



The DIAL study: Deaths Involving Alcohol In Wales Research Report

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Professor Rob Poole

Dr Catherine A Robinson

John Bailey

Dr Charles Shelton

Dr Susan Ruben

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EXECUTIVE SUMMARY.

1. This report describes the principle findings of the Deaths Involving Alcohol (DIAL) study that was conducted in Wales between April 2010 and March 2011.
2. The project was hosted by Betsi Cadwaladr University Health Board. It was conducted by staff from Glyndŵr University, Bangor University and Betsi Cadwaladr University Health Board. The project was approved by the research ethics committees in Bangor University's College of Business, Social Sciences and Law and in Glyndwr University.
3. The study used records in six Coroners' jurisdictions in Wales as the primary source of data. This was only possible with the co-operation of participating Coroners and their staff. We acknowledge their assistance and would like to express our gratitude for their interest and forbearance in the face of disruption of their work.
4. The participating jurisdictions covered urban and rural environments within North, South and Mid-Wales. Our sample includes former residents of the catchment area of five of the current Welsh Health Boards. The study examined deaths that were reported in 2008. All data was collected consecutively. Owing to practical constraints we did not obtain a full year's data from all administrative categories in all offices. In one office we varied the time frame to 1st July 2007 to 30th June 2008. There were inconsistencies in practice, and in our access to primary data, between participating Coronal jurisdictions. We warn against over-interpretation of our findings and against making over-confident projections from these findings for epidemiological purposes. However, the findings presented here are fully reliable.

CONCLUSION 1.

Coroners' data is rich and useful, but there are practical challenges for researchers working in Coroners' offices. Variation in criteria for Inquests and in data collection and storage makes this an

unsuitable source for routine epidemiological data on this subject. However, each office shows consistency of practice over time, and selection of particular jurisdictions allows the collection of important qualitative and trend information.

5. An iterative and heuristic process was used to identify DIAL cases. The assignment of cases to three categories, DIAL case, DIAL borderline case and non-DIAL case, was made using probabilistic criteria, on the basis of judgements made by a research team with medical, sociological, psychological and risk assessment expertise.
6. All judgement processes, from primary screening to final categorical assignment, were subject to within-team validation. All judgements on clinical issues were subject to medical review.
7. As the project progressed, it was possible to apply increasingly robust and transparent rules to the primary screening process that could reliably be applied by non-medical researchers.
8. Just under 6,000 files were subjected to primary screening. 858 deaths were selected for further scrutiny because of an initial indication that the deceased might have misused alcohol. However, as the project progressed, the screening process became more expert, and the proportion screened in fell. Data was collected for comparison on a further 502 deaths related to falls, fires, drivers in road traffic accidents and self harm in the absence of evidence of alcohol misuse.
9. The secondary process of application of DIAL criteria was subject to multi-disciplinary assessment, involving a minimum of three team members. All complex or uncertain cases were subject to full team review. As in the primary screening process, it was possible to develop robust and transparent rules that could be applied.
10. Within the "achieved" sample (i.e. those cases where full data collection was possible), 384 deaths subject to application of DIAL criteria were categorised as definite DIAL cases. There were 26 DIAL borderline cases. A lack of information was the usual

cause of uncertainty, though in a handful of cases, cause of death was complex or unknown. The role of alcohol in contributing to death was usually unambiguous in DIAL cases, and there were few, if any, disagreements when these cases were subject to joint team review.

11. As the proportion of DIAL borderline cases was very low, we excluded them from analyses.

CONCLUSION 2.

This study shows that the DIAL probabilistic approach to causation, when applied to Coroners' data in Inquest cases, can be reliably and practically applied by non-medical researchers with medical support to ascertain cases where alcohol has played a significant causal role in death.

12. Amongst the DIAL cases, mean age at time of death was 52 years with a standard deviation of 14 years. However, this age distribution does not follow a "normal" distribution. Although a significant proportion of middle aged people with a history of prolonged heavy alcohol consumption died as a consequence of diseases strongly associated with alcohol misuse, younger people also died in this way. Significant numbers of people of all ages died as a consequence of behaviour related to acute alcohol intoxication.
13. Of the 384 DIAL cases, 118 were female (i.e. roughly a third). This corresponds to the gender distribution in recent ONS Alcohol-Related Death (A-RD) statistics, which themselves represent a disproportionate increase in premature fatalities amongst women compared to men over the previous decade. As DIAL criteria capture a wider range of deaths related to acute intoxication than ONS A-RD, this increase in female deaths may not solely be related to the greater biological vulnerability of women to the long term toxic effects of alcohol.
14. Of the 384 DIAL cases, 184 (48%) also met ONS A-RD criteria. None of the DIAL borderline cases met ONS criteria.

Amongst deaths reported to the Coroner, the DIAL method captures twice as many cases where alcohol is seriously implicated as a cause of death compared with ONS A-RD criteria. However, when applied to Inquest data, the superiority of DIAL criteria in identifying relevant deaths is much greater (54 by ONS A-RD criteria, 190 by DIAL criteria, almost four times as many).

15. Of the 384 DIAL cases, 19 had illegal drugs in their bodies at the time of death. For a variety of reasons, this figure is likely to be a substantial under-estimate of drug misuse amongst this population. Most of these deaths would have been regarded as drug related deaths in ONS figures. This confirms the common impression amongst substance misuse professionals and Coroners that some apparently drug related deaths are as closely related to alcohol as drug misuse.
16. It was possible to confidently ascertain contact with secondary care or voluntary sector services in 170 DIAL cases where there had been an Inquest. In 73 of these cases there was evidence of contact (the 'intervention group'). In a further three cases, the person was on a waiting list to be seen. In 96 cases there was evidence that there was no contact with secondary services (the 'no intervention group').
17. Amongst the intervention group, one third was female. The majority were middle aged, with only one person over 64 years. None of the intervention group was under the age of 25 years. 10% were homeless. Just under a third had combined problems of drug and alcohol misuse. 40% had an identifiable mental health problem other than substance misuse.
18. The intervention group more often than not had contact with more than one agency. The largest group, a third, had contact primarily with adult mental health services. Just under a third had primary contact with acute general hospital services, a fifth with NHS drug dependency services, and a slightly smaller proportion with NHS alcohol dependency services. Three quarters had been in contact with secondary services within a year a death, and most of these were in current follow up when they died. In a fifth of cases, there was no evidence that the primary

agency (often drug dependency services) was aware that the person had an alcohol problem.

19. Two thirds of the intervention group showed evidence of poor engagement with alcohol treatment services, and a quarter had refused referral for specialist help (usually recurrently). There was little or no evidence of requests for help with alcohol dependency being refused. 10% were awaiting an appointment or admission regarding alcohol dependency at the time of death. In over a third of cases there was evidence that the primary agency had made assertive efforts to assist the person. Two thirds of the intervention group were intoxicated with alcohol at the time of death.
20. Amongst the no intervention group, a substantial proportion had not been identified as having an alcohol problem in life. A significant proportion of these appear to not to have been heavy drinkers in general, but were seriously intoxicated at the time of death. A smaller proportion of the no intervention group were recognised by their GP to have a serious alcohol problem, but would not acknowledge this or refused treatment.
21. Initial scrutiny of the DIAL qualitative data suggests that, in the majority of cases, people close to the deceased were aware that they had an alcohol problem or that that they were very intoxicated in the period immediately preceding death.

CONCLUSION 3.

Our findings show that the DIAL method generates important information about lifestyle, patterns of drinking and premature deaths. It provides a mechanism to produce evidence regarding patterns of alcohol consumption, life circumstances and mortality that could not be ascertained using established methods.

22. The data set generated by this study contains a wealth of information that merits further analysis. A number of important issues can be explored, including:

DIAL cases and women.

DIAL cases and accidents (especially falls).

DIAL cases and death through self harm.

Location of death in DIAL cases.

DIAL cases and older people.

DIAL cases in rural versus urban settings.

DIAL cases and drug misuse (including prescribed and over-the-counter medications).

23. The data set includes information on deaths related to drug toxicity and poisonings where alcohol was not involved. This data can be subjected to the same heuristic processes in order to develop a similar approach to deaths involving drug misuse (of all types).

CONCLUSION 4.

Further analysis of the data set will produce findings of national and international significance.

24. We make two firm recommendations on the basis of our findings so far:

RECOMMENDATION 1.

The data set should be subject to thorough qualitative and quantitative analysis. The full findings should be disseminated through peer reviewed processes.

RECOMMENDATION 2.

A pilot scheme should be developed using the DIAL method to systematically collect and review data concerning premature death due to substance misuse (excluding tobacco) in Wales. This will inform service development and public policy to reduce mortality and harm attributable to this cause.

INTRODUCTION

In the UK over the course of the last 100 years there have been marked changes in quantity and patterns of alcohol consumption, with closely related changes in population health outcomes. For example, increases in liver cirrhosis mortality rates over the last 50 years have been linked to changes in alcohol consumption over the same period (Leon and McCambridge, 2006). Tracking the harmful effects of alcohol has occurred in the context of an opaque backdrop of definitions, descriptors and statistics. In order to generate internationally comparable figures on alcohol related death that are statistically consistent, there has been an effort to concentrate on statistically and medically defensible relationships between alcohol consumption and death (e.g. alcoholic cirrhosis or alcohol poisoning). Difficulties in establishing case definitions for less direct types of alcohol related harm limit our understanding of many aspects of the relationship between alcohol consumption and premature death. The method used in this study was designed to overcome some of these limitations.

A pilot study (Robinson, Poole, Slegg, Ruben and Bailey, 2009) established that it is practical and feasible to develop methodologies to reliably identify deaths which *involve* alcohol in addition to those *related* to alcohol within Office of National Statistics definitions (ONS 2006). The DIAL approach includes deaths where alcohol misuse was part of the deceased's lifestyle, was reported as relevant in the Cause of Death (CoD) or in post-mortem findings or where the deceased was intoxicated at the time of death causing behaviour that contributed to death. These DIAL parameters include cases where the CoD falls outside the ONS definition of A-RD.

Research on suicide and unintentional injury has highlighted the potential of using coroners' records to throw light on continuity and change in patterns of public health risk (Towner and Towner, 2000) as well as providing policy relevant insights on present day patterning of these risks (Towner and Towner, 2008). Insights into everyday lives and deaths can be found in Inquest files (see for example, Hockey and Draper, 2005; Langer, Scourfield and Finchman, 2008). The pilot study confirmed that coroners' records are a rich source of data relevant to the study of deaths involving alcohol.

DEATHS REPORTED TO CORONERS

In 2008 234,784 deaths were reported to coroners in England and Wales, 46.1% of all registered deaths. In nearly half of the reported deaths, a post-mortem examination was carried out. In just over 13% of deaths reported to a coroner an Inquest was held. Only 1.6% of Inquests were heard before a jury. The proportion of all deaths reported to coroners has increased over the last 20 years, in part due the increasing use of deputising services by GPs and in part in response to the Shipman murders. The proportion of deaths where a post-mortem was carried out at the request of coroners has decreased over the same period.

Wales has 12 Coroners' districts or jurisdictions. There is variation from jurisdiction to jurisdiction in the proportion of reported deaths with a post-mortem and in the proportion of reported deaths where an Inquest is held. In Wales in 2008, 14,498 deaths were reported to the coroner.

AIMS OF THE STUDY

- 1) To identify, explore, describe and analyse DIAL cases in Wales using quantitative and qualitative information extracted from Coroners' records.
- 2) To compare findings from the analysis of DIAL cases with information generated by applying standard ONS Alcohol-Related Death criteria.
- 3) To refine the DIAL method and describe the utility of developing regular expert reviews of deaths involving alcohol in Wales.

METHOD

We invited six Coronal Jurisdictions in Wales to participate in the study. The potential participating sites were selected to reflect the geography of Wales and to ensure that inclusion of a sample of deaths arising in each Local Health Board area. The Coroner for one jurisdiction declined the invitation to participate in this particular study, and timely access to files was impossible in one office. However, we successfully sought the participation of two additional jurisdictions.

Table 1 Post Mortem and Inquests as a Percentage of Deaths Reported

Jurisdiction	Health Board	Post-mortem as % total number deaths reported	Inquest cases as % total number deaths reported
Bridgend and Glamorgan Valleys	Abertawe Bro Morgannwg University HB Cwm Taff HB	45	8
Cardiff and Vale of Glamorgan	Cardiff and Vale University HB	51	24
Central North Wales	Betsi Cadwaladr University HB	55	17
Gwent	Aneurin Bevan HB	35	6
North East Wales	Betsi Cadwaladr University HB	57	20
North West Wales	Betsi Cadwaladr University HB	46	15
Powys	Powys Teaching HB	69	21
Ceredigion	Hywel Dda HB	68	15

The multi-disciplinary research team consisted of a social scientist, two psychiatrists (one of these a substance misuse specialist) and two researchers (a psychologist and an environmental scientist).

The research protocol was submitted to and gained ethical approval from the research ethics committees in Bangor University's College of Business, Social Sciences and Law and in Glyndŵr University.

Each participating Coroner agreed to provide the research team with access to the list of all deaths registered ("the Death Register") in a given time sample and the associated paper records. Coroners' records consist of three main administrative categories, each with a varying amount of information about the deceased and the circumstances surrounding their death. **Appendix 1. Coroners Records** details the three administrative categories (Pink Form A, Pink Form B and Inquest) and the type and

range of information likely to be included in each type of file (A files, B files and Inquest files). Primary screening was adapted for each administrative category to accommodate the additional information available in B files and Inquest files.

This enabled the research team to screen for cases of interest and to extract information from those files meeting our inclusion criteria. Our intention was to consider the role of alcohol in all deaths reported in 2008 in our participating jurisdictions.

DATA EXTRACTION

The research team constructed a categorical database for eventual analysis in SPSS (statistical analysis software) and linked this to the qualitative data for eventual analysis in NVIVO (textual analysis software) in order to manage a very rich and detailed dataset. We have included in the database all the deaths initially screened into the sample as a 'case of interest' and comparison samples. There were 64 variables on the field database which is described in **Appendix 2. DIAL Database Structure.**

Full analysis of the qualitative data will generate further variables of interest as we extract more information from witness statements. The DIAL database provides an appropriate and adaptable structure for further research on deaths involving substance misuse and for a substance misuse death review system.

IDENTIFYING DIAL CASES

We conducted a research review of all deaths screened into our sample as cases of interest in order to determine whether they were DIAL cases. This involved the application of the DIAL criteria through a multidisciplinary process.

For Pink Form A deaths, where the primary or secondary CoD met criteria for a DIAL case on screening, the death was included. Medical advice was provided at this stage. No further assessment of these deaths occurred. The cases with B files and Inquest files that had been screened into the study on the basis of our inclusion criteria were subjected to the second stage process to assign each death in one of three categories.

1. Death involving alcohol case (DIAL case)

2. Death involving alcohol borderline case (DIAL borderline case)
3. Not a death involving alcohol case (DIAL non case)

DEFINITION OF A DIAL CASE

Deaths Involving Alcohol: Untimely deaths where the deceased person's consumption of alcohol played a significant part in his or her death.

Where there are doubts as to whether a particular case meets this definition, the following question should be asked:

If this person had not consumed alcohol, would death have occurred in this way at this time?

*Answering **no** or **probably not** would indicate a DIAL case. This judgement should apply the balance of probabilities.*

The categorisation was based upon the evidence available to the research team. We reviewed each case individually using proforma data from the research database, supplemented by information regarding the deceased person's health and social history, events surrounding their death and the post mortem and toxicology reports.

Where there was evidence of alcohol use or misuse, but the evidence did not meet DIAL criteria, the death was categorised as a DIAL non-case. We excluded some modes of death completely¹. "DIAL non-case"

¹ Although the intention was to be inclusive, we found deaths which in the everyday meaning *involve* alcohol, but nonetheless are outside our definition of alcohol-involved death. Examples include homicides where it was the perpetrator who was intoxicated or road traffic accidents where a surviving driver was intoxicated. Indeed, deaths arising from such circumstances have a legal outcome which falls outside the bounds of the coronial system. In such cases where there is an acquittal, there is an additional layer of complexity in determining causality. Whilst it is technically possible to augment the coronial data with information from the criminal justice system, it was beyond the scope of this study both in terms of resources and permissions to access and hold data on living individuals.

therefore refers to deaths where we initially suspected significant alcohol involvement, but following review were found not to meet DIAL criteria. We also examined all deaths due to falls, fires, road traffic accidents and intentional and unintentional self harm. These were included for comparison purposes and are not part of the present analysis.

FINDINGS

The dataset we have constructed using routinely collected information from six different Coronial jurisdictions in Wales is complex. It includes both quantitative and qualitative data. It can be seen from **Table 1** that there are considerable differences between jurisdictions with regard to the proportion of deaths reported to the Coroner that are dealt with through an Inquest or subject to a post-mortem. We also found that Coroners vary in the information that they ask their officers to routinely collect. The full dataset is 'dirty', with differing time frames and levels of information. However, this can be overcome in complex analysis. The qualitative data is extremely rich in detail about everyday lives and everyday deaths.

Detailed subset analysis continues. This will yield unique information on a range of issues of relevance to policy and practice in reducing mortality and morbidity. This further exploitation of the dataset could usefully be informed by the priorities of the commissioning group.

This report addresses four fundamental areas:

1. the establishment of reliable methods of identifying DIAL cases.
2. a description of the sample of DIAL cases we drew from the records of participating Coroners.
3. an exploration of the service inputs for a sample of the DIAL cases.
4. recommendations for the development of a comprehensive scheme to review deaths involving substance misuse based upon the DIAL method.

PRIMARY SCREENING

In the course of the study, through our iterative team review and within-team validation processes, we established the following criteria for primary screening. Pink Form B and Inquest cases were flagged for more detailed research review where one or more of the following criteria were met:

1. Reference to an alcohol related condition in the Cause of death (CoD) part 1a, 1b, 1c or part 2.
2. Explicit reference to an alcohol related condition in the post mortem findings or conclusion.
3. Reportable blood alcohol level or urine alcohol concentration in the toxicology report.
4. Explicit reference to an alcohol related condition in the histology report.
5. Reports of consumption of alcohol in the events immediately surrounding the death.
6. Reports of misuse of alcohol in the deceased person's lifestyle.
7. Reports of harmful or dependent use of alcohol in the deceased person's medical history.
8. Reports of harmful or dependent use of alcohol in the Coroner's conclusion.
9. Suicides and unintentional self harm.
10. Fires.
11. Road traffic accidents.
12. Falls.

Items 9-12 were included in the primary screening for comparative purposes.

We refined and validated the primary screening process during the course of the study. **Appendix 3. Validation and refinement of primary screening** details the methods of checking and refining the screening processes. **Appendix 4. Main inclusion and exclusion rules** describes the primary screening process and the rules that were applied once it had been fully developed.

DIAL CASE CATEGORISATION RULES

We used a heuristic process to refine the application of DIAL criteria, out of which a series of rules emerged. The process became increasingly transparent and objective, with a reduced dependency on medical judgement. This allowed the team to reliably distinguish a DIAL case from deaths which involved alcohol in the everyday meaning. DIAL case criteria include more types of premature fatality than the ONS A-RD category. **Appendix 5. Application of DIAL Criteria** explains the process and contains examples of the inclusion and exclusion rules for Pink Form B and Inquest deaths.

Each stage of the process was supported by systematic cross checks of the screening and categorisation processes. Where non-medical researchers applied rules to medical diagnoses or CoD, these were subject to medical review and were found to be consistently applied. We have established a rigorous, practical and replicable method that allows a confident determination of a DIAL case, without the need to involve medically qualified screeners for each and every case.

DIAL BORDERLINE CASES

For the most part, application of DIAL criteria and categorisation was achieved by following uncomplicated rules. In a relatively small number of cases (26 in total; see **Table 2** below) we were unable to apply the criteria despite evidence of heavy drinking. These deaths were categorised as DIAL borderline cases. In the majority of these, there was insufficient information in the records to make a confident judgement despite full team review. In a small number of cases the causes of death were complex or unknown.

DATA RETRIEVAL ISSUES

Screening and data retrieval was conducted either in Coroners' premises or in offices where the records were stored or archived. The research team was dependent upon timely access to records and on the ability of the Coroner to provide space to carry out the research. The target population in each jurisdiction was all deaths reported during 2008. For a number of practical reasons and to limit disruption to the every-day activity in the participating offices we did not meet this target for all administrative categories of death in each jurisdiction. In one office the timeframe was a 12 month period spanning two calendar years. **Table 2** provides a breakdown of the A, B, and Inquest cases subject to primary screening and subsequent assessment against DIAL criteria ("achieved sample") relative to the available records ("target list").

Table 2 Target Sample and Achieved Sample in Participating Jurisdictions

Office	Deaths Reported		Coroner's Cases ²		A Files		B Files		Inquest Files	
	Target	Sample	Target	Sample	Target	Sample	Target	Sample	Target	Sample
One ³	262	262	258	258	74	74	151	151	33	33
Two	2629	1175	2605	1166	1546	675	798	388	261	103
Three	1016	1106	1008	1008	536	536	324	324	148	148
Four	1706	844	1683	819	844	398	674	341	165	80
Five	1397	1397	1389	1389	595	595	513	513	281	281
Six	1148	1148	1133	1133	491	491	409	409	233	233
Totals	8158	5932	8076	5773	4086	2769	2869	2126	1121	878

This complicates analysis, but it does not invalidate our sample.

² Reported deaths where action was taken by the Coroner

³ 12 month period spanning 2 calendar years

DIAL SAMPLE

The research team examined 5885 Coronial records and read just 878 Inquest files during the primary screening process. 1360 recorded deaths were included after primary screening. Of these, 858 deaths were the cases where alcohol misuse was suspected (potential DIAL case sample) and 502 were screened in as part of the comparison sample (falls, fires, road traffic accidents, intentional and unintentional self harm).

Information about each death was entered onto the database. For A files, only a minimum dataset was available. Within B files additional data was found in post mortem reports and other documents. We gleaned most information from Inquest files but even so there was variability in the number of data items we could complete for each death. This was dependent upon established practice in each office.

Not all data items were relevant to every death. For example, toxicology screening was not carried out in all deaths. However, we were able to make an informed judgement as to the service use and social data that could usefully and realistically be collected as part of a deaths involving substance misuse review process. (see **Recommendations**)

Table 3 Distribution of DIAL cases

Jurisdiction	Deaths reported	Deaths assessed using DIAL criteria	DIAL Cases	DIAL Borderline Case
Office One	262	262	26	0
Office Two	2629	1166 ⁴	97	2
Office Three	1016	1016	60	1
Office Four	1706	919 ⁵	46	5
Office Five	1397	1389	81	12
Office Six	1148	1133	74	6
Total	8158	5885	384	26

⁴ Assessment against DIAL criteria covered deaths reported January –May 2008 and excludes 25 DIAL cases assessed from the Death Register alone June – December 2008

⁵ Assessment against DIAL criteria covered deaths reported January –June 2008 and excludes 25 DIAL cases assessed from Death Register alone July-December 2008

After initial screening, we assessed all cases of interest against the DIAL criteria. This was carried out on a part of a calendar year in two of the jurisdictions (see **Table 2**) and a 12 month period spanning two calendar year in one jurisdiction (see **Table 3**). In the remaining three jurisdictions, the whole of 2008 was included.

The DIAL assessment identified 384 DIAL cases and 26 DIAL borderline cases.

PINK FORM A CASES/A FILES

A proportion of the cases of interest were screened using only the information on the death certificate (which corresponds to the information available on Pink Form A). Of the A files, 136 (87%) were assessed as DIAL cases. As expected, there were no DIAL borderline cases amongst the Pink Form A files. These were deaths where the reference to an alcohol related CoD was mentioned on the death certificate, unequivocally part of the causal chain.

PINK FORM B CASE/B FILES

The B files usually included post-mortem findings and sometimes toxicology and histological findings. In one office, hepatic histology was conducted routinely. We had initially regarded fatty liver (hepatic steatosis) as prima facie evidence of recent heavy drinking. However, this finding was present in a large number of deaths involving seriously ill older people where there was no other evidence of alcohol use. On the advice of the medical members on the research team, we developed a new primary screening rule which reduced the number of false positive in the cases of interest sample. Consequently, the number of B file cases considered to be of interest greatly reduced in subsequent offices, thus accounting for the variation between offices in the proportion of deaths flagged as potentially involving alcohol. .

INQUEST CASES

There were 303 cases of interest amongst the deaths subject to an Inquest. Of these 190 (63%) were definite DIAL cases and 22 (7%) were DIAL borderline cases.

As the number of DIAL borderline cases in all administrative categories is low, these can be excluded from analysis without systematic bias being introduced to findings.

AGE STRUCTURE

Age at time of death amongst DIAL cases does not follow a perfectly 'normal' (Gaussian) distribution, but mean age was 52 years with a standard deviation of 14 years. Whilst this suggests an average of 25 years of lost life, the figure must be approached with great caution. It cannot be assumed that these individuals would have lived to a full life expectancy if they had not taken alcohol. In any case, the sample is heterogeneous, and this 'headline' mean age of death almost certainly conceals quite different patterns of mortality between younger and older age groups.

GENDER

Of the 384 DIAL cases we identified, 124 were women and 260 male (i.e. roughly 1:2 ratio). This gender distribution corresponds to recent ONS findings on A-RDs (ONS, 2011), which also showed women representing a third of these deaths. In 1991, women represented a quarter of ONS A-RDs. This is an increase of alcohol related deaths amongst women both as a proportion of the total and in absolute numbers.

DIAL criteria include more deaths related to acute intoxication than ONS A-RD. The finding that gender distribution is the same using both criteria suggests that the increase is unlikely to solely be a result of the greater biological vulnerability of women to the long term toxic effects of alcohol in the face of a general increase in per capital alcohol consumption. This finding demands further exploration.

There was no statistically significant difference between the mean age of men and women in the DIAL sample.

The following examples are included to illustrate the types of circumstance that led to death in different categories. They are based on different levels of available information. We have made minor changes to all case example details to protect anonymity.

Each example is headed with *Source of information, DIAL category, ONS A-RD category, and Inquest verdict (where applicable)*.

Death register cases

Case example

A file, DIAL, ONS A-RD

- 1a Acute variceal bleed,
- 1b Alcoholic liver disease

Case example

A file, DIAL, Not ONS

- 1a Pneumonia,
- 2. Chronic liver disease (alcohol related) and alcohol intoxication and concussive head injury.

Drowning

Case example

Inquest, DIAL, Not ONS, Open

This woman in her forties was reported missing. She had been depressed for some time. Empty wine bottles were found in her car. Her post mortem blood alcohol concentration was more than twice the UK drink driving limit.

Road Traffic Accident

Case example

Inquest, DIAL, Not ONS, Accidental death

This man in his thirties had been drinking and then proceeded to drive a motor vehicle. His blood alcohol level was two and a half times in excess of the UK drink driving limits.

Intentional self harm

Case example

Inquest, DIAL, Not ONS, Suicide

This woman in her thirties had a known alcohol problem. She fell to her death from a cliff top. The outcome of the Inquest was suicide. Her partner described her drinking in the early years of their relationship as 'social' but said that this had increased over the course of her last seven years. She had started drinking at home. She lost her driving licence four years prior to her death and stopped drinking for some time. She had sought help from her GP and had been referred to several voluntary sector organisations. She found it difficult to talk about her drinking and felt ashamed. She was experiencing relationship difficulties in the period leading to her death. Her post mortem blood alcohol concentration was over twice the UK drink driving limit.

Case example

Inquest, DIAL, Not ONS, Narrative verdict

This woman, in her mid-thirties, was the mother of two young children. She was a social drinker for whom alcohol had never been a problem. She had been suspended from her job for disciplinary reasons and on the morning of her death she was contacted by her employers in relation to this. Her husband reported that, although she had been affected by this, she had been looking at job applications that morning. Her husband left her for a short period of time and said that, at this time, she did not appear to have been drinking. When he returned, he found her body hanging in an outbuilding. At the time of her death, she had a potentially lethal amount of alcohol in her body.

Alcohol poisoning

Case example

Inquest, DIAL, ONS, Misadventure

This man in his early forties was found dead in the living room of his property. His post mortem blood alcohol concentration was more than 5 times the drink driving limit in the UK. He was known to drink alcohol to excess and his mother reported that his problems dated back at least 15 years. He had lost his job about six years previously due to his drinking. The CoD was alcohol poisoning.

Case example

Inquest, DIAL, ONS, Death due to alcohol abuse

This woman in her mid forties was found dead at home. She was known to be alcohol dependent over the previous 15 years. Her father reported that before this her drinking was not problematic, but she liked to drink. However, in the last 10 years alcohol had taken over her life so that she had a poor quality of life. He reported that drinking had cost her several jobs, money and her marriage. Her teenage daughter reported that she was aware that her mother had an alcohol abuse problem and that she had grown up with it. The family were aware that she had sought help from her GP and had tried to abstain. Her family reported that in the week prior to her death she had not been drinking. Her post mortem blood alcohol concentration level was more than six times the drink driving level. The CoD was acute alcohol poisoning.

Accident when intoxicated

Case example

Inquest, DIAL, Not ONS, Accidental death

This man, in his late 60s, died from head injuries resulting from a fall outside his home after returning from an evening drinking in a public house. He had broken his key in the door lock, had been unable open the

door and had subsequently fallen, striking his head. A family member reported a long history of heavy drinking and that he had given up his job almost 20 years before because of it. His GP confirmed that drinking had made him unfit for work and had probably played a large part in his subsequent depression.

Falls

Case example

Inquest, DIAL, Not ONS, Accidental death

This woman, in her early 50s, died from the effects of a ruptured spleen after collapsing in the street. This was determined to be the result of an earlier fall. She was known to suffer from alcoholism and a police witness gave evidence of signs of a chaotic lifestyle in her home which contained a number of empty alcohol bottles. Her liver showed signs of cirrhosis and she had a post mortem blood alcohol concentration of more than three times the drink driving limit.

Intoxication causing behaviour leading to death

Case example

Inquest, DIAL, Not ONS, Misadventure

This young man drowned in the sea after attempting to walk home along the shoreline after an evening spent drinking. It was a stormy night, with a high surf running; he became separated from his companion. He was assumed to have got into difficulties and to have been unable to save himself because of his degree of intoxication. Witnesses who saw him shortly before this described him as being drunk and his post mortem blood alcohol concentration was almost 4 times the drink-drive limit.

Borderline cases

Case example

Inquest, Borderline DIAL, Not ONS, Suicide

This man in his late fifties had a history of mental health and alcohol misuse problems. His drinking had increased in the months leading up to his death. He had previously made attempts to kill himself and was in contact with community psychiatric services. His relationship with a family carer had broken down due to his drinking. He died by hanging. His blood and urine alcohol concentrations were less than 60 mg/100ml and less than 120 mg/100ml respectively. Although the levels of alcohol in this man's system at the time he died were not excessive, the research review of the death was concerned with his whole story and lifestyle. The question we could not resolve was whether it was more likely than not he would have died in this way at this time if he had not been drinking.

Case example

Inquest, Borderline DIAL, Not ONS, Accidental death

This man in his early seventies had a history of falls related to his alcohol consumption. He had not been seen in the week preceding the discovery of his body at the bottom of a flight of stairs at the property he lived in. His post mortem blood alcohol concentration was just less than the drink driving limit for the UK. His death was considered to be an accident. Under these circumstances it was impossible to confidently attribute the fatal fall to alcohol intoxication. However, he may have lain unconscious for a period of time, reducing his blood alcohol concentration by the time of death.

Case example

Inquest, Borderline DIAL, Not ONS, Natural causes (sudden death in epilepsy)

This man in his mid fifties had a known history of alcohol abuse which caused seizures and peripheral neuropathy. He was hospitalised in the months preceding his death but continued to drink. He was in receipt of support from a homelessness team. He collapsed and died suddenly. He had no detectable levels of alcohol in his system at the time he died.

ONS A-RD statistics are derived by applying their criteria to the CoD as recorded on Death Registers. We collected complete CoD information from the Death Registers in each participating jurisdiction for a 12 month time frame.

Using this information, we applied ONS A-RD criteria and then DIAL criteria to the CoD. This allows numerical comparison between the ONS A-RD cases and the DIAL cases. We identified 219 ONS A-RD and 304 DIAL cases. In other words, based on CoD information alone, DIAL criteria identified 85 premature deaths where alcohol was a significant factor which would not have been reported in ONS A-RD statistics.

We also applied ONS A-RD criteria to the 384 DIAL cases where full data collection was achieved and found:

A Files	134 DIAL	106 ONS A-RD
B Files	60 DIAL	24 ONS A-RD
Inquests	190 DIAL	54 ONS A-RD

This shows that the DIAL criteria capture more deaths compared with ONS A-RD criteria as the amount of information available increases. DIAL criteria have particular utility when applied to Inquest information.

CHRONIC CASES AND ACUTE CASES.

We suggest that DIAL cases can be divided into two main categories of alcohol involvement. One group die as the consequence of persistent heavy drinking, leading to a cause of death closely related to conditions with a well-recognised relationship with alcohol consumption. These are deaths due to *chronic alcohol misuse*. This excludes individuals with generally chaotic lifestyles, one feature of which is drinking, where self neglect and poor health due to many other factors (prominently including heavy smoking) which can lead to death.

Chronic cases are more likely to be identified by mention of alcohol or an alcohol related disease in the recorded CoD. Examples would include "alcoholic cirrhosis of the liver", "alcoholic liver disease", "long term

alcohol (ab)use” or “alcoholism” and thus be reported as part of the ONS figures on A-RDs.

The other group comprises individuals who, either according to witness statements or according to toxicology, were heavily intoxicated at the time of death. The intoxication may lead directly to death as in the case of alcohol poisoning, in which case the death will appear in the ONS statistics for ARD.

However, there are further acute cases where alcohol led to behaviour that that was unlikely to have occurred without intoxication AND the behaviour led to death. This includes falls and accidents when intoxicated and sudden fatal self-harm when intoxicated without prior evidence of severe mental disorder or immediate suicidal intention.

These are deaths associated with *acute alcohol misuse*. DIAL criteria exclude from this category cases of suicide where suicidal intention had been expressed when sober, or where intoxication was not severe.

These acute cases (of both types) are unlikely to appear in the ONS statistics for A-RDs.

RELATIONSHIP TO DRUG DEATHS

Amongst the 384 DIAL cases, 19 had significant levels of an illegal drug (mainly opiates) in their body at the time of death. Five of these were suicides. Most of the remainder died from accidental poisoning by drugs and alcohol. By definition, in each case the research team judged that the person would have been unlikely to have died when they did if they had not taken alcohol (i.e. they were unlikely to have died from the effects of drugs alone). Many (or most) of these deaths will have appeared in ONS statistics as Drug Related Deaths.

This corresponds to the widespread impression amongst substance misuse professionals and Coroners that the role of alcohol in deaths attributed to drug misuse is greater than national statistics would suggest.

The figures we present here do not allow an accurate estimate of the proportion of deaths recorded to be Drug Related where alcohol has played a significant causal role. However, with more sophisticated

statistical analysis it will be possible to compare the data that we have collected with ONS statistics in order to derive a reliable estimate.

SECONDARY CARE SERVICE UTILISATION

In examining the Coroner's records of DIAL cases, we specifically searched for evidence regarding the subjects' history of contact with primary and secondary health care, as well as social services and voluntary sector agencies. Generally speaking, this information was only available where an Inquest had been held.

As a consequence of the variation between jurisdictions with regard to the range of witness statements that were routinely collected, there were differences in the amount of detail about previous or current intervention by secondary services (i.e. all agencies other than primary care). Of the 190 DIAL cases where there was an inquest we had sufficient information in 172 cases to categorise into an 'intervention' group and a 'no intervention' group. In 18 cases it was not possible to be certain.

There was evidence of intervention in 73 cases, 3 cases were on a waiting list and there was evidence that intervention had not occurred in 96 cases. Where intervention had occurred, there was sometimes a significant lack of detail as to its nature. On occasion there was inconsistency in accounts of different witnesses. The statements required a degree of interpretation, and their accuracy could not be verified. This is a reflection of the retrospective nature of the study. If information regarding treatment/intervention were collected systematically and prospectively, this would be of significant value.

For statistical purposes, the flaws in the primary data source render numerical analysis of this data field problematic. No statistical conclusions can be drawn regarding the general pattern or efficacy of treatment services from the data presented here. Nonetheless, the information is of interest and important qualitative insights can be gained. The DIAL cases represent a group of people for whom intervention was either ultimately unsuccessful or did not occur at all. We present broad proportions rather than precise numerical analysis as the latter would give a spurious impression that findings could be generalised.

Demography of the intervention group.

One third of this group were female, which matches the gender distribution of both ONS Alcohol Related Deaths and our DIAL cases. The majority of this group were aged between 35 and 64 years, with an even distribution of ages in between. However, only one person was over 65. Just under 10% were younger than 35 years. None were younger than 24 years.

Just over 10% of the intervention group were homeless at the time of death, and a smaller number permanently resided in caravans.

Roughly 30% had combined problems of alcohol and drug misuse. Almost all of this group used opiates, though in some cases this was intermittent. Stimulant use was also common.

About 40% had an identifiable mental health problem. Two thirds of these suffered from depression. A smaller number had personality disorder. A few suffered from psychosis or eating disorder.

Primary agency involvement.

Over half of the intervention group had contact with more than one treatment agency. Many had contact with both the statutory and the voluntary sector (though the distinction between these was not always clear). Consequently, a judgement was made by a medical member of the research team as to which secondary agency was taking a lead role in assisting the individual and this was regarded as the primary agency in the case.

The largest proportion of individuals, a third, had primary involvement with adult mental health services (excluding historical involvement with Child and Adolescent Mental Health Services).

The second largest group, just under a third, had primary involvement with general hospital medical services for treatment of the physical consequences of heavy drinking.

A fifth of the group had primary involvement with NHS drug dependency services and rather less than this had primary involvement with NHS alcohol treatment services.

The remainder had primary involvement with the voluntary sector, social services or probation (National Offender Management) services.

Three quarters of the group had had definite contact with the primary agency in the last year of their lives, and most were in current follow up at the time of death.

In a fifth of cases, there was no clear evidence that the primary agency was aware that the person had an alcohol problem. The majority of these were drug users who also abused alcohol.

Engagement with services

Almost two thirds of the intervention group showed evidence of failure to engage with alcohol treatment (e.g. repeated missed appointments, refusal to accept referral). However, many of these people did otherwise show adequate engagement with the primary agency (e.g. mental health services). A quarter had refused referral for specialist alcohol intervention, and in many cases this refusal was recurrent.

In three cases there was evidence that the individual had made treatment requests that had been refused. All of these involved requests for admission to psychiatric units.

In over a third of intervention cases there was evidence that the primary agency had made strenuous efforts to assist the person (e.g. repeated admissions for detoxification, complex care plans, provision of support workers). In a significant proportion of the remainder, there was inadequate information to judge the degree to which the primary agency had endeavoured to overcome poor engagement.

Roughly 10% of the intervention group were awaiting an intervention at the time of death. In some cases this was an assessment interview, in others admission for detoxification or alcohol rehabilitation.

Two thirds of the intervention group showed intoxication with alcohol at the time of death. The remainder died in hospital or at home as a consequence of alcohol related organ failure.

The no intervention group.

Amongst the DIAL cases where there was Inquest, there is a substantial group of people where there is evidence that there was no intervention other than contact with primary care. In the majority of this group, no alcohol problem was identified in life, and indeed in many cases, notwithstanding the role that alcohol played in their premature death, there is no evidence of alcohol dependency. There is a much smaller group of people with a well established alcohol problem who simply refused treatment.

For illustrative purposes, we have taken a random sample of twelve cases from the no intervention group. In three cases, there was a recognised alcohol problem, but the person refused treatment. In one further case the person was alcohol dependent, but it is not clear why they were not referred. None of the remaining eight appear to have been alcohol dependent, but all were significantly intoxicated at the time of death. Three died from accidents and two died of exposure. Three young men died by hanging when intoxicated.

Case Examples

Under CMHT, poor engagement with alcohol treatment.

A man in his early forties died as a consequence of massive haemorrhage from oesophageal varices, due to alcoholic liver disease. He had been under the care of general psychiatric services for more than 10 years for depression and paranoid ideas, which were believed to be a consequence of heavy drinking. He had involvement with a consultant psychiatrist, psychological therapies and social work. In the last three years of his life he was referred to NHS alcohol treatment services on five occasions, but only ever kept two appointments.

Poor engagement with all services

A sixty year old woman was accidentally run over by a car whilst lying in a poorly lit road, unconscious due to alcohol intoxication. She had a very long standing problem with alcohol dependency. Some years before her death she reported her alcohol consumption to be 200 Units/week, having recently resumed drinking after 10 years of abstinence. She suffered from depression. She was repeatedly referred for psychiatric treatment, but failed to keep appointments, or would not return for follow up. She showed the same pattern with regard to referrals to NHS alcohol

treatment services. She had recent general hospital treatment for withdrawal fits, for 'alcohol-induced psychosis' and for falls. At the time of her death she had recently agreed to be seen at home by NHS alcohol treatment services, but did not answer the door when a CPN called by appointment. Her husband had left the family home shortly before her death owing to her aggression when intoxicated.

Under drug services, alcohol problem not identified.

A forty year old man was found dead at home. He had a long history of opiate dependency and had been under follow up by NHS drug dependency services for many years. In recent times he had missed appointments with drug services, and he had reported his drinking to be one to two cans of beer per night. He had claimed to be free of drug misuse. Toxicology showed high levels of alcohol and diazepam post mortem, but no opiates.

Under CMHT, alcohol problem not identified

A woman in her late thirties was under a Community Mental Health Team for treatment of an eating disorder. It appears that she had been abstinent of alcohol for some time, but shortly before her death had a binge. She died of alcohol poisoning.

Under social services, alcohol problem not identified

A thirty year old man died of carbon monoxide poisoning after setting fires in his accommodation. This was the most recent of a long series of apparent attention seeking episodes when intoxicated with alcohol. He had a disturbed childhood, and life long involvement with social services. He showed a range of disturbed behaviours, some of which had led to criminal convictions. He was well known to the police and was subject to MAPPAs. He had been assessed by psychiatric services in emergency situations and was deemed to be suffering from no mental illness. He had become less chaotic towards the end of his life, having found a role and friendships in a local pub. There is no evidence that alcohol was regarded as a major problem, and there is no evidence of referral to alcohol services.

General hospital primary agency

A woman in her early forties died of liver failure due to alcoholic liver disease. She had repeated contact with general hospital services due to

withdrawal fits, renal and gastric problems. There had been repeated referrals for NHS alcohol treatment and alcohol counselling, but she had never kept any appointments.

Under drug services, homeless

A man in his mid-forties died of an overdose of methadone following heavy drinking. He was known to be dependent on both alcohol and opiates. He was under long term follow up with NHS substance misuse services. He was homeless at the time of his death, and died on a friend's sofa. He had repeated admissions for detoxification, several of which ended when he had consumed drugs or alcohol as an inpatient. The drug team were actively assisting him over accommodation at the time of his death.

Intractable failure to engage with services, homeless.

A homeless woman in her late forties died of alcohol poisoning whilst bedded down in an open fronted disused garage with other homeless people. She had been homeless for some years. There had been extensive contact with social services, mental health services, and general hospital services. She was in contact with services at the time of her death and she had a support worker. Placements repeatedly broke down because of her drinking. Despite strenuous efforts by services, she had no significant periods of sobriety. Her post mortem blood alcohol was nearly 600mg/100ml.

Awaiting assessment by alcohol services

A man in his late fifties died at home from liver failure due to alcoholic liver disease. He had a long history of alcohol dependency, but this was only recognised by medical services in the last two years of his life. He suffered from diabetes and from chronic depression. He had been referred to NHS alcohol treatment services twice in the year before his death, and he was awaiting a second appointment when he died. He lay down at home and passed into unconsciousness. Those around him thought he had been drinking and left him to sleep it off. However, on this occasion he wasn't intoxicated, but suffering from fulminating liver failure. In the morning he was found dead.

Awaiting admission by alcohol services

A woman in her mid forties was found dead at home after massive haemorrhage from oesophageal ulceration due to alcoholic liver disease. She was to be admitted for detoxification on the day of her death. She had a long history of alcohol dependency. Although she had only been in contact with specialist services in the last year of her life, there was intensive involvement. A support worker was in contact with her on the day of her death and was planning to take her to the alcohol treatment unit. She suffered alcoholic hallucinosis and may have been showing signs of Korsakoff's syndrome. She was markedly ambivalent regarding abstinence, and had not attended relapse prevention groups after a previous detoxification admission. She was significantly intoxicated with alcohol at the time of her death.

No intervention, person refused referral.

A man in his late sixties died of pneumonia in the context of self neglect related to chronic heavy drinking. His GP was aware of his alcohol problem, but when challenged he said that he liked drinking and did not want to stop. He attributed smoking related chronic obstructive airways disease to his previous employment in agriculture, describing it as 'Farmer's Lung' (though there was no medical diagnosis of this).

No intervention, death due to accident when intoxicated.

A woman in her early fifties died of subdural haematoma due to a severe head injury. She was not known to be a habitual heavy drinker. She had attended a formal dinner, and her reported degree of drunkenness was regarded by those around her to be disproportionate to the amount of wine she had consumed. Her post mortem blood alcohol was 163mg/100ml. Whilst confirming significant intoxication, this would tend to confirm low tolerance to alcohol. Having been dropped off close to her home, it appears that she tripped on her high heeled shoes, twisted as she fell, and suffered a depressed occipital skull fracture. She died where she lay.

FURTHER ANALYSIS.

The data set that this study has established requires extensive further qualitative and quantitative analysis. It is important to recognise that the findings it generates do not capture all deaths where alcohol is involved.

The method is novel and unconventional within epidemiology. However, taken together with more conventionally generated data, we believe that it is possible to considerably enhance knowledge as to how alcohol consumption causes premature death, and to better delineate those groups of people and patterns of alcohol consumption where alcohol involved fatality is a particular risk. This is likely to be of relevance in public policy and in optimising the impact of intervention services to prevent such deaths.

Initial scrutiny of our data set highlights some particular issues that demand closer attention. These include:

DIAL cases and women.

DIAL cases and accidents (especially falls).

DIAL cases and death through self harm (especially amongst young men).

Location of death in DIAL cases (a significant proportion of DIAL deaths occur at home).

DIAL cases and older people.

DIAL cases in rural versus urban settings.

DIAL cases and drug misuse (including prescribed and over-the-counter medications).

The data set includes information on deaths related to drug toxicity and poisonings where alcohol was not involved. This data can be subjected to the same heuristic processes in order to develop a similar approach to deaths involving drug misuse (of all types).

RECOMMENDATION 1.

The data set should be subject to thorough qualitative and quantitative analysis. The full findings should be disseminated through peer reviewed processes.

The experience of conducting this study, together with our findings, creates the opportunity to develop a novel method of reviewing deaths involving substance misuse in Wales. This will be an improvement on present processes as it will use systematic and reliable procedures to review deaths involving drug misuse, alcohol misuse and prescribed and over-the-counter medication, without artificially segregating them into separate review processes. It will allow capture of a wider range of such fatalities without becoming overwhelmed by the number of deaths and the data generated. In broad outline, the pilot scheme might follow the following fundamental principles and procedures:

- 1) A Welsh national pilot scheme to review deaths involving substance misuse could be conducted with the co-operation of Coroners who have a particular interest in these deaths, and whose premises and record systems will enable the pilot to run without disruption of normal activities. The participation of three jurisdictions will be necessary, covering urban, rural and former mining localities, with at least one jurisdiction in North Wales and at least one in South Wales.
- 2) Whilst 'pure' drug or alcohol involved deaths do occur, there is significant overlap between these categories. Death is sometimes due to combined effects, often together with misuse of prescribed or over the counter medications. Using a single process to review such deaths will more closely reflect realities, without compromising the ability of the review process to collect information about each separately.
- 3) Participating Coroners will be asked to carry out the primary screening process as developed in this study. Our pilot study (Robinson et al., 2009) showed that Coroners' impressionistic flagging identified a very similar group of deaths to our primary screening process, and the use of our rule based approach will make this more reliable. Coroners will also be asked to flag cases that they regard as being of special concern.

- 4) In cases identified as of interest after primary screening, the researchers will record basic death and demographic data in every case. This will create a 'background' data set.
- 5) Where the participating Coroner decides that an Inquest is necessary, they will be asked to collect a minimum data set for each case, including: witness statements, pathology reports including toxicology (where available), a report from the GP, reports from secondary health care services that the deceased had recently used and reports from other service providers who have been involved (e.g. non-statutory health and social care providers, housing support etc). The researchers will examine every Inquest 'case of interest' and extract data from it using a modified version of the DIAL data base.
- 6) All cases of interest will be subject to the same process of determining DIAL caseness as we have described. However, the process will include application of criteria to further identify drug-involved deaths (including prescribed and over the counter medications).
- 7) This will create a rich contemporaneous data base that will generate important information that can be analysed on a continuous basis.
- 8) Drawing on the data set, stratified sampling will be conducted to identify cases for full expert review.
- 9) Taken together, and analysed against the background of other, more conventional types of epidemiological surveillance, this novel approach will significantly improve the quality of information available to policy makers and service providers in designing interventions to reduce mortality due to these causes. Its utility should be subject to evaluation.

The development and piloting of this new scheme will require the involvement of researchers with expertise in interpretation of Coroners' data, and with a good grasp of the method we have developed. Provision of medical expertise, as in our study, will be essential.

RECOMMENDATION 2.

A pilot scheme should be developed using the DIAL method to systematically collect and review data

concerning premature death due to substance misuse (excluding tobacco) in Wales. This will inform service development and public policy to reduce mortality and harm attributable to this cause.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS.

CONCLUSION 1.

Coroners' data is rich and useful, but there are practical challenges for researchers working in Coroners' offices. Variation in criteria for Inquests and in data collection and storage makes this an unsuitable source for routine epidemiological data on this subject. However, each office shows consistency of practice over time, and selection of particular jurisdictions allows the collection of important qualitative and trend information.

CONCLUSION 2.

This study shows that the DIAL probabilistic approach to causation, when applied to Coroners' data in Inquest cases, can be reliably and practically applied by non-medical researchers with medical support to ascertain cases where alcohol has played a significant causal role in death.

CONCLUSION 3.

Our findings show that the DIAL method generates important information about lifestyle, patterns of drinking and premature deaths. It provides a mechanism to produce evidence regarding patterns of alcohol consumption, life circumstances and mortality that could not be ascertained using established methods.

CONCLUSION 4.

Further analysis of the data set will produce findings of national and international significance.

RECOMMENDATION 1.

The data set should be subject to thorough qualitative and quantitative analysis. The full findings should be disseminated through peer reviewed processes.

RECOMMENDATION 2.

A pilot scheme should be developed using the DIAL method to systematically collect and review data concerning premature death due to substance misuse (excluding tobacco) in Wales. This will inform service development and public policy to reduce mortality and harm attributable to this cause.

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The majority of deaths reported to the Coroner have three possible administrative outcomes.

- I. Pink Form A to the Registrar of Births and Deaths (this is where neither a post-mortem nor Inquest is deemed necessary)
- II. Pink Form B to the Registrar of Births and Deaths (this is where a post-mortem determines that the cause of death is natural)
- III. Inquest (this is where the coroner is concerned that the death was unnatural).

Most of the cases disposed of in each of the ways I-III will have an identified CoD. In addition, cases disposed of by an Inquest will have an Inquest verdict or Coroners' conclusion. In a very small number of cases the CoD will be undetermined. Where a death is subject to criminal charges (for example, homicide or death by dangerous driving) the Inquest will be opened and adjourned and in most cases not resumed. The information allows the death to be reported the Registrar of Births and Deaths. Each administrative category usually contains the following information:

- Pink Form A is limited to basic information such as sex, date of birth, age and cause of death.
- Pink Form B is more detailed and often includes a paragraph about the circumstances leading up to the death, post-mortem reports, toxicology results (in many cases) and histology results (in some cases).
- The most detailed information is available for those cases disposed of by an Inquest. Inquest files include witness statements taken from people present at the time or discovery of the death, family members and other people who knew the deceased. Reports from NHS substance misuse services and mental health services and voluntary sector organisations are present in some Inquest files. These reports are produced at the request of the Coroner. They are a retrospective account of service involvement. In a small number

of cases primary health care (GP) information going back many years is available.

APPENDIX 2. DIAL DATABASE STRUCTURE

1. ID
2. JURISDICTION
3. Primary screener
4. Data input date
5. A, B or Inquest
6. Gender
7. DoB
8. DoD
9. AGE
10. ONS ARD
11. ONS DRD
12. Marital Status
13. Living alone
14. Living with
15. Place of critical incident
16. Place of death
17. Occupation
18. COD1a
19. COD1b
20. COD1c
21. COD2
22. Coroners' summary (time, place, circumstances)
23. Coroners conclusion
24. Inquest verdict
25. Inquest narrative - link
26. Witness statement text - file location and name
27. PM collected
28. Tox collected
29. Link to PM information
30. Link to witness statement information
31. Primary Screen Alcohol
32. Primary Screen for Alcohol indicators
33. Primary Screen Fire
34. Primary Screen Fall
35. Self harm ?
36. Drugs overdose (legal, illegal) involved
37. Primary screen Drugs
38. RTA involved
39. RTA ?
40. Specialist alcohol referral in lifetime
41. Specialist mental referral in lifetime
42. Voluntary sector organisation involved

43. On waiting list for mental health services
44. Post Mortem text - file location and name
45. Post Mortem analysis concentrations - file location and name
46. Blood alcohol concentration /mg/100mL
47. Urine alcohol concentration /mg/100mL
48. Prescription drugs
49. Prescription drug name 1
50. Prescription drug 1 blood concentration /mg/L
51. Prescription drug name 2
52. Prescription drug 2 blood concentration /mg/L
53. Illegal drugs present
54. Illegal drug name 1
55. Illegal drug 1 blood concentration /mg/L
56. Illegal drug name 2
57. Illegal drug 2 blood concentration /mg/L
58. Other toxicants
59. General comments
60. Methods notes
61. Life event reported in witness statements or background
62. Death register ONLY review
63. Known to Psychiatric or Substance Misuse Services
64. No. years seriously drinking prior to death

Validation process 1

A sample of deaths was independently screened by two researchers. In comparing the deaths included and excluded by each researcher we established that a small variance in the list of cases included related to a processing error rather than a different interpretation of the information available.

Validation process 2

A sample of excluded files was checked by a different researcher. This resulted in a small number of additional deaths being screened into the sample. Again this related to an individual researcher overlooking a reference to 'alcohol' when reading the file and not to a difference in interpretation.

Validation process 3

A sample of cause of death entries on the register of deaths reported to the Coroner was screened by team members with and without medical background. This allowed the team to establish a list of conditions that automatically led to inclusion or exclusion.

Refinement process 1

In the initial stages of the screening process each B file and each Inquest file was independently reviewed by two researchers. We subsequently only carried out a double screen on the discard pile of the first screener. The initial screening and cross checking role was carried out by different member of the research team.

Refinement process 2

In the initial stages of the screening process we took a very wide approach to which files met our inclusion criteria for further review. In particular, we included any noted abnormality in the liver either in the post-mortem report or histology. This resulted in a large number of deaths being screened into the sample where the only indicator out of the list of our 12 inclusion criteria was a reference to, for example, fatty liver.

Team discussion and specific input from the medical members of the team resulted in a refinement to this initial screening process. We consequently stopped including those deaths for further review, if the **only** indicator was a liver abnormality with no mention of alcohol misuse.

Validation process 4

Medical and non medical researchers independently reviewed a sample of the cases where a liver anomaly or cause of death was the primary reason for screening the death into the sample for further review or where the non medical reviewer was unable to confidently exclude or include a case following the refinement process 2 above.

Validation process 5

A non-medical researcher applied ONS A-RD criteria to the entire list of deaths reported to participating Coroners in the timeframe. He applied the criteria on the basis of knowledge accumulated during data collection. In all cases of uncertainty, or where the CoD was not in the ONS glossary, a medical team member reviewed the case and applied the criteria.

Rules for A and B cases

Does CoD 1 include direct references to alcohol? (eg. alcoholic liver disease, alcohol abuse, alcoholism)

Yes – include

Does CoD 1 include disorders with known likely alcohol causation? (eg. cirrhosis, chronic pancreatitis, chronic liver disease)

Yes – examine PM report and exclude cases with clear alternative explanations (eg. Biliary cirrhosis, drug treatment)

Include cases without alternative explanations.

(At this point and others include FOR MEDICAL REVIEW cases where screener is unsure)

Does CoD 2 include direct references to alcohol or disorders with likely alcohol causation?

Yes – examine CoD 1 for disorders associated with alcohol abuse (eg. chronic disorders of the digestive tract)

Yes – examine circumstances surrounding death/medical history and PM report and EXCLUDE only cases which provide strong alternative (i.e. non-alcoholic) explanations.

No – examine circumstances surrounding death/medical history and PM report and include FOR TEAM REVIEW cases with other indications of alcohol involvement (eg. report of alcohol abuse, severe liver damage)

No alcohol indications in CoD

Examine circumstances surrounding death/medical history and PM report.

Include STRONG indications of alcohol involvement FOR TEAM REVIEW (eg. micronodular cirrhosis, alcohol damage identified histologically, alcohol in toxicology report)

Exclude weaker indicators of alcohol involvement (eg. fatty liver in older people with poor health, fatty liver associated with obesity, congested liver in chronic illness)

Rules for Inquest cases

Exclude cases clearly not of interest (e.g. infants, soldiers killed on active duty)

Include cases where the verdict indicates alcohol involvement (eg. "Death due to the abuse of alcohol", "Killed herself whilst under the influence of alcohol", reference to alcohol intoxication in Narrative verdict

Carry out the B file process for CoD indicating alcohol involvement.

No alcohol indications in CoD

Examine coroner's officer's summary, PM and witness statements

Include FOR TEAM REVIEW cases where long standing problems related to alcohol use are indicated (eg. treatment for alcohol related problems, personal problems resulting from alcohol use, family or friends identification of difficulties with alcohol)

Include FOR TEAM REVIEW cases where toxicology or witness statements indicate consumption of quantities of alcohol or alcohol intoxication in the period immediately leading up to death.

Additional pointers

In some drug related deaths, alcohol has been consumed alongside the relevant drug or drugs. These cases included FOR TEAM REVIEW.

In RTAs only deceased victims who were drivers and had consumed alcohol are included.

Victims of criminal offences who were intoxicated at the time of death are excluded because these cases are adjourned to criminal courts and the relevant data is therefore unavailable.

APPENDIX 5. THE APPLICATION OF DIAL CRITERIA.

In all cases, the criteria were applied by at least three team members. In cases where there was any degree of medical complexity, this included a medical team member. In all cases of doubt, there was a joint review by the full team.

A sample of cases was re-rated by the full team. No cases were reassigned from a definite DIAL case to borderline or DIAL non-case categories as a consequence.

A number of rules emerged through the process. The main rules established were:

- In A file cases, assignment to DIAL case status depended upon an alcohol related condition appearing in the CoD. In A file cases where the condition might or might not have been alcohol related (e.g. cirrhosis where alcohol was not mentioned), they were deemed to be DIAL non-cases.
- In B file cases there was more information, but similar principles applied. DIAL case status was applied conservatively, i.e. only if the team were quite convinced that alcohol led to death.
- The Inquest cases were considerably more complex. However, the team rarely had difficulty in making a categorical assignment.
- We recognised that post-mortem blood alcohol concentrations are difficult to interpret. Firstly, there is sometimes a considerable delay between ingestion of alcohol and death. Where this delay is relatively short, comparison with urine alcohol concentration gives a rough guide to the peak degree of intoxication. Secondly, alcohol is redistributed through fluid compartments after death. Thirdly, alcohols are one of the products of post-mortem decomposition. We made the arbitrary assumption that post-mortem blood alcohol concentrations below the drink drive limit were not significant in the absence of other evidence of intoxication. Where the blood concentration was very high (twice or more the drink drive limit) we assumed that this was sufficient to affect behaviour before death. Other levels were judged in the context of other evidence.
- Where individuals were known to have expressed suicidal thoughts and plans days or weeks before fatal self harm, alcohol was not

regarded as a primary causal factor in death, even where the individual had a chronic drink problem. Intoxication was only regarded as playing a causal role in self harm where *either* the fatal act involved marked impulsivity (for example, throwing one's self from a height when drunk) *or* intoxication made it difficult to survive in the event of a change of heart (for example, drowning).

- People with chaotic lifestyles, with multiple health risks in addition to alcohol misuse, sometimes appeared to have died of self neglect. These were only DIAL cases where the predominance of their alcohol problem was obvious.
- Witness statements that the person had a history of heavy drinking were accepted as accurate. However, this only established that person had misused alcohol, not that this had led to their death.
- Where heavy drinkers died of ischaemic heart disease, they were not categorised as DIAL cases. Whilst alcohol is a risk factor for heart disease, there are other risk factors, including heavy smoking and obesity, both of which are associated with alcohol misuse.