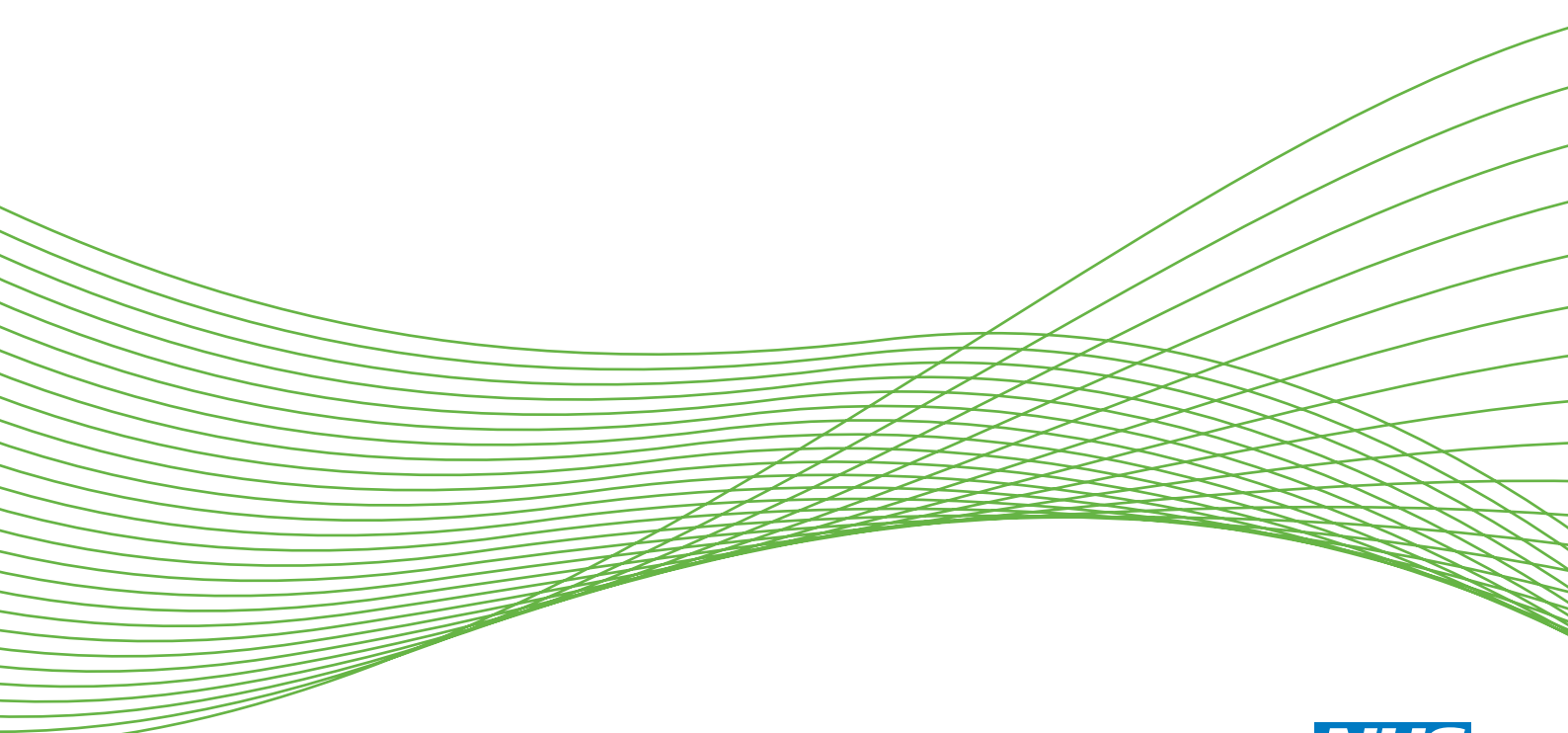


A multicentre programme of clinical and public health research in support of the *National Suicide Prevention Strategy for England*

D Gunnell, K Hawton, O Bennewith, J Cooper, S Simkin, J Donovan, J Evans, D Longson, S O'Connor and N Kapur



**National Institute for
Health Research**

A multicentre programme of clinical and public health research in support of the *National Suicide Prevention Strategy for England*

D Gunnell,^{1*} K Hawton,^{2,3} O Bennewith,¹ J Cooper,⁴
S Simkin,² J Donovan,¹ J Evans,^{1,5} D Longson,⁶
S O'Connor⁵ and N Kapur^{4,6}

¹School of Social and Community Medicine, University of Bristol, Bristol, UK

²Centre for Suicide Research, Department of Psychiatry, University of Oxford, Oxford, UK

³Oxford Health NHS Foundation Trust, Oxford, UK

⁴Centre for Suicide Prevention, University of Manchester, Manchester, UK

⁵Avon and Wiltshire Mental Health Partnership NHS Trust, Chippenham, UK

⁶Manchester Mental Health and Social Care Trust, Manchester, UK

*Corresponding author

Declared competing interests of authors: David Gunnell, Keith Hawton and Nav Kapur are members of England's National Suicide Prevention Advisory Group. David Gunnell is also a member of the Medicines and Healthcare products Regulatory Agency (MHRA) Pharmacovigilance Expert Advisory Group. Keith Hawton and Sue Simkin acted as temporary advisers to the MHRA for its evaluation of the efficacy and safety profile of co-proxamol. Nav Kapur was chairperson of the Guideline Development Group for the National Institute for Health and Care Excellence 2011 guidelines on the longer-term management of self-harm.

Disclaimer: This report contains transcripts of interviews, and similar, conducted in the course of the research and contains language which may offend some readers.

Published October 2013

DOI: 10.3310/pgfar01010

This report should be referenced as follows:

Gunnell D, Hawton K, Bennewith O, Cooper J, Simkin S, Donovan J, *et al.* A multicentre programme of clinical and public health research in support of the *National Suicide Prevention Strategy for England*. *Programme Grants Appl Res* 2013;**1**(1).

Programme Grants for Applied Research

ISSN 2050-4322 (Print)

ISSN 2050-4330 (Online)

This journal is a member of and subscribes to the principles of the Committee on Publication Ethics (COPE) (www.publicationethics.org/).

Editorial contact: nihredit@southampton.ac.uk

The full PGfAR archive is freely available to view online at www.journalslibrary.nihr.ac.uk/PGfAR. Print-on-demand copies can be purchased from the report pages of the NIHR Journals Library website: www.journalslibrary.nihr.ac.uk

Criteria for inclusion in the *Programme Grants for Applied Research* journal

Reports are published in *Programme Grants for Applied Research* (PGfAR) if (1) they have resulted from work for the PGfAR programme, and (2) they are of a sufficiently high scientific quality as assessed by the reviewers and editors

Programme Grants for Applied Research programme

The Programme Grants for Applied Research (PGfAR) programme, part of the National Institute for Health Research (NIHR), was set up in 2006 to produce independent research findings that will have practical application for the benefit of patients and the NHS in the relatively near future. The Programme is managed by the NIHR Central Commissioning Facility (CCF) with strategic input from the Programme Director.

The programme is a national response mode funding scheme that aims to provide evidence to improve health outcomes in England through promotion of health, prevention of ill health, and optimal disease management (including safety and quality), with particular emphasis on conditions causing significant disease burden.

For more information about the PGfAR programme please visit the website: www.ccf.nihr.ac.uk/PGfAR

This report

The research reported in this issue of the journal was funded by PGfAR as project number RP-PG-0606-1247. The contractual start date was in June 2011. The final report began editorial review in September 2012 and was accepted for publication in March 2013. As the funder, the PGfAR programme agreed the research questions and study designs in advance with the investigators. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The PGfAR editors and production house have tried to ensure the accuracy of the authors' report and would like to thank the reviewers for their constructive comments on the final report document. However, they do not accept liability for damages or losses arising from material published in this report.

This report presents independent research funded by the National Institute for Health Research (NIHR). The views and opinions expressed by authors in this publication are those of the authors and do not necessarily reflect those of the NHS, the NIHR, CCF, NETSCC, PGfAR or the Department of Health. If there are verbatim quotations included in this publication the views and opinions expressed by the interviewees are those of the interviewees and do not necessarily reflect those of the authors, those of the NHS, the NIHR, NETSCC, the PGfAR programme or the Department of Health.

© Queen's Printer and Controller of HMSO 2013. This work was produced by Gunnell *et al.* under the terms of a commissioning contract issued by the Secretary of State for Health. This issue may be freely reproduced for the purposes of private research and study and extracts (or indeed, the full report) may be included in professional journals provided that suitable acknowledgement is made and the reproduction is not associated with any form of advertising. Applications for commercial reproduction should be addressed to: NIHR Journals Library, National Institute for Health Research, Evaluation, Trials and Studies Coordinating Centre, Alpha House, University of Southampton Science Park, Southampton SO16 7NS, UK.

Published by the NIHR Journals Library (www.journalslibrary.nihr.ac.uk), produced by Prepress Projects Ltd, Perth, Scotland (www.prepress-projects.co.uk).

Programme Grants for Applied Research Editor-in-Chief

Professor Paul Little Professor of Primary Care Research, University of Southampton, UK

NIHR Journals Library Editor-in-Chief

Professor Tom Walley Director, NIHR Evaluation, Trials and Studies and Director of the HTA Programme, UK

NIHR Journals Library Editors

Professor Ken Stein Chair of HTA Editorial Board and Professor of Public Health, University of Exeter Medical School, UK

Professor Andree Le May Chair of NIHR Journals Library Editorial Group (EME, HS&DR, PGfAR, PHR journals)

Dr Martin Ashton-Key Consultant in Public Health Medicine/Consultant Advisor, NETSCC, UK

Professor Matthias Beck Chair in Public Sector Management and Subject Leader (Management Group), Queen's University Management School, Queen's University Belfast, UK

Professor Aileen Clarke Professor of Health Sciences, Warwick Medical School, University of Warwick, UK

Dr Tessa Crilly Director, Crystal Blue Consulting Ltd, UK

Dr Peter Davidson Director of NETSCC, HTA, UK

Ms Tara Lamont Scientific Advisor, NETSCC, UK

Dr Tom Marshall Reader in Primary Care, School of Health and Population Sciences, University of Birmingham, UK

Professor Elaine McColl Director, Newcastle Clinical Trials Unit, Institute of Health and Society, Newcastle University, UK

Professor William McGuire Professor of Child Health, Hull York Medical School, University of York, UK

Professor Geoffrey Meads Honorary Professor, Business School, Winchester University and Medical School, University of Warwick, UK

Professor Jane Norman Professor of Maternal and Fetal Health, University of Edinburgh, UK

Professor John Powell Consultant Clinical Adviser, National Institute for Health and Care Excellence (NICE), UK

Professor James Raftery Professor of Health Technology Assessment, Wessex Institute, Faculty of Medicine, University of Southampton, UK

Dr Rob Riemsma Reviews Manager, Kleijnen Systematic Reviews Ltd, UK

Professor Helen Roberts Professorial Research Associate, University College London, UK

Professor Helen Snooks Professor of Health Services Research, Institute of Life Science, College of Medicine, Swansea University, UK

Please visit the website for a list of members of the NIHR Journals Library Board:
www.journalslibrary.nihr.ac.uk/about/editors

Editorial contact: nihredit@southampton.ac.uk

Abstract

A multicentre programme of clinical and public health research in support of the *National Suicide Prevention Strategy for England*

D Gunnell,^{1*} K Hawton,^{2,3} O Bennewith,¹ J Cooper,⁴ S Simkin,² J Donovan,¹ J Evans,^{1,5} D Longson,⁶ S O'Connor⁵ and N Kapur^{4,6}

¹School of Social and Community Medicine, University of Bristol, Bristol, UK

²Centre for Suicide Research, Department of Psychiatry, University of Oxford, Oxford, UK

³Oxford Health NHS Foundation Trust, Oxford, UK

⁴Centre for Suicide Prevention, University of Manchester, Manchester, UK

⁵Avon and Wiltshire Mental Health Partnership NHS Trust, Chippenham, UK

⁶Manchester Mental Health and Social Care Trust, Manchester, UK

*Corresponding author

Objectives: To carry out a programme of linked research studies aimed at improving the management of self-harm, reducing the incidence of suicide and providing reliable data to evaluate the impact of the *National Suicide Prevention Strategy for England* (2002).

Methods: There were four research streams: (1) we studied inquest records from 12 coroners and Ministry of Justice data to assess the accuracy of official suicide statistics; (2) we used Office for National Statistics mortality statistics, data from the Multicentre Study of Self-harm in England, national liver unit data, prescription data and patient interviews to assess (a) the impact of paracetamol (acetaminophen) pack size restrictions (1998), (b) the impact of withdrawal of co-proxamol in 2007 and (c) the relative toxicity in overdose of commonly used antidepressants; (3) we carried out 3-month audits of self-harm management in 32 hospitals to investigate variations between hospitals and the impact of management on repeat self-harm; and (4) we developed and piloted letter-based contact interventions aimed at reducing self-harm.

Key findings: (1) Between 1990 and 2005, the proportion of researcher-defined suicides given a verdict of suicide by the 12 coroners studied decreased by almost 7%, largely because of the increased use of misadventure/accident verdicts for deaths thought, on clinical review, to be suicides. Use of narrative verdicts increased markedly. Coroners who gave more narrative verdicts also gave fewer suicide verdicts, and geographical variations in the use of narrative verdicts appeared to distort reliable assessment of small-area differences in suicide rates. 2(a) UK legislation to reduce pack sizes of paracetamol was followed by a 43% reduction in number of deaths and a 61% reduction in registrations for liver transplantation over the next 11 years. Paracetamol overdoses were often impulsive and some were influenced by media (including the internet); sales outlets appeared mostly to be adhering to sales guidance. Smaller pack sizes of paracetamol for sale in Ireland compared with England did not result in a smaller number of tablets being taken in overdose. There was no clear evidence of an effect of the legislation on prescribing of non-steroidal anti-inflammatory drugs, nor on resulting gastrointestinal bleeds. 2(b) Withdrawal of co-proxamol from use in the UK resulted in approximately 600 fewer deaths than predicted between 2005 and 2010 based on previous trends, with no evidence of substitution by poisoning with other analgesics. 2(c) Of the tricyclic antidepressants, dosulepin and doxepin had the greatest toxicity. Citalopram was more toxic than other selective serotonin reuptake inhibitors. (3) There was marked variation between hospitals in the management of self-harm; effects of this variation on patient outcomes were unclear, although psychosocial assessment

may have been associated with reduced repetition. Levels of specialist assessment remained static between 2001–2 and 2010–11, but service quality appeared to improve. (4) Findings of two pilot randomised controlled trials suggested that, although it would be feasible to scale up these interventions to full trials, these interventions might have low generalisability and be of limited benefit to patients.

Conclusion: Within the context of the strengths and limitations of the individual studies, this research programme has made significant additions to the evidence base related to suicide and self-harm prevention in the UK.

Study registration: A pilot study of a contact and information based intervention to reduce repeat self-harm; ISRCTN65171515.

Funding: The National Institute for Health Research Programme Grants for Applied Research programme.

Contents

Glossary	xi
List of abbreviations	xiii
Scientific summary	xv
Chapter 1 Introduction	1
Priority areas in suicide prevention	1
Aim	2
Structure of this report	3
Definitions	3
Chapter 2 The influence of changes in coroners' practices on the validity of national suicide rates in England	5
Abstract	5
Background	5
Objectives	6
Methods	7
Results	9
Discussion	18
Chapter 3 Studies to evaluate the impact of the 1998 UK legislation restricting pack sizes of paracetamol	23
Abstract	23
Background	23
STUDY 1: LONG-TERM EVALUATION OF THE IMPACT OF REDUCED PACK SIZES OF PARACETAMOL ON POISONING DEATHS AND LIVER TRANSPLANT ACTIVITY IN ENGLAND AND WALES	24
Objective	24
Methods	24
Results	25
Discussion	31
STUDY 2: AN INTERVIEW STUDY OF PATIENTS WHO HAVE TAKEN LARGER PARACETAMOL OVERDOSES	33
Objectives	33
Methods	33
Results	33
Discussion	38
STUDY 3: A COMPARATIVE STUDY OF THE IMPACT OF DIFFERENT PACK SIZES OF PARACETAMOL ON INTENTIONAL OVERDOSES IN ENGLAND AND IRELAND	39
Objective	39
Methods	39
Results	40
Discussion	42
STUDY 4: THE IMPACT OF LIMITATIONS ON PACK SIZES OF ANALGESICS ON USE OF NON-STEROIDAL ANTI-INFLAMMATORY DRUGS AND CONSEQUENT GASTROINTESTINAL BLEEDING AND USE OF MEDICATION FOR GASTROINTESTINAL DISORDERS	45
Objectives	45

Methods	45
Results	46
Discussion	48
Chapter 4 Evaluation of the impact of co-proxamol withdrawal in England and Wales on prescribing and deaths	49
Abstract	49
Background	49
Objective	50
Methods	50
Results	51
Discussion	58
Conclusions	60
Chapter 5 Toxicity of antidepressants: study of rates of suicide relative to prescribing and non-fatal overdose	61
Abstract	61
Background	61
Objectives	62
Methods	62
Results	63
Discussion	63
Conclusions	65
Chapter 6 Variations in self-harm service delivery: an observational study examining outcomes and temporal trends	69
Abstract	69
Background	69
Methods	70
Results	73
Discussion	79
Conclusion	81
Chapter 7 A pilot randomised controlled trial of an information and contact-based intervention to reduce repeat self-harm	83
Abstract	83
Background	83
STUDY 1: DEVELOPING A CONTACT-BASED INTERVENTION FOR SELF-HARM	85
Objectives	85
Methods	85
Results	86
STUDY 2: PILOTING A CONTACT-BASED INTERVENTION FOR SELF-HARM	88
Objectives	88
Methods	88
Results	90
Discussion	95
Conclusions	96
Chapter 8 Development and pilot study of an intervention aimed at reducing the incidence of fatal and non-fatal self-harm in the period after psychiatric hospital discharge	99
Abstract	99
Background	99

Objective	100
Methods	100
Results	102
Discussion	109
Conclusions	111
Chapter 9 Discussion	113
Synergies	113
Public and patient involvement	113
Limitations	113
National suicide statistics	114
The influence of prescribing and availability of analgesics and antidepressants on suicide	115
Self-harm services and suicide prevention	117
Preventing suicide in high-risk groups	117
Implications and recommendations	118
Acknowledgements	121
References	125
Appendix 1 Form used to extract data on coroners' verdicts	137
Appendix 2 Protocol for coding vignettes	147
Appendix 3 Interrupted time-series segmented regression analysis	149
Appendix 4 Questionnaire and topic guide for interview study with patients who had taken an overdose of paracetamol	153
Appendix 5 Hospital interview questionnaire	163
Appendix 6 Audit form	183
Appendix 7 Topic guide: service user interviews	185
Appendix 8 Topic guide: staff focus group	189
Appendix 9 Leaflet provided to patients in the intervention group	193
Appendix 10 Example letter for contact intervention	197
Appendix 11 Topic guide: post-intervention participant interviews	199
Appendix 12 Emergent themes from post-intervention participant interviews	203
Appendix 13 Letters used for contact intervention	205
Appendix 14 Intervention leaflet	209
Appendix 15 Post-intervention participant questionnaire	211
Appendix 16 Public and patient involvement in the research programme	215

Glossary

Accidental death A death resulting from actions by an individual or others that have unintended consequences.

Case fatality index The rate of mortality from self-poisoning relative to the non-fatal self-poisoning rate for a specific drug (mortality rate/non-fatal self-poisoning rate). Note: case fatality would typically be defined as the proportion of cases of self-poisoning that are fatal; however, the nature of our data (national mortality/multicentre register incidence, that is, data from three centres) has led us to operationalise the definition slightly differently.

Co-proxamol A prescribed medicine combining paracetamol and dextropropoxyphene used for pain relief. It was withdrawn from use in the UK on 31 December 2007.

Cyclo-oxygenase-2 (COX-2) inhibitor A type of non-steroidal anti-inflammatory drug that works by directly targeting COX-2, an enzyme that is involved in causing inflammation and pain.

Dosulepin One of a group of similar antidepressants known as tricyclic antidepressants.

Fatal toxicity index The rate of mortality from overdose of a specific drug relative to its rate of prescription (mortality rate/prescription rate).

Misadventure, death by The terms 'accident' and 'misadventure' are often used interchangeably by coroners. Some suggest that the distinction is that a death by misadventure occurs when the action was deliberate but the outcome unintended, whereas with accidents both the action and the outcome were unintended.

Narrative verdict This form of verdict records, in several sentences, how, and in what circumstances, the death occurred, rather than giving a single 'short-form' verdict such as suicide, open or accidental death.

Non-steroidal anti-inflammatory drug Non-steroidal anti-inflammatory drugs such as aspirin and ibuprofen work to reduce both pain and inflammation and are used very commonly to treat conditions such as headache and arthritis. However, the chemical action of non-steroidal anti-inflammatory drugs that makes them effective in treating pain and inflammation can also cause gastrointestinal problems, particularly in long-term users.

Noradrenergic and specific serotonergic antidepressant A type of antidepressant that works by increasing neurotransmission of noradrenaline and serotonin.

Open verdict A verdict given by a coroner following an inquest when there is insufficient evidence to determine the deceased's intent or if it is unclear whether the death was self-inflicted or accidental.

Paracetamol-induced hepatotoxicity Injury to the liver caused by overdose or excessive use of paracetamol, which can lead to liver failure.

Potential years of life lost A measure of premature mortality calculated by comparing the age of premature death (e.g. by suicide) with the expected age of death had the person not died prematurely from that cause (e.g. 75 years).

Selective serotonin reuptake inhibitor A type of antidepressant that works by increasing the amount of serotonin in the brain.

Self-harm A deliberate non-fatal act, whether physical, drug overdose or poisoning, carried out in the knowledge that it was potentially harmful and, in the case of drug overdose, that the amount taken was excessive.

Serotonin–noradrenaline reuptake inhibitor A type of antidepressant that works by increasing the amount of serotonin and noradrenaline in the brain.

Suicide An act of self-harm that results in death.

Tricyclic antidepressants An older style of antidepressant named for its chemical structure that forms three rings; these act by increasing the level of noradrenaline and serotonin in the brain.

List of abbreviations

CDMS	Clinical Decision Management System	MHRN	Mental Health Research Network
CI	confidence interval	NaSSA	noradrenergic and specific serotonergic antidepressant
CSM	Committee on Safety of Medicines	NICE	National Institute for Health and Care Excellence
df	degrees of freedom	NSAID	non-steroidal anti-inflammatory drug
FDA	US Food and Drug Administration	ONS	Office for National Statistics
GI	gastrointestinal	OR	odds ratio
HADS	Hospital Anxiety and Depression Scale	OTC	over-the-counter
HES	Hospital Episode Statistics	PYLL	potential years of life lost
HR	hazard ratio	SD	standard deviation
ICD-9	<i>International Classification of Diseases</i> , Ninth Edition	SIS	Suicidal Intent Scale
ICD-10	<i>International Classification of Diseases</i> , Tenth Edition	SNRI	serotonin–noradrenaline reuptake inhibitor
IQR	interquartile range	SSRI	selective serotonin reuptake inhibitor
IRR	incidence risk ratio	TCA	tricyclic antidepressant
LA	local authority		
MHRA	Medicines and Healthcare products Regulatory Agency		

All abbreviations that have been used in this report are listed here unless the abbreviation is well known (e.g. NHS), or it has been used only once, or it is a non-standard abbreviation used only in figures/tables/appendices, in which case the abbreviation is defined in the figure legend or in the notes at the end of the table.

Scientific summary

Background

Suicide and non-fatal self-harm are major, potentially preventable causes of premature mortality and morbidity accounting for >4000 deaths and 200,000 hospital presentations every year in England. The Department of Health's *National Suicide Prevention Strategy for England* (2002) aimed to reduce these outcomes.

Rationale and objectives

Our overall aim was to carry out a programme of linked research studies to provide evidence to improve the management of self-harm, reduce the incidence of suicide and assess the reliability of the suicide mortality statistics used to monitor the impact of the prevention strategy. The rationale and objectives for each of our research streams are outlined in the following sections.

1. Suicide statistics

In the UK, official suicide statistics may be affected by variations in coroners' classifications of deaths as suicide. Coroners may give possible suicides one of four verdicts: suicide, open (given if insufficient evidence to determine suicidal intent), accidental/misadventure (given to a death resulting from actions of the deceased or others that have unintended consequences) or narrative (records in several sentences how, and in what circumstances, the death occurred). The objective of our first work stream was to quantify the extent to which suicide rates, secular trends in suicide, and suicides from co-proxamol, paracetamol (acetaminophen) and tricyclic antidepressant (TCA) poisoning may have been over- or underestimated when based on deaths given suicide or open verdicts by coroners.

2. Medicines commonly taken in fatal overdoses

In the 1990s, overdoses of paracetamol, co-proxamol and dosulepin accounted for approximately 10% of all suicides in England. Consequently, legislation to limit the size of paracetamol packs was introduced in 1998, and co-proxamol was withdrawn in the UK between 2005 and 2007. In this work stream we investigated (a) the long-term impact of the 1998 legislation restricting pack sizes of paracetamol; (b) whether or not the current limit on sales of paracetamol is appropriate and being adhered to; (c) the impact of differing paracetamol regulations in the UK and Ireland; (d) whether or not any increased use of alternative non-steroidal anti-inflammatory drugs (NSAIDs) had led to increased rates of gastrointestinal (GI) haemorrhage; (e) the impact of the withdrawal of co-proxamol on suicide and self-harm in the UK; and (f) the relative toxicity of specific antidepressants.

3. Assessment and management of people who self-harm

The NHS's response to self-harm may be crucial in preventing repeat episodes and ultimately suicide. However, uncertainty as to the most appropriate management of self-harm patients has led to wide variations between hospitals. The objectives of this work stream were to investigate variations in management between hospitals and to determine whether or not the management of self-harm influenced patient outcome, as indicated by self-harm repetition.

4. Trials of interventions to reduce self-harm in high-risk clinical populations

There is a lack of high-quality evidence concerning clinical interventions to reduce suicide rates in two key high-risk groups: patients who have self-harmed and people discharged from psychiatric hospitals. Trials of contact-based (e.g. mail, telephone) interventions have shown some promise. Our objective in this work package was to develop and pilot contact-based interventions aimed at reducing self-harm.

Methods

1. Suicide statistics

We studied inquest records from 12 coroners' jurisdictions in England for deaths that had occurred in 1990–1, 1998, 2005 and, for some methods, also 2006 and 2007. Three researchers rated each case of possible suicide (those given open, narrative or accident/misadventure verdicts by coroners) as being of high, moderate, low or unclear likelihood of suicide. Time trends in the use of different verdicts for these researcher-defined suicides were investigated. We compared researcher-defined suicides for 1998 and 2005 with the way that the Office for National Statistics (ONS) coded these deaths. We specifically investigated verdicts given to deaths from co-proxamol, paracetamol and TCA poisoning. Ministry of Justice data on inquests held between 2008 and 2009 and local authority suicide data (2001–2 and 2008–9) were used to investigate variations between coroners in their use of narrative verdicts and the impact of these on suicide rates, using 'other' verdicts (79% of which are narrative verdicts) as a proxy for narrative verdicts.

2. Medicines commonly taken in fatal overdoses

Paracetamol

We assessed the effects on overdoses of the 1998 legislation limiting pack sizes of paracetamol in four ways:

1. *Poisoning deaths and liver transplants.* To determine the long-term impact of the paracetamol legislation we examined ONS paracetamol mortality data for England and Wales (1993–2009), and liver unit registrations for transplantation and actual liver transplants for paracetamol-induced liver failure in England and Wales between 1995 and 2009 (data from NHS Blood and Transplant). Trends in the data were compared for the period before and the period after the introduction of the legislation.
2. *Patient interview study.* To determine the characteristics of people who take paracetamol in overdose and to examine adherence to paracetamol sales guidelines, we interviewed 60 patients who presented to an Oxford (UK) hospital after taking an overdose of > 16 tablets of paracetamol. We asked about the circumstances of the overdose, the source of the tablets, whether or not they had tried to buy more than the recommended amount and the expected effects of the overdose.
3. *Pack size and size of overdose.* To determine whether or not smaller pack sizes sold in Ireland compared with those sold in England have resulted in a smaller number of tablets being taken in non-fatal overdoses in Ireland, we compared hospital presentations to six hospitals in England for non-fatal self-harm using paracetamol with data from Ireland's National Registry of Deliberate Self Harm for the period 2003–7.
4. *NSAIDs and GI haemorrhage.* To assess whether or not legislation restricting pack sizes of paracetamol resulted in increased use of NSAIDs and a consequent increase in GI symptoms, we examined UK prescription data for analgesics and antiulcerants (used to combat GI irritation) and English hospital admission data for GI bleeds for a period before (1994–8) and a period after (1999–2004) the introduction of the legislation.

Co-proxamol

We examined ONS data on drug-poisoning deaths and national prescribing data for analgesics from England and Wales from three time periods: preceding co-proxamol withdrawal (1998–2004), during its phased withdrawal (2005–7) and following completed withdrawal (2008–10). Trends in drug-poisoning deaths over these three periods were examined, as were the associations between reduced prescribing of co-proxamol and prescribing of alternative analgesics.

Antidepressants

We examined the relative toxicity of TCAs, selective serotonin reuptake inhibitors (SSRIs), venlafaxine (a serotonin–noradrenaline reuptake inhibitor) and mirtazapine (a noradrenergic and specific serotonergic antidepressant). We calculated, using national data, each drug's fatal toxicity index (mortality rate from self-poisoning with the drug/prescription rate) and case fatality index (mortality rate from self-poisoning with the drug/non-fatal self-poisoning rate), and assessed their relative toxicity compared with amitriptyline (a TCA).

3. Assessment and management of people who self-harm

Over a 3-month period we collected patient and in-hospital management data from 32 hospitals in England related to presenting episodes of self-harm. Re-presentations for self-harm within 6 months were also recorded. Key mental health and emergency department staff were interviewed regarding current service structures for self-harm management and a standard measure of service quality was calculated. Data were examined for relationships between provision of aspects of self-harm management and repetition of self-harm. Using data collected in a previous study (2001–2), we also examined the changes in self-harm management that had occurred over time.

4. Trials of interventions to reduce self-harm in high-risk clinical populations

We carried out two pilot studies to assess the feasibility of conducting full randomised trials of a series of letters sent to patients over a 12-month period following (a) presentation to hospital for self-harm and (b) psychiatric hospital discharge from three different inpatient units. Both interventions also included provision of a leaflet listing local sources of help. The letters (eight in Bristol and six in Manchester) expressed concern and encouraged service engagement. The Manchester intervention also included two follow-up calls to patients in the 2 weeks following discharge. These interventions were developed in consultation with service users and hospital staff using questionnaires, interviews and focus groups.

Key findings

1. Suicide statistics

- We reviewed 2086 inquest records. Between 1990 and 2005, the proportion of researcher-defined suicides with a coroner's suicide verdict decreased by almost 7% (from 72.0% in 1991 to 65.4% in 2005), largely because of an increase in researcher-defined suicides given misadventure/accident verdicts by coroners [from 4.6% to 9.1%, $p(\text{trend})=0.001$]. Half of the medicine poisoning deaths given accidental verdicts at inquest were researcher-defined suicides.
- The numbers of suicides by co-proxamol, paracetamol and TCA poisoning are underestimated by between 12% (co-proxamol) and 26% (paracetamol) when estimates are based on suicide and open verdict deaths alone.
- There was a marked rise in the number of narrative verdicts and wide geographical variation in their use.
- Coroners who gave more narrative verdicts also gave fewer suicide verdicts. In the 10 coroners' areas with the highest proportion of narrative verdicts the official incidence of suicide decreased by 16% between 2001–2 and 2008–9, but in those coroners' areas where narrative verdicts were used least frequently the official incidence of suicide increased by 1%.

2. Medicines commonly taken in fatal overdoses

Paracetamol

- There were significant reductions in suicide deaths from paracetamol overdose [estimated average = –17 suicide deaths per quarter, 95% confidence interval (CI) –25 to –9 suicide deaths per quarter] during the 11 years following the legislation, equating to approximately 765 fewer deaths (–43%). There were an estimated 990 fewer deaths when accidents were included.
- Registrations for liver transplantation for paracetamol-induced hepatotoxicity were reduced by 10.7 per quarter during the 11 years following the legislation (95% CI –20 to –1 registrations per quarter) or 61%.
- Overdoses of paracetamol were often impulsive, and some were influenced by the media, including the internet. Participants often chose paracetamol because it was cheap and easily available. Most outlets adhered to the guidance restricting sales.
- The median number of tablets taken in non-fatal overdose did not differ significantly between England (22 tablets) and Ireland (24 tablets), although more pack equivalents were taken in overdose in Ireland

(2.63, 95% CI 2.57 to 2.69 packs) than in England (2.07, 95% CI 2.03 to 2.10 packs) ($\chi^2=215.6$, $p<0.001$).

- Introduction of smaller pack sizes was followed by a gradual increase in prescribing of NSAIDs (along with other analgesics). However, there was no apparent consequent increase in GI adverse effects (hospital admissions for GI bleeds decreased by 0.4 per 100,000 per quarter; $p=0.012$), although increased prescribing of antiulcerants may have offset any negative effects.

Co-proxamol

- There were approximately 500 fewer deaths from suicide involving co-proxamol ingestion between 2005 and 2010 than would have been expected without the withdrawal (600 including accidental deaths).
- There is no evidence that there has been significant substitution by poisoning with other analgesics, in spite of increased prescribing of some of them.

Antidepressants

- The TCAs dosulepin and doxepin (Sinopin[®], Marlborough) had the highest toxicity levels of all antidepressants.
- Venlafaxine appears to be less toxic than the TCAs but more toxic than the SSRIs and slightly more toxic than mirtazapine.
- Fatal toxicity was three times higher for citalopram than for the other SSRIs.

3. Assessment and management of people who self-harm

- Our audits included 6442 individuals presenting with self-harm across the 32 centres. We identified a 3.5-fold difference between hospitals in the proportion of individuals who received a specialist assessment (median 59%, range 28–91%) and a fivefold difference in the proportion of individuals receiving specialist follow-up (median 26%, range 11–61%).
- A hospital-based analysis suggested little association between management and subsequent self-harm repetition, but an individual-level analysis suggested that specialist psychosocial assessment might be associated with reduced risk of repetition.
- Levels of specialist assessment had remained static between 2001–2 and 2010–11, but scores on a service quality scale increased by 26%.

4. Trials of interventions to reduce self-harm in high-risk clinical populations

Patients presenting with self-harm

- The intervention was challenging although feasible to administer, with just under half of eligible patients being recruited to the trial.
- The 12-month repeat rate for self-harm was 34% for the intervention group ($n=32$) compared with 12.5% for the usual treatment group ($n=32$).

Psychiatric inpatient discharges

- The intervention was feasible to administer.
- 102 patients involved in the pilot study received at least one letter; however, because of dropout, largely relating either to readmission ($n=26$) or to patients opting out ($n=24$), only 45 (44.1%) received the full series of letters.
- Patients did not feel that the intervention added to their existing levels of support after discharge, although some thought that it might be more useful for those new to the mental health system or who were receiving less support but that fewer letters should be sent.

Conclusions

This programme of research has a number of findings that have important implications for public health and clinical practice, as well as future research relevant to suicide prevention.

Implications for public health practice

1. Small-area (primary care trusts/local authorities) suicide rates and changes in these rates over time since 2000 should be interpreted with caution in those areas where coroners make high use of narrative verdicts.
2. Further increases in the use of narrative verdicts will compromise the quality of national suicide statistics.
3. Coroners could be required to provide both a short form verdict and a longer narrative account of the death (when appropriate).
4. The ONS might consider including in their suicide statistics deaths from medicine poisoning given a verdict of accident/misadventure by coroners.
5. The Department of Health might consider carrying out surveillance to enable the early identification of increases in the use of high-lethality, easily accessible suicide methods, to enable timely response.
6. Estimates of the numbers of suicides by co-proxamol, paracetamol and TCA poisoning would be more reliable if they included accidental poisonings from these drugs as well as deaths given suicide and open verdicts by coroners.
7. There should be an in-depth analysis of the proportion of suicides in which the internet may have played a contributory role, assessed alongside evidence of the beneficial effects on mental health and suicide.

Implications for clinical practice

1. Services should ensure optimal treatment for those who self-harm, in particular prioritising the provision of psychosocial assessment, as emphasised in national guidelines.
2. When prescribing antidepressants, clinicians should take account of the risk of overdose (especially in patients at risk of self-poisoning) as well as their relative efficacy, acceptability and possible interactions with other medication and alcohol, and patients' concurrent physical morbidity.
3. To prevent ongoing deaths involving paracetamol, further measures might be aimed at reducing breaches of sales guidelines and at encouraging media and internet site producers to follow guidelines on the reporting of suicide.
4. National, multicentre research work would benefit from a simplified system of centralised approval for local research governance permissions.
5. Despite their low cost and apparent simplicity, contact-type interventions following psychiatric hospital discharge or self-harm cannot be recommended for widespread introduction.

Recommendations for future research

1. Variability in self-harm services should continue to be monitored to gain a greater understanding of aspects of treatment that are beneficial for preventing repeat self-harm.
2. Further work is needed to elucidate the active components of therapeutic contact following self-harm and to understand in which groups treatments might have the most impact.
3. Trends in the use of narrative verdicts and their impact on national and small-area suicide rates should be reassessed following recent ONS-led interventions to improve the accuracy of suicide reporting.
4. An assessment should be made of the feasibility and costs of developing a surveillance system to identify as quickly as possible rises in the use of novel methods of suicide, to enable rapid interventions to restrict ease of availability to at-risk individuals.
5. The relative toxicity of other drugs commonly used for intentional self-poisoning should be evaluated to assist clinicians in making prescribing decisions and for informing regulatory agencies.

6. Future changes in availability of medication that is used for self-poisoning should be evaluated, both in terms of impacts on self-harm and suicide, and in terms of indirect consequences resulting from altered availability of other drugs.
7. The effect on the quality of services and patient outcomes of new guidance and future policies on management of self-harm (such as the November 2011 National Institute for Health and Care Excellence guidelines on the longer-term management of self-harm) requires careful evaluation.
8. Assessment of the relative toxicity of antidepressants should continue as new antidepressants are marketed, and international comparisons are warranted in view of differences in prescribing practices between countries.

Registration

The pilot study entitled 'A pilot study of a contact and information based intervention to reduce repeat self-harm' is registered as ISRCTN65171515.

Funding

The National Institute for Health Research Programme Grants for Applied Research programme.

Chapter 1 Introduction

Suicide and self-harm are the most serious and devastating consequences of mental illness. More than 4000 people take their lives every year in England and there are over 200,000 hospital presentations for self-harm annually.¹ Almost one-quarter of people who self-harm repeat their act within 12 months. As suicide occurs predominantly in young people – >50% of deaths occur in those aged <45 years – it is a major contributor to potential years of life lost (PYLL), accounting for more PYLL than strokes or road traffic accidents.² Death by suicide has a profound long-term impact on the family, friends and colleagues of the deceased.

In view of the impact of suicidal behaviour on population health, suicide prevention has been a key area in the health strategies of successive UK governments, and in 2002 the Department of Health (England) launched its *National Suicide Prevention Strategy*.³ However, the evidence base to inform the prevention strategy is limited.^{4,5} The causes of suicidal behaviour are complex, vary at different phases of the life course and operate both at an individual level and at a societal level;^{6,7} thus, national prevention strategies include a range of clinical and public health approaches to reduce its incidence.^{3,8} In this context and in discussion with major stakeholders, we developed a programme of research to address several key areas of relevance to suicide prevention in England. The following paragraphs outline the rationale for our choice of research questions.

Priority areas in suicide prevention

Suicide statistics

Good-quality suicide statistics are critical to inform suicide prevention priorities and to assess the impact of prevention strategies. However, whether a self-inflicted death is recorded as a suicide, an open verdict, a misadventure or an accidental death by the Office for National Statistics (ONS) depends on the outcome of a coroner's investigation, and coroners differ in their threshold for labelling deaths as suicide.⁹ Such differences and changes in coroners' categorisation of possible suicides over time may compromise an assessment of the incidence of suicide and so undermine the evaluation of specific preventative activities using routine data.¹⁰

Medicines commonly taken in fatal overdoses

Suicide may occur in the context of serious mental illness or result from an impulsive act in a moment of crisis. Whether an episode of self-harm results in death depends on the ease of availability of lethal suicide methods, and some of the best evidence concerning suicide prevention concerns restricting access to lethal methods.^{5,11} Drugs associated with high case fatality when taken in overdose are therefore a common target for preventative intervention. Overdoses of paracetamol (acetaminophen), co-proxamol and dosulepin account for 10% of suicides in England, and the Medicines and Healthcare products Regulatory Agency (MHRA) has implemented a number of initiatives to reduce the incidence of suicides using these and other medicines. One of the most recent initiatives has been the phased withdrawal of co-proxamol since 2005. The impact of the withdrawal of co-proxamol requires evaluation to inform both international prescribing policies and future interventions of this sort, such as restricting the use of dosulepin. Furthermore, continued deaths from paracetamol overdose since regulatory action in 1998¹² suggest the need to review existing sales regulations and evaluate the long-term effects of the legislation.

Assessment and management of people who self-harm

Whether someone who attempts suicide and survives later successfully repeats his or her act may depend on the NHS's response to his or her initial attempt.¹³ Yet there is uncertainty concerning the most appropriate service structures to assess and manage self-harm patients. This uncertainty was demonstrated in our previous studies showing wide variations between hospitals in their management of self-harm.^{14,15} It is unclear whether or not these variations have any implications for patient outcomes; although person-based studies suggest that some aspects of service provision may affect outcome,^{16–18} these findings may be

confounded both because patient characteristics may influence the services they receive and because high-risk patients may be most likely to self-discharge without receiving care. It is crucial to assess whether or not differences in hospital management influence outcomes in this key area.

Trials of interventions to reduce self-harm in high-risk clinical populations

Half of all people who die by suicide have been in contact with health services within a month of their death.¹⁹ The two highest-risk groups are patients who have recently been discharged from psychiatric inpatient care and those who have self-harmed. One-quarter of all people who die by suicide have been under the recent care of psychiatric services,²⁰ and around half have been in contact with services following a previous episode of self-harm.⁶ Thus, interventions to reduce suicide risk in these groups are a priority; yet, Cochrane reviews²¹ and National Institute for Health and Care Excellence (NICE) guidance¹³ have highlighted the lack of good-quality evidence concerning the management of self-harm. Trials of contact by telephone or letter, or the provision of 'crisis cards' facilitating access to urgent care following self-harm have had mixed results.²² Likewise, only one randomised controlled trial of an intervention to reduce the risk of suicide following psychiatric inpatient discharge has been carried out,^{23,24} and, although this trial showed promising results, it has not been replicated.

Aim

Our overall aim was to carry out a programme of linked research studies aimed at improving the management of self-harm, reducing the incidence of suicide and providing reliable data to evaluate the impact of the 2002 *National Suicide Prevention Strategy for England*.³

Objectives and research questions

Our research programme consisted of four interlinked studies, each of which related to key aspects of the 2002 *National Suicide Prevention Strategy for England*.³ Our objectives were to:

1. conduct a review of the inquest records of 12 coroners, spanning a period of 15 years, to quantify the extent to which suicide rates, secular trends in suicide, and suicides from co-proxamol, paracetamol and tricyclic antidepressant (TCA) overdose may be over- or underestimated when they are based on deaths given suicide and open verdicts by coroners
2. carry out a series of pharmacoepidemiological studies using national mortality data together with information from self-harm registers in Oxford and Manchester and coroners' records to investigate:
 - (a) associations between blood paracetamol levels and liver damage (note: because of challenges obtaining relevant data, this was subsequently modified to a comparison of the impact of differing paracetamol regulations in the UK and Ireland)
 - (b) whether or not the current sales limit for paracetamol is appropriate and being adhered to, determined by interviewing a sample of people who have taken a paracetamol overdose about their episode
 - (c) whether or not any compensatory increased use of non-steroidal anti-inflammatory drugs (NSAIDs) has led to increased rates of gastrointestinal (GI) haemorrhage
 - (d) the impact on suicide of the recent withdrawal of co-proxamol
 - (e) whether or not regulatory action is warranted concerning dosulepin (a TCA)
3. assess whether or not between-hospital variations in four key aspects of self-harm services (psychosocial assessment, general hospital admission, psychiatric admission and follow-up) influence patient outcome, as indexed by repeat self-harm
4. develop, pilot and evaluate contact-based interventions aimed at reducing:
 - (a) repeat self-harm
 - (b) self-harm following specialist inpatient psychiatric treatment.

Structure of this report

Chapters 2–8 present the findings from the component substudies relevant to each of the research objectives described in the previous section. Although these objectives are grouped thematically, they do not reflect the number of different methodologies used to achieve them. Some research objectives were investigated using a single methodology whereas others were investigated using more than one. For this reason the chapters of this report vary in whether they outline the findings related to one or to several of the research objectives:

- *Chapter 2* outlines the study relating to objective 1, examining the influence of changes in coroners' practices on the validity of national suicide rates in England.
- *Chapter 3* outlines the findings of four separate studies relating to objectives 2(a), (b) and (c). Objective 2(b) was investigated in two studies (*Chapter 3, Study 2 and Study 3*). All of these studies investigate the various impacts of reduced pack sizes of paracetamol for sale in England and Wales.
- *Chapter 4* outlines the research relating to objective 2(d), evaluating the effects of the withdrawal of co-proxamol from the England and Wales markets.
- *Chapter 5* outlines the research on antidepressant toxicity relating to objective 2(e).
- *Chapter 6* details the findings of a study relating to objective 3 regarding variations in self-harm service delivery across 32 centres in England.
- *Chapter 7* relates to objective 4(a) and describes the findings of a study carried out to develop and pilot a contact-based intervention to reduce self-harm.
- *Chapter 8* relates to objective 4(b) and details the pilot testing of a letter-based intervention aimed at reducing self-harm specifically among patients discharged from psychiatric hospitals.
- The final chapter, *Chapter 9*, brings together all of our findings and discusses their relevance to suicide prevention practice and policy.

Each of these chapters presents a brief introduction outlining the context of the substudy and relevant previous literature, the methods used, the main findings and a discussion of the key implications of the findings.

Definitions

Throughout the report, 'self-harm' is defined as intentional self-poisoning or self-injury, irrespective of type of motivation, including degree of suicidal intent.²⁵ It therefore includes acts with clear suicidal intent, those with varying lesser degrees of suicidal intent and those in which suicidal intent was absent but the behaviour would have been intended to have other outcomes (e.g. communication of distress, cessation of consciousness, relief of tension). 'Suicide' is defined as an act of self-harm that results in death.

Chapter 2 The influence of changes in coroners' practices on the validity of national suicide rates in England

Abstract

Reliable mortality statistics are critical for monitoring trends in suicide and identifying appropriate priorities for prevention. We used coroners' inquest records for possible suicides ($n=2086$) carried out in 12 areas of England in 1990–1, 1998 and 2005 together with Ministry of Justice data for all inquests throughout England in 2001–2 and 2008–9 to investigate temporal changes in the validity of national suicide statistics. In addition to the data from these years, we also used the coroners' inquest data from 2006 and 2007 to investigate the possible underestimation of suicide from co-proxamol, paracetamol and TCA poisoning when estimates are based only on deaths given suicide and open verdicts.

Between 1990 and 2005, the proportion of researcher-defined suicides given a suicide verdict by coroners decreased by 7% [$p(\text{trend})=0.001$], largely because of an increased use of accident/misadventure verdicts for researcher-defined suicides, particularly for deaths involving poisoning. The numbers of suicides by co-proxamol, paracetamol and TCA poisoning are underestimated by between 12% (co-proxamol) and 26% (paracetamol) when estimates are based on suicide and open verdict deaths alone.

In our analysis of national Ministry of Justice data we found a marked rise in the use of narrative verdicts and wide geographical variation in their use, with up to 50% of deaths in some areas receiving a narrative verdict. Coroners who gave more narrative verdicts gave fewer suicide verdicts ($r=-0.41$, $p<0.001$). In the 10 coroners' areas where the highest proportions of narrative verdicts were given, the officially recorded incidence of suicide decreased by 16% between 2001–2 and 2008–9, whereas in the areas served by the 10 coroners who used narratives infrequently the officially recorded incidence of suicide increased by 1%. This indicates that the use of narrative verdicts may distort local suicide statistics. Taken together, these findings indicate (1) that the ONS should consider including 'accidental' deaths by poisoning with medicines in the statistics available for monitoring trends in national suicide rates and (2) that small-area suicide rates, and changes in these rates over time since 2000, should be interpreted with caution. Further increased use of narrative verdicts will compromise the quality of national suicide statistics.

Background

Reliable mortality statistics are critical for assessing the population burden of suicide, as well as for developing prevention strategies and monitoring their impact on suicide rates. Officially reported suicide rates in England are derived from figures for the underlying cause of death produced by the ONS. ONS suicide statistics are based on death certificates provided by coroners following their investigation of a possible suicide. The cause of death information provided by coroners on death certificates is assessed by ONS coders who follow internationally agreed rules [currently the *International Classification of Diseases*, Tenth Edition (ICD-10)] to assign an underlying cause of death to all deaths.

The likelihood that a death was self-inflicted is not always clear-cut. The legal criteria used by coroners to determine whether a death was suicide mean that it must be clear *beyond reasonable doubt* that the deceased had intended to take his or her life. When coroners are uncertain about an individual's intent, or if it is unclear whether the death was self-inflicted or accidental, they may give either an *open* verdict or, in more recent years, a *narrative* verdict.

In contrast to the legal definition of suicide, clinicians and researchers assess the likelihood that a death was suicide on the *balance of probability*, and research has shown that a high proportion of deaths given an open verdict by coroners are highly likely to be suicides.^{26–28} For this reason, ONS suicide statistics and monitoring of suicide trends in the *National Suicide Prevention Strategy*³ are based on deaths given suicide verdicts by coroners as well as a high proportion of open verdict deaths.

Narrative verdicts record in several sentences how, and in what circumstances, the death occurred, rather than giving a single *short-form* verdict such as *suicide*, *open* or *accidental death*.^{10,29} Use of narrative verdicts increased exponentially between 2001 and 2009; they now account for over 10% of all verdicts given by coroners ($n=3012$ in 2009).²⁹ This increased use has potentially important implications for the estimation of national suicide rates, as ONS's interpretation of international death coding rules mean that, when suicide intent is uncertain from such narrative accounts, as is often the case, the ONS code such deaths as accidents. The ONS gave the following example of a narrative verdict in a recent publication:²⁹

Mr X, after being found hanging in his cell at X youth offenders institution on [date], died on [date] at X infirmary. It was a serious omission by X youth offenders institution not to have informed X's parents on each occasion that X had self-harmed. The jury's verdict is that X died from hanging.

Because intent was not mentioned within the narrative, the death was classified by the ONS as accidental, but suicide is strongly implied.

As well as the recent impact of narrative verdicts on suicide rates, two further issues are of more long-standing importance in relation to the interpretation of suicide statistics. First, some deaths that are considered by clinicians to be probable suicides are given *accidental* verdicts by coroners.^{30,31} Such deaths are not considered as possible suicides by the ONS, although it recognises that a proportion of these deaths are likely to be 'missed' suicides.³² If coroners' practices regarding their relative use of short-form open verdict and accidental verdict cause of death categories change over time, this may distort apparent secular trends in suicide rates. In Australia, an increasing trend in recording of possible suicides as accidental deaths is thought to have exaggerated an apparent decline in suicide rates, although the degree of impact is debated.^{33,34} Second, there are > 100 coroners in England and they vary both in the criteria that they use in determining the likelihood that a death was suicide^{35,36} and in their use of narrative verdicts.³⁷ These variations may distort small-area differences in suicide rates as geographical patterning may be influenced by the local coroner's practice as well as real area differences in self-inflicted deaths.

Objectives

The original aim of this element of our research programme was to quantify the extent to which suicide rates and secular trends in suicide may be over- or underestimated when they are based on deaths given suicide and open verdicts by coroners (as was then the case). We were interested in determining whether there had been changes over time in the frequency of use of accidental/misadventure verdicts for possible suicides and their impact on suicide rates. We also used data obtained in this strand of the research programme to investigate whether suicides by co-proxamol, paracetamol and TCA poisoning are underestimated when estimates are based only on those deaths given a suicide or an open verdict by coroners.

As described earlier, an additional emerging issue concerning the accuracy of national suicide statistics – the rise in the use of narrative verdicts by coroners – became apparent over the course of the research programme. We therefore extended the brief of this element of our programme to additionally investigate the impact of the growth in use of narrative verdicts on small-area suicide rate estimates.

Methods

Examination of coroners' inquest records

To investigate the impact on trends in national suicide rates of possible changes in coroners' use of different verdicts for likely suicides, we examined the inquest records of a sample of 12 of the 107 coroners' jurisdictions in England in 2005. Our sample comprised the three coroners whose jurisdictions covered the three collaborating research centres (the cities of Bristol, Oxford and Manchester) and a random sample of nine further jurisdictions within 90 minutes' travel time of each of these three centres. Four of the study jurisdictions were urban, three were rural and five were mixed urban/rural. We have previously conducted collaborative studies with these 12 coroners. Ministry of Justice data³⁸ indicate that the relative proportions of suicide, accident/misadventure, open and other (mainly narrative) verdicts given by our sample of 12 coroners in 2005 were broadly similar to those in England as a whole in that year (participating vs. non-participating jurisdictions: suicide 14.3% vs. 19.3%; accident/misadventure 62.7% vs. 53.5%; open 13.5% vs. 15.1%; other 9.6% vs. 12.1%).

Sample size

The sample size for this study was based on our experience working with the Bristol coroner in a previous study³⁰ in which 10% of people identified as definite or probable suicides by the research team were given a misadventure or an accident verdict by the coroner (unpublished data). Based on an estimated 400 suicides per year across the areas served by the 12 coroners with whom we had previous collaborative links, we estimated that we were able to detect (80% power, 5% level of statistical significance) a change in the proportion of missed suicides (researcher-defined suicides given accident/misadventure verdicts by coroners) from 10% to 4% (if this practice was decreasing) or from 10% to 17% (if the practice was growing) between 1990 and 2005. Differences of this size are large enough to have an impact on apparent secular trends in suicide.

Data collection

The records available to us in each of the 12 coroners' districts differed somewhat, as did the approach used by coroners to index records according to verdict. We searched coroners' electronic databases and ledgers or, if neither of these was available, we manually searched all inquest files for information on all cases assigned a verdict of suicide or an open, narrative or accident/misadventure verdict when the death had occurred in 1990 (1991 for one jurisdiction where 1990 data were no longer available), 1998 or 2005. A 15-year period was selected based on our desire to examine a long enough period to detect gradual changes in practice and for the practical consideration that, if we had studied a longer time period, older inquest files might have been destroyed. To increase the sample size for our analysis of deaths from co-proxamol, paracetamol and TCA poisoning, we extended our search of coroners' records to include deaths occurring in 2006 and 2007.

Exclusions

We extracted data using a structured form (see *Appendix 1*) on all suicides and possible suicides assigned open, narrative or accident/misadventure verdicts. We excluded all deaths that occurred outside the UK and those where the deceased was aged <10 years, as suicide is rare in this age group. We also excluded deaths for which the cause was clearly not suicide, for example industrial disease; post-surgery deaths; burns for which the fire report indicated an accidental cause; falls that were not from a height (e.g. slips on pavements); and other deaths for which suicide was an extremely unlikely cause or impossible to determine, such as decomposed bodies on which, because of the state of the body, blood tests could not be carried out (or were negative) and there was no other evidence of self-harm. Furthermore, we excluded people given accident/misadventure verdicts in which the cause of death was a vehicular accident or poisoning by a drug of abuse only (e.g. alcohol, heroin), as our previous experience suggested that accidental deaths from these causes are difficult to distinguish from suicides. We included cases given open verdicts in which the death had been caused by a traffic accident or drug of abuse if there was any evidence in the records of current or past emotional distress.

Classification of cause of death

After the exclusions listed above, all remaining deaths given open or accident/misadventure verdicts were defined as *possible suicides*. These deaths included approximately 50% of all open verdict deaths but < 10% of accident verdict deaths across the 12 coroners' districts. For all possible suicides assigned an open, a narrative or an accident/misadventure verdict, data were extracted from coroners' files on sociodemographic and economic characteristics and clinical characteristics of the death, as well as on circumstances leading up to the death and information retrieved from the death scene. In particular, we recorded details of contact with psychiatric services, whether there had been a previous episode of self-harm, whether there had been a suicide note, and the levels of medication and alcohol in post-mortem blood samples. Vignettes of up to 800 words in length, based on information recorded in coroners' inquest records and witness statements, were written for all possible suicide cases. These described in detail the relevant history and circumstances leading to the death.

Three clinical members of the research team (DG, KH, NK) with extensive experience in suicide research read the vignettes and other data recorded about the possible suicides, blind to year of death, the identity of the coroner and the verdict assigned. They then independently rated the likelihood of suicide as high, moderate, low or unclear. When there was disagreement, consensus decisions were reached on whether a case was a probable suicide or not (see *Appendix 2* for a description of the protocol followed). Cases rated as being of high or moderate likelihood of suicide were included in our sample of researcher-defined suicides together with those given suicide verdicts by the coroner.

Verdicts given to probable suicides by co-proxamol, paracetamol and tricyclic antidepressant poisoning

We identified all deaths by poisoning with co-proxamol, paracetamol and TCAs that were investigated by the 12 study coroners for the years 1990–1, 1998 and 2005–7. We excluded from this analysis deaths given narrative verdicts, as we could not be sure how such deaths would be coded by the ONS. We analysed separately total deaths for which some mention of one of these particular drugs was made in combination with other drugs and deaths for which no other drugs (except alcohol) were mentioned in the coroners' reports, that is, 'pure' poisoning.

Use of Office for National Statistics data

To investigate the relationship between researcher-defined suicides and coding of death by the ONS for use in national statistics, data on the numbers of suicides, undetermined deaths [*International Classification of Diseases*, Ninth Edition (ICD-9) E980–E989, ICD-10 Y10–Y34] and accidental/misadventure deaths (for which the cause of death, such as self-poisoning, jumping/falling or hanging, was similar to that for the undetermined and suicide cases) during 1998 and 2005 were provided by the ONS for 11 of the 12 coroners' jurisdictions. These data were available for only 9 of the 12 jurisdictions for deaths in 1990.

Data analysis

Analyses were carried out using Stata version 11.2 for Windows (StataCorp LP, College Station, TX, USA). Descriptive and logistic regression analyses were used to assess temporal change in the use of verdicts (suicide and open vs. accidental/misadventure) that might have led to an underestimate of suicides using official data. Using a chi-squared test for trend, we investigated whether there was any statistical evidence that the proportion of researcher-defined suicides receiving an accident/misadventure verdict increased across the three time periods included in this study. We then carried out a logistic regression analysis to determine whether any trends in the proportion of deaths receiving accident/misadventure verdicts were explained by changes in the characteristics of the people who had suicided (in terms of age and sex) or the methods that they used (hanging, self-poisoning, drowning, jumping or other method). The latter characteristic was included because an individual's choice of method influences the verdict that he or she receives: some more 'ambiguous' methods such as overdose and drowning are more likely to receive open or accidental verdicts than methods such as hanging.³⁹ We fitted an unadjusted model including year of death as an ordered categorical variable. We then investigated the impact of including terms for age, sex and

suicide method in the model on the association between year of death and verdict. Descriptive data were also used to identify the proportion of researcher-defined suicides with an accident/misadventure verdict, by method, as a proportion of all cases using that method and coded as accidental by the ONS.

Analysis of Ministry of Justice data on narrative verdicts

To investigate the impact on suicide rates of the growth in use of narrative verdicts, we obtained data on the number and types of coroners' verdicts for the 113 jurisdictions in England and Wales for 2008–9 from annual statistics published by the Ministry of Justice.⁴⁰ We excluded data for the Isles of Scilly and the Queen's Household because of the very small numbers of deaths in these jurisdictions.

To investigate geographical variation in the use of narrative verdicts we used a proxy measure: the number of verdicts classified as 'other' verdicts by the Ministry of Justice. ONS data suggest that approximately 80% of 'other' verdicts in 2008 and 2009 were narrative verdicts.²⁹ We were unable to obtain data on the specific numbers of narrative verdicts by coroner jurisdiction as the Ministry of Justice receives data on the breakdown of 'other' verdicts from only around three-quarters of coroners and these data are of varying quality, making the estimation of narrative verdicts at this level difficult (Mark Edwardes, Ministry of Justice, 1 July 2011, personal communication).

To investigate the possible impact of the use of narrative verdicts on apparent trends in suicide we compared changes in suicide rates between 2001–2 and 2008–9 in the English local authorities (LAs) served by the 10 coroners who gave the highest proportion of 'other' verdicts and the 10 LAs whose coroners gave the lowest proportion of such verdicts. We combined suicide data for these two 2-year periods to reduce the impact of small-area variations in suicide rates based on small numbers of events. We obtained the suicide data [ICD-10 codes X60–X84 (suicide – 'Intentional self harm') and Y10–Y34 (open verdicts – 'Event of undetermined intent')] for the LA served by each coroner from the *National Compendium of Clinical and Health Indicators*.⁴¹ As this source includes data for England only, this part of our analysis was restricted to English LAs. Because many coroners serve more than one LA, we present rates for all LAs within relevant coroners' jurisdictions and pooled LA rates for the top and bottom 10 coroners' jurisdictions.

Data analysis

We used Spearman's rank correlation coefficients to investigate associations between use of 'other' verdicts and deaths certified as suicide, open, due to natural causes, accidental or due to industrial disease – the five most frequently used verdicts. Weighted mean rates of suicide for the 10 coroners making the most frequent use of narrative verdicts and the 10 using them least often were calculated by summing the total number of suicides in each LA and dividing this by the sum of the populations of these LAs.

Results

Examination of coroners' records

Search of the coroners' records for 1990–1, 1998 and 2005 led to the retrieval of 1296 coroner-defined suicides and 790 cases of possible suicide. Amongst the 790 cases of possible suicide, 518 (65.6%) had been assigned an open verdict, 240 (30.4%) a verdict of accident or misadventure and 32 (4.1%) a narrative verdict.

The 790 possible suicides were reviewed independently by DG, KH and NK. They agreed on the inclusion/exclusion of 632 (80.0%) of the cases without the need for discussion. The remaining 158 (20.0%) cases were discussed face to face or by teleconference. Following this review, more than three-quarters of the possible suicides assigned an open (415/518, 80.1%) or narrative verdict (25/32, 78.1%) by the coroner were rated as suicide, as were about half (131/240, 54.6%) of those with an accident/misadventure verdict. Altogether, 571 (72.3%) of 790 possible suicides with a non-suicide verdict were rated as suicide (*Table 1*).

TABLE 1 Cases of possible suicide rated as suicide by study researchers for 1990–1, 1998 and 2005

Verdict	No. of cases of possible suicide ^a	No. (%) rated as suicide
Open	518	415 (80.1)
Accident/misadventure	240	131 (54.6)
Narrative	32	25 (78.1)
Total	790	571 (72.3)

a The 1296 cases assigned a verdict of suicide were not rated according to likelihood of suicide and were included in the denominator of researcher-defined suicides.

Source: Gunnell D, Bennewith O, Simkin S, Cooper J, Klineberg E, Rodway C, *et al.* Time trends in coroners' use of different verdicts for possible suicides and their impact on officially reported incidence of suicide in England: 1990–2005 [published online ahead of print 1 November 2012]. *Psychol Med* 2012. <http://dx.doi.org/10.1017/S0033291712002401>. Reprinted with the permission of Cambridge University Press.

Characteristics of researcher-defined suicides

Subsequent analyses were based on the 1867 researcher-defined suicide cases: the 1296 (69.4%) cases assigned a verdict of suicide by the coroners and 571 (30.6%) cases with an open, accidental or narrative verdict assessed as probable suicides by the research team. Three-quarters (1405/1867, 75.3%) of the suicide cases involved males. The median age was 41 years, with males (median age 40 years) slightly younger than females (median age 46 years). The most common methods used for suicide were hanging (689/1867, 36.9%) and self-poisoning (521/1867, 27.9%).

The characteristics of the researcher-defined suicide cases in 2005, stratified by the coroner's verdict, are shown in *Table 2*. We restricted this analysis to data for 2005 – because of resource constraints we did not record detailed clinical information on cases given a coroner's verdict of suicide in 1990–1 or 1998. Suicide cases tended to be older (mean age 46.2 years) than those receiving open or accident/narrative verdicts (mean age 42.6 years and 40.7 years respectively). Cases given suicide verdicts were somewhat more likely to be male than those given 'other' verdicts: 79% of suicide verdicts involved males compared with 69% of open verdicts and 73% of accident/narrative verdicts. The proportion of cases who had previously self-harmed or who had a history of contact with specialist mental health services was similar across the three categories of verdict. Surprisingly, 11% of those given open verdicts and 15% given accidental/narrative verdicts left a suicide note but despite this did not receive a suicide verdict. Method of suicide differed markedly across verdict categories. Deaths by self-poisoning and drowning accounted for over half of open and accident/narrative verdict cases whereas they accounted for less than one-quarter of all cases given a suicide verdict. It is noteworthy that 40 open verdict deaths and 15 accident/narrative verdict deaths (9.6% of all researcher-defined suicides) were by hanging.

Temporal change in verdicts assigned by coroners to researcher-defined suicide cases

In keeping with national suicide statistics,⁴² the number of suicide cases that we identified from our sample of 12 coroners rose between 1990 and 1998 before falling between 1998 and 2005. In 1990–1, 72.0% [95% confidence interval (CI) 68.3% to 75.5%] of researcher-defined suicide cases in our sample had been assigned a verdict of suicide by the coroner. By 2005 this had decreased somewhat to 65.4% (95% CI 61.4% to 69.2%) (*Figure 1*). There was also a slight decrease in researcher-defined suicide cases assigned an open verdict between 1990–1 and 2005. In contrast, the proportion of researcher-defined suicide cases with a coroner's verdict of accident/misadventure nearly doubled between 1990 and 2005, from 4.6% (95% CI 3.1% to 6.6%) to 9.1% [95% CI 6.9% to 11.7%; $p(\text{trend})=0.02$]. Most of this rise was due to an increase in the number of cases of researcher-defined suicide by self-poisoning. In 1990–1, 12.3% (20/163) of cases of researcher-defined suicide by self-poisoning had been assigned an accidental verdict by the coroner; this increased to 22.2% (35/158) in 2005. In logistic regression models controlling for age, sex and method of

TABLE 2 Characteristics of the researcher-defined suicide cases according to the verdict that they received from the coroner for deaths in 2005

Characteristic	Coroner's verdict			Total (n = 593)
	Suicide (n = 388)	Open (n = 126)	Accident/narrative (n = 79)	
Mean age, years	46.2	42.6	40.7	44.7
Male, n (%)	307 (79.1)	87 (69.0)	58 (73.4)	452 (76.2)
Current or past contact with psychiatric services, n (%) ^a	189 (56.3)	72 (64.9)	43 (65.2)	304 (59.3)
Suicide note, n (%) ^b	193 (50.9)	14 (11.3)	12 (15.2)	219 (37.6)
Previous self-harm, n (%) ^c	187 (54.5)	61 (53.0)	31 (46.3)	279 (53.1)
Suicide method, n (%)				
Self-poisoning	66 (17.0)	55 (43.7)	37 (46.8)	158 (26.6)
Hanging	221 (57.0)	35 (27.8)	20 (25.3)	276 (46.5)
Car exhaust gas	18 (4.6)	1 (0.8)	0 (0)	19 (3.2)
Jumping/falling	17 (4.4)	10 (7.9)	5 (6.3)	32 (5.4)
Rail	16 (4.1)	4 (3.2)	4 (5.1)	24 (4.0)
Fire/burns	7 (1.8)	2 (1.6)	4 (5.1)	13 (2.2)
Drowning	6 (1.5)	11 (8.7)	7 (8.9)	24 (4.0)
Other	37 (9.5)	8 (6.3)	2 (2.5)	47 (7.9)

a Data for 513/593 cases.

b Data for 582/593 cases.

c Data for 525/593 cases.

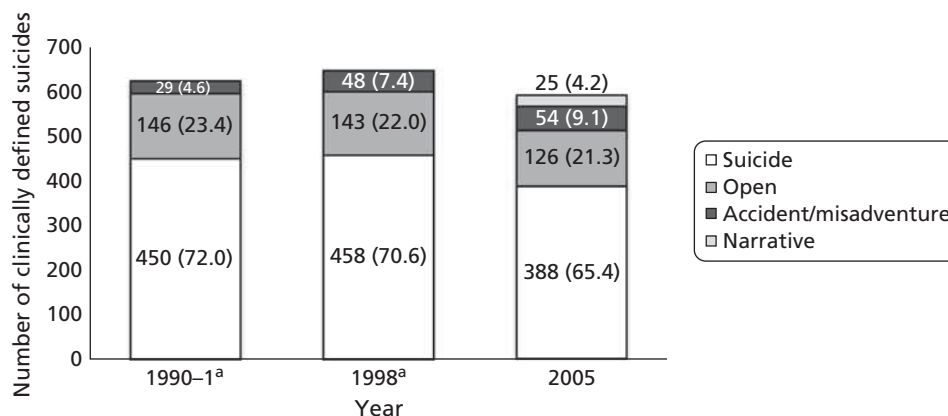


FIGURE 1 Number (%) of researcher-defined suicide cases (all methods) assigned each verdict for deaths in 1990-1, 1998 and 2005. a, No narrative verdicts were recorded in 1990-1 or 1998. Source: Gunnell D, Bennewith O, Simkin S, Cooper J, Klineberg E, Rodway C, *et al.* Time trends in coroners' use of different verdicts for possible suicides and their impact on officially reported incidence of suicide in England: 1990-2005 [published online ahead of print 1 November 2012]. *Psychol Med* 2012. <http://dx.doi.org/10.1017/S0033291712002401>. Reprinted with the permission of Cambridge University Press.

suicide, statistical evidence for the trend towards increasing use of accidental verdicts for probable suicides increased [$p(\text{trend})=0.001$]. This indicates that neither changes in the age/sex distribution of suicides nor changes in the methods used account for the observed increase in use of accidental verdicts for probable suicides.

Temporal change in the use of accident verdicts for researcher-defined suicide across coroners' jurisdictions

An examination of verdicts stratified by coroner jurisdiction showed an increase in the use of the accident/misadventure verdict for researcher-defined suicide between 1990 and subsequent years for most of the 12 coroners' jurisdictions (*Table 3*). The jurisdiction with the highest number of researcher-defined suicides with a verdict of accident/misadventure in 2005 ($n=24$, coroner A) also had the highest increase in the use of that verdict, from 3.4% (4/117) of all researcher-defined suicides in 1990 to 22.6% (24/106) in 2005. When a sensitivity analysis was carried out, excluding data for this coroner, the magnitude of the temporal increase in the use of the accident/misadventure verdict was diminished [1990–1: 25/508, 4.9%, 95% CI 3.2% to 7.2% use of the accident/misadventure verdict; 2005: 30/487, 6.2%, 95% CI 4.2% to 8.7%; $p(\text{trend})=0.3$].

Method of death for cases assigned a verdict of accident/misadventure

Using ONS data on the total number of accidental deaths by each method, around half of all poisoning, rail, hanging and car exhaust gas deaths in 1998 and 2005 assigned an accident/misadventure verdict across 11 coroners' jurisdictions were judged to be suicides in our study (*Table 4*). These proportions are probably somewhat overestimated as information in the coroners' files available to the research team enabled us to clearly identify the suicide method used, but such information was not available to the ONS when it coded the death certificates. For example, the death certificates of some rail suicide cases state cause of death as 'multiple injuries' without mentioning that these occurred on the railway; similarly, a few deaths by hanging were recorded on death certificates as due to asphyxiation.

Verdicts given to probable cases of suicide by co-proxamol, paracetamol and tricyclic antidepressant poisoning

In 1990–1, 1998 and 2005–7, the 12 coroners investigated 91 deaths from co-proxamol poisoning, 107 from paracetamol poisoning and 161 from TCA poisoning. Most of these deaths were assigned a researcher-defined verdict of probable suicide (*Table 5*).

Most deaths from pure co-proxamol poisoning (74/76, 97.4%) were thought by the research team to be likely suicides. Nine (12.2%) of the 74 probable cases of suicide would have been excluded from analyses focusing only on coroner-defined suicide and open verdict deaths because they were given accidental death verdicts. In fact, the research team classified as probable cases of suicide most of the pure co-proxamol poisoning deaths (9/11, 81.8%) receiving accidental verdicts from the coroners.

The research team also classified the majority of deaths from pure paracetamol poisoning (65/81, 80.2%) as probable cases of suicide. Seventeen (26.2%) of the 65 probable suicides from paracetamol would have been excluded from analyses focusing only on coroner-defined suicide and open verdict deaths because they were given accidental death verdicts. In fact, almost two-thirds (17/28, 60.7%) of the pure paracetamol poisoning deaths receiving accidental verdicts were also thought to be probable cases of suicide.

Most deaths from pure TCA poisoning (108/115, 93.9%) were assigned a researcher-defined verdict of suicide. Eighteen (16.7%) of the 108 probable suicides would have been excluded from analyses focusing only on coroner-defined suicide and open verdict deaths because they were given accidental death verdicts. The research team also thought that almost three-quarters (18/25, 72.0%) of pure tricyclic poisoning deaths receiving accidental verdicts were probable cases of suicide.

For all three substances, analyses based on mixed overdoses yielded similar conclusions.

TABLE 3 Variation between the 12 study coroners (A–L) in the numbers given an accident/misadventure verdict

Year	Researcher-defined suicide cases given an accident/misadventure verdict, n (%)												
	A	B	C	D	E	F	G	H	I	J	K	L	Total
1990	4 (3.4)	7 (10.3)	1 (4.6)	0 (0.0)	0 (0.0)	1 (5.6)	6 (12.0)	2 (3.1)	4 (9.1)	1 (2.2)	0 (0.0)	3 (4.8)	29 (4.6)
1998	19 (19.2)	6 (8.2)	0 (0.0)	5 (19.2)	0 (0.0)	1 (5.6)	1 (1.9)	4 (5.3)	3 (6.5)	4 (7.4)	2 (3.3)	3 (3.9)	48 (7.4)
2005	24 (22.6)	2 (3.0)	0 (0.0)	3 (14.3)	2 (8.0)	2 (10.5)	3 (4.6)	1 (2.2)	4 (9.1)	3 (5.4)	2 (3.7)	8 (11.1)	54 (9.1)

Analysis of Ministry of Justice data on verdicts given by coroners and local authority suicide data

In 2008 and 2009, coroners delivered 58,777 inquest verdicts: 28,996 in 2008 and 29,781 in 2009. The mean annual number of verdicts given per coroner was 262 (range 17–979). Of these, the most common verdict (figures for 2009) was accident or misadventure ($n=8673$, 29%), closely followed by natural causes ($n=8281$, 28%); there were 3797 (13%) 'other' (mainly narrative) verdicts, 3330 (11%) suicide verdicts and 2240 (8%) open verdicts.

There is considerable variation between jurisdictions in the proportion of inquest outcomes recorded as 'other' (mainly narrative) verdicts: these ranged from 0% to 50% (median 9%) of all inquests. *Table 6* shows the number (%) of verdicts given by the coroners in the 10 jurisdictions with the highest proportionate use of 'other' verdicts in 2008 and 2009 and by the coroners in the 10 jurisdictions with the lowest proportionate use of 'other' verdicts in 2008 and 2009. Jurisdictions ranked in the top 10 gave 'other' verdicts in >20% of inquests whereas jurisdictions in the bottom 10 gave 'other' verdicts in <2% of cases. In Birmingham and Solihull an 'other' verdict was recorded in 985 (50.3%) of the 1958 inquests. The proportions of suicide verdicts were higher in the bottom 10 jurisdictions, with a mean proportion of 15.2% compared with 9.3% in the top 10 jurisdictions. Of note, the jurisdictions with the greatest proportion of 'other' verdicts seem to also deal with a higher number of inquests overall, with an average of 669 inquests in 2008 and 2009 compared with an average of 450 across England and Wales. Conversely, jurisdictions with a lower proportion of 'other' verdicts dealt with a lower average number of inquests over the same period (mean 218 per year).

Analysis based on all 113 jurisdictions confirmed that the use of 'other' (mainly narrative) verdicts was inversely related to the recording of suicide verdicts ($r=-0.41$, $p<0.001$), although there was only a weak association with the proportion of open verdicts ($r=-0.16$, $p=0.09$) (*Table 7*). There was no association between the proportion of natural death verdicts given by coroners and their use of 'other' verdict categories ($r=0.01$), although the proportion of accidental death verdicts was also inversely associated with 'other' verdicts ($r=-0.50$, $p<0.001$). Surprisingly, there was no association between the proportions of suicide verdicts and open verdicts given by coroners ($r=0.02$, $p=0.8$).

The weighted average change in the rate of suicide between 2001–2 and 2008–9 was –16% (95% CI –27% to 5%) in the 30 LA areas served by the 10 English coroners' jurisdictions giving the highest proportions of 'other' (mainly narrative) verdicts (*Table 8*); in the 30 LA areas served by the 10 English

TABLE 4 Researcher-defined suicide cases in 1998 and 2005 coded as accident/misadventure by the ONS and by coroners across 11 coroners' jurisdictions

Suicide method	No. of accident/misadventure deaths recorded by the ONS for the 11 coroners	Researcher-defined suicide cases coded as accident/misadventure, n (%)
Self-poisoning ^a	102	51 (50.0)
Hanging	27	12 (44.4)
Car exhaust gas	4	2 (50.0)
Jumping/falling	645	6 (0.9)
Rail	10	6 (60.0)
Fire/burns ^b	81	4 (4.9)
Drowning	42	9 (21.4)

a ICD-9 E850.1–E858.9; ICD-10 X40–41 and X43–44.

b Includes deaths by scalding and from the respiratory effects of combustion.

Source: Gunnell D, Bennewith O, Simkin S, Cooper J, Klineberg E, Rodway C, *et al.* Time trends in coroners' use of different verdicts for possible suicides and their impact on officially reported incidence of suicide in England: 1990–2005 [published online ahead of print 1 November 2012]. *Psychol Med* 2012. <http://dx.doi.org/10.1017/S0033291712002401>. Reprinted with the permission of Cambridge University Press.

TABLE 5 Coroners' verdicts given to researcher-defined suicide cases and total deaths by poisoning from co-proxamol, paracetamol and TCAs either alone or with alcohol ('pure co-proxamol/pure paracetamol/pure tricyclic poisoning') or when taken in combination with other drugs

Cause of death	Suicide		Open		Accident/misadventure		Total RD suicides, n (% of total deaths)	Total deaths, n	Total RD suicides, n (% of total deaths)
	CD suicide, n (% of total deaths)	RD suicide, n (% of total RD suicides)	CD open, n (% of total deaths)	RD suicide, n (% of total RD suicides)	CD accident/misadventure, n (% of total deaths)	RD suicide, n (% of total RD suicides)			
Co-proxamol									
'Pure' poisoning deaths	38 (50.0)	38 (51.4)	27 (35.5)	27 (36.5)	11 (14.5)	9 (12.2)	76	74 (97.4)	
Total poisoning deaths	47 (51.6)	47 (52.8)	31 (34.1)	31 (34.8)	13 (14.3)	11 (12.4)	91	89 (97.8)	
Paracetamol									
'Pure' poisoning deaths	32 (39.5)	32 (49.2)	21 (25.9)	16 (24.6)	28 (34.6)	17 (26.2)	81	65 (80.2)	
Total poisoning deaths	46 (43.0)	46 (51.1)	26 (24.3)	21 (23.3)	35 (32.7)	23 (25.6)	107	90 (84.1)	
TCAs									
'Pure' poisoning deaths	53 (46.1)	53 (49.1)	37 (32.2)	36 (33.3)	25 (21.7)	18 (16.7)	115	107 (93.0)	
Total poisoning deaths	76 (47.2)	76 (51.4)	47 (29.2)	45 (30.4)	38 (23.6)	27 (18.2)	161	148 (91.9)	

CD, coroner defined; RD, researcher defined.

TABLE 6 Top and bottom 10 coroners' jurisdictions in England and Wales ranked on their percentage of 'other' verdicts based on 2008 and 2009 data

Position of Coroner's jurisdiction based on their use of 'other' verdicts	Coroner jurisdiction	Population ^a	Total no. of inquests	No. (%) of 'other' verdicts	No. (%) of suicide verdicts	No. (%) of open verdicts
Top 10 coroners' jurisdictions ranked according to percentage of 'other' verdicts	Birmingham and Solihull	1,233,900	1958	985 (50.3)	36 (1.8)	60 (3.1)
	Cardiff and Vale of Glamorgan	460,800	830	258 (31.1)	34 (4.1)	69 (8.3)
	Stoke-on-Trent and North Staffordshire	458,900	820	237 (28.9)	50 (6.1)	36 (4.4)
	North Lincolnshire and Grimsby	318,100	290	82 (28.3)	42 (14.5)	13 (4.5)
	Telford and Wrekin	162,300	147	38 (25.9)	20 (13.6)	10 (6.8)
	South and East Cumbria	226,500	329	85 (25.8)	23 (7.0)	22 (6.7)
	Blackburn, Hyndburn and Ribble Valley	278,700	641	145 (22.6)	51 (8.0)	14 (2.2)
	Wolverhampton	238,500	232	50 (21.6)	17 (7.3)	29 (12.5)
	Suffolk	714,100	555	116 (20.9)	94 (16.9)	78 (14.1)
	Preston and West Lancashire	708,700	883	184 (20.8)	117 (13.3)	39 (4.4)
Bottom 10 coroners' jurisdictions ranked according to percentage of 'other' verdicts	Central Hampshire	347,500	388	5 (1.3)	59 (15.2)	36 (9.3)
	York City	198,800	197	3 (1.5)	34 (17.3)	12 (6.1)
	North and West Cumbria	268,700	222	3 (1.4)	38 (17.1)	25 (11.3)
	Blackpool/Fylde	216,300	235	3 (1.3)	43 (18.3)	15 (6.4)
	North West Kent	338,200	416	3 (0.7)	59 (14.2)	39 (9.4)
	Isle of Wight	140,200	156	2 (1.3)	15 (9.6)	27 (17.3)
	Ceredigion	76,400	76	1 (1.3)	8 (10.5)	4 (5.3)
	Western Dorset	160,800	156	1 (0.6)	21 (13.5)	39 (25.0)
	Carmarthenshire	180,800	175	0 (0.0)	33 (18.9)	15 (8.6)
	Pembrokeshire	117,400	158	0 (0.0)	27 (17.1)	4 (2.5)

a Population data are based on mid-year estimates in 2009 for LAs/districts included in coroner jurisdictions published by the ONS.

Source: Carroll R, Hawton K, Kapur N, Bennewith O, Gunnell D. Impact of the growing use of narrative verdicts by coroners on geographic variations in suicide: analysis of coroners' inquest data *J Public Health* [published online ahead of print 15 November 2011]. 2011. <http://dx.doi.org/10.1093/pubmed/fdr091>. By permission of Oxford University Press.

TABLE 7 Spearman's ranked correlation coefficients for the associations between the percentage of 'other' (mainly narrative) verdicts and the percentages of suicide, open, natural death, accidental and industrial disease verdicts in England and Wales, 2008–9 ($n=113$)

Verdict	<i>r</i>	<i>p</i> -value
Other and suicide	–0.41	<0.001
Other and open	–0.16	0.090
Other and natural death	0.01	0.904
Other and accidental death	–0.50	<0.001
Other and industrial disease	–0.03	0.715

Source: Carroll R, Hawton K, Kapur N, Bennewith O, Gunnell D. Impact of the growing use of narrative verdicts by coroners on geographic variations in suicide: analysis of coroners' inquest data *J Public Health* [published online ahead of print 15 November 2011]. 2011. <http://dx.doi.org/10.1093/pubmed/fdr091>. By permission of Oxford University Press.

TABLE 8 Coroner jurisdictions with the highest proportions of 'other' verdicts in England in 2008–9 and their corresponding LA directly standardised rates of suicide^a

Coroner jurisdiction	LA	Population	Average rate 2001–2 ^b	Average rate 2008–9 ^b	Difference (%)
Birmingham and Solihull	Birmingham MCD	1,028,700	10.11	7.08	–3.03 (–30)
	Solihull MCD	205,200	6.14	4.48	–1.66 (–27)
Stoke-on-Trent and North Staffordshire	Stoke-on-Trent UA	239,300	13.26	6.83	–6.44 (–49)
	Staffordshire Moorlands CD	95,400	9.53	8.61	–0.93 (–10)
	Newcastle-under-Lyme CD	124,200	10.01	5.59	–4.42 (–44)
North Lincolnshire and Grimsby	North East Lincolnshire UA	157,100	10.64	8.48	–2.16 (–20)
	North Lincolnshire UA	161,000	8.33	8.73	0.40 (5)
Telford and Wrekin	Telford and Wrekin UA	162,300	10.38	7.82	–2.57 (–25)
South and East Cumbria	Barrow-in-Furness CD	70,900	11.97	7.25	–4.73 (–39)
	Eden CD	51,800	2.26	6.31	4.05 (180)
	South Lakeland CD	103,800	7.56	7.64	0.08 (1)
Blackburn, Hyndburn and Ribble Valley	Blackburn with Darwen	139,900	14.98	9.96	–5.02 (–33)
	Hyndburn	81,100	10.76	8.74	–2.02 (–19)
	Ribble Valley	57,700	7.27	11.87	4.60 (63)
Wolverhampton	Wolverhampton MCD	238,500	10.30	9.85	–0.45 (–4)
Suffolk	Waveney CD	117,700	12.04	10.50	–1.54 (–13)
	Suffolk Coastal CD	124,100	6.58	7.45	0.87 (13)
	Ipswich CD	126,600	9.71	10.06	0.35 (4)
	Babergh CD	85,800	9.75	7.68	–2.07 (–21)

continued

TABLE 8 Coroner jurisdictions with the highest proportions of 'other' verdicts in England in 2008–9 and their corresponding LA directly standardised rates of suicide^a (*continued*)

Coroner jurisdiction	LA	Population	Average rate 2001–2 ^b	Average rate 2008–9 ^b	Difference (%)
	Mid Suffolk CD	94,200	8.33	10.23	1.90 (23)
	St Edmundsbury CD	103,500	7.60	9.18	1.58 (21)
	Forest Heath CD	62,200	8.56	13.41	4.85 (57)
Preston and West Lancashire	Chorley	104,800	8.57	14.24	5.67 (66)
	Lancaster	139,800	11.33	6.18	–5.15 (–45)
	Preston	134,600	11.85	13.52	1.67 (14)
	South Ribble	108,200	8.38	6.65	–1.73 (–21)
	West Lancashire	110,200	3.25	9.15	5.90 (182)
	Wyre	111,100	9.20	11.43	2.23 (24)
	East Riding and Hull	Kingston upon Hull, City of UA	261,100	11.19	10.82
East Riding of Yorkshire UA		336,100	10.48	5.62	–4.86 (–46)
Weighted means and % mean difference (all 10 jurisdictions)			9.82	8.27	–1.55 (–16)

CD, council district; MCD, metropolitan council district; UA, unitary authority.

a These data are based on the *National Compendium of Clinical and Health Indicators*⁴¹ and do not include data on Welsh LAs.

b No. of cases per 100,000 population.

Source: Carroll R, Hawton K, Kapur N, Bennewith O, Gunnell D. Impact of the growing use of narrative verdicts by coroners on geographic variations in suicide: analysis of coroners' inquest data *J Public Health* [published online ahead of print 15 November 2011]. <http://dx.doi.org/10.1093/pubmed/fdr091>. By permission of Oxford University Press.

coroners' jurisdictions giving the lowest proportions of 'other' verdicts the rate did not change (0%, 95% CI –15% to 6%) (*Table 9*). There was weak statistical evidence that these two changes in rates differed: difference in rates 1.51 (95% CI –0.14 to 3.36) per 100,000 ($p=0.09$). These findings were based on suicide data for England and so we were unable to include the four Welsh LAs listed in *Table 6* in this analysis.

Discussion

Our results support four main conclusions. First, national suicide rates may have been underestimated in recent years both because of the growth in the use of narrative verdicts²⁹ and because of a trend for coroners to give accidental death verdicts to cases that in the past they may have given open or suicide verdicts to. If these trends continue, so too will the underestimation of suicide rates. Second, there is substantial variation between coroners in the extent to which their practices have changed. Such variation means that differences in suicide trends in different areas of England must be treated with extreme caution. Third, the main cause of accidental death where a high proportion of deaths are considered on clinical grounds to be probable suicides is death by medicine poisoning. Approximately half of accidental deaths due to poisoning by medicines are probably suicides. Fourth, estimates of total numbers of suicides by 'pure' poisoning with co-proxamol, paracetamol and TCAs may be underestimated by 12.2%, 26.2% and 16.8%, respectively, when these are based only on deaths receiving suicide or open verdicts.

TABLE 9 Coroner jurisdictions with the lowest proportions of 'other' verdicts in England in 2008–9 and their corresponding LA directly standardised rates of suicide^a

Coroner jurisdiction	LA	Population	Average rate 2001–2 ^b	Average rate 2008–9 ^b	Difference (%)
Western Dorset	West Dorset CD	96,500	9.18	11.77	2.60 (28)
	North Dorset CD	64,300	4.97	11.96	7.00 (141)
North West Kent	Sevenoaks CD	113,200	5.53	4.30	–1.24 (–22)
	Tunbridge Wells CD	107,600	9.69	10.04	0.35 (4)
	Tonbridge and Malling CD	117,400	4.44	8.52	4.08 (92)
Blackpool/Fylde	Blackpool UA	140,000	20.99	12.34	–8.65 (–41)
	Fylde CD	76,300	6.67	6.25	–0.42 (–6)
Isle of Wight	Isle of Wight UA	140,200	13.16	14.68	1.52 (12)
Central Hampshire	Winchester CD	113,300	7.78	11.29	3.51 (45)
	Test Valley CD	113,400	8.28	9.36	1.09 (13)
	Eastleigh CD	120,800	9.41	7.20	–2.21 (–23)
North and West Cumbria	Allerdale CD	94,300	8.90	13.40	4.50 (51)
	Carlisle CD	104,700	12.38	8.79	–3.59 (–29)
	Copeland CD	69,700	12.81	9.01	–3.80 (–30)
York City	York UA	198,800	5.82	8.55	2.73 (47)
Teesside	Redcar and Cleveland UA	137,800	10.65	10.00	–0.65 (–6)
	Middlesbrough UA	140,100	12.51	7.96	–4.55 (–36)
	Stockton-on-Tees UA	189,800	7.98	8.76	0.78 (10)
Spilsby and Louth ^c	East Lindsey CD	140,800	7.54	15.16	7.62 (101)
Essex and Thurrock	Thurrock UA	157,200	7.96	4.11	–3.85 (–48)
	Brentwood CD	73,800	5.55	5.96	0.41 (7)
	Basildon CD	174,100	7.38	7.29	–0.09 (–1)
	Epping Forest CD	124,000	9.53	4.75	–4.78 (–50)
	Chelmsford CD	167,800	4.20	7.75	3.55 (84)
	Maldon CD	62,900	5.74	6.85	1.11 (19)
	Uttlesford CD	75,600	6.11	8.56	2.45 (40)
	Braintree CD	142,700	7.32	5.49	–1.84 (–25)
	Colchester CD	177,100	6.39	7.84	1.45 (23)
	Tendring CD	148,000	8.31	4.49	–3.82 (–46)
	Harlow CD	80,600	8.36	3.90	–4.46 (–53)
Weighted mean and % mean difference (all 10 jurisdictions)			8.56	8.52	–0.04 (0)

CD, council district; UA, unitary authority.

a These data are based on the *National Compendium of Clinical and Health Indicators*⁴¹ and do not include data on Welsh LAs.

b No. of cases per 100,000 population.

c Suicide data were unavailable for the parishes from West Lindsey that are included in this jurisdiction (population ~16,000).

Source: Carroll R, Hawton K, Kapur N, Bennewith O, Gunnell D. Impact of the growing use of narrative verdicts by coroners on geographic variations in suicide: analysis of coroners' inquest data *J Public Health* [published online ahead of print 15 November 2011]. 2011. <http://dx.doi.org/10.1093/pubmed/fdr091>. By permission of Oxford University Press.

Concerns about the accuracy of national suicide statistics are neither new^{27,32,35,43} nor unique to English suicide data.^{44,45} Nevertheless, the issues that we have investigated suggest that, in the last 20 years, suicide rates are likely to have been underestimated to a greater extent than in previous years, and local trends in suicide may be particularly misleading. For example, health strategists in the areas served by the Birmingham and Solihull coroners, who give narrative verdicts at more than half of their inquests,³⁷ may be falsely reassured that suicide rates in their areas are declining. Any such favourable trends may, in fact, reflect coding difficulties experienced by the ONS when it attempts to classify deaths given narrative verdicts. Similarly, recent downwards trends in English suicide rates may have been overestimated. The ONS has recently assessed the extent of possible underestimation of suicide rates: it reported that, if all deaths from hanging and poisoning given narrative verdicts by coroners and coded as accidents by the ONS were, in fact, suicides, the 2009 suicide rate would have been underestimated by 6% – a difference equivalent to almost one-third of the 2002 *National Suicide Prevention Strategy's*³ 20% reduction target. This may be a conservative assessment because the ONS's analysis did not include other common methods of suicide, such as drowning and jumping; furthermore, Ministry of Justice data for 2010 and 2011 indicate a continuing rise in the use of narrative verdicts.

A possible contributor to changes in the pattern of coroners' verdicts over time may be an increase in the popularity of methods of suicide such as drowning and self-poisoning, in which intent can be more ambiguous. However, between 1990 and 2005, the main changes in the methods used for suicide in England and Wales were a >50% increase in the use of hanging⁴² (this method accounted for over half of suicides over the study period) and a reduction in the use of all other methods. In keeping with this, our multivariable analysis controlling for differences in age and sex and methods used by people dying by suicide strengthened the statistical evidence for an increasing trend in the use of accidental verdicts for probable (researcher-defined) suicides.

The ONS suggestion that suicide rates may be underestimated by up to 6% because of the increased use of narrative verdicts, combined with our analysis indicating that 9% of researcher-defined suicides are given accidental death verdicts by coroners, suggest that suicide rates may have been underestimated by approximately 15% in England in recent years. The extent of the problem is likely to be somewhat less than this as some deaths of undetermined intent (around 20%; see *Table 1*) currently included in national statistics are not suicides. Evidence for the growth in use of accident verdicts for researcher-defined suicides and narrative verdicts when suicide or open verdicts might previously have been given means that decreases in suicide rates since 1990 are likely to have been overestimated. A practical impact of these trends is that they may lead to health policy-makers in England underestimating the impact of the current economic crisis on suicide or providing false reassurance concerning the magnitude of the public health problem caused by suicide in England.¹⁰ Furthermore, the number of suicides from paracetamol poisoning and, to a lesser extent, co-proxamol and TCA poisoning will be underestimated when these are based on deaths receiving suicide and open verdicts alone.

Limitations

In our assessment of the likelihood of suicide among individuals given open, narrative or accidental verdicts by the 12 coroners in our study, there was an initial lack of consensus across the three coders for about one-fifth of the cases examined, illustrating the difficulties involved in deciding whether some cases were suicide or not. Although the coroners' jurisdictions studied comprised 10% of all jurisdictions in England and Wales, the number of jurisdictions and the variability in their size meant that a difference in practice (verdicts assigned) by a single coroner with a large jurisdiction could bias the assessment of a temporal increase in the use of the accident/misadventure verdict. Furthermore, because of resource limitations, we studied only three time periods. An analysis of data for additional years would have increased confidence in our assessment of time trends.

The main limitation of our analysis of Ministry of Justice data is that we used 'other' verdicts as a proxy for narrative verdicts. Nevertheless, recent ONS analysis²⁹ indicates that this is a reasonable assumption, with over three-quarters of 'other' verdicts in 2008–9 being narratives. It remains possible that there are

regional variations in the proportion of narratives amongst 'other' verdicts. The Ministry of Justice does not receive consistent nor reliable data from individual coroners on their 'other' verdicts, which prevents the accurate reporting of narrative verdict use in each jurisdiction.

Conclusions

National suicide statistics are crucial to public health surveillance and this research has a number of policy and public health implications. First, small area (primary care trust/LA)-specific suicide rates and trends in suicide rates should be treated with caution in those areas where local coroners make high use of narrative verdicts. Second, approaches to ensure the future reliability of national suicide statistics should be taken – these might include asking coroners to both record the short-form verdict and, when appropriate, accompany this with a longer narrative account of the death. LA medical examiners and the post of Chief Coroner may lead to improvements in reporting practices; what is clear is that approaches are needed to ensure consistency in reporting cause of death between coroners. Third, the ONS might consider including in its suicide statistics deaths from medicine poisoning given verdicts of accident/misadventure by coroners. In particular, the assessment of the overall burden of suicide from co-proxamol, paracetamol and TCA poisoning is best achieved by combining deaths from these medicines receiving suicide, open and accidental verdicts.

Chapter 3 Studies to evaluate the impact of the 1998 UK legislation restricting pack sizes of paracetamol

Abstract

In 1998, legislation was introduced restricting pack sizes of paracetamol sold over the counter in an attempt to reduce self-poisonings and paracetamol-induced hepatotoxicity. We conducted four studies related to this legislation. Analysis of mortality data for England and Wales and UK liver unit data showed that the legislation was followed by significant reductions in deaths over an 11-year period (43% or 765 fewer deaths; 990 when accidental deaths were included) and in liver transplantation for paracetamol-induced hepatotoxicity (61% fewer transplantations). Interviews with 60 general hospital patients who had been admitted after taking overdoses of ≥ 16 paracetamol tablets showed that most used paracetamol because it was readily available, although few breaches of sales guidance were reported. Evidence of media (including internet) influence on the choice of paracetamol for self-poisoning was found. Examination of data from the Multicentre Study of Self-harm in England and the National Registry of Deliberate Self Harm in Ireland indicated that, despite smaller pack sizes in Ireland, there was no major difference in overdose size between the two settings. More 'pack equivalents' were generally consumed in Ireland, raising questions about whether sales guidance is followed as strictly as in the UK. Finally, GP prescribing data for the UK (from IMS Health) showed that prescribing of NSAIDs following the 1998 legislation increased in line with prescribing of other analgesics, with no evidence of an increase in admissions for GI bleeds in Hospital Episode Statistics (HES) data. However, a gradual increase in use of antiulcerants may have offset any increase in incidence of GI symptoms.

Although the 1998 legislation appears to have been beneficial, the continuing toll of deaths from paracetamol overdose suggests that further initiatives may be necessary. Media (including internet) influences should be addressed.

Background

Paracetamol, an analgesic available over the counter, is the most common drug used for self-poisoning in the UK.^{22,46} It is also a frequent cause of poisoning in many other countries.⁴⁷⁻⁵³ If untreated, an overdose of 10–15 g (20–30 tablets) of paracetamol can result in fatal hepatotoxicity.^{54,55}

In September 1998, legislation was introduced by the UK government following a recommendation by the UK Medicines Control Agency (now the MHRA) restricting pack sizes of paracetamol (and other analgesics) sold through pharmacies to a maximum of 32 tablets and restricting non-pharmacy sales to 16 tablets^{56,57} (although MHRA guidance in 2009 suggests that up to two packs of 16 tablets can be bought from the latter⁵⁸). This policy was introduced because of the large number of people taking paracetamol overdoses⁵⁹⁻⁶¹ and the increasing numbers of deaths⁶² and liver transplants⁶³ resulting from paracetamol-induced hepatotoxicity. Another motivation for the legislation was the knowledge gained from interviewing people who had presented to hospital following paracetamol overdoses, many of whom reported that the act was often impulsive and involved the use of medication already stored in the home.^{64,65}

Our research group showed that the UK legislation had beneficial effects in England and Wales during the first few years following its introduction in terms of paracetamol-related deaths, liver transplants and numbers of tablets consumed in overdoses.^{12,66} Although other studies supported these findings,^{67,68} some

commentators have questioned the impact of the legislation.^{69,70} Furthermore, in Scotland, no evidence of an impact on deaths has been found.^{71,72} More long-term studies are therefore required to assess whether or not the legislation has been a success.⁶⁸

There is also evidence that some retail outlets have not fully complied with the intention of the legislation, and that it is possible to purchase large quantities of paracetamol over the counter.^{73–76} Furthermore, the increase in internet sites from which drugs can be bought is also a potential cause for concern.

In Ireland, similar legislation was introduced in October 2001,⁷⁷ but pack sizes were restricted to lower maximum amounts than in the UK, namely a maximum pack size of 24 tablets in pharmacies and 12 tablets in non-pharmacy outlets, with just a single pack to be supplied in any one transaction.

One area of concern relating to the introduction of this legislation is whether the reduced paracetamol pack size may have resulted in increased use of NSAIDs, with adverse consequences in terms of GI bleeds,⁷⁸ which might also be reflected in increased prescribing of drugs for GI disorders.

To investigate some of these issues, we conducted four research studies to address the following questions:

1. What has been the long-term impact of the 1998 legislation to reduce pack sizes of paracetamol in terms of deaths and liver disease?
2. What are the circumstances associated with larger overdoses of paracetamol, and are the intentions of the legislation being complied with?
3. Do differences in pack sizes of paracetamol in the UK and Ireland have an impact on overdoses of the drug?
4. Did the UK legislation on pack sizes of paracetamol result in an increased rate of GI disorders because of greater use of NSAIDs?

STUDY 1: LONG-TERM EVALUATION OF THE IMPACT OF REDUCED PACK SIZES OF PARACETAMOL ON POISONING DEATHS AND LIVER TRANSPLANT ACTIVITY IN ENGLAND AND WALES

Objective

The objective of the study was to investigate the long-term impact in England and Wales of the 1998 introduction of smaller paracetamol pack sizes on poisoning deaths, especially suicides, and liver unit activity for paracetamol-induced hepatotoxicity, in terms of registration for liver transplantation and actual transplants.

Methods

Data sources

Deaths

To evaluate the impact of the legislation on suicides, we used data on deaths receiving a suicide verdict and deaths recorded as being of undetermined intent (open verdicts) (see *Chapter 2*). The ONS provided quarterly information on drug-poisoning deaths (suicides, open verdicts and accidental poisonings) involving paracetamol, the more common paracetamol compounds used for self-poisoning (paracetamol with codeine, dihydrocodeine, ibuprofen or aspirin) and all drugs, based on death registrations from 1993 to 2009 in England and Wales. We did not include deaths involving the paracetamol/dextropropoxyphene compound (co-proxamol) as dextropropoxyphene is usually the lethal agent in co-proxamol poisonings and the drug was

withdrawn in 2007⁷⁹ (see *Chapter 4*). We have restricted our analyses to deaths involving single drugs (paracetamol or paracetamol compounds) with or without alcohol, for individuals aged ≥ 10 years. Similar data were supplied for all deaths receiving suicide and open verdicts.

Registrations for liver transplantation and actual transplants

We used data supplied by UK Transplant (now NHS Blood and Transplant) on registrations for liver transplantation and actual liver transplants as a result of paracetamol poisoning between 1995 and 2009 in residents of England and Wales aged ≥ 10 years.

Non-fatal self-poisoning with paracetamol

We used data collected through the Oxford Monitoring System for Attempted Suicide²⁵ (which includes all hospital presentations for self-harm) to examine trends in non-fatal overdoses involving paracetamol (in pure or compound form) throughout the period 1993–2009.

Statistical analyses

Analyses were conducted using Stata version 10.0. We used interrupted time-series analysis⁸⁰ to estimate changes in levels and trends following the 1998 legislation. We compared the mean quarterly numbers of deaths and liver unit registrations and transplantations that might have occurred in the post-intervention period without the legislation with the number that occurred with the legislation.⁸¹ The end of the third quarter of 1998 was chosen as the point of intervention. For more details of this method see *Appendix 3*.

In addition to the basic regression model for the analysis of paracetamol-related deaths, we included adjustment for potentially confounding trends in 'all drug-poisoning suicide deaths' by inclusion of 'all drug suicide deaths excluding paracetamol' as a covariate. We also calculated a conservative estimate of the absolute effect, which assumed no increase in the number of deaths in the absence of the legislation. The absolute effect of the legislation was determined as the difference between the outcome expected at the last point of the pre-intervention period and the outcome expected at the mid-point of the post-intervention period. For analysis of liver unit registrations and transplantations we also used the basic regression model and the conservative estimate analysis.

We also conducted a sensitivity analysis to determine whether our results changed when January 1998 was used as the intervention point – this corresponds to the date when the packaging changes began to occur (9 months before the legislation).

Results

Deaths

The numbers of deaths in England and Wales between 1993 and 2009 from poisoning with all drugs and from paracetamol specifically that received suicide, open and accidental verdicts are shown in *Table 10*. Paracetamol poisoning deaths constituted between approximately 9% and 10% of drug-poisoning suicide deaths before the legislation and between approximately 7% and 9% after the legislation.

Regression analysis of quarterly data indicated a significant decrease corresponding to the September 1998 legislation in both level (i.e. step change) and trend in deaths involving paracetamol in England and Wales that received a suicide or open verdict (*Figure 2* and *Table 11*).

The estimated average decrease in number of deaths was 17 per quarter (95% CI –25 to –9 deaths per quarter) in the post-intervention period compared with the expected number based on trends in the pre-intervention period (*Table 12*). This change equated to an overall decrease in number of deaths of about 43% in the 11.25 years post legislation, or 765 fewer deaths than would have been predicted based on trends during 1993–September 1998. An overall decrease of 36% was found when a conservative method of analysis was used (see *Table 12*).

TABLE 10 Suicide and open verdict deaths by all causes, and suicide, open verdict and accidental deaths from poisoning with all drugs, paracetamol alone and paracetamol compounds (with or without alcohol) in England and Wales for individuals aged ≥ 10 years, 1993–2009

Year	All causes, <i>n</i>	All drugs, <i>n</i> (%)		Paracetamol, <i>n</i> (% ^a)		Paracetamol compounds, ^b <i>n</i> (% ^a)	
	Suicide, open	Suicide, open	Suicide, open, accidental	Suicide, open	Suicide, open, accidental	Suicide, open	Suicide, open, accidental
1993	5182	1314	1897	132 (10.0)	181 (9.5)	17 (1.3)	22 (1.2)
1994	5090	1298	2003	126 (9.7)	163 (8.1)	15 (1.2)	20 (1.0)
1995	5127	1390	2140	122 (8.8)	155 (7.2)	24 (1.7)	27 (1.3)
1996	4910	1325	2103	121 (9.1)	158 (7.5)	24 (1.8)	26 (1.2)
1997	4830	1406	2252	149 (10.6)	204 (9.1)	21 (1.5)	27 (1.2)
1998	5347	1432	2246	135 (9.4)	183 (8.1)	16 (1.1)	20 (0.9)
1999	5241	1414	2294	113 (8.0)	150 (6.5)	29 (2.1)	33 (1.4)
2000	5081	1309	2143	90 (6.9)	123 (5.7)	29 (2.2)	31 (1.4)
2001	4904	1280	2176	108 (8.4)	142 (6.5)	18 (1.4)	27 (1.2)
2002	4762	1227	1983	90 (7.3)	124 (6.3)	22 (1.8)	28 (1.4)
2003	4811	1194	1843	91 (7.6)	120 (6.5)	22 (1.8)	28 (1.5)
2004	4883	1246	2008	88 (7.1)	127 (6.3)	31 (2.5)	40 (2.0)
2005	4718	1154	1926	92 (8.0)	126 (6.5)	33 (2.9)	37 (1.9)
2006	4513	979	1821	92 (9.4)	131 (7.2)	35 (3.6)	46 (2.5)
2007	4322	888	1852	66 (7.4)	90 (4.9)	23 (2.6)	36 (1.9)
2008	4603	884	2071	61 (6.9)	106 (5.1)	26 (2.9)	44 (2.1)
2009	4682	898	2185	69 (7.7)	125 (5.7)	26 (2.9)	39 (1.8)

a Percentage of all drug-poisoning deaths shown in parentheses.

b Compounds include paracetamol plus codeine, paracetamol plus dihydrocodeine, paracetamol plus ibuprofen, paracetamol plus aspirin.

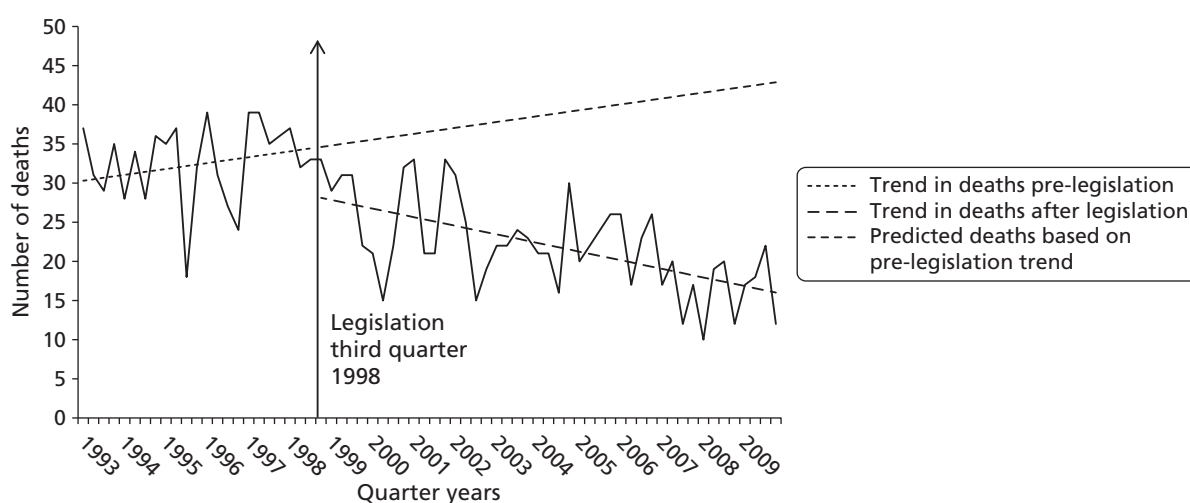
**FIGURE 2** Number of suicide and open verdict deaths involving paracetamol alone in England and Wales, 1993–2009, by quarter years, and best fit regression lines related to the 1998 legislation.

TABLE 11 Interrupted time-series segmented regression analysis of deaths in England and Wales from paracetamol poisoning, other drug poisoning and all causes for individuals aged ≥ 10 years, 1993–2009, with September 1998 as the point of intervention

Cause of death	Segmented regression models											
	Base-level coefficient (β_0)	Robust SE	p-value	Base-trend coefficient (β_1)	Robust SE	p-value	Step-change coefficient ^a (β_2)	Robust SE	p-value	Trend-change coefficient ^a (β_3)	Robust SE	p-value
Suicide, open												
Paracetamol	30.103	1.901	<0.001	0.188	0.116	0.111	-6.023	2.430	0.016	-0.463	0.132	0.001
Paracetamol (adjusted) ^b	21.085	7.208	0.005	0.149	0.113	0.194	-6.473	2.397	0.009	-0.328	0.164	0.049
Paracetamol compounds	4.801	1.081	<0.001	0.007	0.087	0.933	1.249	1.534	0.419	0.013	0.095	0.892
All drug poisoning except paracetamol	291.078	12.757	<0.001	1.290	0.886	0.150	12.928	12.150	0.291	-4.347	0.925	<0.001
All drug poisoning	321.373	14.007	<0.001	1.462	0.966	0.135	7.142	13.067	0.587	-4.795	1.011	<0.001
All causes	1277.176	28.050	<0.001	-1.075	2.365	0.651	36.928	41.443	0.376	-2.893	2.574	0.265
Suicide, open, accidental												
Paracetamol	39.344	2.460	<0.001	0.309	0.158	0.055	-10.300	3.111	0.002	-0.521	0.0176	0.004
Paracetamol (adjusted) ^b	30.171	7.099	<0.001	0.236	0.170	0.170	-9.959	3.085	0.002	-0.426	0.191	0.029
Paracetamol compounds	5.777	1.172	<0.001	0.017	0.087	0.842	0.358	1.489	0.811	0.081	0.094	0.392
All drug poisoning except paracetamol	445.966	27.361	<0.001	2.919	1.885	0.126	-10.246	29.152	0.726	-3.931	2.042	0.059
All drug poisoning	468.263	29.352	<0.001	3.122	1.989	0.121	-18.461	31.001	0.554	-4.361	2.140	0.046

SE, standard error.

a Post-intervention change in level (β_2) and post-intervention change in trend (β_3).

b Adjusted by addition of covariate (all drug deaths excluding paracetamol) in regression.

TABLE 12 Changes in numbers of poisoning deaths involving paracetamol in England and Wales for individuals aged ≥ 10 years associated with the 1998 legislation to reduce pack size, 1993–2009

Cause of death	Estimation of the absolute effect of the legislation October 1998–2009 ^a			Conservative estimation ^b of the absolute effect of the legislation October 1998–2009 ^a		
	Mean quarterly estimated no. of deaths without legislation ^c	Mean quarterly estimated no. of deaths with legislation ^c	Mean quarterly change October 1998–2009 ^d (95% CI) ^e	Mean quarterly estimated no. of deaths without legislation ^c	Mean quarterly estimated no. of deaths with legislation ^c	Mean quarterly change October 1998–2009 ^d (95% CI) ^e
Suicide, open						
Paracetamol	39	22	-17 (-25 to -9)	34	22	-12 (-20 to -4)
All drug poisoning (except paracetamol)	350	263	-87 (-145 to -29)	321	263	-58 (-115 to 1)
Paracetamol (adjusted) ^f	28	14	-14 (-23 to -5)	24	14	-10 (-19 to -2)
Paracetamol compounds	5	6	1 (-5 to 7)	5	6	1 (-5 to 8)
All drug poisoning	388	285	-103 (-166 to -40)	355	285	-70 (-132 to -7)
All causes	1228	1198	-30 (-199 to 140)	1252	1198	-54 (-224 to 115)
Suicide, open, accidental						
Paracetamol	53	31	-22 (-30 to -14)	46	31	-15 (-23 to -7)
All drug poisoning (except paracetamol)	580	480	-100 (-225 to 23)	513	480	-33 (-158 to 90)
Paracetamol (adjusted) ^f	41	21	-20 (-32 to -8)	35	21	-14 (-26 to -2)
Paracetamol compounds	7	9	2 (-4 to 8)	6	9	3 (-3 to 9)
All drug poisoning	612	493	-119 (-249 to 11)	540	493	-47 (-177 to 83)

a Using interrupted time-series segmented regression analysis⁸⁰ in which the intervention point is taken as the third quarter of 1998.

b Assuming flat trend in post-legislation period had the legislation not occurred.

c Estimated for the mid-point quarter of October 1998–2009.

d Absolute difference between estimated number of deaths with legislation and estimated number of deaths without legislation, taken at the mid-point of the post-intervention period.

e 95% CI calculated according to Zhang *et al.*⁸²

f Adjusted by including all drug-poisoning deaths (except paracetamol) as a covariate in regression.

There was also a downwards trend in all drug-poisoning (excluding paracetamol) deaths receiving a suicide or open verdict during the post-legislation period, although this was smaller in magnitude (25%) and was not associated with the step change seen for paracetamol following the introduction of the 1998 legislation. When the change in paracetamol deaths was adjusted to take account of the fall in poisoning deaths involving other drugs, the decline in paracetamol deaths changed very little (see *Table 12*). Similar results were found when accidental poisoning deaths involving paracetamol were included with suicides and open verdicts (see *Table 12*). The reduction in deaths in the post-legislation period when accidents were included equated to 990 fewer deaths than expected. Although suicides (including open verdicts) involving any method showed a significant downwards trend during the post-legislation period, there was no step change associated with the legislation (see *Table 11*).

When the intervention point was moved back 9 months to the beginning of 1998 to take account of earlier introduction of packaging changes, there remained a significant downwards trend in suicide and open verdict deaths involving paracetamol during 1998–2009 but no step change (see *Appendix 3, Table 45*).

There was no major change in number of deaths involving paracetamol compounds following the 1998 legislation (see *Tables 11 and 12*). These deaths represented a relatively small proportion of overall paracetamol-related deaths (see *Table 10*).

Liver unit activity

Registration for liver transplantation

There was a decrease in level and trend of the number of registrations for liver transplantation related to paracetamol-induced hepatotoxicity in England and Wales following the 1998 legislation (*Figure 3*). The mean quarterly change compared with the expected number of registrations based on trends in the pre-intervention period was -10.7 (95% CI -20 to -1), equating to a 61% reduction (mean 6.9 individuals per quarter vs. mean 17.6 in the pre-legislation period) (*Table 13*). This was equivalent to 482 fewer registrations over the 11.25-year period following the legislation. We obtained a similar result when we used the beginning of 1998 as the legislation point. A conservative estimate of the absolute change in number of registrations for liver transplants was smaller, and was not significant.

Liver transplantation

There was a non-significant reduction in number of liver transplantations for paracetamol-induced hepatotoxicity in England and Wales in the period October 1998–2009 following the legislation compared

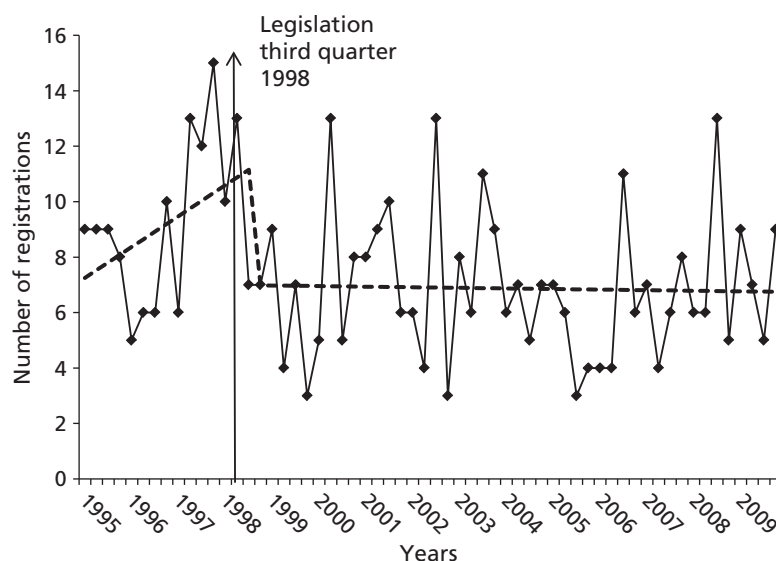


FIGURE 3 Paracetamol-related registrations for liver transplantation waiting list in England and Wales, 1995–2009, by quarter years, and best fit regression lines related to the 1998 legislation.

TABLE 13 Changes in number of paracetamol-related registrations for liver transplantation and liver transplants in England and Wales, 1995–2009, associated with 1998 legislation to reduce pack size

Liver unit registrations and transplants	Estimation of the absolute effect of the legislation October 1998–2009 ^a			Conservative estimation of the absolute effect of the legislation October 1998–2009 ^a		
	Mean quarterly estimated no. without legislation ^b	Mean quarterly estimated no. with legislation ^b	Mean quarterly change October 1998–2009 ^c (95% CI) ^d	Mean quarterly estimated no. without legislation ^b	Mean quarterly estimated no. with legislation ^b	Mean quarterly change October 1998–2009 ^c (95% CI) ^d
Paracetamol-related						
Registrations	17.6	6.9	–10.7 (–20 to –1)	11.1	6.9	–4.3 (–14 to 5)
Transplants	8.2	4.8	–3.4 (–12 to 6)	6.8	4.8	–2.0 (–11 to 7)
All liver transplants	132.3	148.8	16.5 (–30 to 63)	138.9	148.8	9.9 (–37 to 57)

a Using interrupted time-series segmented regression analysis⁸⁰ in which the intervention point is taken as the third quarter of 1998.
b Estimated for the mid-point quarter of October 1998–2009.
c Absolute difference between estimated number with legislation and estimated number without legislation, taken at the mid-point of the post-intervention period.
d 95% CI calculated according to Zhang *et al.*⁸²

with the estimated level based on the 1995–September 1998 trend (*Figure 4*). The estimated mean quarterly change was -3.4 (95% CI -12 to 6) transplantations (see *Table 13*). The number of liver transplantations for all causes in the UK showed a small but non-significant increase during the post-legislation period (from a mean estimated quarterly number of 132.3 before the legislation to 148.8 after).

Non-fatal self-poisoning with paracetamol

There was no decline in the number of hospital presentations in Oxford between 1993 and 2009 for non-fatal overdoses involving paracetamol (pure or compound form) (1993–8 mean = 567.0 per year vs. 1999–2009 mean = 601.6 per year).

Discussion

We have shown that the 1998 legislation to restrict pack sizes of paracetamol was associated with a significant reduction in the number of deaths from paracetamol poisoning in England and Wales over an 11-year period, in terms of both deaths receiving a suicide or an open verdict from the coroner and deaths receiving a suicide, an open or an accidental verdict from the coroner. This effect was found in analyses with estimates based on a continuation of the pre-legislation trend, as well as with more conservative estimates assuming no increasing trend in the absence of the legislation. The downwards step change was not apparent when the intervention point was moved back to the beginning of 1998.

There was no significant change in number of deaths from fatal poisoning with paracetamol compounds, but these constituted a relatively small proportion of paracetamol-related deaths. There was also a significant reduction in number of deaths from poisoning with drugs excluding paracetamol between 1998 and 2009, but to a lesser extent than was found for paracetamol and without the step change associated with the 1998 paracetamol legislation. When we repeated the analyses for paracetamol with an adjustment for underlying trends in poisoning deaths (excluding those that were paracetamol related) the findings for paracetamol deaths were largely unaltered.

Following the legislation a significant reduction was also found in the number of registrations for liver transplantation in England and Wales for paracetamol-induced hepatotoxicity, although a downwards step change was also apparent when the beginning of 1998 was used as the intervention point, and the change was not significant using a conservative estimate of the effect. Although there was also a reduction in the

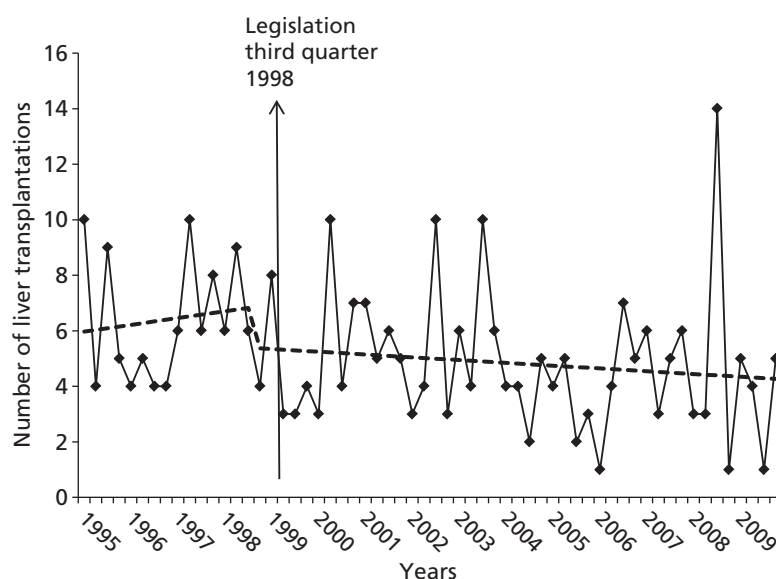


FIGURE 4 Paracetamol-related liver transplantations in England and Wales, 1995–2009, by quarter years, and best fit regression lines related to the 1998 legislation.

number of liver transplants of a similar order to that for registrations, this was not statistically significant because of the smaller numbers involved. It is interesting that the decline in liver unit activity (see *Figures 3 and 4*) shows a somewhat different pattern from that for paracetamol poisoning deaths (see *Figure 2*), with the former flatlining after an initial abrupt reduction and the latter a more continuous reduction. The reasons for this are unclear.

The reduction in number of registrations for liver transplantation is particularly striking because in 2005 the criteria for registration were broadened, with a lowering of the thresholds for consideration for surgery.⁸³ It is possible that some of the reduction in liver transplant registrations may have resulted from improvements in the early management of patients presenting to hospital with paracetamol poisoning, including administration of the antidote *N*-acetylcysteine and the increasing sophistication and success of intensive care support provided to patients with paracetamol-induced acute liver failure.⁸⁴ These factors could also have accounted for some of the downwards trend in numbers of paracetamol deaths observed over the study period; however, the process of change has been one of continuous evolution and would be unlikely to account for the step change seen in outcomes coincident with the introduction of pack size restrictions. It is important to note, however, that, based on data from Oxford, presentations of non-fatal overdoses to hospital involving paracetamol did not decrease during the study period.

The impact of the 1998 legislation restricting pack sizes of paracetamol is likely to reflect the fact that many people who self-poison with paracetamol take what is available in the household,^{65,85} especially if the overdose is impulsive. Also, when individuals buy paracetamol specifically for the purpose of an overdose, the quantity per purchase is limited. Perhaps the most convincing evidence that reduced pack sizes of paracetamol have contributed to a reduced occurrence of hepatotoxicity and mortality is our earlier finding that the legislation was followed by a reduction in the number of tablets taken in paracetamol overdoses and in the number of large overdoses.^{12,65}

Strengths and limitations

One limitation of this study is that we used only data on deaths from poisoning with paracetamol (with or without alcohol) in pure or compound form, not deaths in which paracetamol was consumed with other drugs. This approach, however, ensured that the findings of the study were restricted primarily to paracetamol and not substantially affected by the toxicity of other drugs or compounds. One strength of the study is that it was based on national data for both deaths and liver unit activity.

We have not been able to estimate the number of possible substitutions of paracetamol overdoses with other methods of poisoning or self-harm, but the trend in total suicides (all methods) during the post-1998 legislation period was downwards, as was the trend in suicides by ingestion. This downwards trend in all suicides probably reflects other factors that have favourably influenced suicide rates and, hence, may have contributed to the findings for paracetamol poisoning deaths. A further limitation was that data on non-fatal overdoses of paracetamol were restricted to one hospital, but this included all presentations, not just admissions.

Conclusions

The legislation introduced in 1998 to restrict pack sizes of paracetamol was associated with long-term benefits in terms of reduced numbers of deaths from paracetamol poisoning and registrations for liver transplantation. The number of deaths annually from paracetamol poisoning suggests, however, that further methods of prevention should be sought.

STUDY 2: AN INTERVIEW STUDY OF PATIENTS WHO HAVE TAKEN LARGER PARACETAMOL OVERDOSES

Objectives

The objectives were to conduct an interview study to investigate the characteristics of larger paracetamol overdoses and the people who use this method of self-poisoning, and to assess whether the intention of the legislation to restrict sales of large numbers of tablets is being complied with by shops and pharmacies.

Methods

Patients were eligible for inclusion if they had taken an overdose of > 16 pure paracetamol tablets, were aged ≥ 16 years and had received a psychosocial assessment by a member of the clinical self-harm team in the Department of Psychological Medicine at the John Radcliffe Hospital in Oxford.

The research interview consisted of standardised and open-ended questions regarding the circumstances of the act, the number of tablets consumed, the number available, the source of the tablets, whether the patient had tried to buy more than the recommended amount and his or her expectations of the physical effects of overdose (see *Appendix 4*).

Patients were shown cards with common motives for overdoses written on them (modified from Bancroft *et al.* 1979⁸⁶) and were asked to choose those that best explained their own motivation. They were also asked about previous paracetamol overdoses and potential influences on their decision to take the current overdose. Scores on the Suicidal Intent Scale (SIS)⁸⁷ were recorded, using data collected by the clinician during the psychosocial assessment. At the end of the research interview, patients completed the Hospital Anxiety and Depression Scale (HADS).⁸⁸

The patients' verbatim responses to open-ended questions were recorded manually by the interviewer. The interviews were carried out between November 2008 and July 2010 by a research interviewer, members of the clinical self-harm team and a research support facilitator.

The study received ethical approval from Oxfordshire Research Ethics Committee C (REC reference 08/H0606/45) and from the Research and Development Departments of the Oxford Radcliffe Hospitals NHS Trust and Oxford Health NHS Foundation Trust.

Quantitative data were analysed with SPSS for Windows version 14 (SPSS Inc., Chicago, IL, USA) using descriptive statistics, including chi-squared and Mann-Whitney tests. A simplified thematic approach was used to examine qualitative data arising from the patients' responses to open-ended questions. Themes were identified by SS from the written comments and reviewed and approved by KH.

Results

Sixty patients were included in the study. *Figure 5* shows the flow diagram for inclusion and exclusion of potential participants.

Patient characteristics

The study sample included 35 females [mean age 29.9 years, standard deviation (SD) 13.2 years, range 16–65 years] and 25 males (mean age 33.3 years, SD 14.9 years, range 19–65 years) (*Table 14*). For 24 patients (40.0%) this was their first overdose, but 10 patients (16.7%) were multiple repeaters, having taken at least five previous overdoses (see *Table 14*). Over half ($n = 32$, 53.3%) had taken a previous overdose

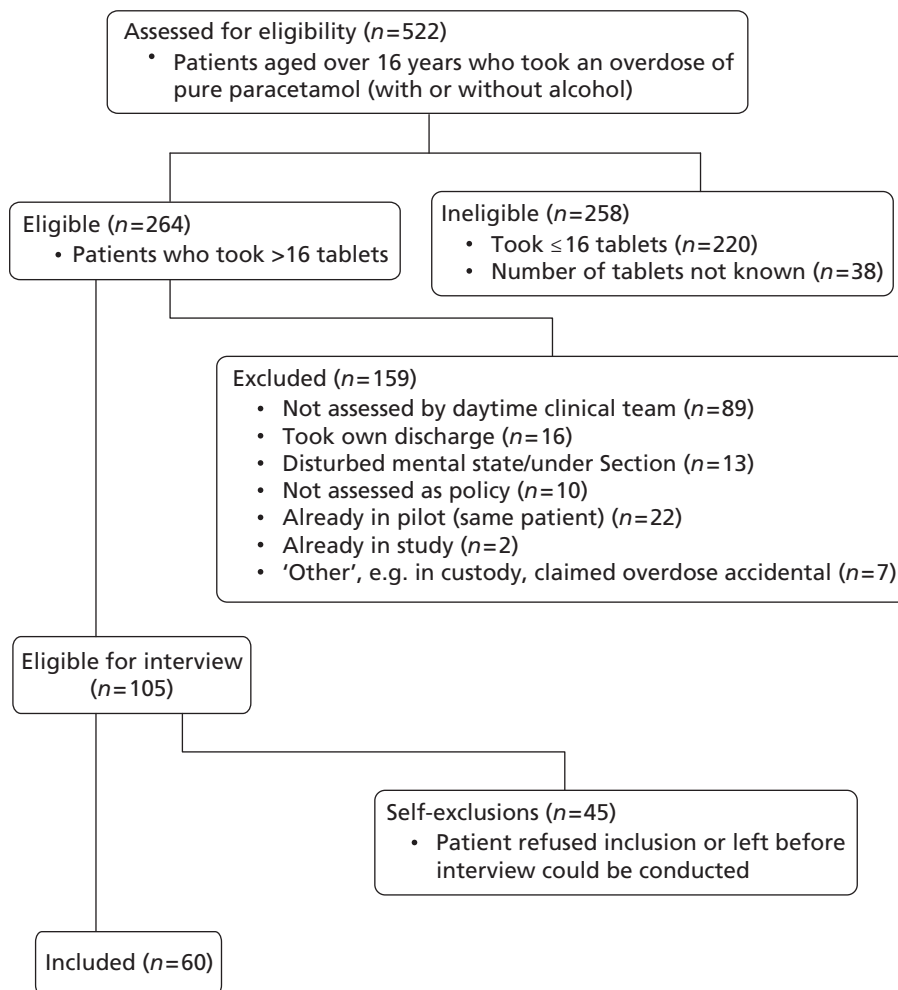


FIGURE 5 Flow chart of recruitment to the study. Source: Simkin S, Hawton K, Kapur N, Gunnell D. What can be done to reduce mortality from paracetamol overdoses? A patient interview study. *Q J Med* 2012;**105**:41–51. By permission of Oxford University Press.

of paracetamol. The SIS was completed for 59 patients. High (13–20) or very high (21+) scores were recorded for over half ($n=33$, 56.0%) of these patients. At the time of the research interview, 43 patients (72.9%) reached case status for anxiety (score >9) on the HADS and 37 (62.7%) reached case status for depression (score >9).

Nature of the overdose

Over one-third of the patients had consumed alcohol at the time of the overdose (*Table 15*). Presentation to hospital was delayed by >6 hours after taking the tablets in 22 cases (36.7%). The majority ($n=50$, 83.3%) were treated with the antidote *N*-acetylcysteine. Seventeen patients took one or more other drugs in their overdose.

The number of paracetamol tablets taken ranged from 18 to 224. Over three-quarters of the patients took fewer than 50 tablets, but over half ($n=35$, 58.3%) took all of the tablets available. Half of the patients had taken the overdose impulsively, within an hour of first thinking about it (see *Table 15*). One-quarter said that they had thought about the act for <15 minutes before taking the tablets. However, seven people had considered the overdose for more than a week.

Source of the paracetamol

In many cases ($n=32$, 53.3%) the tablets were already in the home, mostly for general pain relief. Three people had boxes of 100 tablets, which had been prescribed after operations or for back pain.

TABLE 14 Characteristics of patients included in the study ($n=60$)

Characteristic	<i>n</i>	%
Sex		
Female	35	58.3
Male	25	41.7
Age, years		
16–20	17	28.3
21–40	28	46.7
41+	15	25.0
Previous overdoses		
0	24	40.0
1	15	25.0
2–4	9	15.0
5+	10	16.7
Yes, number not known	2	3.3
Previous paracetamol overdose	32	53.3
SIS score ($n=59$)		
Low (0–6)	4	6.8
Moderate (7–12)	22	37.3
High (13–20)	27	45.8
Very high (21+)	6	10.2
HADS score ($n=59$)		
Case – anxiety (>9)	43	72.9
Case – depression (>9)	37	62.7

Source: Simkin S, Hawton K, Kapur N, Gunnell D. What can be done to reduce mortality from paracetamol overdoses? A patient interview study. *Q J Med* 2012;**105**:41–51. By permission of Oxford University Press.

Over half ($n=32$, 58.3%) bought tablets specifically for the overdose (nine of these also had supplies at home). Most purchases were made from a supermarket or pharmacy (see *Table 15*). Other outlets included four garages and an online pharmacy site.

Ten people tried to buy >32 tablets in one transaction; four succeeded. Of these, one was able to buy in bulk from a cash and carry outlet, one purchased 14 packs of 16 tablets from an online pharmacy, and one obtained multiple packs by telling pharmacy staff that he was going away on holiday and needed supplies to take with him. The fourth bought three packs of 16 tablets from a supermarket. Nine patients commented that they were aware of the limit on sales and had therefore bought supplies in more than one transaction.

Anticipated effects of the overdose

When asked what they had thought the physical effects of the overdose would be if untreated, the majority ($n=53$, 88.3%) said that they knew that a paracetamol overdose could cause death or permanent damage (see *Table 15*). Over three-quarters ($n=48$, 80.0%) knew that excess paracetamol could harm the liver.

TABLE 15 Characteristics of the overdose (*n*=60)

Characteristic	<i>n</i>	%
Alcohol		
Within 6 hours of the overdose	19	31.7
At the time of the overdose	23	38.3
Delayed presentation to hospital	22	36.7
Treatment in hospital		
<i>N</i> -acetylcysteine	50	83.3
No treatment	10	16.7
Number of tablets taken		
≤32 (> 1–2 packs)	27	45.0
33–48 (> 2–3 packs)	20	33.3
>48 (> 3 packs)	13	21.7
Took all the tablets available	35	58.3
Bought tablets specially for the overdose	35	58.3
Source of the tablets ^a		
Already in the home	32	53.3
Pharmacy	17	28.3
Supermarket	21	35.0
Local shop	8	13.3
Other outlet (e.g. garage, internet)	7	11.7
Time spent planning the overdose		
0 to <15 minutes	15	25.0
15 to <60 minutes	15	25.0
1 to <24 hours	14	23.3
1 to <7 days	9	15.0
1+ weeks	7	11.7
Anticipated effects if untreated		
Completely safe	0	0
Mild, short-lived effects	0	0
Harmful but short-lasting effects	4	6.7
Permanent damage or harm	11	18.3
Could cause death	42	70.0
Not known	3	5.0

^a Tablets could be bought from more than one source.
Source: Simkin S, Hawton K, Kapur N, Gunnell D. What can be done to reduce mortality from paracetamol overdoses? A patient interview study. *Q J Med* 2012;**105**:41–51. By permission of Oxford University Press.

However, 42 (70.0%) thought that they would lose consciousness after the overdose. Over half of these ($n=23$, 54.8%) said that they would not have taken paracetamol if they had known that they would not lose consciousness and that the effects would not be immediate.

The patients were asked how many tablets they thought would cause death. Twelve (20.0%) did not know. Of the rest, the number chosen ranged from 7 to 200. Five people (8.3%) thought that ≤ 16 tablets could kill, and 17 (28.3%) thought that 17–32 tablets would be lethal. Nine (15.0%) thought that ≥ 100 tablets would be necessary to cause death. Some people's opinion was influenced by the pack sizes: 'I thought that over 32 tablets would be toxic, as that is the limit you can buy over the counter'; 'Ten tablets could kill, because it says on the pack not to take over eight'.

Paracetamol packs include a warning about the dangers of overdose. Just under half of the patients ($n=29$, 48.3%) said that they had noticed this, but in most of these cases (23/29, 79.3%) this had not affected their decision to take the tablets. Six people reported that the warning had strengthened their decision, for example, 'The wording [i.e. go straight to doctor if you take more than eight] implies that it would be good to overdose on ... The warning made it seem that an overdose would be effective.'

Most of those who had not noticed the warning said that they would still have taken the overdose if they had seen it (24/30, 80.0%). Only five people thought that seeing the warning would have deterred them from taking the tablets. Almost all (52/58, 89.7%) said that they would still have taken a paracetamol overdose even if the packs had contained fewer tablets.

Motivation

When asked to indicate which of the motives shown on cards best explained why they had taken their overdose (they could choose as many as they liked), over three-quarters said that they had wanted to die (Table 16). Other common reasons were 'to get relief from a terrible state of mind' and 'to escape from an unbearable situation'.

Influences and reasons for taking paracetamol

Over one-third of the patients ($n=23$, 38.3%) knew someone else who had taken an overdose of paracetamol. Twenty-one patients (35.0%) had seen or read about paracetamol overdoses in the media; nine (42.9%) of these thought that this had influenced their decision to take an overdose. For example,

TABLE 16 Reasons for taking the overdose

Reason for overdose ^a	<i>n</i>	%
To die	46	76.7
To get relief from a terrible state of mind	45	75.0
To escape from an unbearable situation	44	73.3
To show how desperate they were feeling	32	53.3
To get help	26	43.3
To find out whether someone really loved them	9	15.0
To make someone feel sorry	9	15.0
To influence someone	3	5.0

^a Patients could choose more than one reason.
Source: Simkin S, Hawton K, Kapur N, Gunnell D. What can be done to reduce mortality from paracetamol overdoses? A patient interview study. *Q J Med* 2012;105:41–51. By permission of Oxford University Press.

two people had read newspaper articles that specified the number of tablets taken in fatal overdoses and then took the same number of tablets in their own overdose. Another person saw a local news item about someone who had taken paracetamol together with alcohol and other medication; she went out the next day to buy paracetamol to take with her own prescribed medication and alcohol. Eight people had used the internet to obtain information on suicide methods. Five of them said that this had influenced their decision to take paracetamol and had provided them with information on toxic amounts.

When asked why they had chosen to take paracetamol in their overdose, over one-third ($n=23$, 38.3%) said that the tablets were already in the household. Twelve (20.0%) bought paracetamol because it was cheap and readily available. Sixteen people (26.7%) had chosen paracetamol because they knew that it was effective: '*... catastrophic effect on the liver*'.

Although patients were aware of the unpleasant effects of paracetamol, this did not deter them: 'I heard it was a slow and painful death'; 'I don't deserve any better than a horrible death'. Five people (8.3%) said that they had taken paracetamol because they had done so in the past: 'I've always done paracetamol – I know it's a nasty killer, it takes a long time to do it'; 'I've always done so in the past and always managed to get through it'.

Discussion

The overall aim of this study was to obtain information that might assist in the identification of further initiatives to reduce paracetamol overdoses, especially those involving large and hence potentially life-threatening numbers of tablets.

As found in other studies,^{26,64} the main reasons that patients gave for using paracetamol for overdose were that it was cheap and easily available (either already in the household or easy to buy from multiple outlets). Over half of the patients took all of the tablets that were available to them, compared with one-third of patients in an earlier interview study in Oxford⁶⁵ (in which patients who took smaller overdoses were included). In both studies, similar proportions of patients had bought tablets specifically for the overdose: 58.3% in the current study compared with 52.5% in the earlier study. In a study of patients who took paracetamol overdoses and presented to an emergency department in south London after the legislation, 48% of patients who had ingested > 16 tablets had purchased paracetamol specifically for the act, whereas those who had taken < 16 tablets were more likely to have taken tablets already in the household.⁷⁴

Nearly one-third of those who bought tablets specifically for the act had spent < 1 hour planning it. If their distress was apparent, this might suggest the potential for intervention at the point of sale, but it is probably unrealistic to expect sales staff to identify such individuals and to intervene in any positive way, apart from refusing to supply more than the recommended number of tablets.

Four of the 10 people in our study who tried to buy more than the recommended amount of paracetamol in one transaction were able to do so, including a person who bought 224 tablets from an online pharmacy. We alerted the MHRA about the internet sale, and the online outlet subsequently restricted purchases of paracetamol to 32 tablets.

One of the intentions behind the pack size legislation was to reduce the dangers of impulsive overdoses by limiting the number of tablets available in the household at any one time. Half of the patients in our study had taken the overdose within an hour of first seriously contemplating it, including one-quarter who had thought about the act for < 15 minutes.

Public knowledge of the dangers of paracetamol overdose has increased considerably since the late 1970s.³¹ In our study, 88% of patients knew that an overdose could cause death or permanent damage, a similar figure to the 78% of patients in the earlier (1992–3) Oxford study.⁶⁴ However, 80% in the present study

knew of the potential for hepatotoxicity compared with 43% in the earlier study. Despite being aware of the harmful effects of paracetamol overdose, a high proportion of the patients thought that they would quickly become unconscious. This finding is consistent with that from other studies.^{26,31,64} If people who take a paracetamol overdose expect to lose consciousness but do not, they may think that they have not taken a dangerous amount and may not seek medical attention until symptoms of liver damage appear, by which time it may be too late to treat successfully. Half of the patients in our study who were unaware that they would not lose consciousness immediately said that they would not have taken the paracetamol overdose if they had known this. There may be potential for educational initiatives highlighting this aspect of paracetamol toxicity, although it is possible that this may have a reverse effect (e.g. an episode of a popular television drama featuring a fatal paracetamol overdose was followed by an increase in similar overdoses among viewers⁸⁹).

Nearly half of the patients had noticed the warnings about the dangers of overdose printed on the pack, but in most cases this did not affect their decision to take the tablets; indeed, for some people the warning had reinforced their decision by confirming that an overdose could be lethal. This apparent lack of a positive impact of warning signs on packs in this sample was also found in the earlier Oxford study.⁶⁵

The role of the media and the internet in providing information about paracetamol overdose was clear in some cases. It is important that media guidelines that emphasise the importance of not providing precise details of suicide methods be followed.^{90,91}

Limitations

The study was based in a single large general hospital and so it is uncertain if the findings are generalisable to patients presenting to other hospitals. However, the characteristics of people presenting to the hospital in Oxford with paracetamol overdoses are similar to those seen elsewhere.⁴⁶ We relied on patient report of the number of tablets that they had taken in overdose, and this may be unreliable.^{42,46,92}

Conclusions

The characteristics of the patients in our study who took paracetamol overdoses were remarkably similar to those in the previous Oxford study⁶⁴ over 15 years earlier. The impulsive nature of many of the overdoses and the fact that a substantial proportion of patients used household supplies of paracetamol for self-poisoning mean that special attention needs to continue to be paid to the availability of paracetamol, especially in quantities that can cause hepatotoxicity. There appears to be reasonable adherence to the sales guidance. Media influences on use of paracetamol for self-poisoning, including through the internet, are important in some cases.

STUDY 3: A COMPARATIVE STUDY OF THE IMPACT OF DIFFERENT PACK SIZES OF PARACETAMOL ON INTENTIONAL OVERDOSES IN ENGLAND AND IRELAND

Objective

The objective of this study was to compare sizes of overdoses of paracetamol taken in England and in Ireland to answer the question of whether or not it might be beneficial to further reduce pack sizes of paracetamol in the UK.

Methods

We investigated the number of tablets of paracetamol consumed in overdoses that resulted in presentation to six general hospitals in three centres in England and all general hospitals in Ireland between 2002 and

2007 for those aged ≥ 10 years. Data were restricted to non-fatal, intentional self-poisoning episodes in which paracetamol was the sole medicinal agent consumed (with or without co-ingestion of alcohol) and at least four tablets were taken at one time (i.e. double the maximum recommended single therapeutic dose of two tablets). The data collected in the study hospitals included patient sex and age, drugs used for self-poisoning, numbers of tablets, and alcohol involvement at the time of the overdose.

Data sources

Multicentre Study of Self-harm in England

The Multicentre Study of Self-harm in England project is based on data collected on general hospital presentations for self-harm in six major general hospitals in England:^{1,93} one in Oxford, three in Manchester and two in Derby.

National Registry of Deliberate Self Harm in Ireland

Information is collected in the National Registry of Deliberate Self Harm for all presentations for intentional self-poisoning and self-injury to general hospitals in Ireland.⁵³

Ethical approval

The monitoring systems in Oxford, Manchester and Derby all have approval from local ethics committees to collect data on self-harm for local and multicentre projects. The National Registry of Deliberate Self Harm in Ireland has ethical approval from the National Research Ethics Committee of the Faculty of Public Health Medicine, and from the relevant hospitals and Health Service Executive ethics committees.

Data analysis

We used SPSS for Windows version 14 to compare overdoses of paracetamol in England and Ireland. Analyses comparing the numbers of tablets consumed, and numbers of packs used, in overdoses of paracetamol in England and Ireland were conducted using the chi-squared test, Mann–Whitney *U*-test and Kruskal–Wallis test. Analyses were conducted on combined data and separately by sex, age group and alcohol involvement with the overdose (data from the English study on alcohol consumed during the 6 hours before self-poisoning and/or as part of the overdose were combined for this analysis). The number of packs used was calculated as a multiple of the non-pharmacy maximum pack size in each country, from one pack to nine or more packs (e.g. in England an overdose involving up to one pack was 4–16 tablets, two packs was 17–32 tablets, three packs was 33–48 tablets, and so on; in Ireland, up to one pack was 4–12 tablets, two packs was 13–24 tablets, three packs was 25–36 tablets, and so on).

Results

Study samples

During the 6-year study period (2002–7) there were 31,107 hospital presentations for self-poisoning (alone) in the three English centres (six hospitals) and 42,877 in Ireland (up to 40 hospitals: 34 in 2002, 37 in 2003, 38 in 2004–5 and 40 in 2006–7). Of these, paracetamol was involved in 10,208 (32.8%) episodes in the English centres and in 9057 (21.1%) episodes in Ireland. Paracetamol alone (with or without alcohol) was involved in 5444 episodes in the English centres and in 3886 episodes in Ireland.

Of the episodes involving paracetamol alone, data on number of tablets taken in overdose were missing for 559 (10.3%) episodes in the English centres and 358 (9.2%) in Ireland. We also excluded episodes in which fewer than four tablets were taken, data on sex or age were missing or patients were < 10 years old [totalling 27 (0.5%) in the English centres and 19 (0.5%) in Ireland]. Thus, the samples for inclusion in the study consisted of 4858 episodes in the English centres and 3509 in Ireland.

The female to male ratio for episodes was somewhat larger among the Irish sample (2.1 : 1) than among the English sample (1.8 : 1) (*Table 17*). The age distributions of the two samples showed a greater proportion of

TABLE 17 Episodes of self-poisoning with a known number of paracetamol tablets for those aged ≥ 10 years in three centres (six general hospitals) in England and in Ireland, 2002–7

Characteristic	England ($n=4858$), n (%)	Ireland ($n=3509$), n (%)	Chi-square	p -value
Sex				
Male	1736 (35.7)	1146 (32.7)		
Female	3122 (64.3)	2363 (67.3)	8.537	0.003
Age group, years				
10–24	2186 (45.0)	1682 (47.9)		
25–34	962 (19.8)	753 (21.5)		
35+	1710 (35.2)	1074 (30.6)	19.442 (df=2)	<0.001
Alcohol use				
Yes	1851 (38.1)	1259 (35.9)		
No or not known	3007 (61.9)	2250 (64.1)	4.311	0.038

df, degrees of freedom.

younger individuals among the Irish sample and a greater proportion of older people among the English sample. Alcohol use at the time of overdose occurred with similar frequency in the English and the Irish samples.

Number of tablets taken in overdoses

The distribution of the number of tablets taken in paracetamol overdose in the English centres and in Ireland is shown in *Figure 6*. There were clear peaks in each of the countries corresponding to the pack size limits for non-pharmacy and pharmacy sales. Thus, in the English sample there were peaks at 16 and 32 tablets and in the Irish sample there were peaks at 12 and 24 tablets. There were also peaks at multiples of these pack sizes. There were, in addition, peaks in both samples at 10 and multiples of 10 tablets.

The median number of tablets consumed in paracetamol overdoses did not differ significantly between the English (median 22 tablets) and the Irish (median 24 tablets) samples (*Table 18*). When the samples were

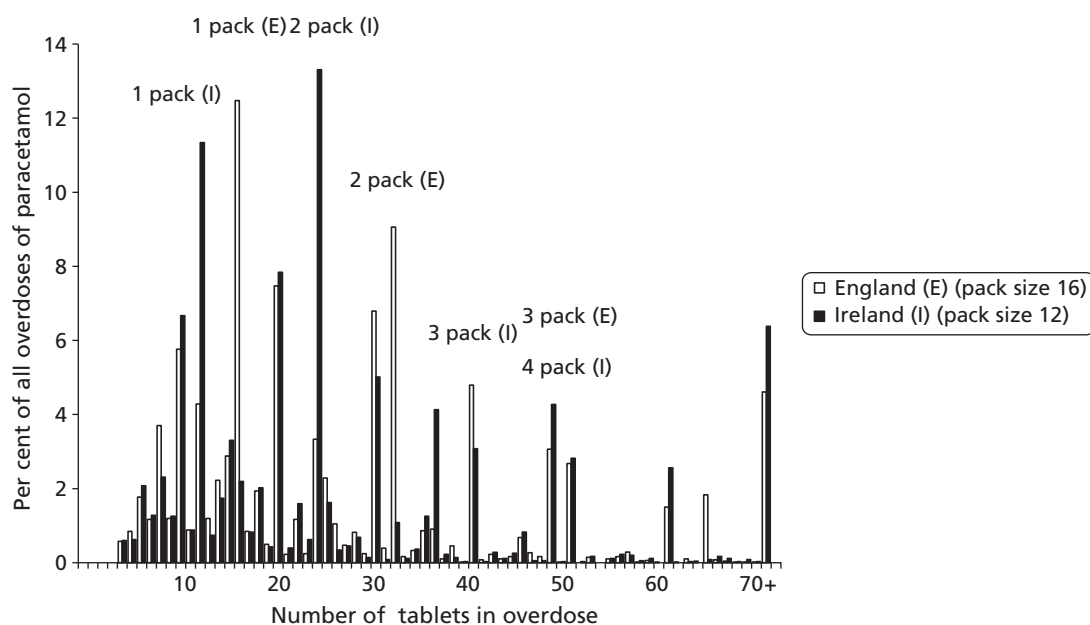
**FIGURE 6** Distribution of the number of tablets taken in paracetamol overdose by those aged ≥ 10 years in England ($n=4858$) and Ireland ($n=3509$), 2002–7, shown as percentages of the total number of overdoses of paracetamol in each country.

TABLE 18 Numbers of tablets of pure paracetamol taken alone in overdose in England and Ireland, 2002–7, by sex and age group

Characteristic	England (<i>n</i> =4858)		Ireland (<i>n</i> =3509)		Mann–Whitney <i>U</i>	
	Median	IQR	Median	IQR	<i>Z</i>	<i>p</i> -value
Sex						
Both	22	15–32	24	12–36	–0.758	0.449
Males	28	16–40	27	18–48	–2.015	0.044
Females	20	13–32	20	12–30	–1.651	0.099
Age range, years						
10–24	19	12–32	20	12–30	–1.179	0.239
25–34	24	16–40	24	15–45	–1.509	0.131
35+	26	16–40	24	12–40	–2.862	0.004
Age range males, years						
10–24	22	15–32	24	14–36	–1.364	0.173
25–34	30	16–45	30	20–50	–2.128	0.033
35+	30	16–48	30	20–49	–1.083	0.279
Age range females, years						
10–24	16	12–30	20	12–28	–0.655	0.513
25–34	20	14–32	24	12–36	–0.543	0.587
35+	24	16–32	23	12–32	–3.843	<0.001

IQR, interquartile range.

divided into three age groups and the two countries compared, a small but statistically significant difference in the median number of paracetamol tablets consumed between the English (median=24) and the Irish (median=23) samples was found among women in the ≥ 35 years age group (see *Table 18*).

In both England and Ireland, more paracetamol tablets tended to be taken by men but not women when alcohol was involved in overdoses (England: $Z = -3.141$, $p = 0.002$; Ireland: $Z = -2.105$, $p = 0.035$) (*Table 19*). There was a non-significant trend for smaller overdoses in males in Ireland who had not consumed alcohol than in those in England who had not consumed alcohol.

Number of packs used in overdoses

When the numbers of tablets consumed in overdoses by individuals in each country were categorised into numbers of pack equivalents used, the mean number of packs used was greater in Ireland (2.63, 95% CI 2.57 to 2.69 packs) than in England (2.07, 95% CI 2.03 to 2.10 packs). For both sexes combined, the largest proportion of overdoses in England (39.0%) involved one pack only, but the largest proportion of overdoses in Ireland (37.9%) involved three or more packs (*Table 20*). Females and the younger age group (15–24 years) in England were more likely to use one pack, but two packs were more likely in Ireland in these groups. Males and older age groups (25–34 years and 35+ years) were far more likely to use three or more packs in Ireland than in England.

Discussion

We found little evidence that different restrictions on paracetamol pack sizes in England and Ireland had an impact on sizes of overdoses taken in the two countries. There were peaks in the numbers of tablets taken in paracetamol overdoses in both England and Ireland that reflected the maximum pack sizes in the respective

TABLE 19 Number of tablets of pure paracetamol taken alone in overdose in England and Ireland, 2002–7, by alcohol use at the time of, or before, the overdose

Alcohol use	England (<i>n</i> = 4858)		Ireland (<i>n</i> = 3509)		Mann–Whitney <i>U</i>	
	Median	IQR	Median	IQR	<i>Z</i>	<i>p</i> -value
Both sexes						
Alcohol use	24	16–35	24	13–36	– 0.619	0.536
No/not known	20	14–32	24	12–36	– 0.328	0.743
Males						
Alcohol use	30	16–40	30	18–48	– 1.086	0.277
No/not known	28	16–40	25.5	16–48	– 1.739	0.082
Females						
Alcohol use	20	14–32	20	12–30	– 1.496	0.135
No/not known	20	13–32	20	12–30	– 0.954	0.340

IQR, interquartile range.

countries. Peaks were also found for multiples of these pack sizes, which could reflect overdoses in which multiple packs were purchased for the acts. The additional peaks in both samples at 10 and multiples of 10 tablets presumably reflect effects of rounding or approximation by patients and possibly clinicians.

There was a marked difference between England and Ireland in terms of the number of pack equivalents of paracetamol taken in overdoses. More pack equivalents were in general consumed in overdoses in Ireland. This difference was found for both sexes and across all three age groups examined. This raises the following questions:

1. Is advice on sales of packs being followed to the same extent in the two countries?
2. Do purchasing patterns differ, with paracetamol packs being bought with greater frequency in Ireland, so that more are available in households?
3. Are there differences in patient characteristics between the two countries influencing patterns of self-poisoning?
4. Are individuals in Ireland who have taken paracetamol overdoses less likely to present to hospital when the amount taken is relatively small?

Unfortunately, we do not have access to over-the-counter (OTC) sales data for the two countries. We have no reason to believe that there are major differences between the sociodemographic characteristics of patients who take paracetamol overdoses in England and the characteristics of patients who take paracetamol overdoses in Ireland, except that it appears that paracetamol is taken more frequently in overdose in England, that the female to male ratio is greater in Ireland, and a somewhat greater proportion of patients in Ireland are in the youngest age group. These differences do not, however, appear large enough to explain the extent of the difference in patterns of pack consumption in overdoses. However, there might be differences in other characteristics that contributed to the findings but which we were unable to compare, such as degree of suicidal intent and other psychological factors. We do not have information in this study on the frequency of hospital presentations in relation to the size of overdoses in the two countries. One important difference between the two countries is that many individuals who present to emergency departments in Ireland are subject to a fee, whereas this is not the case in England. Also, obtaining general practitioner care in Ireland often involves a fee, which could influence willingness to seek help for emotional problems and therefore increase the risk of self-poisoning. The more rural nature of Ireland, and hence larger distances to hospitals for many residents, could also influence presentation to emergency departments.

TABLE 20 Number of non-pharmacy pack equivalents of pure paracetamol used in overdoses in England (maximum pack size=16 tablets) and in Ireland (maximum pack size=12 tablets), 2002–7

No. of packs	England (<i>n</i> =4858), <i>n</i> (%)	Ireland (<i>n</i> = 3509), <i>n</i> (%)	Chi-square (df = 2)	<i>p</i> -value
Both sexes				
1	1893 (39.0)	949 (27.0)		
2	1790 (36.8)	1229 (35.0)		
3+	1175 (24.2)	1331 (37.9)	215.6	<0.001
Males				
1	521 (30.0)	217 (18.9)		
2	638 (36.8)	327 (28.5)		
3+	577 (33.2)	602 (52.5)	109.8	<0.001
Females				
1	1372 (43.9)	732 (31.0)		
2	1152 (36.9)	902 (38.2)		
3+	598 (19.2)	729 (30.9)	135.6	<0.001
Age 15–24				
1	1019 (46.6)	495 (29.4)		
2	768 (35.1)	657 (39.1)		
3+	399 (18.3)	530 (31.5)	145.3	<0.001
Age 25–34				
1	324 (33.7)	160 (21.2)		
2	354 (36.8)	244 (32.4)		
3+	284 (29.5)	349 (46.3)	57.9	<0.001
Age 35+				
1	550 (32.2)	294 (27.4)		
2	668 (39.1)	328 (30.5)		
3+	492 (28.8)	452 (42.1)	52.9	<0.001

df, degrees of freedom.

An important possible explanation for the difference in number of packs used for overdoses in England and Ireland may be less rigorous enforcement of sales advice contained in regulatory notices in Ireland than in England. A study conducted before the Irish legislation was introduced indicated that sales advice for non-pharmacy outlets from the Irish Medicines Board was often not being followed.⁹⁴ Following the introduction of the legislation, researchers visiting pharmacy and non-pharmacy outlets in Dublin were able to purchase in excess of statutory limits of paracetamol in a single transaction in half of all pharmacies and the majority of non-pharmacy outlets – a situation that largely persisted when the researchers revisited outlets a year later.⁹⁵ Although there is also evidence of breaches of the legislation in non-pharmacy outlets in England,⁷⁴ this appears to happen to a far lesser degree than in the post-legislation study in Ireland⁹⁵ (see earlier in this chapter).

Strengths and limitations

The study involved large numbers of patients in both countries: the Irish sample included all overdose presentations to general hospitals in Ireland, and the English sample included presentations to six general hospitals in three centres (although these may not be fully representative of all general hospitals in England).

The recording of the number of tablets taken in overdoses relied largely on patient self-report, which is known to be subject to inaccuracy.^{42,54,92}

It is not known whether or not there was any change in the sizes of overdoses in Ireland following the introduction of the 2001 legislation on pack sizes there.⁷⁷ However, the size of overdose for which calls were made to the National Poisons Centre decreased in the first 2 years after the legislation was introduced.⁹⁶

We have not been able to examine the impact on actual suicides of the differing legislation in the two countries because data for suicide deaths according to specific drugs ingested are not currently available in Ireland.

Conclusions

No major difference was found between England and Ireland in the size of paracetamol overdose, in spite of differences in maximum pack sizes between the two countries. Although this may suggest that further reductions in pack sizes in the UK would not be effective in further reducing self-poisoning with paracetamol, the finding may reflect differences in adherence to sales guidance in Ireland compared with England, and other factors such as patient characteristics and ease of access to clinical care.

STUDY 4: THE IMPACT OF LIMITATIONS ON PACK SIZES OF ANALGESICS ON USE OF NON-STEROIDAL ANTI-INFLAMMATORY DRUGS AND CONSEQUENT GASTROINTESTINAL BLEEDING AND USE OF MEDICATION FOR GASTROINTESTINAL DISORDERS

Objectives

To investigate whether 1998 legislation to reduce pack sizes of paracetamol (and other analgesics) was followed by increased prescribing of NSAIDs with possible adverse effects on GI bleeding.

Methods

We examined prescriptions for NSAIDs and other analgesics, plus those for medication for GI symptoms, and hospital admissions for GI haemorrhage for the period 1994–2004. We limited the study period to 1994–2004 because in 2004 prescribing of NSAIDs changed markedly because of the withdrawal of some COX-2 inhibitor drugs.⁹⁷

Sources of data

Prescriptions

IMS Health provided quarterly data from Disease Analyzer UK on the numbers of patients prescribed drugs in the therapy classes listed below, by age groups 15–34, 35–54, 55–64 and 65+ years, for the years 1994–2004. IMS Disease Analyzer UK is a primary care database containing de-identified general practice patient records continuously collected from around 210 computerised practices throughout the UK. The sample is designed to be representative of the UK population. The drugs for which we analysed data were non-narcotic analgesics (including NSAIDs), antirheumatic non-steroidal drugs, and drugs that might be prescribed to alleviate GI symptoms, including antiulcerants as one category and all other GI drugs as a second category (antacids, antiflatulents, antispasmodics, anticholinergics and gastroprokinetics). The Disease Analyzer data set also contains the number of patients available for diagnosis/treatment.

Hospital admissions

We used the Department of Health's *Hospital Episode Statistics Database* for England⁹⁸ to extract quarterly data on the number of hospital admissions for GI haemorrhage between 1994 and 2004, for age groups

15–34, 35–54, 55–64 and 65+ years. Admission rates were calculated using quarterly population figures interpolated from the corresponding annual mid-year population estimates for England from the ONS.⁹⁹

Statistical analysis

Gastrointestinal admission and prescription rates (number of admissions and prescriptions per 100,000 population) for each age group were calculated on a quarterly basis using the population data. The impact of the legislation on numbers of GI admissions and prescriptions and trends in GI admission and prescription rates was analysed using interrupted time-series analysis. This method controls for baseline rate and trend when estimating expected changes in the number of GI admissions (or prescriptions) due to the intervention. The third quarter of 1998 was chosen as the point of intervention. All analysis was carried out using Stata version 11.2.

Results

Prescriptions for non-steroidal anti-inflammatory drugs and other analgesics

There was a significant increase in the rate of prescribing of NSAIDs following the 1998 legislation regarding pack sizes of paracetamol of 31.5 per 100,000 per quarter ($p=0.009$). There was also an increase in prescribing of other non-narcotic analgesics ($p=0.05$) (Table 21 and Figure 7).

Hospital admissions for gastrointestinal bleeds

There was an immediate increase in the hospital admission rate for GI bleeds of 3.66 per 100,000 per quarter after the 1998 legislation ($p=0.012$). However, the rate of change of GI admissions during the whole post-legislation period declined by 0.4 per 100,000 per quarter ($p=0.012$) compared with beforehand (Table 22 and Figure 8).

During the study period, the rate of admission for GI bleeds was highest in the 65+ years age group and lowest in the 15–34 years age group. Trends in admission rates showed a decline after the legislation in some age groups (Figure 9), including in those aged 55–64 years (estimated mean change in the trend from before to after the legislation = -0.63 , 95% CI -1.12 to -0.14 , $p=0.014$) and 65+ years (mean change in trend = -1.34 , 95% CI -2.06 to -0.62 , $p=0.001$).

Prescriptions for gastrointestinal drugs

There was a steady overall increase in prescriptions for antiulcerants following the legislation ($p<0.001$) (see Table 21 and Figure 7). The increase was significant in the younger age groups [mean change in trend (95% CI) for those aged 15–34 years, 35–54 years and 55–64 years = 9.41 (7.03 to 11.79), 38.25 (17.09 to 59.42) and 90.37 (69.80 to 110.94), respectively (all $p\leq 0.001$)], but not in those aged 65+ years [mean change in trend (95% CI) = 22.21 (-130.76 to 175.17), $p=0.77$].

TABLE 21 Changes in prescriptions involving NSAIDs and other drugs associated with and without the 1998 legislation

Drug category	Mean quarterly estimated no. of prescriptions at the mid-point after the intervention (per 100,000)		Mean quarterly change ^a (95% CI)	Change in the trend from before to after the legislation (95% CI)
	Without legislation ^a	With legislation ^a		
NSAIDs	3902.7	4213.7	311 (-10 to 632)	31.50 (8.40 to 55.50)
Other non-narcotic analgesics	4832.8	5280.3	448 (53 to 843)	31.40 (0.78 to 62.01)
Antiulcerants	2487.0	3187.3	700 (264 to 1136)	57.74 (21.11 to 94.36)
Other GI drugs	1974.1	2024.0	50 (-93 to 192)	-0.84 (-9.74 to 8.05)

^a Estimated for the mid-point quarter of 1998–2004 (i.e. third quarter of 2001).

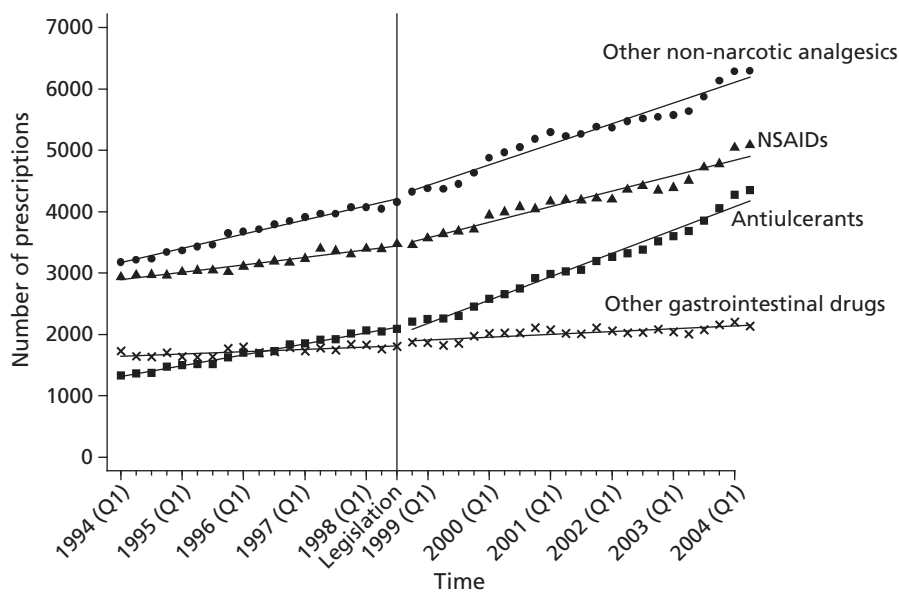


FIGURE 7 Rates of prescribing of NSAIDs, other non-narcotic analgesics, antiulcerants and other GI drugs, 1994–2004 (second quarter), from a UK primary care database. Source: IMS Health.

TABLE 22 Changes in GI admission rates associated with and without the 1998 legislation

Mean quarterly estimated no. of GI admissions at the mid-point after the intervention (per 100,000)		Mean quarterly change ^a (95% CI)	Change in the trend from before to after the legislation (95% CI)
Without legislation	With legislation		
70.802	69.661	-1 (-6 to 4)	-0.40 (-0.71 to -0.09)

a Estimated for the mid-point quarter of 1998–2004 (i.e. third quarter of 2001).

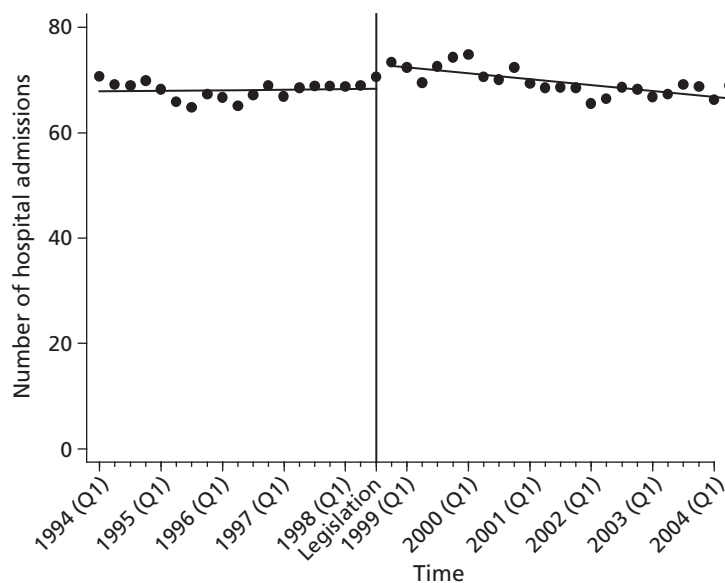


FIGURE 8 Rates of hospital admissions in England for GI haemorrhage, 1994–2004 (second quarter).

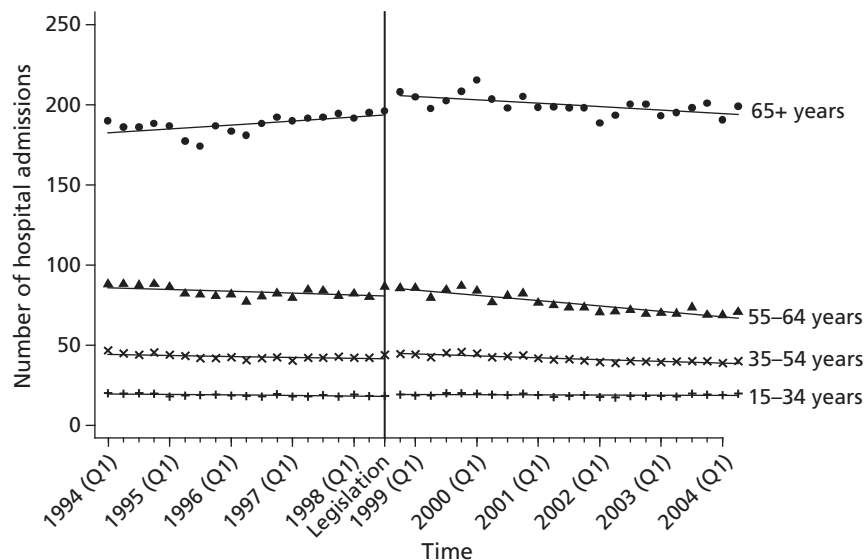


FIGURE 9 Rates of hospital admissions in England for GI haemorrhage, 1994–2004 (second quarter), by age group.

There was no evidence of an increase in prescribing of other GI drugs following the legislation ($p=0.85$) (see *Table 21*). This applied to all age groups except those aged 15–34 years, in whom there was a gradual rise in prescribing over time [mean change in trend (95% CI)=9.55 (3.32 to 15.77), $p=0.004$].

Discussion

The 1998 legislation that limited pack sizes of paracetamol and aspirin was followed by increased prescribing of NSAIDs. There was also an increase in prescribing of other non-narcotic analgesics (which included paracetamol and aspirin). However, these changes were gradual, with no indication of a specific effect of the legislation.

There was no convincing evidence that the legislation had a major secondary impact on hospital admissions for GI bleeds. Although there was an immediate increase in admissions for GI bleeds following the legislation, it was relatively small and was followed by a decreasing trend in hospital admissions (possibly related to increased prescribing of antiulcerants). This decline in admissions was found only in age groups 55–64 years and 65+ years.

Although prescribing of antiulcerants increased following the 1998 legislation, there was no evidence of a stepwise increase, just a rising trend. There was no major change in prescribing of other GI drugs except for an increased trend in the 15–34 years age group. This is in keeping with an earlier finding in relation to the withdrawal of COX-2 inhibitors that no consistent evidence was seen of an adverse influence on trends in the incidence of GI haemorrhages.⁹⁷

Limitations

We were unable to examine the impact of the legislation on OTC sales of analgesics, as this information was not available. This is important as any impact might be expected to occur primarily in relation to OTC sales. However, use of the data on admissions for GI bleeds and drugs used to treat GI disturbances allowed us to examine any negative effects of possible changes in use of NSAIDs on gastric health.

Conclusions

Prescribing of NSAIDs increased following the 1998 legislation on pack sizes of paracetamol and other analgesics. However, there was no clear evidence that the legislation had a *specific* impact on prescribing of NSAIDs as the gradual increase in prescribing of these drugs over time was also seen for other analgesics. There was also no evidence that GI bleeds increased as a result of any altered prescribing (or changes in OTC sales) associated with the legislation. However, a gradual increase in prescribing of antiulcerants could have offset changes in the incidence of GI symptoms.

Chapter 4 Evaluation of the impact of co-proxamol withdrawal in England and Wales on prescribing and deaths

Abstract

Before 2005, the analgesic co-proxamol (a paracetamol and dextropropoxyphene combination) was involved in about 20% of all drug-poisoning suicides and a substantial number of accidental poisonings in the UK. In January 2005, following a review of the efficacy/safety profile of co-proxamol by the MHRA, the Committee on Safety of Medicines (CSM) advised that co-proxamol should be withdrawn from use in the UK; the final date for withdrawal was 31 December 2007. Using interrupted time-series analyses of 1998–2010 data for England and Wales on deaths and prescribing of analgesics, we have shown that withdrawal of co-proxamol has had major beneficial effects on the number of poisoning deaths involving this drug, including deaths by suicide and by accidental poisoning. Furthermore, there is no evidence of significant substitution by poisoning with other analgesics, in spite of their increased prescribing. There were an estimated 500 fewer deaths from suicide between 2005 and 2010 than would be expected without the withdrawal, and 600 fewer deaths when accidental poisonings were included. During the full withdrawal phase (2008–10) there was an average of just 19 suicide and open verdict deaths involving co-proxamol per year (23 per year including accidents), compared with 228 deaths per year during 1998–2004 (271 per year including accidents). In 2009, following the UK lead, the European Medicines Agency recommended that dextropropoxyphene-containing medication be withdrawn throughout the European Union, and a similar initiative has been introduced in the USA and Canada.

Background

For many years concerns have been expressed about the extent of fatal poisoning with the analgesic co-proxamol (a combination of paracetamol and dextropropoxyphene) and, in particular, its use for suicide.^{100,101} Death from poisoning with co-proxamol occurs largely because of the toxic effects of high levels of dextropropoxyphene on respiration and cardiac conduction.^{102,103} There is also a relatively narrow margin between therapeutic and potentially lethal levels.¹⁰⁴ Between 1997 and 1999, co-proxamol was the single drug used most frequently for suicide in England and Wales (766 deaths over the 3-year period), being implicated in nearly one-fifth of all drug-related poisoning suicides.^{101,105}

In January 2005, after the MHRA conducted a review of the efficacy/safety profile of co-proxamol,¹⁰⁶ the CSM advised that co-proxamol should be withdrawn from use in the UK; the final date of withdrawal was 31 December 2007.¹⁰⁷ During the intervening period (2005–7), doctors were advised not to prescribe co-proxamol to any new patients and to make efforts to move patients currently taking the drug to suitable alternative medication (although patients for whom this was difficult could continue to receive the drug through normal prescribing).

We have conducted two evaluations assessing the impact of co-proxamol withdrawal on prescribing of co-proxamol and other analgesics, and on deaths involving these drugs, in England and Wales. The first evaluation was of the impact of the initial withdrawal phase (2005–7). The second evaluation was of the overall impact of this phase and the 3 subsequent years of full withdrawal. We have investigated drug-poisoning deaths that received a suicide or an open verdict, and also those with a verdict of accidental death, some of which may have been suicidal acts (see *Chapter 2* for a full discussion of these terms).

Substitution of method is a potential concern when a common means used for suicide becomes less available, particularly when the substituted method has a higher case fatality than the restricted method.¹⁰⁸ For this reason we have also investigated the impact of the withdrawal of co-proxamol on the prescribing of, and deaths involving, other analgesics.

Objective

To investigate the impact of the withdrawal of co-proxamol on the prescribing of analgesics and their use in poisoning deaths, both suicidal and accidental.

Methods

Data types

Prescriptions

Quarterly data for 1998–2010 on prescriptions of co-proxamol, co-codamol, codeine, co-dydramol, dihydrocodeine, NSAIDs, paracetamol and tramadol in England and Wales were obtained from the NHS Health and Social Care Information Centre (England) and Prescribing Services Partneriaeth Cydwasaethau GIG Cymru (Wales). Prescription data for Wales were not available for the first quarter of 1998 and so figures for this quarter were estimated using least-squares methods to extrapolate from trend data for subsequent quarters.

We also obtained prescription data for oral morphine and oxycodone for England only between 1998 and 2010 (data for Wales were unavailable for some of this period).

Deaths

To evaluate the impact of the withdrawal of co-proxamol on suicide, we have used data on deaths receiving a suicide verdict and those coded as injury or poisoning of undetermined intent (open verdicts) by the ONS (see *Chapter 2*). In England and Wales it has been customary to assume that most of the latter are cases in which the harm was self-inflicted but there was insufficient evidence to prove intent to die.^{32,109}

The ONS provided quarterly data on drug-poisoning deaths (suicides, open verdicts and accidental poisonings) involving co-proxamol, co-codamol, codeine, co-dydramol, dihydrocodeine, NSAIDs, paracetamol and tramadol based on death registrations during 1998–2010 in England and Wales. We also received annual death data for oxycodone. Data were obtained from the ONS database of deaths related to drug poisoning, which is extracted from the national mortality database for England and Wales.¹¹⁰ Analyses were restricted to deaths involving single drugs or single drugs and alcohol. Similar data were supplied for overall drug-poisoning deaths.

Statistical analyses

Analyses of trends in prescribing and deaths were conducted using Stata version 10.0. We used interrupted time-series analysis to estimate changes in levels and trends in prescribing and deaths following the CSM announcement of the withdrawal of co-proxamol. This method controls for baseline level and trend when estimating expected changes in the number of prescriptions (or deaths) due to the intervention.⁸¹

Specifically, segmented regression analysis⁸⁰ was used to estimate the mean quarterly numbers of prescriptions and deaths that might have occurred in the post-intervention period without the CSM announcement, and the numbers of prescriptions and deaths that actually occurred following the CSM announcement. The latter were obtained from best-fitted data lines from the regressions and are better estimates than taking the average of the actual values. The beginning of 2005 was chosen as the point of intervention. Thus, our data comprised 28 quarters in the pre-intervention segment and 12 in the

post-intervention segment for the evaluation of the initial impact of the withdrawal (2005–7) and 24 for the evaluation of the longer-term impact (2005–10). Slope and level regression coefficients were used to estimate the mean quarterly absolute differences in prescriptions and deaths (first, at the mid-point of the withdrawal phase, midway between quarter two and quarter three of 2006; and, second, at the mid-point of the post-intervention period, midway between quarter four of 2007 and quarter one of 2008).

Preliminary analyses indicated some autocorrelation in the data; therefore, the Cochrane–Orcutt autoregression procedure was used (rather than ordinary linear regression) to correct for first-order serially correlated errors. The Durbin–Watson statistic of all final models was close to the preferred value of 2, indicating that no serious autocorrelation remained.

Results

Impact of initial withdrawal phase (2005–7)

Because the impact of the initial withdrawal phase is included in our longer-term evaluation to the end of 2010 (see below), we will only summarise the results of our investigation of this phase.

Prescriptions

There was a 59% reduction in prescribing of co-proxamol in the initial withdrawal period (*Table 23* and *Figure 10*), with increased prescribing of some other analgesics but also decreased prescribing of NSAIDs and dihydrocodeine.

Deaths

There was a marked reduction in the numbers of suicides and open verdicts involving co-proxamol between 2005 and 2007 (*Figure 11* and *Table 24*). Before 2005, deaths from poisoning with co-proxamol alone made up 17.5% of all drug-poisoning suicides (95% CI 15.5% to 19.5%), whereas between 2005 and 2007 they constituted just 8.3% (95% CI 4.3 to 12.3%) (see *Table 24*).

Regression analyses indicated a significant decrease in both level and slope for deaths involving co-proxamol that received a suicide or an open verdict (*Table 25*). The number of deaths decreased by an average of 19 per quarter in the post-intervention period (95% CI 8 to 29 deaths per quarter) (see *Table 23*). This equated to an estimated overall decrease of 226 deaths (95% CI 190 to 262 deaths), approximately 48%, in the 3-year post-intervention period (2005–7) compared with 1998–2004.

When accidental poisoning deaths involving co-proxamol were included, there was a mean quarterly decrease of 22 deaths (95% CI 13 to 32 deaths), which equated to an overall decrease of 268 deaths (95% CI 235 to 300 deaths), approximately 47%, in the 3-year post-intervention period (2005–7) (see *Table 23*).

There were no statistically significant changes in level or slope in the post-intervention period for deaths involving the other analgesics, both for those deaths that received a suicide or open verdict (mean quarterly change=6, 95% CI –4 to 16 deaths) and when accidental poisoning deaths were also included (mean quarterly change=5, 95% CI –9 to 19 deaths).

Impact of longer-term withdrawal (2005–10)

Prescriptions

At the beginning of 2008, following the initial step-change reduction in prescribing of co-proxamol in England and Wales during 2005–7 compared with the trend in prescribing during 1998–2004, there was a further downwards step in prescribing such that there were very few prescriptions dispensed during 2008–10 (see *Figure 10*). Overall, between 2005 and 2010 there was a 53% reduction in prescribing of co-proxamol compared with previous trends (*Table 26*).

TABLE 23 Changes in the numbers of prescriptions and poisoning deaths involving co-proxamol, other analgesics and all drugs in England and Wales, 1998–2007, associated with the CSM announcement

Data type	Estimation of the absolute effect of the CSM announcement, 2005–7 ^a		
	Mean quarterly estimated no. without announcement ^b	Mean quarterly estimated no. with announcement ^b	Mean quarterly change, 2005–7 ^c (95% CI ^d)
Prescriptions (×1000)			
Co-proxamol	1465.1	605.7	–859 (–1065 to –653)
Co-codamol	2524.7	3024.6	500 (459 to 540)
Codeine	534.6	578.0	43 (31 to 55)
Co-dydramol	1018.2	1140.0	122 (99 to 145)
Dihydrocodeine	634.6	600.0	–35 (–68 to –2)
NSAIDs	5633.8	4581.0	–1053 (–1186 to –920)
Paracetamol	2947.0	3330.0	383 (268 to 497)
Tramadol	1130.1	1193.9	64 (–5 to 133)
Deaths: suicide and open			
Co-proxamol	39	20	–19 (–29 to –8)
Other analgesics ^e	40	45	6 (–4 to 16)
All drugs (except co-proxamol and other analgesics)	204	186	–18 (–39 to 3)
All drugs	283	252	–31 (–66 to 3)
All causes	1152	1130	–22 (–89 to 45)
Deaths: suicide, open and accidental			
Co-proxamol	47	25	–22 (–32 to –13)
Other analgesics ^e	57	62	5 (–9 to 19)
All drugs (except co-proxamol and other analgesics)	350	379	29 (–18 to 76)
All drugs	452	466	14 (–46 to 74)

a Using interrupted time-series segmented regression analysis⁸⁰ in which the intervention point is taken as the end of 2004 (the CSM announcement on the withdrawal of co-proxamol, January 2005).

b Estimated for the mid-point quarter of 2005–7.

c Absolute difference between the estimated number with the CSM announcement and the estimated number without the CSM announcement, taken at the mid-point of the post-intervention period.

d 95% CIs taken from Stata results or calculated according to Zhang *et al.*⁸²

e Other analgesics include co-codamol, codeine, co-dydramol, dihydrocodeine, NSAIDs, paracetamol and tramadol.

There were significant increases in prescribing of co-codamol (+23%), paracetamol (+16%), codeine (+10%), co-dydramol (+6%) and tramadol (+19%) during 2005–10 (see *Figure 10* and *Tables 25* and *26*), and a sharp decrease in prescribing of NSAIDs (which was due to safety concerns about COX-2 inhibitors¹¹⁴), which began shortly before the withdrawal of co-proxamol. There was also a decrease in prescribing of dihydrocodeine (–10%) in 2005–10. Overall, when all seven analgesics (excluding co-proxamol) were combined, there was no significant change in prescriptions, in either level or trend, associated with the withdrawal of co-proxamol. With NSAIDs excluded, however, there was a significant 15% increase in prescribing of the other six analgesics combined.

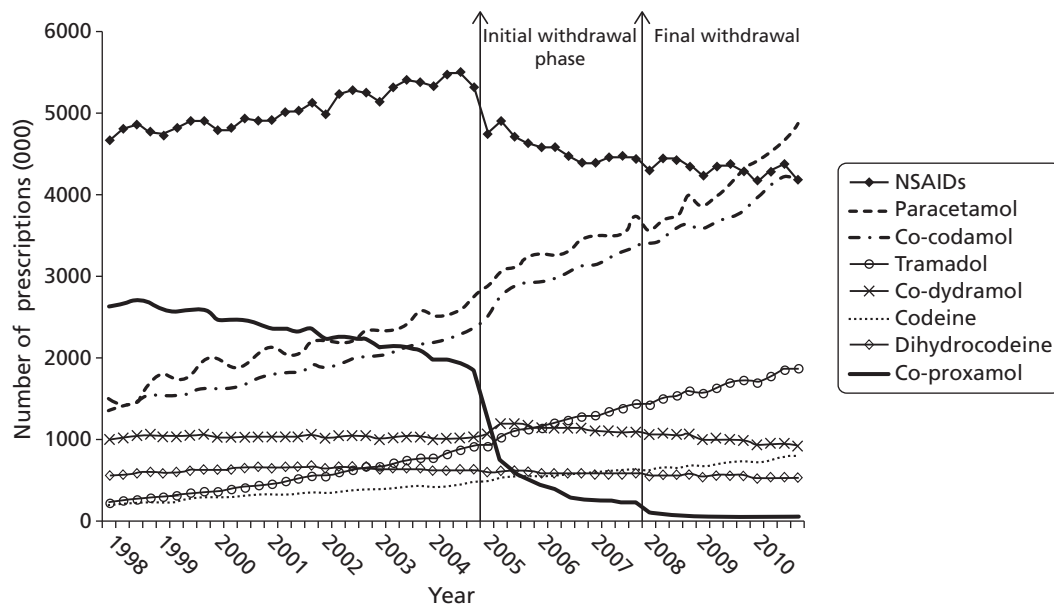


FIGURE 10 Trends in prescriptions dispensed for co-proxamol and seven other analgesics in England and Wales, 1998–2010.

TABLE 24 Suicide and open verdict deaths by all causes, and suicide, open verdict and accidental deaths from poisoning with all drugs, co-proxamol alone and seven other analgesics alone (or with alcohol) in England and Wales, 1998–2010

Year	All causes, <i>n</i>	All drugs, <i>n</i>		Co-proxamol alone, <i>n</i> (% of all drug-poisoning deaths)		Other analgesics ^a alone, <i>n</i> (% of all drug-poisoning deaths)	
	Suicide and open	Suicide and open	Suicide, open and accidental	Suicide and open	Suicide, open and accidental	Suicide and open	Suicide, open and accidental
1998	5347	1432	2246	259 (18.1)	309 (13.8)	202 (14.1)	277 (12.3)
1999	5241	1414	2294	260 (18.4)	316 (13.8)	207 (14.6)	279 (12.2)
2000	5081	1309	2143	261 (19.9)	303 (14.1)	175 (13.4)	230 (10.7)
2001	4904	1279	2180	232 (18.1)	276 (12.7)	195 (15.2)	257 (11.8)
2002	4762	1225	1983	204 (16.7)	247 (12.5)	182 (14.9)	237 (12.0)
2003	4811	1194	1843	188 (15.7)	218 (11.8)	166 (13.9)	237 (12.9)
2004	4883	1246	2006	189 (15.2)	230 (11.5)	168 (13.5)	233 (11.6)
2005	4718	1154	1926	131 (11.4)	157 (8.2)	196 (17.0)	254 (13.2)
2006	4513	979	1821	67 (6.8)	81 (4.4)	200 (20.4)	287 (15.8)
2007	4322	888	1852	52 (5.9)	61 (3.3)	151 (17.0)	209 (11.3)
2008	4603	884	2071	29 (3.3)	34 (1.6)	157 (17.8)	257 (12.4)
2009	4682	898	2185	21 (2.3)	26 (1.2)	155 (17.3)	267 (12.2)
2010	4528	873	2137	8 (0.9)	10 (0.5)	150 (17.2)	257 (12.0)

^a Other analgesics include co-codamol, codeine, co-dydramol, dihydrocodeine, NSAIDs, paracetamol and tramadol.

TABLE 25 Interrupted time-series segmented regression analysis of prescriptions and deaths from co-proxamol, other analgesics, all drugs and all causes in England and Wales that received a suicide or an open verdict, 1998–2010

Data type	Regression coefficients and standard errors (SEs)											
	Pre intervention ^a					Post intervention ^a						
	Base-level coefficient (β_0)	SE	p-value	Base-trend coefficient (β_1)	SE	p-value	Change in level (β_2)	SE	p-value	Change in trend (β_3)	SE	p-value
Prescriptions (x1000)												
Co-proxamol	3263.058	350.294	<0.001	-55.438	13.813	<0.001	-581.900	48.575	<0.001	3.712	16.499	0.823
Co-codamol	1337.508	18.694	<0.001	35.189	1.194	<0.001	245.072	69.509	0.001	31.573	4.052	<0.001
Codeine	204.962	3.943	<0.001	9.543	0.230	<0.001	23.098	7.359	0.003	2.711	0.527	<0.001
Co-dydramol	1054.915	6.092	<0.001	-1.018	0.355	0.006	178.873	25.633	<0.001	-9.476	1.499	<0.001
Dihydrocodeine	659.523	21.364	<0.001	-0.394	0.998	0.695	-29.717	4.751	<0.001	-2.703	1.570	0.092
NSAIDs	4655.803	47.083	<0.001	28.125	3.000	<0.001	-707.122	68.453	<0.001	-50.755	4.981	<0.001
Paracetamol	1488.220	99.268	<0.001	42.798	5.124	<0.001	94.470	61.795	0.133	34.323	7.741	<0.001
Tramadol	158.794	14.675	<0.001	25.882	0.913	<0.001	74.309	33.695	0.032	12.756	1.856	<0.001
Other analgesics (excluding NSAIDs) ^b	4880.483	72.010	<0.001	112.492	4.332	<0.001	642.097	156.145	<0.001	64.849	10.046	<0.001
Other analgesics ^b	9533.461	60.185	<0.001	14.086	3.613	<0.001	-72.139	163.290	0.661	14.006	11.198	0.217
Deaths: suicide and open												
Co-proxamol	70.111	3.478	<0.001	-0.890	0.239	<0.001	-15.558	4.932	0.003	-0.430	0.331	0.201
Co-codamol	2.482	1.327	0.068	0.045	0.073	0.538	1.310	1.567	0.407	-0.044	0.104	0.673
Codeine	0.913	0.542	0.099	0.096	0.052	0.072	-0.167	1.403	0.906	0.016	0.101	0.875
Co-dydramol	1.753	0.302	<0.001	-0.022	0.017	0.206	1.229	0.653	0.066	-0.075	0.038	0.054
Dihydrocodeine	9.474	2.281	<0.001	-0.107	0.113	0.346	1.069	1.512	0.483	-0.007	0.129	0.958
NSAIDs	4.834	1.016	<0.001	-0.120	0.056	0.039	0.968	0.936	0.306	0.068	0.069	0.327
Paracetamol	30.002	2.341	<0.001	-0.323	0.139	0.025	2.289	2.837	0.424	-0.097	0.179	0.592

Data type	Regression coefficients and standard errors (SEs)											
	Pre intervention ^a						Post intervention ^a					
	Base-level coefficient (β_0)	SE	p-value	Base-trend coefficient (β_1)	SE	p-value	Change in level (β_2)	SE	p-value	Change in trend (β_3)	SE	p-value
Tramadol	0.908	0.557	0.110	0.127	0.032	0.000	0.378	1.192	0.752	0.074	0.125	
Other analgesics (excluding NSAIDs) ^b	45.471	3.236	<0.001	-0.173	0.199	0.388	5.426	4.710	0.255	0.282	0.298	
Other analgesics ^b	50.406	2.828	<0.001	-0.305	0.198	0.132	6.976	4.870	0.159	0.276	0.383	
All drugs except co-proxamol and other analgesics	232.587	8.993	<0.001	-0.780	0.545	0.159	-20.377	11.118	0.073	0.740	0.915	
All drugs	351.810	12.579	<0.001	-1.890	0.848	0.031	-31.642	18.168	0.088	1.161	0.612	
All causes	1316.784	26.003	<0.001	-4.632	1.601	0.006	-56.336	37.768	0.142	2.360	0.026	
Deaths: suicide, open and accidental												
Co-proxamol	83.199	3.398	<0.001	-1.054	0.221	<0.001	-18.161	4.983	0.001	0.324	0.094	
Other analgesics (excluding NSAIDs) ^b	60.399	3.945	<0.001	-0.147	0.244	0.549	2.052	7.096	0.774	0.447	0.390	
Other analgesics ^b	66.354	3.942	<0.001	-0.279	0.258	0.285	2.401	7.677	0.756	0.462	0.295	
All drugs except co-proxamol and other analgesics	428.311	13.917	<0.001	-2.274	0.967	0.023	-24.940	21.317	0.248	1.681	<0.001	
All drugs	578.543	18.273	<0.001	-3.647	1.289	0.007	-39.643	27.992	0.163	2.091	<0.001	

^a Intervention point is the end of 2004 (the CSM announcement in January 2005 on the withdrawal of co-proxamol).

^b Other analgesics include co-codamol, codeine, co-dydramol, dihydrocodeine, NSAIDs, paracetamol and tramadol.

TABLE 26 Changes in the number of prescriptions involving co-proxamol and seven other analgesics in England and Wales, 1998–2010, associated with the CSM announcement in January 2005

Prescriptions (×1000)	Estimation of the absolute effect of the CSM announcement during 2005–10 ^a		
	Mean quarterly estimated no. without announcement ^b	Mean quarterly estimated no. with announcement ^b	Mean quarterly change 2005–10 ^c (95% CI ^d)
Co-proxamol	1018	482	– 536 (– 941 to – 130)
Co-codamol	2762	3402	640 (554 to 726)
Codeine	591	648	57 (44 to 70)
Co-dydramol	1014	1074	60 (36 to 85)
Dihydrocodeine	643	580	– 63 (– 105 to – 22)
NSAIDs	5794	4453	– 1341 (– 1507 to – 1176)
Paracetamol	3222	3745	523 (288 to 759)
Tramadol	1207	1440	233 (179 to 288)
All analgesics except co-proxamol	10,104	10,207	103 (– 132 to 337)
All analgesics except co-proxamol and NSAIDs	9436	10,889	1453 (1200 to 1706)

- a Using interrupted time-series segmented regression analysis in which the intervention point is taken as the end of 2004 (the CSM announcement on the withdrawal of co-proxamol, January 2005).
- b Estimated for the mid-point quarter of 2005–10.
- c Absolute difference between the estimated number with the CSM announcement and the estimated number without the CSM announcement, taken at the mid-point of the post-intervention period.
- d 95% CIs taken from Stata results or calculated according to Zhang *et al.*⁸²

Prescription data for morphine were available only for England for the study period. Our analysis showed a significant mean quarterly increase in the number of prescriptions of morphine associated with the CSM announcement, up to 71,000 prescriptions (95% CI 62,000 to 79,000 prescriptions), equating to a 35% increase in the period 2005 to 2010.

Prescription data for oxycodone were also available only for England for the study period. The number of prescriptions increased steadily from very low levels (mean of 69,000 per year in 1998–2004) to a mean of 527,000 per year in 2005–10. Because of small numbers, an interrupted time-series analysis (as conducted on other prescription data) did not generate meaningful estimates.

Deaths involving co-proxamol and other analgesics

Table 24 shows the numbers of deaths reported as suicide (including open verdicts) or accidental poisoning between 1998 and 2010 involving co-proxamol alone and those involving the seven other analgesics alone (both with and without alcohol), together with all drug-poisoning deaths and all suicides. Between 2005 and 2010 there was a marked reduction in the number and proportion of all poisoning deaths recorded as suicide that involved co-proxamol. Although the number of deaths involving other analgesics receiving a suicide or an open verdict was lower in 2007–10 than in earlier years, their proportionate contribution to total drug-poisoning deaths increased somewhat (presumably because the overall number of deaths declined in line with the reduction in co-proxamol deaths). There was a similar marked decrease in number of deaths involving co-proxamol when accidental deaths were included, but without an increase in percentage of poisoning deaths involving other analgesics (although the number of accidental poisonings with other analgesics increased slightly in 2008–10). Exclusion of NSAIDs made little difference to the results of these analyses.

Figure 11 shows graphically the impact of the initial withdrawal phase (2005–7) and the full withdrawal (2008–10) on both deaths involving co-proxamol and deaths involving other analgesics. There was some reduction in number of deaths involving co-proxamol in the years preceding the beginning of the initial withdrawal phase (1998–2005), then a steady, marked reduction during the initial withdrawal phase (2005–7), with a further, smaller reduction during the first 3 years of the full withdrawal (2008–10). The number of deaths involving other analgesics did not appear to change markedly during these periods.

The overall apparent beneficial changes following the withdrawal of co-proxamol were confirmed when the data were subjected to interrupted time-series regression analyses (Table 27). During the 2005–10 period, there was a highly significant mean quarterly reduction in number of deaths involving co-proxamol alone that received a suicide (including open) verdict (–21, 95% CI –34 to –8 deaths), and a similar reduction when accidental deaths were included (–25, 95% CI –38 to –12 deaths). There was no significant change in number of deaths involving the seven other analgesics combined. When we examined these drugs separately (see Table 25), none showed a significant step or trend change associated with the withdrawal of co-proxamol. There were increases in numbers of deaths involving co-codamol and codeine during the overall study period, but these began well before the withdrawal of co-proxamol. All drug-poisoning deaths (excluding those involving co-proxamol and other analgesics) receiving a suicide or open verdict were reduced following the withdrawal of co-proxamol, although when accidental deaths were included there was a significant increase of 84 deaths per quarter (95% CI 28 to 141 deaths per quarter) (see Table 27).

The estimated reduction in number of deaths involving co-proxamol alone between 1998–2004 and 2005–10 was 61% for suicide and open verdict deaths and 62% when accidental deaths were included. This reduction equated to approximately 500 fewer deaths from suicide between 2005 and 2010 than would be expected without the withdrawal, and 600 fewer deaths when accidental poisonings were included. As can be seen in Table 24, during the full withdrawal phase (2008–10) there was an average of just 19 deaths per year (23 per year including accidents). This figure is in contrast to the 228 deaths per year during 1998–2004 (271 per year including accidents).

We have not presented data on deaths involving morphine because the ONS cannot distinguish between deaths resulting from oral administration and deaths resulting from intravenous administration (and between those due to morphine and those due to heroin). Deaths involving oxycodone alone and receiving suicide, open or accidental verdicts increased during the study period from a mean of 2.3 per year between 2001 and 2004 to a mean of 8.2 per year between 2005 and 2010 (including 15 in 2010).

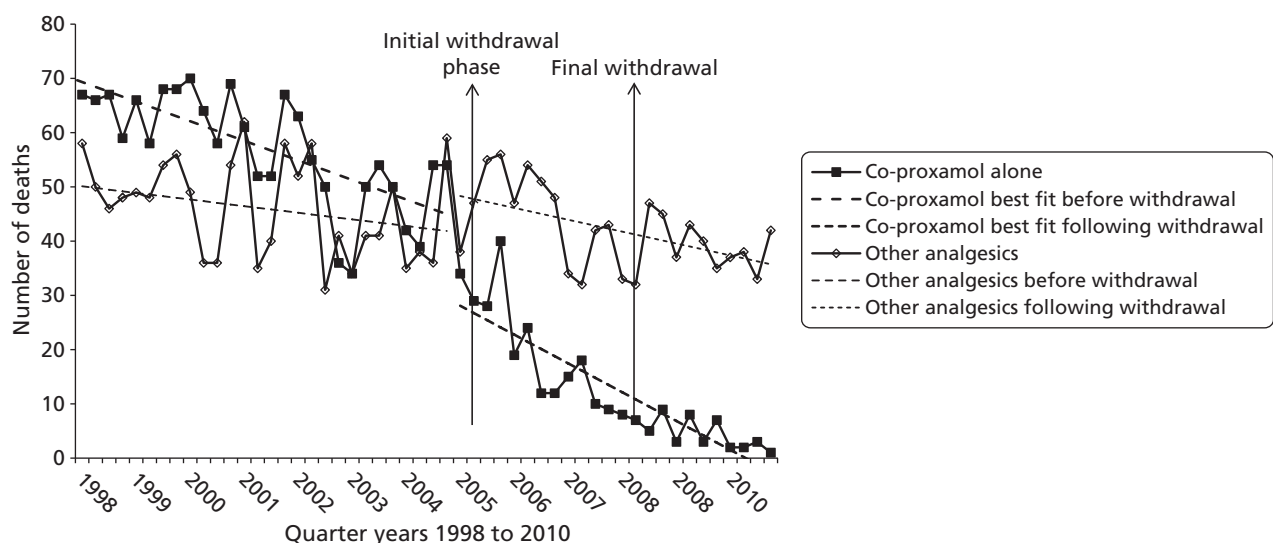


FIGURE 11 Deaths in England and Wales from poisoning with co-proxamol and other analgesics, 1998–2010 (suicide and open verdicts, substances taken alone, with or without alcohol).

TABLE 27 Changes in numbers of poisoning deaths involving co-proxamol, other analgesics and all drugs in England and Wales, 1998–2010, associated with the CSM announcement in January 2005

Cause of death	Estimation of the absolute effect of the CSM announcement during 2005–10 ^a		
	Mean quarterly estimated no. without announcement ^b	Mean quarterly estimated no. with announcement ^b	Mean quarterly change 2005–10 ^c (95% CI ^d)
Suicide and open			
Co-proxamol	34	13	–21 (–34 to –8)
Other analgesics ^e	38	42	4 (–8 to 16)
Other analgesics ^e (except NSAIDs)	38	40	2 (–10 to 13)
All drugs (except co-proxamol and other analgesics)	201	181	–19 (–49 to 10)
All drugs	275	236	–39 (–87 to 9)
All causes	1129	1140	11 (–81 to 104)
Suicide, open and accidental			
Co-proxamol	40	15	–25 (–38 to –12)
Other analgesics ^e	55	63	8 (–7 to 24)
Other analgesics ^e (except NSAIDs)	54	61	7 (–7 to 21)
All drugs (except co-proxamol and other analgesics)	336	420	84 (28 to 141)
All drugs	430	499	69 (–7 to 144)

a Using interrupted time-series segmented regression analysis in which the intervention point is taken as the end of 2004 (the CSM announcement on the withdrawal of co-proxamol, January 2005).

b Estimated for the mid-point quarter of 2005–10.

c Absolute difference between the estimated number with the CSM announcement and the estimated number without the CSM announcement, taken at the mid-point of the post-intervention period.

d 95% CIs taken from Stata results or calculated according to Zhang *et al.*⁸²

e Other analgesics include co-codamol, codeine, co-dydramol, dihydrocodeine, NSAIDs, paracetamol and tramadol.

Discussion

We have demonstrated an apparent beneficial effect of withdrawal of co-proxamol in England and Wales during the initial 3-year withdrawal phase (2005–7) in terms of numbers of deaths (suicides, open verdicts and accidents). We have also shown that there were further significant changes following full withdrawal of co-proxamol in January 2008, in terms of not only the expected reduced prescribing of co-proxamol, but also the increased prescribing of some other analgesics suggested by the CSM as substitutes for co-proxamol (paracetamol, co-codamol, codeine and co-dydramol; and, for progressive chronic pain, oxycodone and morphine), and also tramadol. During 2005–10 there was a 61% reduction in deaths from co-proxamol poisoning, equating to approximately 500 fewer deaths receiving suicide or open verdicts, and 600 when accidental poisonings were included. Some of the accidental poisonings are also likely to have been probable suicides, especially because of the recent increase in narrative verdicts by coroners, as highlighted in *Chapter 2*, and the fact that those responsible for coding cause of death at the ONS have difficulty in deciding the cause from the narrative and are therefore obliged by international convention to record the death as accidental.²⁹ Most importantly, the major reduction in number of deaths involving co-proxamol was not associated with a compensatory overall increase in number of deaths from poisoning with other analgesics (although the number of accidental poisonings with other analgesics increased in the period 2008–10).

During the full withdrawal phase, prescribing of co-proxamol did not cease completely, presumably because of off-licence prescribing. Also, deaths from poisoning with co-proxamol did not reach zero (although there were just eight suicide deaths involving co-proxamol in 2010, and 10 including accidental poisonings); again, this may be partly because of off-licence prescribing, but also because of residual supplies remaining in homes, and possibly supplies obtained through the internet. The acute reduction in prescribing of NSAIDs that began just before the withdrawal of co-proxamol because of concerns about COX-2 inhibitors¹¹¹ would have been unlikely to have affected the findings as NSAIDs alone are rarely implicated in poisoning deaths, especially by suicide.¹²

There was an overall reduction in number of poisoning deaths receiving suicide or open verdicts in England and Wales in 2005–10, although this did not reach statistical significance and was not paralleled by a decline in number of overall drug-poisoning deaths (possibly because of an increase in narrative verdicts; see *Chapter 2*). However, the number of suicides overall was not reduced, possibly because of the effects of the recession that began in 2008.^{112,113} The increase in number of overall poisoning deaths during 2005–10 appears to be related to increased numbers of deaths involving methadone and also benzodiazepines, usually combined with other drugs.¹¹⁰

Strengths and limitations

One strength of this study is that it is based on national data and includes reasonably long pre-intervention (7 years) and post-intervention (6 years) periods. Also, the method of statistical analysis (interrupted time-series regression) controls for baseline trends when estimating effects of the intervention on prescribing and deaths, which is preferable to methods such as comparison of changes in proportions before and after the intervention. However, estimates of overall effects do involve extrapolation and hence are subject to some degree of uncertainty. Also, percentage changes during the post-intervention period compared with the pre-intervention period are based on mean quarterly change estimates, which have associated uncertainty, and therefore should be interpreted with caution.

To ensure that we were examining deaths due to specific drugs, we based our mortality calculations solely on deaths involving single analgesics alone (with or without alcohol). There are also considerable numbers of poisoning deaths involving multiple drugs.¹¹⁰ When co-proxamol is one of the drugs, it is very likely to have been the lethal agent, given its high toxicity. It is possible, therefore, that our findings underestimate the full effects of the withdrawal of co-proxamol. The increasing number of narrative verdicts recorded by coroners in England and Wales²⁹ could have influenced the findings through a small reduction in suicide verdicts, although this would probably have equally affected poisonings with co-proxamol and the other analgesics, and any impact would have been included in our analysis of suicide, open and accidental deaths combined.

We have presented prescription data for the analgesics that we have investigated. For some analgesics, notably paracetamol and co-codamol, sales will mainly be OTC rather than through prescription. Comprehensive OTC sales data are unfortunately not available; this would not, of course, affect the validity of the mortality data.

As noted above, we were unable to investigate the impact of the withdrawal of co-proxamol on deaths involving morphine; however, most of such deaths result from illicit drug use.¹¹⁰

Finally, we have not been able to assess possible compensatory increases in numbers of deaths involving methods other than poisoning that may have occurred following the withdrawal of co-proxamol. This is because of the range of other potential methods of suicide and also the likely temporal effects of other influences, such as the economic recession. However, as individuals tend to show a preference for particular methods of suicide,¹⁰⁸ it is unlikely that any such effect would have been substantial.

Conclusions

Withdrawal of co-proxamol in the UK appears to have had major beneficial effects on the number of poisoning deaths involving this drug, including suicides and accidental poisonings, with no evidence of significant substitution by poisoning with other analgesics, in spite of their increased prescribing. In June 2009, following the UK lead, the European Medicines Agency recommended that dextropropoxyphene-containing medication be withdrawn throughout the European Union.¹¹⁴ This became European policy in June 2010, with full withdrawal by September 2011. In 2009, a US Food and Drug Administration (FDA) panel recommended that the FDA should withdraw dextropropoxyphene from the US market,¹¹⁵ and in 2010 the FDA instructed manufacturers to cease production.¹¹⁶ Also, in 2010 all dextropropoxyphene products were withdrawn in Canada.¹¹⁷ The impact of this initiative should now be evaluated on a larger scale.

Chapter 5 Toxicity of antidepressants: study of rates of suicide relative to prescribing and non-fatal overdose

Abstract

We have assessed the relative toxicity of antidepressants, including specific TCAs, a serotonin–noradrenaline reuptake inhibitor (SNRI), a noradrenergic and specific serotonergic antidepressant (NaSSA) and selective serotonin reuptake inhibitors (SSRIs). We conducted an observational study between 2000 and 2006 of prescriptions (UK), poisoning deaths involving single antidepressants receiving a coroner's verdict of suicide or an open verdict (England and Wales), and non-fatal self-poisoning episodes presenting to six general hospitals (in Oxford, Manchester and Derby). We calculated toxicity based on (1) the ratio of rate of deaths to rate of prescriptions (fatal toxicity index) and (2) the ratio of rate of deaths to rate of non-fatal self-poisonings (case fatality index). Fatal toxicity and case fatality indices provided very similar results (ρ for relative ranking of indices = 0.99). Case fatality rate ratios showed greater toxicity for TCAs (13.8, 95% CI 13.0 to 14.7) than for the SNRI venlafaxine (2.5, 95% CI 2.0 to 3.1) and the NaSSA mirtazapine (1.9, 95% CI 1.1 to 2.9), both of which had greater toxicity than the SSRIs (0.5, 95% CI 0.4 to 0.7). Within the TCAs, compared with amitriptyline, both dosulepin (relative toxicity index 2.7) and doxepin (Sinopin®, Marlborough) (relative toxicity index 2.6) were more toxic. Within the SSRIs, citalopram had a higher case fatality than the other SSRIs (1.1, 95% CI 0.8 to 1.4, vs. 0.3, 95% CI 0.2 to 0.4). The results showed wide differences in toxicity not only between classes of antidepressants, but also within classes. The findings are relevant to prescribing decisions, especially in individuals at risk, and to regulatory policy.

Background

Self-poisoning is a common method of suicide, especially among women.⁹ Antidepressants are frequently used for self-poisoning, being involved in around 20% of all poisoning suicides in the UK⁹ and in 20–30% of non-fatal overdoses.¹ This reflects the facts that depression is the most frequent psychiatric disorder in people dying by suicide,¹¹⁸ the method used for suicidal acts is often determined by availability¹¹ and self-poisoning in depressed individuals often involves antidepressants prescribed for them.¹¹⁹

Relative toxicity is an important factor likely to determine the outcome of an antidepressant overdose. Studies using different approaches have shown wide variation in the relative toxicity of antidepressants,^{120,121} with the older TCAs generally being more toxic than the newer SSRIs.^{120,121} In this component study of our research programme, we have used two approaches to assessing the relative toxicity of classes of antidepressants and individual antidepressants. The first approach was to relate drug-specific poisoning mortality rates to prescription rates – termed the 'fatal toxicity index'.¹²² The second, and generally less-used, approach is to compare the rate of death with the rate of non-fatal self-poisoning,^{121,123} which generates a 'case fatality index'. The fatal toxicity index approach is probably less accurate because it is more heavily influenced by prescribing policies, including the use of some antidepressants for conditions other than depression,¹²⁴ and selective prescribing, for example based on the clinician's assessment of suicide risk (i.e. confounding by indication).

Objectives

The specific aims of the study were to provide up-to-date information on the relative toxicity of individual antidepressants to assist clinicians in making decisions about prescribing and to inform interventions by regulatory authorities.

Methods

The antidepressants investigated in this study were the TCAs amitriptyline, clomipramine, dosulepin, doxepin, imipramine, nortriptyline and trimipramine; the SNRI venlafaxine; the NaSSA mirtazapine; and the SSRIs citalopram, fluoxetine, fluvoxamine, paroxetine and sertraline. The period covered by the study was 2000–6. Escitalopram was not included as it first became available in the UK in 2003.

Prescriptions

Quarterly estimates for the years 2000–6 for the UK for the numbers of antidepressant prescriptions dispensed in the community were obtained from the Medical Data Index and supplied by IMS Health.¹²⁵ Mid-year population estimates for the UK for the years 2000–6 were obtained from the ONS.¹²⁶ Rates of prescribing were calculated per 100,000 population for people of all ages for the years 2000–6 combined. We were unable to take account of average numbers of prescriptions per course of treatment.

Deaths

Information on drug-poisoning deaths receiving a verdict of suicide or death of undetermined intent that involved the antidepressants under investigation was provided by the ONS based on death registrations during 2000–6 in England and Wales. In England and Wales it has been customary to assume that the majority of injuries and poisonings of undetermined intent are cases in which the harm was self-inflicted but there was insufficient evidence to prove that the deceased deliberately intended to kill him- or herself.^{32,109} In our investigation of coroners' practices (see *Chapter 2*) we found that 80% of possible suicide deaths given an open verdict were judged by the research team to be probable suicides. We have restricted our analyses to deaths involving single drugs, or single drugs and alcohol. Data were obtained for males and females separately. Mortality rates were calculated as the number of deaths per 100,000 population in England and Wales for those aged ≥ 10 years.

Self-poisoning

Self-poisoning data came from three centres currently involved in the Multicentre Study of Self-harm in England.¹ Data in the present study were for all patients who presented to emergency departments at general hospitals in Oxford (one hospital), Manchester (three hospitals) and Derby (two hospitals) during the study period with an overdose of antidepressants, including those involving other drugs (with or without alcohol).

Episodes of self-poisoning involving the antidepressants in those aged ≥ 10 years for the defined population areas of Oxford City, Manchester City and Derby Unitary Area were included in the study. Mid-year population estimates for these areas for the years 2000–6 were obtained from the ONS.¹²⁶ Rates of self-poisoning per 100,000 population were calculated for these areas combined.

Statistical analysis

Fatal toxicity index

Rate ratios for drug-specific poisoning mortality rate relative to prescribing rate were calculated from the mortality rate (numerator) and the prescription rate (denominator).

Case fatality index

Rate ratios for poisoning mortality relative to non-fatal self-poisoning for specific drugs were calculated from the mortality rate (numerator) and the self-poisoning rate (denominator). As noted in the *Glossary*, this represents a slight deviation from the usual approach, which would be to compare deaths against a combination of non-fatal and fatal poisonings for specific methods. We have used this alternative approach because national figures for non-fatal self-poisonings are not available.

Relative toxicity indices were calculated by standardising the rate ratios to amitriptyline. This drug is used as the reference preparation in many studies.

Rate ratios and 95% CIs, Spearman's rho and heterogeneity were calculated using Stata version 10.0.

Results

The numbers of deaths, prescriptions and episodes of self-poisoning are given for both sexes in *Table 28*, for males in *Table 29* and for females in *Table 30*. The antidepressants most frequently involved in suicide deaths were (in descending order) dosulepin, amitriptyline, venlafaxine and citalopram. For non-fatal poisonings the most frequently involved antidepressants were (in descending order) fluoxetine, citalopram, amitriptyline, paroxetine, venlafaxine, dosulepin, sertraline and mirtazapine (see *Table 28*). These patterns were similar in both sexes (see *Tables 29* and *30*).

Fatal toxicity index (mortality to prescriptions rate ratios)

There was significant heterogeneity in fatal toxicity within the TCA group [$\chi^2=365.02$, degrees of freedom (df)=6, $p<0.001$]. The mortality to prescriptions rate ratio was considerably higher for dosulepin and doxepin than for amitriptyline (*Table 31*). This is reflected in the toxicity ratios relative to amitriptyline for these drugs (dosulepin 3.2, doxepin 2.5). The fatal toxicity ratios were generally far higher in males than in females but the relative toxicity indices were mostly similar in males and females.

The relative toxicity index for venlafaxine (0.46) was approximately half that for amitriptyline but over five times higher than that for the SSRIs (0.08). The relative toxicity index for mirtazapine (0.32) was slightly lower than that of venlafaxine.

There was significant heterogeneity in fatal toxicity within the SSRI group ($\chi^2=28.76$, df=4, $p<0.001$). The fatal toxicity index for citalopram was three times higher than that for the other SSRIs (1.7, 95% CI 1.3 to 2.3, vs. 0.6, 95% CI 0.4 to 0.8).

Case fatality index (mortality to self-poisonings rate ratios)

The findings based on mortality to self-poisonings rate ratios were essentially the same as for fatal toxicity, including relatively high case fatality of dosulepin and doxepin within the tricyclics, similar case fatality of venlafaxine and higher case fatality of citalopram than the other SSRIs (*Table 32*).

Comparison of fatal toxicity and case fatality

There was a very high correlation between the rankings of the results of the fatal toxicity and case fatality approaches to estimating relative toxicity of the specific antidepressants (Spearman's $\rho=0.99$, $p<0.001$).

Discussion

We used two methods for assessing relative toxicity of antidepressants: the fatal toxicity index and the case fatality index. The findings based on both approaches showed that dosulepin and doxepin are considerably more toxic than amitriptyline. Because of extensive prescribing of dosulepin relative to doxepin (see *Table 28*), attention regarding toxicity has mainly focused on the former drug. In December 2007, the MHRA

TABLE 28 Deaths by suicide and undetermined intent in England and Wales, prescriptions in the UK and self-poisoning episodes in three centres in England involving each antidepressant for those aged ≥ 10 years, 2000–6

Antidepressant	No. of deaths ^a	Death rate per 100,000	No. of prescriptions ^b	Prescription rate per 100,000	No. of self-poisonings ^c	Self-poisoning rate per 100,000
TCAs						
Amitriptyline	395	0.1211	44,286,108	10,606	704	14.09
Clomipramine	39	0.0120	3,544,517	849	48	0.96
Dosulepin	589	0.1807	20,812,372	4984	388	7.77
Doxepin	22	0.0067	1,001,373	240	15	0.30
Imipramine	25	0.0077	2,575,206	617	30	0.60
Nortriptyline	5	0.0015	645,175	155	7	0.14
Trimipramine	13	0.0040	1,113,166	267	14	0.28
All TCAs	1088	0.3338	73,977,917	17,717	1206	24.14
SNRI: venlafaxine	83	0.0255	20,100,751	4814	508	10.17
NaSSA: mirtazapine	18	0.0055	6,386,479	1529	149	2.98
SSRIs						
Citalopram	50	0.0154	37,371,364	8950	719	14.39
Fluoxetine	17	0.0052	39,818,056	9536	885	17.71
Fluvoxamine	0	0	195,897	47	13	0.26
Paroxetine	10	0.0031	25,980,311	6222	556	11.13
Sertraline	8	0.0025	15,374,325	3682	315	6.31
All SSRIs	85	0.0261	118,739,953	28,437	2488	49.80

a In England and Wales.

b In the UK, including prescriptions for those aged < 10 years.

c In three centres in England: Oxford, Manchester and Derby.

Source: Hawton K, Bergen H, Simkin S, Cooper J, Waters K, Gunnell D, *et al.* Toxicity of antidepressants: rates of suicide relative to prescribing and non-fatal overdose. *Br J Psychiatry* 2010;**196**:354–8. Reprinted with permission.

issued advice regarding dosulepin and measures to reduce the risk of fatal overdose.¹²⁷ Since November 2007, pack sizes have been limited and packaging made safer. Our findings support these measures but also highlight the need to extend them to doxepin, although the latter drug is much less frequently prescribed.

Venlafaxine (a SNRI) is clearly far less toxic in overdose than the TCAs. Its relative toxicity index based on both assessment approaches was intermediate between those of the TCAs and the SSRIs. The MHRA issued a warning about the relatively high toxicity of venlafaxine in 2006, recognising that selective prescribing to patients at risk of suicide could be a contributory factor to this finding.¹²⁸ The regulatory body also issued prescribing advice, including restricting pack sizes and initial supplies for patients. In our study, the relative toxicity of mirtazapine (a NaSSA) was slightly lower than that of venlafaxine, but considerably greater than for the SSRIs.

Within the SSRIs, citalopram had a higher relative toxicity index, based both on the fatal toxicity measure and that using case fatality. This finding is in keeping with other reported concerns about the toxicity of citalopram^{129,130} and may reflect known cardiotoxic¹³⁰ and proconvulsant¹²¹ effects of citalopram in overdose. Although the absolute fatal toxicity is low, this finding should nevertheless be considered when making risk/benefit decisions regarding prescribing for individual patients.

TABLE 29 Deaths by suicide and undetermined intent in England and Wales, prescriptions in the UK and self-poisoning episodes in three centres in England involving each antidepressant for males aged ≥ 10 years, 2000–6

Antidepressant	No. of deaths ^a	Death rate per 100,000	No. of prescriptions ^b	Prescription rate per 100,000	No. of self-poisonings ^c	Self-poisoning rate per 100,000
TCAs						
Amitriptyline	213	0.1343	13,502,515	6617	304	12.27
Clomipramine	13	0.0082	1,055,351	517	10	0.40
Dosulepin	313	0.1974	5,711,075	2799	165	6.66
Doxepin	13	0.0082	278,542	136	11	0.44
Imipramine	11	0.0069	832,451	408	9	0.36
Nortriptyline	0	0	164,783	81	3	0.12
Trimipramine	8	0.0050	293,191	144	2	0.08
All TCAs	571	0.3602	21,837,908	10,701	504	20.34
SNRI: venlafaxine	46	0.0290	6,792,071	3328	181	7.31
NaSSA: mirtazapine	8	0.0050	2,500,957	1226	52	2.10
SSRIs						
Citalopram	29	0.0183	11,385,772	5579	258	10.41
Fluoxetine	5	0.0032	11,634,141	5701	299	12.07
Fluvoxamine	0	0	85,351	42	4	0.16
Paroxetine	7	0.0044	8,501,428	4166	222	8.96
Sertraline	4	0.0025	4,838,067	2371	106	4.28
All SSRIs	45	0.0284	36,444,759	17,859	889	35.89

a In England and Wales.

b In the UK, including prescriptions for those aged < 10 years.

c In three centres in England: Oxford, Manchester and Derby.

Source: Hawton K, Bergen H, Simkin S, Cooper J, Waters K, Gunnell D, *et al.* Toxicity of antidepressants: rates of suicide relative to prescribing and non-fatal overdose. *Br J Psychiatry* 2010;**196**:354–8. Reprinted with permission.

A major strength of the study is that we used two approaches to assessing relative toxicity, the findings of which were remarkably similar. Although the findings for fatal toxicity could have been influenced by selective prescribing (e.g. use of less toxic antidepressants for people more at risk of overdose), this is less likely to be the case for case fatality in that this assesses the risk of death once someone takes an overdose. One limitation is that in calculating case fatality we compared deaths with non-fatal poisonings, rather than deaths against a combination of non-fatal and fatal poisonings for specific methods. This is because national figures for non-fatal self-poisoning are not available. However, were these to be available, the addition of fatal cases to the very large number of non-fatal cases would have made little difference to the results.

Conclusions

Of the TCAs, dosulepin and doxepin have the greatest toxicity based on overdose deaths relative to both prescriptions and non-fatal self-poisonings. Venlafaxine appears to be far less toxic than the TCAs but more toxic than the SSRIs and slightly more toxic than mirtazapine. Of the five SSRIs that we examined, citalopram appears to be more toxic than the other four. These findings have been communicated to the

TABLE 30 Deaths by suicide and undetermined intent in England and Wales, prescriptions in the UK and self-poisoning episodes in three centres in England involving each antidepressant for females aged ≥ 10 years, 2000–6

Antidepressant	No. of deaths ^a	Death rate per 100,000	No. of prescriptions ^b	Prescription rate per 100,000	No. of self-poisonings ^c	Self-poisoning rate per 100,000
TCAs						
Amitriptyline	182	0.1087	30,783,593	14 419	398	15.80
Clomipramine	26	0.0155	2,489,079	1166	38	1.51
Dosulepin	276	0.1648	15,101,297	7074	223	8.85
Doxepin	9	0.0054	722,831	339	4	0.16
Imipramine	14	0.0084	1,742,755	816	21	0.83
Nortriptyline	5	0.0030	480,392	225	4	0.16
Trimipramine	5	0.0030	819,975	384	12	0.48
All TCAs	517	0.3088	52,139,922	24,423	700	27.79
SNRI: venlafaxine	37	0.0221	13,308,622	6234	327	12.98
NaSSA: mirtazapine	10	0.0060	3,885,522	1820	97	3.85
SSRIs						
Citalopram	21	0.0125	25,985,426	12,172	461	18.30
Fluoxetine	12	0.0072	28,183,838	13,202	586	23.26
Fluvoxamine	0	0	110,546	52	9	0.36
Paroxetine	3	0.0018	17,478,883	8187	334	13.26
Sertraline	4	0.0024	10,536,046	4935	2098	8.30
All SSRIs	40	0.0289	82,294,739	38,548	1599	63.48

a In England and Wales.

b In the UK, including prescriptions for those aged < 10 years.

c In three centres in England: Oxford, Manchester and Derby.

MHRA. Our results suggest that when prescribing antidepressants the clinician should take account of the risk that may be associated with an overdose, especially in someone judged to be at risk of self-poisoning, as well as their relative efficacy, acceptability and possible interactions with other medication and alcohol, and patients' concurrent physical morbidity. We suggest that assessment of the relative toxicity of antidepressants should continue as new antidepressants are marketed, and that international comparisons are warranted in view of differences between countries in prescribing practices.

TABLE 31 Fatal toxicity: rate ratios and relative toxicity indices for individual antidepressants based on rates of death (suicide and undetermined intent) in England and Wales and prescription rates in the UK

Antidepressant	Both sexes		Males		Females	
	Rate ratio (95% CI)	Relative toxicity index ^a	Rate ratio (95% CI)	Relative toxicity index ^a	Rate ratio (95% CI)	Relative toxicity index ^a
TCA's						
Amitriptyline	11.4 (10.3 to 12.6)	1.0	20.3 (17.7 to 23.2)	1.0	7.5 (6.5 to 8.7)	1.0
Clomipramine	14.1 (10.0 to 19.3)	1.2	15.9 (8.4 to 27.1)	0.8	13.3 (8.7 to 19.5)	1.8
Dosulepin	36.3 (33.4 to 39.3)	3.2	70.5 (62.9 to 78.8)	3.5	23.3 (20.6 to 26.2)	3.1
Doxepin	28.1 (17.6 to 42.6)	2.5	60.1 (32.0 to 102.7)	3.0	15.9 (7.3 to 20.1)	2.1
Imipramine	12.4 (8.1 to 18.4)	1.1	17.0 (8.5 to 30.4)	0.8	10.2 (5.6 to 17.2)	1.4
Nortriptyline	9.9 (3.2 to 23.2)	0.9	0	0	13.3 (4.3 to 31.0)	1.8
Trimipramine	15.0 (8.0 to 25.6)	1.3	35.1 (15.2 to 69.2)	1.7	7.8 (2.5 to 18.1)	1.0
All TCAs	18.8 (17.7 to 20.0)	1.7	33.7 (31.0 to 36.5)	1.7	12.6 (11.6 to 13.8)	1.7
SNRI: venlafaxine	5.3 (4.2 to 6.6)	0.46	8.7 (6.4 to 11.6)	0.43	3.5 (2.5 to 4.9)	0.47
NaSSA: mirtazapine	3.6 (2.1 to 5.7)	0.32	4.1 (1.8 to 8.1)	0.20	3.3 (1.6 to 6.0)	0.44
SSRIs						
Citalopram	1.7 (1.3 to 2.3)	0.15	3.3 (2.2 to 4.7)	0.16	1.0 (0.6 to 1.6)	0.14
Fluoxetine	0.5 (0.3 to 0.9)	0.05	0.6 (0.2 to 1.3)	0.03	0.5 (0.3 to 1.0)	0.07
Fluvoxamine	0	0	0	0	0	0
Paroxetine	0.5 (0.2 to 0.9)	0.04	1.1 (0.4 to 2.2)	0.05	0.2 (0.05 to 0.6)	0.03
Sertraline	0.7 (0.3 to 1.3)	0.06	1.1 (0.3 to 2.7)	0.05	0.5 (0.1 to 1.2)	0.06
All SSRIs	0.9 (0.7 to 1.1)	0.08	1.6 (1.2 to 2.1)	0.08	0.6 (0.4 to 0.8)	0.08

^a Index of toxicity relative to amitriptyline.

Source: Hawton K, Bergen H, Simkin S, Cooper J, Waters K, Gunnell D, *et al.* Toxicity of antidepressants: rates of suicide relative to prescribing and non-fatal overdose. *Br J Psychiatry* 2010;**196**:354-8. Reprinted with permission.

TABLE 32 Case fatality: rate ratios and relative toxicity indices for individual antidepressants based on rates of death (suicide and undetermined intent) in England and Wales and rates of non-fatal self-poisoning in three centres

Antidepressant	Both sexes		Males		Females	
	Rate ratio (95% CI)	Relative toxicity index ^a	Rate ratio (95% CI)	Relative toxicity index ^a	Rate ratio (95% CI)	Relative toxicity index ^a
TCAs						
Amiripryline	8.6 (7.8 to 9.5)	1.0	11.0 (9.5 to 12.5)	1.0	6.9 (5.9 to 8.0)	1.0
Clomipramine	12.5 (8.9 to 17.0)	1.4	20.3 (10.8 to 34.7)	1.9	10.3 (6.7 to 15.1)	1.5
Dosulepin	23.3 (21.4 to 25.2)	2.7	29.6 (26.4 to 33.1)	2.7	18.6 (16.5 to 21.0)	2.7
Doxepin	22.5 (14.1 to 34.0)	2.6	18.5 (9.8 to 31.6)	1.7	33.9 (15.5 to 64.3)	4.9
Imipramine	12.8 (8.3 to 18.9)	1.5	19.1 (9.5 to 34.2)	1.7	10.0 (5.5 to 16.8)	1.5
Nortriptyline	11.0 (3.6 to 25.5)	1.3	0	0	18.8 (6.1 to 43.9)	2.7
Trimipramine	14.2 (7.8 to 24.3)	1.7	62.5 (27.0 to 123.1)	5.7	6.3 (2.0 to 14.6)	0.9
All TCAs	13.8 (13.0 to 14.7)	1.6	17.7 (16.3 to 19.2)	1.6	11.1 (10.2 to 12.1)	1.6
SNRI: venlafaxine	2.5 (2.0 to 3.1)	0.29	4.0 (2.9 to 5.3)	0.36	1.7 (1.2 to 2.3)	0.25
NaSSA: mirtazapine	1.9 (1.1 to 2.9)	0.22	2.4 (1.0 to 4.7)	0.20	1.6 (0.7 to 2.9)	0.23
SSRIs						
Citalopram	1.1 (0.8 to 1.4)	0.12	1.8 (1.2 to 2.5)	0.12	0.7 (0.4 to 1.1)	0.10
Fluoxetine	0.3 (0.2 to 0.5)	0.03	0.3 (0.1 to 0.6)	0.02	0.3 (0.2 to 0.5)	0.04
Fluvoxamine	0	0	0	0	0	0
Paroxetine	0.3 (0.1 to 0.5)	0.03	0.5 (0.2 to 1.0)	0.05	0.1 (0.03 to 0.4)	0.02
Sertraline	0.4 (0.2 to 0.8)	0.05	0.6 (0.2 to 1.5)	0.05	0.3 (0.08 to 0.7)	0.04
All SSRIs	0.5 (0.4 to 0.7)	0.06	0.8 (0.6 to 1.1)	0.07	0.4 (0.3 to 0.5)	0.05

^a Index of toxicity relative to amitriptyline. Source: Hawton K, Bergen H, Simkin S, Cooper J, Waters K, Gunnell D, et al. Toxicity of antidepressants: rates of suicide relative to prescribing and non-fatal overdose. *Br J Psychiatry* 2010;**196**:354–8. Reprinted with permission.

Chapter 6 Variations in self-harm service delivery: an observational study examining outcomes and temporal trends

Abstract

Historically, service provision for self-harm in the UK has been extremely variable. In this study, we aimed to describe the characteristics of individuals attending hospital with self-harm in 32 centres across England in 2010–11 and the management that they received. We also investigated how key aspects of management (assessment, admission, follow-up) related to repetition of self-harm and how management had changed since an earlier study in 2001. Data on service provision were collected through interviews with key staff. Data on individuals who had self-harmed were collected using a specifically designed proforma. Over 6400 individuals presented during the 3-month study period. There was a 3.5-fold difference between hospitals in the proportion of individuals who received a specialist assessment and a fivefold difference in the proportion of individuals receiving specialist follow-up. Overall, 4 out of 10 individuals left hospital without having had an assessment with a mental health specialist. In an ecological analysis there was little evidence that aspects of management were associated with outcome, but an individual-level analysis suggested that specialist psychosocial assessment might be associated with a reduced risk of repetition of self-harm. Comparing our data with data from the earlier time period, levels of specialist assessment had remained static, but scores on a self-reported service quality scale increased by 26%. Overall, there was little evidence that guidelines and policy initiatives to date have had a major impact on the variability of services, but they may have helped to improve markers of service quality.

Background

Every year in England there are around 4500 suicides and it is estimated that hospitals manage approximately 220,000 episodes of self-harm. Our previous studies have demonstrated wide variations in self-harm service delivery. In one study of a representative sample of 32 hospitals in England there was a twofold variation in the level of specialist assessment, a fourfold variation in the level of medical admission, a ninefold variation in the level of psychiatric admission and a twofold variation in arrangements for mental health follow-up.¹⁵ However, it is unclear how such variations relate to the outcome of self-harm in trusts with different approaches to management. Such outcomes research is essential to guide service provision for self-harm,¹³¹ especially as randomised trials in this area tend to be underpowered, recruit highly selected samples and be hampered by the poor engagement of participants with treatment.²¹

In 2004, two sets of clinical guidelines on the management of self-harm were published.^{13,132} In addition, the Royal College of Psychiatrists initiated the Better Services for People who Self-harm project,¹³³ an audit-based quality improvement project involving surveys of service users' experiences, staff attitudes and training, and care pathways. The two sets of guidelines and the Better Services project might be expected to reduce the variability of services and improve the quality of care for self-harm patients.

In the current study we aimed to investigate whether or not aspects of the hospital management of self-harm in 32 hospitals had any impact on patient outcomes, specifically self-harm repetition. Comparison with the results of our previous study carried out in 2001 in the same sites¹⁵ also enabled us to explore whether service variability had decreased and service quality had improved in response to guidelines and policy initiatives introduced in the intervening period.

Our main objectives were to:

1. describe patient characteristics and hospital management of self-harm across the 32 sites
2. investigate how key aspects of management (e.g. levels of assessment, admission and specialist follow-up) related to the repetition of self-harm
3. compare our findings with those from the earlier 2001 study to ascertain whether the variability in services had decreased and the quality of services had improved.

Methods

Study sites

We intended to carry out the study in the stratified random sample of 32 hospitals in England identified in our earlier investigation.¹⁵ Only hospitals with an emergency department were included in the original sampling process. The sample was stratified so that four hospitals were selected within each of the eight former health regions in England and to ensure that small and large hospitals were included, as well as those with high and low self-harm readmission rates. In total, 31 of the original 32 hospitals agreed to take part in the current study. The one hospital that declined to participate was replaced by an alternative, randomly selected hospital from within the appropriate stratum.

Local approvals

Approval to carry out the study was sought through the research and development departments at each NHS trust through completion of a Site Specific Investigation Form [via the Integrated Research Approval System (IRAS)]. As part of this process we approached potential local collaborators at each trust, commonly through the assistance of appropriate local and national networks [e.g. the Mental Health Research Network (MHRN) and Comprehensive Local Research Network].

Service interviews

Once approval had been obtained, the local collaborators identified the key mental health and emergency department staff involved in the provision of self-harm services. These personnel were interviewed by telephone or in person about current service structures (see *Appendix 5*). Using the staff responses, hospitals were then rated on a measure of service quality developed as part of the previous study¹⁵ and based on the Royal College of Psychiatrists guidelines for the general hospital management of self-harm¹³² (*Box 1*). Each item was scored as '1' or '0' depending on the presence or absence of a particular aspect of the service. For two items (6 and 10), for which such a strict categorisation was not possible, scores of '0', '0.5' or '1' were given in consultation with the research team.

Ethical approval

This study received ethical approval from Tameside and Glossop NHS Research Ethics Committee in August 2009.

Potential total scores ranged from 0 to 21, with higher scores indicating better-quality services. Information on the hospital catchment area (estimated size; urban, rural or mixed urban/rural) was collected during interviews with staff or from hospital records.

Service audits

With the assistance of our local collaborators and with subsequent approval of the Information Governance departments allowing data sharing between relevant trusts, we facilitated the set-up of audits of self-harm in each hospital through NHS trust personnel or their equivalent (e.g. clinical studies officers who were employed by the trusts in some centres). For each audit, data were collected on all episodes of self-harm in those aged ≥ 18 years occurring during a 3-month period. Service configurations for young people were likely to be markedly different from adult services and therefore those aged < 18 years were excluded from this

BOX 1 Service scale items**Service scale items**

1. Is there a protocol/guideline/aide memoire for staff in the A&E department for the immediate medical management of self-harm?
2. Is there a protocol/guideline/aide memoire for staff in the A&E department for the immediate assessment of risk and severe mental disorder in self-harm patients?
3. Is there a designated self-harm specialist clinical service? (include A&E liaison)
4. Is there a local specific planning/working group (of the team who undertake the psychosocial assessments) that meets at least once a year to plan/oversee the service for self-harm patients?
5. Are there psychosocial assessment training sessions for new staff who are involved in the psychosocial assessment of patients?
6. Are there supervision arrangements in place for staff members (new and existing) who undertake psychosocial assessments?
7. Are there written guidelines/a checklist to assist psychiatric clinicians in the psychosocial assessment of self-harm patients?
8. Does the A&E department have 24-hour access to a psychiatrist, psychiatric nurse or social worker who is able to undertake psychosocial assessments?
9. If yes to 8, is immediate (within 15 minutes) advice available over the telephone?
10. If yes to 8, is emergency attendance, when requested, available within 1 hour?
11. Do regular (at least once a year) service planning/strategy meetings take place between the self-harm team/psychiatric service and the general medical service involved in the care of self-harm patients?
12. Are rooms that allow for privacy and confidentiality available for conducting interviews with self-harm patients either in or close to the A&E department?
13. Are rooms that allow for privacy and confidentiality available for conducting interviews with self-harm patients either in or close to the inpatient unit where most of the patients are assessed?
14. Does a formal arrangement exist with social services to visit and offer advice to self-harm patients who have significant social difficulties?
15. Can those admitted as inpatients remain in hospital until they have received a psychosocial assessment?
16. Is there a policy stating that a patient's GP should be contacted within 24 hours of patient discharge from an A&E department?
17. Is there a policy stating that a patient's GP should be contacted within 24 hours of patient discharge from a medical inpatient unit?
18. Are self-harm patients routinely given printed material about local services, voluntary groups and how to obtain access to them?
19. Are there any formal links with non-statutory services (e.g. self-help groups, the Samaritans)?
20. Has a system been set up for the monitoring of hospital attendance/discharge and referral of self-harm patients?
21. Has there been any audit of the service for self-harm patients in the last 2 years?

study. The exact time period varied between centres but all audits took place between May 2010 and June 2011.

Case definition

As in the previous study, self-harm was defined as 'a deliberate non-fatal act whether physical, drug over-dosage or poisoning, done in the knowledge that it was potentially harmful and in the case of drug overdose that the amount taken was excessive' (p. 68).¹³⁴ The final decisions on inclusion were made by the clinical staff/data collectors. Definitions were discussed in detail in the pilot phase of each audit and the data collectors were encouraged to contact the research team with any queries.

Case ascertainment

Episodes of self-harm were identified from emergency department records using relevant search terms from our previous study¹⁵ and from current self-harm monitoring systems in England.^{1,135} The individual medical records of possible cases were examined to confirm case inclusion. The robustness of this methodology was tested in each hospital in a pilot data collection exercise against all presentations for a brief period (1–2 weeks) and/or against lists of presentations compiled by mental health teams, to identify missed cases. Search terms were adjusted accordingly to maximise case ascertainment.

Baseline data collection

Data were recorded on openCDMS (Clinical Decision Management System) (<http://opencdms.org/>), which is a web-based data entry system supported by the MHRN. Technical support and user training were provided by specialist e-Science Officers working for the MHRN Information Services team. Individual-level data were collected using a simple one-page (electronic) audit form completed by designated staff. The audit form (see *Appendix 6*) contained items relating to basic demographic and clinical data, details of the drugs taken in overdose and the patient's recent contact with specialist mental health services. Details of in-hospital management were also recorded, specifically whether the individual received a psychosocial assessment [defined as 'an interview carried out by a member of mental health staff who has been trained in the process, is usually of about 30 minutes duration, and covers the assessment of factors such as the causes and degree of suicidal intent, current mental state and level of social support, psychiatric history, personal and social problems, future risk and need for follow-up' (p. 68)],¹³⁴ whether he or she was admitted to a psychiatric or medical bed and whether he or she was referred for psychiatric follow-up. Data were collected from both emergency department and mental health medical records systems.

Follow-up data

The index episode for each individual was his or her first self-harm attendance during the 3-month study period. The main outcome was hospital attendance with a repeat episode within 6 months. However, because we collected follow-up data for 6 months after the end of the 3-month audit, follow-up data for individuals were available for between 6 and 9 months. Repeat episodes were identified through hospital databases by matching on name, date of birth and NHS number if available. Data collectors kept a record of individuals' identifying details against their unique openCDMS number, but patient identifiers were not used on the audit forms either in hard copy or in electronic form. All data were anonymised at source (at the participating hospital) before being sent to the research team. A named person within the trust held the key to enable subsequent patient attendances/episodes to be identified.

Sample size

Hospital-level data

To measure the effect of hospital management on the proportion of patients repeating within 6 months, we considered a sample size of 32 hospitals would enable us to detect correlations of 0.31 between continuous predictor variables and self-harm repetition (using Spearman's rank correlation coefficients and two-sided significance levels of 5%). This would enable factors accounting for $\geq 9\%$ of the variability in level of repetition between hospitals to be identified.

Individual-level data

We estimated that approximately 4000 individuals would attend the study centres with a self-harm episode during the 3 months of the audit period. Considering the least common key service factor (admission to a psychiatric bed – occurring in 10% of index episodes), this sample size would give us $>90\%$ power to detect a clinically significant 5% difference in levels of 6-month repetition between those who were admitted and those who were not admitted (7% vs. 12%).

Analysis

Analysis relating aspects of management to repetition was carried out at aggregate hospital level and at individual level. The hospital-based analysis examined associations between hospital level of 6-month

repetition and rates of key management/service provision, specifically the proportions of individuals receiving a psychosocial assessment, admitted to a medical bed, admitted to a psychiatric bed and referred for specialist mental health follow-up, and the hospital's total service scale score. Spearman's rank correlation coefficient was used to measure associations between levels of hospital key clinical management and total service score and repetition, and Mann–Whitney tests were used for comparisons of levels of repetition for hospitals with/without individual items from the service scale.

We used meta-regression to further evaluate the relationship between levels of key clinical management and hospital levels of repetition. This method allowed us to take into account the sample size of each hospital and to estimate the combined (pooled) effect of levels of management on the level of repetition. Through these models we obtained an odds ratio (OR) representing the effect of changes in levels of management on the odds of repetition.

In an individual-based analysis we examined the relationship between levels of key hospital management and repetition of self-harm (within 6–9 months) using survival analyses (Cox proportional hazards regression). We adjusted as far as possible for differences in the case mix of patients receiving different types of management. We also adjusted the standard error measurement to account for clustering by hospital.

We measured changes in management and service provision between the present study and the 2001–2 period using *episodes* of self-harm rather than individuals' index presentation, because data on individuals were not available for the earlier study. Differences in median scores between the two time periods were tested using the matched-pairs sign test.

Analyses were conducted using Stata version 11.0 and SPSS version 19.

Results

Characteristics of the sample

This section is based on each individual's first (index) episode during the 3-month audit period. A total of 6442 individuals presented with 7689 episodes of self-harm at the 32 hospitals during the 3-month audit period. Overall, 56% ($n=3583$) of individuals were female and 51% ($n=3274$) were aged <35 years [age range 18–94 years, median age 34 years, interquartile range (IQR) 24–45 years]. Information on ethnicity was not widely available for seven of the hospitals. Data were 85% complete in the remaining hospitals ($n=4333$): 93% ($n=4017$) of the individuals were white, 3% ($n=124$) were South Asian, 2% ($n=78$) were black and 3% ($n=114$) were from other ethnic groups.

The main method of self-harm was known in 99.7% ($n=6424$) of index episodes: self-poisoning with drugs in 79% ($n=5073$), self-poisoning (other) in 2% ($n=102$), self-cutting in 14% ($n=890$) and other methods of harm (including burning, attempted hanging and jumping) in 6% ($n=359$). Use of alcohol/drugs with the act was known for 90% ($n=5828$) of individuals. Alcohol was taken within 6 hours of the self-harm act in 53% ($n=3111$) of cases and recreational drugs in 7% ($n=385$). Data were available for previous self-harm episodes in 97% ($n=6237$) of individuals and reported as present in 51% ($n=3173$) of these. Data were available on whether or not patients were receiving psychiatric treatment at the time of their index self-harm episode for 96% ($n=6181$) of individuals, and 32% ($n=1982$) of these were known to be in current psychiatric treatment. Data on psychiatric inpatient care were 97% ($n=6269$) complete, and 10% ($n=636$) of individuals had been an inpatient in a psychiatric ward in the 12 months before the self-harm presentation.

Time of presentation was known in 99% of episodes ($n=7622$). There was a steady increase in presentations during the day with a peak time of presentation between 2200 and 2300 (*Figure 12*). The majority (57%, $n=4362$) of presentations occurred out of hours (we considered 'out of hours' to be 2000 to 0800 and daytime/evening to be 0800 to 2000, based on information of routine service availability from hospital interviews).

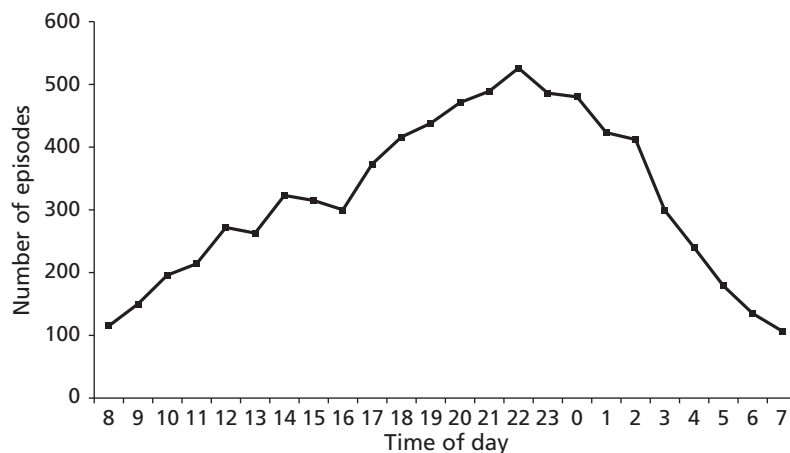


FIGURE 12 Time of presentation: all episodes during the 3-month audit (n=7622).

Management in hospital

A psychosocial assessment by a mental health specialist took place in 58% of index episodes (Table 33). A total of 66% (n=2651) of these were carried out by a mental health nurse (including mental health liaison nurses and those from specialist self-harm teams and crisis teams), 20% (n=683) by a psychiatrist (any grade) and 4% (n=142) by another mental health professional (such as a social worker). Out-of-hours presentations were slightly less likely to receive psychosocial assessment than presentations during working hours (56% vs. 60%, p=0.001). Daytime and evening presentations were more likely to be assessed by a psychiatrist than out-of-hours presentations (22% vs. 18%, p=0.012).

A total of 2155 out of 2660 individuals (81%) were assessed within 24 hours of their presentation. The median number of hours between time of hospital presentation and time of assessment was 10 hours (IQR 4–20 hours). For those not admitted to a medical bed, the median time to assessment was 5 hours (IQR 3–8 hours) and this did not vary by time of presentation (working hours vs. out of hours). A total of 42% (335/798) of assessments occurred within 4 hours of presentation in this group. Amongst all assessed individuals, those using alcohol at the time of self-harm had a median of 11 hours (IQR 6–20 hours) wait to be assessed compared with 9 hours (IQR 5–20 hours) when alcohol was not used. Over half of the index episodes resulted in admission to a medical bed. Amongst these, 63% (n=2245) were admitted to an emergency department observation/assessment ward or equivalent, 32% (n=1145) to a general ward and 5% (n=194) to other types of medical beds including intensive care units. A total of 7% of presentations resulted in admission to a psychiatric bed and in 30% (n=1828) of presentations patients were referred to specialist mental health outpatient services (including psychiatric care, crisis teams, community mental health teams and statutory drug and alcohol services). In 18% of episodes patients were referred to other,

TABLE 33 Management following presentation to an emergency department for self-harm

Service ^a	Overall proportion of cases receiving the service, % (n/N ^b)	Range (IQR) (%)
Specialist mental health assessment	58 (3574/6154)	28–91 (46–70)
Admission to general medical bed	56 (3587/6422)	22–85 (42–67)
Psychiatric admission	7 (433/6036)	0–20 (4–11)
Specialist mental health follow-up	30 (1828/6036)	11–61 (21–39)
Referral to non-statutory services	18 (1018/5624)	3–69 (9–26)

a Services related to mental health management refer to the 31 hospitals in which mental health records were accessed.
 b The denominator varies according to data availability.

non-statutory services, most commonly drug/alcohol services (25%, $n=255$), counselling/psychotherapy (16%, $n=167$), social services (13%, $n=128$) and prison/police custody (12%, $n=123$).

In total, 20% ($n=1313$) of individuals reattended with a repeat episode of self-harm within 6 months of the index episode. This ranged from 6–27% (IQR 18–24%) in the 32 hospitals.

Aggregate-level outcome analysis

This section presents results at the hospital level. Analyses relating to the 21-item service scale and admission to general hospital were conducted using data from 32 hospitals. Those relating to specialist mental health management were carried out on data from the 31 hospitals in which mental health records were accessed.

The Spearman's rank correlation coefficient between the proportion of individuals receiving psychosocial assessment and the rate of 6-month repetition was 0.16 ($p=0.38$) (Figure 13). There was no apparent association between 6-month repetition and the rate of hospital medical admission (Spearman's $\rho=0.15$, $p=0.413$), psychiatric admission (Spearman's $\rho=0.077$, $p=0.679$) or specialist outpatient referral (Spearman's $\rho=0.20$, $p=0.28$). The rate of repetition did not vary according to total service scale score (Spearman's $\rho=-0.065$, $p=0.73$) (Figure 14) or individual aspects of the scale.

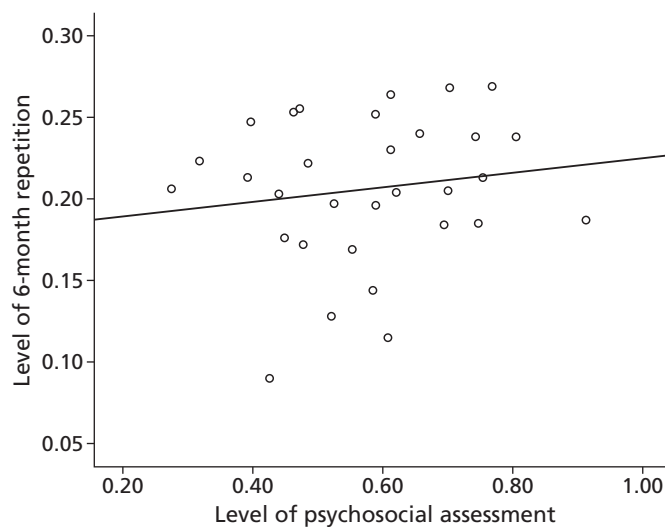


FIGURE 13 Association between level of psychosocial assessment and level of repetition within 6 months.

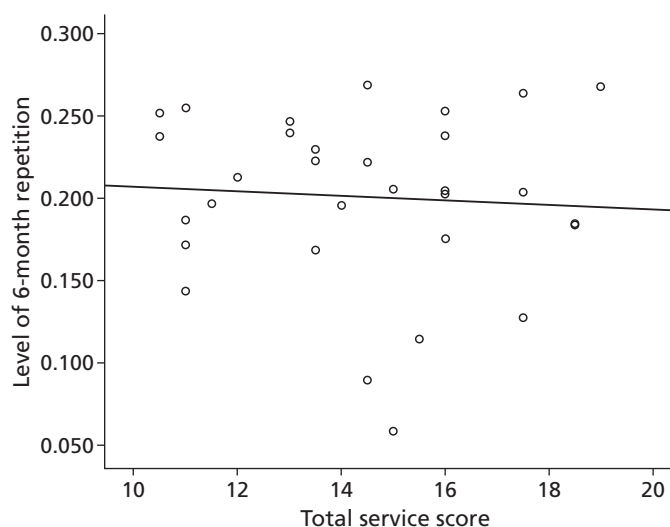


FIGURE 14 Association between service scale score and level of repetition within 6 months.

Meta-regression

There were no significant associations between levels of key management by hospitals and the odds of repetition within 6 months (Table 34). The pooled OR for the effect of a 10% increase in the proportion of patients who received a psychosocial assessment on the odds of repetition was 1.04 (95% CI 0.97 to 1.13, $p=0.27$).

Individual-level outcome analysis

After adjusting for baseline characteristics, we found that psychosocial assessment was associated with a decreased risk of repeat self-harm, although this was non-significant at the $p=0.05$ level (Table 35). In a post hoc analysis we compared the association between repetition and main speciality of assessor. The adjusted hazard ratio (HR) for repeat self-harm in individuals assessed by a psychiatrist ($n=629$; based on complete data) compared with those not assessed was 0.78 (95% CI 0.64 to 0.94, $p=0.01$). Psychosocial assessment by a mental health nurse ($n=2620$; based on complete data) was not associated with a significantly decreased risk of repetition (HR 0.89, 95% CI 0.77 to 1.04, $p=0.13$).

Specialist mental health follow-up was associated with a significantly increased HR, reflecting the increased risk of this group. Adjusting for characteristics associated with risk reduced the HR somewhat. There was a similar process for psychiatric inpatient admission.

Comparison between 2001–2 and 2010–11 data

Our earlier study¹⁵ in 2001–2 was based on episodes of self-harm, not individuals; therefore, all comparisons here are episode based. Comparisons are based on the 31 hospitals that were included in both studies.

TABLE 34 The association between aspects of patient management and risk of repeat self-harm in the 6 months following the index episode

Patient management	OR (95% CI)	p-value
Hospital management		
Specialist mental health assessment ^a	1.04 (0.97 to 1.13)	0.27
Admission to general medical bed ^a	1.02 (0.95 to 1.10)	0.55
Psychiatric admission ^b	1.00 (0.98 to 1.02)	0.98
Specialist mental health follow-up ^a	1.06 (0.98 to 1.15)	0.16
Service provision		
Total service scale score ^c	0.99 (0.95 to 1.04)	0.78
Presence of a designated self-harm service	0.87 (0.59 to 1.30)	0.49

a OR per 10% increase in the rate of hospital management (consistent with the analysis from the original study).⁷⁶

b OR per 1% increase in the rate of psychiatric admission.

c OR per 1-point increase in service scale score.

TABLE 35 Unadjusted and adjusted HRs for repetition according to hospital management

Management	Unadjusted HR (95% CI, p-value)	Adjusted HR (95% CI, p-value)
Specialist mental health assessment	1.13 (0.97 to 1.32, 0.11)	0.88 (0.76 to 1.01, 0.08)
Admission to general medical bed	0.96 (0.84 to 1.09, 0.50)	0.99 (0.88 to 1.11, 0.86)
Psychiatric admission	1.54 (1.36 to 1.75, <0.001 ^a)	0.91 (0.77 to 1.07, 0.25)
Specialist mental health follow-up	1.47 (1.27 to 1.70, <0.001 ^a)	1.01 (0.87 to 1.18, 0.85)

a Statistically significant HRs at $p<0.001$.

Management

We compared the proportions of episodes receiving key aspects of clinical management in the two time periods (Table 36). The proportion of episodes in which psychosocial assessment occurred was similar between the two study periods (overall 57% in both 2001–2 and in 2010–11). Assessment rates in the present study did not correlate strongly with those in 2001–2 (Spearman's $\rho=0.23$, $p=0.22$). A higher proportion of episodes in the present study than in the 2001–2 study resulted in admission to a medical ward (55% vs. 44%, an increase of 12%), increasing in 21 out of 31 hospitals. The proportion receiving specialist mental health follow-up, including inpatient admission, was 39% in the present study compared with 54% in 2001–2, a decrease of 15%, and the variability between hospitals appeared to be greater (IQR 26–48% vs. 46–63%).

Service provision

The total score from the service scale measure had increased from the earlier study in 23 out of 31 hospitals (Table 37), possibly indicating improved service quality. The median score increased from 11.5 (IQR 10–14) in the earlier study to 14.5 (IQR 11.5–16) in the present study, an increase of 26%. The difference between scores in the two time periods was statistically significant ($p=0.006$).

Three individual service scale items improved in half or more of all centres – these were items 6 (availability of supervision to staff undertaking assessments), 11 (joint service planning meetings between mental health and acute services) and 14 (formal arrangements for social services input).

Number of episodes

Although it was not possible to identify the number of individuals presenting – and therefore calculate rates of self-harm – in the earlier study period, we were able to compare numbers of episodes (Table 38). We

TABLE 36 Changes in service provision and hospital management: 2001–2 vs. 2010–11 ($n=31$)

Aspect of service	2001–2	2010–11	p -value
Total episodes	4150	7599	
Specialist mental health assessment ^a			
Overall (median), %	57 (55)	57 (58)	0.43
Range (IQR), %	36–82 (44–71)	24–88 (45–70)	
Admission to medical ward			
Overall (median), %	44 (39)	55 (54)	<0.001
Range (IQR), %	20–83 (29–58)	22–85 (41–63)	
Specialist mental health follow-up (including admission) ^a			
Overall (median), %	54 (51)	39 (38)	<0.001
Range (IQR), %	35–82 (46–63)	17–67 (26–48)	
Psychiatric admission ^a			
Overall (median), %	10 (9)	8 (7)	<0.001
Range (IQR), %	3–24 (7–15)	0–21 (4–12)	
Total service scale score			
Overall score (all hospitals combined) (%)	375.5/651 (58)	442/651 (68)	<0.001
Mean score (median)	12.0 (11.5)	14.0 (14.5)	
Range (IQR)	7–20 (10–14)	10.5–19 (11.5–16)	

a Calculated from 30 hospitals (we did not have access to mental health data for one of the sites).

TABLE 37 Service scale scores for the 31 study hospitals: 2001–2 vs. 2010–11

Hospital	Total score (2001–2)	Total score (2010–11)	Change
1	11	17.5	6.5
2	11.5	13.5	2
3	11	13.5	2.5
4	15	10.5	-4.5
5	10	13.5	3.5
6	11	11	0
7	16	11	-5
8	14.5	15	0.5
9	13.5	11	-2.5
10	14	14.5	0.5
11	8.5	12	3.5
12	14	11.5	-2.5
13	10	17.5	7.5
14	7.5	16	8.5
15	15.5	18.5	3
16	12	17.5	5.5
17	11.5	15	3.5
19	8.5	11.5	3
20	8	13	5
21	17.5	18.5	1
22	13.5	15.5	2
23	8	14	6
24	7	11	4
25	10.5	16	5.5
26	11	16	5
27	15.5	19	3.5
28	20	13	-7
29	9.5	16	6.5
30	16	14.5	-1.5
31	10	14.5	4.5
32	14	10.5	-3.5
Total	375.5	442	66.5

For one hospital (no. 18) data were not available for both time periods.

TABLE 38 Total episodes of self-harm presenting to emergency departments at 31 hospitals in a 4-week period: 2001–2 vs. 2010–11

Episodes	2001–2	2010–11
Total no. of episodes, all hospitals	2075	2563
Median no. of episodes	67	75
Range (IQR)	32–134 (42–80)	30–173 (54–104)

compared the number of self-harm attendances (expressed as the number of attendances per 4-week period) in 2001–2 and 2010–11. Overall, there was a 24% increase in the total number of episodes and a 12% increase in the median number of episodes. In total, 25 out of 31 hospitals had a higher number of episodes in 2010–11 than in 2001–2.

There had been various changes relating to individual hospitals since the 2001–2 study period including hospital trust mergers. We anticipated that the self-reported number of beds in each hospital would give an approximate indication of capacity and catchment population. The number of beds increased by 21% overall, and 22 hospitals had a greater number of beds in 2010–11 than in 2001–2. In total, 18 of the 25 hospitals with an increased number of episodes also had an increased number of beds.

Discussion

Main findings in relation to objectives

We collected data on over 6400 individuals who had presented with self-harm to 32 sites across England in a 3-month period. The characteristics of our sample were broadly consistent with those in other hospital-based studies in the UK,¹ with the majority of episodes related to self-poisoning, and self-harm being more common in younger age groups and women. Alcohol was involved in over half of the episodes, and over half of the individuals had a previous history of self-harm. There was marked variability in service provision with a 3.5-fold difference between hospitals in the proportion of individuals who received a specialist assessment, a fourfold difference in medical admission and a fivefold difference in the proportion of individuals receiving specialist follow-up. Overall, 4 out of 10 individuals left hospital without having had an assessment with a mental health specialist.

We found little evidence that aspects of care were related to outcome in terms of repetition of self-harm in our aggregate analysis. Findings based on area-level analyses should not be used to necessarily infer individual-level associations (the ecological fallacy); however, aggregate-level associations are really the only means of evaluating services as a whole. It could be that higher levels of assessment and admission are partly markers of good-quality care. This may have the effect of increasing engagement and making individuals more likely to present to hospital when they self-harm. There was limited evidence from the individual-level analyses that psychosocial assessment might be associated with a 12% reduced risk of repetition but, again, these findings are based on observational data and should be interpreted cautiously. We attempted to adjust for individual characteristics at baseline but our findings could simply reflect unmeasured confounding factors. The possible protective effect of assessment is, however, consistent with results from previous studies.¹³⁶ In a post hoc analysis there was an interesting possible difference in the effect of assessment according to the main speciality of the assessor. However, these results should be interpreted cautiously as psychiatrists and nursing staff are likely to have assessed distinct groups of patients.

Considering changes over time, we found that the overall number of episodes of self-harm in the study centres increased by around one-quarter. However, our data suggested that this might partly reflect service consolidation rather than a true increase in incidence. Disappointingly, given clinical guidelines and policy emphasis, variations in service provision were as wide as 10 years previously. The proportion of individuals

receiving assessment from specialist services had remained static and the level of specialist follow-up had decreased, perhaps because of a greater involvement of voluntary organisations in services (nearly one-fifth of individuals received follow-up from non-statutory services in this study, but these data were not available for the earlier time period). The increased proportion of episodes resulting in admission may well have reflected the greater use of emergency department observation and assessment wards rather than an increase in acute admissions to general medical beds. This may partly have been driven by the policy emphasis on reduced waiting times in emergency departments.¹³⁷ A measure of service quality developed as part of the previous study did show an improvement in 23 of the 31 hospitals, with a 26% improvement in the median service quality score. The individual service items that showed an improvement in the greatest number of hospitals related to the availability of supervision, social services input and joint service planning meetings between mental health and acute care services as recommended by NICE guidelines.¹³

Permissions and data sharing

One major unanticipated challenge that we encountered was securing local research governance permissions. As this study involved acute and mental health services, this meant making a total of 62 separate applications for local approval (not 64 trusts as some participating mental health trusts provided services over multiple sites). Processes and the time to approval varied between organisations. Even when local approvals had been given, additional permissions were required in some instances (e.g. from IT departments). Because of the nature of the study, acute and mental health services needed to share data. Despite both services providing care to the same group of patients – those who had harmed themselves – data-sharing agreements, when required, were sometimes difficult (and in one case impossible) to achieve within the study period. Identifying local staff who could collect data was also a major challenge but was helped considerably by clinical studies officers (from local and topic-specific research networks).

Strengths and limitations

This was a large study of hospital attendances following self-harm using recent data at individual level and episode level from multiple sites randomly selected from across England. Different electronic systems in the study hospitals required individual methodologies to identify and capture data. However, the robustness of the data was affirmed at each study site by the individual data collectors, and pilot data collection was carried out in each centre.

Nevertheless, our findings should be interpreted in the context of a number of methodological limitations. We collected data on self-harm attendances to hospital only and did not record outcomes or repeat episodes that did not come to the medical attention of the participating hospitals. As a country-wide audit, the data sources were based on clinical records rather than in-depth interviews. If there was no information in the notes of an item of interest then this was coded as absent. As a consequence, some of our findings may underestimate the true prevalence of particular characteristics or associated factors.

Another potential weakness was that we did not collect data on aspects of care offered after discharge from hospital, such as a patient receiving an assessment by the mental health team in the community. In addition, the mental health follow-up variable described referral for such follow-up, but we were unable to determine whether or not patients actually attended.

Although data completeness was high overall and we were able to include 31 of the original 32 sites, there were some difficulties relating to individual hospitals. For example, in one acute trust, patients received mental health care from a variety of mental health providers, so mental health data were unavailable for a small proportion of presentations. Within another site, data-sharing agreements between acute and mental health trusts could not be achieved, which again resulted in missing mental health data.

Implications for future research

One of the main difficulties that we encountered in this study was securing local permissions. Future multicentre work that is national in scope would benefit from a simplified system of centralised approval. Our understanding is that the NHS Health Research Authority (www.hra.nhs.uk/) is currently considering how this

might be achieved. Our study demonstrates the invaluable contribution that clinical studies officers can make to the conduct of research when appropriate access permissions have been granted. Future work on this scale would not be possible without such posts.

Research in this area should continue to monitor the variability of self-harm services. In this study we found a discrepancy between process measures (e.g. proportion of people receiving psychosocial assessments), which did not improve, and quality scores, which did. An area of future research might be to determine what aspects of quality are important determinants of outcome and how they should be measured. The impact of management on outcomes is an important but methodologically challenging area. We need to understand which aspects of treatment are beneficial in routine practice and why. We also need to understand in which groups of individuals treatments might have the most impact. The role of psychosocial assessment warrants particular attention.¹³⁶ Randomised trials of national service-level interventions are not always possible or practical, and alternative observational designs (e.g. pre–post studies¹³⁸) may be worthwhile.

Conclusion

Our study suggests that national guidelines and policy initiatives have had little impact on the variability of self-harm service provision. Around 60% of individuals can expect a psychosocial assessment when they attend hospital following an episode of self-harm, and this proportion has remained static over the last decade or so. There is some evidence to suggest that the overall quality score of self-harm services has improved, although this is inconsistent with process measures, and the effect of the quality score on outcomes is unclear. It is possible that the quality scores did not capture true markers of high-quality care or had an inherent response bias as they were based on self-report by providers. New NICE guidelines on the longer-term management of self-harm were published in November 2011¹³⁹ and included an additional focus on implementation. The guidelines will also inform quality standards for self-harm (www.nice.org.uk/aboutnice/qualitystandards/qualitystandards.jsp), which will be markers of high-quality care and may contribute to the commissioning and monitoring of self-harm services. The question of whether or not new guidance and future policies have a positive effect on the quality of services and patient outcomes will need careful evaluation.

Chapter 7 A pilot randomised controlled trial of an information and contact-based intervention to reduce repeat self-harm

Abstract

Brief interventions of telephone or postal contact following self-harm have shown some promise in reducing the incidence of repeat self-harm, but research findings have been equivocal and mechanisms of action uncertain. In this study we aimed to develop a contact-based intervention and test its feasibility in a randomised controlled trial. We used qualitative methods to develop an intervention that consisted of an information leaflet listing local sources of help, two telephone calls soon after presentation to an emergency department and a series of letters expressing concern sent over a 12-month period. We carried out a pilot randomised controlled trial of the intervention compared with usual treatment in two hospitals in Manchester, using a parallel-group design. Potential participants included patients aged > 18 years and living in Manchester attending the study hospitals following self-harm. Overall, 30% of eligible individuals could not be contacted and a further 28% did not consent to take part; 66 patients were eventually randomised (with 33 patients in each group). The 12-month repeat rate for individuals in the intervention group was 34% (95% CI 20% to 52%) and the rate for the usual treatment group was 12.5% (95% CI 4% to 29%). The total number of repeat episodes of self-harm was higher in the intervention group than in the usual treatment group (41 vs. 7). This pilot trial proved challenging to carry out but showed that the methodology was feasible. Our findings on the repetition of self-harm may partly reflect an unequal distribution of baseline risk factors between groups. However, we cannot rule out the possibility that the intervention was associated with a true increase in the risk of repetition. Future studies of these apparently simple contact interventions need to be alert to this possibility and should aim to identify the active components of therapeutic contact with a view to refining existing interventions or developing new ones.

Background

The evidence base for effective interventions to reduce repetition following an episode of self-harm is limited. The recent NICE guidelines¹³⁹ suggested that three to 12 sessions of brief psychological intervention might reduce the risk of repetition following self-harm. The effectiveness of low-cost universal interventions such as telephone contact or sending postcards expressing concern following an episode of self-poisoning was also reviewed. The guidelines concluded that there was insufficient evidence of clinical benefit for these low-cost universal interventions, but further research in this area was recommended. In an early study by Motto and Bostrom²⁴ (discussed in the next chapter), provision of letters to patients previously admitted to psychiatric hospitals was associated with a lower risk of suicide in the first 2 years of the study (the proportion of individuals dying by suicide was <2% in the contact group compared with >3% in the no contact group; $p=0.043$), although the effect diminished over the 15-year follow-up period.

A variant of this intervention was used in a more recent Australian trial of individuals who had intentionally poisoned themselves.^{140,141} Participants were randomised to receive either a series of postcards over 12 months (in addition to usual treatment) or usual treatment alone. The postcards included a simple message of concern. The proportion of individuals repeating self-poisoning and presenting to hospital was no different between the two groups (intervention 15%, 95% CI 11.5% to 18.7%, vs. control 17%, 95% CI 13.5% to 21.0%) but the number of repetitions in the intervention group was half that in the usual treatment group [101 vs. 192, incidence risk ratio (IRR) 0.55, 95% CI 0.35 to 0.87]. These treatment effects were maintained at the 2-year follow-up. However, the between-group difference in the number of

repetitions was largely accounted for by a small number of women in the control group ($n = 18$, <3% of the sample) who had three or more repeat episodes of self-harm during the follow-up period. A replication of this study in New Zealand found that, after adjustment for previous self-harm, there were no significant differences between the control and intervention groups in the proportion of participants re-presenting with self-harm or in the total number of re-presentations for self-harm.¹⁴² A modified version of the intervention (which included greeting cards with pictures rather than just text, and offers in several of the cards to contact the treating toxicologist) was tested in a large sample of patients admitted with self-poisoning at a hospital in Iran.¹⁴³ The study found a reduction in number of suicide attempts in the intervention group (relative risk reduction 0.42, 95% CI 0.11 to 0.63) but the treatment context (low levels of mental health care) and overall low incidence of repetition in both the treatment and control groups determined from follow-up interviews (3.0% for the intervention group and 5.1% for the control group) compared with those in Western countries (median repeat rate for hospital-treated episodes 16%)¹⁴⁴ mean that it may not be possible to generalise the findings internationally.

A different approach to the use of postcards is the provision of emergency or crisis cards that encourage help-seeking or which offer enhanced access to services. The findings of studies using these methods have also been variable. A British study that examined the effect of emergency cards found that the proportion of individuals repeating self-harm was slightly higher in the intervention group than in the control group (OR 1.20, 95% CI 0.82 to 1.75).¹⁴⁵ However, a subgroup analysis found that, in those without a previous history of self-harm, the intervention was associated with a reduced risk of repetition at 6 months (8% for the intervention vs. 12% for usual treatment; OR 0.64, 95% CI 0.34 to 1.22), although statistical evidence for an effect was weak, whereas, for those with a past history, provision of the card appeared to be associated with an almost doubling in the risk of repetition (27% vs. 16.5%; OR 1.85, 95% CI 1.14 to 3.03). A French study of individuals who had poisoned themselves used telephone contact as an alternative to mail.¹⁴⁶ Participants received telephone contact at 1 month, telephone contact at 3 months or no telephone contact, with experienced psychiatrists (who had not previously met the participants) making the calls. There were few differences in outcomes between the groups in an intention-to-treat analysis.

Combination approaches have also been tried. A recent World Health Organization-sponsored trial in eight hospitals in Brazil, India, Sri Lanka, Iran and China randomised individuals who had made suicide attempts to either 'brief intervention and contact' or treatment as usual.¹⁴⁷ The intervention involved provision of a structured 1-hour information session. After discharge, clinicians made nine follow-up contacts over 18 months either by telephone or in person. Referrals to other agencies and services were arranged as appropriate. Although the overall number of deaths was small, the proportion of individuals who died by suicide was lower in the intervention group than in the control group (0.2% vs. 2.2%, $p < 0.001$). However, methodological issues (e.g. concerning sources of mortality data) mean that the findings of this study need to be interpreted cautiously. When repeat non-fatal suicide attempts in the 18 months following the index attempt were compared, the researchers found little difference between the intervention and treatment-as-usual groups.¹⁴⁸

Simple contact-type interventions may hold some promise in the care of individuals who have harmed themselves, but their effectiveness and potential mechanisms of action remain unclear. Authors have suggested that they enhance 'social connectedness' – a sense of being joined to something meaningful outside oneself that acts as a stabilising emotional influence.²⁴ Alternatively, these interventions might facilitate access to existing health services. This chapter describes two studies: in the first study we used qualitative research methods to help develop and refine a brief contact intervention aimed at reducing repeat self-harm; in the second study we went on to pilot the use of this contact intervention in a small randomised trial.

STUDY 1: DEVELOPING A CONTACT-BASED INTERVENTION FOR SELF-HARM

Objectives

We aimed to gain an understanding of the underlying psychological mechanisms and content of interventions that might be of benefit or detriment to patients in preventing repetition of self-harm. We wanted to further understand the pragmatic barriers to the implementation of various forms of follow-up contact care following hospitalisation from an episode of self-harm by bringing in the perspectives of staff working on the 'front line'.

Methods

The study was presented to the Bolton Research Ethics Committee, north-west England, who ruled that ethical approval was not required under NHS research governance arrangements as this was a service development study (08/H1009/32).

Using qualitative methodology, we investigated service user and staff experiences of, and attitudes towards, different types of intervention. Both staff and service users consented to the use of verbatim quotations.

Service user interviews

Service users who had recently attended the emergency departments of three hospitals in a city in the north-west of England following self-harm were given information packs inviting them to participate in the study. 'Non-fatal self-harm' was defined as intentional self-poisoning or self-injury, irrespective of motivation.²⁵ We employed purposive sampling¹⁴⁹ for service user interviews to select male and female adult patients of varying age and self-harm history and directed the distribution of information packs accordingly. People fulfilling these criteria were likely to have different needs and preferences regarding support following a self-harm episode. Semistructured interviews were conducted using a topic guide (see *Appendix 7*) with prompts that allowed the researcher flexibility to follow up issues that emerged. During the interviews, the researcher introduced different contact-based interventions and asked the participant to comment on them.

Staff focus group

A purposive sample of key informants from clinical staff in three relevant service areas (emergency department, liaison psychiatry and primary care) and workers from the voluntary sector were recruited. A focus group was conducted with most of the staff participants ($n=8$) using a topic guide (see *Appendix 8*). The focus group was introduced as an open discussion with the aim of informing the development of a pilot intervention for people who had self-harmed. Additional individual interviews were conducted for those unable to attend the focus group, and their contributions within the thematic coding frame identified from the group discussion analysis were included in the results.

Data analysis

We conducted thematic analyses¹⁵⁰ of the transcribed interviews with service users (mean time of service user interview was 57 minutes) and staff and the focus group discussion (70 minutes' duration). Analytical themes were identified to summarise the data and were coded using computer-assisted qualitative data analysis software (NVivo version 7; QSR International, Southport, UK), to facilitate comparison and develop descriptive accounts. Quotations were selected to illustrate particular themes.

Researcher orientations

The main investigator (JC) conducted all of the interviews and facilitated the focus group. She is a trained psychiatric nurse, with experience of working with those who self-harm. The other investigators included an academic psychiatrist (NK), an experienced qualitative methodologist (JD) and a doctoral student in

qualitative methodology (CH). Two researchers (including the main investigator) (JC, CH) analysed the interview transcripts, with another blind coding the initial interviews (AOS). We acknowledge that our professional backgrounds may have influenced the themes derived from the data, although effort was made through the methods of constant comparison and discussion within the research group to keep our themes grounded in the data.

Results

Participants

Of the 17 service users who expressed interest in the study, 11 (SU1–SU11; six females, five males), aged 18–53 years, participated. The predominant method of harm was self-poisoning (10/11), although four of the participants described mixed methods.

Of 16 clinical staff from relevant service areas (emergency department, liaison psychiatry, primary care and the voluntary sector) invited to participate, eight (SP1–SP8) agreed to take part in the focus group and two (SP9, SP10) in individual staff interviews.

Thematic analysis

A number of themes emerged from the data (*Table 39* provides illustrative quotations). These included the need for support and encouragement and for some form of intervention shortly after hospital attendance for self-harm. Staff agreed that the immediate period after discharge was a vulnerable time, and both service users and staff expressed a need for contact to be proactive, as service users might find it difficult to initiate obtaining help.

An important aspect of care mentioned by both groups was the 'genuineness of the service', although there was a subtle difference in interpretation. Staff were more concerned with the style of the service, whereas service users were more concerned with the manner of the clinicians' responses. Staff felt that, for the intervention to be worthwhile and perceived as genuine, it should be integrated into current services, and there should be some consistency of staff delivering the intervention.

Potential mechanisms emerged from the transcripts that provided insight into how a contact-based intervention might be of benefit. Letters expressing concern were perceived as a gesture of caring that was ultimately reassuring for the recipient as he or she experienced being looked after ('contained'). For some, this would prevent further self-harm, as contact with other people would counter against loneliness and fear of abandonment, and acknowledging their pain might reduce their sense of isolation or suffering alone.

Promoting engagement with services by providing people with relevant support information was viewed by staff as an important function, particularly for those who did not engage with statutory treatment. Raising awareness of other options was a particular benefit highlighted by the service users.

Practical issues and problems relating to the proposed interventions included a preference by service users for a mode of contact that was immediate (at least initially), perhaps by telephone; however, it was stated that letters might be acceptable later. The letters were viewed as potentially counteracting feelings of loneliness, and the proposed wording was considered caring, although there was no consensus on the preferred frequency of contact. There was agreement between service users and staff that the intervention should be delivered by mental health specialists, as they had the necessary skills and experience of dealing with people in crisis; however, they suggested that the impact on the staff of dealing with these situations should be considered. Issues of privacy, confidentiality and access were raised in the context of using the internet as a means of communication, similar to concerns relating to text messaging in the Bristol-led pilot study (see *Chapter 8*). As in the Bristol study, letters and the telephone were seen as the preferred mode of contact, although illiteracy, no fixed address, not having a telephone and not having any telephone credit were raised as potential barriers to a contact-based intervention.

TABLE 39 Main themes emerging in the development of the pilot study of a contact-based intervention

Theme	Illustrative quotations
Support and encouragement	<p>'Just give me some more encouragement not to do stupid things, instead of being kicked out the front door and thinking what you're going to do yourself, if you got a bit more encouragement then it helps you along' (SU8)</p> <p>'I like the idea of somebody following them up (...) the fact that there's somebody else also looking into it to make sure that there's a safety net in place' (SP10)</p>
Time of greatest need is directly after discharge	'because there's that window when they're more likely to self-harm, and from my experience, that impulsivity is sort of greatest in the 24 hours after [discharge from A&E]' (SP4)
Gesture of caring	'Well, it [letters] just gives you ... you think someone's caring for you – someone's doing something for you and thinking of you' (SU8)
Genuine in delivery	<p>'I think it has to be given out with, sort of, sincerity and meaning ... You want them to feel that this is a genuine support service' (SP9)</p> <p>'If the person on the other end of the phone wasn't bothered because it's half past four in the morning, she's just waiting to get off the phone or something, you can just tell in her voice' (SU8)</p>
Mode of delivery	<p>'I just think it's quicker and easier on the phone' (SU10)</p> <p>'the phone calls would have helped initially in the first few weeks but letters might also help, ... at a later stage' (SU1)</p>
Mitigates against loneliness	'that would be good if you could read [in the letters]: "I missed you today I hope everything is OK", that's reassuring, someone gives a shit. That's what it boils down to – I'm alone and isolated' (SU1)
Integrated into current services	'if they say "no, things aren't right" ... you can't just say "oh sorry to hear that", you then have to get them a service, so then services have to be able to respond' (SP6)
Promoting engagement with services (signposting)	<p>'they struggle to, you know, initiate any contact with the GPs or anything themselves, so there has to be that element of chasing them, I think' (SP4)</p> <p>'extending that to people, you know, even if you don't feel able to make this call, there are other services available to you and listing out some generalised services with some details' (SP2)</p> <p>'for me the more you're aware what's out there the more choices you've got' (SU1)</p>
Delivery by mental health specialists	<p>'It would be better if they were trained in mental health problems, because they have more understanding then' (SU7)</p> <p>'it's very difficult to answer telephone calls to people in crisis when you've never met them before, and I think you've just got to bear that in mind when you're trying to set up a service' (SP5)</p>

Strengths and limitations

As with many qualitative studies, the small sample size limits the generalisability of the findings and our results need therefore to be interpreted with caution.¹⁵¹ Those who self-harm are a difficult group to engage in research,^{152,153} and it may be that the views presented here differ from those of potential participants who did not respond to the invitation to participate in the study.

Informing the design of the proposed intervention

Preferences around timing, content, duration, method and delivery of contact were highlighted in the service user accounts. We identified some of the aspects of contact interventions that people valued, in particular the need for encouragement and support soon after discharge. Telephone calls were mentioned as providing immediacy of contact and a means of proactively engaging the service users. Service users also expressed positive views of simple messages of concern delivered by post. They considered that any contact provided should be genuine and caring, with, for example, letters being worded appropriately. Awareness of other service options was also considered useful.

The findings suggested that an appropriate design for an intervention might be the provision of an information leaflet, telephone calls (soon after discharge) and then letters (offering continuity of contact). In the next phase of the work we piloted an intervention informed by these findings.

STUDY 2: PILOTING A CONTACT-BASED INTERVENTION FOR SELF-HARM

Objectives

1. To investigate the utility and feasibility of aspects of our methodology for a contact-based intervention for preventing repetition of self-harm (particularly recruitment and randomisation).
2. To assess the acceptability of the contact-based intervention to patients, and to further refine the intervention in response to feedback.
3. To determine the proportion of patients with at least one repeat episode of self-harm in 12 months, and the number of repeat episodes of self-harm over 12 months in both the intervention group and the control group.

Methods

Design

The design for this pilot study was a parallel-group randomised controlled trial. Individuals were randomised to the intervention and treatment as usual or to treatment as usual alone.

Inclusion criteria

Potentially eligible participants were adults aged > 18 years who presented to the emergency departments of two study hospitals with self-harm during a 6-month period and were resident in Manchester. 'Self-harm' was defined as 'an act of intentional self-injury or poisoning irrespective of the apparent purpose of the act'. This included acts of self-harm regardless of the associated degree of suicidal intent or medical seriousness.

Exclusion criteria

The following groups of patients were excluded from the study: psychiatric inpatients, patients with a general hospital admission of >7 days, those of no fixed abode or with no telephone access and those unable to give informed consent during the first telephone call. Patients who were not able to understand English were also excluded from the study as the intervention involved telephone calls and would not be suitable for this group.

Sample size

We aimed to achieve a maximum of 50 patients in each of the intervention and usual treatment groups. This was a pilot study designed to inform a larger multicentre trial and provide preliminary data that would enable a more precise calculation of sample size in a main trial. We estimated that recruitment would be required for a minimum of 3 months.

Recruitment and consent procedure

Once clinicians working in the clinical teams at the two hospitals had ascertained patients' eligibility, patients were sent by post an invitation letter, an information sheet about the study and a copy of the consent sheet. Patients were contacted by a clinical researcher by telephone at least 3 working days later, who then invited them to take part in the study and audio recorded their verbal consent. Contact details available on hospital medical records systems were verified with the patients' GPs if required. The patients' GPs and/or care co-ordinators were contacted with the consents to inform them of their patients' participation in the study. Those patients randomised to the intervention arm were sent an advice leaflet (see *Appendix 9*) and a

notification of change of address form. Participants in both groups were advised that their routine treatment would not be affected by their participation in the study.

Randomisation procedures

The randomisation process was conducted by a remote internet-based randomisation service (www.sealedenvelope.com). The allocation sequence used a computer random number generator to select randomised permuted blocks with randomly varying block sizes. Separate allocation sequences were generated for each of the two collaborating hospitals/centres, and patients had an equal probability of assignment to each group. Patients were then informed of their allocation status. An e-mail confirmation of the identification number, the allocated treatment and the date and time of randomisation was sent to the clinical researcher. The randomisation list was kept separately from the collection of outcomes.

Blinding

Because of the nature of the intervention, all patients were unblinded and fully aware of their allocation to the intervention group or the control group. A researcher who was also unblinded administered the intervention, including the initial telephone call and the mailing of the letters. However, a researcher blind to allocation status collected outcome data using self-harm databases.

Intervention

Patients in the intervention group received an information leaflet (see *Appendix 9*) listing local sources of help, two telephone calls and then a series of letters. The leaflet provided information on national and local sources of help and was reviewed by the local service provider (Manchester Mental Health and Social Care Trust). It was posted to participants as soon as possible after consent, and another copy was included in the first letter. The telephone calls were made by clinical researchers using a semistructured format. The purpose of the telephone calls was to make contact and facilitate access to appropriate treatment. The first telephone call was attempted at least 3 days after the invitation letter was sent. The second telephone call was made a week later. The letters were sent to the participants over a 12-month period (schedule: 1, 2, 4, 6, 8 and 12 months), which is similar to the methodology used in other studies. The format of the letters followed a standard pattern and included a general statement of concern (see *Appendix 10* for an example of a typical letter), but they were modified when indicated to personalise them in response to individual circumstances (e.g. 'we are sorry to hear that you have been in hospital recently'). The first letter included further details of how to opt out of the study and a request that participants notify us of any change of address.

Usual treatment

Both the intervention and control groups received usual treatment, which was similar at the two participating sites. A mental health liaison nursing team was in operation 7 days a week between 0900 and 2100, with out-of-hours care provided by the duty psychiatrist. One-quarter of patients in the centres are referred for mental health follow-up after a specialist assessment, with one-fifth referred to social services or to the voluntary sector.¹³⁵

Study outcomes

We assessed the proportion of patients who accepted the invitation to join the study and gave informed consent. We recorded the proportion of patients with at least one repeat episode of self-harm resulting in attendance at a study hospital within 12 months, identified from hospital information systems. In addition, we noted the number of repeat episodes during the same time period. For all participants we also investigated use of health services to pilot collection of such data for the future economic evaluation of a full trial. Repetition and resource use data were obtained from routine information systems and hospital databases. In addition, patients receiving the intervention were asked in their final letter if they could be approached for their views on the intervention, and a stamped addressed envelope was enclosed for their reply. Within this self-selected group of patients who responded, qualitative interviews (see topic guide in *Appendix 11*) were conducted after the study period ended to assess the acceptability of the intervention and to help refine it.

Statistical analysis plan

In accordance with the CONSORT (Consolidated Standards of Reporting Trials) principles,¹⁵⁴ we have reported all participant flow in the pilot study. All primary analysis was based on intention to treat. Because this was a feasibility study and was not powered to test for a difference between the intervention and usual treatment groups, our analyses were primarily descriptive in nature. We examined the incidence of any repeat self-harm as well as the number of repeat episodes.

Data analysis for the follow-up qualitative interviews

Data analysis for the qualitative interviews (see topic guide in *Appendix 11*) used methods of constant comparison with repeated scrutinising of transcripts to determine the themes emerging from the data.

Ethical approval

The study was ethically approved by Greater Manchester West North West 9 Research Ethics Committee and the International Standard Randomised Controlled Trial Number is ISRCTN65171515.

Results

Recruitment statistics

In total, there were 250 adult patients resident in the Manchester area who presented to the two study hospitals from 1 November 2010 to 17 May 2011 and who were identified as having harmed themselves. *Figure 15* summarises the recruitment of participants to the study.

Comparison of study participants with eligible non-participants

Four clinical researchers recruited 66 participants from two emergency departments (hospitals A and B) during the study period. The median time between presentation to the emergency department and the information pack being sent was 2 days (IQR 1–6.25 days, range 0–64 days) and between presentation to the emergency department and recruitment to the study was 20 days (IQR 14–29 days, range 5–89 days).

When we compared study participants ($n=66$) and eligible non-participants (i.e. those who we were unable to contact and those who declined, $n=84$), we found that the two groups were similar in terms of sex (consented participants: males 34.8%, females 65.2%; eligible non-participants: males 42.9%, females 57.1%; $\chi^2=0.993$, $p=0.40$) and age [consented participants: mean (SD) age 33.3 (10.2) years; eligible non-participants: mean (SD) age 35.9 (13.4) years].

Comparisons between the intervention group and the treatment as usual group

The two groups were similar with respect to sociodemographic characteristics (*Table 40*). However, participants in the intervention group were slightly more likely to be white, be unemployed, use methods other than poisoning to self-harm and have a past history of psychiatric treatment or previous self-harm; however, none of these differences reached a conventional level of statistical significance.

Repetition of self-harm within 12 months

The repeat rate for individuals in the intervention group was 34% (95% CI 20% to 52%) whereas the repeat rate for individuals in the usual treatment group was 12.5% (95% CI 4% to 29%). The total number of episodes of repeat self-harm was also higher in the intervention group than in the usual treatment group (41 vs. 7). These differences were statistically significant when tested using logistic regression and negative binomial regression models respectively. The distribution of repeat self-harm episodes in any sample is highly skewed with a small number of individuals accounting for a large number of repeats.¹ In this study, in the analysis of number of self-harm episodes, there was one extreme outlier in the intervention group who alone accounted for nearly half of the total number of repeat episodes. Excluding this individual, the total number of repeat self-harm episodes was 21 compared with 7 (IRR=3.0, 95% CI 0.84 to 10.68).

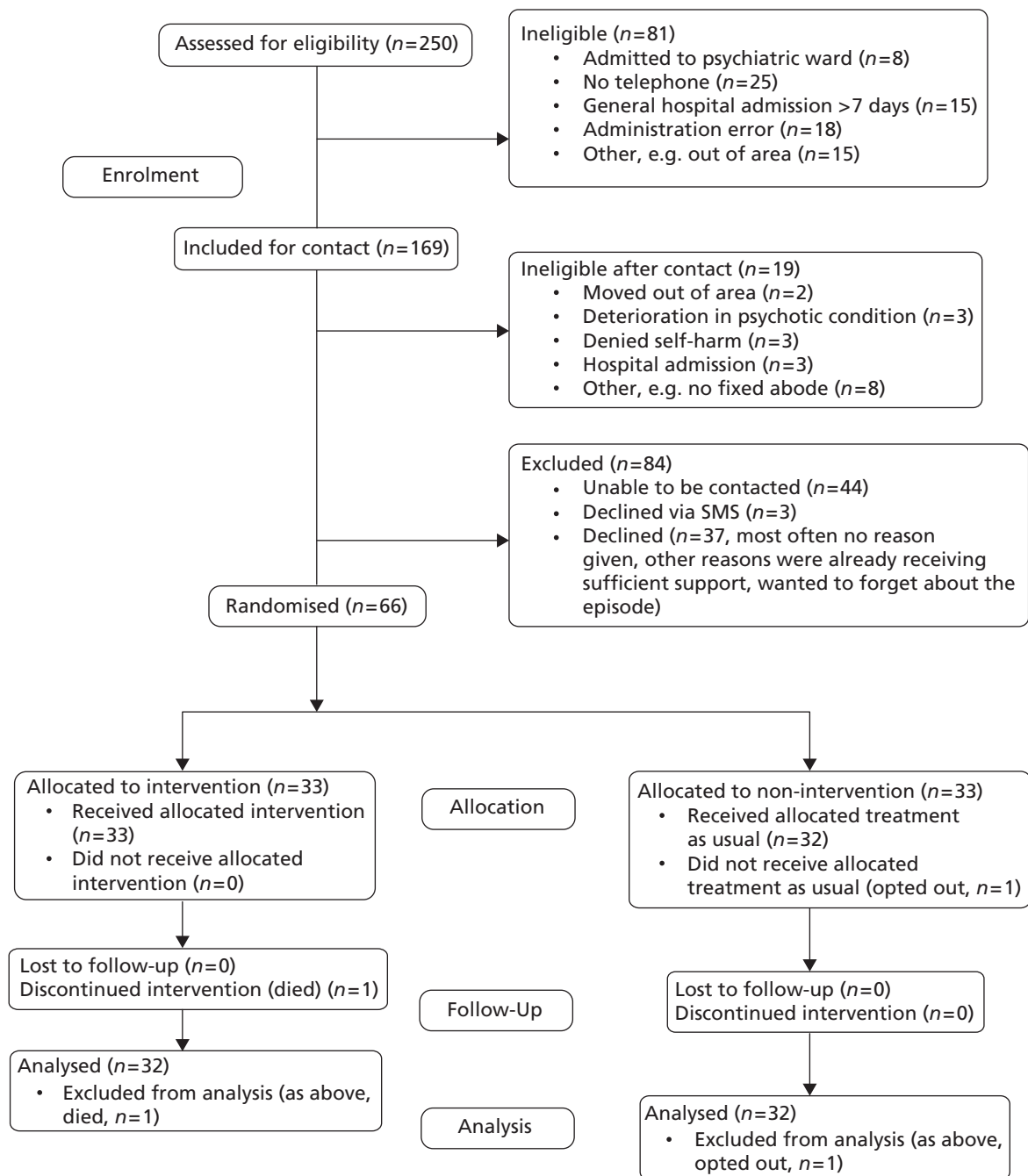


FIGURE 15 Flow chart of recruitment to the study. Reproduced with permission from the *British Journal of Psychiatry* (URL: <http://bjp.rcpsych.org/content/203/1/73/suppl/DC1>).

In analyses adjusting for baseline clinical factors (*Table 41*), the OR for repetition and the IRR for number of repeat episodes remained elevated; however, in the case of the OR, this was no longer statistically significant.

One person in the intervention group died following a drug overdose but was not included in the repeat self-harm group in the main analyses, as they did not re-present to the study hospitals with self-harm during the study period. As they had incomplete follow-up they were excluded from the main analyses (see *Figure 15*). Including this person in the repeat group increased the OR and IRR slightly (adjusted OR 4.97, 95% CI 1.10 to 22.50, $p=0.037$; adjusted IRR 7.34, 95% CI 1.61 to 33.45, $p=0.01$).

TABLE 40 Baseline characteristics and comparisons between the intervention group (*n*=33) and the treatment as usual group (*n*=32)

Characteristic	Intervention group, <i>n</i> (%)	Treatment as usual group, <i>n</i> (%)
Sex (<i>n</i> =65)		
Female	22 (66.7)	20 (62.5)
Male	11 (33.3)	12 (37.5)
Age (years) (<i>n</i> =65)		
< 35	19 (57.6)	17 (53.1)
≥ 35	14 (42.4)	15 (46.9)
Ethnicity (<i>n</i> =40)		
White	19 (100.0)	19 (90.5)
Non-white	0 (0.0)	2 (9.5)
Marital status (<i>n</i> =60)		
Married/partner	6 (20.7)	7 (22.6)
Not married	23 (79.3)	24 (77.4)
Employment status (<i>n</i> =58)		
Not employed/registered sick	20 (69.0)	17 (58.6)
All others (employed, student, houseperson/carer)	9 (31.0)	12 (41.4)
Main method of self-harm (<i>n</i> =63)		
Self-poisoning (drugs/other)	24 (77.4)	29 (90.6)
All other methods	7 (22.6)	3 (9.4)
Psychiatric treatment		
Current psychiatric treatment	14/32 (43.8)	14/33 (42.4)
Previous psychiatric treatment	21/33 (63.6)	17/32 (53.1)
Previous self-harm	22/33 (66.7)	17/32 (53.1)

The death was reported to the study sponsor, the ethics committee and the research and development department of the NHS trust. The research team was given access to medical records and the hospital's own serious untoward incident investigation and spoke to the consultant psychiatrist providing care for the patient. There was no indication that the study procedures resulted in the death.

Intervention telephone calls

Most of the telephone calls by clinical researchers to the participants in the intervention arm of the trial (29/33) were rated as 'good' in terms of engagement with the patient.

The first intervention call in most cases focused on identifying and reinforcing available support and encouraging self-support, for example discussing triggers to self-harm, anticipating problems and related coping mechanisms and helpful activities, and discussing support that had been useful in the past. The clinical researcher would often signpost relevant support services listed in the information leaflet. Some patients expressed that they were receiving adequate support and were already aware of the information provided in the leaflet; others thought that they might use the information on the leaflet in the future if they needed help. Some participants found the telephone call supportive whereas others thought the face-to-face contact that they were already receiving from mental health staff was adequate.

TABLE 41 Twelve-month self-harm outcomes by randomised group

	Intervention group (n=32)	Usual treatment group (n=32)	OR	IRR	95% CI	p-value	Adjusted OR ^a	Adjusted IRR ^a	95% CI	p-value
No. repeating (%; 95% CI)	11 (34, 20 to 52)	4 (12.5, 4 to 29)	3.67	-	1.0 to 13.1	0.05	4.35	-	0.9 to 19.8	0.06
No. of repeat episodes (median, IQR)	41 (0, 0-1)	7 (0, 0-0)	-	5.86	1.4 to 24.7	0.02	-	7.16	1.6 to 32.8	0.01

^a Adjusted for age, sex, centre, employment status, method of harm, previous self-harm and previous psychiatric treatment.

The second telephone call focused on encouraging engagement with treatment (attending appointments, following up missed appointments, etc.), sometimes clarifying referral status from medical records (in one case because the patient felt unwell at the time of assessment and was unable to assimilate information, and in another case because the mental health worker called at the wrong address and subsequently closed the case as a 'did not attend').

Resource use

From hospital records and databases we collected resource use data retrospectively for both the intervention group and the treatment as usual group, from the index episode date to 12 months following the recruitment date. We assessed the feasibility of accessing records and extracting these data, and described the health service activity in both groups. From the emergency department records we recorded the number and types of presentations and disposal from the emergency department (estimated time taken to retrieve information = 5 minutes per individual record). From the mental health records we recorded the number of face-to-face contacts with each patient and the discipline of the person contacting (approximately 10 minutes per individual record). These data are summarised in *Table 42*. It was interesting to note that, despite a higher number of repeat episodes of self-harm in the intervention group, the overall number of emergency department presentations in the two groups was similar. The non-self-harm presentations in the usual treatment group resulted from a variety of physical complaints as well as specific mental health problems. The intervention group had a greater number of contacts with specialist mental health services [median (IQR) = 2 (0–9) vs. 0 (0–2), $p = 0.053$].

Evaluation of the intervention by participants

In the final letter (at 12 months after recruitment), participants receiving the intervention were invited to contact the research team to provide their opinion of the intervention and to suggest ways that it could be improved. Out of 33 participants, four responded (all male) but only three were interviewed as one respondent was unable to be contacted subsequently by telephone or letter. Of the three respondents, one repeated self-harm on multiple occasions, one repeated on two occasions and one did not repeat. Five themes emerged from these interviews (see *Appendix 12* for illustrations of themes): (1) support received from other services, which was valued but, in the case of a participant receiving care from the voluntary sector only, not always enough; (2) participant needs were too great and the intervention did not meet, or was irrelevant to, needs; (3) useful for signposting/promoting help-seeking behaviour (telephone contact); (4) effects of letters/telephone contact (mitigates against loneliness, calming, prevents further self-harm and provides extra support); and (5) practical issues around the design of the intervention (easy to read, good intervals between letters, wanted letters to continue for a longer time in some cases).

TABLE 42 Twelve-month resource use by randomised group

Resource use	Intervention group (n=32)	Usual treatment group (n=32)	Mann-Whitney U	Chi-square	p-value
Emergency department attendances, median (IQR)	1 (0–3)	1 (0–2)	– 0.65		0.52
Medical inpatient days, median (IQR) ^a	0 (0–1)	0 (0–1)	0.07		0.98
Face-to-face contacts with mental health services, median (IQR)	2 (0–9)	0 (0–2)	– 1.94		0.05
Admitted to a psychiatric bed, n (%)	1 (3.1)	2 (6.3)		0.35	0.55

^a Available for one hospital only.

Discussion

Feasibility

Overall, our proposed methodology proved feasible. Approximately 60% of those who were screened were found to be eligible for participation in the trial. Of those who were eligible, 30% could not be contacted and just over one-quarter (28%) declined. This refusal rate was very similar to refusal rates in previous studies in Western health-care settings^{140,142,146} but higher than that in an Iranian study.¹⁴³ Only one individual dropped out of the trial.

The process of online randomisation worked well and permitted real-time allocation of intervention status during the recruitment telephone call. The trial database allowed efficient tracking of participants and the scheduling and mailing of letters was not associated with any difficulties. There were no adverse incidents associated with trial processes, for example we recorded no instances of letters being sent to incorrect addresses or therapeutic telephone calls to individuals who were not the participants. Comparatively novel aspects of our methodology such as digital recording of consent and opting opt out by SMS were feasible. We restricted ourselves to basic resource use data within secondary care as these resources make up the majority of the costs of self-harm,¹⁵⁵ and such data were relatively straightforward to collect.

Recruitment to the study was more challenging than we had anticipated. This may have been in part because we restricted ourselves to adult patients resident in Manchester (who on the basis of previous data make up approximately 60–70% of presentations to the study hospitals¹³⁵). We did this because of differences in service provision for young people in the study centres, because of lack of evidence of efficacy of contact-type interventions in this group and because the information leaflet contained contact details for Manchester-specific services and helping agencies. Including individuals from a wider catchment area would have necessitated a number of different leaflets and would have added to the complexity of this pilot trial.

Contact information obtained from emergency departments was not always valid. Accessing mental health and GP medical records, when required, improved the accuracy of this information. The recruitment pathway involved multiple staff members involved in a multistage recruitment process. Clinical staff entered names of potentially eligible participants into the database. Designated members of the team screened participants for eligibility and then sent out recruitment packs. If individuals did not opt out they were contacted by one of four clinical researchers. The process from entry by clinicians to determine eligibility to the sending out of information packs created delays in recruitment.

Acceptability

Just over one-quarter of individuals who were eligible for the study refused to take part, but there was only one dropout from the study. Data from the post-intervention telephone interviews were limited but seemed to suggest that individuals found the intervention acceptable and helpful to some extent.

Differences in outcome between groups

We found that a higher proportion of individuals repeated self-harm in the intervention group than in the usual treatment group (33% vs. 13%). We also found that there was a higher number of repeat episodes in the intervention group than in the usual treatment group (41 vs. 7) and this reached conventional levels of statistical significance ($p < 0.05$). This difference was less marked when one potential outlier was excluded (21 vs. 7). We found an increased number of contacts from specialist mental health staff in the intervention group after recruitment to the trial compared with the treatment as usual group, but interestingly there was no difference in emergency department contacts. In addition, there was one death in the intervention group from an overdose of drugs. Baseline markers of increased risk (previous self-harm, psychiatric history, method of harm other than self-poisoning) appeared to be more common in the intervention group than in the usual treatment group. However, the differences between the groups persisted when we carried out a limited adjustment for these confounders.

Limitations

Our findings need to be interpreted in the context of the methodological limitations of the study. It was a small pilot study in just two centres and we were able to randomise just under half of the eligible participants. Although participants and non-participants were similar in terms of age and sex, it is possible that the two groups differed on other important variables, which could have meant that those included in our study were not typical of others who had harmed themselves. We included only adults resident in Manchester, an area with high rates of deprivation, self-harm and suicide, factors that could feasibly have limited the impact of the intervention. There may also have been problems with our main outcome measure as we considered only repeat self-harm behaviour that presented to the study hospitals. We did not record self-reported or community episodes of self-harm nor consider wider treatment outcomes¹⁵⁶ because this would have been beyond the scope of the project. The lower than expected number of participants in the post-intervention interview also meant that we were unable to draw meaningful conclusions from this part of the study.

Implications for future work

In this trial, baseline risk factors appeared to be somewhat unequally distributed between the groups. We do not think this represented a problem with our randomisation (which was carried out using a commercially available online package), but rather was more likely to be a chance occurrence made more likely by our small sample size. The importance of stratifying for baseline variables, particularly previous self-harm, has been highlighted in previous work.^{142,157}

With respect to recruitment, a simpler and more flexible process could lead to higher recruitment rates. Perhaps the most productive measure would be to embed recruiting staff within clinical teams or to give existing staff dedicated time to carry out recruitment. Ensuring that administrative staff in emergency departments check patient details at reception is likely to be important, but was apparently routine practice in the centres in this study. Individuals who have harmed themselves may be a hard-to-reach population and one possibility would be to recruit patients in the emergency department before they leave (assuming of course that they have the capacity to consent). For those who are not approached in this way, recruitment by telephone, SMS or mail could also be tried. It should be noted that recruitment of sufficient numbers of individuals might be less challenging in hospitals with geographically defined catchments than it was in the current study. Researchers involved in recruitment need to be experienced clinical staff. At times they will be required to manage distressed patients and they also need to engage participants who have complex needs and who may be regarded by some staff as hard to help.

Some flexibility in the intervention might also improve delivery. For example, individuals who prove difficult to reach by telephone might receive only the information leaflet and letter components of the intervention.

This study considered repeat presentations to hospital for self-harm at 12 months as a main outcome. However, this may not be the most important measure of a treatment effect.¹⁴⁴ It does not take into account repeat episodes not resulting in presentation to hospital. Equally, it could be that increased hospital presentation for self-harm is a positive treatment outcome for some people, representing better engagement with services. A broader range of outcomes might be collected in future work (e.g. self-reported repetition, depression, hopelessness, suicidal ideation), but of course this will increase the complexity and cost of such studies.

Conclusions

Using qualitative methods we developed a contact-based intervention for individuals following self-harm. This consisted of an information leaflet, telephone calls soon after presentation and a series of letters over a 12-month period. In many ways this was a composite of interventions to date,¹⁴⁶ and similar to a planned intervention in France.¹⁵⁸ With respect to the main aim of our study, we found that carrying out a pilot randomised trial of our intervention was challenging but feasible.

Our study was small and not designed to be an efficacy trial, but those who received the intervention appeared to be more likely to repeat self-harm and had higher rates of contact with specialist mental health services than those who received usual treatment alone. This could have been a chance occurrence or may have partly reflected an unequal distribution of baseline risk factors between groups. It should also be noted that we may have recruited a sample that was not representative of the wider population, particularly as the study was carried out in only one centre in the UK. Equally, it is possible that repeat self-harm presenting to hospital may not, in fact, represent a negative outcome but could be a positive marker of increased engagement. On the basis of our results, we cannot rule out the possibility that the intervention was associated with a true increase in the risk of repetition, but these findings should be regarded as tentative.

Future studies of these apparently simple contact interventions need to be alert to the possibility of increased repetition and should also record adverse effects. Studies to date of the effect of contact interventions on repeat self-harm have had mixed results, but some have suggested possible beneficial effects. Further work is needed to elucidate the active components of therapeutic contact following self-harm in these studies and to refine existing interventions or develop new ones.

Chapter 8 Development and pilot study of an intervention aimed at reducing the incidence of fatal and non-fatal self-harm in the period after psychiatric hospital discharge

Abstract

People recently discharged from inpatient psychiatric care are at high risk of suicide, with about 250 suicides (6% of all suicides) in England each year occurring in the 3 months after discharge. There is trial evidence from the USA that supportive letters sent by psychiatrists to patients in the period following hospital discharge resulted in a reduction in suicide. We aimed to assess the feasibility of conducting a similar trial in the context of present-day UK clinical practice. We developed and piloted a letter-based intervention suitable for all people discharged from a psychiatric unit. Up to eight letters were sent to patients over the 12 months after discharge. The intervention was relatively easy to operationalise, with the process of patient contact taking at most 7 hours per week per ward. Altogether, 102 patients discharged from the three wards in different hospitals in the south-west region received at least one letter, but only 45 (44.1%) received the full series of letters. The main reasons for dropout were patients opting out ($n=24$) or readmission ($n=26$). However, in the context of new policy initiatives of intensive follow-up post discharge in present-day UK practice, qualitative interviews with service users showed that most already felt adequately supported and the intervention added little to this. Those interviewed felt that it was possible that the intervention might benefit people new to, or with little follow-up from, mental health services, but that fewer letters should be mailed. Although there is a need for interventions in this period of high risk for suicide and self-harm, contact-based interventions may be more beneficial in areas where there is less intensive post-discharge support.

Background

The first few weeks after discharge from inpatient psychiatric care are associated with a greatly elevated risk of suicide.^{159–163} An analysis of HES data for England carried out in the early stages of this research programme showed that the risk of non-fatal self-harm is similarly elevated in the period after hospital discharge.¹⁶⁴ In total, >6% of patients discharged from psychiatric inpatient care were admitted to a general hospital bed as a result of self-harm in the subsequent 12 months.

Our understanding of why suicide risk is so high in this period and what can be done to reduce risk is limited. The Department of Health's guidance for mental health services in 2003¹⁶⁵ recommended that (1) inpatient and community teams carry out a joint case review before discharge, (2) care plans should take into account the heightened risk of suicide in the first 3 months after discharge, with specific reference to the first week, and (3) patients who were thought to be at high risk of suicide during their admission should be followed up within 48 hours of discharge. However, no studies have investigated whether or not these recommendations have had an impact on post-discharge suicide rates.

A number of studies of letter-based contacts with patients in the period after hospital attendance for self-harm or psychiatric inpatient discharge have shown promising results in reducing repeat self-harm and suicide.²² These interventions involved the mailing of a series of short letters from the hospital of discharge expressing concern about the person's well-being since discharge. In particular, a randomised controlled trial of letter-based contacts over a 5-year period with 843 patients who had been discharged

from inpatient psychiatric care in the USA between 1968 and 1974 provided some evidence that those in receipt of such an intervention have a reduced risk of suicide.^{23,24} A recent pilot study has demonstrated the feasibility of running a similar intervention amongst people discharged from military hospitals in the USA, although e-mail contacts were preferred by the (mainly male) participants.¹⁶⁶

The only randomised trials of contact-based interventions since Motto's original work²³ have involved a different patient group: people who have attended an acute hospital following an episode of self-harm. In a recent study in Australia, eight letters, similar to those used in the original Motto study, were mailed over a 12-month period following discharge to people who had attended a toxicology unit following self-poisoning.¹⁴⁰ Similar interventions have been trialled in New Zealand and Iran among people who have attended hospital for treatment following self-harm. Findings from these trials have been mixed.²² To the best of our knowledge, none has used qualitative interviews to explore patient attitudes to the intervention.^{142,143}

Objective

The aim of this element of our programme was to develop and pilot a contact-based intervention aimed at reducing the incidence of self-harm after discharge from psychiatric inpatient care. This chapter describes the development and piloting of the intervention. It was piloted with people discharged from inpatient psychiatric wards at three hospitals managed by two NHS trusts in the south-west of England (Bristol and Gloucester). Motto's 1976 study²³ was used as the starting point for developing the intervention. At the time of recruiting the wards to the study, they did not have a process of intensive post-discharge follow-up in place, although this changed as the study progressed.

Methods

Intervention development

We carried out a questionnaire survey of current and recent psychiatric inpatients and conducted some qualitative interviews to inform the design of the contact-based intervention. The aim of these studies was to assess (1) patients' preferred means of contact (letter/e-mail/text/telephone); (2) whether or not they might find such letters useful; (3) the wording/contents of the letters; (4) the best frequency of contact; (5) who the letters should be sent by; and (6) any other issues that patients felt were relevant.

Exploratory interviews were undertaken with 10 recently discharged service users sampled from five general adult wards in two acute psychiatric hospitals in Bristol. Initially, consecutive patients were approached on the wards prior to discharge to obtain their consent for a post-discharge interview. As the interviews progressed we then used purposive sampling to identify patient groups who had not been interviewed, including people who lived alone, who had a history of self-harm or depression/affective disorder or who abused alcohol. Ward managers used their professional judgement with regard to which service users should be approached, and were guided by the research team as to which characteristics were of particular interest (see above). The aim of the interviews was to explore participants' attitudes to discharge, their experiences since discharge and their views about the proposed contact-based intervention.

A questionnaire was administered to 71 patients on four general adult psychiatric inpatient wards in Bristol. The questionnaires asked about patients' access to and use of different forms of communication technology and their preferred method of post-discharge contact.

To allow further development of the intervention and to ensure that its implementation was feasible and appropriate within existing discharge arrangements for psychiatric inpatients, we then presented the findings from these studies to groups of ward and community staff associated with the psychiatric inpatient units where the intervention would be piloted.

Pilot study

Aims and setting

The contact intervention was piloted on three wards in three psychiatric inpatient units managed by two mental health trusts in the south-west of England.

We used a cohort study design to assess:

1. the usefulness of the intervention to service users
2. the feasibility of running the intervention as a national study and ultimately as a service within the NHS
3. the feasibility of collecting data to identify the costs of the intervention (an economic evaluation) and outcome data.

Two of the participating inpatient psychiatric wards were located in Bristol with contrasting inner-city (ward A, a 23-bed unit) and suburban (ward B, a 19-bed unit) catchment populations. A third ward (ward C), with 22 beds, was located in Gloucester and served a mixed urban/rural population.

The Gloucester ward was recruited to the pilot 1 year after piloting began in Bristol and, because of time constraints and participant feedback from the qualitative interviews, the letters were mailed for the first 6 months following discharge only, so these patients received just six letters. Furthermore, some of the outcome data were not available for the Gloucester ward (ward C), and data on non-completion of the intervention were available for 6 months post discharge only, so most analyses focus on the two Bristol wards with comparable 12-month post-discharge data. Data are reported for the Gloucester ward when these are available and relevant.

Inclusion criteria

Consecutive patients discharged from the two Bristol wards over a 6-month period in 2009–10 and from the Gloucester ward over a 3-month period in 2011 were eligible to receive the intervention.

Exclusion criteria

We excluded the following psychiatric discharges from the pilot: (1) people who lived outside the catchment areas served by the study wards (as contact information on study leaflets was tailored to those living within the intervention wards' catchment areas); (2) people with no known or fixed address or who were discharged to prison or another psychiatric unit; and (3) patients whose discharge was notified to the person administering the study database >4 weeks after discharge.

The contact intervention

The intervention that we developed consisted of a series of eight letters mailed out at increasing intervals over the 12 months following inpatient psychiatric discharge (at 1, 2 and 4 weeks and at 2, 4, 6, 9 and 12 months post discharge). Examples of the letters are given in *Appendix 13*.

The letters were signed by either the ward manager or a member of ward staff familiar to the patient. Each of the letters differed in the wording and was tailored to be appropriate to the patient's stage of care and whether or not he or she was still in contact with psychiatric services. In contrast to Motto's original study,²³ recipients of the letters were not invited to make contact with the person signing the letter, as this was felt to be inappropriate within the context of local mental health-care service pathways. However, when patients responded to letters (this was very infrequent), individualised responses were added to subsequent letters. Patients who were readmitted and discharged again within the recruitment period received a further series of letters. Patients who were readmitted and discharged outside the recruitment period received no further letters. Copies of each letter were sent to the patients' care co-ordinators.

A support and advice leaflet (see *Appendix 14*) listing contact details of organisations offering telephone and face-to-face support was included with each mailing.

Letter administration was aided by a bespoke database installed on each unit's computer system and managed by a member of ward staff or a MHRN clinical studies officer. The database included automatic prompts when the next letter was due to be sent to a patient, and checks on the database ensured that patients were not sent letters if they had opted out of the study, had been readmitted or had died.

With ethical committee approval, individual patient consent was not sought for sending the letters as the letters were considered to be a service development. However, all letters included an opt-out slip giving patients the opportunity to opt out from receiving any further letters at any stage. In our qualitative evaluation of the pilot, for which we gained individual patient consent, we explored issues around the lack of consent with patients.

Process and outcome measures

We collected both qualitative and quantitative data during piloting. Qualitative interviews were conducted with 13 patients; this was complemented by a brief questionnaire on patient views of the intervention, sent by post to all patients who received one or more letters up to October 2010. Using trust information systems, we compared the number of readmissions to the two study wards in Bristol with the number of readmissions to other acute wards in Bristol for the periods before and during the intervention. We also searched emergency department records to quantify the incidence of post-discharge self-harm among patients discharged from the two study wards in Bristol during the intervention period.

We collected process data on whether participants (1) opted out of the intervention, (2) attended an emergency department/had a general hospital admission for self-harm (Bristol-based patients only) or (3) were readmitted to a psychiatric hospital.

We piloted the methods for collecting data for an economic evaluation of the intervention in a full trial by collecting relevant data from hospital information systems. We were given anonymised data on the number and type (face-to-face vs. telephone) of mental health community service contacts for a subset of 12 Bristol-based patients in the 12 months following discharge.

Ethics

Ethical approval was obtained from the Southmead Research Ethics Committee.

Results

Development studies

Questionnaire survey

In total, 48 of the 71 (67.6%) psychiatric inpatients at the time of the survey completed a questionnaire about their use of mobile phones and e-mail, as well as their preferred method of contact. Seventeen (35.4%) were aged <36 years and 18 (37.5%) were male.

Two-thirds (32/48, 66.7%) of the respondents owned a mobile phone. Some respondents who owned mobile phones did not complete all items on the questionnaire, so the following figures are based on the number of participants who responded to each item. The majority (28/31, 90.3%) of responders used their phone to send text messages. One-third (9/27, 33.3%) thought that at home someone else might read their text messages and so it would be difficult to keep them private. Just over one-quarter (13/46, 28.3%) of patients had an e-mail address.

Only 26 patients responded to the final item on the questionnaire about how they would prefer to be contacted following discharge. Nearly one-quarter (6/26, 23.1%) of these patients stated that they would prefer not to be contacted. Of the remaining 20 individuals, eight selected more than one preferred mode so that there were 30 responses in all. Of the 15 individuals who owned a mobile phone and selected a

preferred mode of contact, only four (26.7%) selected text messages. The most popular methods were telephone (13/15, 86.7%) and letter (11/15, 73.3%). Less than half (4/10, 40%) of those who used e-mail stated that they would like to be contacted by this method.

Exploratory interviews

Although most patients felt well supported after discharge, a few had felt unsupported and alone. Most interviewees said that it would be helpful to receive regular messages from people who have cared for them in hospital to ask how they were getting on. However, others thought that it would be better to be contacted by someone in the community care team, such as the community psychiatric nurse or social worker.

Most interviewees thought that messages from the ward should be received on a weekly basis after discharge, although some were concerned that this could become intrusive if it went on for too long. Most preferred the idea of receiving a letter rather than a telephone call as they felt that telephone calls could be intrusive. It was local NHS policy at the time of these interviews for ward staff to telephone patients twice in the first 2 weeks after hospital discharge, and a number of interviewees reported that they found these calls rather contrived and functional, and most did not find these supportive or helpful.

All those interviewed thought that having a 'crisis card' with a number to call if they were feeling very distressed would be helpful, and many said that just knowing that it is there would make them feel better. The importance of having a reliable response to crisis calls was stressed, as was the importance that the person answering the phone is both sympathetic and offers useful advice.

All interviewees said that the usefulness of any intervention would vary considerably according to the person and his or her situation, particularly depending on how long he or she had been in hospital and who he or she had around at home for support.

Summary

Findings from the above two studies were fed back to the research group and groups of inpatients and community mental health staff. It was agreed that the best form of contact would be by letter and that community staff should be sent copies of all communications. The wording of some letters was altered based on the feedback from interviewees and staff to include reminders about when patients might expect to be contacted by community services and to remind patients of the crisis contact numbers. A leaflet with further information about crisis contacts and other mental health-related sources of help and advice in the statutory and voluntary sectors was developed.

Pilot study

Participants

Table 43 shows the number and characteristics of patients who participated in the pilot. Altogether, 102 patients (66% males), with a mean age of 38 years, received one or more intervention letters. The main diagnostic group was schizophrenia/psychosis, comprising 44% of discharges over the study period, although information on diagnosis from ward records was not available for nearly two-thirds (27/43, 62.8%) of participants from ward B.

Acceptability and usefulness of the intervention

Nearly two-thirds (102/162, 63.0%) of patients discharged from wards A and B over the recruitment period received at least one letter (Figure 16). The main reason for non-recruitment was residence out of the ward's catchment area. Of those who received at least one study letter, only 45 (44.1%) received all of the study letters (see Figure 16). These represent 27.8% (45/162) of all discharges over the relevant recruitment periods.

TABLE 43 Number and characteristics of patients recruited

Characteristic	Ward A (Bristol)	Ward B (Bristol)	Ward C (Gloucester)	All wards
Recruitment start and end dates	November 2009–April 2010	January–July 2010	February–May 2011	November 2009–May 2011
No. of patients recruited	37	43	22	102
Age (years), mean (range)	39.2 (18–70)	38.2 (20–67)	35.4 (18–57)	37.8 (18–70)
Sex, <i>n</i> (%)				
Male	26 (70.3)	23 (53.5)	18 (81.8)	67 (65.7)
Female	11 (29.7)	20 (46.5)	4 (18.2)	35 (34.3)
Diagnosis, ^a <i>n</i> (%)				
Affective disorders	15 (45.5)	3 (18.8)	6 (27.3)	24 (33.8)
Schizophrenia and other psychoses	10 (30.3)	12 (75.0)	9 (40.9)	31 (43.7)
Personality disorders	3 (9.1)	0	5 (22.7)	8 (11.3)
Substance-related disorders	3 (9.1)	0	1 (4.5)	4 (5.6)
Other	2 (6.1)	1 (6.3)	1 (4.5)	4 (5.6)
Follow-up end date	18 May 2011	11 August 2011	25 November 2011	25 November 2011

a Data for 33 (89.2%) cases for ward A, 16 (37.2%) for ward B and 22 (100%) for ward C.

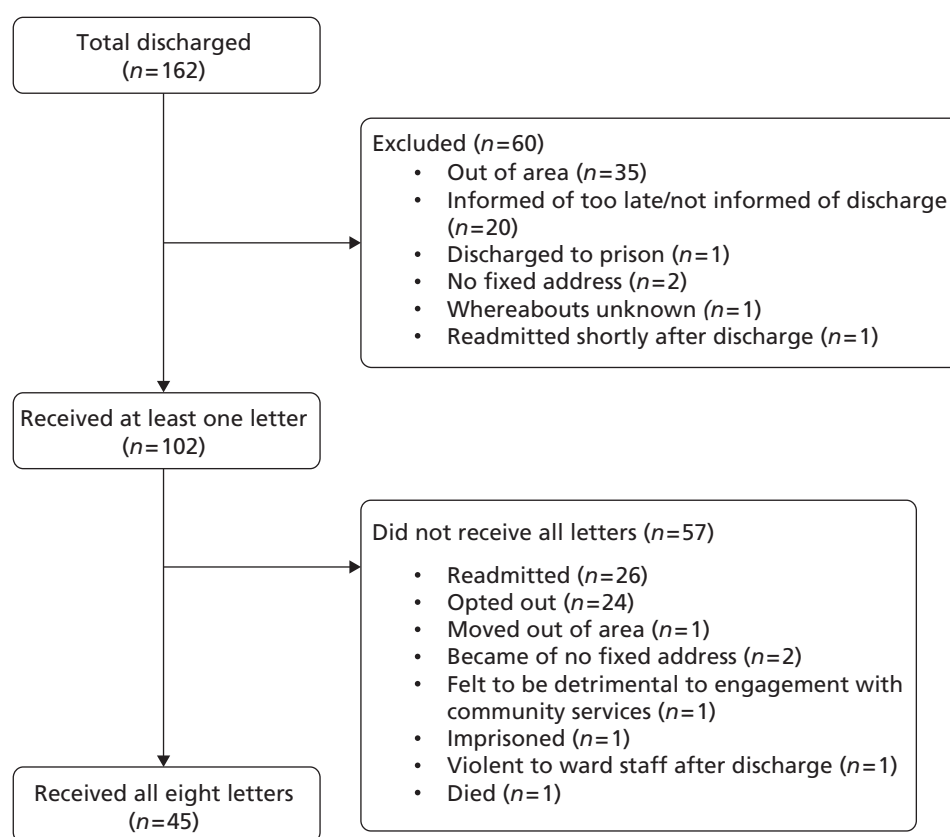


FIGURE 16 Patient flow for recruitment and mailings.

An opt-out slip and stamped addressed envelope were enclosed with each mailing so that, if they wished, participants could opt out of receiving the letters. The main reasons for cessation of mailings were patient opt-out (24/102, 23.5%) and readmission (26/102, 25.5%). Although a lower proportion of patients opted out from ward C (18.2%), this was most likely because of the shorter period over which letters were mailed from that ward.

Some people who opted out or who were excluded for other reasons were also subsequently readmitted but were not then recorded as excluded for that reason.

Data on post-discharge self-harm

Because of resource limitations and time constraints we collected information on post-discharge self-harm for patients from the Bristol A&E units only. Twelve (15.0%, 95% CI 6% to 21%) of the people discharged from the Bristol inpatient psychiatric wards attended a local A&E unit for treatment following a self-harm episode in the 12 months post discharge; of these, eight (10% of those discharged, 95% CI 3% to 17%) were admitted to a hospital bed. In addition, one person died by suicide. There was no evidence that the intervention was implicated in precipitating any of these episodes.

Two study participants self-harmed within 2 weeks of discharge (one the same day), a further eight within the first 6 months after discharge and two during the 6–12 months after discharge. Most of these participants were still receiving the letters at the time of self-harm [only 3/11 (27.3%) were not – one had self-harmed 6 months after their first inpatient discharge within the study period and had opted out of the intervention 4 months earlier and the other two had self-harmed following a further psychiatric admission and discharge].

Readmissions

We were able to use trust data to crudely compare levels of readmissions within 12 months to wards A and B with levels of readmissions to other acute wards in the same hospitals before and during the study period (Table 44). There was no evidence of a reduction in readmissions on ward A – 35.3% of people were readmitted pre intervention and 35.7% of people were readmitted during the intervention period. In contrast, readmission rates fell on the two comparator wards. Although readmissions did fall on ward B (from 44.1% to 36.2%), equivalent reductions were seen on the other acute ward at that hospital.

TABLE 44 Discharges and readmissions to intervention and non-intervention wards before and during the intervention period

Intervention period	Hospital A			Hospital B	
	Ward A (intervention)	Ward X (non-intervention)	Ward Y (non-intervention)	Ward B (intervention)	Ward Z (non-intervention)
Pre-intervention period ^a					
Total no. of discharges	51	62	89	68	52
Total no. (%) readmitted within 12 months	18 (35.3)	21 (33.9)	36 (40.4)	30 (44.1)	24 (46.2)
Intervention period ^b					
Total no. of discharges	56	48	69	58	102
Total no. (%) readmitted within 12 months	20 (35.7)	15 (31.3)	20 (29.0)	21 (36.2)	37 (36.3)
Difference in readmissions across the two time points, %	0.4	–2.6	–11.4	–7.9	–9.9

a Hospital A: 1 November 2007–30 April 2008; hospital B: 6 January 2008–30 July 2008.

b Hospital A: 1 November 2009–30 April 2010; hospital B: 6 January 2010–30 July 2010.

Service contacts during the 12 months post index discharge

To pilot data collection for an economic evaluation, we collected detailed data on post-discharge contacts made by mental health-care staff with 12 individuals. On average they made 12 contacts (either face-to-face or by telephone) during the first month after discharge (Figure 17). Eleven of the 12 individuals had at least two follow-up contacts in the first week following discharge. The one individual who had no contact during the first week had three face-to-face contacts during the second week. When we stratified our sample to investigate whether or not the distribution of contact timings was affected by readmissions to hospital we found no evidence that such readmissions contributed to the observed rise in contacts in months 6 and 7.

Information from the qualitative interviews (see below) provides evidence on whether the participants felt that the intervention added anything to the perceived level of support provided by community mental health services.

During the course of the study, the mental health trust in one of the areas in which the pilot took place instituted a policy of two home visits to patients in the first week following hospital discharge.

Qualitative interviews

All people who received one or more letters were invited to participate in a qualitative interview to obtain their views about the intervention and assess its acceptability. Thirteen (12.7%) agreed to be interviewed. Table 45 shows the characteristics of these patients. The sample comprised primarily long-term service users who were aware of the services and numbers to ring in a crisis situation. This then influenced how they perceived an intervention aimed at providing post-discharge support.

Five respondents had received four intervention letters at the time of the interview, six had received five to seven letters and one had received all eight letters. The findings of the qualitative interviews of particular relevance to the intervention are reported here.

The interviewer field notes and the audio recordings of the interviews indicate that some participants were difficult to engage during the interview. The interview findings must be interpreted with this in mind. The sample size was also small as not all eligible patients were willing to take part, resulting in a sample that does not include a wide range of characteristics. Those who were interviewed had particular experiences of mental health services, including of post-discharge support, and these experiences appeared to influence their views on the intervention. In general, these participants appeared well supported by community mental health services following discharge and recalled instances of the ward telephoning to check on their welfare. The intervention was seen as less or not useful among those who were well supported, as they felt that it did not offer anything new. Therefore, it was felt to be of better use for those new to the system and those with less support:

I think I'm quite lucky that the support I was getting from [team name], and I am still getting pretty much meets all of my needs. So I can imagine for somebody else, if they weren't happy with what was going on, it might have been more helpful.

P12

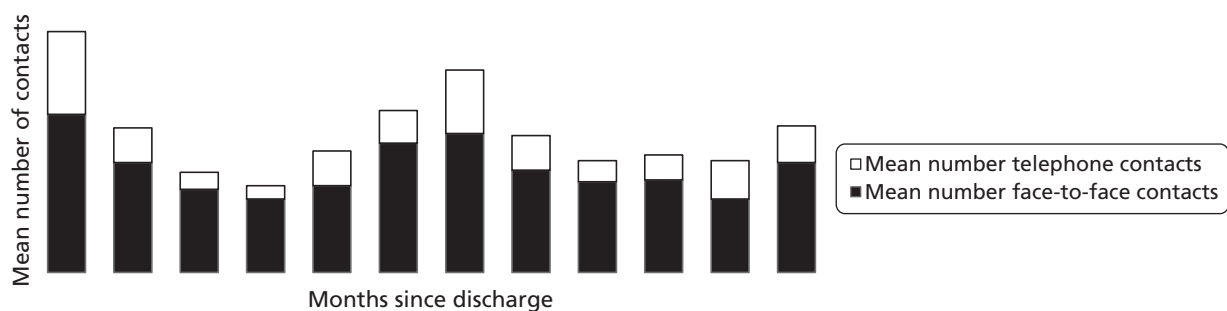


FIGURE 17 Mean number of face-to-face and telephone contacts by month over the 12 months following the index inpatient discharge (n = 12 patients).

TABLE 45 Characteristics of the patients who participated in qualitative interviews

Characteristic	Summary data
No. of patients recruited	13
Age (years), mean (median, range)	40.8 (41.0, 31–56)
Sex, <i>n</i> (%)	
Male	8 (61.5)
Female	5 (38.5)
Ethnicity, ^a <i>n</i> (%)	
White	9 (75.0)
Black	2 (16.7)
Mixed	1 (8.3)
Diagnosis, ^b <i>n</i> (%)	
Affective disorders	6 (54.5)
Schizophrenia and other psychoses	2 (18.2)
Personality disorders	2 (18.2)
Substance-related disorders	0 (0.0)
Other	1 (9.1)
a Not known for one case.	
b Not known for two cases.	

To the first timers, yeah, they come out and they've got nowhere to turn, and obviously the information could be vital for them.

P13

Because if you do get into trouble, because you've already been in the ward, you know the people to ring up (...) once you're admitted in, you work with the crisis team and also your CPN [community psychiatric nurse], they give you all the numbers and things anyway.

P8

Nevertheless, the psychological benefits of receiving the letters, the feelings of reassurance, of not being forgotten, an acknowledgement of hospitalisation and that 'somebody cares', were highlighted by several participants. One felt this way despite thinking that the letters were computer generated, and strongly felt that the benefits of sending the letters outweighed any risks. Some also viewed the intervention positively because it appeared to be the only link to the ward/hospital and because it facilitated having all of the numbers in one place so that they were handy in a crisis.

One person (who had been asked to leave the ward) had found the letters upsetting and another explained that the salutation (use of their forename and surname) on the letters had triggered their psychotic symptoms. The salutation was subsequently personalised on letters by the members of ward staff who signed the letters. The intervention did not, however, cause harm to most participants.

Although some found the initial letters positive and reassuring, a recurring theme was that after a while the letters felt repetitive in content, and too frequent, and thereby a reminder of their hospitalisation:

I thought it was quite reassuring (...) if I needed contact with anybody then you know the services were available. (...) [laughs] And after the first couple, I thought, 'oh! not another one!'

P10

When I first got the letters they were kind of a reassurance as such that there was (...) fall-back service after the crisis team (...) But what I found it was a repetition, it was the same letter, same numbers (...) it was a reminder that I'd been into hospital.

P9

The similarity of the information provided also influenced whether the letters/leaflets were retained or thrown away and contributed somewhat to the feelings of some that the letters were too frequent and impersonal:

The letters were impersonal, like round robins. To me they suggested that you'd written a draft, it was printed off on the computer, and sent to everyone. (...) If you're looking for a way of reducing self-harm or suicide after a hospital admission you need to have a sense of love (...) this sense of actual human compassion instead of this computerised letter and a round robin of telephone numbers.

P5

Participants' use of the numbers/information provided in the letters/leaflets was minimal. Reactions to the letters being sent from the ward were mixed, with some viewing them as positive and others not finding them helpful. There was some confusion and questioning over not being able to contact the ward, despite the letters coming from the ward:

I think the strange thing was though, getting a letter from the hospital kind of telling me about support but nothing of it was to do with them and that felt a little bit strange. (...) it was like reminding me that they were there, but they weren't going to do anything and they can't help, they're just giving me information.

P12

Although the opt-out slip was not seen to be important by most participants, some acknowledged that it might have been important for others. Not obtaining consent before sending the letters did not appear to be a particularly problematic issue.

These findings emphasise the different ways that such an intervention can be perceived by mental health service users. For some users a letter reminded them of their illness and hence dependency on the services, whereas for others it may have been a crucial link to the services. It seems unlikely that a single intervention could be developed that will benefit all users.

Questionnaire survey

Individuals who had received letters up to October 2010 ($n=77$) were sent a brief questionnaire (see *Appendix 15*) asking for their views about the letters and information leaflets. Ten (13%) of the questionnaires were completed, resulting in a self-selected sample. Four of the 10 had either already participated in a qualitative interview or agreed to take part in an interview following completion of the questionnaire. The questionnaires therefore provided information only on the views of six respondents in addition to those interviewed.

Although three questionnaire respondents had opted out of the intervention, only one of these was consistently negative in his responses. One described receiving the letters as 'reassuring'. The other seven respondents were all positive about receiving the letters, one describing them as reminding him of the

'positive help' that he had received on the ward. When asked to comment on the letters, two of the seven respondents who had not opted out of the intervention pointed out how useful the support and advice leaflet could be (although neither had used it). Six of the seven respondents who had not opted out of the intervention and two of those who had found the number of letters 'about right'.

Time taken to establish and deliver the intervention on study wards

The intervention was administered on the wards by two MHRN clinical studies officers and by a ward administrator/health-care assistant. The maximum time taken for mailing the letters in a single week was 7 hours for ward A, 4 hours for ward B and 5 hours for ward C. This gives an indication of the resource required to maintain the intervention at 'steady state'.

Our assessment of the amount of researcher time required for site recruitment and set-up and maintenance of the intervention was based on our experience on ward C (Gloucester), as by the time that we recruited this ward the development problems with running the intervention and the study database had been resolved at the other two pilot sites. To recruit a centre and set up the intervention on the ward took approximately 20 hours of researcher time, including preparation for meetings, attendance at staff meetings, travel and subsequent contacts. Liaison with trust research and development and tailoring the intervention documents for local use (including details of local organisations for the support and advice leaflet) took approximately 11 hours, and liaison with and training of the person administering the intervention took approximately 17 hours. Thus, a total of 48 hours of research team input was required to establish the intervention on a ward. Once established, approximately 30–60 minutes of researcher time per week was required to respond to issues related to administration of the letters.

Discussion

We set out to develop and pilot a contact-based intervention aimed at reducing the incidence of post-discharge self-harm with the eventual ambition of seeking funding for a full trial of the intervention. Using quantitative and qualitative approaches and involving service users and mental health staff, we successfully designed a letter-based intervention and a process for administering these letters within mainstream psychiatric services. The aims of our pilot were to determine:

1. whether or not the intervention was seen as useful by service users
2. whether or not it would be feasible to run the intervention as a national study and ultimately as a service within the NHS
3. the feasibility of collecting data to identify the costs of the intervention (an economic evaluation) and outcome data.

In this section we discuss each of these issues in turn.

Service users' views of the intervention

Our qualitative interviews with 13 service users who received the letter, as well as the responses to the questionnaire survey, indicated that, although most patients could see the potential benefits of the letters and were positive about receiving them, they generally felt that they would be of more benefit to people who were new to the mental health system. Some patients did use the information in the leaflet, but this was unusual.

There was concern about the repetitive nature of the letters and that they might appear impersonal. Issues such as how the salutation on the letter was worded, for example first name only or first name and family name (as standard practice in the trusts), could make a difference, but it was clear that different approaches would appeal to different people. The sense of impersonality may have been compounded by the need for us to send an opt-out sheet and reply envelope with each letter. There is clearly a tension between the need for some degree of automation and the inevitable loss of personalisation.

Another indication of the (limited) acceptability of the intervention was the level of opt-out: 23.5% of patients opted out over the intervention period, some after just one or two letters.

Feasibility of a national study of the letter-based intervention

We were able to run the intervention on three different psychiatric inpatient wards across two different mental health trusts. We estimated that it took approximately 48 hours to establish the intervention on a ward, a maximum of 7 hours per week of NHS staff time to deliver the intervention and up to 1 hour of research assistant time per week to respond to issues arising from a ward.

No adverse events arising as a result of us sending the letters were reported, although, as reported in the qualitative interviews, one patient was upset by what he perceived to be the impersonal nature of the salutation used in the letters.

A key issue that became clear to us during the piloting was the high level of readmission (25.5%) in the 12 months following discharge – a figure in keeping with national data indicating that, between April 2004 and March 2005, 24.7% of people discharged from an inpatient psychiatric unit in England were readmitted within 12 months.¹⁶⁴ This raises issues concerning the potential repetitiveness of the cycle of letters in this patient group – if the letters were restarted after the second, third or any subsequent discharge, they may seem less personal. Furthermore, when we compared the overall readmission rates of two of the intervention wards with those for other non-intervention wards in the same hospital we saw no evidence of an intervention-related reduction. In keeping with this, the recent pilot study of a similar letter-/e-mail-based intervention in US military hospitals indicated that those in receipt of the intervention had higher levels of readmission than non-participants (13.6% vs. 7.4%).¹⁶⁶

Eight (10.0%, 95% CI 3.0% to 17.0%) of the participants discharged from the Bristol wards who attended an emergency department following an episode of self-harm after discharge were admitted to a hospital bed. These figures are in keeping with national data: between 1 April 2004 and 31 March 2005, 6.5% of people were admitted to a general hospital bed following a self-harm episode during the 12 months following inpatient psychiatric discharge.¹⁶⁴

The high levels of readmission (25.5%) and opt out (23.5%) meant that only half of those patients who received the first letter received them all. A further 24.7% of discharges were not eligible to receive the letters, mainly because they lived outside the wards' catchment areas. This means that the intervention might be acceptable and deliverable to less than half of all ward discharges.

During the course of the piloting in Bristol, the local mental health trust introduced a policy of visiting patients discharged from inpatient care twice in the week after discharge, thereby potentially diluting any effect of the letter-based intervention.

Based on our analysis of HES data¹⁶⁴ indicating that 6% of patients are admitted to hospital after self-harm in the year after discharge from psychiatric inpatient care and an estimated 12% ($n=10,000$) present to emergency departments with self-harm, the sample size required to detect a 15% reduction in episodes of non-fatal self-harm in the year after discharge would be about 9800 patients. The sample size would need to be larger ($n=20,800$) if only inpatient admissions for self-harm were used as the outcome measure. With MHRN support, a UK trial of this intervention might be feasible, although challenging, to mount.

Feasibility of collecting data to identify the costs of the intervention (an economic evaluation) and outcome data

Collection of data relevant to an economic evaluation of the intervention and outcome data (readmissions/emergency department attendance for self-harm) was straightforward using routine sources.

Conclusions

The study steering group carefully reviewed the findings from all aspects of the pilot study. Although recognising the heightened risk of self-harm in the early weeks after discharge, the group considered that there were insufficient grounds for pursuing the intervention to a full trial. This decision was particularly informed by three findings. First, service changes within mental health trusts (e.g. the increase in number of post-discharge visits in Bristol) and national policy initiatives to reduce post-discharge suicides mean that any impact of the letters is likely to be diluted. Second, less than half of all patients received the full intervention. In particular, about one-quarter of participants opted out of the intervention and qualitative interviews highlighted the potential for people to be upset by various aspects of it, indicating incomplete buy-in amongst the target population. Third, high levels of readmission mean that the intervention may seem repetitive and, together with high levels of opt-out, only half of patients might complete the intervention. Although alterations to the wording of the letters and other approaches to make them more personalised might reduce levels of opt-out and increase their impact, the other concerns outlined above are likely to outweigh any beneficial impact of such changes.

Chapter 9 Discussion

We have successfully completed a programme of research to inform priority areas identified in the *National Suicide Prevention Strategy for England*.³ Some of our findings have already been incorporated within drafts of the revised strategy, *Preventing Suicide in England – a Cross-Government Outcomes Strategy to Save Lives*.¹⁶⁷ Other findings have informed European and UK medicine regulatory activity in relation to co-proxamol and an ONS assessment of the impact of the increasing use of narrative verdicts by coroners on the reliability of national suicide statistics^{29,168}.

Our work on the relative toxicity of different antidepressants has provided important information regarding safe prescribing. We have developed and piloted two interventions aimed at reducing the risk of suicide in high-risk groups: people who have recently self-harmed and people who have recently been discharged from psychiatric units.

We have disseminated our research findings through publications^{22,37,79,85,169–183} (submitted paper: Hawton K, Simkin S, Yu L-M, Omar O, Gichuru P, Kapur N, *et al.* Did UK legislation restricting pack sizes of analgesics result in increased gastro-intestinal disorders due to greater use of NSAIDs?), our programme website (www.bris.ac.uk/social-community-medicine/projects/suicide-prevention/) and conference presentations. When relevant, we have passed on our findings to appropriate government organisations including the ONS, the MHRA, the Department of Health and the All-Party Parliamentary Group on Suicide and Self Harm Prevention.

Synergies

There were a number of synergies between various research streams in this programme. We have not explicitly commented on these in the report, as our focus was on presenting key findings in relation to the main research questions. Nevertheless, the synergies between the various elements informed a number of strands of our research, for example:

1. the inclusion of accidental deaths from paracetamol and co-proxamol poisoning within our analysis of mortality was justified by our findings from the study of coroners' records; specifically, that a high proportion of these are likely to be considered suicides by clinicians (see *Chapter 2*)
2. when we searched coroners' records we investigated whether or not inquests concerning suicides occurring soon after presentation to hospital for self-harm shed light on common service deficiencies; we did not find any novel/generalisable lessons concerning self-harm management within the records
3. likewise, we did not find any useful information in coroners' records concerning sources of paracetamol used in cases of self-poisoning.

Public and patient involvement

The programme benefited from strong public and patient involvement. *Appendix 16* lists specific highlights of such involvement. Public and patient involvement can be challenging with regard to some aspects of suicide research, particularly those concerning methods of suicide and the relative lethality of those different methods, as such information may inform later suicide attempts in vulnerable individuals.

Limitations

Although this research programme makes an important contribution to the evidence base relating to the *National Suicide Prevention Strategy for England*,³ we also recognise that there are a number of priority areas

that were beyond the scope of this programme. Alcohol is commonly a factor in suicide and self-harm,¹⁸⁴ but was not addressed as an objective of our research. Future research in this area should investigate the aetiology of alcohol use as a risk factor for suicide and self-harm, as well as how services might best deal with the overlap between alcohol misuse and self-harm behaviour. Similarly, although our research involved samples from within the UK, it did not examine suicide or self-harm within minority ethnic groups who have been shown to be at higher risk. Such groups include young South Asian^{184,185} and black¹⁸⁶ women, who are also less likely to seek psychiatric care.^{186,187} Research in this area should investigate the components of culturally appropriate and effective prevention and treatment programmes for these groups.

In this final chapter we discuss each of the key elements of our programme in turn in relation to their implications for health care and suicide prevention and conclude by making recommendations for future research priorities.

National suicide statistics

Objective 6.1 of the *National Suicide Prevention Strategy*³ was to monitor suicide statistics relevant to the goals and objectives of the strategy. Accurate suicide statistics, recorded in a consistent manner over time, are vital both to inform priority areas for suicide prevention activity and to monitor the success or failure of such suicide prevention initiatives at a local and a national level. Problems with the accuracy of suicide statistics have long been the subject of debate, nationally and internationally, and recent changes to coroners' certification practices in England and Wales have added to these concerns.

We investigated the validity of national suicide mortality statistics through an in-depth analysis of the inquest records of 12 coroners from 1990–1, 1998 and 2005. We used data collected in this investigation, supplemented by a review of coroners' records for 2006 and 2007, to assess the possible underestimation of numbers of suicides from co-proxamol, paracetamol and TCA poisoning. As a result of new information emerging during the course of the programme, we also carried out an analysis of small-area variations in suicide statistics in relation to the use of narrative verdicts by the local coroners.

We found that suicide rates in recent years are likely to have been underestimated because of a growth in the use of narrative verdicts by coroners since 2000. We also found evidence of a small increase in the use of accidental death verdicts for deaths that our researchers deemed as likely suicides, which will also lead to an underestimation of suicide rates. If these trends continue, so too will the underestimation of suicide rates, and trends in suicide rates will be distorted. Coroners differ in their use of narrative and accidental death verdicts for probable (researcher-defined) suicides. Such variation means that differences in suicide trends in different areas of England must be treated with extreme caution. We also found that an assessment of the overall burden of suicide from co-proxamol, paracetamol and TCA poisoning is best achieved by combining deaths from these medicines receiving suicide, open *and* accidental verdicts.

We have presented our findings to the ONS and the Ministry of Justice and discussed them at the National Suicide Prevention Advisory Group. We have provided the ONS with a document summarising our findings and have ensured that it has received regular updates of our findings and copies of all of our manuscripts. We have presented our findings to a government minister and the All-Party Parliamentary Group on Suicide and Self Harm Prevention. The ONS is reviewing its practices regarding the coding of narrative verdicts and is working with the Coroners' Society of England and Wales to develop an approach to improve the current situation. The importance of this issue has been highlighted in the revised national suicide prevention strategy¹⁶⁷ and we propose further monitoring of this issue over the coming years (see *Recommendations for future research*).

In the course of our work on coroners' statistics, we also became aware of two issues of emerging importance in relation to suicide prevention. First, we found a number of cases of suicide by charcoal burning. This method is highly lethal and has become a major public health concern in East Asia.¹⁸⁸ We have

recently published a brief report describing the characteristics of these early cases¹⁸³ and have obtained funding to develop a surveillance system to help identify (and respond to) the emergence of a similar epidemic in the UK. Second, we have been able to quantify the proportion of cases of suicide in which the internet may have played a role in facilitating the death.¹⁷⁰ We found that there was evidence of a direct internet contribution in nine (1.5%, 95% CI 0.7% to 2.9%) of the 593 suicides in 2005. In seven (77.8%) of the cases, the individuals had used the internet to research the method of suicide that they used. These findings are likely to underestimate the size of the problem and we recommend that this issue is kept under careful review.

The influence of prescribing and availability of analgesics and antidepressants on suicide

Goal 3 of the *National Suicide Prevention Strategy for England*⁸ was focused on reducing the availability and lethality of methods used for suicide. Objective 3.2 targeted self-poisoning suicide cases. Drugs commonly used for fatal self-poisoning include paracetamol, co-proxamol and antidepressants.

Paracetamol

The 1998 UK legislation⁵⁷ to restrict pack sizes of paracetamol appears to have had significant beneficial effects on both deaths and registrations for liver transplantation. In spite of these apparent benefits, there continues to be a considerable number of deaths each year from paracetamol poisoning, averaging 121 per year (for suicide, open and accidental verdicts) between 2000 and 2009 for paracetamol alone with or without alcohol, excluding compounds. The benefits should therefore not lead to complacency. Further measures may be required to limit this death toll. These might include stronger enforcement of the legislation, although we found few breaches of the sales guidance. Another possibility is for pack sizes to be reduced further. Lower pack sizes have been introduced in some other countries (e.g. Ireland⁷⁷ and Germany⁴⁴). Although the findings from our Anglo-Irish study did not suggest that smaller pack sizes of paracetamol in Ireland have resulted in smaller overdoses than in England, there may be several reasons for this. For example, in Ireland, more often than in England, it appears that the numbers of tablets taken are equivalent to multiples of packs. This raises the question of whether or not this practice reflects differences in patients' characteristics and access to care and greater ease of purchasing of multiple packs in Ireland than in England. The findings therefore do not provide definitive information on whether or not a further reduction in the maximum pack sizes for paracetamol sold over the counter in the UK would have further beneficial effects on overdose size (and hence on deaths from paracetamol overdose). The current pharmacy upper limit pack size of 32 tablets includes sufficient paracetamol that if all of it is ingested in an overdose the risk of hepatotoxicity is rather high.⁵⁴

Our patient interview study identified media influences (including the internet) in some cases. Media producers should be encouraged to comply with guidelines concerning detailed descriptions of suicide methods.⁹⁰ Internet influences on self-harm and suicide are increasingly recognised, including proliferation of sites giving details of drugs that may be used for fatal self-poisoning.^{189,190} This requires careful monitoring and, when feasible, possible restriction of those that are considered dangerous.

Another possible measure to limit the dangers of paracetamol overdose would be to reduce the amount of paracetamol in each tablet (e.g. to 325 mg, as has recently been instigated by the US FDA for paracetamol in compound preparations¹⁹¹), especially as lower-dose and 500-mg tablet preparations have been shown to have equivalent pain-relieving efficacy.¹⁹²

Fortunately, although we have shown that prescribing of analgesics has risen since the 1998 legislation, increased prescribing of NSAIDs does not appear to have had deleterious effects in terms of GI disturbances, although greater prescribing of antiulcerants could have offset any negative effects on GI function. This study, however, illustrates the importance of widening the evaluation of measures aimed at limiting the

availability of specific medications so that any deleterious effects that result from changes in the availability of alternative medications can be detected.

Co-proxamol

In 2003, a report highlighted that co-proxamol was used in 20% of poisoning suicides in England and Wales and that co-proxamol was far more toxic than TCAs in overdose.¹⁰¹ Consequently, the MHRA reviewed its relative benefit/safety profile and in January 2005 recommended to the CSM that co-proxamol be withdrawn, with a 3-year initial partial withdrawal period.¹⁰⁶ We have shown that during both this period and the subsequent 3 years, as prescribing of co-proxamol declined and there was an increase in prescribing of some other analgesics, there was a net reduction in analgesic poisoning deaths.^{79,175} By the end of the 6-year period following the withdrawal of co-proxamol, there had been an estimated 500 fewer suicides involving co-proxamol alone, and 600 when accidental deaths were included, with no evidence of significant substitution by death involving other analgesics.¹⁷⁵

Our findings were communicated to the MHRA both after the evaluation of the first 3 years following its decision and at the end of the 6 years following withdrawal of co-proxamol. They were also presented to the European Medicines Agency and influenced its decision to recommend to the European Union that prescribing of dextropropoxyphene (the more dangerous component of co-proxamol) cease.¹¹⁴ Prescribing of dextropropoxyphene has now been banned in the USA and Canada.

The UK initiative appears to have been a very successful suicide prevention measure. Our findings are consistent with other evidence which indicates that reducing the availability of a common and particularly dangerous method of suicide can reduce the number of suicides by that method and does not necessarily lead to substitution by an increase in numbers of suicides by similar methods.¹¹ However, such initiatives require careful long-term evaluation, especially as new methods of suicide become more popular and available.

Antidepressants

Another way of restricting access to dangerous means of self-poisoning is through prescribing less toxic drugs to people at risk. Depression is the most common psychiatric disorder in people dying by suicide, with approximately 60% of those who die suffering from affective disorder.¹¹⁸ Affective disorders are also common in patients who engage in non-fatal self-harm, with 72% having such disorders in one UK study.¹⁹³ People with depression who engage in suicidal acts often take antidepressants in overdose and therefore considerable attention has been paid to their toxicity, especially that of the TCAs.⁴⁵ It is well known that people often take their prescribed medication in overdose.¹⁹⁴ Choice of antidepressant in someone at risk should be determined by effectiveness, side effects and toxicity.

The usual approach to assessing fatal toxicity of a prescribed drug is to compare number of deaths involving that drug with the extent to which it is prescribed.¹⁴⁶ We have employed both this and another less used measure, case fatality, in which the death rate is compared with the rate of non-fatal overdoses,^{45,159} to assess the relative toxicity of all of the antidepressants in common current use. Importantly, we showed that the results obtained with the relative toxicity and case fatality approaches were practically identical.

Although we have confirmed the well-known higher toxicity of TCAs relative to SSRIs, we have highlighted important differences within these categories. Thus, among the TCAs, both dosulepin and doxepin were found to be considerably more toxic than amitriptyline. The elevated toxicity of dosulepin has previously been recognised,¹⁴³ but our results, which we communicated to the MHRA, highlight the need for stronger advice to be given to clinicians, especially as dosulepin is still prescribed widely in some parts of the UK.¹⁵⁹ Although doxepin is less often prescribed than dosulepin, clinicians should be aware of its relatively high level of toxicity.

Selective serotonin reuptake inhibitors are well recognised as being safer than the TCAs, but we have shown that citalopram is approximately three times more toxic than the other SSRIs. It is important that clinicians are

also aware of this finding, which is supported by other research,^{129,130} as it is again relevant to prescribing decisions, especially in patients at risk of self-poisoning.

Lastly, although our finding that the toxicity of venlafaxine is intermediate between that of the TCAs and that of the SSRIs has been recognised before and resulted in advice from the MHRA about restricting pack sizes and initial supplies for patients,¹²⁸ the similar toxicity of mirtazapine is a new finding. This result has also been communicated to the MHRA.

Self-harm services and suicide prevention

Objective 1.2 of the *National Suicide Prevention Strategy for England*³ was to reduce the number of suicides in the year following self-harm. Despite the strong association between self-harm and suicide, service provision for self-harm in the UK has been extremely variable.

We carried out interviews with key staff and 3-month audit projects in 32 centres in England to investigate this variability, but also to examine how management in hospital was related to outcome. We found that the variability of services was as wide as ever (with a 3.5-fold difference between hospitals in the proportion of individuals who received a specialist assessment and a fivefold difference in the proportion of individuals receiving specialist follow-up). Overall, 4 out of 10 individuals left hospital without having had an assessment with a mental health specialist. There was little evidence that aspects of management were associated with outcome in an ecological analysis, but an individual-level analysis suggested that specialist psychosocial assessment might be associated with a reduced risk of repetition of self-harm. Comparing our data with that from approximately 10 years earlier, we disappointingly found that the levels of specialist assessment had remained static. However, scores on a self-reported service quality scale increased by 26%, suggesting that at least some aspects of care may have improved.

Our findings suggest that national guidelines and policy initiatives have had a limited impact on the variability of self-harm service provision, although service quality may have improved. The effect of this on outcomes is unclear. New guidelines have included an additional focus on implementation,¹³⁹ which may have a positive effect on the quality of services and patient outcomes in the future.

Preventing suicide in high-risk groups

Goal 1 of the *National Suicide Prevention Strategy for England*³ was to reduce suicide risk in key high-risk groups. Two groups highlighted were people who have recently self-harmed and those currently or recently in contact with mental health services.

For individuals who have self-harmed, the findings of trials assessing the effect of telephone or postal contact have been equivocal. We developed an intervention for this group of patients, again using qualitative methods. The final intervention consisted of an information leaflet listing local sources of help, two telephone calls soon after presentation to an emergency department and a series of letters expressing concern, sent over a 12-month period. We then carried out a pilot randomised controlled trial of the intervention compared with usual treatment to assess feasibility and to carry out a preliminary investigation of efficacy for reducing repeat self-harm. This pilot trial proved challenging to carry out (with a proportion of individuals being uncontactable and others refusing to participate) but suggested that the methodology was feasible. Paradoxically, the incidence of repetition was higher in the intervention group than in the usual treatment group (34% vs. 12.5%), which may have partly reflected an unequal distribution of baseline risk factors between groups, our selected sample, the study setting or better engagement with services by those receiving the intervention. However, we cannot rule out the possibility that the intervention was associated with a true increase in the risk of repetition. Future studies of these apparently simple contact interventions need to be alert to this possibility.

Our findings with respect to repeat self-harm are interesting and should be used to inform further research rather than as a basis for a decision not to proceed to definitive trials. However, it is our view that moving immediately to a large multicentre trial of the current intervention before undertaking further development work is premature. Equally, further work is clearly needed before contact interventions more generally can be considered for incorporation into routine clinical services.

For people in contact with mental health services, we developed and piloted a contact-based intervention (a series of supportive letters and information leaflets) based on Jerome Motto's intervention trialled successfully in the USA in the 1960s and 1970s.²³ After a questionnaire survey and exploratory interviews with service users and consultation with mental health service staff, we modified Motto's intervention to suit present-day UK clinical practice. We also developed an approach to automate the implementation of the intervention to facilitate its roll-out into mainstream practice if trial evidence supported this move.

We found that the intervention was relatively straightforward to operationalise, taking at most 7 hours per week on the three wards on which it was piloted. However, mainly because of patient opt-out and readmission, only 45 (44.1%) of the 102 patients recruited received the full series of letters. In the context of policy changes in the UK since we developed our original proposal – with more intensive post-discharge follow-up – qualitative interviews with service users showed that most already felt adequately supported and the intervention added little to this. Those interviewed felt that it was possible that the intervention might benefit people new to, or with little follow-up from, mental health services but that fewer letters should be mailed. For these reasons we did not feel that there was sufficient evidence to proceed to a full trial of this intervention.

In a parallel analysis of HES data and data collected by the National Confidential Inquiry, we have found some evidence that recent policy changes (enhanced post-discharge follow-up of people discharged from psychiatric wards) have reduced the risk of non-fatal self-harm in this period.¹⁷² A longer-term analysis of this issue might help to clarify the impact of policy changes on suicide.

Implications and recommendations

This programme of research has a number of findings that have important implications for public health and clinical practice as well as for future research relevant to suicide prevention.

Implications for practice and research

1. Small-area (primary care trusts/LAs) suicide rates and changes in these rates over time since 2000 should be interpreted with caution in those areas where coroners make high use of narrative verdicts.
2. Further increases in the use of narrative verdicts will compromise the quality of national suicide statistics.
3. Coroners could be required to provide both the short-form verdict and a longer narrative account of the death (when appropriate).
4. The ONS might consider including in its suicide statistics deaths from medicine poisoning given a verdict of accident/misadventure by coroners.
5. The Department of Health might consider carrying out surveillance to enable the early identification of increases in the use of high-lethality, easily accessible suicide methods, to enable a timely response.
6. Estimates of the numbers of suicides by co-proxamol, paracetamol and TCA poisoning would be more reliable if they included accidental poisonings from these drugs as well as deaths given suicide and open verdicts by coroners.
7. There should be an in-depth analysis of the proportion of suicides in which the internet may have played a contributory role, assessed alongside evidence of the beneficial effects on mental health and suicide risk.

Implications for clinical practice

1. Services should ensure optimal treatment for those who self-harm, in particular, prioritising the provision of psychosocial assessment as emphasised in national guidelines.
2. When prescribing antidepressants, clinicians should take account of the risk of overdose, especially in patients at risk of self-poisoning, as well as their relative efficacy, acceptability and possible interactions with other medication and alcohol, and patients' concurrent physical morbidity.
3. To prevent ongoing deaths involving paracetamol, further measures might be aimed at reducing breaches of sales guidelines and at encouraging media and internet site producers to follow guidelines on the reporting of suicide.
4. National, multicentre research would benefit from a simplified system of centralised approval for local research governance permissions.
5. Despite their low cost and apparent simplicity, contact-type interventions following psychiatric hospital discharge or self-harm cannot be recommended for widespread introduction.

Recommendations for future research

1. Variability in self-harm services should continue to be monitored to gain a greater understanding of aspects of treatment that are beneficial for preventing repeat self-harm.
2. Further work is needed to elucidate the active components of therapeutic contact following self-harm and to understand in which groups treatments might have the most impact.
3. Trends in the use of narrative verdicts and their impact on national and small-area suicide rates should be reassessed following recent ONS-led interventions to improve the accuracy of suicide reporting.
4. An assessment should be carried out of the feasibility and costs of developing a surveillance system to identify as quickly as possible rises in the use of novel methods of suicide to enable rapid interventions to restrict ease of availability to at-risk individuals.
5. The relative toxicity of other drugs commonly used for intentional self-poisoning should be evaluated to assist clinicians in making prescribing decisions and for informing regulatory agencies.
6. Future changes in availability of medications that are used for self-poisoning should be evaluated in terms of both impacts on self-harm and suicide and indirect consequences because of altered availability of other drugs.
7. The effect on the quality of services and patient outcomes of new guidance and future policies on management of self-harm (such as the November 2011 NICE guidelines¹³⁹ on the longer-term management of self-harm) requires careful evaluation.
8. Assessment of the relative toxicity of antidepressants should continue as new antidepressants are marketed, and international comparisons are warranted in view of the differences in prescribing practices between countries.

Acknowledgements

The views and opinions expressed in this paper are those of the authors and do not necessarily reflect those of the National Institute for Health Research (NIHR), the NHS or the Department of Health. The NIHR and Department of Health had no role in study design, the collection, analysis and interpretation of data, the writing of the report and the decision to submit the paper for publication.

Avon and Wiltshire Mental Health Partnership NHS Trust hosted the research programme.

Keith Hawton, David Gunnell and Jenny Donovan are NIHR Senior Investigators. Keith Hawton is also supported by Oxford Health NHS Foundation Trust and Nav Kapur by the Manchester Mental Health and Social Care Trust.

We would like to thank the following people for their invaluable help with undertaking components of this programme of work.

Study to investigate the influence of changes in coroners' practices on the validity of national suicide rates in England

We thank the coroners who allowed us access to their files, their staff and Record Office staff who assisted us, and the following researchers: Robert Carroll, Dr Emily Klineberg, Cathryn Rodway, Sarah Steeg and Lesley Sutton.

Oxford-based study of toxicity of antidepressants

Dr Helen Bergen and Keith Waters.

Oxford-based evaluation of co-proxamol withdrawal

Dr Helen Bergen, Anita Brock, Clare Griffiths, Ester Romeri, Claudia Wells, Karen Smith of the Centre for Statistics in Medicine, Oxford, for statistical advice, the Contact Centre Team at the NHS Health and Social Care Information Centre (England) and Sandra Hennefer at the Prescribing Services Partneriaeth Cydwasaethau GIG Cymru (Wales) for supplying the prescription data.

Oxford-based evaluation of the 1998 UK legislation restricting pack sizes of analgesics

Long-term evaluation

Dr Helen Bergen, Dr Sue Dodd, Dr Phil Pocock, Dr William Bernal and Claudia Wells.

Interview study

Fiona Brand, Sheryl Denman Taylor, Karen Lascelles, Jacklyn Patzsanda, John Ryall, Dr Kate Saunders and Linda Whitehead for their help in identifying patients for the study and conducting some of the interviews; Dorothy Rutherford for assistance in extracting data from the Oxford Monitoring System for Attempted Suicide; and Dr Helen Bergen and Deborah Casey for support and advice on analyses.

Anglo-Irish comparison

Dr Helen Bergen, Dr Ella Arensman, Dr Paul Corcoran and Keith Waters.

Non-steroidal anti-inflammatory drug prescribing and gastrointestinal consequences

Ly-Mee Yu, Omar Omar, Phillip Gichuru, Peter Stephens of IMS Health for organising the provision of prescription data and Dr Ben Wheeler for providing data on trends in hospital admissions for gastrointestinal haemorrhage in England.

Variation in self-harm services study

Dr Matthew Lowe, Iain Donaldson, Rita Jordan, Kelly Wild and clinical studies officers and research staff from the Mental Health Research Network and Comprehensive Local Research Networks.

Manchester-based self-harm intervention study

Dr Sarmad Nadeem, Dr Samer Khalil, Dr Cheryl Hunter, Dr Amanda Owen-Smith, Iain Donaldson, Victoria Matthews, Sarah Steeg, Rita Jordan and Clive Turpin (Self-harm Assessment, Follow-up, Engagement; SAFE team), and Professor Kevin Mackway-Jones.

Bristol-based pilot study of an intervention to prevent post-discharge suicide

Jerome Motto for information on the content of the letters sent to participants in his contact-based study that contributed to the development of our study; staff on the intervention wards and from the Mental Health Research Network for their assistance in administering the mailing of the letters, in particular Davina Chauhan, Nicola Cook and Genevieve Riley who collected data on patient participation and retention and outcome data on community contacts; staff in the Avon and Wiltshire Partnership NHS Trust Information Department for providing anonymised outcome data on admissions and readmissions; and steering group members and researchers Rosie Davies, Dr Sarah Greef, Keith Hall, Davidson Ho, Stephen Hoddell (Samaritans), Dr Will Hollingworth, Dr Amanda Owen-Smith and Dr Sangeetha Paramasivan.

Contribution of authors

Professor David Gunnell (Professor of Epidemiology) was co-principal investigator on the programme grant, led the Bristol-based components of the research (coroner study and Bristol-based intervention pilot study) and contributed methodological and practical advice to all other components of the research programme and publications arising from the research.

Professor Keith Hawton (Professor of Psychiatry) was co-principal investigator on the Programme Grant, led the Oxford-based components of the research (pharmacoepidemiological studies) and contributed methodological and practical advice to all other components of the research programme and publications arising from the research.

Professor Nav Kapur (Professor of Psychiatry and Population Health) was co-principal investigator on the Programme Grant, led the Manchester-based components of the research (the self-harm intervention study

and variations in self-harm services) and contributed methodological and practical advice to all other components of the research programme and publications arising from the research.

Olive Bennewith (Research Associate) was the lead Bristol-based researcher. She convened research meetings and developed and implemented research protocols for the Bristol-based intervention pilot study of an intervention to reduce self-harm following hospital discharge and the study of coroners' records. She analysed quantitative data arising from these projects and wrote first drafts of the reports of these studies. She also assisted with data collection from a number of centres in the Manchester-led study of self-harm services.

Dr Jayne Cooper (Senior Research Fellow) was the lead Manchester-based researcher and had key roles in the design, writing and implementation of research protocols for the Manchester-based contact intervention for self-harm and the multisite national observational study of self-harm services. She analysed qualitative and quantitative data arising from these projects and contributed to writing the reports of these studies. She also assisted with the study of coroners' records and supervision of junior staff.

Sue Simkin (Research Associate) was the lead Oxford-based researcher. She contributed to the design of the interview study of patients who took large paracetamol overdoses, conducted most of the interviews, analysed the data and wrote the first draft of the paper. She contributed to all of the other Oxford-led studies, including to their design, data collection and writing of papers for publication. She also assisted with data collection for the Bristol-led coroner study and wrote the first draft of an editorial on use of coroners' records for research.

Dr Damien Longson (Consultant in Psychiatry) was a co-applicant on the research programme and provided clinical and self-harm research expertise to the Manchester-based self-harm intervention study, as well as helping to oversee and facilitate recruitment and data collection by clinical teams.

Jenny Donovan (Professor of Social Medicine) was a co-applicant on the research programme and contributed qualitative research expertise and expertise in clinical trial design to the self-harm intervention pilot studies in Bristol and Manchester and supervised qualitative researchers working on these studies.

Jonathan Evans (Senior Lecturer in Psychiatry) was a co-applicant on the research programme and provided clinical and self-harm research expertise to the steering group of the Bristol-based intervention pilot study of an intervention to reduce self-harm following hospital discharge.

Susan O'Connor (Consultant Psychiatrist and former Medical Director of the Avon and Wiltshire Partnership NHS Trust) was a co-applicant on the research programme, provided clinical and self-harm research expertise to the steering group of the Bristol-based intervention pilot study of an intervention to reduce self-harm following hospital discharge and helped engage local wards in participating in the research pilot.

Peer-reviewed publications arising from the research programme

Chen YY, Bennewith O, Hawton K, Simkin S, Cooper J, Kapur N, *et al.* Suicide by burning barbecue charcoal in England. *J Public Health* 2013;**35**:223–7.

Gunnell D, Hawton K, Ho D, Evans J, O'Connor S, Potokar J, *et al.* Hospital admissions for self-harm following psychiatric hospital discharge: cohort study. *BMJ* 2008;**337**:1331–4.

Hawton K, Bergen H, Simkin S, Cooper J, Waters K, Gunnell D, *et al.* Toxicity of antidepressants: rates of suicide relative to prescribing and non-fatal overdose. *Br J Psychiatry* 2010;**196**:354–8.

Kapur N, Clements C, Bateman N, Foëx B, Mackway-Jones K, Huxtable R, *et al.* Advance directives and suicidal behaviour. *BMJ* 2010;**341**:590–1.

Kapur N, Cooper J, Bennewith O, Gunnell D, Hawton K. Postcards, green cards, and telephone calls: therapeutic contact with individuals following self-harm. *Br J Psychiatry* 2010;**197**:5–7.

Carroll R, Hawton K, Kapur N, Bennewith O, Gunnell D. Impact of the growing use of narrative verdicts by coroners on geographic variations in suicide: analysis of coroners' inquest data [published online ahead of print 15 November 2011]. *J Public Health* 2011. <http://dx.doi.org/10.1093/pubmed/fdr091>.

Cooper J, Hunter C, Owen-Smith A, Gunnell D, Donovan J, Hawton K, *et al.* 'Well it's like someone at the other end cares about you'. A qualitative study exploring the views of users and providers of care of contact-based interventions following self-harm. *Gen Hosp Psychiatry* 2011;**33**:166–76.

Hawton K, Bergen H, Simkin S, Arensman E, Corcoran P, Cooper J, *et al.* Impact of different pack sizes of paracetamol in the United Kingdom and Ireland on intentional overdoses: a comparative study. *BMC Public Health* 2011;**11**:460.

Hawton K, Bergen H, Waters K, Murphy E, Cooper J, Kapur N. Impact of withdrawal of the analgesic co-proxamol in the UK on non-fatal self-poisoning. *Crisis* 2011;**32**:81–7.

Gunnell D, Bennewith O, Kapur N, Simkin S, Cooper J, Hawton K. The use of the Internet by people who die by suicide in England: a cross sectional study. *J Affect Disord* 2012;**141**:480–3.

Gunnell D, Metcalfe C, While D, Hawton K, Ho D, Appleby L, *et al.* Impact of national policy initiatives on fatal and non-fatal self-harm after psychiatric hospital discharge: a time series analysis. *Br J Psychiatry* 2012;**201**:233–8.

Hawton K, Bergen H, Simkin S, Wells C, Kapur N, Gunnell D. Six-year follow-up of impact of co-proxamol withdrawal in England and Wales on prescribing and deaths: time-series study. *PLoS Med* 2012;**9**:e1001213.

Simkin S, Bennewith O, Cooper J. Investigating official records of suicides for research purposes: challenges and coping strategies. *Crisis* 2012;**33**:123–6.

Simkin S, Hawton K, Kapur N, Gunnell D. What can be done to reduce mortality from paracetamol overdoses? A patient interview study. *Q J Med* 2012;**105**:41–51.

Hawton K, Bergen H, Simkin S, Dodd S, Pocock P, Bernal W, *et al.* Reduced pack sizes of paracetamol: long-term evaluation of impacts on poisoning deaths and liver transplant activity in England and Wales. *BMJ* 2013;**346**:f403.

Bennewith O, Evans J, Donovan J, Paramasivan S, Owen-Smith A, Hollingworth W, *et al.* A contact-based intervention for people recently discharged from inpatient psychiatric care: a pilot study. 2013; in press.

Owen-Smith A, Bennewith O, Donovan J, Evans J, Hawton K, Kapur N, *et al.* 'When you're in the hospital, you're in a sort of bubble'. Understanding the high risk of self-harm and suicide following psychiatric discharge: qualitative study. *Crisis* 2013; in press.

Hawton K, Bergen H, Simkin S, Brock A, Griffiths C, Romeri E, *et al.* Effect of withdrawal of co-proxamol on prescribing and deaths from drug poisoning in England and Wales: time series analysis. *BMJ* 2009;**338**:b2270. <http://dx.doi.org/10.1136/bmj.b2270>

Kapur N, Gunnell D, Hawton K, Nadeem S, Khalil S, Longson D, J, *et al.* Messages from Manchester: pilot randomised controlled trial following self-harm. *Br J Psychiatry* 2013;**203**:73–4. doi: 10.1192/bjp.bp.113.126425.

References

1. Hawton K, Bergen H, Casey D, Simkin S, Palmer B, Cooper J, *et al.* Self-harm in England: a tale of three cities. Multicentre study of self-harm. *Soc Psychiatry Psychiatr Epidemiol* 2007;**42**:513–21. <http://dx.doi.org/10.1007/s00127-007-0199-7>
2. Gunnell D. The epidemiology of suicide. *Int Rev Psychiatry* 2000;**12**:21–6. <http://dx.doi.org/10.1080/09540260074076>
3. Department of Health. *National suicide prevention strategy for England*. London: Department of Health; 2002.
4. Mann JJ, Apter A, Bertolote J, Beautrais A, Currier D, Haas A, *et al.* Suicide prevention strategies. A systematic review. *JAMA* 2005;**294**:2064–74. <http://dx.doi.org/10.1001/jama.294.16.2064>
5. Gunnell D, Frankel S. Prevention of suicide: aspirations and evidence. *BMJ* 1994;**308**:1227–33.
6. Hawton K, Van Heeringen K. Suicide. *Lancet* 2009;**373**:1372–81. <http://dx.doi.org/10.1136/bmj.308.6938.1227>
7. Gunnell D, Lewis G. Studying suicide from the life course perspective: implications for prevention. *Br J Psychiatry* 2005;**187**:206–8. <http://dx.doi.org/10.1192/bjp.187.3.206>
8. Taylor SJ, Kingdon D, Jenkins R. How are the nations trying to prevent suicide? An analysis of national suicide prevention strategies. *Acta Psychiatr Scand* 1997;**95**:457–63. <http://dx.doi.org/10.1111/j.1600-0447.1997.tb10132.x>
9. Office for National Statistics. Deaths related to drug poisoning in England and Wales, 2002–06. *Health Stat Q* 2007;**36**:66–72.
10. Gunnell D, Hawton K, Kapur N. Coroners' verdicts and suicide statistics: increasing use of narrative verdicts raises serious concerns. *BMJ* 2011;**343**:d6030.
11. Hawton K. Restriction of access to methods of suicide as a means of suicide prevention. In Hawton K, editor. *Prevention and treatment of suicidal behaviour: from science to practice*. Oxford: Oxford University Press; 2005. pp. 279–91.
12. Hawton K, Simkin S, Deeks J, Cooper J, Johnston A, Waters K, *et al.* UK legislation on analgesic packs: before and after study of long term effect on poisonings. *BMJ* 2004;**329**:1076–9. <http://dx.doi.org/10.1136/bmj.38253.572581.7C>
13. National Institute for Clinical Excellence. *Self-harm: the short-term physical and psychological management and secondary prevention of self-harm in primary and secondary care*. London: National Institute for Clinical Excellence; 2004.
14. Kapur N, House A, Creed F, Feldman E, Friedman T, Guthrie E. Management of deliberate self poisoning in adults in four teaching hospitals: descriptive study. *BMJ* 1998;**316**:831–2. <http://dx.doi.org/10.1136/bmj.316.7134.831>
15. Bennewith O, Gunnell D, Peters TJ, Hawton K, House A. Variations in the hospital management of self-harm in adults in England: observational study. *BMJ* 2004;**328**:1108–9. <http://dx.doi.org/10.1136/bmj.328.7448.1108>
16. Crawford MJ, Wessely S. Does initial management affect the rate of repetition of deliberate self harm? Cohort study. *BMJ* 1998;**317**:985–90. <http://dx.doi.org/10.1136/bmj.317.7164.985>
17. Hickey L, Hawton K, Fagg J, Weitzel H. Deliberate self-harm patients who leave the accident and emergency department without a psychiatric assessment. A neglected population at risk of suicide. *J Psychosom Res* 2001;**50**:87–93.

18. Kapur N, House A, May C, Creed F. Service provision and outcome for deliberate self-poisoning in adults – results from a six centre descriptive study. *Soc Psychiatry Psychiatr Epidemiol* 2003; **38**:390–5.
19. Pirkis J, Burgess P. Suicide and recency of health care contacts. A systematic review. *Br J Psychiatry* 1998; **173**:462–74. <http://dx.doi.org/10.1192/bjp.173.6.462>
20. Appleby L, Shaw J, Kapur N, Windfuhr K, Ashton A, Swinson N, et al. *Avoidable deaths: five year report of the national confidential inquiry into suicide and homicide by people with mental illness*. Manchester: University of Manchester; 2006.
21. Hawton K, Arensman E, Townsend E, Bremner S, Feldman E, Goldney R, et al. Deliberate self-harm: systematic review of efficacy of psychosocial and pharmacological treatments in preventing repetition. *BMJ* 1998; **317**:441–7. <http://dx.doi.org/10.1136/bmj.317.7156.441>
22. Kapur N, Cooper J, Bennewith O, Gunnell D, Hawton K. Postcards, green cards, and telephone calls: therapeutic contact with individuals following self-harm. *Br J Psychiatry* 2010; **197**:5–7. <http://dx.doi.org/10.1192/bjp.bp.109.072496>
23. Motto JA. Suicide prevention for high-risk persons who refuse treatment. *Suicide Life Threat Behav* 1976; **6**:223–30.
24. Motto JA, Bostrom AG. A randomized controlled trial of postcrisis suicide prevention. *Psychiatr Serv* 2001; **52**:828–33. <http://dx.doi.org/10.1176/appi.ps.52.6.828>
25. Hawton K, Harriss L, Hall S, Simkin S, Bale E, Bond A. Deliberate self-harm in Oxford, 1990–2000: a time of change in patient characteristics. *Psychol Med* 2003; **33**:987–96.
26. Cooper P, Milroy C. The coroners' system and under-reporting of suicide. *Med Sci Law* 1995; **35**:319–26.
27. O'Donnell I, Farmer R. The limitations of official suicide statistics. *Br J Psychiatry* 1995; **166**:458–61. <http://dx.doi.org/10.1192/bjp.166.4.458>
28. Linsley KR, Schapira K, Kelly TP. Open verdict v. suicide – importance to research. *Br J Psychiatry* 2001; **178**:465–8. <http://dx.doi.org/10.1192/bjp.178.5.465>
29. Hill C, Cook L. Narrative verdicts and their impact on mortality statistics in England and Wales. *Health Stat Q* 2011; **49**:81–100. <http://dx.doi.org/10.1057/hsq.2011.4>
30. Bennewith O, Gunnell D, Nowers M. The effect of the barriers on the Clifton Suspension Bridge, England on local patterns of suicide. *Br J Psychiatry* 2007; **190**:266–7. <http://dx.doi.org/10.1192/bjp.bp.106.027136>
31. Holding T, Barraclough B. Undetermined deaths – suicide or accident? *Br J Psychiatry* 1978; **133**:542–9. <http://dx.doi.org/10.1192/bjp.133.6.542>
32. Adelstein A, Mardon C. Suicides 1961–74. *Popul Trends* 1975; **2**:13–18.
33. De Leo D, Dudley MJ, Aebersold CJ, Mendoza JA, Barnes MA, Harrison JE, et al. Achieving standardised reporting of suicide in Australia: rationale and program for change. *Med J Aust* 2010; **192**:452–6.
34. Page A, Taylor R, Martin G. Recent declines in Australian male suicide are real, not artefactual. *Aust N Z J Psychiatry* 2010; **44**:358–63. <http://dx.doi.org/10.3109/00048670903489874>
35. Nicholson S. Suicide in North Devon: epidemic or problem of classification? *Health Trends* 1992; **24**:95–6.
36. Saunderson T, Haynes R, Langford IH. Urban–rural variations in suicides and undetermined deaths in England and Wales. *J Public Health Med* 1998; **20**:261–7. <http://dx.doi.org/10.1093/oxfordjournals.pubmed.a024767>

37. Carroll R, Hawton K, Kapur N, Bennewith O, Gunnell D. Impact of the growing use of narrative verdicts by coroners on geographic variations in suicide: analysis of coroners' inquest data [published online ahead of print 15 November 2011]. *J Public Health* 2011. <http://dx.doi.org/10.1093/pubmed/fdr091>.
38. Ministry of Justice. *Coroners statistics – England and Wales, 2006*. URLs: <http://webarchive.nationalarchives.gov.uk/> and www.dca.gov.uk/statistics/cb2006full2.pdf (accessed December 2010).
39. Platt S, Backett S, Kreitman N. Social construction or causal ascription: distinguishing suicide from undetermined deaths. *Soc Psychiatry Psychiatr Epidemiol* 1988;**23**:217–21. <http://dx.doi.org/10.1007/BF01787820>
40. Ministry of Justice. *Coroners statistics – England and Wales, 2009*. URL: www.justice.gov.uk/statistics/coroners-and-burials/deaths (accessed December 2010).
41. The Information Centre. *National compendium of clinical and health indicators*. URL: www.nchod.nhs.uk (accessed June 2011).
42. Thomas K, Gunnell D. Suicide in England and Wales 1861 to 2007: a time-trends analysis. *Int J Epidemiol* 2010;**39**:1464–75. <http://dx.doi.org/10.1093/ije/dyq094>
43. Pounder D. Classifying suicide. *BMJ* 1992;**305**:472. <http://dx.doi.org/10.1136/bmj.305.6851.472>
44. Kapusta N, Tran U, Rockett I, De Leo D, Naylor C, Niederkrotenthaler T, et al. Declining autopsy rates and suicide misclassification: a cross-national analysis of 35 countries. *Arch Gen Psychiatry* 2011;**68**:1050–7. <http://dx.doi.org/10.1001/archgenpsychiatry.2011.66>
45. Tollefsen I, Hem E, Ekeberg O. The reliability of suicide statistics: a systematic review. *BMC Psychiatry* 2012;**12**:9. <http://dx.doi.org/10.1186/1471-244X-12-9>
46. Prescott K, Stratton R, Freyer A, Hall I, Le Jeune I. Detailed analyses of self-poisoning episodes presenting to a large regional teaching hospital in the UK. *Br J Clin Pharmacol* 2009;**68**:260–8. <http://dx.doi.org/10.1111/j.1365-2125.2009.03458.x>
47. Gunnell D, Murray V, Hawton K. Use of paracetamol (acetaminophen) for suicide and non-fatal poisoning: world-wide patterns of use and misuse. *Suicide Life Threat Behav* 2000;**30**:313–20.
48. Larson AM, Polson J, Fontana RJ, Davern TJ, Lalani E, Hynan LS, et al. Acetaminophen-induced acute liver failure: results of a United States multicenter, prospective study. *Hepatology* 2005;**42**:1364–72. <http://dx.doi.org/10.1002/hep.20948>
49. Nourjah P, Ahmad SR, Karwoski C, Willy M. Estimates of acetaminophen (paracetamol)-associated overdoses in the United States. *Pharmacoepidemiol Drug Saf* 2006;**15**:398–405.
50. Daly FFS, Fountain JS, Murray L, Graudins A, Buckley NA. Guidelines for the management of paracetamol poisoning in Australia and New Zealand – explanation and elaboration. *Med J Aust* 2008;**188**:296–301.
51. Wei G, Bergquist A, Broomé U, Lindgren S, Wallerstedt S, Almer S, et al. Acute liver failure in Sweden: etiology and outcome. *J Intern Med* 2007;**262**:393–401. <http://dx.doi.org/10.1111/j.1365-2796.2007.01818.x>
52. Canbay A, Jochum C, Bechmann LP, Festag S, Gieseler RK, Yüksel Z, et al. Acute liver failure in a metropolitan area in Germany: a retrospective study (2002–2008). *Z Gastroenterol* 2009;**47**:807–13. <http://dx.doi.org/10.1055/s-0028-1109058>
53. National Suicide Research Foundation. *National registry of deliberate self harm annual report 2009*. Cork, Ireland: National Suicide Research Foundation; 2010.

54. Prescott LF. Paracetamol overdose: pharmacological considerations and clinical management. *Drugs* 1983;**25**:290–314. <http://dx.doi.org/10.2165/00003495-198325030-00002>
55. British Medical Association and Royal Pharmaceutical Society of Great Britain. *British national formulary*. No. 59, March 2010. London: BMA and RPS; 2010.
56. Committee on Safety of Medicines. Paracetamol and aspirin. *Curr Prob Pharmacovigilance* 1997;**23**:9.
57. Statutory Instruments 1997 No. 2045. *The Medicines (Sales or Supply) (Miscellaneous Provisions) Amendment (No 2) Regulations 1997*. London: The Stationery Office; 1997.
58. Medicines and Healthcare products Regulatory Agency. *Best practice on the sale of medicines for pain relief*. URL: www.mhra.gov.uk/home/idcplg?IdcService=GET_FILE&dDocName=CON065560&RevisionSelectionMethod=Latest (accessed December 2009).
59. Bialas MC, Reid PG, Beck P, Lazarus JH, Smith PM, Scorer RC, *et al*. Changing patterns of self-poisoning in a UK health district. *QJM* 1996;**89**:893–901. <http://dx.doi.org/10.1093/qjmed/89.12.893>
60. Hawton K, Fagg J, Simkin S, Bale E, Bond A. Trends in deliberate self-harm in Oxford, 1985–1995. Implications for clinical services and the prevention of suicide. *Br J Psychiatry* 1997;**171**:556–60. <http://dx.doi.org/10.1192/bjp.171.6.556>
61. Gunnell D, Hawton K, Murray V, Garnier R, Bismuth C, Fagg J, *et al*. Use of paracetamol for suicide and non-fatal poisoning in the UK and France: are restrictions on availability justified? *J Epidemiol Community Health* 1997;**51**:175–9. <http://dx.doi.org/10.1136/jech.51.2.175>
62. Bray GP. Liver failure induced by paracetamol: avoidable deaths still occur. *BMJ* 1993;**306**:157–8.
63. Bernal W. Changing patterns of causation and the use of transplantation in the United Kingdom. *Semin Liver Dis* 2003;**23**:227–37.
64. Hawton K, Ware C, Mistry H, Hewitt J, Kingsbury S, Roberts D, *et al*. Why patients choose paracetamol for self poisoning and their knowledge of its dangers. *BMJ* 1995;**310**:164. <http://dx.doi.org/10.1136/bmj.310.6973.164>
65. Hawton K, Ware C, Mistry H, Hewitt J, Kingsbury S, Roberts D, *et al*. Paracetamol self-poisoning. Characteristics, prevention and harm reduction. *Br J Psychiatry* 1996;**168**:43–8. <http://dx.doi.org/10.1192/bjp.168.1.43>
66. Hawton K, Townsend E, Deeks JJ, Appleby L, Gunnell D, Bennewith O, *et al*. Effects of legislation restricting pack sizes of paracetamol and salicylates on self poisoning in the United Kingdom: before and after study. *BMJ* 2001;**322**:1203–7. <http://dx.doi.org/10.1136/bmj.322.7296.1203>
67. Prince MI, Thomas SHL, James OFW, Hudson M. Reduction in incidence of severe paracetamol poisoning. *Lancet* 2000;**355**:2047–8. [http://dx.doi.org/10.1016/S0140-6736\(00\)02354-0](http://dx.doi.org/10.1016/S0140-6736(00)02354-0)
68. Hawkins LC, Edwards JN, Dargan PI. Impact of restricting paracetamol pack sizes on paracetamol poisoning in the United Kingdom: a review of the literature. *Drug Saf* 2007;**30**:465–79. <http://dx.doi.org/10.2165/00002018-200730060-00002>
69. Bateman DN. Limiting paracetamol pack size: has it worked in the UK? *Clin Toxicol* 2009;**47**:536–41. <http://dx.doi.org/10.1080/15563650903093192>
70. Morgan O, Griffiths C, Majeed A. Impact of paracetamol pack size restrictions on poisoning from paracetamol in England and Wales: an observational study. *J Public Health* 2005;**27**:19–24. <http://dx.doi.org/10.1093/pubmed/fdh216>

71. Bateman DN, Gorman DR, Bain M, Inglis JHC, House FR, Murphy D. Legislation restricting paracetamol sales and patterns of self-harm and death from paracetamol-containing preparations in Scotland. *Br J Clin Pharmacol* 2006;**62**:573–81. <http://dx.doi.org/10.1111/j.1365-2125.2006.02668.x>
72. Sheen CL, Dillon JF, Bateman DN, Simpson KJ, MacDonald TM. Paracetamol pack size restriction: the impact on paracetamol poisoning and over-the-counter supply of paracetamol, aspirin and ibuprofen. *Pharmacoepidemiol Drug Saf* 2002;**11**:329–31. <http://dx.doi.org/10.1002/pds.701>
73. Norman E, Dhairiwan R, Dargan PI, Wallace C, Jones AL. Paracetamol poisoning: can it be prevented? *Proc R Coll Physicians Edinb* 2001;**31**:62–5.
74. Greene SL, Dargan PI, Leman P, Jones AL. Paracetamol availability and recent changes in paracetamol poisoning: is the 1998 legislation limiting availability of paracetamol being followed? *Postgrad Med J* 2006;**82**:520–3. <http://dx.doi.org/10.1136/pgmj.2005.042036>
75. Medicines and Healthcare products Regulatory Agency. *Advertising complaint – Home Bargains Stores, multiple sales of paracetamol – August 2009*. URL: www.mhra.gov.uk/Howweregulate/Medicines/Advertisingofmedicines/Advertisinginvestigations/CON065609 (accessed December 2009).
76. Mills J. *Student, 17, sold lethal paracetamol dose by Tesco*. *Daily Mail*, 27 May 2006. URL: www.dailymail.co.uk/news/article-387953/Student-17-sold-lethal-paracetamol-dose-Tesco.html# (accessed February 2011).
77. Irish Statute Book. *S.I. No. 150/2001 – Medicinal Products (Control of Paracetamol) Regulations, 2001*. Dublin: Stationery Office; 2001.
78. NHS Evidence. *Nonsteroidal anti-inflammatory drugs (standard or coxibs) – prescribing issues – management*. 2012. URL: www.cks.nhs.uk/hsaids_prescribing_issues/management/detailed_answers/gastrointestinal_adverse_effects/preventing_gi_adverse_effects (accessed February 2012).
79. Hawton K, Bergen H, Simkin S, Brock A, Griffiths C, Romeri E, et al. Effect of withdrawal of co-proxamol on prescribing and deaths from drug poisoning in England and Wales: time series analysis. *BMJ* 2009;**338**:b2270. <http://dx.doi.org/10.1136/bmj.b2270>
80. Wagner AK, Soumerai SB, Zhang F, Ross-Degnan D. Segmented regression analysis of interrupted time series studies in medication use research. *J Clin Pharm Ther* 2002;**27**:299–309. <http://dx.doi.org/10.1046/j.1365-2710.2002.00430.x>
81. Ramsay CR, Matowe L, Grilli R, Grimshaw JM, Thomas RE. Interrupted time series designs in health technology assessment: lessons from two systematic reviews of behavior change strategies. *Int J Technol Assess Health Care* 2003;**19**:613–23. <http://dx.doi.org/10.1017/S0266462303000576>
82. Zhang F, Wagner A, Soumerai SB, Ross-Degnan D. *Estimating confidence intervals around relative changes in outcomes in segmented regression analyses of time series data*. Buffalo, NY: NorthEast SAS Users Group Inc.; 2002. URL: www.nesug.info/Proceedings/nesug02/st/st005.pdf (accessed July 2011).
83. Neuberger J, Gimson A, Davies M, Akyol M, O'Grady J, Burroughs A, et al. Selection of patients for liver transplantation and allocation of donated livers in the UK. *Gut* 2008;**57**:252–7. <http://dx.doi.org/10.1136/gut.2007.131730>
84. Bernal W, Auzinger G, Sizer E, Wendon J. Intensive care management of acute liver failure. *Semin Liver Dis* 2008;**28**:188–200. <http://dx.doi.org/10.1055/s-2008-1073118>
85. Simkin S, Hawton K, Kapur N, Gunnell D. What can be done to reduce mortality from paracetamol overdoses? A patient interview study. *Q J Med* 2012;**105**:41–51. <http://dx.doi.org/10.1093/qjmed/hcr135>

86. Bancroft J, Hawton K, Simkin S, Kingston B, Cumming C, Whitwell D. The reasons people give for taking overdoses: a further inquiry. *Br J Med Psychol* 1979;**52**:353–65. <http://dx.doi.org/10.1111/j.2044-8341.1979.tb02536.x>
87. Beck A, Schuyler D, Herman J. Development of suicidal intent scales. In Beck A, Resnik H, Lettieri DJ, editors. *The prediction of suicide*. Bowie, MD: Charles Press; 1974. pp. 45–56.
88. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983;**67**:361–70. <http://dx.doi.org/10.1111/j.1600-0447.1983.tb09716.x>
89. Hawton K, Simkin S, Deeks JJ, O'Connor S, Keen A, Altman DG, *et al*. Effects of a drug overdose in a television drama on presentations to hospital for self poisoning: time series and questionnaire study. *BMJ* 1999;**318**:972–7. <http://dx.doi.org/10.1136/bmj.318.7189.972>
90. Beales I. *The editors' codebook: the handbook to the editors' code of practice (major revision for 2011)*. London: Newspaper Publishers Association, Newspaper Society, Periodical Publishers Association, Scottish Daily Newspaper Society, Scottish Newspaper Publishers Association; 2011.
91. Samaritans. *Media guidelines for reporting suicide and self-harm*. Ewell, Surrey: Samaritans; 2008.
92. Pohjola-Sintonen S, Kivistö KT, Vuori E, Lapatto-Reiniluoto O, Tiula E, Neuvonen PJ. Identification of drugs ingested in acute poisoning: correlation of patient history with drug analyses. *Ther Drug Monit* 2000;**22**:749–52. <http://dx.doi.org/10.1097/00007691-200012000-00016>
93. Bergen H, Hawton K, Waters K, Cooper J, Kapur N. Epidemiology and trends in non-fatal self-harm in three centres in England, 2000 to 2007. *Br J Psychiatry* 2010;**197**:493–8. <http://dx.doi.org/10.1192/bjp.bp.110.077651>
94. Laffoy M, Scallan E, Byrne G. Paracetamol availability and overdose in Ireland. *Ir Med J* 2001;**94**: 212–14.
95. NíMhaoláin ÁM, Davoren M, Kelly BD, Breen E, Casey P. Paracetamol availability in pharmacy and non-pharmacy outlets in Dublin, Ireland. *Ir J Med Sci* 2009;**178**:79–82.
96. Donohue E, Walsh N, Tracey JA. Pack-size legislation reduces severity of paracetamol overdoses in Ireland. *Ir J Med Sci* 2006;**175**:40–2.
97. Wheeler BW, Metcalfe C, Gunnell D, Stephens P, Martin RM. Population impacts of regulatory activity to restrict prescribing of selective COX-2 inhibitors ('coxibs') on gastrointestinal haemorrhage and acute myocardial infarction: ecological study. *Br J Clin Pharmacol* 2009;**68**: 752–64.
98. Department of Health. *Hospital episode statistics database*. London: Department of Health; 2007.
99. Office for National Statistics. *Population estimates for UK, England and Wales, Scotland and Northern Ireland*. 2007. URL: www.statistics.gov.uk/StatBase/Product.asp?vlnk=601 (accessed June 2009).
100. Simkin S, Hawton K, Sutton L, Gunnell D, Bennewith O, Kapur N. Co-proxamol and suicide: a review to inform initiatives to prevent the continuing toll of overdose deaths. *Q J Med* 2005;**98**: 159–70.
101. Hawton K, Simkin S, Deeks JJ. Co-proxamol and suicide: a study of national mortality statistics and local non-fatal self-poisonings. *BMJ* 2003;**326**:1006–8. <http://dx.doi.org/10.1136/bmj.326.7397.1006>
102. Distalgesic and its equivalents: time for action. *Drug Ther Bull* 1983;**21**:17–19.
103. Bateman DN, Afshari R. Licence needs to be changed. *BMJ* 2003;**327**:287. <http://dx.doi.org/10.1136/bmj.327.7409.287>

104. Hawton K, Simkin S, Gunnell D, Sutton L, Bennewith O, Turnbull P, *et al.* A multicentre study of co-proxamol poisoning suicides based on coroners' records in England. *Br J Clin Pharmacol* 2005;**59**:207–12.
105. Office for National Statistics. Deaths related to drug poisoning: England and Wales, 1993–2005. *Health Stat Q* 2007;**33**:82–8.
106. Medicines and Healthcare products Regulatory Agency. *Withdrawal of co-proxamol products and interim updated prescribing information*. CEM/CMO/2005/2. URL: www.mhra.gov.uk/home/groups/pl-a/documents/websiteresources/con019461.pdf (accessed March 2005).
107. Committee on Safety of Medicines. Withdrawal of co-proxamol (Distalgesic, Cosalgesic, Dolgesic). *Curr Prob Pharmacovigilance* 2006;**31**:11.
108. Daigle MS. Suicide prevention through means restriction: assessing the risk of substitution: a critical review and synthesis. *Accid Anal Prev* 2005;**37**:625–32.
109. Brock A, Baker A, Griffiths C, Jackson G, Fegan G, Marshall D. Suicide trends and geographical variations in the United Kingdom, 1991–2004. *Health Stat Q* 2006;**31**:6–22.
110. Office for National Statistics. *Deaths related to drug poisoning in England and Wales, 2010*. *Statistical Bulletin*, 23 August 2011. URL: www.ons.gov.uk/ons/rel/subnational-health3/deaths-related-to-drug-poisoning/2010/pdf-download.pdf (accessed September 2011).
111. Gottlieb S. Warnings issued over COX 2 inhibitors in US and UK. *BMJ* 2005;**330**:9. <http://dx.doi.org/10.1136/bmj.330.7481.9-c>
112. Gunnell D, Platt S, Hawton K. The economic crisis and suicide. Consequences may be serious and warrant early attention. *BMJ* 2009;**338**:1456–7.
113. Stuckler D, Basu S, Suhrcke M, Coutts A, McKee M. Effects of the 2008 recession on health: a first look at European data. *Lancet* 2011;**378**:124–5. [http://dx.doi.org/10.1016/S0140-6736\(11\)61079-9](http://dx.doi.org/10.1016/S0140-6736(11)61079-9)
114. European Medicines Agency. *European Medicines Agency recommends withdrawal of dextropropoxyphene-containing medicines*. Press release. EMEA/401062/2009. London: EMEA; 2009.
115. US Food and Drug Administration. *FDA takes action on Darvon, other pain medications containing propoxyphene*. 2009. URL: www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm170769.htm (accessed February 2009).
116. US Food and Drug Administration. *Xanodyne agrees to withdraw propoxyphene from the U.S. market*. 2010. URL: www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm234350.htm (accessed May 2011).
117. Health Canada. *Darvon-N (dextropropoxyphene) – recall and withdrawal in Canada – for the public*. 2010. URL: www.hc-sc.gc.ca/dhp-mps/medeff/advisories-avis/public/_2010/darvon-n_pc-cp-eng.php (accessed May 2011).
118. Cavanagh JTO, Carson AJ, Sharpe M, Lawrie SM. Psychological autopsy studies of suicide: a systematic review. *Psychol Med* 2003;**33**:395–405. <http://dx.doi.org/10.1017/S0033291702006943>
119. Tournier M, Grolleau A, Cougnard A, Molimard M, Verdoux H. Factors associated with choice of psychotropic drugs used for intentional drug overdose. *Eur Arch Psychiatry Clin Neurosci* 2009;**259**:86–91. <http://dx.doi.org/10.1007/s00406-008-0839-2>
120. Buckley N, McManus P. Fatal toxicity of serotonergic and other antidepressant drugs: analysis of United Kingdom mortality data. *BMJ* 2002;**325**:1332–3.

121. White N, Litovitz T, Clancy C. Suicidal antidepressant overdoses: a comparative analysis by antidepressant type. *J Med Toxicol* 2008;**4**:238–50. <http://dx.doi.org/10.1007/BF03161207>
122. Henry J. A fatal toxicity index for antidepressant poisoning. *Acta Psychiatr Scand* 1989;**80**:37–45. <http://dx.doi.org/10.1111/j.1600-0447.1989.tb03045.x>
123. Rose J, Unis A. A mortality index for postmarketing surveillance of new medications. *Am J Emerg Med* 2000;**18**:176–9. [http://dx.doi.org/10.1016/S0735-6757\(00\)90013-5](http://dx.doi.org/10.1016/S0735-6757(00)90013-5)
124. Lawrenson RA, Tyrer F, Newson RB, Farmer RDT. The treatment of depression in UK general practice: selective serotonin reuptake inhibitors and tricyclic antidepressants compared. *J Affect Disord* 2000;**59**:149–57.
125. IMS Health. *Intercontinental medical statistics*. URL: www.imshealth.com (accessed October 2008).
126. Office for National Statistics. *Population estimates for UK, England and Wales, Scotland and Northern Ireland – current datasets*. 2008. URL: www.statistics.gov.uk/statbase/Product.asp?vlnk=15106 (accessed June 2009).
127. Medicines and Healthcare products Regulatory Agency. Dosulepin: measures to reduce risk of fatal overdose. *Drug Saf Update* 2007;**1**:7–8.
128. Medicines and Healthcare products Regulatory Agency. *Venlafaxine (Efexor) summary of basis for regulatory position*. 2006. URL: www.mhra.gov.uk/Safetyinformation/Safetywarning/salertsandrecalls/Safetywarningsandmessagesformedicines/CON2023846 (accessed March 2009).
129. Flanagan R. Fatal toxicity of drugs used in psychiatry. *Hum Psychopharmacol* 2008;**23**:43–51. <http://dx.doi.org/10.1002/hup.916>
130. Kelly CA, Dhaun N, Laing WJ, Strachan FE, Good AM, Bateman DN. Comparative toxicity of citalopram and the newer antidepressants after overdose. *Clin Toxicol* 2005;**42**:67–71. <http://dx.doi.org/10.1081/CLT-120028747>
131. Kapur N. Management of self-harm in adults: which way now? *Br J Psychiatry* 2005;**187**:497–9. <http://dx.doi.org/10.1192/bjp.187.6.497>
132. Royal College of Psychiatrists. *Assessment following self-harm in adults*. London: Royal College of Psychiatrists; 2005.
133. Royal College of Psychiatrists. *Better Services for People who Self-harm project*. London: Royal College of Psychiatrists; 2005.
134. Gunnell D, Bennewith O, Peters TJ, House A, Hawton K. The epidemiology and management of self-harm amongst adults in England. *J Public Health* 2005;**27**:67–73. <http://dx.doi.org/10.1093/pubmed/fdh192>
135. Dickson S, Steeg S, Gordon M, Donaldson I, Matthews V, Kapur N, et al. *Self-harm in Manchester 2008–2009*. Manchester: Centre for Suicide Prevention, University of Manchester; 2011.
136. Kapur N, Murphy E, Cooper J, Bergen H, Hawton K, Simkin S, et al. Psychosocial assessment following self-harm: results from the Multi-Centre Monitoring of Self-Harm Project. *J Affect Disord* 2008;**106**:285–93. <http://dx.doi.org/10.1016/j.jad.2007.07.010>
137. Department of Health. *Total time spent in A&E*. 2011. URL: www.dh.gov.uk/en/Publicationsandstatistics/Statistics/Perfomancedataandstatistics/AccidentandEmergency/DH_079085 (accessed July 2012).
138. While D, Bickley H, Roscoe A, Windfuhr K, Rahman S, Shaw J, et al. Implementation of mental health service recommendations in England and Wales and suicide rates, 1997–2006: a cross-sectional and before-and-after observational study. *Lancet* 2012;**379**:1005–12. [http://dx.doi.org/10.1016/S0140-6736\(11\)61712-1](http://dx.doi.org/10.1016/S0140-6736(11)61712-1)

139. National Institute for Health and Care Excellence. *Self-harm: longer-term management*. National clinical guideline 133. London: British Psychological Society and Royal College of Psychiatrists; 2012.
140. Carter GL, Clover K, Whyte IM, Dawson AH, D'Este C. Postcards from the EDge project: randomised controlled trial of an intervention using postcards to reduce repetition of hospital treated deliberate self poisoning. *BMJ* 2005;**331**:805–9. <http://dx.doi.org/10.1136/bmj.38579.455266.E0>
141. Carter GL, Clover K, Whyte IM, Dawson AH, D'Este C. Postcards from the EDge: 24-month outcomes of a randomised controlled trial for hospital-treated self-poisoning. *Br J Psychiatry* 2007;**191**:548–53. <http://dx.doi.org/10.1192/bjp.bp.107.038406>
142. Beautrais A, Gibb S, Faulkner A, Fergusson D, Mulder R. Postcard intervention for repeat self-harm: randomised controlled trial. *Br J Psychiatry* 2010;**197**:55–60. <http://dx.doi.org/10.1192/bjp.bp.109.075754>
143. Hassanian-Moghaddam H, Sarjami S, Kolahi AA, Carter GL. Postcards in Persia: randomised controlled trial to reduce suicidal behaviours 12 months after hospital-treated self-poisoning. *Br J Psychiatry* 2011;**198**:309–16. <http://dx.doi.org/10.1192/bjp.bp.109.067199>
144. Owens D, Horrocks J, House A. Fatal and non-fatal repetition of self-harm. Systematic review. *Br J Psychiatry* 2002;**181**:193–9. <http://dx.doi.org/10.1192/bjp.181.3.193>
145. Evans MO, Morgan HG, Hayward A, Gunnell DJ. Crisis telephone consultation for deliberate self-harm patients: effects on repetition. *Br J Psychiatry* 1999;**175**:23–7. <http://dx.doi.org/10.1192/bjp.175.1.23>
146. Vaiva G, Ducrocq F, Meyer P, Mathieu D, Philippe A, Libersa C, *et al*. Effect of telephone contact on further suicide attempts in patients discharged from an emergency department: randomised controlled study. *BMJ* 2006;**332**:1241–5. <http://dx.doi.org/10.1136/bmj.332.7552.1241>
147. Fleischmann A, Bertolote JM, Wasserman D, De Leo D, Bolhari J, Botega NJ, *et al*. Effectiveness of brief intervention and contact for suicide attempters: a randomized controlled trial in five countries. *Bull World Health Organ* 2008;**86**:703–9. <http://dx.doi.org/10.2471/BLT.07.046995>
148. Bertolote JM, Fleischmann A, De Leo D, Phillips MR, Botega NJ, Vijayakumar L, *et al*. Repetition of suicide attempts: data from emergency care settings in five culturally different low- and middle-income countries participating in the WHO SUPRE-MISS Study. *Crisis* 2010;**31**:194–201. <http://dx.doi.org/10.1027/0227-5910/a000052>
149. Patton M. *Qualitative evaluation and research methods*, 2nd edn. Newbury Park, CA: Sage; 1990.
150. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol* 2006;**3**:77–100. <http://dx.doi.org/10.1191/1478088706qp063oa>
151. Sandelowski M. Sample size in qualitative research. *Res Nurs Health* 1995;**18**:179–83. <http://dx.doi.org/10.1002/nur.4770180211>
152. Clarke AR, Schnieden V, Hamilton BA, Dudley AM, Beard J, Einfeld SL, *et al*. Factors associated with treatment compliance in young people following an emergency department presentation for deliberate self-harm. *Arch Suicide Res* 2004;**8**:147–52. <http://dx.doi.org/10.1080/13811110490270994>
153. Hawton K, Sinclair J. The challenge of evaluating the effectiveness of treatments for deliberate self-harm. *Psychol Med* 2003;**33**:955–8. <http://dx.doi.org/10.1017/S0033291703008304>
154. Schulz K, Altman D, Moher D, CONSORT Group. CONSORT 2010 statement: updated guidelines for reporting parallel group randomised trials. *BMJ* 2010;**340**:c332. <http://dx.doi.org/10.1136/bmj.c332>

155. Sinclair J, Gray A, Rivero-Arias O, Saunders K, Hawton K. Healthcare and social services resource use and costs of self-harm patients. *Soc Psychiatry Psychiatr Epidemiol* 2011;**46**:263–71. <http://dx.doi.org/10.1007/s00127-010-0183-5>
156. Owens C. Interventions for self-harm: are we measuring outcomes in the most appropriate way? *Br J Psychiatry* 2010;**197**:502–3. <http://dx.doi.org/10.1192/bjp.197.6.502a>
157. Hatcher S, Owens D. Do get in touch. *BMJ* 2005;**331**:78–9. <http://dx.doi.org/10.1136/bmj.331.7520.788>
158. Vaiva G, Walter M, Al Arab AS, Courtet P, Bellivier F, Demarty AL, *et al.* ALGOS: the development of a randomized controlled trial testing a case management algorithm designed to reduce suicide risk among suicide attempters. *BMC Psychiatry* 2011;**11**:1. <http://dx.doi.org/10.1186/1471-244X-11-1>
159. Geddes J, Juszcak E. Period trends in rate of suicide in first 28 days after discharge from psychiatric hospital in Scotland, 1968–92. *BMJ* 1995;**311**:357–60. <http://dx.doi.org/10.1136/bmj.311.7001.357>
160. Goldacre M, Seagroatt V, Hawton K. Suicide after discharge from psychiatric inpatient care. *Lancet* 1993;**342**:283–6. [http://dx.doi.org/10.1016/0140-6736\(93\)91822-4](http://dx.doi.org/10.1016/0140-6736(93)91822-4)
161. Meehan J, Kapur N, Hunt IM, Turnbull P, Robinson J, Bickley H, *et al.* Suicide in mental health in-patients and within 3 months of discharge. National clinical survey. *Br J Psychiatry* 2006;**188**:129–34. <http://dx.doi.org/10.1192/bjp.188.2.129>
162. Qin P, Nordentoft M. Suicide risk in relation to psychiatric hospitalization: evidence based on longitudinal registers. *Arch Gen Psychiatry* 2005;**62**:427–32. <http://dx.doi.org/10.1001/archpsyc.62.4.427>
163. Thong JY, Su AH, Chan YH, Chia BH. Suicide in psychiatric patients: case-control study in Singapore. *Aust N Z J Psychiatry* 2008;**42**:509–19.
164. Gunnell D, Hawton K, Ho D, Evans J, O'Connor S, Potakar J, *et al.* Hospital admissions for self harm after discharge from psychiatric inpatient care: cohort study. *BMJ* 2008;**337**:a2278. <http://dx.doi.org/10.1136/bmj.a2278>
165. National Institute for Mental Health in England. *Preventing suicide: a toolkit for mental health services*. Leeds: NIMHE; 2003.
166. Luxton DD, Kinn JT, June JD, Pierre LW, Reger MA, Gahm GA. Caring letters project: a military suicide-prevention pilot program. *Crisis* 2012;**33**:5–12. <http://dx.doi.org/10.1027/0227-5910/a000093>
167. Department of Health. *Preventing suicide in England – a cross-government outcomes strategy to save lives*. London: Department of Health; 2011.
168. Office for National Statistics. Suicides in the United Kingdom 2011. *Statistical Bulletin*, 22 January 2013. URL: www.ons.gov.uk/ons/rel/subnational-health4/suicides-in-the-united-kingdom/2011/stb-suicide-bulletin.html (accessed August 2013).
169. Cooper J, Hunter C, Owen-Smith A, Gunnell D, Donovan J, Hawton K, *et al.* 'Well it's like someone at the other end cares about you'. A qualitative study exploring the views of users and providers of care of contact-based interventions following self-harm. *Gen Hosp Psychiatry* 2011;**33**:166–76. <http://dx.doi.org/10.1016/j.genhosppsy.2011.01.009>
170. Gunnell D, Bennewith O, Kapur N, Simkin S, Cooper J, Hawton K. The use of the Internet by people who die by suicide in England: a cross sectional study. *J Affect Disord* 2012;**141**:480–3. <http://dx.doi.org/10.1016/j.jad.2012.04.015>
171. Gunnell D, Hawton K, Ho D, Evans J, O'Connor S, Potakar J, *et al.* Hospital admissions for self-harm following psychiatric hospital discharge: cohort study. *BMJ* 2008;**337**:1331–4.

172. Gunnell D, Metcalfe C, While D, Hawton K, Ho D, Appleby L, *et al.* Impact of national policy initiatives on fatal and non-fatal self-harm after psychiatric hospital discharge: a time series analysis. *Br J Psychiatry* 2012;**201**:233–8. <http://dx.doi.org/10.1192/bjp.bp.111.104422>
173. Hawton K, Bergen H, Simkin S, Arensman E, Corcoran P, Cooper J, *et al.* Impact of different pack sizes of paracetamol in the United Kingdom and Ireland on intentional overdoses: a comparative study. *BMC Public Health* 2011;**11**:460. <http://dx.doi.org/10.1186/1471-2458-11-460>
174. Hawton K, Bergen H, Simkin S, Cooper J, Waters K, Gunnell D, *et al.* Toxicity of antidepressants: rates of suicide relative to prescribing and non-fatal overdose. *Br J Psychiatry* 2010;**196**:354–8. <http://dx.doi.org/10.1192/bjp.bp.109.070219>
175. Hawton K, Bergen H, Simkin S, Wells C, Kapur N, Gunnell D. Six-year follow-up of impact of co-proxamol withdrawal in England and Wales on prescribing and deaths: time-series study. *PLoS Med* 2012;**9**:e1001213. <http://dx.doi.org/10.1371/journal.pmed.1001213>
176. Hawton K, Bergen H, Waters K, Murphy E, Cooper J, Kapur N. Impact of withdrawal of the analgesic co-proxamol in the UK on non-fatal self-poisoning. *Crisis* 2011;**32**:81–7.
177. Kapur N, Clements C, Bateman N, Foëx B, Mackway-Jones K, Huxtable R, *et al.* Advance directives and suicidal behaviour. *BMJ* 2010;**341**:590–1. <http://dx.doi.org/10.1136/bmj.c4557>
178. Simkin S, Bennewith O, Cooper J. Investigating official records of suicides for research purposes: challenges and coping strategies. *Crisis* 2012;**33**:123–6. <http://dx.doi.org/10.1027/0227-5910/a000167>
179. Hawton K, Bergen H, Simkin S, Dodd S, Pocock P, Bernal W, *et al.* Reduced pack sizes of paracetamol: long-term evaluation of impacts on poisoning deaths and liver transplant activity in England and Wales. *BMJ* 2013;**346**:f403.
180. Bennewith O, Evans J, Donovan J, Paramasivan S, Owen-Smith A, Hollingworth W, *et al.* A contact-based intervention for people recently discharged from inpatient psychiatric care: a pilot study.
181. Owen-Smith A, Bennewith O, Donovan J, Evans J, Hawton K, Kapur N, *et al.* 'When you're in the hospital, you're in a sort of bubble'. Understanding the high risk of self-harm and suicide following psychiatric discharge: qualitative study. *Crisis* 2013; in press.
182. Kapur N, Gunnell D, Hawton K, Nadeem S, Khalil S, Longson DJ, *et al.* Messages from Manchester pilot randomised controlled trial following self-harm. *Br J Psychiatry* 2013;**203**:73–4.
183. Chen Y, Bennewith O, Hawton K, Simkin S, Cooper J, Kapur N, *et al.* Suicide by burning barbecue charcoal in England. *J Public Health* 2013;**203**:73–4. <http://dx.doi.org/10.1093/pubmed/fds095>
184. Haw C, Hawton K, Casey D, Bale E, Shepherd A. Alcohol dependence, excessive drinking and deliberate self-harm. *Soc Psychiatry Psychiatr Epidemiol* 2005;**40**:964–71. <http://dx.doi.org/10.1007/s00127-005-0981-3>
185. Bhui K, McKenzie K, Rasul F. Rates, risk factors and methods of self harm among minority ethnic groups in the UK: a systematic review. *BMC Public Health* 2007;**7**:336. <http://dx.doi.org/10.1186/1471-2458-7-336>
186. Cooper J, Murphy E, Webb R, Hawton K, Bergen H, Waters K, *et al.* Ethnic differences in self-harm rates, characteristics and service provision: three-city cohort study. *Br J Psychiatry* 2010;**197**:212–18. <http://dx.doi.org/10.1192/bjp.bp.109.072637>
187. Husain M, Waheed W, Husain N. Self-harm in British South Asian women: psychosocial correlates and strategies for prevention. *Ann Gen Psychiatry* 2006;**5**:7.

188. Liu KY, Beautrais A, Caine E, Chan K, Chao A, Conwell Y, *et al.* Charcoal burning suicides in Hong Kong and urban Taiwan – an illustration of the impact of a novel method of suicide on overall regional rates. *J Epidemiol Community Health* 2007;**61**:248–53. <http://dx.doi.org/10.1136/jech.2006.048553>
189. Biddle L, Donovan J, Hawton K, Kapur N, Gunnell D. Suicide and the Internet. *BMJ* 2008;**336**:800–2. <http://dx.doi.org/10.1136/bmj.39525.442674.AD>
190. Collings SC, Macdonald C, Kemp C, Fortune S, Hawton K. *In the balance. Pro-suicide and support material located by New Zealand-based web searches.* Auckland: Te Pou; 2010.
191. US Food and Drug Administration. *FDA limits acetaminophen in prescription combination products; requires liver toxicity warnings.* 2011. URL: www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm239894.htm (accessed January 2011).
192. Toms L, McQuay HJ, Derry S, Moore RA. Single dose oral paracetamol (acetaminophen) for postoperative pain in adults. *Cochrane Database Syst Rev* 2008;**4**:CD004602. <http://dx.doi.org/10.1002/14651858.CD004602.pub2>
193. Haw C, Hawton K, Houston K, Townsend E. Psychiatric and personality disorders in deliberate self-harm patients. *Br J Psychiatry* 2001;**178**:48–54. <http://dx.doi.org/10.1192/bjp.178.1.48>
194. Gjelsvik B, Heyerdahl F, Hawton K. Prescribed medication availability and deliberate self-poisoning: a longitudinal study. *J Clin Psychiatry* 2012;**73**:e548–54. <http://dx.doi.org/10.4088/JCP.11m07209>

Appendix 1 Form used to extract data on coroners' verdicts

All possible suicides 1990, 1998 and 2005 and all anti-depressant, paracetamol, coproxamol & charcoal-burning deaths (according to cause of death and/or reported by toxicologist) in 2005, 2006 and 2007

(1) THE CORONER

Q1a *Centre* 1 = Oxford 2 = Bristol 3 = Manchester CENTRE

Q1b *Coroner's District (Name) (CORDIST)* _____

Q1c *Coroner (Initials)* CORONER

Q1d *Coroner's Record Number* REC NO

(2) DEMOGRAPHICS OF DECEASED

Q2a *Date of birth (dd/mm/yyyy)* DOB

Q2b *Age (years) for those aged >=10* AGE

Q2c *Post code of usual residence* POSTCD1 POSTCD2

Q2d *Sex* 1 = Male 2 = Female SEX

Q2e *Ethnicity* 1=White 3=Asian ETHNICITY

Q2f **Marital status**

2=Black
4=Other
9=Not Known

1 = Single
2 = Married
3 = Widowed
4 = Divorced
5 = Other
9 = Not Known

Q2g **Employment status at time of death**

1=Unemployed
2=Employed
3=Retired
4=Other *specify* (EMPLTXT)²
9=Not Known

Q2h Occupation (if unemployed, state usual occupation);
(If retired, state previous occupation)
specify _____ (OCCUP)

Q2i **Living circumstances on day of suicide**

1 = Alone
2 = With family (including partner)
3 = With others (e.g. friends)
4 = Hospital in-patient – Psychiatric Hospital
5 = Hospital in-patient - General Hospital
6 = Other *specify** _____ (LIVTXT)²
7 = NFA
9 = Not Known

MARIT

EMPL¹

DAYLIV¹

*if the deceased had been living in a hostel, enter details of the type of hostel where described in the coroner's file (YMCA, rehabilitation of offenders...)

(3) VERDICT AND CAUSE OF DEATH

Q3a *Date of death (if not known, enter date death certified)*
DOD

Q3b *The above date is:* 1 = Date of death & certification
2 = Date of certification only
DDC

Q3c *Inquest verdict*
1 = Suicide 3=Accident 5=Narrative
2 = Open 4=Misadventure
VERDICT

Q3d **If open or accidental/misadventure verdict – probability of suicide (consensus decision)**
1 = High 8 = Not Applicable
2 = Moderate 9 = Not clear/insufficient information
3 = Low
SUIPROB

Q3e **Underlying cause of death**
1 = Poisoning
2 = Hanging/suffocation
3 = Firearms/Gunshots
4 = Car exhaust gas
5 = Jumping/falling
6=Charcoal burning
7 = Other (Describe) _____ (METHTEXT)²
METH¹

Cause of death from death certificate (CAUSETXT)

Q3f

Q3g

Was an additional method involved?

- 1 = Yes *specify below(Q3h)*
 2 = No
 9 = Not Known

ADMETH

Q3h

Additional method used

- 1 = Poisoning
 2 = Hanging/suffocation
 3 = Firearms/Gunshots
 4 = Car exhaust gas
 5 = Jumping/falling
 6 = Charcoal burning
 7 = Other (Describe) _____ (METHTXT2)²

METH2¹

Q3i

If jumping was the method used, what was the site of jump?

- 1=Bridge
 2=Car park
 3=Place of residence
 4=Other 9=NK
 If not place of residence, name site _____ (JUMPTXT)²

JUMP¹

- Q3j** Did they leave a suicide note?
 1=Yes
 2=No
 9=Not Known
- NOTE
- Q3k** Do the inquest records indicate that there was a possible role of the Internet in the death?
 1=Yes (describe) _____ (INTERNET)²
 2=No
- INTERNET¹

(4) PSYCHIATRIC AND MEDICAL HISTORY

- Q4a** Had the deceased ever had contact with Psychiatric Services?
 1 = Yes specify below (Q4b)
 2 = No
 9 = Not Known
- CONTPSY
- Q4b** Timing of contact with Psychiatric Services
 1 = At time of death
 2 = During last year
 3 = >1 year previously
 9 = Not Known
- TIMEPSY
- Q4c** Was the subject suffering from a psychiatric disorder at the time of death?
 1 = Yes
 2 = No
 3 = Probably
 9 = Not Known
- PSYCHDIS
- Q4d** Primary psychiatric diagnosis at time of death

- 1 = Schizophrenia and other delusional disorders
 2 = Affective disorder (Depression/Depression-anxiety/BPD)
 3 = Anxiety disorder
 4 = Alcohol dependence
 5 = Drug dependence
 6 = Other *specify* _____ (DIAGTXT)
 7 = No mental disorder
 9 = Not Known
- DIAG

Q4e

Date of last contact with general practitioner (dd/mm/yyyy)
Include all contacts i.e. face to face/telephone/or other means of contact
DO NOT INCLUDE contact with receptionist/nurse

GPCONTA

--	--	--	--	--	--	--	--	--	--

Q4f

Most recent contact with General Practitioner
include all contacts i.e. face to face/telephone/or other means of contact
DO NOT INCLUDE contact with receptionist/nurse

- 1 = ≤1 week
 2 = > 1 week – 1 month
 3 = > 1 month – 6 months
 4 = > 6 months – 1 year
 5 = > 1 year
 6 = Cannot be categorised
 9 = Not Known
 If information cannot be categorised, describe _____ (GPTXT)
- History of previous self-harm/suicide attempt**
- 1 = 1 or more
 2 = None
 9 = Not known
- GPONTB
- PREVSH

Q4g

Q4h Method of last non-fatal self-harm/suicide attempt

- 1 = Poisoning
- 2 = Hanging/suffocation
- 3 = Firearms/Gunshots
- 4 = Car exhaust gas
- 5 = Jumping/falling
- 6 = Charcoal burning
- 7 = Other (Describe) _____ (METHTXT2)

PREMETH

Patient psychiatric management during a previous presentation to a general hospital in previous 3 months (MANAGETXT)

Q4i

(5) ALCOHOL

Q5a. Was alcohol consumed as part of the act or beforehand?

- 1 = Yes specify below (Q5b)
- 2 = No
- 9 = Not Known

ALC

Q5b. Alcohol consumed in relation to legal limit

- 1 = Likely to be over legal limit at time of death (or action leading to death)
 2 = Likely < legal limit
 9 = Not known

ALCLEV

Q5c. Pathologist report of Blood alcohol level

Specify units/volume

(i) _____ / (ii) _____

BLALC

(mg/dl)

<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------

Q5d. Was alcohol detected by the pathologist?

- 1 = Yes
 2 = No alcohol/below detection level
 9 = Not Known

ALCL

Q5e. Alcohol level detected

- 0 = < 20 mg/100 ml
 1 = 20-49 mg/100 ml
 2 = 50-79 mg/100 ml
 3 = 80 – 149 mg/100 ml
 4 = ≥ 150 mg/100 ml
 9 = Not Known

ALCL2

Q5f. Pathologist report of Urine alcohol

Specify units/volume

(i) _____ / (ii) _____

URALC
(mg/dl)

<input type="text"/>	<input type="text"/>	<input type="text"/>
----------------------	----------------------	----------------------

(6) VIGNETTE of CIRCUMSTANCES of SUICIDE

Description of circumstances including precipitants for those assigned a verdict of open, accident or misadventure

All self-poisoning deaths in 1990, 1998 and 2005 and all anti-depressant, paracetamol and coproxamol deaths (according to cause of death and/or reported by toxicologist), 2006 and 2007

(7) DETAILS OF SELF-POISONING (SP)

	(a) Drug Name	(b) No. taken	(c) Tablet size	(d) Source*	(e) Source txt (SPSOURCETXT)	From Toxicology report			(h) Toxic level (SPTOXICLEV)
						(f) Blood level	(g) Therapeutic level (SPBLTHERAP)		
i)									
ii)									
iii)									
iv)									
v)									
vi)									
vii)									
viii)									

*1=prescribed for deceased, 2= prescribed for other. Specify relationship to deceased in Source txt, 3=not prescribed & bought for act, 4=not prescribed & present in household, 5=not prescribed & other, 9=NK. Specify in Source txt.

(8) DETAILS OF PRESCRIPTION (PRSC) Record details where drugs taken in overdose had been prescribed for the deceased (last prescription prior to death)

	(a) Drug Name (PRSCNAME)	(b) Reason prescribed † (PRSCREASON)	(c) When prescribed ‡ (PRSCWHEN)	Details of prescription	
				(d) No. of tablets (NOTABLETS)	(e) Dose (e.g. 5mg)
i)					
ii)					
iii)					
iv)					
v)					
vi)					
vii)					
viii)					

†e.g depression, pain ‡dd/mm/yyyy

Appendix 2 Protocol for coding vignettes

We define suicide as 'any act of self-damage which on the balance of evidence was considered to be deliberately initiated and which resulted in the individual's death'.

All vignettes will be independently coded by DG, KH and NK blind to the year of death. Based on the available information each investigator will rate the probability that a particular death was suicide as:

- 1 = high
- 2 = moderate
- 3 = low
- 9 = not clear.

For deaths coded as 'low' or 'not clear' likelihood of suicide, the most likely alternative cause of death will be coded as one of the following:

- a. accident
- b. homicide
- c. misadventure (the unintended outcome of an intended action)
- d. other – please specify.

The following indicators will contribute to decision-making (based in part on those used by Cooper and Milroy²⁶):

1. a suicide note (likely high probability)
2. prima facie evidence of intent (e.g. statement to others that person intended to take his or her life) (high probability)
3. the method used – hanging/firearm/carbon monoxide poisoning from car/barbecue charcoal (high probability of deliberate act) [although exceptions are possible, for example autoerotic hanging (as indicated by presence of pornography/cross-dressing)]
4. previous acts of non-fatal self-harm (increased probability)
5. a history of previous psychiatric illness with associated suicide risk, for example schizophrenia/major depression was seen as increasing the possibility that an act was suicide
6. circumstantial evidence as to the most reasonable and probable explanation for the death
7. if there are clear psychosocial stressors around the time of the act that might plausibly have prompted some to kill themselves (e.g. bankruptcy/impending criminal conviction/marriage breakdown), these were taken to increase the likelihood of suicide
8. if there is evidence of a high level of alcohol or illicit drug ingestion prior to the act, this may introduce some degree of uncertainty (unless other indicators such as a note are present – moderate)
9. if there is insufficient information (e.g. someone has been dead for several weeks and post-mortem blood levels are unreliable), code as not clear
10. if other people involved with the case (medical staff/family) felt that suicide was likely
11. if the blood level of a drug is considerably above the therapeutic dose this is a pointer to deliberate overdose rather than accidental overdosing, for example to relieve pain in someone who has high blood alcohol levels.

Appendix 3 Interrupted time-series segmented regression analysis

The following is an explanation of the method of Wagner *et al.*,⁸⁰ applied to our particular analysis.

Segmented regression analysis is a method of estimating changes in levels and trends in an outcome (deaths, in our case) associated with an intervention (the legislation in the third quarter of 1998 to reduce pack size of paracetamol). The time-series regression equation for this model is:

$$\hat{Y}_t = \beta_0 + \beta_1 \times time_t + \beta_2 \times intervention_t + \beta_3 \times time_after_intervention_t + e_t \quad (1)$$

where \hat{Y}_t is the outcome (mean number of deaths per quarter); *time* indicates the number of quarters from the start of the series (1–68); *intervention* is a dummy variable taking the values 0 in the pre-intervention segment and 1 in the post-intervention segment; *time_after_intervention* is 0 in the pre-intervention segment and counts the quarters in the post-intervention segment at time *t* (1–45); the coefficient β_0 estimates the base level of the outcome (number of deaths) at the beginning of the series; β_1 estimates the base trend, that is, the change in outcome per quarter in the pre-intervention segment; β_2 estimates the change in level of deaths in the post-intervention segment; β_3 estimates the change in trend in deaths in the post-intervention segment; and e_t estimates the error.

Absolute effect of the intervention

The model was used to estimate the absolute effect of the intervention in two ways, both of which we used:

- (a) First, we calculated the difference between the estimated outcome at a certain time after the intervention and the outcome at that time if the intervention had not taken place. For example, to estimate the effect of the intervention at the mid-point of the post-intervention period (when *time*=46 and *time_after_intervention*=23), we have:

$$\hat{Y}_{46(\text{without intervention})} = \beta_0 + \beta_1 \times 46 \quad (2)$$

$$\hat{Y}_{46(\text{with intervention})} = \beta_0 + \beta_1 \times 46 + \beta_2 + \beta_3 \times 23 \quad (3)$$

Thus, the absolute effect of the intervention is:

$$\hat{Y}_{46(\text{with intervention})} - \hat{Y}_{46(\text{without intervention})} = \beta_2 + \beta_3 \times 23 \quad (4)$$

- (b) Second, when there is an increasing trend in the pre-intervention period, a more conservative estimate of the absolute effect of the intervention may be calculated. Here the outcome without the intervention was taken at the earlier time (not assuming any increase in the post-intervention period). Thus, we have:

$$\hat{Y}_{23(\text{without intervention})} = \beta_0 + \beta_1 \times 23 \quad (5)$$

and the outcome with the intervention remains unchanged:

$$\hat{Y}_{46(\text{with intervention})} = \beta_0 + \beta_1 \times 46 + \beta_2 + \beta_3 \times 23 \quad (6)$$

Thus, the conservative estimate of absolute effect of the intervention was:

$$\hat{Y}_{46(\text{with intervention})} - \hat{Y}_{23(\text{without intervention})} = \beta_1 \times 23 + \beta_2 + \beta_3 \times 23 \quad (7)$$

Coefficients and errors from full models including all terms in *Equation 1* are given in *Table 46*. Non-significant terms were included as there may be correlation between slope and level terms, which should be accounted for.

TABLE 46 Interrupted time-series segmented regression analysis of deaths from paracetamol poisoning, other drug poisoning and all causes in England and Wales for individuals aged ≥ 10 years, 1993–2009

Cause of death	Segmented regression models ^a											
	Base-level coefficient (β_0)	Robust SE	p-value	Base-trend coefficient (β_1)	Robust SE	p-value	Step-change coefficient ^b (β_2)	Robust SE	p-value	Trend-change coefficient ^b (β_3)	Robust SE	p-value
With September 1998 as the point of intervention												
Deaths: suicide, open												
Paracetamol	30.103	1.901	<0.001	0.188	0.116	0.111	-6.023	2.430	0.016	-0.463	0.132	0.001
Paracetamol (adjusted) ^c	21.085	7.208	0.005	0.149	0.113	0.194	-6.473	2.397	0.009	-0.328	0.164	0.049
Paracetamol (adjusted) ^d	11.005	10.018	0.276	0.206	0.117	0.082	-6.535	2.540	0.012	-0.424	0.140	0.004
Paracetamol compounds	4.801	1.081	<0.001	0.007	0.087	0.933	1.249	1.534	0.419	0.013	0.095	0.892
All drug poisoning except paracetamol	291.078	12.757	<0.001	1.290	0.886	0.150	12.928	12.150	0.291	-4.347	0.925	<0.001
All drug poisoning	321.373	14.007	<0.001	1.462	0.966	0.135	7.142	13.067	0.587	-4.795	1.011	<0.001
All causes	1277.176	28.050	<0.001	-1.075	2.365	0.651	36.928	41.443	0.376	-2.893	2.574	0.265
Deaths: suicide, open, accidental												
Paracetamol	39.344	2.460	<0.001	0.309	0.158	0.055	-10.300	3.111	0.002	-0.521	0.0176	0.004
Paracetamol (adjusted) ^c	30.171	7.099	<0.001	0.236	0.170	0.170	-9.959	3.085	0.002	-0.426	0.191	0.029
Paracetamol compounds	5.777	1.172	<0.001	0.017	0.087	0.842	0.358	1.489	0.811	0.081	0.094	0.392
All drug poisoning except paracetamol	445.966	27.361	<0.001	2.919	1.885	0.126	-10.246	29.152	0.726	-3.931	2.042	0.059
All drug poisoning	468.263	29.352	<0.001	3.122	1.989	0.121	-18.461	31.001	0.554	-4.361	2.140	0.046
With January 1998 as the point of intervention												
Deaths: suicide, open												
Paracetamol	29.803	2.117	<0.001	0.216	0.181	0.239	-3.567	2.984	0.236	-0.531	0.190	0.007

SE, standard error.

a Regression based on Equation 1.⁸⁰b Post-intervention change in level (β_1) and post-intervention change in trend (β_3).

c Adjusted by addition of covariate (all drug deaths excluding paracetamol) in regression.

d Adjusted by addition of covariate (all-cause deaths excluding paracetamol) in regression.

Appendix 4 Questionnaire and topic guide for interview study with patients who had taken an overdose of paracetamol

Information on p1 obtained from clinical assessor & medical notes

Interviewer (initials)			
Sex	Male 1	Female 2	
Age			
Date of interview			
Date of overdose (if staggered, record latest date)			
Staggered overdose	No 0	Yes 1	NK 9
Time of overdose			
Overdose included self injury	No 0	Yes 1	
If YES, Details of self injury			

Substances taken in overdose	Number of tablets
Paracetamol	
.....	
.....	
.....	
.....	

Paracetamol level @ 4 hours mmols/L				●	
Delayed presentation	No 0	Yes 1	NK 9		
Alcohol taken as part of the act	No 0	Yes 1	NK 9		
Alcohol in 6 hours before	No 0	Yes 1	NK 9		
Number of units (1 unit = ½ pt beer, 1 small glass wine, 1 measure spirits)					

Medical treatment (from casenotes/ward staff)

None 0, Activated charcoal 1, Parvalax 2, Activated charcoal + parvalax 3, Other 4 (specify)

SIS score	Part 1		
	Part 2		
	TOTAL		

Interview Schedule

1. If patient took paracetamol compound as well as paracetamol::

Did you know that x contained paracetamol?

No 0 Yes 1 NK 9

If NO

1.1 **Would you have taken them as well as the other paracetamol if you had known?**

No 0 Yes 1 NK 9

If 1.1 = 0 or 1

1.2 **Why?**

2. **How long was there between first seriously thinking about this overdose and actually doing it? (i.e. when patient actually planned the overdose)**

1	0 - < 15 minutes	5	12 - < 24 hours
2	15 - < 60 minutes	6	1 - < 7 days
3	1 - < 3 hours	7	7 - 28 days
4	3 - < 12 hours	8	> 1 month
		9	NK

3. **Over what period of time did you take the tablets?**

1	< 5 minutes	4	30 - < 60 minutes
2	5 - < 15 minutes	5	1 - < 3 hours
3	15 - < 30 minutes	6	3 hours +

If longer than 3 hours, RECORD DETAILS.

4. **Did you take all the paracetamol tablets that were available?**

1	All available	3	Minority (<1/2)
2	Majority (> 1/2)	4	About half

How many were available?

RECORD DETAILS: Number of packs, pack size

5. **Where did you get the tablets?**

RECORD ALL (can be more than one)

No 0 Yes 1 NK 9

Already in the home <i>see q.7 below</i>	<input type="checkbox"/>
Bought for chemist	<input type="checkbox"/>
the act*- supermarket	<input type="checkbox"/>
local shop	<input type="checkbox"/>
other outlet (e.g. garage)	<input type="checkbox"/>
specify	
Family member	<input type="checkbox"/>
Friend	<input type="checkbox"/>
GP	<input type="checkbox"/>
Other (specify)	<input type="checkbox"/>

*RECORD ALL DETAILS

Specific Outlet	Quantity	When bought	Who bought	> recommended amount?
-----------------	----------	-------------	------------	-----------------------

If > maximum pack size (32 tablets pharmacy, 16 tablets other outlet):

- 6, **Chemists have been advised not to sell more than 32 tablets /**
Supermarkets /garages /shops have been advised not to sell more than 16 tablets
Did you try to buy any more than that at any one outlet?

No 0 Yes 1 NK 9

If YES:

6.1 **What happened?** (i.e. was there any intervention by salesperson/ pharmacist?)

7. If already in the home:

Where were the tablets at the time of the overdose?

1 Bathroom cabinet	4 Other (specify)
2 Kitchen	5 More than one place
3 Bedroom	9 NK

8. If obtained specifically for the overdose (e.g. from shop, friend):
How long before you took the tablets did you obtain them?

9. **Why were the tablets obtained?**

1 For the OD	9 NK
2 Other reason (specify)	

10. **Why did you choose paracetamol for the o/d?**

RECORD:

1. **People take overdoses for all sorts of reasons. I'm going to show you some cards with different reasons on them. Please could you look through them and choose any which might explain why you took your overdose. You can choose as many as you like.**

YELLOW CARDS

No 0 Yes 1

- I wanted to show how desperate I was feeling
 I wanted to die
 I wanted to escape from an unbearable situation
 I wanted to influence someone
 I wanted to make someone feel sorry
 I wanted to get relief from a terrible state of mind
 I wanted to find out whether someone really loved me
 I wanted to get help

- 11.1 **Were there any other reasons?**

No 0 Yes 1

IF YES, RECORD:

12. **Before you took the tablets, what did you think the physical effects of taking an overdose of paracetamol might be?**

SPECIFY:

13. **I'm going to show you some cards which show possible outcomes from taking an overdose – please could you choose the ONE which best describes what you thought the effects of the paracetamol overdose might have been if you had not received treatment**

BLUE CARDS

- 1 Completely safe
 2 Only mild effects which are short lived
 3 May be harmful but the effects are not lasting
 4 May cause permanent damage or harm
 5 Could kill you if not treated in time
 6 Don't know

If 3, 4 or 5

- 13.1 **What are the dangers?**

- 13.2 **How many tablets of paracetamol do you think could cause death?**

RECORD NUMBER

--	--	--	--

NK 9999

NA (i.e. thought not to be harmful) 8888

14. IF NECESSARY, ASK
Do you think paracetamol could
- 1. Harm a part of your body?**
- | | | | | | |
|----|---|-----|---|----|---|
| No | 0 | Yes | 1 | NK | 9 |
|----|---|-----|---|----|---|
- IF YES, SPECIFY:
- 2. Cause you to lose consciousness?**
- | | | | | | |
|----|---|-----|---|----|---|
| No | 0 | Yes | 1 | NK | 9 |
|----|---|-----|---|----|---|
- 3. Have other effects?**
- | | | | | | |
|----|---|-----|---|----|---|
| No | 0 | Yes | 1 | NK | 9 |
|----|---|-----|---|----|---|
- IF YES, SPECIFY:
15. **What have you been told since you came into hospital about the dangers of an overdose of paracetamol? Who told you?**
- SPECIFY:
16. IF PATIENT HAS INDICATED THAT THEY KNOW THERE ARE HARMFUL EFFECTS:
How quickly do the harmful effects show themselves?
- | | | | |
|---|-------------------------|---|----------------------------------|
| 1 | At once | 3 | > 6 up to 24 hours after the o/d |
| 2 | 1-6 hours after the o/d | 4 | > 24 hours after the o/d |
| | | 9 | DK |
17. IF UNAWARE OF DANGERS:
Sometimes despite treatment paracetamol overdose can cause serious harm, even death
- Knowing this, would you still have taken paracetamol?**
- | | | | | | |
|----|---|-----|---|----|---|
| No | 0 | Yes | 1 | NK | 9 |
|----|---|-----|---|----|---|
18. **In fact when a paracetamol overdose causes harm, this is usually after several days, not at once, and during this period the person remains conscious for most of the time.**
- Knowing this, would you still have taken paracetamol?**
- | | | | | | |
|----|---|-----|---|----|---|
| No | 0 | Yes | 1 | NK | 9 |
|----|---|-----|---|----|---|

19. **Paracetamol packs now have warnings telling you not to take more than the recommended dose, and to seek immediate medical advice in the event of an overdose, even if you feel well.**

Did you notice the warning on the pack?

No 0 Yes 1 NK 9

If YES:

19.1 **Did this have any effect on your decision to take the tablets?**

No 0 Yes 1 NK 9

DETAILS:

If NO:

19.2 **If you had seen it, would you have taken the tablets?**

No 0 Yes 1 NK 9

20. **If the paracetamol pack contained fewer tablets, would you still have taken an overdose?**

No 0 Yes 1 NK 9

If NO:

20.1 **Why not?**

21. PREVIOUS OVERDOSES

Have you taken any overdoses before, or tried to harm yourself in any other way?

(Note incidences of self harm not involving overdose, but record overdoses in detail)

RECORD DETAILS OF OVERDOSES:

Total number:

When Drugs taken

22. IF PREVIOUSLY TOOK PARACETAMOL:
What was the outcome?

If over 5, record information on 1st and last 4 episodes

No 0 Yes 1 NA 8 NK 9

	1 st ever	Most recent	next	next	next
No medical contact					
Non-hospital (e.g. GP)					
General hospital, not admitted					
General hospital, admitted					
Specialist treatment, e.g. liver unit					

23. For MOST RECENT *previous* paracetamol overdose:
 (if not known already) **How many tablets did you take?**

RECORD NUMBER

--	--	--

24. **Did your previous experience affect your decision to use paracetamol this time?**

No 0 Yes 1 NA 8 NK 9

If YES

24.1 **In what way?**

RECORD:

25. **If you ever felt like taking an overdose again, would you take paracetamol?**

No 0 Yes 1 NK 9

Why?

RECORD DETAILS:

26. **Do you know anyone who has taken a paracetamol overdose?**

No 0 Yes 1 NK 9

If YES

26.1 **Who?**

RECORD DETAILS: Who, when, outcome

- 1 Friend
- 2 Relative
- 3 Other (specify)

27. **Have you seen or heard about anything in the media (TV, films, news) about people using paracetamol for overdoses?**

No 0 Yes 1 NK 9

RECORD DETAILS:

If YES

27.1 **Did this influence you in any way?**

28. **Do you use the internet?
Have you come across anything on the internet about paracetamol?**

No 0 Yes 1 NA (don't use internet) 8 NK 9

RECORD DETAILS

If YES

28.1 **Did this influence you in any way?**

Before we finish, do you have any further comments you would like to make which might help us understand a bit more about why you chose this method, or about anything else which has been raised?

Thank you very much

Appendix 5 Hospital interview questionnaire

GENERAL HOSPITAL SERVICES FOR SELF-HARM (SH) PATIENTS

- 1. Hospital:
- 2. Acute Trust:
- 3. Mental Health Trust:
- 4. Job Titles of informants:
 - a) Mental Health Nurse
 - b) Consultant Liaison Psychiatrist
 - c) Mental Health Manager (specify role:...)
 - d) A&E Consultant
 - e) A&E medic
 - f) A&E nurse
 - e) A&E manager
 - f) Mental Health other (specify.....)
 - g) A&E other (specify.....)

5. GENERAL HOSPITAL AND PSYCHIATRY SERVICES

- 5.1 Nature of general hospital
- | | |
|------------------------------------|--------------------------|
| Teaching (University) ¹ | <input type="checkbox"/> |
| DGH ² | <input type="checkbox"/> |
| Other ³ | <input type="checkbox"/> |

(i) Has your psychiatric service changed since 2001?

Yes ¹	No ²
<input type="checkbox"/>	<input type="checkbox"/>

a) If yes, specify

.....

(ii) Comments (What influenced these changes? E.g. Clinical Guidelines, achieving targets etc)

.....

.....

5.2 (i) Is there a psychiatric unit/department within the hospital?

Yes ¹	No ²
<input type="checkbox"/>	<input type="checkbox"/>

(ii) a) Has this changed since 2001/2?

Yes ¹	No ²
<input type="checkbox"/>	<input type="checkbox"/>

b) If yes, specify

(iii) Comments.....

6. SERVICES FOR SELF-HARM (SH) PATIENTS

6.1 (i) Has a system been set up for monitoring the number of [G20] hospital attendances, discharges & referrals of SH patients?

Yes ¹	No ²
<input type="checkbox"/>	<input type="checkbox"/>

item scale: 20

(ii) a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**

(iii) **Has there been any audit of the service for SH patients in the last 2 years?**

[G2
1]

Yes ¹	No ²

item scale: 21

ASK FOR REPORT IF AVAILABLEa) **If yes, describe** (give key findings and recommendations).....

.....

(iv) **Comments**

6.2 (i) **Is there a local specific planning/working group for planning/overseeing the service for self-harm patients?**

[G4]

Yes ¹	No ²

(ii) a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**(iii) **Comments** (who? ask for professional backgrounds / roles of members)

.....

6.3 (i) **Is there a specific consultation or liaison psychiatric service for general medical or surgical patients? ***

Yes ¹	No ²

*Designated service defined as 'where at least one member of staff was based at the general hospital site in a liaison service'

(ii) a) **Has this changed since 2001/2?**

--	--

b) **If yes, specify**(iii) **Comments** (grade, number of staff and hours available

(WTE).....

.....

(iv) **Are patients provided with follow care by this service?**

Yes ¹	No ²

(v) **Describe service** (e.g. therapeutic interventions)

.....

6.4 (i) **Is there a service for self-harm patients only, in addition to the service described in 6.3?'**

Yes ¹	No ²

[G3]

a) **If yes, describe**.....

.....

(ii) a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify** (inc. any decrease in services available).....

.....

(iii) **Are patients provided with follow care with this service?**

Yes ¹	No ²

(iv) **Describe service (e.g. therapeutic interventions)**

.....

.....

6.5 **If there is a psychiatric liaison service or designated self-harm service available:**

Yes ¹	No ²

(i) a) **Are there regular meetings at which these staff discuss specific patients?**

b) **If yes, how frequently are these held?**.....

c) **Has this changed since 2001/2?**

Yes ¹	No ²

d) **If yes, specify**.....

.....

(ii) a) **Are there service planning/strategy meetings for these staff?**

Yes ¹	No ²

b) **If yes, describe**.....

.....

c) **If yes, how frequently are these held?**.....

d) **Has this changed since 2001/2?**

Yes ¹	No ²

e) **If yes, specify**.....

(iii) **Comments**.....

6.6 (i) a) **Do regular service planning meetings take place between the self-harm team/psychiatric service and the general medical service involved in the care of self-harm patients?**

Yes ¹	No ²

b) **If yes, how frequently are these held?**..... [G11]
(at least once per year)

(ii) a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**.....

(iii) **Comments** (who attends these meetings?).....

6.7 (i) **If there IS a A&E liaison and/or specific self-harm service, is this available:**
item scale: 8 (also see comments)

- [G8] a) All the time (day and night)
b) Daytime (weekdays only)
c) Daytime (including weekends)
d) Other (describe)

Yes¹ No²

(ii) a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**.....

(iii) **Comments** (Include arrangements for non-cover periods).....

If there IS a specific A&E liaison and/or self-harm service, go to question 6.10

If there is NO specific A&E liaison and/or SH service:-

6.8 For those patients who are not admitted:

(i) **Are psychosocial assessments provided by:**

- a) On-call psychiatrists or psychiatric staff on a routine basis
b) Staff calling in psychiatrists only for special cases
c) Other (describe)
d) Is 24-hour cover available by one or more of the above?

Yes¹ No²

item scale: 8 (see also 6.7)

(ii) a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**.....

(iii) **Are these arrangements available:**

- [G8] a) All the time (day and night)
 b) Daytime (weekdays only)
 c) Daytime (including weekends)
 d) Other (describe)

Yes ¹	No ²

.....

(iv) a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**.....

(v) **Comments**.....

6.9 If there is no specific SH service:-

For those patients who are admitted:

(i) **Are psychosocial assessments provided by:**

- a) On-call psychiatrists and colleagues on a routine basis
 b) Medics calling in psychiatrists only for special cases
 c) Other (describe)
 d) Is 24 hour cover available by one or more of the above?

Yes ¹	No ²

.....

(ii) a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**.....

(iii) **Are these arrangements available:**

- [G8] a) All the time (day and night)
 b) Daytime 9-5 (weekdays only)
 c) Daytime 9-5 (including weekends)
 d) Other (describe)

Yes ¹	No ²

.....

(iv) a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**.....

(v) **Comment**

6.10 If there is 24 hour access to a psychiatrist, psychiatric nurse or social worker who is able to undertake psychosocial assessments:-

(i) Is immediate advice (within 15 minutes) available over the telephone?
[G9]

item scale: 9

Yes ¹	No ²

(ii) Is emergency attendance, when requested, available within 1 hour?
[G10]

item scale: 10

Yes ¹	No ²
Yes ¹	No ²

(iii) Has this changed since 2001/2?

a) If yes, specify.....

(iv) Comment: (e.g. difference in experience between policy and on the ground)

6.11 Psychosocial assessments carried out by mental health staff:

(i) Do these psychosocial assessments include an assessment of suicide risk?
[G9]

[G9]

(ii) An assessment of needs?

[G9]

(iii) a) Has this changed since 2001/2?

Yes ¹	No ²
Yes ¹	No ²
Yes ¹	No ²

b) If yes, specify.....

(iv) Comment: (how are these assessments carried out e.g. structured proforma/ semi-structured interview/clinical judgement)

.....
.....

(v) Approximately what proportion of self-harm patients attending ED receive a specialist psychosocial assessment?

(vi) Comments.....

(vii) Are there written Guidelines/checklist to assist psychiatric clinicians in the psychosocial assessment of SH patients?
[G7]

item scale: 7

Yes ¹	No ²

a) Has this changed since 2001/2?

Yes ¹	No ²

b) If yes, specify.....

(viii) Comments.....

ASK FOR COPY OF POLICY DOCUMENT AND/OR GUIDELINES/ SCALE/ ASSESSMENT TOOL IF AVAILABLE

[G6] (ix) **Are there ongoing supervision arrangements in place for psychiatric staff members (new and existing) who undertake psychosocial assessments?**

Yes ¹	No ²

a) **If yes, give details**.....

.....

b) **Who undertakes this supervision?**.....

c) **Has this changed since 2001/2?**

Yes ¹	No ²

d) **If yes, specify**.....

(x) **Comments**.....

ASK FOR A COPY OF POLICY DOCUMENT AND/OR GUIDELINES IF AVAILABLE

6.12 Referral & Assessment Policy (irrespective of whether or not there is a specific service)

[G10] (i) **Do staff in the ED have access to Mental Health Patient Information systems when assessing patients?**

Yes ¹	No ²

(ii) **Has this changed since 2001/2?**

Yes ¹	No ²

a) **If yes, specify**.....

(iii) **Comment:**

(iv) **Is there a protocol/guideline/aide memoire for staff in the ED:**

[G1] a) **for the immediate medical management of self-harm?**

Yes ¹	No ²

item scale: 1

[G2] b) **for the immediate assessment of suicide risk and severe mental disorder for self-harm patients?**

Yes ¹	No ²

item scale: 2

[G2] c) **for the assessment of needs of all self-harm patients?**

Yes ¹	No ²

(v) **Has this changed since 2001/2?**

Yes ¹	No ²

a) **If yes, specify**.....

(vi) **Comment** (policy, use of scale, when and by whom assessment takes place)

.....

(vii) **Is there a specific policy regarding who should be referred for assessment to the psychiatric service (e.g. all possible patients to be assessed)?**

Yes ¹	No ²

If yes:

a) **What is this policy?**

[G7] b) **Are there written guidelines/a checklist for use in deciding which patients should be referred to psychiatry?**

Yes ¹	No ²

(viii) **Has this changed since 2001/2?**

Yes ¹	No ²

a) **If yes, specify**

(ix) **Comments:**

[G7] (x) b) **Is there a specific triage system used for patients who self-harm?**

Yes ¹	No ²

If yes:-

a) **What is this policy?**

.....

(xi) **Has this changed since 2001/2?**

Yes ¹	No ²

a) **If yes, specify**

(xii) **Comments:**

[G7] (xiii) a) **Are there written guidelines/a checklist for use in referrals for the ED to community health teams?**

Yes ¹	No ²

(xiv) **Has this changed since 2001/2?**

Yes ¹	No ²

a) **If yes, specify**

(xv) **Comments:**

ASK FOR A COPY OF POLICY DOCUMENT AND/OR GUIDELINES IF AVAILABLE

6.13 Training policy:

(i) **Is there any training for ED staff in the assessment**

Yes ¹	No ²
------------------	-----------------

for psychiatric referral of self-harm patients?

--	--

If yes what is the nature of this training:

a) who is nominated to undertake the training?

.....

b) what is the frequency of this training?

.....

c) How long are the sessions?

.....

d) What are the subjects covered?

.....

.....

e) For whom is it provided?.....

.....

(ii) Has this changed since 2001/2?

Yes ¹	No ²

a) If yes, specify

.....

(iii) Is there any training for general medical/nursing staff on the special admission (short stay)/ED/observation wards, in the assessment for psychiatric referral of self-harm patients?

Yes ¹	No ²

If yes:

a) What is the nature of this training (who is nominated to undertake the training/frequency/how long/subjects covered?)

.....

.....

b) For whom is it provided?.....

(iv) Has this changed since 2001/2?

Yes ¹	No ²

a) If yes, specify

(v) Comments:

vi) **Is there any training for general medical/nursing staff on the general ward (to which most patients are admitted), in the assessment for psychiatric referral of self-harm patients?**

Yes ¹	No ²

If yes:

a) **What is the nature of this training (who is nominated to undertake the training/frequency/how long/subjects covered)?**

.....

b) **For whom is it provided?**

(vii) **Has this changed since 2001/2?**

Yes ¹	No ²

a) **If yes, specify**

(viii) **Comments:**

[G6]

(ix) **Are there ongoing supervision arrangements in place for staff members (new and existing) who undertake psychosocial assessments?**

Yes ¹	No ²

a) **If yes, give details**

.....

b) **Who undertakes this supervision?**

(x) **Has this changed since 2001/2?**

Yes ¹	No ²

a) **If yes, specify**

(xi) **Comments**

6.14 Are rooms which allow for privacy and confidentiality, available for conducting interviews with self-harm patients (and other patients/relatives with emotional problems):

[G12] (i) a) **Either in or close to the A & E department?**
item scale: 12

[G13] b) **Either in or close to the inpatient unit where the majority of patients are assessed?**

item scale: 13

(ii) **Has this changed since 2001/2?**

Yes ¹	No ²

Yes ¹	No ²

a) **If yes, specify**

(iii) **Comments**

6.15 (i) a) **Does a formal referral arrangement exist with Social Services to visit and offer advice to SH patients who have significant social difficulties?**

[G14]
item scale: 14

Yes ¹	No ²

b) **If yes, specify**

(ii) (a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**

(iii) **Comments**

6.16 (i) a) **Can those admitted as inpatients remain in hospital until they have received a psychosocial assessment?**

[G15]
item scale: 15

Yes ¹	No ²

b) **Comments (include reasons if no):**

(ii) a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**

6.17 (i) a) **Is there a policy stating that a patient's GP should be contacted within 24 hours of patient discharge from an ED Department?**

[G16]
item scale: 16

Yes ¹	No ²

b) **Comments** [prompt: any policy regarding contact with GPs/target interval]

c) **Where a patient who has self-harmed is discharged from ED, whose responsibility is it to communicate with the GP?**

d) **Is there a policy for communicating with GP/others for patients who self-discharge prior to assessment?**

.....
 (ii) a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**.....

6.18 (i) a) **Is there a policy stating that a patient's GP should be**
 [G17] **contacted within 24 hours of patient discharge from an**
medical inpatient unit?

Yes ¹	No ²

item scale: 17

b) **Comments:**.....

c) Where a patient who has self-harmed is discharged from an medical inpatient unit, whose responsibility is it to communicate with the GP?

(ii) (a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**.....

6.19 a) **Are self-harm patients routinely given printed material**
 [G18] **about local services, voluntary groups and how to obtain**
access to them?

Yes ¹	No ²

What information is given? (list)

1.....

2.....

3.....

4.....

b) **Has this changed since 2001/2?**

Yes ¹	No ²

c) **If yes, specify**.....

d) **Comments**.....

6.20 a) **Are there any formal links with non-statutory services**
 [G19] **(e.g. self-help groups, the Samaritans)?**

Yes ¹	No ²

item scale: 19

b) **If yes, specify**.....

Aftercare service

6.21 a) Do patients receive routine cards/letters following discharge?

Yes ¹	No ²

b) If yes, specify.....

e) Has this changed since 2001/2?

Yes ¹	No ²

f) If yes, specify.....

g) Comments.....

6.22 (i) a) Are patients offered emergency access to the service in future crises? (e.g. by giving them an emergency (Green) Card)

Yes ¹	No ²

If yes:

b) What form does this take?.....

c) What criteria are used in deciding to whom this should be offered?.....

d) Comments.....

(ii) a) Has this changed since 2001/2?

Yes ¹	No ²

b) If yes, specify.....

.....

6.23 (i) a) Do any of the local health service organisational structures affect the care of SH patients (e.g. different Trusts for psychiatric and general hospital services, psychiatric services on a different site some distance away.....any others)?

Yes ¹	No ²

b) If yes, specify.....

.....

.....

Yes ¹	No ²

(ii) a) **Has this changed since 2001/2?**

--	--

b) **If yes, specify**.....

.....

6.24 (i) a) **Are there special arrangements for young people who have self-harmed?**

Yes ¹	No ²

If yes:

b) **What are these?** (define young people).....

.....

(ii) (a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**.....

.....

ASK FOR A COPY OF THE PROTOCOL, IF AVAILABLE

6.25 a) **Are there any special arrangements for the care of older self-harmers ?**

Yes ¹	No ²

If yes:

b) **What are these?** (define older people).....

.....

a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**.....

.....

ASK FOR A COPY OF THE PROTOCOL, IF AVAILABLE

6.26 a) **Are there any special arrangements for the carers of self-harmers ?**

Yes ¹	No ²

If yes:

b) **What are these?** e.g. given information on services available

.....

.....

a) **Has this changed since 2001/2?**

Yes ¹	No ²

b) **If yes, specify**.....

.....

ASK FOR A COPY OF THE PROTOCOL, IF AVAILABLE

**Diagram of process of hospital care for SH patients (physical site, who seen by and sequence) – has this changed since 2001-2002? – if so, specify.
NB: compiled by research team based on information collected**

DATA FROM OTHER HOSPITAL SOURCES (OBTAIN INFORMATION ON SOURCES AT THE END OF EACH INTERVIEW)

7. AMBULANCE SERVICES

7.1 (i) **Do patients have a choice regarding which ED they are brought to by the ambulance service?**

Yes ¹	No ²

(ii) **Has this changed since 2001/2?**

Yes ¹	No ²

a) **If yes, specify**.....

.....

8. GENERAL HOSPITAL DATA

8.1 (i) **What is the size of the catchment area population?**

a) All ages.....

b) 15 years and over.....

(ii) **What is the predominant distribution of this population?**

a) Urban	
b) Rural	
c) Both Equally	

(iii) **Comments**.....

8.2 (i) **What is the total number of general hospital beds (of all kinds)?**.....

(ii) **What type of special admission (short-stay)/ED/observation beds are there?**

Ward type ¹	No. of beds ²	Inclusion in hospital admission figures ³ (Y/N)
a)		
b)		
c)		
d)		

(iii) **Comments**.....

(iii) **Has the type, number or coding of such beds changed since 2001/2?**

Yes ¹	No ²

a) **If yes, describe**.....

.....

8.3 (i) **Is there a designated ward for the admission of most cases of self-harm?**

Yes ¹	No ²

a) **If yes, describe**.....

.....

(ii) **Does this ward have staff with psychiatric experience?**

Yes ¹	No ²

a) **If yes, give details**.....

.....

(iii) **Comments**.....

8.4 (i) **Total number of attendances in ED in**

a) 2001/02.....

b) 2008/2009.....

(ii) **Comments**.....

(iii) **Total number of SH attendances in ED**.....

a) 2001/02.....

b) 2007/08.....

c) 2008/09.....

(iv) **Comments** (including data sources).....

.....

Appendix 6 Audit form

APP 7: 30/03/10 V2: Please complete for self-harm patients aged 18 and over attending A&E from xx to xx inc

Patient Name: DOB: NHS No:
(for identification by hospital staff only)

A&E attendance number: «HO1_ind» «HO1ep_id»

M¹ F² 2. Age: 3. Date of arrival in A&E: 4. Time of arrival in A&E:
(24h) ^hhour ^{mins}mins

5. Ethnicity: White¹ Black² South Asian³ Other⁴ (specify)..... Not stated⁵

6. a) Method of harm (tick all that apply):
 self-poisoning (drugs)¹ self-poisoning (other)² self-laceration³
(please specify)
 If self-poisoning by drug(s) state name of drug.....

Other method⁴ 6 b) Were recreational substances taken within 6hrs of the attempt? Yes¹/No².....
(please specify) 6 c) (if yes specify) alcohol Yes¹/No²/NK³ rec drugs Yes¹/No²/NK³

7. a) Was the patient admitted to a general hospital bed? Yes¹/No².....
 b) If yes, what type of ward was the patient admitted to:-
 A&E ward/bed¹ General medical/hospital bed² Other³
(short-stay medical assessment unit) (please specify)

8. Was there evidence of a risk assessment by A&E staff? Yes¹/No²/NK³

9. a) Was a specialist psychosocial assessment requested? Yes¹/No²/NK³
 b) If not, please state the reason for this.....

10. a) Did the patient have a specialist psychosocial assessment at any stage during the hospital episode?
 Yes¹/No²/NK³.....
 b) If not, please state the reason for this.....

For the purposes of this audit: A specialist psychosocial assessment is an interview carried out by a member of mental health staff.

11. If the patient had a specialist psychosocial assessment:
 a) When was the assessment carried out?: (i) Date: (ii) Tick time:
(24h) ^hhour ^{mins}mins
 b) Who was the assessment carried out by? :-
 Psychiatrist¹ CPN /MH Liaison Nurse² Other³
(please specify)

12. Had the patient previously self-harmed? Yes¹/No²/NK³.....

13. Is the patient currently in receipt of specialist mental health services? Yes¹/No²/NK³.....

14. a) Has the patient been a psychiatric in-patient in the last 12 months? Yes¹/No²/NK³.....
 b) If yes, how recently? (tick first that applies)
 current <1month ago 1m-<12 months ago NK

15. Follow-up arrangements:-
 a) Was the episode communicated to the GP? Yes¹/No²/NK³.....
 b) Select all follow-up arrangements that apply:
 GP¹ Social Worker² Inpatient psychiatric care³ Outpatient psychiatric care⁴
 CMHT⁵ Other⁶ None⁷ Not Known (NK)
(please specify)

HO1_ind..... «HO1ep_id»

Appendix 7 Topic guide: service user interviews

<p>Introduction</p> <ul style="list-style-type: none"> ❖ <i>Researcher explains research, asks if any queries on Patient Information Sheet, and confirms / takes consent.</i> - <i>Ask informant to mark current feelings on Likert distress scale</i> <p>Background</p> <ul style="list-style-type: none"> - <i>I've been told that you attended the A&E department [name] X weeks / months ago after you had harmed yourself– can you tell me what led up to that? What has been happening with you since then?</i> <ul style="list-style-type: none"> o <i>Probe – health status / follow up regimen</i> - <i>What have been the most difficult times for you since you this time?</i> - <i>How have you coped with these?</i> <ul style="list-style-type: none"> o <i>Probe – have there been times when you felt like self-harming again? What prevented you/might have prevented you self-harming at this time?</i> - <i>[If not mentioned] Can you remember how were you feeling in the first few days/ weeks following discharge/attendance?</i>
<p>Support after leaving hospital</p> <ul style="list-style-type: none"> - <i>What support have you received since your attendance at hospital?</i> <ul style="list-style-type: none"> o <i>Probe – contact with or information received (e.g. contact details) on mental health services/primary care/vol orgs</i> o <i>Probe – what has been helpful / unhelpful?</i> - <i>Do you feel there has been enough support available to you since discharge/attendance?</i> - <i>Do you feel you want to stay in touch with the people that cared for you at the hospital?</i> <ul style="list-style-type: none"> o <i>Probe – why / why not / does this depend on other social networks / contacts?</i>
<p>'Outreach' interventions - introduction</p> <ul style="list-style-type: none"> - <i>Explain we are interested in finding the best ways to stay in touch with people to provide support.</i> - <i>What do you think would be good ways to stay in touch?</i> <ul style="list-style-type: none"> o <i>Probe – letters or cards / telephone / text / email</i> - <i>Which of these ways of staying in contact would you prefer? Do you think others would think the same?</i> - <i>Could such an intervention help someone feeling desperate, or even suicidal? Would it help you? How?</i> <ul style="list-style-type: none"> o <i>Probe – a case of just maintaining a connection, or to be used as a route back to services?</i> - <i>What would be the barriers to you / others using the intervention?</i> - <i>Can you think of any disadvantages of keeping in touch in this way? For you / others.</i> <ul style="list-style-type: none"> o <i>Probe – what could go wrong e.g. concerns over privacy /ongoing reminder of difficult life event / too impersonal</i> - <i>Would this be more / less useful than other services already available? Why?</i>
<p>'Outreach' interventions – detailed comments</p> <ul style="list-style-type: none"> - <i>How often (and when) would it be useful to receive such contacts?</i> <ul style="list-style-type: none"> o <i>Probe – would this vary according to how long since you last self-harmed?</i> - <i>Who do you think the contact should come from?</i> <ul style="list-style-type: none"> o <i>Probe – A&E / inpatient / community carers; psychiatrists / other doctors / other staff; vol. sector org.e.g.Samaritans</i> - <i>What sorts of things should be said in the message to help people when feeling very distressed, or even suicidal?</i> - <i>Distribute mock ups where available</i> <ul style="list-style-type: none"> o <i>Probe: usefulness of wording/format used in previous study –show card and ask for comments</i> o <i>Probe: how personalised should it be / importance of interaction</i>
<p>Crisis contact card</p> <ul style="list-style-type: none"> ❖ <i>Explain another idea is giving people a crisis card they can carry with them. The card would have a number to call to speak to someone at the hospital when they are feeling</i>

<p><i>particularly distressed, or even suicidal or contact details of voluntary organisations</i></p> <ul style="list-style-type: none"> ❖ <i>Distribute mock up and ask for comments.</i> <ul style="list-style-type: none"> ○ <i>Probe: does it matter how it looks (card or letter) colour/size, format/ wording. Who should the contact person be?</i> ○ <i>Whether it is appropriate to make an offer of consultation / inpatient care on the card</i> - <i>Do you think this would be helpful to you / others? How is this going to help you?/How would this be helpful?</i> <ul style="list-style-type: none"> ○ <i>Probe – how would this add to other services?</i> - <i>Can you think of any disadvantages of carrying such a card with you?</i> - <i>If the intervention is to be useful, what should happen once you make the call?</i> <ul style="list-style-type: none"> ○ <i>Probe – who would you want to speak to / a shortcut to care or just someone to talk to?</i> - <i>Would you have found such a crisis card useful at any point since your last attendance at A&E?</i> <ul style="list-style-type: none"> ○ <i>Probe – what happened / how else did you cope with these feelings?</i> - <i>Would this be more or less useful than getting regular contacts from your/a care team, as we discussed above? Why? Which would be better to provide?</i>
<p>Trial organisation [depends on informant]</p> <ul style="list-style-type: none"> - <i>Explain we would like to trial one or two of these interventions, and what this would mean for patients involved (random allocation). One way of testing these things is to give one group of people a card and the other group would not get one. What do you think about that?</i> - <i>Probe: how would you feel about being in the group that had the treatment? / didn't have the treatment?</i> - <i>How do you think people would feel about being involved in this sort of research?</i> <ul style="list-style-type: none"> ○ <i>Probe - What would be good ways of encouraging people to take part in the research?</i> - <i>What would be a good way for us to tell if the person has been helped?</i>
<p>Closure</p> <ul style="list-style-type: none"> - <i>Is there anything else you would like to add?</i> ❖ <i>Ask informant to mark current feelings on Likert distress scale</i> - <i>Thank informant and offer summary of results</i>

Appendix 8 Topic guide: staff focus group

<p>Introduction</p> <ul style="list-style-type: none"> - Researcher explains the background to the research – NIHR study with the aim of designing an intervention to reduce the risk of suicide following. ❖ Researcher takes consent and explains ‘rules of conduct’ of the group – confidentiality, respect.
<p>Background</p> <ul style="list-style-type: none"> - Self-harm is the strongest predictor of suicide risk (at least ½ suicides previously self-harmed). Up 1% of those who presented to A&E with self-harm will die by suicide within a year, (3-5% in the longer term). 1 in 3 repetitions of self-harm occur within a month following attendance at A&E with self-harm. Why do you think this is such a risky time for people? <ul style="list-style-type: none"> o Probe - Do you think risk changes over time? - What services are there currently in place to help people cope at this very vulnerable time? - What type of additional services or interventions [if any] do you think might help people further?
<p>Designing interventions</p> <ul style="list-style-type: none"> ❖ Explain that we asked people recently discharged from A&E department what would be useful ways for them to stay in touch with service providers, and what would help them when they were feeling very distressed, particularly if they were feeling like self-harming. ❖ Having considered the information they provided, we have come up with some suggestions for interventions that could be used to help people. We would like your opinions on these in terms of both their feasibility and their likelihood of being successful.
<p>‘Outreach’ interventions - introduction</p> <ul style="list-style-type: none"> - Do you think staying in touch with people would be useful to reduce risk of repetition of self-harm? Why? <ul style="list-style-type: none"> o Probe: Would it complement / duplicate other services? o Probe: importance of connectedness or just a route back to services? - Would it be more useful to some service users than others? <ul style="list-style-type: none"> o Probe: age / 1st episode vs repeater / engagement with services - What barriers would people in extreme mental distress face to responding to such a contact? - Do you think such an intervention could potentially be harmful to any groups of service users (self-harmed)?
<p>‘Outreach’ interventions – detailed comments</p> <ul style="list-style-type: none"> - What do you think would be best way to contact service users following presentation at A&E after self-harm? <ul style="list-style-type: none"> o Probe: post, telephone, text, email - How often do you think such contacts should be made, and over how long a period? - Who should the contact come from – e.g. A&E / inpatient / community teams, psychiatrists / other doctors / other staff; vol. sector org. - What do you think such a message should say? <ul style="list-style-type: none"> o Probe: how personalised should it be / importance of interaction ❖ Distribute mock ups where available <ul style="list-style-type: none"> o Probe: format / wording - What would be the resource implications of introducing such an intervention (and how would these differ by contact type)? Could it be facilitated within existing resources?
<p>Crisis contact card (if shown to be useful option following analysis of 1:1 interviews)</p> <ul style="list-style-type: none"> ❖ Explain another idea would be to give people a crisis contact card to carry with them. - Do you think this is likely to be useful in reducing suicide risk following discharge? <ul style="list-style-type: none"> o Probe: Would it complement / duplicate other services? - Would it be more useful to some service users than others? <ul style="list-style-type: none"> o Probe: gender/ age / 1st episode vs repeater / engagement with services - What barriers would people in extreme mental distress face to using this intervention? - Do you think such an intervention could potentially be harmful to any groups of service users who have self-harmed? ? ❖ Distribute mock up and ask for comments. <ul style="list-style-type: none"> o Probe: format/ wording. Who should the contact person be? o Whether it is appropriate to make an offer of consultation / inpatient care on the card - What would need to be in place after calling the crisis contact for the intervention to be useful? - What would be the resource implications of introducing such an intervention? Could it be facilitated within existing resources?

Trial organisation

- ❖ *Explain that we want to test one or two of these interventions through a RCT.*
- Which [if any] of the interventions discussed should we try out? (I.e. which is most likely to reduce the risk of repetition of self-harm?)
- Do you think people who have self-harmed would be prepared to take part in such a trial?
 - *Probe: how could we encourage participation?*
- How should we measure whether the intervention has been successful?

Closure - Thank informants and offer summary of results

Appendix 9 Leaflet provided to patients in the intervention group

Self-Harm

- There are many different reasons why people self-harm.
- It may be a way of coping with distress and feelings caused by things that have happened recently or in the past.
- It can provide relief and distraction from unbearable and painful feelings.
- It can be a way of letting others know of your distress, frustration or anger. It may also be a way of confirming how bad you are feeling.
- Self-harm may be a way of surviving for some people or might seem like the only solution at the time.

Help

- You may be unsure whether or not to talk to someone about your feelings. Trying to understand how you are feeling may help prevent such intense distress in the future. You may be able to find different ways of coping.
- This might feel like a brave step to take, but it may provide relief that there is someone you could talk to.
- Starting counselling or therapy can be challenging and distressing. It may take some time to develop trust. However it can provide a safe space to think things through. The aim is to help you reach an acceptance of yourself and learn to cope with or change the struggles you have.
- Some services, such as counselling and psychotherapy, can be accessed through a referral from your GP, which you can request.
- Listed ahead are some sources of information, help and support

Information and Services

- Crisis Point
(up to 6 nights admission for people in crisis)
0161 225 9500
- Self Harm Awareness and Recovery for Everyone (SHARE) 0161 226 5412
Support group meets Tuesdays 6-8pm at Zion Centre, Hulme, Manchester.
selfhelpselfharmgroup@gmail.com
- Manchester Women's Self-Harm Support 0161 226 0787
42nd Street
832 0170
(for young people aged between 15-25). 0161
- Manchester Brook
(up to 25yr olds)
0161 237 3001
- The Roby Centre
(Counselling)
0161 257 2653
- St Mary's Centre (counselling for people who have been sexually assaulted)
0161 276 6515
- Stockport Mind
(Self-help group, meets Wednesdays 7-8.30pm) www.stockportmind.org.uk

Helplines:

NHS Direct
0845 4647



SAMARITANS
0161 236 8000



SANE
SANE Line

0845 767 8000

(18:00 to 23:00 or email saneline@sane.org.uk)

Domestic Violence Helpline
0808 200 0247

**Websites:**

National Self-Harm Network
www.nshn.co.uk

Self-Harm
And Related Issues
www.siar1.co.uk



www.selfinjury.org.uk



www.thesite.org
(16-24 yr olds)



Preventing young suicides
www.papyrus-uk.org

Manchester Mind
0161 272 8205

www.mind-in-manchester.org.uk

Additional Services

MANCHESTER
CITY COUNCIL

Benefit Helpline 0800 882200

Bereavement Centre, MRI
0161 276 4109

Citizens Advice Bureau
0161 834 9844

Community Alcohol Team 0161 882 1300

Eating Disorders Group 0161 232 7312

Families and Children Information
Line 0800 083 7921

George House Trust
(HIV positive)
0161 274 4499

Lesbian & Gay Foundation
0161 235 8035

Manchester Advice 0161 234 5600

Manchester Debt Advice Service
0161 234 5678

Patient Advice and Liaison Service
0161 918 4047

RELATE 0161 872 0303

Advice and Support

Following attendance at Accident & Emergency Dept

Appendix 10 Example letter for contact intervention

Dear «Salutation»,

This is just a note to see how you are getting on. We hope things are going well for you and if so, that they will continue to do so.

We hope that if you made contact with any of the organisations on the leaflet we previously sent you, you found them helpful.

With best wishes,

Clinical Researcher

On behalf of the research team at the University of Manchester and Manchester Mental Health and Social Care Trust

Appendix 11 Topic guide: post-intervention participant interviews

<p>Introduction</p> <ul style="list-style-type: none"> ❖ <i>Researcher explains research, asks if any queries on PIS, and confirms / takes consent.</i> ❖ <i>Ask informant to mark current feelings on Likert distress scale</i>
<p>Background</p> <p>What has it been like for you since you presented at hospital at the time you were recruited to this study?</p> <ul style="list-style-type: none"> ○ <i>Prompt informant on their self-harm history and whether this has changed over the study period</i> ○ <i>Prompt informant on their experience of care since attending A&E department (positive, negative?)</i>
<p>Experience of recruitment</p> <ul style="list-style-type: none"> - How did you feel about being approached to take part in the study <p><i>Prompts:</i></p> <ul style="list-style-type: none"> ○ <i>What made you agree?</i> ○ <i>Was there anything that could have been done better?</i>
<p>Experience of telephone contact(s)</p> <ul style="list-style-type: none"> - How did you feel about receiving the telephone contacts? <p><i>Prompts:</i></p> <ul style="list-style-type: none"> ○ <i>Timing of contact.</i> ○ <i>Were there any problems with getting the phone calls. Can you give me any specific examples?</i> ○ <i>Could it have been done better? How?</i> ○ <i>What were the positive aspects? Can you give me any specific examples?</i> <ul style="list-style-type: none"> - What did you think about who contacted you? <p><i>Prompts:</i></p> <ul style="list-style-type: none"> ○ <i>What were the positive aspects?</i> ○ <i>Did you have any problems with the person who phoned you- what were they?</i> <ul style="list-style-type: none"> - What about what they said ? <p><i>Prompts:</i></p> <ul style="list-style-type: none"> ○ <i>In what way was it helpful/unhelpful. Can you give me any specific examples?</i> ○ <i>Could it have been done better? How?</i> ○ <i>Is there anything else you would have liked to have discussed?</i>
<p>Usefulness of the information and advice leaflet</p> <ul style="list-style-type: none"> - How did you feel about receiving the leaflet? <p><i>Prompts:</i></p> <ul style="list-style-type: none"> ○ <i>What were the positive aspects? Did you use it? Can you give me any specific examples?</i> ○ <i>Did it add to your knowledge about available support services?</i> ○ <i>Were there any problems with the leaflet? E.g. Information not comprehensive enough; not relevant; difficulty in contacting organisations listed</i> ○ <i>Could it have been done better? How? E.g. appearance (size, colour, layout) , content (additional services)</i> ○ <i>Did you keep the leaflet? Why not? Explore possible issues of availability(e.g. did they want to obtain another one)</i>
<p>Experience of letters</p> <ul style="list-style-type: none"> - How did you feel about receiving the letters? <p><i>Prompts:</i></p> <ul style="list-style-type: none"> ○ <i>Were they helpful – in what way? E.g. contact / route into help</i> ○ <i>Can you give me any examples of specific occasions where you were pleased / displeased when a letter arrived in the post?</i>

<ul style="list-style-type: none"> ○ <i>What did you do with the letters?</i> - What would have made the letters more useful to you? <p><i>Prompt:</i></p> <ul style="list-style-type: none"> ○ <i>How might we improve the letters?</i>
<p>Format</p> <ul style="list-style-type: none"> - What did you think about the content of the letters? <ul style="list-style-type: none"> ○ <i>Prompts: wording ok; reminder of contact details for main source of support helpful / accurate?</i>
<p>Frequency and duration</p> <ul style="list-style-type: none"> - What did you think about how often the letters came/ how long they came for? <p><i>Prompts:</i></p> <ul style="list-style-type: none"> ○ <i>Are the letters delivered at about the right frequency – too often / not often enough?</i> ○ <i>Did you receive the letters for long enough?</i> ○ <i>Would it have been helpful to have the option to continue to receive them?</i>
<p>Letters and the reduction of self harm</p> <ul style="list-style-type: none"> - Did receiving these telephone calls and letters alter your behaviour at all? <ul style="list-style-type: none"> ○ <i>Probe: influence your decision to make contact with support services?</i> ○ <i>Probe: What might they have done otherwise?</i> - If you were feeling very distressed, could receiving one of these letters encourage you to get in touch with sources of support? <ul style="list-style-type: none"> ○ Why / why not? ○ What about for others? ○ Do you think they might be useful to you or someone else if they were considering harming themselves?
<p>Problems and barriers</p> <ul style="list-style-type: none"> - Was there anything upsetting about receiving these letters? <ul style="list-style-type: none"> ○ <i>Probe: did they make you feel worse?</i> ○ <i>Probe: did they go astray/go to the wrong person</i> - Would it be more useful to some groups than others? Why is that? <ul style="list-style-type: none"> ○ Can you think of any improvements to the intervention?
<p>Other specific issues</p> <ul style="list-style-type: none"> - Which aspect of this service (telephone calls and letters) was most useful to you?
<p>Closure</p> <ul style="list-style-type: none"> - Is there anything else you would like to add? ❖ <i>Ask informant to mark current feelings on Likert distress scale</i> ❖ <i>Thank informant.</i>

Appendix 12 Emergent themes from post-intervention participant interviews

Theme	Illustrative quote
Engagement with services	<p><i>Interviewer: 'Okay so you see creative support, is that the only service that you see?'</i></p> <p>Participant 1: 'I've seen the people at creative support and that's it'</p> <p>Participant 2: 'I was under the crisis team ... and they were really good helping me'</p> <p>Participant 3: 'I've been all right since I was in [inpatient psychiatric unit], I'm okay now, I'm a lot better'</p>
Needs too great/intervention not meeting needs as has to come from self	<p>Participant 1: 'there's only so much anyone else can do, you know it's my illness and I have to deal with it the best I can'</p> <p>Participant 1: 'if I'm feeling as though I'm on my own I can always get them [the letters] out and read them again'</p>
Useful signposting/promoting help-seeking behaviour (telephone contact)	<p>Participant 1: 'He [Clinical Researcher] was good, he was very helpful'</p> <p>Participant 1: 'he told me to ring the Samaritans for help you know, rather than be on my own and just suffer, and that's what I've started doing'</p> <p>Participant 3: 'she [Clinical Researcher] asked me about what I like doing and you know I can be with my friends and could talk about that and it's good you know, it keeps me occupied'</p>
Leaflet did not register or already received literature on support	<p><i>Interviewer: 'you got a leaflet as well ... an advice leaflet – do you remember that?'</i></p> <p>Participant 1: 'I remember getting it but I don't remember what was on it'</p> <p>Participant 2: 'to be truthful, no cos I get that many letters'</p> <p>Participant 2: 'to be honest I have got something like that [leaflet]'</p> <p>Participant 3: 'No I don't remember that one'</p>
Effect of letters/telephone contact: mitigates against loneliness, provides extra support, calming, prevents further self-harm	<p>Participant 1: 'Yeah I like them and save them [letters], and when I receive one, you know, it makes me realise that there are people out there that can help me and I'm not totally on my own and people are trying to help me'</p> <p>Participant 2: 'I keep all my letters ... I get them to read for appointments and stuff'</p>

Theme	Illustrative quote
Practical issues relating to letters: easy to read, timing (good intervals, wanted them to continue for a longer time), letters good because they could be kept	Participant 3: 'it was a nice talk, yeah it was ... it was good when I was receiving the calls but I've not had none since'
	<i>Interviewer: 'How did you feel when you received them [letters]?'</i>
	Participant 3: 'Relaxed'
	Participant 2: 'It did me good ... it was good to have that extra support, it's a good idea'
	Participant 1: 'They certainly made me feel calmer, knowing there are people out there who are actually trying to help me'
	Participant 1: '[when] I was getting phone calls or letters or spoke to creative support, that would make me, you know, that would make me stop myself [self-harming]'
	Participant 1: 'they were not too complicated, and they were easy to read'
	Participant 2: 'I like them [the letters] and it was all right easy to read'
	Participant 1: 'I think it was very well designed and very well done'
	Participant 1: 'I think they could have gone on longer'
	Participant 1: 'they were good and they came at good intervals, then again, some people might not want that, for me, I like contact by phone or by letter cos it helps me, and I don't mind how much I get letter or phone calls'
	Participant 1: 'Yeah I like them and save them, and when I receive one, you know, it makes me realise that there are people out there that can help me and I'm not totally on me own and people are trying to help me'
	Participant 1: 'the letters were very useful because I do not throw anything away ... so if I'm feeling as though I'm on my own I can always get them out and read them again'
<i>Interviewer: 'what was it about them you think, that you liked?'</i>	
Participant 3: 'It was the words and the, what she put in it'	

Appendix 13 Letters used for contact intervention

Week 1 letter to service users discharged to a community mental health team

Dear

It has been a short time since you were on [name of ward]. We know that the time after discharge can be difficult for people so wanted to drop you a line.

We are writing to you to remind you that a member of your community mental health team [name of team] should be contacting or visiting you within the next 7 days and that if things get difficult you can contact them on [number]. You can talk to a member of the team about any areas of your life that are causing you concern (e.g. money or housing problems), not just mental health issues.

If things get difficult outside 9 a.m. to 5 p.m. and at weekends you can contact the [team name] on [number].

Enclosed is a leaflet that we have put together to provide you with some information about other services that might be of interest to you. These include telephone support lines and support groups.

With best wishes,
[name of ward manager]
On behalf of the ward team

Week 2 letter to service users discharged to a community mental health team



Dear

We are writing to you as a way of keeping in touch and to remind you of the services that are available to you.

A member of your community mental health team should have now contacted you. We hope this worked out for you. If things get difficult you can contact them on [number].

Outside 9 a.m. to 5 p.m. and at weekends you can contact the [team name] on [number].

With best wishes,

[name of ward manager]
On behalf of the ward team

Appendix 14 Intervention leaflet

Support & Advice

Telephone helplines for people in distress or in need of emotional support



Mindline
Tel: 0808 808 0330
Wednesdays to Sundays
8pm - midnight

Saneline
Tel: 0845 767 8000
7 days a week
6pm - 11pm



Sane also provide information and advice on mental health problems:-
Tel. 020 7375 1002 or www.sane.org.uk (a discussion board is available) or you can email with queries (response can take up to 5 working days) on sanemail@sane.org.uk



Samaritans
Tel: 0117 983 1000
24hrs. 7 days a week

National Samaritans number (reduced rate):
08457 90 90 90

www.samaritans.org/bristol

Some local support groups:



Day or evening meetings take place at 6 different venues across Bristol with two more planned for 2011. Call 0117 941 1123 (weekday mornings 9-12.30) for further information.
www.changesbristol.org.uk
Email: changesbristol@googlemail.com

The Manic Depression Fellowship: a group meets monthly in the Bristol area. For further info, call: 01270 230 260 (daytime) / www.mdf.org.uk

Hearing Voices group (www.bhvn.org.uk):-
Meets every Tuesday 3-4.30p.m. at Bristol Mind, 35 Old Market Street, Bristol, BS2 0E2 - you can just turn up or tel. 0117 973 5142 and ask to speak to Tim or Glenn.

There are support groups in the Bristol area that you may feel suit you better than those shown above. Information is available on them from:

Bristol Mind,
35 Old Market Street, Bristol, BS2 0E2.
www.bristolmind.org.uk Tel: 0117 980 0370
Mon/Wed/Thurs from 9.30 am to 4.45 p.m.
or Well Aware on 0808 808 5252
(9.30 am to 4.30 pm Monday to Friday)

For financial advice:-

Bristol Debt Advice Centre
Tel: 0117 954 3990
(9 a.m. to 5 p.m. Monday to Friday)

For advice on housing:-

Call Bristol City Council advice line on 0117 914 1188 or visit your local Customer Service Point (in Bristol centre at Phoenix Court, Bond Street South, Bristol, BS1 3PH)

or
Call your local Shelter office
on 0344 515 1705.

Shelter's local office is at Kenham House,
Wilder Street, St Pauls, Bristol BS2 8PD

In event of acute mental health crisis:-

The Bristol Crisis Resolution and Home Treatment Team
Tel: 0845 9000 075
(Mental Health services crisis team)

Mashruuca Tala Bixinta Soomaalida waxuu bixiyaa tala bixin sharciiga waafaqan oo Soomaali ah. Waxay kaloo kugu hogaajin karaan adeegyada kale eed u baahan tahay. Fadlan soo wac 0117 941 3889 Isniinta ilaa Khamista si aad ula hadasho tala bixiye Soomaali ah.

The Somali Advice Project offers legal advice in Somali, and can direct Somali people to other services they need. Please call 0117 941 3889 Monday - Wednesday to speak to a Somali advice worker.

Appendix 15 Post-intervention participant questionnaire

Avon and Wiltshire **NHS**
Mental Health Partnership NHS Trust

 University of
BRISTOL



Thank you for taking the time to complete this short questionnaire. In it we ask for your views on the letters you were sent by xx ward after you were discharged. Please tick the relevant boxes below. If you are unhappy about completing any of the questions, please leave them blank.

1) Receiving the letters

Do you remember having received regular letters from the ward after you were discharged?

Yes If yes, go to Question 2

No If no, please return the questionnaire in the envelope provided.

2) a) Do/did you like receiving the letters?

Very much Somewhat Neutral Not very much Not at all

If you would like to, please tell us more about this:-

.....

.....

b) Is there anything that has upset you about receiving the letters?

Yes

No

If you would like to, please tell us more about this:-

.....

.....

3) Wording of the letters

a) Do you like the wording of the letters?

Very much	Somewhat	Neutral	Not very much	Not at all
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you would like to, please tell us more about this:-

.....

.....

4) The leaflet with information on telephone contacts and groups

a) Do you find the leaflet with information on telephone contacts and groups useful?

Very much	Somewhat	Neutral	Not very much	Not at all
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you have used the leaflet to make contact with any of those listed, please tell us about this below

.....

5) The number of letters you received

a) How do you feel about the number of letters you have received?

I would like to have received more	About right	There were too many	I would rather have received none at all
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you would like to, please tell us more about this:

.....

.....

If you would like to make any further comments before doing so, please write them in the space below:-

Thank you for answering the questions. Please return the completed questionnaire to us in the envelope provided.

...

Appendix 16 Public and patient involvement in the research programme

1. Two to three service user collaborators on the programme attended annual programme grant meetings and were active contributors to discussions.
2. There were two service users and a Samaritans' representative on the steering group for the strand of the programme in which we developed and piloted a contact-based intervention aimed at reducing the incidence of fatal and non-fatal self-harm in the period after psychiatric hospital discharge (see *Chapter 8*). One is a co-author on the paper arising from this strand of the research.
3. The contact letters and protocols for patient contact following psychiatric hospital discharge (see *Chapter 8*) were co-produced with the service user member of the research group and had input from a number of patients who had recently been discharged from a psychiatric inpatient unit.
4. Using qualitative methodologies to investigate the views of service users and staff regarding contact-based interventions, we developed a three-stage intervention for people presenting to hospital with self-harm (the process is described in *Chapter 7* and in a paper published in *General Hospital Psychiatry*¹⁷⁰). We interviewed self-harm patients recently discharged from an emergency department, and clinical and voluntary staff from relevant service areas (including a local branch of the Samaritans) took part in a focus group and individual interviews.
5. For the study of contact following self-harm (see *Chapter 7*), a service user and a representative from MIND commented on the design of the study and provided comments and suggestions that were incorporated into the final letters to patients and the telephone interview guide.
6. Service users are members of the advisory groups for the self-harm data collection centres involved in assembling data on non-fatal poisoning. These data were used in the studies of relative toxicity of antidepressants and of the sizes of overdoses of paracetamol in England and Ireland. Service user representatives were able to comment on the studies.
7. Towards the end of the programme, we sought wide public and patient involvement in planning the next phase of the research and our application for further NIHR funding. A 1-day meeting was convened and members of the planning group included service users from several centres (one of whom was a co-applicant on our application for renewed funding), a representative of the Samaritans (Chief Executive), Madeleine Moon MP (chairperson of the All-Party Parliamentary Group on Suicide and Self Harm Prevention), representatives of the ONS (Myer Glickman, Head of Health Analysis; Claudia Wells, Head of Mortality Analysis) and a representative of the MHRA (June Raine, Director of Post Licensing).
8. Throughout the programme, members of the research team engaged with the print and broadcast media and undertook presentations to lay and user groups including national meetings of the Samaritans and Papyrus.

A decorative graphic consisting of numerous thin, parallel green lines that curve from the left side of the page towards the right, creating a sense of movement and depth.

EME
HS&DR
HTA
PGfAR
PHR

Part of the NIHR Journals Library
www.journalslibrary.nihr.ac.uk

This report presents independent research funded by the National Institute for Health Research (NIHR). The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health

Published by the NIHR Journals Library