Article

Cause of death coding in mortality statistics, software changes: January 2022

The software used to code death registrations in England and Wales changed from MUSE 5.5 to MUSE 5.8 on 1 January 2022. This paper details the differences in cause of death coding when using MUSE 5.5 software compared with the updated MUSE 5.8 as demonstrated on a sample of mortality data for England and Wales.

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1 . Main points

- When comparing a sample of deaths dual coded using the previous Multi-causal and Uni-causal Selection Engine (MUSE) 5.5 and the updated MUSE 5.8 version, 99.2% of underlying causes of death remained in the same International Classification of Diseases, Tenth Revision (ICD-10) chapter designation, and 98.6% remained in the same leading cause of death designation.

- This is less than half of the change observed when we switched from IRIS 4.2.3 to MUSE 5.5 in 2020.

- There are two ICD-10 chapters with strong evidence of change in the frequency that the underlying causes of death falls within them; Chapter I Certain infectious and parasitic diseases decreased by 4% between the two versions and Chapter VI Diseases of the nervous system increased by 1%.

- There are five leading causes of death with strong evidence of change in the frequency that the underlying causes of death falls within them and a further 11 with evidence of change.

- The most significant leading causes of death change was Disorders of fluid electrolyte and acid-based balance (dehydration) which had a net loss of 44%, which mostly corresponded with a net gain of 24% to Mental and behavioural disorders due to psychoactive substance use.

- The second most significant leading causes of death change was Parkinson's disease with a net gain of 3%, which mostly corresponded with a net loss of 4% from Acute respiratory infections other than influenza and pneumonia.

2 . Overview of software changes affecting ICD-10

The underlying cause of death (UCOD) for non-neonatal deaths (in those aged 28 days and over) registered in England and Wales is determined from information captured on the medical certificate of cause of death (MCCD). Coding of health conditions uses the World Health Organization's (WHO) International Classification of Diseases, Tenth Revision (ICD-10) and WHO rules are followed to establish a single UCOD. The UCOD is defined as either the disease or injury that initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence that produced the fatal injury. Coding of deaths is largely automated and uses specialist software, but where the automated process fails, deaths are manually coded by staff trained in WHO rules.

Since ICD-10 was introduced for causes of death in England and Wales in January 2001, various amendments and rule changes have been implemented. These occur to correct errors in the classification, allow adoption of new codes and accommodate advances in medical knowledge of the relationship between conditions. Changes are incorporated into software updates and rules for the manually coded process.

Until December 2010, Office for National Statistics (ONS) used the Mortality Medical Data System (MMDS) ICD-10 version 2001.2 software provided by the US National Center for Health Statistics (NCHS) to code cause of death. Since then:

- ONS updated to version 2010 in January 2011 and incorporated most of the WHO amendments authorised up to 2009

- IRIS version 2013 was introduced on 1 January 2014, which incorporated all updates to ICD-10 approved by the WHO and timetabled for implementation before 2014

- on 1 January 2017, ONS updated to IRIS 4.2.3 software, which incorporates all changes to ICD-10 that had been authorised by the WHO up to the end of 2016

- on 1 January 2020, ONS updated to a successor of IRIS, Multi-causal and Uni-causal Selection Engine (MUSE) 5.5 (IRIS version 5.5)

- on 1 January 2022, ONS moved to MUSE 5.8, which incorporates ICD-10 changes to 2019

In ICD-10 version 2019 there are 13,232 codes, structured into 22 chapters (broad cause groupings, for example Neoplasms), 213 sub-chapters (for example Malignant neoplasms) and 2,053 blocks (for example Malignant neoplasm of lip). ONS defines 68 leading causes of death, which account for almost 90% of deaths, based on a specially designed categorisation developed by the WHO.

The following sections chart the effects of switching from MUSE version 5.5 to 5.8 on coding non-neonatal deaths by UCOD through ICD-10 chapter and leading cause of death designation. The impact upon still-births and neonatal deaths will be published separately.

3 . Methodology

The underlying cause of death (UCOD) was analysed from a sample of 42,413 deaths registered in England and Wales in 2017. The sample represents four weeks of complete death registration data, excluding still-births and neonatal deaths, with one week from each quarter of 2017 selected after excluding weeks containing or immediately following a bank holiday. The records were already coded using IRIS 4.2.3 at time of sampling. The sample was recoded using Multi-causal and Uni-causal Selection Engine (MUSE) 5.5 in 2019 and again using MUSE 5.8 in 2021. Therefore a tri-coding study is possible; the UCOD attributed under IRIS 4.2.3, MUSE 5.5 and MUSE 5.8 may differ and result in changes to International Classification of Diseases, Tenth Revision (ICD-10) block and sub-chapter. Our focus is changes to the UCOD that affect the ICD-10 chapter and leading cause of death designation.

The net change by designation is important as it allows adjustments to be made to a timeseries to maintain comparability. These adjustments are called comparability ratios and are simply the ratio of change (count under new rules/count under old rules). The 95% confidence intervals for these ratios are estimated for categories with greater than 30 source cases, according to the method previously published by the Office for National Statistics (ONS).

The data analysed in this paper is based on the original software coding without revision. This means that, unlike our finalised death registrations, this data has not been subject to full quality checks and any further information on the death that is provided that may revise the cause of death has not been included. This particularly affects inquest data as all inquest data are manually coded and more likely to be updated than routine registrations. Out of the non-inquest records, just under 24% were manually coded for MUSE 5.5 and MUSE 5.8.

There is additional uncertainty because of manual coding which is subject to a level of interpretative inconsistency that likely lessens with coder experience. The manually coded sample death registrations under MUSE 5.5 and MUSE 5.8 were the first records to be coded according to new rules. This experience effect means that the observed discrepancy rate in the sampled data may differ slightly. Finally, the sample size does not give enough statistical power to analyse changes that are small. Therefore, comparability ratios presented here should be viewed as indicative measures of change only.

Out of the sample of 42,413 deaths, the UCOD ICD-10 chapter designation changed in 880 records between IRIS 4.2.3 and MUSE 5.5, in 344 records between MUSE 5.5 and MUSE 5.8, and 954 records between IRIS 4.2.3 and MUSE 5.8 (Table 1). Therefore, the change in chapter of the underlying cause of death between coding rule changes is not additive; out of the 880 records that disagreed between IRIS 4.2.3 and MUSE 5.5 for underlying cause of death, 128 agreed between IRIS 4.2.3 and MUSE 5.8.

Table 1: Record level changes in under-lying cause of death (UCOD) designation between coding by IRIS 4.2.3, MUSE 5.5 and MUSE 5.8 and consequential impact by ICD-10 level and leading cause

Coding versions		UCOD	Block	Sub-chapter	Chapter	Leading cause
IRIS 4.2.3 and MUSE 5.5	Agreement	39,298	40,821	41,310	41,533	41,193
	Disagreement	3,115	1,592	1,103	880	1,220
MUSE 5.5 and MUSE 5.8	Agreement	41,125	41,435	41,905	42,069	41,814
	Disagreement	1,288	978	508	344	599
IRIS 4.2.3 and MUSE 5.8	Agreement	38,981	40,602	41,220	41,459	41,078
	Disagreement	3,432	1,811	1,193	954	1,335
IRIS 4.2.3, MUSE 5.5 and MUSE 5.8	Agreement (3 way)	38,624	40,266	41,027	41,331	40,852
	Disagreement (3 way)	257	87	32	14	32

Source: Office for National Statistics

Notes:

1. Taken from the sample of 42,413 non-neonatal records registered in England and Wales in 2017.

4 . Changes to the underlying cause of death designation affecting ICD-10 chapter and leading cause of death

The coding of deaths through Multi-causal and Uni-causal Selection Engine (MUSE) 5.5 and MUSE 5.8 to underlying cause of death (UCOD) by International Classification of Diseases, Tenth Revision (ICD-10) chapter and leading cause of death for the sample of 42,413 non-neonatal deaths is available in the accompanying dataset . Summaries of the net changes by ICD-10 chapter and a selection of leading cause with their corresponding comparability ratios are shown in tables 2 and 3, respectively.

The overall proportion of records with a UCOD coded to a different chapter by MUSE 5.5 and MUSE 5.8 was 0.8%. Out of the 22 chapters, enough sample was available in 15 to estimate comparability ratios. Of these, there is evidence for a net change in ICD-10 chapter assignment for four chapters (less than 5% chance that this has randomly occurred (p<0.05); Table 2).

Table 2: ICD-10 Chapter changes and comparability ratios following dual coding by MUSE 5.5 and MUSE 5.8 [1]

ICD-10 codes	Chapter		Cases		Net change		Comparability ratio			
			MUSE 5.5	MUSE 5.8	Count	%	Est	lcl	ucl	p
A00 to B99	I	Certain infectious and parasitic diseases	345	330	-15	-4%	0.96	0.93	0.99	0.009
C00 to D48	II	Neoplasms	11,681	11,686	5	0%	1.00	1.00	1.00	0.466
D50 to D89	III	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	85	81	-4	-5%	0.95	0.88	1.03	0.253
E00 to E90	IV	Endocrine, nutritional and metabolic diseases	666	655	-11	-2%	0.98	0.97	1.00	0.056
F00 to F99	V	Mental, Behavioural and Neurodevelopmental disorders	4,004	4,013	9	0%	1.00	1.00	1.01	0.323
G00 to G99	VI	Diseases of the nervous system	2,777	2,799	22	1%	1.01	1.00	1.01	0.001
H00 to H59	VII	Diseases of the eye and adnexa	0	0	0	0%	-	-	-	-
H60 to H95	VIII	Diseases of the ear and mastoid process	1	1	0	0%	-	-	-	-
I00 to I99	IX	Diseases of the circulatory system	10,635	10,653	18	0%	1.00	1.00	1.00	0.094
J00 to J99	X	Diseases of the respiratory system	6,180	6,170	-10	0%	1.00	1.00	1.00	0.318
K00 to K93	XI	Diseases of the digestive system	2,072	2,068	-4	0%	1.00	0.99	1.00	0.527
L00 to L99	XII	Diseases of the skin and subcutaneous tissue	154	154	0	0%	1.00	0.97	1.03	1.000
M00 to M99	XIII	Diseases of the musculoskeletal system and connective tissue	316	314	-2	-1%	0.99	0.97	1.02	0.671
N00 to N99	XIV	Diseases of the genitourinary system	725	736	11	2%	1.02	1.00	1.03	0.039
O00 to O99	XV	Pregnancy, childbirth and the puerperium	2	2	0	0%	-	-	-	-
P00 to P96	XVI	Certain conditions originating in the perinatal period	20	20	0	0%	1.00	-	-	-

Q00 to Q99	XVII	**Congenital malformations, deformations and chromosomal abnormalities**	134	135	1	1%	1.01	0.95	1.07	0.795	
R00 to R99	XVIII	**Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified**	1,004	1,009	5	0%	1.00	1.00	1.01	0.094	
S00 to S99; T00 to T98	XIX	**Injury, poisoning and certain other consequences of external causes**	0	0	0	0%	-	-	-	-	
U50.9; V01 to Y89	XX	**External causes of morbidity**	1,611	1,586	-25	-2%	0.98	0.97	1.00	0.011	
Z00 to Z99	XXI	**Factors influencing health status and contact with health services**	1	0	-1	-100%	-	-	-	-	
U00 to U49; U82 to U85	XXII	**Codes for special purposes**	0	1	1	-	-	-	-	-	

Source: Office for National Statistics

Notes:

1. Net changes from the sample of 42,413 non-neonatal records registered in England and Wales in 2017.

There are 68 leading causes of death plus an Other category. The overall proportion of records with an underlying cause of death coded to a different leading cause by MUSE 5.5 and MUSE 5.8 was 1.4%. Out of the 69 leading causes of death, including Other, enough sample was available in 55 to estimate comparability ratios. Of these, there is evidence for a net change in leading cause of death assignment for 16 leading causes (p<0.05; Table 3).

Table 3: Changes and comparability ratios following dual coding by MUSE 5.5 and MUSE 5.8[1] for selected leading causes of death[2]

ICD-10 codes	Leading cause	Cases		Net change		Comparability ratio			
		MUSE 5.5	MUSE 5.8	Count	%	Est	lcl	ucl	p
F01; F03; G30	Dementia and Alzheimer's disease	5,352	5,349	-3	0%	1.00	1.00	1.00	0.701
I20 to I25	Ischaemic heart diseases	4,717	4,719	2	0%	1.00	1.00	1.00	0.781
J40 to J47	Chronic lower respiratory diseases	2,784	2,794	10	0%	1.00	1.00	1.01	0.041
I60 to I69	Cerebrovascular diseases	2,409	2,433	24	1%	1.01	1.00	1.02	0.001
C33 to C34	Malignant neoplasm of trachea, bronchus and lung	2,348	2,340	-8	0%	1.00	0.99	1.00	0.103
J09 to J18	Influenza and pneumonia	2,294	2,305	11	0%	1.00	1.00	1.01	0.047
C18 to C21	Malignant neoplasm of colon, sigmoid, rectum and anus	1,167	1,169	2	0%	1.00	0.99	1.01	0.670
R00 to R99	Symptoms, signs and ill-defined conditions	1,004	1,009	5	0%	1.00	1.00	1.01	0.094
C81 to C96	Malignant neoplasms, stated or presumed to be primary of lymphoid, haematopoietic and related tissue	919	924	5	1%	1.01	1.00	1.02	0.295
C61	Malignant neoplasm of prostate	859	853	-6	-1%	0.99	0.98	1.01	0.274
N00 to N39	Diseases of the urinary system	696	708	12	2%	1.02	1.00	1.03	0.021
G20	Parkinson's disease	580	600	20	3%	1.03	1.02	1.05	<0.001
C67	Malignant neoplasm of bladder	358	364	6	2%	1.02	1.00	1.03	0.030
J00 to J06; J20 to J22	Acute respiratory infections other than influenza and pneumonia	365	349	-16	-4%	0.96	0.93	0.98	0.002
C56	Malignant neoplasm of ovary	272	267	-5	-2%	0.98	0.97	1.00	0.024
C53 to C55	Malignant neoplasm of uterus	216	221	5	2%	1.02	1.00	1.04	0.021
C23 to C24	Malignant neoplasm of gallbladder and other parts of biliary tract	74	79	5	7%	1.07	1.00	1.14	0.041
I05 to I09	Chronic rheumatic heart diseases	100	91	-9	-9%	0.91	0.84	0.98	0.020
U50.9; X85 to Y09; Y87.1	Homicide and probable homicide	86	78	-8	-9%	0.91	0.83	0.99	0.047
C32	Malignant neoplasm of larynx	50	54	4	8%	1.08	1.01	1.16	0.025
F10 to F19	Mental and behavioural disorders due to psychoactive substance use	50	62	12	24%	1.24	1.09	1.42	<0.001

E86 to E87	Disorders of fluid, electrolyte and acid–base balance (incl. dehydration)	34	19	-15	-44%	0.56	0.45	0.69	<0.001
	Other	4,807	4,747	-60	-1%	0.99	0.98	0.99	<0.001

Source: Office for National Statistics

Notes:

1. Net changes from the sample of 42,413 non-neonatal records registered in England and Wales in 2017.

2. There are 68 leading cause of death classifications. This table includes the 10 most frequent leading causes, leading causes with significant net changes, and the Other category, which comprises codes that are not allocated to one of the 68 leading causes.

The significant changes in leading cause coding are discussed in the context of ICD-10 chapter changes below.

ICD-10 Chapter I : Certain infectious and parasitic diseases

There were 9 gains, 24 losses and 321 unchanged records to ICD-10 Chapter I moving from coding in MUSE 5.5 to MUSE 5.8. This net decrease of 4% is significant (Table 2; p=0.009). Half of the losses and two of the gains were to, or from, Chapter X Diseases of the respiratory system. Nine losses were to the Chapter X sub-chapter Influenza and pneumonia, two to Chronic lower respiratory diseases and one to Other acute lower respiratory infections. The two gains from Chapter X were both to the leading cause of death, Tuberculosis. None of the seven leading causes of death that fall within Chapter I had significant net change. Though, not significant itself (p=0.1), Septicaemia is noteworthy with a net decrease of 5% resulting from a loss of 10 and a gain of 4 records. The 10 losses of coding to Septicaemia in MUSE 5.5 were 6 coding to Influenza and pneumonia, two to Dementia and Alzheimer's disease, and one each to Urinary diseases and Acute Respiratory diseases in MUSE 5.8. The four gains of coding to Septicaemia in MUSE 5.8 were two coded from Other (one within chapter, the other from Chapter XX) and one each for Ischaemic heart diseases and Pulmonary heart disease and diseases of pulmonary circulation, both in Chapter IX, in MUSE 5.5.

ICD-10 Chapter II: Neoplasms

There were 26 gains, 21 losses and 11,600 unchanged records to ICD-10 Chapter II from MUSE 5.5 to MUSE 5.8. This is not a significant change (Table 2). However, there were 179 records whose UCOD was coded to different ICD-10 blocks within this chapter. These tended to focus on a small number of blocks which are mostly captured by the analysis of change in the leading causes of death (Table 3). The exceptions (blocks that had changes within this chapter but are not leading causes) are Malignant neoplasm without specification of site and Malignant neoplasm of other and ill-defined sites, which had changes to 55 and 18 records, respectively, and a net loss of 11 and 14 records, respectively, from MUSE 5.5 to MUSE 5.8 coding. There are five leading causes of death within Chapter II that had significant change:

- Malignant neoplasm of bladder with a net gain of 2%

- Malignant neoplasm of ovary with a net loss of 2%

- Malignant neoplasm of uterus with a net gain of 2%

- Malignant neoplasm of gallbladder and other parts of biliary tract with a net gain of 7%

- Malignant neoplasm of larynx with a net gain of 8%

ICD-10 Chapter III: Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism

The UCOD rarely codes to Chapter III, the rate of change was low, and the net loss of 5% was not significant. There were no changes in the ICD-10 blocks that contribute to the leading cause Malnutrition and nutritional anaemias within this chapter or the next (Chapter IV).

ICD-10 Chapter IV: Endocrine nutritional and metabolic diseases

There were 22 losses, 11 gains and 644 unchanged records to Chapter IV going from coding in MUSE 5.5 to MUSE 5.8. The net loss was 2% with a range between a loss of 3% and 0% (p=0.06). There are two leading causes of death that fall wholly within this chapter: Diabetes with no significant net change (p=0.3); and Disorders of fluid electrolyte and acid-based balance (inc. dehydration) which had the most significant change observed (loss of 44%, p<0.001). Disorders of fluid electrolyte and acid-based balance (inc. dehydration) gained 1, lost 16 and had 18 unchanged records going from MUSE 5.5 to MUSE 5.8 coding. Of these losses, 12 were to Mental and behavioural disorders due to psychoactive substance use and resulted from a dictionary amendment applied in MUSE 5.8 that amends the code order of E87, F10 to F10, E87. As this change was applied under epidemiological advice as a post-processing quality check in MUSE 5.5, the real-world impact of this dictionary change is likely to be smaller.

ICD-10 Chapter V: Mental and behavioural disorders

There were 37 losses, 46 gains and 3,967 unchanged records to Chapter V going from MUSE 5.5 to MUSE 5.8, which is not significant (Table 2). A major part of the change was through the ICD-10 block Unspecified dementia, which saw a loss of 26 and a gain of 25 records. This is a component of the leading cause Dementia and Alzheimer's disease that also had no significant change (Table 3). The remaining leading cause of death that maps to this chapter is Mental and behavioural disorders due to psychoactive substance use, which gains 15, loses 3 and has 47 unchanged records. This is a significant loss of 24% (Table 3; p<0.001).

Chapter VI: Diseases of the nervous system

Chapter VI gained 34, lost 12 and had 2,777 records unchanged from MUSE 5.5 to MUSE 5.8, a net increase of 1% (significant, p=0.001; Table 2). A major part of this is captured by changes to the leading cause of death, Parkinson's disease, which had a net increase of 19 records from between chapters and a net increase of 1 record within chapter. In total, Parkinson's disease has a net increase of 3% (p<0.001; Table 3). Of the gains to Parkinson's disease, 15 came from the ICD-10 block Unspecified acute lower respiratory infection, which is part of the leading cause Acute respiratory infections other than influenza and pneumonia. This was mostly caused by a rule change in MUSE 5.8 that places the block Unspecified acute lower respiratory infection, in the sequelae table to a consequence of Parkinson's disease. The three remaining leading causes of deaths associated with Chapter VI saw no significant change.

Chapter IX: Diseases of the circulatory system

There were 49 losses, 67 gains and 10,586 unchanged records to Chapter IX going from coding in MUSE 5.5 to MUSE 5.8 (p=0.09). Out of the gains, 17 were from Exposure to unspecified factor and Other nontraumatic intracranial haemorrhage, part of the leading cause group Cerebrovascular diseases. This was caused by a rule change that saw intracranial haemorrhage with no obvious cause (non-traumatic) being defined as the UCOD in MUSE 5.8 rather than an unspecified accident. Out of the 12 leading causes associated with Chapter IX, Cerebrovascular diseases with a net gain of 1% was the most significant (p=0.001). Also significant was Chronic rheumatic heart diseases with a net loss of 9% (p=0.02; Table 3). Of these, a net loss of six records was to Nonrheumatic valve disorders and endocarditis. Changes to this or the remaining nine leading causes of deaths associated with Chapter IX were not significant (Table 3).

Chapter X: Diseases of the respiratory system

There were 55 losses, 45 gains and 6,125 unchanged records to Chapter X moving to MUSE 5.8, which is not significant (p=0.3; Table 2). Out of the five leading causes of death associated with this chapter, three have significant change:

- acute respiratory infections other than influenza and pneumonia loses 22 and gains 6 resulting in a net loss of 4% (p=0.002, 15 of these losses are to Parkinson's disease)

- Chronic lower respiratory diseases has a net gain of 10 cases (0.4%, p=0.04), three of which are within chapter

- Influenza and pneumonia gains 21 (including 6 from Septicaemia) and loses 10 resulting in a net gain of 0.5% (p=0.047)

Chapter XI: Diseases of the digestive system

There were 22 losses, 18 gains and 2,050 unchanged records to Chapter XI (p=0.5). There are two leading causes of death that fall wholly within this chapter, neither which saw significant change.

Chapter XIV: Diseases of the genitourinary system

There were 9 losses, 20 gains and 716 unchanged records to Chapter XIV resulting in a net increase of 2% (p=0.04). These changes, bar one loss, all are within the leading cause Diseases of the Urinary system, a significant gain (1.7%, p=0.02).

Chapter XVIII: Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified

There were 1,002 unchanged records, 2 losses and 7 gains going from coding in MUSE 5.5 to MUSE 5.8 in Chapter XVIII resulting in a net increase of 0.5% which was not significant (p=0.09).

Chapter XX: External causes of morbidity and mortality

There were 1,551 unchanged records, 60 losses and 35 gains to Chapter XX, a net loss of 2% (p=0.01; Table 2). The ICD-10 block Exposure to unspecified factor (X59) had 32 losses and 8 gains. The ICD-10 block Unspecified fall had 14 losses and 6 gains. There are eight leading causes of death associated with this chapter, two of which are insufficiently represented in the sample. Out of the remaining, the only leading cause with significant change was Homicide and probable homicide with a net loss of eight cases (six of which were within chapter) resulting in a comparability ratio of 0.91 (0.83 to 0.99; p=0.047). Accidental falls had a net loss of 11 cases (negative 2.6%), but this was not significant (p=0.1).

Other chapters

The remaining chapters have a small number of deaths classified to them and show, or are expected to show, no significant changes.

- Chapter VII: Diseases of the eye and adnexa had no cases in the sample.

- Chapter VIII: Diseases of the ear and mastoid process had one case in the sample.

- Chapter XII: Diseases of the skin and subcutaneous tissue had 151 unchanged records, three losses and three gains.

- Chapter XIII: Diseases of the musculoskeletal system and connective tissue had 304 unchanged records, 12 losses and 10 gains.

- Chapter XV: Pregnancy, childbirth and the puerperium had two cases in the sample.

- Chapter XVI: Certain conditions originating in the perinatal period had 20 cases in the sample.

- Chapter XVII: Congenital malformations, deformations and chromosomal abnormalities had 127 unchanged records, 7 losses and 8 gains.

- Chapter XIX: Injury poisoning and certain other consequences of external causes are secondary or contributory cause codes and are never used as underlying causes of death.

- Chapter XXI: Factors influencing health status and contact with health services had one case coded to this chapter in MUSE 5.5.

- Chapter XXII: Codes for special purposes had one case coded to this chapter in MUSE 5.8.

5 . Impact on existing Office for National Statistics (ONS) publications

The implementation of the automatic cause of death coding software Multi-causal and Uni-causal Selection Engine (MUSE) 5.8 will have an effect on all ONS publications using mortality data from 2022 onwards that analyse deaths by underlying cause of death. ONS does not routinely use comparability ratios, but we may provide them for users upon request.

6 . Cause of death coding data

[Indicative comparability ratios for underlying cause of death by ICD-10 chapter and leading cause of death between MUSE 5.5 and MUSE 5.8](#)
Dataset | Released 7 January 2022
Underlying cause of death by ICD-10 chapter and leading cause of death in a sample of 42,413 death registrations from 2017 in England and Wales, coded through MUSE 5.5 and MUSE 5.8.

7 . Related links

[Deaths registered in England and Wales: 2020](#)
Bulletin | Released 6 July 2021
Registered deaths by age, sex, selected underlying causes of death and the leading causes of death.
Contains death rates and death registrations by area of residence and single year of age.

[Monthly mortality analysis, England and Wales](#)
Bulletin | Released monthly
Provisional death registration data for England and Wales, broken down by sex, age and country. Includes deaths due to coronavirus (COVID-19) and leading causes of death.