

The **Networked Data Lab**: Analysis plan for Topic 2 on children and young people's mental health

Satellite analysis for NDL Wales

Alisha Davies, Jiao Song, David Florentin, Bethan Carter, Laura Bentley,
Ashley Akbari, Ann John, Gareth John, Lisa Trigg, Joanna Dundon.

21st July 2021

Version 1.0

Contents

1. Research rationale, aims, objectives.....	33
2. Data and data linkages.....	55
3. Statistical methods.....	55
4. Governance	1111
5. Dissemination and engagement	1211
6. Appendix A.....	1313

1. Research rationale, aims, objectives

Rationale: The motivation for the research, including the local context, existing analytical work and public involvement in developing research

Addressing the mental health and wellbeing of children and young people is a priority in Welsh Government's Together for Mental Health – the plan for 2019 to 2022ⁱ. This delivery plan includes actions towards improving access to support and services for children and young people (CYP) aged 11-24 years, crisis and out of hours support for people of all ages, and for those most vulnerable including individuals with a history of substance misuse. Following engagement with a wide range of partners including colleagues in mental health policy and practice and patient and public involvement and engagement (PPIE) groups, a key question for NDL Wales was to try to understand patterns of mental health crisis presentation and differences between groups.

A mental health crisis has been defined by the Royal College of Psychiatrists as a situation that is believed, either by the individual experiencing the crisis or anyone else, to require immediate support, assistance and care from a statutory or voluntary mental health crisis care service. This includes situations where there is significant risk (or intent) of harm to the individual or othersⁱⁱ. Understanding crisis presentation due to mental health in routine health and care data sources is challenging because a range of mental health problems can cause crises, and there are several services where patients might presentⁱⁱⁱ. Furthermore, data validity is variable, with broad categorisation of mental health problems and only primary diagnosis in emergency department and ambulance service data that could omit underlying mental health issues. A number of studies in the UK and Wales have provided information on trends for specific mental health conditions or behaviours related to crises. For example, rates of suicide and injury or poisoning of undetermined intent have increased in recent years, particularly among females aged 10-24 years, and were the leading cause of death for young adults aged 20-34 years in the UK between 2001 and 2018^{iv}. The National Child Mortality Database examined child suicide rates in England before and after lockdown and found a concerning, although not statistically significant increase^v. Trends in the incidence of self-harm across primary and hospital care in Wales also increased from 2003 to 2015, particularly amongst CYP aged 10-24 years^{vi}. Overall, in England, the number of children under 18 years attending emergency departments with a psychiatric condition tripled between 2010 and 2018 suggesting a steep rise in children presenting to emergency care in crisis^{vii}. However, there is much less understanding of patterns and outcomes amongst those who present to ambulance care, often the first response in crisis.

In Wales, electronic ambulance call centre records and dispatch information is available within the Secure Anonymised Information Linkage (SAIL) Databank, presenting a unique opportunity to utilise individual-level linkable anonymised data sources across the emergency care pathway from 999 call to Emergency Department (ED) and emergency admission. This data has been used in an earlier study (2007/8) to explore trends in non-accidental non-fatal drug poisonings, with some challenges in terms of data quality^{viii}. Since then, there has been a policy and practice focus on improving mental health crisis care, in particular through the Crisis Care Concordat^{ix}. No studies have used this data to explore mental health crisis presentation and outcomes in young people, nor the overlap with other health services - essential to support whole system response to mental ill health.

Many studies focus on one specific clinical presentation of mental health crisis, or presentation in one service area (e.g. primary care or secondary care only). This means that trends in presentation and differences between groups largely reflect the population that present at that type of health service, or with a specific condition, and a change in trend in one service area may reflect an increase in another. As a result, it is not possible to fully understand the true incidence of mental health crises in CYP, and differences between population groups. Combining datasets from

multiple services may provide a more complete understanding of the incidence of mental health crises. For example, a study of WAST dispatch and on-scene codes found that mental health related callouts were underestimated by nearly half^x. Conversely, the cases in WAST data may be missing from other services' datasets. Through the trusted research environment (TRE) available in Wales, the SAIL Databank, the exploration of differences in presentation over time is possible through longitudinal individual-level anonymised data linkage at a population-scale, enabling evaluation of changes over time and between groups of interest. Such information is needed to help inform a population health approach to mental health crisis and provide further insights on the extent of the challenge across an integrated health system.

Impact of COVID-19

The COVID-19 pandemic disrupted life for all, from routes to health and social care, through to changes in education, work and resulted in a loss of social connections to friends, family, formal and informal support networks. Amongst the general population, national self-reported surveys have highlighted that the mental health of the general population has been negatively impacted during the COVID-19 pandemic^{xixii}. Presentations to mental health services have reduced during the pandemic and deferred access to care may lead to increased urgent and emergency presentations^{xiii}. In Wales, the impact of COVID-19 on CYP's mental health has been identified as a priority by the Children's Commissioner in her Coronavirus and Me report^{xiv} and Public Health Wales^{xv}.

As Welsh Government and partners look towards responding to the impact of COVID-19, the *Review of the Together for Mental Health Delivery Plan 2019 to 2022 in Response to COVID-19*^{xvi} included ensuring that all people in Wales have access to appropriate mental health support. A better understanding of the impact of recent challenges on the presentation for mental ill health amongst children and young people, especially the pandemic's impact on crisis presentations, and differences across societal groups is needed to help inform future action.

Our research aims and objectives have been developed with input from clinicians, Welsh Government, leading CYP mental health researchers and patient and public groups.

Aims:

The aim of this study is to describe annual trends in mental health crisis presentation amongst children and young people (11-24 years) across the health and care system in Wales between 2016 and 2020, and to examine differences across population groups.

Objectives

Utilising anonymised population-scale individual-level linked data, the objectives of this study are to:

1. Describe annual trends in mental health crisis incidence and patient pathway amongst children and young people interacted with Welsh Ambulance Service Trust (WAST) service
 - a. Examine differences in trends **incidence** by demographics;
 - b. Examine differences in **care pathway outcomes** following incident calls to WAST by demographics;
2. Describe annual trends in mental health crisis incidence amongst children and young people **across the health care system** in Wales:
 - a. Describe trends in mental health crisis incidence overall;
 - b. Describe trends in mental health crisis incidence **by service** (i.e. first documentation of mental health event in a care journey across WAST, ED and Hospital admission);
 - c. Examine differences in trends in mental health **incidence** by demographics;

- d. Examine differences in trends in mental health **incidence** by history of substance misuse;
3. Examine the risk factors for mental health crisis presentation.

2. Data and data linkages

This study will utilise the routinely collected population-scale electronic health record (EHR) and administrative health care data sources available within the Secured Anonymised Information Linkage (SAIL) Databank^{xvii}. The SAIL Databank (www.saildatabank.com) is a privacy protecting trusted research environment of anonymised individual-level linkable data sources, including the following data sources which will be used in this analysis:

- WAST – Welsh Ambulance Service Trust data for all call outs and responses (Advanced Medical Priority Dispatch System (AMPDS)) to all ambulance calls in Wales;
- EDDS – Emergency Departments dataset, containing data for all emergency departments in Wales (34 sites, including minor injuries units);
- PEDW – Patient Episode Database Wales, containing data for all NHS Wales hospital admissions (emergency and elective) and outpatient attendances;
- SMDS – Substance misuse Dataset, containing data for all NHS Wales substance misuse service attendances (over 50 treatment providers in Wales)^{xviii}
- WDS – Welsh Demographic Service Dataset containing linkable data on demographics of the Welsh population from the Census;
- ADDE – Annual District Death Extract (from Office for National Statistics (ONS) mortality register, containing data on all deaths in Wales within the study period
- OPDW – Out Patient Database for Wales, containing follow-up (outcome) information
- OPRD – Out Patient Referral Database, containing follow-up (outcome) information
- WLGP – Wales Longitudinal General Practice

All data sources described above are routinely collected by the NHS and local authority services for the whole population in Wales (≈ 3.1 million), except the WLGP dataset in the SAIL Databank which covers a representative sample of approximately 80% of the GP practices in Wales. All data are available and cover the study period 2016-2020.

3. Statistical methods

3.1 Study design

This is an observational retrospective population cohort study to ascertain the incidence of mental health crisis events across the health care system in Wales.

3.2 Study period

The study period is from 1st January 2016 and 31st December 2020.

3.3 Study population

In this study children and young people are defined as those aged 11 to 24 years, in line with Together for Mental Health.

3.4 Mental health crisis events

We propose to take the Royal College of Psychiatrists' broad definition of mental health crisis events², as described above, including the following conditions; self-harm, suicide attempt, overdose, psychosis, and other serious mental illness spanning ambulance and secondary care.

Given the way routine health care data is recorded a mental health crisis event will be defined differently in each of the different health care services; WAST, EDDS and PEDW. These are described below;

A mental health crisis event in WAST is defined as;

- a mental health related code in the Patient Clinical Record (PCR) which contains further information on mental health related events (Appendix B). When PCR information is absent, an event attended by ambulance crews with corresponding incident call recorded by Advanced Medical Priority Dispatch System (AMPDS) as mental health or self-harm (from 'overdose/poisoning' or 'Psychiatric behavior' categories, see Appendix A).

A mental health crisis event in emergency department is defined as;

- an EDDS attendance recorded as self-harm (value 13 in attendance group) / accidents (method of injury=self)/ or *psychiatric / Psychological conditions* diagnosis code (21Z)¹

A mental health crisis event as an emergency admission is defined as;

- all emergency admissions in PEDW with a psychiatric consultancy code during the person spell, or a mental health ICD-10 diagnosis code referring to a mental or behavioural disorder (Chapter F), or undetermined intent (Y10-Y34), self-harm code (X60-X84)^{6,2} in the ICD-10 Version:2016 (who.int) within the first three codes of the first episode of the person spell (Appendix C).

Out of hours events

Time of event, defined as time of the incident call, will be determined for each crisis event in WAST data to explore difference in patterns of mental health crisis during in and out-of-hours (out of hours from 6pm to 8am).

3.5 Demographics

Demographics are defined and ascertained as follows:

- age group at event date (11-15, 16-19, 20-24, unknown);
- sex (M, F, Unknown);
- deprivation quintile (linked on patient Lower-layer Super Output Area (LSOA) version 2011, using Welsh Index of Multiple Deprivation (WIMD) version 2019)
- rural/urban indicator (linked on patient LSOA 2011);
- Welsh Health Board (linked on patient LSOA 2011).

3.6 History of substance misuse

History of substance misuse is defined as all children and young people who have been referred to substance misuse services as recoded in the SMDS in the five years prior to the mental health crisis event.

(NOTE: this will be limited to those registered with GP practice in Wales and resident in Wales for 5 years for whom past health care activity is available)

3.7 Statistical approaches (for objectives 1 & 2)

Person time follow up

The cohort is all CYP aged 11 to 24 years registered with a GP in Wales from 1st January 2016 to 31st December 2020.

¹ http://www.wales.nhs.uk/sitesplus/documents/299/20090401_DSCN_022009%28W%29.pdf

² Rates of self-harm presenting to general hospitals: a comparison of data from the Multicentre Study of Self-Harm in England and Hospital Episode Statistics | BMJ Open

Each individual contributes person time from general practice registration, 11th birthday or 1st January 2016, whichever is the latest. Person time follow up ends on date of deregistration, death, 25th birthday or 31st December 2020, whichever is the earliest.

Annual incidence rates

Annual incidence rates and 95% confidence intervals will be calculated as the number of events per 1,000 person years at risk (PYAR).

Examination of differences between groups

We will use chi-square and Cochran-Armitage tests to investigate whether the differences in trends by population subgroups, and trends of presentation are statistically significant at a significance level of 0.05.

3.8 Methodological approaches

The approach for each of the study objectives are outlined below;

Objective 1. Describe annual trends in mental health crisis incidence and patient pathway amongst children and young people interacted with WAST service

- a. **Examine differences in trends incidence by demographics;**
- b. **Examine differences in care pathway outcomes following incident calls to WAST by demographics.**

This objective focuses on WAST data to provide valuable insights to the service on the number of calls and incidents that crew responded to where mental health crisis is a concern, trends over time, and the differences by population groups.

- All mental health crisis response events (defined above) will be identified for the study population and study period.
- The total number of mental health crisis (i) events and (ii) discrete events (defined as those within a 24 hour period (Duncan 2019)) will be determined and plotted as an annual trend (i) discrete events (ii) number of patients and (ii) as a % of all responses (Table 1a). *This provides the WAST team an overview of the actual number of calls outs to the population of interest.*

Examine differences in trends incidence by demographics

- Annual incidence per 1,000 11-24 years registered GP population will be calculated and plotted (i) overall and stratified by (ii) demographic group (age, sex, deprivation quintile, rurality, health board) (iii) history of substance misuse.

Examine differences in care pathway outcomes following presentation to WAST by demographics

To examine differences in outcomes following presentation to WAST, the care “end points” for all mental health crisis responses by WAST will be determined.

Specific **outcomes of interest** are defined as;

- Care refusal;
- No need to be transferred;
- Transfer to ED within 24 hrs and self-discharge against clinical advice;
- Transfer to ED within 24 hrs and discharged;
- Transfer to ED and admitted within 7 days - to determine whether WAST attendance resulted in admission. A 7-day window allows for an individual to remain in ED prior to admission and for delays in data recording.^{xix}

[NOTE: Outcomes of interest will be further refined following input from PPIE/practitioners]

Four further outcomes will be determined:

- OPD referral to CAMHS/specialty [identified using speciality codes] within 30 days;²⁰
- GP attendance related to mental health [identified using READ codes] within 30 days;
- Repeat presentation for mental health crisis to WAST within (i) 7 days (ii) 30 days.
- Repeat presentation for any reason to WAST within (i) 7 days (ii) 30 days.

Table 1a: Mock table: Annual events, patients and incidence rate of mental health crisis in WAST

	% of ALL WAST responses to C&YP for a mental health crisis	Discrete mental health crisis events (n)	Individuals presenting with mental health crisis (N)	Incidence rate mental health crisis per 1000 11-24 yrs
2016...				
....				
2020				

Objective 2. Describe annual trends in mental health crisis incidence amongst children and young people across the health care system in Wales:

- a. **Describe trends in mental health crisis incidence overall;**
- b. **Describe trends in mental health crisis incidence by service (i.e. first documentation of mental health event in a care journey across WAST, ED and Hospital admission);**
- c. **Examine differences in trends in mental health incidence by demographics;**
- d. **Examine differences in trends in mental health incidence by history of substance misuse;**

This objective focuses on mental health crisis across the population and health care system, to provide valuable insights on the overall incidence, trends over time, and the differences by population groups.

All presentations to WAST, EDDS attendances and PEDW Emergency admissions for mental health crisis (as defined above) for 11-24 years from 1st January 2016 to 31st December 2020 will be identified.

Data sources will be linked at the individual-level and the first presentation for each event identified. Defining discrete events needs to take into consideration lag times for data entry documenting a patient journey from one service to another (e.g. from WAST to ED to admission). Therefore multiple presentations in health services by one patient within a short period of time may all be related to a single event. To explore this issue we will carry out a sensitivity analysis to define discrete events as all events occurring within 24 hours or 7 days of each other. The start date will be the earliest date of the first health care presentation in WAST, EDDS or PEDW for that event.

Trends in mental health crisis incidence overall

- Annual incidence per 1,000 11-24 years registered GP population will be calculated and plotted from 2016 to 2020.

Trends in mental health crisis incidence by service type

Health service presentation will be the first service type (WAST, EDDS, PEDW) the episode was identified as a mental health crisis event.

- Annual incidence per 1,000 11-24 years registered GP population will be calculated and plotted by first health service presentation (WAST, EDDS, PEDW).

Trends in mental health crisis incidence by demographics

Demographics will be determined from the first mental health crisis presentation.

- Annual incidence per 1,000 11-24 years registered GP population will be calculated and plotted by first health service by age, sex, deprivation quintile, rurality, health board.

Trends in mental health crisis incidence by history of substance misuse

- Annual incidence per 1,000 11-24 years registered GP population will be calculated and plotted by first health service by history* of substance misuse. (* history in previous 5 years)

Objective 3. Examine the risk factors for mental health crisis presentation.

This objective focuses on ascertaining risk factors for presentation for mental health crisis and how that might have changed in 2020.

To ascertain the risk factors for mental health crisis each event (identified from Objective 2) person time follow up will be used to inform a Poisson regression. Given the likely impact of COVID-19 incident rate ratio (IRR) will be presented in two time periods 2016-2019 and 2020 (Table 3a). Individuals can contribute multiple events in a single year.

Poisson regression will be used to calculate the incidence rate ratio (IRR) to investigate the adjusted association between the risk of mental health crisis and demographics, adjusting for other variables in the model:

- age group at event date (11-15*, 16-19, 20-24 years);
- sex (M*, F);
- deprivation quintile (linked on patient LSOA version 2011, using WIMD version 2019. Most deprived = 1, least deprived = 5*);
- rural/urban indicator (rural*, urban) (linked on patient LSOA 2011);
- Welsh Health Board (linked on patient LSOA 2011);
- calendar year of event (single years 2016* to 2020);
(*reference category)
- history of substance misuse

Table 3a: Mock table: Events and adjusted incidence rate of mental health crisis

	2016-2019		2020	
	Discrete events (n)	IRR	Discrete events (n)	IRR
Sex				
Age group				
11-15 (reference group)				
1-19				
20-24				
Deprivation quintile				
Urban rural				
Health Board				
History of substance misuse				
Year (single years)				

3.9 Methods for addressing missing data

In principle, we would like to keep all individuals in the cohorts with full or missing demographic and clinical records unless impossible under disclosure control measures. We do not plan to conduct multiple imputation.

3.10 Known limitations

Data sources

- All data was routinely collected for administrative purposes and as such the information recorded is for clinical management rather than to address a specific research question.
- We expect a large amount of missing data in WAST due to the nature of data collection, i.e. we expect 50% condition codes missing in PCR

Study design and statistical models

- Objective 1 focuses on mental health crisis presentation to WAST. This will help to understand the demand on the service and outcomes for those children and young people who are initially responded to by the ambulance service. We expected a large amount of missing data in WAST due to the nature of data collection, and lack of specificity of identifying a mental health crisis event. Therefore, this is likely to underestimate the number of crisis events for children and young people. To address this objective 2 explore mental health crisis presentation across the health and care system.
- In objective 1 the Advanced Medical Priority Dispatch System (AMDPS) is not a diagnostic tool for any clinical presentation including mental health, it is used to identify and prioritise life-threatening conditions. Therefore, it is likely to underestimate mental health crisis events for children and young people.
- Data linkage between WAST and EDDS is on probabilistic basis as it is not mutually exclusive.
- Annual trends mental health crisis overall will not capture if the individual first presented in a health care service where mental health crisis was not recorded, (e.g. GP followed by WAST, but only recorded as mental health event in WAST).
- We will not capture past events for those who present in Jan 2016. This may mean that some mental health crisis events which began in Dec 2015 are included in the 2016 estimates.

4. Governance

Availability of data and materials

The data used in this study are available in the SAIL Databank at Swansea University, Swansea, UK, but as restrictions apply they are not publicly available. All proposals to use SAIL data are subject to review by an independent Information Governance Review Panel (IGRP). Before any data can be accessed, approval must be given by the IGRP. The IGRP gives careful consideration to each project to ensure proper and appropriate use of SAIL data. When access has been granted, it is gained through a privacy protecting safe haven and remote access system referred to as the SAIL Gateway. SAIL has established an application process to be followed by anyone who would like to access data via SAIL at <https://www.saildatabank.com/application-process>.

Ethics approval and consent to participate

Approval for the use of anonymised data in this study, provisioned within the Secure Anonymised Information Linkage (SAIL) Databank was granted by an independent Information Governance Review Panel (IGRP) under project 1330. The IGRP has a membership comprised of senior representatives from the British Medical Association (BMA), the National Research Ethics Service (NRES), Public Health Wales and NHS Wales Informatics Service (NWIS). Usage of additional data was granted by data owner. The SAIL Databank is General Data Protection Regulations (GDPR) and the UK Data Protection Act compliant.

5. Dissemination and engagement

- Key stakeholders and engagement plans, include output formats (peer-reviewed paper for each of the study objectives, infographic from the outputs, presentations to policy and practice colleagues and exploring opportunities for blogging, workshops/conferences), and key target audiences for these (e.g. academic, policy, commissioning, clinical, public).
- Some of the targeted groups who have already fed into the development of this analysis plan include:
 - NHS Wales Mental Health Network and CAMHS subgroups;
 - Welsh Government Mental Health Leads;
 - Mental health leads in the Welsh Ambulance Services Trust and Public Health Wales.
- We will follow up opportunities for PPIE engagement especially with younger population through the PHW Youth Ambassador programme and the Future Generations Office.

6. Appendix A

Advanced Medical Priority Dispatch System (AMPDS) codes in WAST.

WAST use AMPDS codes for recording the patient's most important condition, allocating resources and prioritising calls (O'Hara 2016). The AMPDS codes considered mental health crisis in this study are highlighted in yellow. The list is based on academic studies and is being refined with input from WAST (O'Hara 2016; Duncan 2019)

draft list

Code	Description
23	Intentional poisoning
25A00	Override
25A01	Non-suicidal without 1st party verification (alert and awake)
25A01B	Non-suicidal without 1st party verification (alert and awake) - Both Violent and Weapons
25A01V	Non-suicidal without 1st party verification (alert and awake) - Violent
25A01W	Non-suicidal without 1st party verification (alert and awake) - Weapons
25A02	Suicidal (not threatening) without 1st party verification (alert and awake)
25A02B	Suicidal (not threatening) without 1st party verification (alert and awake) - Both Violent and Weapons
25A02V	Suicidal (not threatening) without 1st party verification (alert and awake) - Violent
25A02W	Suicidal (not threatening) without 1st party verification (alert and awake) - Weapons
25B00	Override
25B00V	Override - Violent
25B01	SERIOUS haemorrhage
25B01B	SERIOUS haemorrhage - Both Violent and Weapons
25B01V	SERIOUS haemorrhage - Violent
25B01W	SERIOUS haemorrhage - Weapons
25B02	Non-SERIOUS or MINOR haemorrhage
25B02B	Non-SERIOUS or MINOR haemorrhage - Both Violent and Weapons
25B02V	Non-SERIOUS or MINOR haemorrhage - Violent
25B02W	Non-SERIOUS or MINOR haemorrhage - Weapons
25B03	THREATENING SUICIDE
25B03B	THREATENING SUICIDE - Both Violent and Weapons
25B03V	THREATENING SUICIDE - Violent
25B03W	THREATENING SUICIDE - Weapons
25B04	Jumper (threatening)
25B04B	Jumper (threatening) - Both Violent and Weapons
25B04V	Jumper (threatening) - Violent
25B04W	Jumper (threatening) - Weapons
25B05	Near hanging, strangulation, or suffocation (alert without difficulty breathing)
25B05B	Near hanging, strangulation, or suffocation (alert without difficulty breathing) - Both Violent and Weapons
25B05V	Near hanging, strangulation, or suffocation (alert without difficulty breathing) - Violent
25B05W	Near hanging, strangulation, or suffocation (alert without difficulty breathing) - Weapons
25B06	Unknown status/Other codes not applicable
25B06B	Unknown status/Other codes not applicable - Both Violent and Weapons
25B06V	Unknown status/Other codes not applicable - Violent
25B06W	Unknown status/Other codes not applicable - Weapons
25D00	Override
25D00B	Override - Both Violent and Weapons
25D00V	Override - Violent
25D00W	Override - Weapons
25D01	Not alert
25D01B	Not alert - Both Violent and Weapons
25D01V	Not alert - Violent
25D01W	Not alert - Weapons
25D02	DANGEROUS haemorrhage
25D02B	DANGEROUS haemorrhage - Both Violent and Weapons
25D02V	DANGEROUS haemorrhage - Violent
25D02W	DANGEROUS haemorrhage - Weapons
25D03	Near hanging, strangulation, or suffocation (alert with difficulty breathing)
25D03B	Near hanging, strangulation, or suffocation (alert with difficulty breathing) - Both Violent and Weapons
25D03V	Near hanging, strangulation, or suffocation (alert with difficulty breathing) - Violent
25D03W	Near hanging, strangulation, or suffocation (alert with difficulty breathing) - Weapons
25O01	Non-suicidal with 1st party verification (alert and awake)
25O01V	Non-suicidal with 1st party verification (alert and awake) - Violent
25O01W	Non-suicidal with 1st party verification (alert and awake) - Weapons

25O02	Suicidal (not threatening) with 1st party verification (alert and awake)
25O02V	Suicidal (not threatening) with 1st party verification (alert and awake) - Violent
09E03	Hanging
17D02J	Falls, long fall (= > 6 ft./2 m) – Jumper
17D03J	falls, unconscious or not alert – Jumper

Appendix B

WAST PCR condition codes with descriptions. Mental health crisis related codes to be included in this study are highlighted.

draft list

CondCode	CondDescription
1	Abdominal pain acute
2	Abdominal pain non-specific
3	Addisonian Crisis
4	Ankylosing spondilitis
5	Appendicitis
6	Cancer
7	Catheter blocked/problem
8	Cervical spondilosis
9	Chronic back pain
10	Clotting/bleeding disorder
11	Collapse ? Cause
12	Constipation
13	Continuous convulsions
14	Convulsions
15	Convulsions - Febrile
16	Decompression Sickness (Bends)
17	Dehydration
18	Diabetes
19	Diarrhoea
20	DVT
21	Epistaxis
22	Gastritis
23	Gastroenteritis
24	Gastrointestinal obstruction
25	Haematemesis
26	Haematuria
27	Haemoptysis
28	Haemorrhage
29	Haemorrhage - GI
30	Haemorrhage - PR
31	Haemorrhage - PV
32	Headache
33	Hyperglycaemia
34	Hypertension
35	Hypoglycaemia

36	Hypotension
37	Iatrogenic drug effect
38	Melaena
39	Meningitis
40	Meningococcal septicaemia
41	Nausea
42	Non-cardiac chest pain
43	Oedema
44	Otitis
45	Palliative care
46	Peptic Ulcer Disease (PUD)
47	Photophobia
48	Pleurisy
49	Post ictal state
50	Post surgical complication
51	Pyrexia
52	Rash
53	Renal calculi
54	Renal problem
55	Retention of urine
56	Sepsis
57	Sickle cell crisis
58	Syncope
59	Tonsillitis
60	Toothache
61	Urinary tract infection
62	Varicose vein rupture
63	Vomiting
64	Head injury
65	Face injury
66	Eye injury
67	Cervical Spine injury
68	Spinal cord injury
69	General back injury
70	Shoulder injury
71	Chest injury
72	Abdominal injury
73	Genital injury
74	Arm Injury
75	Hand/finger injury
76	Leg injury
77	Foot/toe injury
78	Ligament injury
79	Traumatic amputation
80	Bite wound
81	Deglove wound
82	Incised wound

83	Lacerated wound
84	Pattern bruising
85	Stab wound
86	Skull#
87	Base of Skull#
88	Facial Bone#
89	Vertebral#
90	Clavicle#
91	Sternum#
92	Rib#
93	Upper Limb#
94	Wrist/hand/finger #
95	Pelvis#
96	Neck of Femur #
97	Femur#
98	Lower Limb#
99	Ankle/toot/toe #
100	Multiple#s
101	Dislocation of Joint
102	Drowning
103	Heat Exhaustion/heat stroke
104	Hypothermia
105	Near drowning
106	Poisoning/accidental OD
107	Face/head/neck burn/scald
108	Respiratory tract burn/scald
109	Upper limb burn/scald
110	Trunk burn/scald
111	Lower limb burn/scald
112	APH
113	Apnoea of newborn
114	Breech presentation
115	Cord Around Neck
116	Eclampsia
117	Ectopic pregnancy
118	Face presentation
119	Miscarriage
120	Normal Labour
121	Placenta Abruptio
122	Placenta Praevia
123	PPH
124	Pre-eclampsia
125	Premature labour
126	Prolapsed Cord
127	Resp distress of newborn
128	Retained Placenta
129	Shoulder presentation

130	Tender uterus
131	Umbilical haemorrhage
132	Aneurysm
133	Cardiac Arrest (complete CARF & PCR)
134	Cardiac chest pain
135	CCF
136	LVF
137	RVF
153	Croup
138	Shock - Cardiogenic
139	Shock - Hypovolaemic
140	Shock - Septic
141	Shock - other
142	Systemic Anaphylaxis
143	STEMI
144	n-STEM
145	Stable Angina
146	Unstable Angina
147	Acute asthma attack
148	Acute epiglottitis
149	Acute laryngotracheitis
150	Asphyxia
151	Carbon monoxide poisoning
152	Choking
153	Croup
154	Exacerbation of COPD
155	Dyspnoea
156	Haemo/pneumothorax
157	Hanging
158	Hyperventilation
159	Pulmonary embolism
160	Pulmonary oedema
161	Respiratory arrest
162	RTI (upper)
163	RTI (lower)
164	Smoke/ fumes inhalation
165	Tachypnoea
166	Tension pneumothorax
167	Alcohol Abuse
168	Attempted Suicide
169	Overdose
170	Self Inflicted Injury
171	Substance Misuse
172	CVA
173	Dizziness/disorientation
174	Intracranial bleed
175	TIA

176	Unconscious ? Cause
177	Admission-Compulsory
178	Admission-Informal
179	Contused/distressed/upset
180	Psychiatric condition
181	Acute stress
182	Anxiety disorder

Appendix C

ICD-10 codes, available in the ICD-10 Version:2016 (who.int)), used in emergency inpatient care (PEDW)

1. Psychological or behavioural disorders (Chapter F)
2. Self-harm code (X60-X84) & undetermined intent (Y10-Y34)

ⁱ *Together for Mental Health – the plan for 2019 to 2022*

<https://gov.wales/sites/default/files/publications/2020-06/together-for-mental-health-delivery-plan-plain-english-version.pdf>

ⁱⁱ *All Age Crisis Care: Improving the Quality of Care in England - Recommendations and positive practice* (rpsych.ac.uk)

ⁱⁱⁱ *Beyond the Call – National review of access to emergency services for those experiencing mental health and/or welfare concerns* <https://gov.wales/sites/default/files/publications/2020-12/beyond-the-call.pdf>

^{iv} *Suicides in the UK - Office for National Statistics* (ons.gov.uk)

^v Odd D, Stoianova S, Williams T, et al. Arch Dis Child Epub ahead of print: [21st July 2021].

doi:10.1136/archdischild-2020-320899

<https://adc.bmj.com/content/archdischild/early/2021/06/21/archdischild-2020-320899.full.pdf?withds=yes>

^{vi} Marchant A, Turner S, Balbuena L, et al Self-harm presentation across healthcare settings by sex in young people: an e-cohort study using routinely collected linked healthcare data in Wales, UK Archives of Disease in Childhood 2020;105:347-354. <https://adc.bmj.com/content/105/4/347.citation-tools>

^{vii} <https://www.parliament.uk/business/publications/written-questions-answers-statements/written-question/Commons/2018-10-18/181292/>

^{viii} Ann John Non-accidental non-fatal poisonings attended by emergency ambulance crews: an observational study of data sources and epidemiology

^{ix} <https://gov.wales/sites/default/files/publications/2019-03/mental-health-crisis-care-concordat.pdf>

^x Morrison-Rees, 2021 <https://emj.bmj.com/content/32/5/e3.2>

^{xi} Pierce M, Hope H, Ford T, Hatch S, Hotopf M, John A, Kontopantelis E, Webb R, Wessely S, McManus S, Abel KM. Mental health before and during the COVID-19 pandemic: a longitudinal probability sample survey of the UK population. Lancet Psychiatry. 2020 Oct;7(10):883-892. doi: 10.1016/S2215-0366(20)30308-4. Epub 2020 Jul 21. PMID: 32707037; PMCID: PMC7373389.

^{xii} Daly M, Sutin AR, Robinson E. Longitudinal changes in mental health and the COVID-19 pandemic: evidence from the UK Household Longitudinal Study. Psychol Med. 2020 Nov 13:1-10. doi: 10.1017/S0033291720004432. Epub ahead of print. PMID: 33183370; PMCID: PMC7737138.

^{xiii} Chen, S., Jones, P. B., Underwood, B. R., Moore, A., Bullmore, E. T., Banerjee, S., ... & Cardinal, R. N. (2020). The early impact of COVID-19 on mental health and community physical health services and their patients' mortality in Cambridgeshire and Peterborough, UK. Journal of psychiatric research, 131, 244-254.

^{xiv} https://www.childcomwales.org.uk/wp-content/uploads/2020/06/FINAL_formattedCVRep_EN.pdf

xv <https://phw.nhs.wales/news/staying-at-home-policy-has-reduced-spread-of-coronavirus-but-has-also-had-other-positive-and-negative-impacts-on-the-well-being-of-welsh-society/a-health-impact-assessment-of-the-staying-at-home-and-social-distancing-policy-in-wales-in-response-to-th/>

xvi Review of the Together for Mental Health Delivery Plan 2019 to 2022 in Response to COVID-19 https://gov.wales/sites/default/files/publications/2020-10/review-of-the-together-for-mental-health-delivery-plan-20192022-in-response-to-covid-19_0.pdf

xvii SAIL Databank - The Secure Anonymised Information Linkage Databank [Internet]. [cited 2021 Jun 8]. Available from: <https://saildatabank.com/> ; Lyons RA, Jones KH, John G, Brooks CJ, Verplancke JP, Ford D V., et al. The SAIL databank: Linking multiple health and social care datasets. BMC Med Inform Decis Mak [Internet]. 2009 Jan 16 [cited 2021 Jun 7];9(1):1–8. Available from: <http://www.biomedcentral.com/1472-6947/9/3> ; Ford D V., Jones KH, Verplancke JP, Lyons RA, John G, Brown G, et al. The SAIL Databank: Building a national architecture for e-health research and evaluation. BMC Health Serv Res [Internet]. 2009 Sep 4 [cited 2021 Jun 7];9(1):1–12. Available from: <http://www.biomedcentral.com/1472-6963/9/157>

xviii <https://gov.wales/sites/default/files/publications/2019-10/treatment-data-substance-misuse-in-wales-2018-19.pdf>

xix Marchant A, Turner S, Balbuena L, et al Self-harm presentation across healthcare settings by sex in young people: an e-cohort study using routinely collected linked healthcare data in Wales, UK Archives of Disease in Childhood 2020;105:347-354. <https://adc.bmj.com/content/105/4/347.citation-tools>