
3) T42.6 used to code drugs like Pregabalin as a prescription drug of new relevance for DRD may be difficult for classification;
4) No specific T codes for new synthetic substances.
5) T43.6 used for substances not applicable to any specific T-code.

The above mentioned codification issues effect to a certain degree which varies between countries, the amount of under-reporting, as the codes mentioned in point 1-4 above are not included in the EMCDDA protocol. The use of unspecified X and Y codes to code drug related deaths which are non specific may also include X49, X69 and Y19.

4.7 Comparisons during earlier versus later DRDs data in ICD codes used, impact of WHO update

In countries reporting according to selection B (table 6), (countries which are not shaded) a comparison was made of the codes used to report DRDs as percentages, in the earlier years compared to the most recent data available. It was not possible to use years prior to the WHO ICD-10 updates in some countries as this information was not available. Changes in the percentages in the different ICD groups depends both on certification and codification issues. However when comparing percentages in the earlier to later period few changes seemed to have taken place vis a vis the WHO ICD updates.

A decrease in the use of F codes was seen mainly in Belgium and United Kingdom, as well as Lithuania (other specific definition) however in other countries which report low levels of F codes, this was also so in the earlier period (however as stated previously data before ICD-10 updates was not always available in some countries). Use of X44 was reported in Belgium, Denmark, Malta, Norway and Sweden in their latest available data compared to no countries reporting X44 except for Norway previous to the ICD-10 updates.

The use of X44 Poland and Spain is not according to EMCDDA definition, as in Spain X44 is used for accidental poisonings due to exposure to drugs and is very commonly used to codify deaths due to “overdose.”The GMR of Spain doesn´t not include toxicology information, so T codes are not included. Poland also does not have T codes.

Table 6: Comparisons of ICD codes used, impact of WHO update

(*data for the UK has been updated recently and figures below may need to be updated)

		% of deaths in the ICD					% of deaths in the ICD groups			
ICD code groups	F codes	X41, X61, Y11	X42, X62, Y12	X44, X64, Y14	ICD code groups	Definition	F codes	X41, X61, Y11	X42, X62, Y12	X44, X64, Y14
Belgium (2005)	45.7 (n=48)	0.0	54.3 (n=57)	0.0	Belgium (2012)	Selection B	27.8 (n=20)	4.2 (n=3)	62.5 (n=45)	5.6 (n=4)
Bulgaria (2006)	0.0	20.7 (n=6)	79.3 (n=23)	0.0	Bulgaria (2014)	Selection B	0.0	0.0	100 (n=15)	0.0
Croatia (2008)	4.6 (n=4)	4.6 (n=4)	90.8 (n=79)	0.0	Croatia (2014)	Selection B	18.6 (n=11)	1.7 (n=1)	79.7 (n=47)	0.0
Denmark (2005)	17.4 (n=36)	0.5 (n=1)	82.1 (n=170)	0.0	Denmark (2013)	Selection B	11.3 (n=25)	0.9 (n=2)	44.6 (n=99)	43.2 (n=96)
Estonia (2006)	0.0	4.4 (n=3)	95.6 (n=65)	0.0	Estonia (2014)	Selection B	0.0	6.1 (n=6)	93.9 (n=92)	0.0
Finland (2006)	2.9 (n=4)	8.7 (n=12)	88.4 (n=122)	0.0	Finland (2014)	Selection B	13.1(n=23)	4.0 (n=7)	83.0 (n=146)	0.0
France (2006)	60.3 (n=184)	0.0	39.7 (n=121)	0.0	France (2012)	Selection B	53.0 (n=140)	0.0	47.0 (n=124)	0.0
Latvia (2006)	0.0	11.8 (n=2)	88.2 (n=15)	0.0	Latvia (2014)	Selection B	0.0	13.3 (n=2)	86.7 (n=13)	0.0
Lithuania (2006)	28.6 (n=18)	1.6 (n=1)	69.8 (n=44)	0.0	Lithuania (2014)	Other	1.1 (n=1)	0.0	98.9 (n=86)	0.0
Malta (2006)	0.0	0.0	85.7	14.3	Malta (2014)	Selection B	0.0	0.0	50 (n=1)	50 (n=1)
Netherlands (2006)	14.3 (n=16)	3.6 (n=4)	82.1 (n=92)	0.0	Netherlands (2014)	Selection B	21.1 (n=26)	11.4 (n=14)	67.5 (n=83)	0.0
Norway (2005)	11.1 (n=26)	5.1 (n=12)	76.1 (n=178)	7.7 (n=18)	Norway (2013)	Selection B	10.7 (n=25)	6.4 (n=15)	70.1 (n=164)	12.8 (n=30)
Poland					Poland (2013)	Other	2.0 (n=5)	0.0	48.6	49.4
Slovenia (2005)	5.6 (n=2)	0.0	94.4 (n=34)	0.0	Slovenia (2014)	Selection B	0.0	3.6 (n=1)	96.4 (n=27)	0.0
Spain					Spain (2013)	Other	5.5	0.0	22.8	71.7
Sweden					Sweden (2014)	Selection B	3.6	6.2	47.9	42.2
United Kingdom* (2007)	54.2 (n=1068)	2.6 (n=52)	42.3 (n=835)	0.9 (n=17)	United Kingdom* (2013)	Selection B	5.8 (n=142	1.8 (n=141	7.7 (n=190	0.8 (n=264

5. Discussion and Recommendations

Efforts to improve accuracy and coverage of DRDs are dependent on both certification and codification processes. Having a protocol in place as that developed by the EMCDDA is important for harmonisation of data extraction. Countries which have access to multiple sources of information especially those able to access autopsy and toxicology reports helps greatly improves coverage and accuracy. In those countries were under-reporting of DRDs is considered to be high, greater efforts by national focal points is needed to bring together key stakeholders with the aim of improving coverage, completeness and sensitivity of DRDs.

ICD updates by WHO in 2002/2003 may allow identification of some additional relevant DRD cases that previously might have been unrecognised under X44 or X49 codes. However as described in previous sections of this document updates were not universally adopted by all countries for a number of reasons, one of the main being the absence or insufficient use of codes to specify the substances related to the deaths (i.e. the T-codes).

ICD coding by countries varies and depends on a variety of factors which include availability of information on the death certificate, availability of toxicological results, database options

(e.g. how many codes one is permitted to enter) and coding practices including the uptake of WHO revisions.

The availability or otherwise of T codes often determines whether or not WHO updates can be implemented. Also in countries who only have one T code in their database this limits the possibility of implementing ICD updates.

In countries which provide DRD data from the GMR and the SR it is often the case that one source provides a more comprehensive data set than the other. For most countries the main source of data on DRDs reports more cases on average than the other source. However this is not always so and greater cooperation between the two sources needs to be developed. In countries where data protection laws permit it, linkage between SR and GMR should be done where this is possible.

A number of recommendations regarding guidelines to ICD-1O coding were described in the EMCDDA scientific report CT.00.RTX.22[7] of 2002 and have been implemented by the WHO through the ICD-10 updates. Also this report created a number of methodologies which can be used by countries to estimate the burden of drug related deaths in a country depending on what is feasible in a particular country. Estimation of the direct number of DRDs is done in Spain, and such or similar procedure may be necessary in other countries whose register underestimates DRDs to a substantial extent. Other estimates may be made based on overdose rates in cohort studies and POU estimates.

Based on the findings in this report and on previous studies the following recommendations are being proposed:

- Provision of guidelines/training for coding of DRDs especially when new updates are to be implemented.
- Discussion with WHO regarding T codes for new drugs.
- Discussion with WHO regarding ICD-11 and any foreseen impact on the DRD protocol.
- Greater efforts to include all T codes rather just one T code in the country databases.
- In those countries when only one T code can be inputted this should be according what the certifier thinks is the most important drug or if no indication given, this should follow the ICD-1O priority guidelines;
- Further analysis of drugs coded under T50.9 and other non-specific codes.
- Develop methodologies to estimate DRDs in countries with underestimates allowing more accurate data to be compared between countries.
- Collaboration between EMCDDA, Eurostat and the European Council of Legal Medicine[7] regarding access to autopsy and toxicology reports.

6. References

1. Van Laar M, De Zwart ; Feasibility study of the implementation of the proposals given in the final report of REITOX sub-task 3.3 -to improve the quality and comparability of data on drug-related deaths.(feasibility study). EMCDDA project CT.97.EP.08; July 1998: http://www.emcdda.europa.eu/html.cfm/index58085EN.html
2. EMCDDA ; EMCDDA standard protocol to collect data and report figures for the key indicator drug-related deaths (DRD-Standard, version 3.2). EMCDDA, 2010; http://www.emcdda.europa.eu/html.cfm/index107404EN.html
3. WHO; International Classification of diseases (ICD); http://www.who.int/classifications/icd/en/; last accessed in May 2016
4. EMCDDA; Codification practices of DRD following the WHO revision of guidelines of 2002-2003 (to be implemented in 2006) http://www.emcdda.europa.eu/attachements.cfm/att_243598_EN_04.%20I.%20Giraudon%20-%20Codification%20practices%20of%20DRD.pdf
5. WHO; List of official ICD-10 updates. http://www.who.int/classifications/icd/icd10updates/en/; last accessed in May 2016
6. **Emcdda: EMCDDA Statistical bulletin 2016; http://www.emcdda.europa.eu/data/stats2016**
7. EMCDDA 2002; Co-ordination of the implementation of the EMCDDA standard guidelines on the drug-related deaths indicator in the EU Member States, and the collection and anaylsis of information on drug-related deaths. http://www.emcdda.europa.eu/html.cfm/index65309EN.html

Annex 1

Identifying the most danagerous drug according to ICD 10 2002/2003 updates[5]

To provide useful statistics on multiple drug deaths, it is of utmost importance that the most dangerous drug is identifiable in addition to the underlying cause (see also Nature of injury, pp. 86–87). When selecting the code for the most dangerous drug, apply the following instructions. If one component of the combination is specified as the cause of death, code to that component. If no single component is indicated as the cause of death, code combinations of alcohol with a drug to the drug. When the classification provides a specific category for a combination of drugs, e.g. mixed antiepileptics (T42.5), code to that category. If no appropriate combination category is available, select the main injury code in the following order of priority:

1. **Opioids** (T40.0-T40.2): Combinations including opioids classifiable to more than one fourth-character subcategory in T40.0-T40.2: Code to T40.2
2. **Cocaine** (T40.5)
3. Psychostimulants with abuse potential (T43.6). Includes: Amphetamine and derivates
4. **Synthetic narcotics** and other and unspecified narcotics (T40.3-T40.4, T40.6)
   Combinations including synthetic narcotics classifiable to more than one fourth-character subcategory in T40.3-T40.4: Code to T40.4
   Combinations including synthetic narcotics classifiable to more than one fourth-character subcategory in T40.3-T40.4 with other and unspecified narcotics classifiable to T40.6: Code to T40.6
5. **Antidepressants** (T43.0-T43.2): Combinations including antidepressants classifiable to more than one fourth-character subcategory in T43.0-T43.2: Code to T43.2
6. **Non-opioid analgesics** (T39.-): Combinations including non-opioid analgesics classifiable to more than one fourth-character subcategory in T39.0-T39.4: Code to T39.8
7. **Drugs and substances not listed above**: If the death certificate reports more than one such drug, code to the first mentioned.