

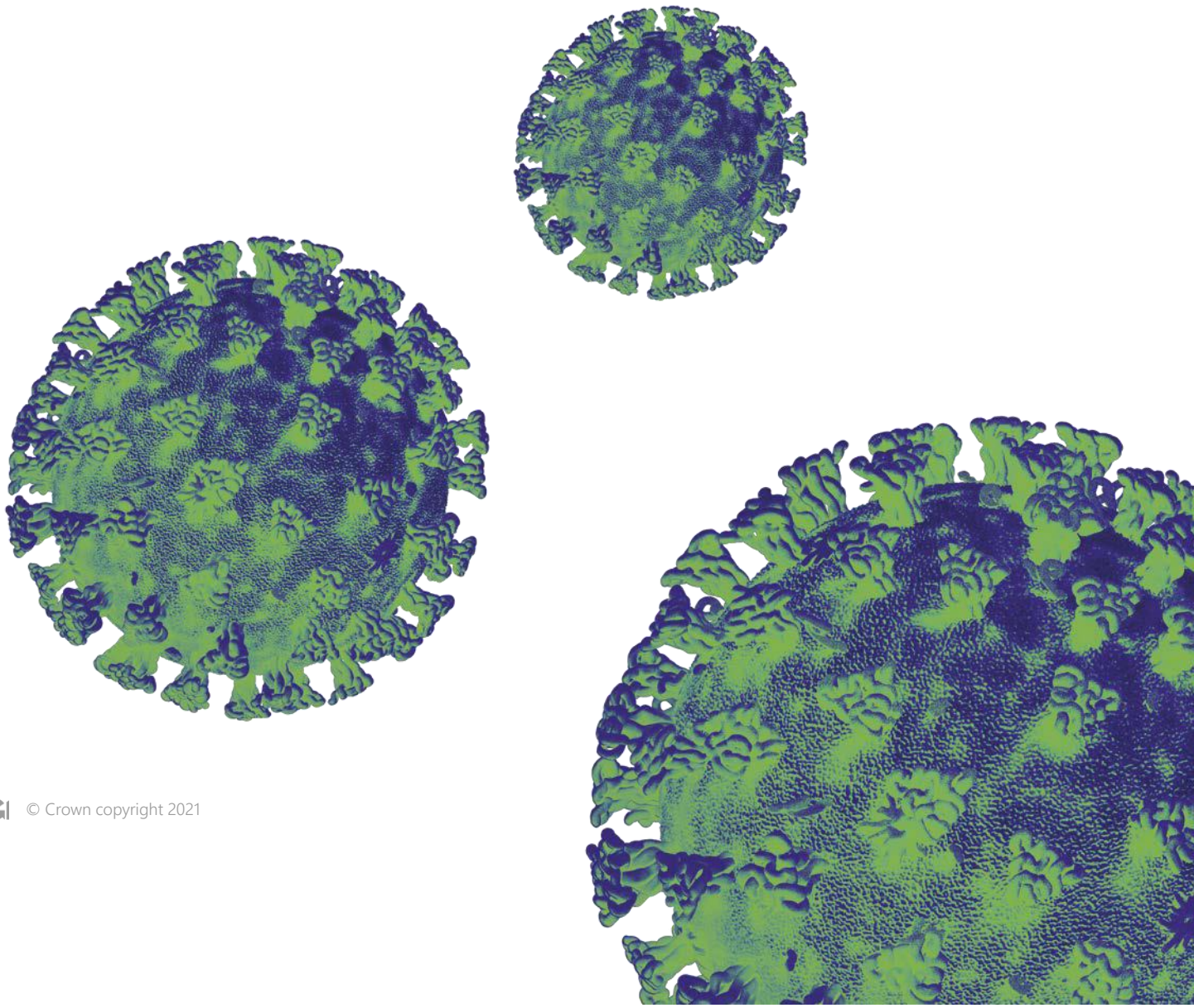


Llywodraeth Cymru
Welsh Government

Technical Advisory Cell

Report to Welsh Government COVID-19 Technical Advisory Group (TAG) on COVID-19 Hospital Admissions

2 January 2022



Report to Welsh Government COVID-19 Technical Advisory Group (TAG) on COVID-19 Hospital Admissions

Summary

TAG requested an analysis of COVID-19 related admissions to hospital to inform planning and modelling of future scenarios. The question under consideration was what proportion of emergency admission were caused by COVID and what due to COVID being a co-morbidity. The 3.3M ConCOV total population cohort was analysed within the SAIL databank until the end of August 2021 to allow for catch up with hospital coding, which is around three months in arrears.

The methodology adopted is a standard approach used in SAIL comparing the position of the COVID codes with first non-R, non-Z ICD codes being used to designate admissions with COVID as the primary cause and COVID codes in subsequent positions as being admissions for other reasons with COVID being identified as a co-morbidity or incidental findings.

The figures and tables show that most (71.2%) of admissions where COVID was mentioned anywhere in the discharge coding were due to suspected or confirmed COVID19. For those where COVID19 was not in the primary diagnostic position the most frequent categories were trauma (19.8%) and diseases of the circulatory (16.5%), respiratory (11.2%), digestive (10.1%), genitourinary (9.6) and infectious and parasitic disorders (6.1%).

The appendices contain more details on monthly and age-group distributions.

Positive SARS-CoV-2 laboratory were also analysed looking at 7 and 14 day windows around admission.

15.9% of admissions with a positive COVID-19 pathology test within 7 days of a hospital admission date were designated as not being COVID admissions but COVID being recorded as a co-morbidity or incidental finding.

It is likely that most of the admissions in respiratory and infectious diseases chapters are due to COVID. If these are added this would increase the proportion caused by COVID up to a maximum of 88.5% of admissions.

Whilst, trauma might surprise some as the leading cause in co-morbidity/incidental group it is worth noting that there has been very little impact of the pandemic on serious trauma admissions (separate EU PHIRI project). Acute illnesses are known to increase the propensity to fall, which on top of reduced physical activity and consequent muscle loss due to shielding and self-isolation issues, would increase the likelihood of hip fractures.

Estimating the exact proportions of hospital admissions being due to COVID19 or COVID19 is an incidental finding is not a straightforward task due to coding and testing issues. The best estimate is that 71.2% to 88.5% of admissions of people to Welsh hospitals where COVID19 is mentioned anywhere in the discharge diagnoses are directly due to COVID-19.

Acknowledgement

This report has been curated by the Health Data Research (HDR) UK team at Swansea University with the support of the SAIL Databank.

This work uses de-identified data from the SAIL Databank and uses data provided by patients and collected by the NHS as part of their care and support. We would like to acknowledge all data providers who make data available for research. We wish to acknowledge the collaborative partnership that enabled acquisition and access to the de-identified data, which led to this output.

Introduction

This report aims to investigate the current reasons/trends for COVID-19 hospital admissions in Wales and better understand the reasons for these admissions. The report focuses on emergency hospital admissions in the Patient Episode Database for Wales (PEDW).

The data used in this report covers all people alive and resident /interacting with health services in Wales from January 2020 to August 2021 using the Welsh COVID-19 e-cohort (C19-COHORT20) data and population who have an emergency admission to hospital during the follow-up period (they have an admission date between January 2020 and August 2021). All ALFs appearing in the C19-COHORT20 and matching the criteria were used, including all ages. Restrictions on Welsh residence were not implemented for this analysis (any use of the NHS is therefore included).

First non-R, non-Z ICD-10 code and COVID-19 elsewhere

As part of this work, we have investigated the first recorded non-R, non-Z ICD-10 code for emergency PEDW admissions between January 2020 and August 2021. 'R' codes relate to the ICD-10 chapter 'Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified' and 'Z' codes related to the chapter for 'Factors influencing health status and contact with health services.' These were excluded to explore the first, more specific diagnosis code recorded on admission.

The diagnosis codes used for this analysis were extracted from

SAILWMC_V.C19_COHORT_PEDW_DIAG and the DIAG_NUM (diagnosis number) was used as an indication of the sequence of each diagnosis code recorded. COVID-19 ICD-10 codes U071 (confirmed COVID-19) and U072 (suspected COVID-19) were used when specifically looking at COVID-19 cases.

We have also looked at cases where the first recorded non-R, non-Z code is not U071 or U072 (i.e., the reason for admission was not suspected or confirmed COVID-19) but either of these codes appears elsewhere in the diagnosis sequence for that admission.

The table below shows all non-R, non-Z ICD-10 Chapter codes as well as the descriptions for reference and interpretation.

Table 1a: ICD-10 Chapter codes and descriptions

Code	Description
A00-B99	Infectious and parasitic diseases
C00-D49	Neoplasms
D50-D89	Diseases of blood and blood forming organs and certain disorders involving the immune system
E00-E89	Endocrine, nutritional and metabolic diseases
F01-F99	Mental, Behavioural and Neurodevelopmental disorders
G00-G99	Diseases of Nervous System
H00-H59	Diseases of eye and adnexa
H60-H95	Diseases of ear and mastoid process
I00-I99	Diseases of circulatory system
J00-J99	Diseases of respiratory system
K00-K95	Diseases of digestive system
L00-L99	Diseases of skin and subcutaneous tissue
M00-M99	Diseases of musculoskeletal system and connective tissue
N00-N99	Diseases of the genitourinary system
O00-09A	Pregnancy, childbirth and the puerperium
P00-P96	Certain conditions originating in the perinatal period
Q00-Q99	Congenital malformations, deformations and chromosomal abnormalities
S00-T88	Injury, poisoning and certain other consequences of external causes
U00-U85	Codes for special purposes

The figure below shows an overview of the first non-R, non-Z codes for emergency hospital admissions for the entire period (January 2020 – August 2021).

Figure 1a: Frequency of first non-R, non-Z ICD-10 (DIAG_1234) code grouped by ICD-10 chapter heading for all emergency hospital admissions between January 2020 and August 2021.

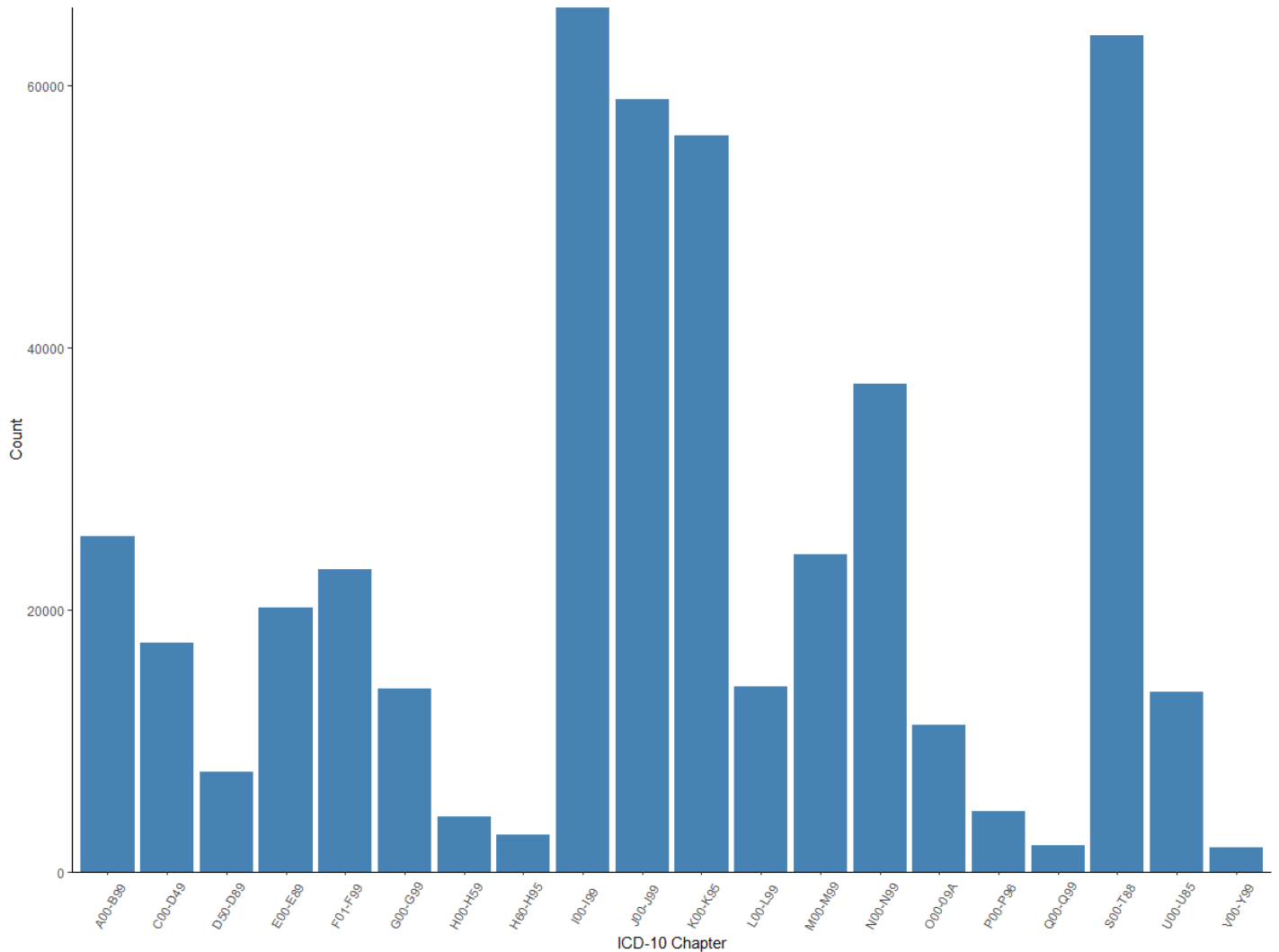
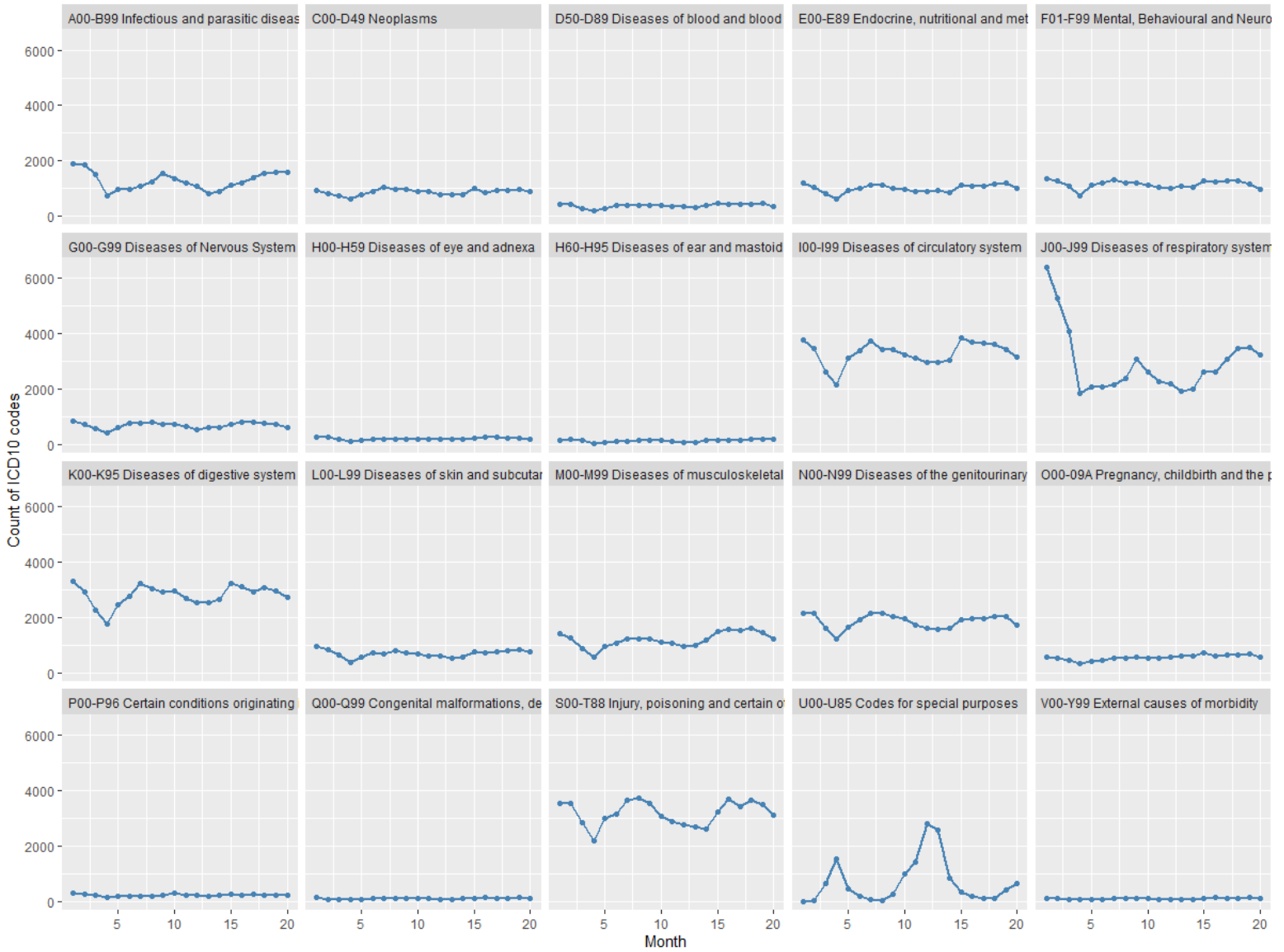


Table 1b. Percentages of first non-R, non-Z ICD-10 codes in each ICD-10 chapter heading for all emergency hospital admissions between January 2020 and August 2021 (highest to lowest).

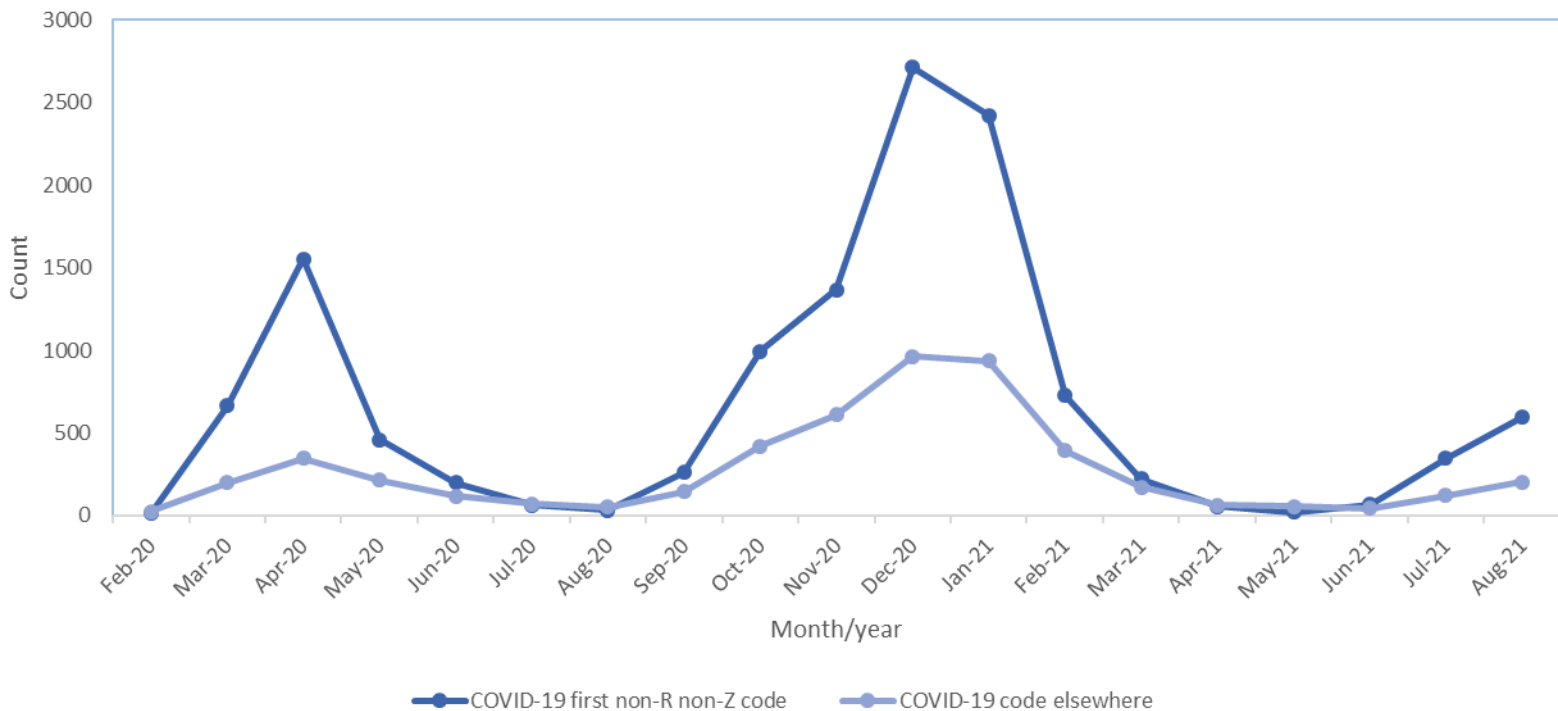
ICD-10 Chapter heading	%
S00-T88 Injury, poisoning and certain other consequences of external causes	14.1
I00-I99 Diseases of circulatory system	13.6
J00-J99 Diseases of respiratory system	12.6
K00-K95 Diseases of digestive system	12.0
N00-N99 Diseases of the genitourinary system	7.9
A00-B99 Infectious and parasitic diseases	5.5
M00-M99 Diseases of musculoskeletal system and connective tissue	5.2
F01-F99 Mental, Behavioural and Neurodevelopmental disorders	4.9
E00-E89 Endocrine, nutritional and metabolic diseases	4.3
C00-D49 Neoplasms	3.7
U00-U85 Codes for special purposes	3.0
L00-L99 Diseases of skin and subcutaneous tissue	3.0
G00-G99 Diseases of Nervous System	2.9
O00-09A Pregnancy, childbirth and the puerperium	2.4
D50-D89 Diseases of blood and blood forming organs and certain disorders involving the immune system	1.6
P00-P96 Certain conditions originating in the perinatal period	1.0
H00-H59 Diseases of eye and adnexa	0.9
H60-H95 Diseases of ear and mastoid process	0.6
V00-Y99 External causes of morbidity	0.4
Q00-Q99 Congenital malformations, deformations and chromosomal abnormalities	0.4

Figure 1b. First non-R, non-Z diagnoses by ICD-10 chapter heading, month and year (from January 2020 – August 2021)



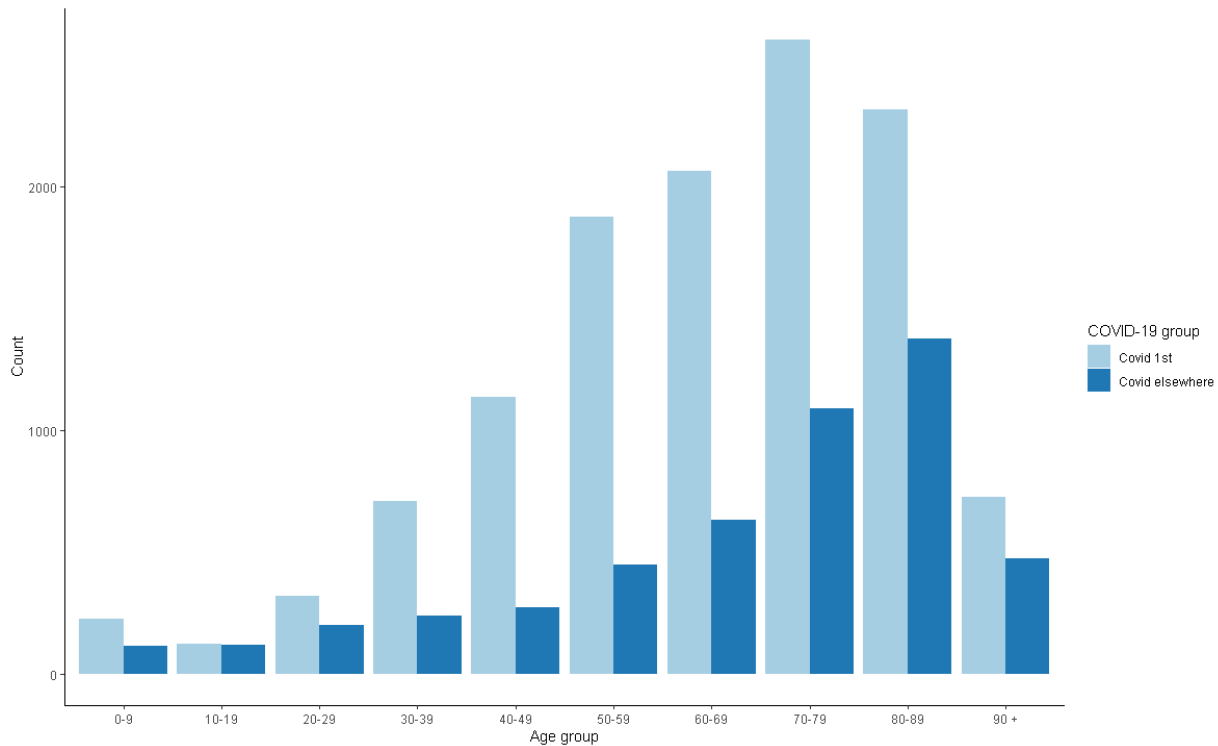
The figure below shows counts of emergency hospital admissions with a COVID-19 ICD-10 code (U071 or U072) as the first recorded non-R, non-Z code and counts of emergency admissions where the first non-Z, non-R code is not U071 or U071, but either of these codes appears elsewhere in the diagnosis sequence. The graph shows the counts by month/year from February 2020 to August 2021; January 2020 figures were suppressed due to low numbers.

Figure 1c: Counts of admissions with COVID-19 (U071 or U072) as the first non-R, non-Z code and admissions with a Covid-19 code appearing elsewhere in the diagnosis sequence by month/year.



See appendix table 4a for figures.

Figure 1d: Age group breakdown for emergency hospital admissions with COVID-19 (U071 or U072) as first non-R, non-Z code (COVID 1st) and COVID-19 code appearing elsewhere in the diagnosis sequence (COVID elsewhere).



For a full breakdown of numbers for Figure 1d see appendix table 1a.

Table 1c: Gender breakdown for emergency hospital admissions with COVID-19 (U071 or U072) as first non-R, non-Z code (COVID 1st) and COVID-19 code appearing elsewhere in the diagnosis sequence (COVID elsewhere)

Gender	COVID 1st	%	COVID elsewhere	%
Male	6510	54	2379	48
Female	5582	46	2577	52
Total	12092		4956	

Figure 1e below shows a breakdown of the first recorded non-R, non-Z code grouped by ICD-10 chapter headings for emergency admissions with a COVID-19 code (U071 or U072) appearing elsewhere in the diagnosis sequence for that particular admission. Note that ICD-10 chapter 'U000-U085' is included in this list due to other codes within that chapter associated with COVID-19, for example, the first recorded code could be a personal history of COVID-19.

Figure 1e: First recorded non-R non-Z code for admissions with a COVID-19 ICD-10 code (U071 or U072) appearing elsewhere in the diagnosis sequence by ICD-10 chapter heading

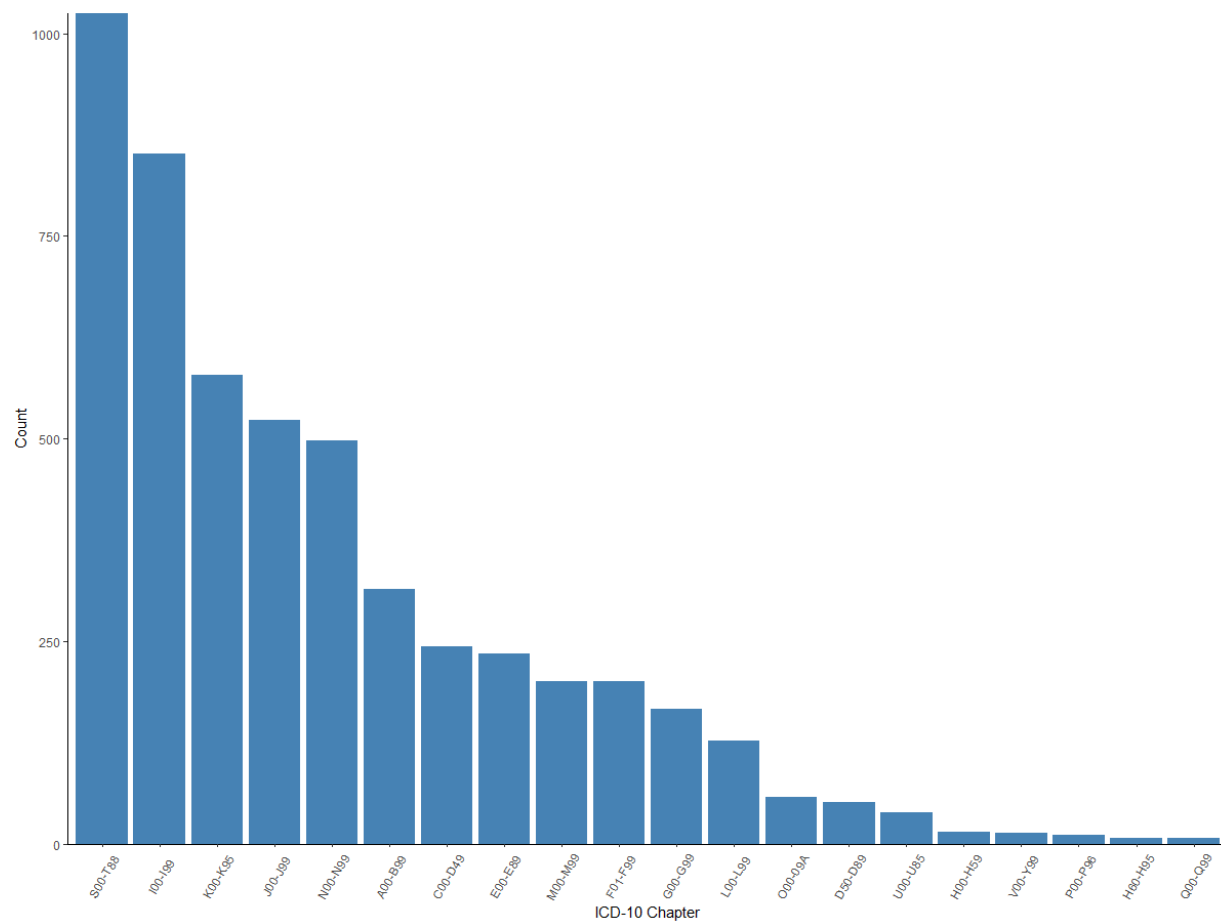


Table 1d. Percentages of first non-R, non-Z ICD-10 codes in each ICD-10 chapter heading for admissions with a COVID-19 ICD-10 code (U071 or U072) appearing elsewhere in the diagnosis sequence (see table 4c in appendix for all figures).

ICD-10 Chapter heading	%
S00-T88 Injury, poisoning and certain other consequences of external causes	19.8
I00-I99 Diseases of circulatory system	16.5
K00-K95 Diseases of digestive system	11.2
J00-J99 Diseases of respiratory system	10.1
N00-N99 Diseases of the genitourinary system	9.6
A00-B99 Infectious and parasitic diseases	6.1
C00-D49 Neoplasms	4.7
E00-E89 Endocrine, nutritional and metabolic diseases	4.6
M00-M99 Diseases of musculoskeletal system and connective tissue	3.9
F01-F99 Mental, Behavioural and Neurodevelopmental disorders	3.9
G00-G99 Diseases of Nervous System	3.2
L00-L99 Diseases of skin and subcutaneous tissue	2.5
O00-09A Pregnancy, childbirth and the puerperium	1.1
D50-D89 Diseases of blood and blood forming organs and certain disorders involving the immune system	1.0
U00-U85 Codes for special purposes	0.8
H00-H59 Diseases of eye and adnexa	0.3
V00-Y99 External causes of morbidity	0.3
P00-P96 Certain conditions originating in the perinatal period	0.2
Q00-Q99 Congenital malformations, deformations and chromosomal abnormalities	0.1
H60-H95 Diseases of ear and mastoid process	0.1

Positive COVID-19 test results in PATD (COVID-19 PCR test data)

The section below shows figures for emergency hospital admissions where there is also a positive COVID-19 test result recorded for that patient in PATD 14 days before or after the hospital admission date. Note that PATD coverage begins 03/02/2020.

Figure 2a. First recorded non-R, non-Z code grouped by ICD-10 chapter for emergency hospital admissions with a positive COVID-19 test result 14 days before or after the hospital admission.

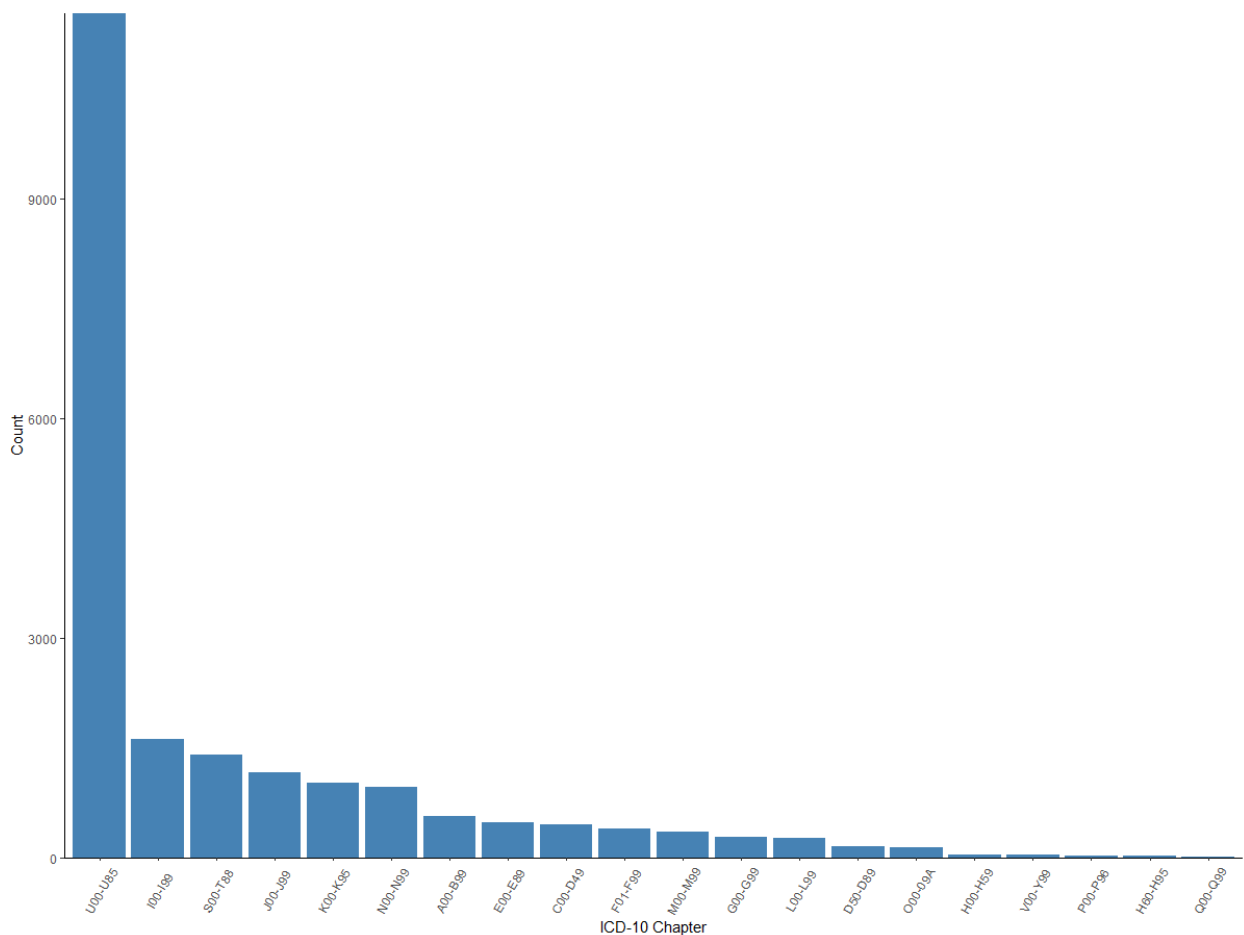
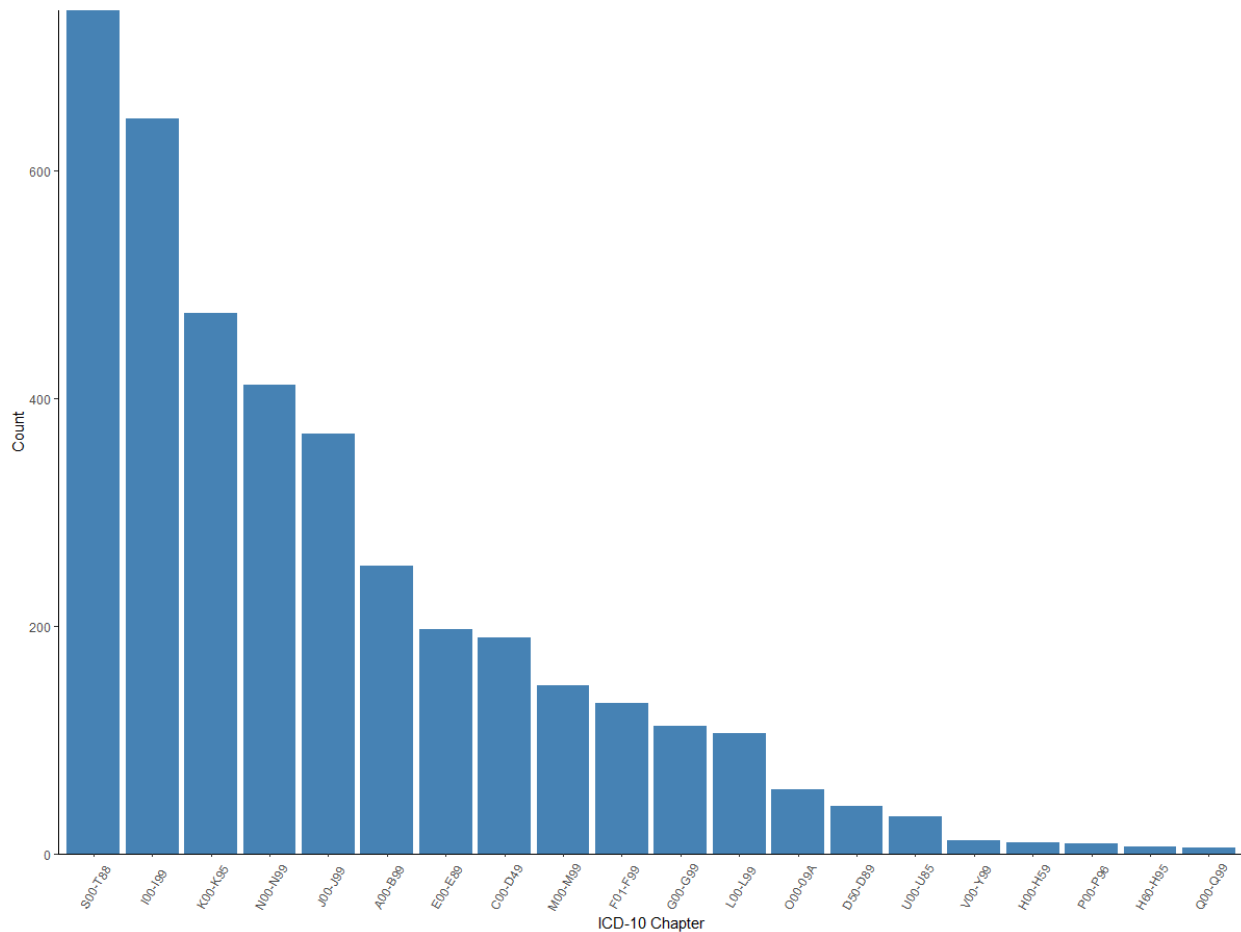


Table 2a: Percentages of first recorded non-R, non-Z code for admissions with a positive COVID-19 test result 14 days before or after the hospital admission date.

ICD-10 chapter heading	%
U00-U85 Codes for special purposes	55.3
I00-I99 Diseases of circulatory system	7.7
S00-T88 Injury, poisoning and certain other consequences of external causes	6.7
J00-J99 Diseases of respiratory system	5.5
K00-K95 Diseases of digestive system	4.9
N00-N99 Diseases of the genitourinary system	4.6
A00-B99 Infectious and parasitic diseases	2.7
E00-E89 Endocrine, nutritional and metabolic diseases	2.3
C00-D49 Neoplasms	2.2
F01-F99 Mental, Behavioural and Neurodevelopmental disorders	1.9
M00-M99 Diseases of musculoskeletal system and connective tissue	1.7
G00-G99 Diseases of Nervous System	1.3
L00-L99 Diseases of skin and subcutaneous tissue	1.3
D50-D89 Diseases of blood and blood forming organs and certain disorders involving the immune system	0.7
O00-09A Pregnancy, childbirth and the puerperium	0.7
H00-H59 Diseases of eye and adnexa	0.2
V00-Y99 External causes of morbidity	0.2
P00-P96 Certain conditions originating in the perinatal period	0.1
H60-H95 Diseases of ear and mastoid process	0.1
Q00-Q99 Congenital malformations, deformations and chromosomal abnormalities	0.1

Figure 2c: First recorded non-R non-Z code for admissions with a COVID-19 ICD-10 code (U071 or U072) appearing elsewhere in the diagnosis sequence by ICD-10 chapter heading for patients with a COVID-19 ICD-10 code (U071 or U072) who have a positive COVID-19 test result 14 days before or after the hospital admission date.



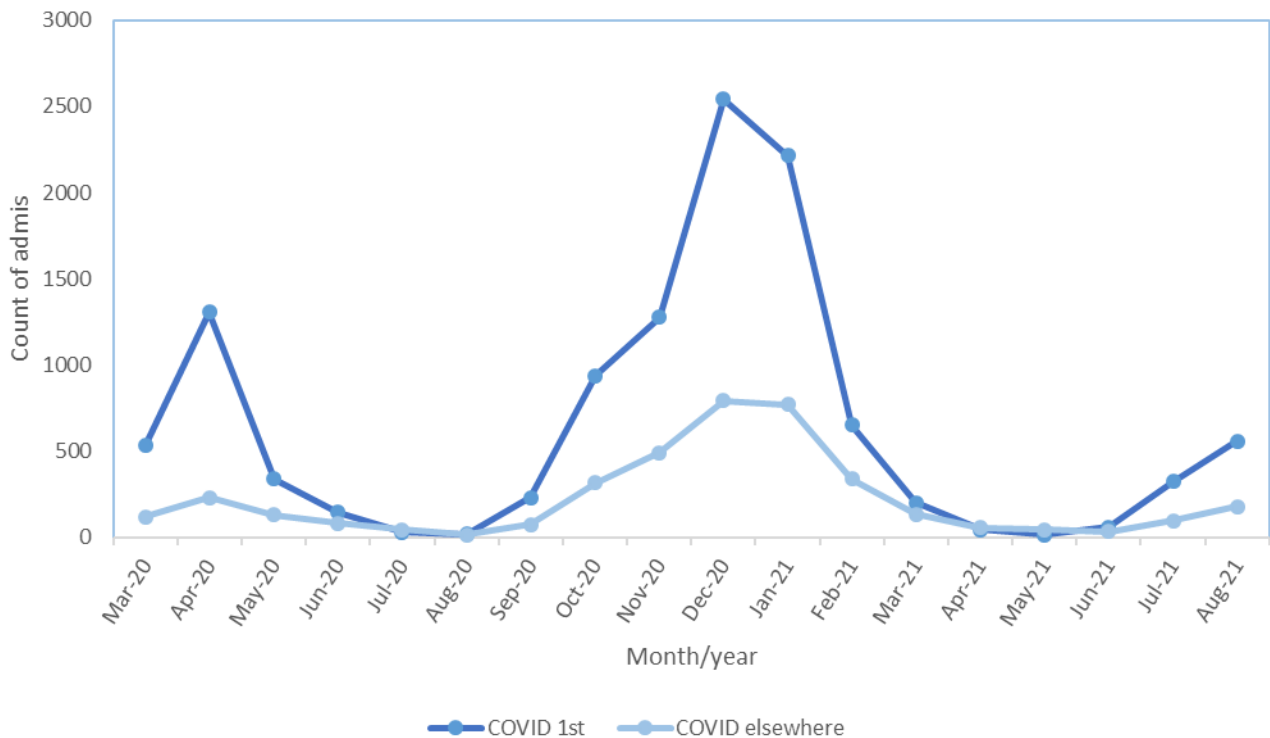
15.9% of admissions with a positive COVID-19 test result in PATD +/- 7 days around hospital admission date had a code other than U071 or U072 recorded as the first non-R, non-Z code but code U071 or U071 appeared elsewhere in the diagnosis sequence for the admission.

Table 2b: Percentages of first recorded non-R, non-Z code for admissions with a COVID-19 ICD-10 code (U071 or U072) appearing elsewhere in the diagnosis sequence and a positive COVID-19 test result 14 days before or after the hospital admission date.

ICD-10 chapter heading	%
S00-T88 Injury, poisoning and certain other consequences of external causes	18.7
I00-I99 Diseases of circulatory system	16.3
K00-K95 Diseases of digestive system	12.0
N00-N99 Diseases of the genitourinary system	10.4
J00-J99 Diseases of respiratory system	9.3
A00-B99 Infectious and parasitic diseases	6.4
E00-E89 Endocrine, nutritional and metabolic diseases	5.0
C00-D49 Neoplasms	4.8
M00-M99 Diseases of musculoskeletal system and connective tissue	3.7
F01-F99 Mental, Behavioural and Neurodevelopmental disorders	3.3
G00-G99 Diseases of Nervous System	2.8
L00-L99 Diseases of skin and subcutaneous tissue	2.7
O00-09A Pregnancy, childbirth and the puerperium	1.4
D50-D89 Diseases of blood and blood forming organs and certain disorders involving the immune system	1.1
U00-U85 Codes for special purposes	0.8
V00-Y99 External causes of morbidity	0.3
H00-H59 Diseases of eye and adnexa	0.3
P00-P96 Certain conditions originating in the perinatal period	0.2
H60-H95 Diseases of ear and mastoid process	0.2
Q00-Q99 Congenital malformations, deformations and chromosomal abnormalities	0.1

Please see appendix table 4d for a full breakdown of numbers.

Figure 2d. Monthly breakdown of admissions with COVID-19 as first non-R, non-Z code (COVID 1st) and admissions with a COVID-19 code elsewhere (COVID elsewhere) with a positive COVID-19 test result 14 days before or after the hospital admission date. February is excluded due to low numbers.

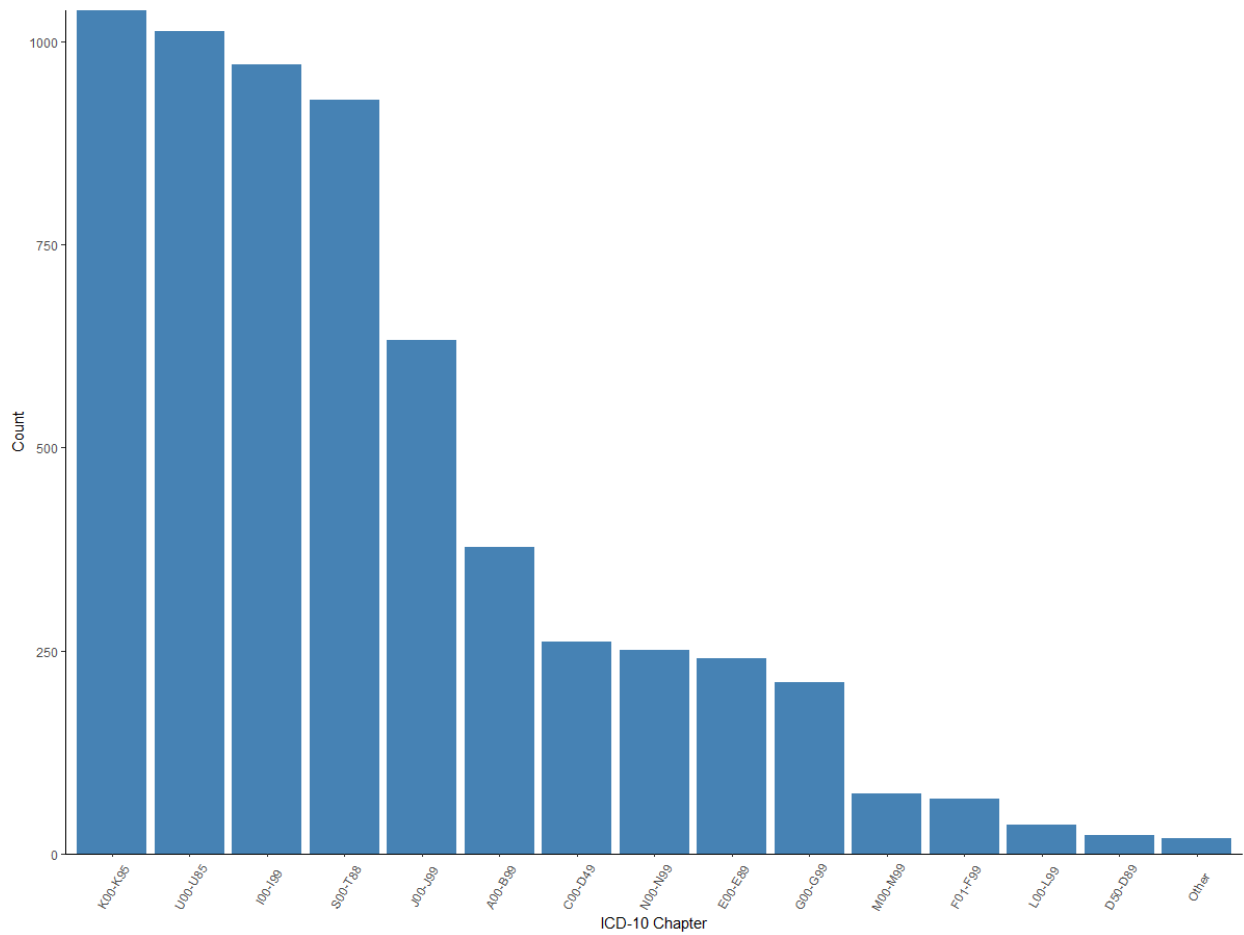


See appendix table 4e for a breakdown of the numbers.

Critical Care admissions

The section below shows figures for emergency hospital admissions where the patient has a critical care admission 7 days before or after hospital admission date. At the time of preparing this report, complete data on critical care admissions were available in ICNARC until March 2021, this was used as the cut-off date as using only CCDS admissions would potentially lead to an incomplete representation of all critical care cases for the cohort. The INTEGRATE method, which combines critical care admissions from ICNARC and CCDS, was used to link to critical care admissions for the cohort.

Figure 3a. First recorded non-R non-Z code for admissions by ICD-10 chapter heading for patients with a critical care admission +/-7 days around hospital admission date



Other category created due to low numbers. Includes the following chapters:

Q00-Q99

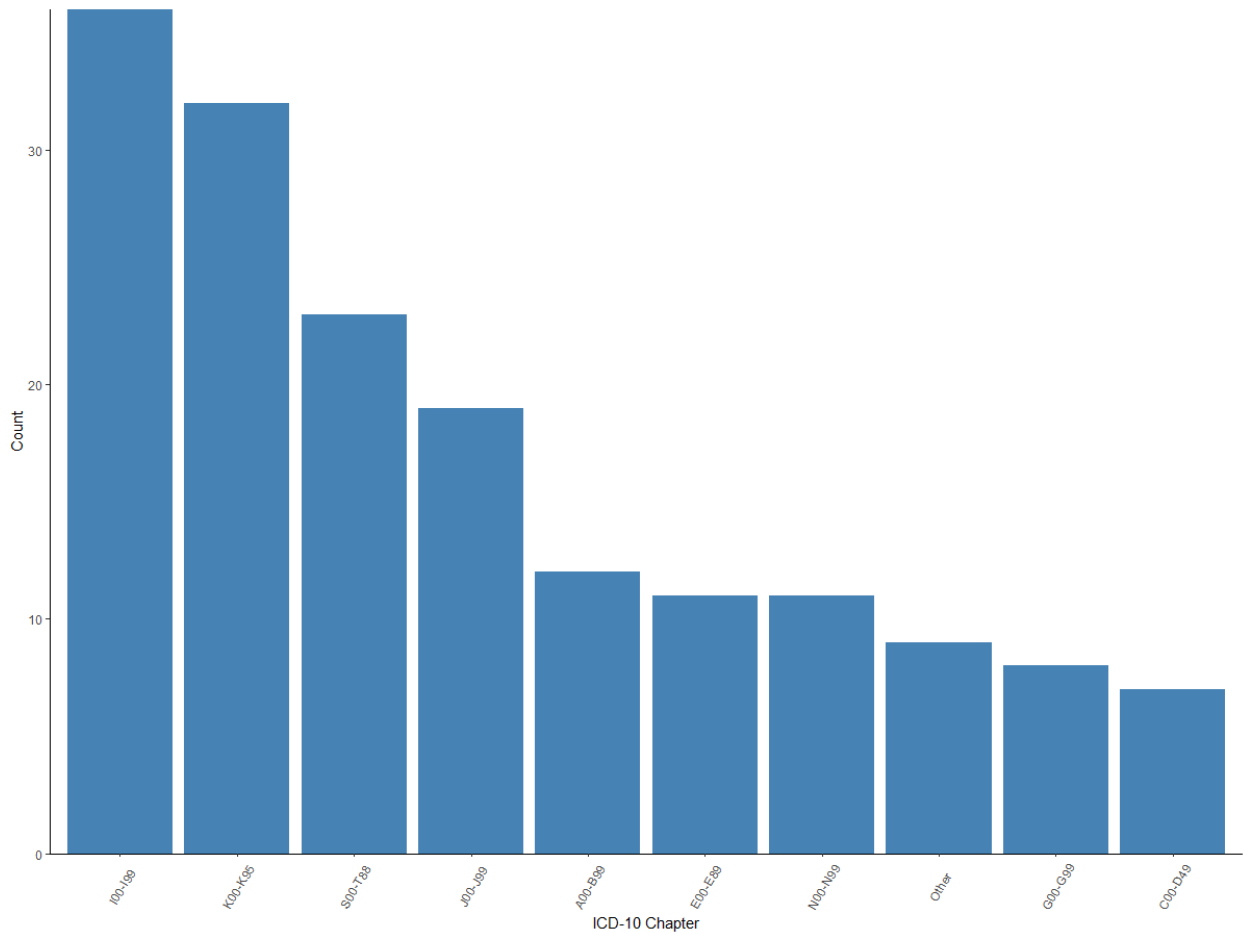
O00-09A

V00-Y99

H00-H59

H60-H95

Figure 3b. First recorded non-R non-Z code for admissions with a COVID-19 ICD-10 code (U071 or U072) appearing elsewhere in the diagnosis sequence and a critical care admission +/-7 days around hospital admission date by ICD-10 chapter heading.



Numbers were too low to report a monthly breakdown for critical care admissions by COVID 1st and COVID elsewhere.

Other category created due to low numbers. Includes the following chapters:

M00-M99
 U00-U85
 D50-D89
 L00-L99
 O00-09A

Please see table appendix table 4f and 4g for a breakdown of the numbers.

Appendix

Table 4a. Admissions with COVID-19 (U071 or U072) as the first non-R, non-Z code and admissions with a Covid-19 code appearing elsewhere in the diagnosis sequence by month/year.

Month/year	COVID 1st	COVID elsewhere
Mar-20	533	118
Apr-20	1305	230
May-20	341	130
Jun-20	144	83
Jul-20	32	46
Aug-20	19	16
Sep-20	232	76
Oct-20	940	317
Nov-20	1275	490
Dec-20	2543	792
Jan-21	2214	770
Feb-21	652	338
Mar-21	201	134
Apr-21	45	57
May-21	16	47
Jun-21	62	33
Jul-21	323	99
Aug-21	557	178

Table 4b: Age group breakdown for emergency hospital admissions with COVID-19 (U071 or U072) as first non-R, non-Z code (COVID 1st) and COVID-19 code appearing elsewhere in the diagnosis sequence (COVID elsewhere).

Age group	COVID 1st	%	COVID elsewhere	%
0-9	223	1.8	114	2.3
10-19	123	1.0	119	2.4
20-29	320	2.6	200	4.0
30-39	708	5.9	237	4.8
40-49	1134	9.4	270	5.4
50-59	1875	15.5	446	9.0
60-69	2065	17.1	633	12.8
70-79	2601	21.5	1088	22.0
80-89	2317	19.2	1375	27.7
90 +	727	6.0	474	9.6

Table 4c. First recorded non-R non-Z code for admissions with a COVID-19 ICD-10 code (U071 or U072) appearing elsewhere in the diagnosis sequence by ICD-10 chapter heading

ICD-10 Chapter heading	Count of first non-R non-Z code	%
S00-T88 Injury, poisoning and certain other consequences of external causes	1025	19.8
I00-I99 Diseases of circulatory system	852	16.5
K00-K95 Diseases of digestive system	579	11.2
J00-J99 Diseases of respiratory system	523	10.1
N00-N99 Diseases of the genitourinary system	497	9.6
A00-B99 Infectious and parasitic diseases	314	6.1
C00-D49 Neoplasms	243	4.7
E00-E89 Endocrine, nutritional and metabolic diseases	235	4.6
M00-M99 Diseases of musculoskeletal system and connective tissue	201	3.9
F01-F99 Mental, Behavioural and Neurodevelopmental disorders	200	3.9
G00-G99 Diseases of Nervous System	166	3.2
L00-L99 Diseases of skin and subcutaneous tissue	127	2.5
O00-09A Pregnancy, childbirth and the puerperium	58	1.1
D50-D89 Diseases of blood and blood forming organs and certain disorders involving the immune system	52	1.0
U00-U85 Codes for special purposes	39	0.8
H00-H59 Diseases of eye and adnexa	15	0.3
V00-Y99 External causes of morbidity	13	0.3

P00-P96 Certain conditions originating in the perinatal period	11	0.2
Q00-Q99 Congenital malformations, deformations and chromosomal abnormalities	7	0.1
H60-H95 Diseases of ear and mastoid process	7	0.1
Total	5164	

Table 4d. First recorded non-R, non-Z code for admissions with a positive COVID-19 test result 14 days before or after the hospital admission date and first recorded non-R, non-Z code for admissions with a COVID-19 code elsewhere and a positive COVID-19 test result 14 days before or after the hospital admission date.

ICD-10 chapter heading	COVID 1st	%	COVID elsewhere	%
A00-B99 Infectious and parasitic diseases	558	2.7	253	6.4
C00-D49 Neoplasms	453	2.2	190	4.8
D50-D89 Diseases of blood and blood forming organs and certain disorders involving the immune system	147	0.7	42	1.1
E00-E89 Endocrine, nutritional and metabolic diseases	484	2.3	197	5.0
F01-F99 Mental, Behavioural and Neurodevelopmental disorders	387	1.9	132	3.3
G00-G99 Diseases of Nervous System	274	1.3	112	2.8
H00-H59 Diseases of eye and adnexa	39	0.2	10	0.3
H60-H95 Diseases of ear and mastoid process	20	0.1	6	0.2
I00-I99 Diseases of circulatory system	1616	7.7	646	16.3
J00-J99 Diseases of respiratory system	1157	5.5	369	9.3
K00-K95 Diseases of digestive system	1023	4.9	475	12.0
L00-L99 Diseases of skin and subcutaneous tissue	264	1.3	106	2.7
M00-M99 Diseases of musculoskeletal system and connective tissue	355	1.7	148	3.7

N00-N99 Diseases of the genitourinary system	960	4.6	412	10.4
O00-09A Pregnancy, childbirth and the puerperium	136	0.7	56	1.4
P00-P96 Certain conditions originating in the perinatal period	23	0.1	9	0.2
Q00-Q99 Congenital malformations, deformations and chromosomal abnormalities	11	0.1	5	0.1
S00-T88 Injury, poisoning and certain other consequences of external causes	1399	6.7	741	18.7
U00-U85 Codes for special purposes	11534	55.3	33	0.8
V00-Y99 External causes of morbidity	33	0.2	12	0.3
Total	20873		3954	

Table 4e. Monthly breakdown of admissions with COVID-19 as first non-R, non-Z code (COVID 1st) and admissions with a COVID-19 code elsewhere (COVID elsewhere) with a positive COVID-19 test result 14 days before or after the hospital admission date. February is excluded due to low numbers.

Month/year	COVID 1st	COVID elsewhere
Mar-20	533	118
Apr-20	1305	230
May-20	341	130
Jun-20	144	83
Jul-20	32	46
Aug-20	19	16
Sep-20	232	76

Oct-20	940	317
Nov-20	1275	490
Dec-20	2543	792
Jan-21	2214	770
Feb-21	652	338
Mar-21	201	134
Apr-21	45	57
May-21	16	47
Jun-21	62	33
Jul-21	323	99
Aug-21	557	178

Table 4f. First recorded non-R non-Z code for admissions by ICD-10 chapter heading for hospital admissions with a critical care admission +/-7 days around hospital admission date

ICD-10 chapter heading	Count	%
K00-K95 Diseases of digestive system	1039	16.9
U00-U85 Codes for special purposes	1013	16.5
I00-I99 Diseases of circulatory system	972	15.8
S00-T88 Injury, poisoning and certain other consequences of external causes	928	15.1
J00-J99 Diseases of respiratory system	633	10.3
A00-B99 Infectious and parasitic diseases	377	6.1
C00-D49 Neoplasms	261	4.2
N00-N99 Diseases of the genitourinary system	251	4.1
E00-E89 Endocrine, nutritional and metabolic diseases	241	3.9
G00-G99 Diseases of Nervous System	211	3.4
M00-M99 Diseases of musculoskeletal system and connective tissue	74	1.2
F01-F99 Mental, Behavioural and Neurodevelopmental disorders	67	1.1
L00-L99 Diseases of skin and subcutaneous tissue	36	0.6
D50-D89 Diseases of blood and blood forming organs and certain disorders involving the immune system	23	0.4
Other	19	0.3
Total	6145	

Table 4g. First recorded non-R non-Z code for admissions with a COVID-19 ICD-10 code (U071 or U072) appearing elsewhere in the diagnosis sequence and a critical care admission +/-7 days around hospital admission date by ICD-10 chapter heading.

ICD-10 chapter heading	Count	
I00-I99 Diseases of circulatory system	36	21.4
K00-K95 Diseases of digestive system	32	19.0
S00-T88 Injury, poisoning and certain other consequences of external causes	23	13.7
J00-J99 Diseases of respiratory system	19	11.3
A00-B99 Infectious and parasitic diseases	12	7.1
E00-E89 Endocrine, nutritional and metabolic diseases	11	6.5
N00-N99 Diseases of the genitourinary system	11	6.5
G00-G99 Diseases of Nervous System	8	4.8
C00-D49 Neoplasms	7	4.2
Other	9	5.4
Total	168	