NZHTA REPORT
12 April 2002

Suicide prevention topic 1:

What kind of follow-up is needed to reduce the risk of repeated suicide attempts/suicide?

A critical appraisal of the literature

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LIST OF TABLES

LIST OF ABBREVIATIONS

AOC	–	awareness of consequences test
c.f.	–	compared with
CI	–	confidence intervals
CPN	–	community psychiatric nurse
CPRS	–	Comprehensive Psychopathological Rating Scale
DSH	–	deliberate self harm
Dx	–	diagnosis
f/u	–	follow-up
IPSST	–	interpersonal problem-solving skills training
ITT	–	intention to treat
MA	–	meta-analyses
MACT	–	manual-assisted cognitive therapy
MEPS	–	means-ends problem solving
Nss	–	not statistically significant
Nssd	–	not statistically significantly different
OCCPI	–	Operational Criteria Checklist for Psychotic Illness
OPC	–	outpatient clinic
OTT	–	optional thinking test
PQRST	–	personal questionnaire rapid scaling technique
POMS	–	profile of mood states
prn	–	as required
RCT	–	randomised controlled trial
RR	–	risk ratio
Rx	–	treatment
SANS	–	Scale for Assessment of Negative Symptoms
SCL-90	–	Symptom Checklist (90 items)
SPS	–	self-perception scale
SR	–	systematic review
SRPS	–	self-rating problem-solving scale
ssd	–	statistically significant difference
UK700	–	UK700 Socio-demographic Schedule
vs	–	versus
WHO	–	World Health Organisation
w.r.t.	–	with respect to

Scope of systematic review of suicide prevention

The development of this systematic review involved consultation between the NZHTA and the Suicide Working Group.

LITERATURE SEARCH

Main search terms

Medline subject terms (MESH terms): suicide, suicide-attempted, self-injurious behavior, recurrence, follow-up studies, aftercare, longitudinal studies, prospective studies, program evaluation, evaluation studies.

Psychinfo subject terms: suicide, attempted suicide, suicide ideation, suicide prevention, posttreatment followup, followup studies, aftercare, psychiatric evaluation, treatment effectiveness evaluation, evaluation criteria, emergency services, crisis intervention services.

Additional keywords: suicid*, parasuicid*, ((second or third or multiple) adj attempt*)), recrudesc*, repeat*, recurren*, emergenc*, repetition, follow up

Note: the range of questions addressed required multiple searches rather than one large search. The above major search terms were supplemented with additional subject headings and keywords appropriate to each individual search.

Principal sources of information

The following databases were searched using the search strategies outlined in **Appendix 1**.

Bibliographic databases

Medline
Embase
Cinahl
Psychinfo
Current Contents
Science/Social Science Citation Index
Index New Zealand

Review databases

Evidence-based medicine reviews
Cochrane Database of Systematic Reviews
DARE
NHS Economic Evaluation Database
Health Technology Assessment Database

The search was restricted to information from 1990 in English. Each research question required a separate literature search.

Note: hand searching of journals, or contacting of authors for unpublished research was not undertaken during the search process.

The complete search strategies are given in **Appendix 1**.

INCLUSION AND EXCLUSION CRITERIA

Inclusion and exclusion criteria were firstly applied to the abstracts captured by the literature searches. Those papers considered for inclusion in the literature appraisal were retrieved and this warranted the exclusion of further papers based on the availability of these in full text.

Peer reviewed studies were considered for this review if they used one of the following study designs:

- systematic review or meta-analysis
- randomised controlled trial (RCT)
- controlled clinical trial (CCT)
- cohort study
- case-control study
- quasi-experimental before and after study
- descriptive study.

Note: the 'grey' literature was included, where appropriate, for New Zealand specific studies looking at special population groups: Maori, Pacific Island, Asian and the elderly.

STUDY INCLUSION CRITERIA

The following criteria was used to **include** studies for appraisal:

- study population are persons presenting following suicide attempt, expressing suicidal ideation, suicide threat
- study set in Emergency Department
- study set in tertiary mental health service
- study published in 1990 or later
- study written in English.
- outcomes considered include:
  - repeat presentations for suicidality
  - repeat suicide attempts
  - mortality from suicide.

STUDY EXCLUSION CRITERIA

The following criteria was used to **exclude** studies from appraisal:

- study population primarily (50% or more) those with deliberate self-harm in the absence of suicide intent
- study population primarily (50% or more) those involved in assisted suicide
- study population primarily (50% or more) presentations for self-mutilation
- study population primarily (50% or more) children 12 years of age and under
- study focus is on the treatment of people with drug/substance abuse or dependence, that is treatment directed to their addiction rather than any suicide attempt
- study population are criminal offenders
- studies on suicide prevention interventions specifically for people with HIV/AIDS
- studies with small numbers of case presentations (one to five cases)
- studies concerned with suicide in homicidal people
- studies concerned with school-based suicide prevention interventions
- studies concerned with economic analyses
- citations which are letters to the editor, comments, editorials, abstract only

- studies where population is primarily a special population with e.g. underlying personality disorder or affective disorder (and therefore potential confounder of study results and treatments).

STUDY SELECTION

Studies were selected for appraisal using a two-stage process. Initially, the titles and abstracts (where available) identified from the search strategy were scanned and excluded as appropriate. The full text articles were retrieved for the remaining studies and these were appraised if they fulfilled the study selection criteria outlined above.

204 papers were identified via the search strategy, 40 retrieved (12 as background only), and four further references were retrieved from cross-references, (two as background only). 30 papers were formally reviewed, 13 papers were included for analysis and 17 excluded.

TABLE 1 (EVIDENCE TABLE)

Summaries of appraisal results are shown in tabular form and include:

- study reference and country
- study design
- study quality grading and evidence level
- study arm description of intervention, service, treatment
- patient inclusion and exclusion criteria
- number of patients included in study sample
- study outcomes and p-values and/or 95% confidence intervals
- comments on the study and its internal validity issues arising from the study appraisal.

P-values unless otherwise stated relate to between group comparisons.

APPRAISAL METHODOLOGY

Articles were formally appraised using the checklist schedules and hierarchy of evidence coding system developed by the Scottish Intercollegiate Guidelines Network (SIGN). Validated criteria were used to appraise the studies selected for review. Key facets of the selected studies (including limitations) were documented in the text. Conclusions were drawn based on the study design and the specific problems associated with individual studies. The evidence presented in the selected studies were assessed and classified according to the SIGN grades of guideline recommendation by the suicide prevention guideline group.

The final grading (1++, 1+ or 1-) code was allocated based upon the study design and study quality.

For a RCT study to receive a 1++ grading the following criteria needed to be fulfilled:

- clearly defined study question
- a clear description of an adequate randomisation design and process
- absence of baseline differences in demographic variables and other potential confounding variables between intervention groups post-randomisation
- an adequate concealment method and use of single blinding in outcome assessment
- outcomes measured in a standard, valid and reliable way
- all study arms treated equally
- adequate statistical power
- an ITT analysis was presented.

Factors (four or more) that consigned studies to a 1- grading included:

- open study
- study groups were not treated equally

- ITT analysis not presented, analysis not based on randomised allocation
- baseline study differences
- outcome assessment not blinded to allocation
- inadequate method or description of randomisation and concealment
- significant omissions or errors in patient demographic information and outcome results.

All other studies were graded as 1+.

Within each grade, papers are presented in alphabetical order according to first author surname.

Study limitations

This question examines suicidal behaviour or suicide as a formal outcome measure in relationship to interventions (follow-up) put in place after initial treatment for a suicide attempt. Other outcomes, such as improvement in depression etc., are included where significant due to the paucity of good data answering this question. Crisis interventions – i.e. therapy or treatment given at the initial (or index) suicide attempt, are not included here but are addressed in question 2.

Table 1 (pages 6-13) contains all included, critically appraised papers with excluded papers (and the reasons for exclusion), bibliography and search strategies presented in the following appendices. Three systematic reviews (two graded 1++, one graded 1+) and 10 randomised control trials (four graded 1+, six graded 1-) are presented in **Table 1 (pages 6-13)**. Papers were excluded for several reasons: for multiple methodological shortcomings which were highly likely to give biased results (four papers), being more relevant for question 2 (four papers), providing level 4 (expert opinion) evidence only (three papers), meeting other specific exclusion criteria (three papers), not addressing the above research question (two papers), or being unable to obtain via Interloan within a three month timeframe (one paper).

Overall, the evidence suggests that no firm conclusions can be reached on the efficacy of a variety of different kinds of follow-up, largely due to the small size of most trials and the variety of interventions and non-standardisation of 'standard' care making it difficult to perform meta-analyses. There is some evidence to suggest that cognitive-behavioural strategies may reduce repeat suicide attempts but it is unknown which sub-groups of patients would most benefit; also any positive effect seen diminishes with follow-up periods of longer than 6-12 months.

Individual study limitations for included and appraised papers are described in the comment section in **Table 1 (pages 6-13)**.

Limitations to the review methodology that need to be considered in developing the suicide prevention guideline, include the restrictions to:

- articles published from 1990 onwards
- the published literature
- English language articles only
- reviewing each study by one researcher only
- study evaluation criteria not covering aspects of statistical methodology such as the appropriateness of the data collected and the statistical tests used to analyse this.

In developing a guideline for suicide prevention, consideration will need to be given to studies published pre-1990. Important articles of interest were published in the pre-1990 time period so methods should be developed by the guidelines group to assess whether the new evidence presented in this review is sufficient to alter any recommendations included in previous evidence-based guidelines.

Restriction to the published literature is likely to lead to bias since the unpublished literature tends to consist of studies not identifying a significant result. Restriction to English language may result in study bias, but the direction of this bias cannot be determined.

None of the articles appraised were set in New Zealand. Therefore, the generalisability of these studies to the New Zealand setting needs to be considered.

The studies were initially selected by examining the abstracts of these articles. Therefore, it is possible that some studies were inappropriately excluded prior to examination of the full text article.

There is a limitation on space in **Table 1 (pages 6-13)**, therefore, study details have been summarised.

This review was conducted over a limited timeframe (December 2001 – April 2002).

Table 1. Evidence table of appraised articles

Title of review: What kind of follow-up is needed to reduce the risk of repeated suicide attempts/suicide?

Study; design type; evidence grading; country	Intervention/ comparison Outcome measure	Criteria for Inclusion/ Exclusion	Results/Outcome	Comments including methodological issues
(Marshall et al. 2001) SR & MA Grade 1++ Country: England	Day-hospital versus outpatient care Outcome measures: engagement with treatment, hospital readmission, clinical outcomes, cost of care	Inclusion: RCTs comparing day-hospital versus outpatient care for psychiatric disorders. Exclusion: Majority of patients <18 or >65 years old; primary diagnosis of substance abuse or organic brain disorder.	Weak evidence suggests day treatment programmes superior c.f. out-patient care w.r.t. improved psychiatric symptoms. No evidence day care centres were better or worse than outpatient treatment on any clinical or social outcome variable, or costs. One trial's evidence suggests transitional day hospital may be superior c.f. out-patient care w.r.t. keeping patients engaged in Rx. Authors' conclusions: Limited evidence to justify day treatment and transitional day hospital; no current evidence to support provision of day care centres. Further research needed to clarify situation.	• Cochrane Library review • day hospital care defined as day treatment programme, day care centre or transitional day hospital • reviewed 5 databases (Cochrane Library, Medline, Embase, CINAHL and PsychLit) + f/u of reference lists + personal communications • no included studies specifically examined post-suicide attempt patients.

Table 1. Evidence table of appraised articles *(continued)*

Study; design type; evidence grading; country	Intervention/ Comparison Outcome measure	Criteria for Inclusion/ Exclusion	Results/Outcome	Comments including methodological issues
(Hawton et al. 2001) SR & MA Grade 1++ Country: England	Various interventions: (see results) vs standard care and other comparisons Outcome mesure: Repetition of DSH (f/u period < or = 2 years)	Inclusion: RCTs comparing specific treatments to standard care for DSH Exclusion: Suicidal ideators with no self-harm; depression with DSH as an outcome variable; DSH due to mental disability (handicap).	Interventions examined included: ▪ problem solving therapy vs standard aftercare ▪ intensive intervention plus outreach vs standard aftercare ▪ emergency card vs standard aftercare ▪ dialectical behaviour therapy vs standard aftercare ▪ inpatient behaviour therapy vs standard aftercare ▪ same therapist both in hospital and aftercare vs different therapists ▪ general hospital admission vs discharge ▪ flupenthixol vs placebo ▪ antidepressants vs placebo ▪ long-term therapy vs short-term therapy ▪ home-based therapy vs standard aftercare. Authors' conclusions: Insufficient evidence to indicate the most effective forms of treatment for DSH. No guidelines can be recommended. Most trials small with insufficient power. The term 'standard care' is usually not defined or described increasing methodological uncertainty. Paroxetine may be of benefit in reducing recurrence but further research is necessary.	• Cochrane Library review • definition of DSH inclusive of suicide attempts plus episodic self-mutilation • reviewed 4 databases (CCTR, Medline, PsychLit, Embase) + full-text search of 10 specialist journals + f/u reference lists +personal communications • 23 RCTs included, meta-analyses performed where possible.

Table 1. Evidence table of appraised articles *(continued)*

Study; design type; evidence grading; country	Intervention/ Comparison Outcome measure	Criteria for Inclusion/ Exclusion	Results/Outcome	Comments including methodological issues
(van der Sande et al. 1997) SR & MA Grade 1+ Country: The Netherlands	Various interventions (see results) vs standard care Outcome measure: Repetition of suicide attempt	Inclusion: Prospective RCTs of Rx and/or improved compliance following suicide attempt. Exclusion: Study population mentally handicapped &/or learning disabilities.	A ssd found for cognitive-behavioural treatment (4 studies, total 122 patients, overall RR= 0.5, CI 0.3-0.8). No ssd found for: 1. psychiatric management of poor compliance vs standard care 2. guaranteed in-patient shelter 3. psychosocial crisis intervention	• 2 databases searched (Medline, PsychLit) + lateral reference search. 31 papers retrieved, 15 met inclusion criteria. Papers grouped into 4 categories • methodological concerns: homogeneity of categories, publication bias (negative results less likely to be published). • cognitive-behavioural treatment result based on 4 studies (including Salkovskis et al 1990 and McLeavey et al 1994 reviewed below), only 1 with an intention to treat analysis, small numbers in each study, high baseline rates of previous suicide attempts in study possibly biasing the results towards high risk patients only, less effect seen with longer f/u.
(Allard et al. 1992) RCT Grade 1+ Country: Canada	Intensive intervention vs standard care Outcome measure: repetition of suicide attempt (f/u period 2 years) Recruitment period from January 1985 to June 1997	Inclusion: Patients presenting to A&E following genuine suicide attempt; resident in hospital catchment area; speaking French or English. (Age range not specified). Exclusion: No fixed abode; already under care; physical disability preventing attendance; unable to consent; sociopathy; suicide attempt>1 week ago.	76 in intervention group, 74 in standard care; only statistically significant difference experimental group more likely to have 1 or more contacts/week with friend (p=0.0284). No difference found in repeat attempt rates: 22 in intervention arm (35%) and 19 (30%) in standard care group made at least one suicide attempt in the 2 year f/u period (p=0.568, nss)	• intensive intervention = 18xappointments over 1 year inc. 1xhome visit + reminders • standard care = treatment by another staff team at the hospital • researchers blinded to allocation • various types of therapy offered: psychoanalysis, psychosocial, drug or behavioural • 24/150 (16%) lost to f/u • no ssd in demograhics between groups, except control group has significantly greater weekly contact with a friend. Age range of participants not specified: text states 46% of experimental group & 51% of control group were age >30 years, 43% and 46% male respectively.

Table 1. Evidence table of appraised articles *(continued)*

Study; design type; evidence grading; country	Intervention/ comparison Outcome measure	Criteria for Inclusion/ Exclusion	Results/Outcome	Comments including methodological issues
(Evans et al. 1999b) RCT Grade 1+ Country: England	Standard care+green card vs standard care Outcome measure: Repetition of self-harm (f/u 6 months) Patents recruited between November 1994 and July 1996 (2 hospitals), October 1995 to July 1996 (1 hospital)	Inclusion: All adult patients (age range not specified) admitted to hospital following episode of self-harm. Exclusion: Normal residence outside hospital catchment areas; multiple contacts and non-compliant with psychiatric services in preceding 6 months; severe aggression; drug and/or alcohol misuse leading to multiple presentations and non-compliance.	1301 admitted for DSH, 390 patients self-discharged/discharged before psychiatric assessment, 57 met exclusion criteria and 27 erroneously excluded. 827 randomised into standard care+green card (417) and standard care only (410). Nss found in repeat self-harm rates between the two groups.	• experimental care = standard care + green card with hospital-based 24-hour telephone crisis counselling contact details • this study differs from Morgan et al 1993 (see below) in that Evans et al was not restricted to first-time self-harm patients only, and the green card did not include an offer of hospital admission • self-harm includes deliberate self-poisonings and deliberate self-mutilations • methodological concerns: possible biases include the large number 390/1301 not entered into study and the repetition of DSH being assessed by repeat hospital attendance rates only (episodes treated by GP and/or no treatment sought not recorded), findings not necessarily generalisable to patients not admitted overnight • average age for green card group = 32.9 years, 42% male; average age for control group = 33.8 years, 47.3% male. Other demographics between groups described as similar but not tested.
(Morgan et al 1993) RCT Grade 1+ Country: England	Standard care + green card vs standard care alone Outcome measure: Repetition of self harm (f/u period 1 year) No recruitment period provided	Inclusion: No previous episode of deliberate self-harm; resident in hospital catchment area; (age range not specified).	101 in experimental group, 111 in control group nss reduction in repetition of self harm in experimental group c.f. control (p value not provided).	• experimental care = standard care + a green card (information for contacting doctor in emergency) • standard care= A&E assessment and referral to primary healthcare team or psychiatric admission • good randomisation process and both groups' characteristics similar • only study to limit enrolment to first episode of self harm • no ssd in demographics between groups. Mean age of experimental group = 27.4 years, mean age control = 32.5 years.

Table 1. Evidence table of appraised articles *(continued)*

Study; design type; evidence grading; country	Intervention/ comparison Outcome measure	Criteria for Inclusion/ Exclusion	Results/Outcome	Comments including methodological issues
(Van Heeringen et al. 1995) RCT Grade 1+ Country: Belgium	Intervention (Community nurse visits) vs standard care Outcome measures: Repetition of suicide attempt and compliance with therapy at 1 year f/u Recruitment period from January 1987 to December 1990	Inclusion: Patients presenting to A&E following suicide attempt; age 15 years or greater; living in Gent. Exclusion: Requiring in-patient therapy (other than ICU admission).	516 patients (258 in each group). nss reduction in repetition of suicidal behaviour in intervention group at 1 year f/u. No ssd in compliance with outpatient aftercare after discharge. Compliance after home visit of non-conpliant patients significantly increased from 42.5% to 51.2% by intervention (p=0.010, no CI).	• aim of study to improve compliance; reduction of suicide attempts a secondary outcome • No ssd in demographics between groups. Mean age for intervention group 34 years and 39.2% male; Mean age 33.8 and 47.7% male in control group • non-compliance defined as not attended first out-patient appointment or (if no appointment made) seeking an appointment within 1 week of hospital attendance • intervention = 1xhome visit by community nurse to assess reasons • study design does not allow analysis of home visits to define reasons for improved compliance • Data on suicidal behaviour repetition only available for 75.8% of patients.
(Evans et al. 1999a) RCT Grade 1- Country: England	Manual-assisted cognitive therapy (MACT) vs standard care Outcome measures: Primary: repetition of self-harm attempts by 6 months f/u Secondary: anxiety and depression assessments at 6 months f/u No recruitment period specified	Inclusion: Presenting to 1 of 2 A&Es following episode of self-harm; age 16 to 50 years; personality disturbance within flamboyant, histrionic or emotionally unstable cluster; at least 1 previous episode of DSH in last year. Exclusion: Primary diagnosis of organic, alcohol or drug, or schizophrenia groups.	42 referrals, 36 eligible for inclusion, 2 refused. 34 patients enrolled, 18 in MACT, 16 in standard care. 2 controls lost to f/u. Analysis done on remaining 32. Rate of repeat DSH was lower in MACT group but was nssd. Depressive symptomatology significantly lower in MACT group at 6 months f/u (p=0.03, no CI).	• MACT= 2-6 sessions with therapist+6 small booklets+homework • repetition of self-harm attempts assessed by the Parasuicide History Interview + hospital admissions/contacts records • methodological problems: small sample sizes fail to reach number necessary as defined by power analysis (60 required), standard treatment may differ between the two hospitals, no intention to treat analysis, little analysis of group demographics to ensure these truly represented the study population • authors regard this as a pilot study.

Table 1. Evidence table of appraised articles *(continued)*

Study; design type; evidence grading; country	Intervention/ comparison Outcome measure	Criteria for Inclusion/ Exclusion	Results/Outcome	Comments including methodological issues
(Guthrie et al. 2001) RCT Grade 1- Country: England	4 x weekly interpersonal therapy vs standard care Outcome measures: Assessment at baseline, treatment 1 month & 6 months f/u via Beck scales for suicidal ideation and depression, patient satisfaction and self-reported further attempts at self-harm. No recruitment period specified	Inclusion: Patients between 18-65 years presenting to A&E following deliberate self-poisoning. Exclusion: No exclusion criteria presented other than those refusing to consent to enter trial.	▪ 58 in intervention group, 61 in standard care ▪ significantly fewer further attempts at self-harm reported by intervention group than standard care (9% vs 28%, p=0.009) ▪ significant improvement at 6 months in Beck suicidal ideation scale in intervention group c.f. standard care (mean 7.9 vs 12.8; p=0.005) over 1 month treatment period (mean 10.3 vs 12.4; p=0.22). Difference remained significant when adjusted for marriage rates of two groups ▪ significant improvement at 6 months in Beck depression scale in intervention group c.f. standard care (mean 18.8 vs 23.7; p=0.037) over 1 month treatment period (mean 21.3 vs 22.8; p=0.55). Difference did not remain significant when adjusted for marriage ▪ significantly higher patient satisfaction scores (mean 6.6 vs 4.4, p=0.015) with intervention group.	• examines patients attempting suicide via deliberate self-poisoning only • standard care=A&E assessment by doctor or psych. reg+ f/u (1/3 psych out-patient; 2/3 GP) • possible biases include participants having a higher degree of psychiatric morbidity than average self-poisonings, intervention group more likely to be married, non-specific effects of intervention, and self-reporting biases from patients w.r.t. further episodes of harm • demographics described as similar between groups, mainly well-matched except for marriage rates (higher in standard care) at baseline and f/u after losses to f/u (20% overall) • trial was too recent to be included in the Cochrane review by Hawton et al. 2001.
(McLeavey et al. 1994) RCT Grade 1- Country: Eire	Interpersonal Problem Solving Skills Training (IPSST) vs standard care Outcome measures: Repetition of self-poisoning rates at 1 year + multiple assessment tools at 6 months (MEPS, OTT, AOC, SRPS, SPS, Becks Hopelessness Scale) No recruitment period specified	Inclusion: Presenting to A&E following deliberate self-poisoning; age between 15-45; no history of psychosis, mental retardation, organic cognitive disorder; no inpatient admission or day-patient care required; IQ score >80 on Mill Hill Vocabulary Scale.	91 met inclusion criteria, 39 completed treatment with full assessments 19 in IPSST group, 20 in standard care. No difference in repetition of self-poisoning rates at 1 year f/u. Persistently higher SRPS and SPS scores in IPSST group (p<0.01, no CI provided) at 6 months f/u.	• examines patients attempting suicide by self-poisoning only • IPSST= weekly 1 hour sessions for 5-6 weeks+homework assignments • standard care= brief (no. of sessions not given) problem-orientated therapy • multiple methodological problems: small sample sizes, no intention to treat analysis, no power analysis, inclusion criteria (espec need for admission/day-care) may bias group towards less unwell patients, self-poisoning repetition rates only assessed via GP and hospital records (true rate may be higher) • no ssd in select demographic variables reported. Mean age in IPSST group 23.6 years and 21% male; mean age in control group 25.3 years and 30% male. Large difference in history of self poisoning episodes, IPSST group 47% and control group 25%.

Table 1. Evidence table of appraised articles *(continued)*

Study; design type; evidence grading; country	Intervention/ comparison Outcome measure	Criteria for Inclusion/ Exclusion	Results/Outcome	Comments including methodological issues
(Motto and Bostrom 2001) RCT Grade 1- Country: USA	Intensive letter contact vs no contact Outcome measures: suicidal deaths at 5 and 15 year f/u Recruitment period between 1969 and 1974	Inclusion: Admission to 1 of 9 hospitals for 'a depressive or suicidal state', refusal of therapy &/or discontinuation of therapy within 30 days of discharge. Exclusion: Acceptance and continuing compliance with discharge therapy plan; unable to be traced; death within 30 days post-discharge.	From 3005 admissions, 1939 were continuing treatment and 223 could not be contacted. 845 enrolled, 389 into contact group and 454 into no contact group. Lower death rates in contact group in all of the first 5 years but no ssd seen in suicidal death rates after 5 or 15 years between the two groups. Fewer deaths in contact group up to 2 years and was ssd from non-contact group (p=0.043, no CI provided).	• patients reviewed for eligibility 30 days post-hospital discharge • intensive letter contact= monthly for 4 months + every 2 months for 8 months + every 3 months for 4 years • Mean age 34.4 years and 42% male in contact group, mean age 32.8 years and 46% male in non-contact group • multiple methodological problems: few exclusion criteria, unstated if all admissions considered for enrolment, no description of randomisation process, unstated if researchers blind to allocation, limited (age and gender) analysis of sample groups' characteristics (espec. note no analysis for severity and/or type of psychiatric morbidity) or sample groups similarity to original population, no power analysis.
(Salkovskis et al. 1990) RCT Grade 1- Country: England	Cognitive behaviour problem solving vs standard treatment Outcome measures: Further DSH episodes at 6 and 18 month f/u + multiple psychometric assessment tools (Becks suicidal ideation, depression and hopelessness scales, POMS, PQRST) up to 1 year f/u No recruitment period specified	Inclusion: Presenting to A&E following suicide attempt, age 16-65, living in hospital catchment. Exclusion: Requiring immediate psychiatric care, psychotic, organic brain disorder.	Unstated number eligible, 20 enrolled – 12 in experimental arm, 8 in control. Repetition of DSH (just) significantly lower at 6 months for intervention arm (p=0.049, no CI); nssd at 18 months between groups. Intervention group showed greater improvement on psychometric tests c.f. control (some ssds – results not presented here due to small sample sizes).	• intervention=5x1 hour cognitive problem-solving sessions over 6 months+/-homework assignments prn • control's standard treatment not described • Mean age 26.4 years and 42% male in experimental group, mean age 28.5 years years and 62% male in control group • further DSH episodes assessed by reviewing hospital records only – rates may be higher. • multiple methodological problems: very small sample sizes, no description of randomisation process, no power analysis, researchers not blinded to randomisation, gender distribution unequal across samples.

Table 1. Evidence table of appraised articles *(continued)*

Study; design type; evidence grading; country	Intervention/ comparison Outcome measure	Criteria for Inclusion/ Exclusion	Results/Outcome	Comments including methodological issues
(Van der Sande et al. 1997) RCT Grade 1- Country: The Netherlands	Intensive in-patient & community intervention vs standard care. Outcome measures: Repeat suicide rates at 1 year and patient wellbeing as assessed by the SCL-90 and Hopelessness scale. Patients recruited between January 1993 and March 1995	Inclusion: Patients over 15 presenting to A&E following suicide attempt not in need of subsequent psychiatric hospitalisation. Exclusion: Habitual self-mutilation; alcohol or drug addiction or heavy user; accidental overdose; non-Dutch speaking; non-resident in hospital catchment area; psychiatric hospitalisation; imprisonment; acute psychosis; recurrent consultations with hospital liaison psychiatry.	140 in intensive intervention group, 134 in standard care. No ssd in repeat suicide rates between the two groups (p=0.59). No ssd in psychological wellbeing ratings between the two groups.	• suicide attempt defined using WHO multicentre study in parasuicide definition • intensive intervention= short hospital admission (1-4 days) + out-patient therapy with CPN using problem-solving therapy + 24 hour access to unit • standard care = A&E assessment and treatment (not described). 25% admitted, 75% referred to OPC • f/u assessments done at 3, 6 and 12 months • high drop-out of participants particularly in control group (33% intensive intervention and 64% control drop-out by 12 months) • analysis done on 'intention to treat' basis • nssd in demography between the two groups. For intervention group, mean age 35.8, male 34.3%. Control group mean age 36.6, male 34.3% • possible biases: researchers not blinded to allocation, conclusions about wellbeing only based on 60% of group • no power analysis performed.

Appendix 1

SEARCH STRATEGIES

Cinahl

1982 to November Week 5 2001

1. suicide/ or suicidal ideation/ or suicide, attempted/ (1974)
2. suicid$.tw. (2182)
3. parasuicid$.tw. (38)
4. or/1-3 (2840)
5. exp Emergency Service/ (3913)
6. Psychiatric Emergencies/ (207)
7. emergenc$.tw. (10649)
8. or/5-7 (12473)
9. recurr$.tw. (2732)
10. repeat$.tw. (4127)
11. repetition.tw. (454)
12. Recurrence/ (1567)
13. ((second or third or multiple) adj attempt$).tw. (18)
14. follow up.tw. (9505)
15. or/9-14 (16927)
16. 4 and 8 and 15 (15)
17. from 16 keep [selected references]
18. program evaluation/ (4450)
19. 4 and 18 (15)

Cinahl

1982 to December Week 2 2001

1. suicide/ or suicidal ideation/ or suicide, attempted/ (1982)
2. suicid$.tw. (2193)
3. parasuicid$.tw. (38)
4. Injuries, Self-Inflicted/ (222)
5. or/1-3 (2855)
6. or/1-4 (3026)
7. recurr$.tw. (2765)
8. repeat$.tw. (4158)
9. repetition.tw. (457)
10. recurrence/ (1588)
11. ((second or third or multiple) adj attempt$).tw. (18)
12. or/7-11 (8226)
13. 5 and 12 (47)
14. 6 and 12 (53)
15. 14 not 13 (6)
16. from 15 keep [selected references]

Current Contents

1993 Week 26 to 2001 Week 51

1. suicid$.mp. (13063)
2. parasuicid$.mp. (347)
3. 1 or 2 (13124)
4. (emergency or emergencies).mp. (25900)
5. 3 and 4 (401)
6. limit 5 to english language (350)
7. limit 6 to (editorial material or letter) (7)
8. case report.mp. (28174)
9. 6 not (7 or 8) (338)
10. repeat$.mp. (113293)
11. repetition.mp. (8000)
12. ((second or third or multiple) adj attempt$).mp. (343)
13. or/10-12 (120685)
14. 9 and 13 (26)
15. from 14 keep [selected references]

Embase

1988 to 2001 Week 48

1. Suicide/ (7759)
2. suicidal behavior/ or self poisoning/ or suicide attempt/ (5556)
3. suicid$.tw. (13438)
4. parasuicid$.tw. (272)
5. or/1-4 (16823)
6. Recurrent Disease/ (19444)
7. recrudesc$.tw. (769)
8. repeat$.tw. (112909)
9. repetition.tw. (4147)
10. ((second or third or multiple) adj attempt$).tw. (385)
11. or/6-10 (135875)
12. follow up/ (78890)
13. aftercare/ (461)
14. case control study/ (6168)
15. evaluation/ (6492)
16. follow up.tw. (168550)
17. effective$.tw. (292019)
18. health care quality/ (18205)
19. or/12-18 (490318)
20. emergency health service/ or emergency ward/ or emergency treatment/ (12326)
21. 5 and 11 and 19 (139)
22. 5 and 20 (298)
23. 5 and (20 or 12 or 13) (753)
24. 21 or 22 or 23 (837)
25. limit 24 to (english language and yr=1990-2002) (681)
26. from 25 keep [selected references]

Embase

1988 to 2002 Week 04

1. suicide/ or suicidal behavior/ or self poisoning/ or suicide attempt/ (12693)
2. suicid$.tw. (13669)
3. parasuicid$.tw. (274)
4. Automutilation/ (1876)
5. or/1-3 (17098)
6. or/1-4 (18568)
7. recurrent disease/ (19963)
8. recrudesc$.tw. (781)
9. repeat$.tw. (114375)
10. repetition.tw. (4210)
11. ((second or third or multiple) adj attempt$).tw. (389)
12. or/7-11 (137915)
13. 5 and 12 (550)
14. 6 and 12 (625)
15. 14 not 13 (75)
16. limit 15 to (english language and yr=1990-2002) (59)
17. from 16 keep [selected references]

Medline

1966 to October Week 5 2001

1. suicide/ or suicide, attempted/ (23444)
2. suicid$.tw. (23132)
3. parasuicid$.tw. (399)
4. or/1-3 (31869)
5. repeat$.tw. (167180)
6. Recurrence/ (87657)
7. recrudesc$.tw. (1395)
8. repetition.tw. (6488)
9. ((second or third or multiple) adj attempt$).tw. (530)
10. or/5-8 (256728)
11. Follow-Up Studies/ (248456)
12. follow up.tw. (243083)
13. aftercare/ (4419)
14. longitudinal studies/ (29768)
15. prospective studies/ (140167)
16. program evaluation/ (15241)
17. evaluation studies/ (115384)
18. effective$.tw. (430284)
19. "outcome and process assessment (Health Care)"/ (11815)
20. or/11-19 (1025039)
21. 4 and 10 and 20 (305)
22. 4 and (11 or 14 or 15) (1662)
23. 4 and 10 (954)
24. 21 or 23 (954)
25. case report/ (1031559)
26. (letter or editorial).pt. (578847)
27. 24 (954)
28. limit 27 to (english language and yr=1990-2002) (549)
29. 28 not (25 or 26) (476)
30. 29 keep [selected references]
31. from 29 keep [selected references]
32. limit 22 to (controlled clinical trial or randomized controlled trial) (42)
33. controlled clinical trials/ or randomized controlled trials/ (22156)

34. exp case-control studies/ (199993)
35. cohort studies/ (33002)
36. 22 and (33 or 34 or 35) (252)
37. 32 or 36 (289)
38. limit 37 to (english language and yr=1990-2002) (237)
39. 38 not (25 or 26) (234)
40. 39 not 29 (208)
41. from 40 keep [selected references]
42. Emergency Services, Psychiatric/ (1300)
43. (42 and 4) not (29 or 40 or 25 or 26) (149)
44. limit 43 to (english language and yr=1990-2002) (58)
45. from 44 keep [selected references]
46. emergency medical services/ or emergency service, hospital/ (33310)
47. (46 and 4) not (29 or 40 or 25 or 26 or 44) (298)
48. limit 47 to (english language and yr=1990-2002) (117)
49. from 48 keep [selected references]
50. 30 or 31 or 41 or 45 or 49 (127)

Medline

1966 to January Week 2 2002

1. suicide/ or suicide, attempted/ (23665)
2. suicid$.tw. (23436)
3. parasuicid$.tw. (400)
4. exp Self-Injurious Behavior/ (3546)
5. or/1-4 (35217)
6. or/1-3 (32238)
7. repeat$.tw. (169819)
8. recurrence/ (88691)
9. recrudesc$.tw. (1416)
10. ((second or third or multiple) adj attempt$).tw. (540)
11. or/7-10 (255494)
12. 6 and 11 (939)
13. 5 and 11 (1077)
14. 13 not 12 (138)
15. limit 14 to (english language and yr=1990-2002) (76)
16. from 15 keep [selected references]

Psycinfo

1967 to December Week 1 2001

1. suicide/ or attempted suicide/ or suicidal ideation/ or suicide prevention/ (12847)
2. suicid$.tw. (19130)
3. parasuicid$.tw. (495)
4. or/1-3 (19409)
5. recurren$.mp. (6098)
6. exp "RELAPSE (DISORDERS)"/ or exp RELAPSE PREVENTION/ (3019)
7. repeat$.tw. (22612)
8. repetition.tw. (5297)
9. ((second or third or multiple) adj attempt$).tw. (66)
10. or/5-9 (35136)
11. posttreatment followup/ (820)
12. exp FOLLOWUP STUDIES/ (12527)
13. exp AFTERCARE/ (648)
14. exp PSYCHIATRIC EVALUATION/ or exp TREATMENT EFFECTIVENESS EVALUATION/ or exp EVALUATION CRITERIA/ (5815)
15. effective$.tw. (94187)
16. or/11-15 (110323)
17. emergency services/ or crisis intervention services/ (2275)
18. emergenc$.tw. (12117)
19. or/17-18 (12731)
20. 4 and 19 and (10 or 16) (116)
21. 18 and 4 (669)
22. 20 or 21 (690)
23. limit 22 to (english language and yr=1990-2002) (352)
24. exp case report/ (22054)
25. limit 23 to ("0700 editorials" or 1200 letter) (12)
26. 23 not (24 or 25) (325)
27. from 26 [selected references]
28. from 26 keep [selected references]
29. 27 or 28 (64)

Psycinfo

1967 to January Week 3 2002

1. suicide/ or attempted suicide/ or suicidal ideation/ or suicide prevention/ (12923)
2. suicid$.tw. (19263)
3. parasuicid$.tw. (496)
4. self destructive behavior/ or self inflicted wounds/ or self mutilation/ (2433)
5. or/1-3 (19542)
6. or/1-4 (21482)
7. repeat$.tw. (22780)
8. repetition.tw. (5332)
9. ((second or third or multiple) adj attempt$).tw. (66)
10. recurren$.tw. (6124)
11. exp "relapse (disorders)"/ or exp relapse prevention/ (3046)
12. or/7-11 (35375)
13. 5 and 12 (794)
14. 6 and 12 (888)
15. 14 not 13 (94)
16. limit 15 to (english language and yr=1990-2002) (58)
17. from 16 keep [selected references]

Appendix 2

INCLUDED, CRITICALLY APPRAISED STUDIES

Allard, R., Marshall, M., & Plante, M. C. (1992). Intensive follow-up does not decrease the risk of repeat suicide attempts. *Suicide & Life-Threatening Behavior*, 22, 303-314.

Evans, K., Tyrer, P., Catalan, J., Schmidt, U., Davidson, K., Dent, J., Tata, P., Thornton, S., Barber, J., & Thompson, S. (1999a). Manual-assisted cognitive-behaviour therapy (MACT): a randomized controlled trial of a brief intervention with bibliotherapy in the treatment of recurrent deliberate self-harm. *Psychological Medicine*, 29, 19-25.

Evans, M. O., Morgan, H. G., Hayward, A., & Gunnell, D. J. (1999b). Crisis telephone consultation for deliberate self-harm patients: effects on repetition. *British Journal of Psychiatry*, 175, 23-27.

Guthrie, E., Kapur, N., Mackway-Jones, K., Chew-Graham, C., Moorey, J., Mendel, E., Marino-Francis, F., Sanderson, S., Turpin, C., Boddy, G., & Tomenson, B. (2001). Randomised controlled trial of brief psychological intervention after deliberate self poisoning. *BMJ*, 323, 135-138.

Hawton, K., Townsend, E., Arensman, E., Gunnell, D., Hazell, P., House, A., & van Heeringen, K. (2001). Psychosocial versus pharmacological treatments for deliberate self harm. (Cochrane Review). In: *The Cochrane Library*, Issue 4. Oxford Updated Software.

Marshall, M., Crowther, R., Almaraz-Serrano, A., Creed, F., Sledge, W., Kluiter, H., Roberts, C., Hill, E., Wiersma, D., Bond, G. R., Huxley, P., & Tyrer, P. (2001). Systematic reviews of the effectiveness of day care for people with severe mental disorders: (1) acute day hospital versus admission; (2) vocational rehabilitation; (3) day hospital versus outpatient care. *Health Technology Assessment (Rockville, Md)*, 5, 1-75.

McLeavey, B. C., Daly, R. J., Ludgate, J. W., & Murray, C. M. (1994). Interpersonal problem-solving skills training in the treatment of self-poisoning patients. *Suicide & Life-Threatening Behavior*, 24, 382-394.

Morgan, H. G., Jones, E. M., & Owen, J. H. (1993). Secondary prevention of non-fatal deliberate self-harm. The Green Card study. *British Journal of* Psychiatry, 163, 111-112.

Motto, J. A., & Bostrom, A. G. (2001). A randomized controlled trial of postcrisis suicide prevention. *Psychiatric Services*, 52, 828-833.

Salkovskis, P. M., Atha, C., & Storer, D. (1990). Cognitive-behavioural problem solving in the treatment of patients who repeatedly attempt suicide. A controlled trial. *British Journal of Psychiatry*, 157, 871-876.

Van der Sande, R., Buskens, E., Allart, E., van der Graaf, Y., & van Engeland, H. (1997). Psychosocial intervention following suicide attempt: a systematic review of treatment interventions. *Acta Psychiatrica Scandinavica*, 96, 43-50.

Van der Sande, R., Va Rooijen, L., Buskens, E., Allart, E., Hawton, K., Van der Graaf, Y., & Van Engeland, H. (1997). Intensive in-patient and community intervention versus routine care after attempted suicide. A randomised controlled intervention study. *British Journal of Psychiatry*, 170, 35-41.

Van Heeringen, C., Jannes, S., Buylaert, W., Henderick, H., De Bacquer, D., & Van Remoortel, J. (1995). The management of non-compliance with referral to out-patient after-care among attempted suicide patients: a controlled intervention study. *Psychological Medicine*, 25, 963-970.

Appendix 3

EXCLUDED, RETRIEVED STUDIES

The following papers were reviewed but rejected for inclusion in the analysis:

Abba, K., Church, E., & Webster, J. (1999). What happens to patients who attend A and E with deliberate self-harm? - Tracking the follow-up they receive. *Journal of Clinical Governance*, 7, 68-73.

Descriptive audit only, no interventions tested.

Aoun, S. (1999). Deliberate self-harm in rural Western Australia: results of an intervention study. *Australian & New Zealand Journal of Mental Health Nursing*, 8, 65-73.

Poorly designed and described retrospective cohort study with historical control. Multiple methodological faults, most notably missing data in intervention arm for 124 (60%) participants.

Brent, D. A. (1997). The aftercare of adolescents with deliberate self-harm. *Journal of Child Psychology & Psychiatry & Allied Disciplines*, 38, 277-286.

Retrieved for background purposes only, non-systematic review, level 4 evidence only.

Donaldson, D., Spirito, A., Arrigan, M., & Aspel, J. W. (1997). Structured disposition planning for adolescent suicide attempters in a general hospital: Preliminary findings on short-term outcome. *Archives of Suicide Research*, 3, 271-282.

Multiple methodological faults: small sample size, no clear eligibility criteria, retrospective 3 year old historical control with no analysis presented to ensure samples comparable, non-validated assessment tool, no statistically significant results.

Francis, E., Marchand, W., Hart, M., Carter, A., Schinka, J., Feldman, A., & Ordorica, P. (2000). Utilization and outcome in an overnight psychiatric observation program at a veterans affairs medical center. *Psychiatric Services*, 51, 92-95.

Crisis intervention – reviewed under topic 2.

Greenfield, B., Hechtman, L., & Tremblay, C. (1995). Short-term efficacy of interventions by a youth crisis team. *Canadian Journal of Psychiatry*, 40, 320-324.

Poorly designed with multiple methodological faults.

Kurz, A., & Moller, H.J. (1995). Attempted suicide: efficacy of treatment programs. *Psychiatry & Clinical Neurosciences*, 49 (Suppl 1), S99-S103.

Unable to obtain paper via Interloan after three months of multiple requests.

Linehan, M. M., Heard, H. L., & Armstrong, H. E. (1993). Naturalistic follow-up of a behavioral treatment for chronically parasuicidal borderline patients. *Archives of General Psychiatry*, 50, 971-974.

Examines borderline personality disorder patients only.

Links, P. S., Balchand, K., Dawe, I., & Watson, W. J. (1999). Preventing recurrent suicidal behaviour. *Canadian Family Physician*, 45, 2656-2660.

Non-systematic review, level 4 evidence only.

MacLeod, A. K., Tata, P., Evans, K., Tyrer, P., Schmidt, U., Davidson, K., Thornton, S., & Catalan, J. (1998). Recovery of positive future thinking within a high-risk parasuicide group: results from a pilot randomized controlled trial. *British Journal of Clinical Psychology*, 37, 371-379.

Largely narrative description of study with little methodological and statistical detail. Poorly described randomisation process. No data presented re. repeat suicide rates excluding a brief aside that these rates were nss lower in the intervention group.

Morgan, V. & Coleman, M. (2000). An evaluation of a liaison service in an A&E department. *Journal of Psychiatric and Mental Health Nursing*, 7, 391-397.

Crisis intervention – reviewed under topic 2.

Randell, B. P., Eggert, L. L., & Pike, K. C. (2001). Immediate post intervention effects of two brief youth suicide prevention interventions. *Suicide & Life-Threatening Behavior*, 31, 41-61.

School-based intervention programme.

Rhodes, A. E., & Links, P. S. (1998). Suicide and suicidal behaviours: implications for mental health services. *Canadian Journal of Psychiatry - Revue Canadienne de Psychiatrie*, 43, 785-791.

Non-systematic review, level 4 evidence only.

Rotheram-Borus, M. J., Piacentini, J., Cantwell, C., Belin, T. R., & Song, J. (2000). The 18-month impact of an emergency room intervention for adolescent female suicide attempters. *Journal of Consulting & Clinical Psychology*, 68, 1081-1093.

Crisis intervention – reviewed under topic 2.

Rotheram-Borus, M. J., Piacentini, J., Van Rossem, R., Graae, F., Cantwell, C., Castro-Blanco, D., Miller, S., & Feldman, J. (1996). Enhancing treatment adherence with a specialized emergency room program for adolescent suicide attempters. *Journal of the American Academy of Child & Adolescent Psychiatry*, 35, 654-663.

Crisis intervention – reviewed under topic 2.

Rudd, M. D., Rajab, M. H., Orman, D. T., Joiner, T., Stulman, D. A., & Dixon, W. (1996). Effectiveness of an outpatient intervention targeting suicidal young adults: preliminary results. Journal of Consulting & Clinical Psychology, 64, 179-190.

Formal outcome measures did not include repeat suicide attempts.

Walsh, E., Harvey, K., White, I., Higgitt, A., Fraser, J., & Murray, R. (2001). Suicidal behaviour in psychosis: prevalence and predictors from a randomised controlled trial of case management: report from the UK700 trial. *British Journal of Psychiatry*, 178, 255-260.

Examines psychotic patients only.

Appendix 4

BACKGROUND PAPERS

The following papers were retrieved for background purposes only:

Anonymous (2001). Summary of the practice parameters for the assessment and treatment of children and adolescents with suicidal behavior. *Journal of the American Academy of Child & Adolescent Psychiatry*, 40, 495-499.

Appleby, L., Morriss, R., Gask, L., Roland, M., Lewis, B., Perry, A., Battersby, L., Colbert, N., Green, G., Amos, T., Davies, L., & Faragher, B. (2000). An educational intervention for front-line health professionals in the assessment and management of suicide patients (The STORM Project). *Psychological Medicine*, 30, 805-812.

Brent, D. A. (1997). The aftercare of adolescents with deliberate self-harm. *Journal of Child Psychology & Psychiatry & Allied Disciplines*, 38, 277-286.

Brent, D. A., & Shaffer, D. (2001). Assessment and treatment of the youthful suicidal patient. *Annals of the New York Academy of Sciences*, 932.

Burns T., Creed F., Fahy T., Thompson S., Tyrer P., & White I. (1999). Intensive versus standard case management for severe psychotic illness: a randomised trial. *Lancet*, 353, 2185-2189. (Reviewed for further details of the methodology of Walsh et al. 2001.)

Catenaccio R. (1995). Crisis intervention with suicidal adolescents: a view from the emergency room. In: *Zimmerman JK, Asnis G*, (Eds). Treatment Approaches with Suicidal Adolescents. New York: John Wiley & Sons.

Doyle B.B. (1990). Crisis management of the suicidal patient. In: *Blumenthal S. J., Kupfer D. J.*, (Eds). Suicide over the life cycle: risk factors, assessment, and treatment of suicidal patients.. Washington, D.C.: American Psychiatric Press, 1990:381-423.

Griswold, T. (2000). Psychotherapy in emergency situations. *Sabo, A. N. & Havens L.* (Eds). The Real World Guide to Psychotherapy Practice. Harvard, MA: Harvard University Press.

Hickey, L., Hawton, K., Fagg, J., & Weitzel, H. (2001). Deliberate self-harm patients who leave the accident and emergency department without a psychiatric assessment: a neglected population at risk of suicide. *Journal of Psychosomatic Research*, 50, 87-93.

Kleespies, P. M., Deleppo, J. D., Gallagher, P. L., & Niles, B. L. (1999). Managing suicidal emergencies: Recommendations for the practitioner. *Professional Psychology - Research & Practice*, 30, 454-463.

Litman, R. E. (1991). Predicting and preventing hospital and clinic suicides. *Suicide & Life-Threatening Behavior*, 21, 56-73.

Rives, W. (1999). Emergency department assessment of suicidal patients. *Psychiatric Clinics of North America*, 22, 779-787.

Thienhaus, O. J., & Piasecki, M. (1997). Emergency psychiatry: Assessment of suicide risk. *Psychiatric Services*, 48, 293-294.

UK700 group. 1999 Comparison of intensive and standard case management for patients with psychosis. *British Journal of Psychiatry*, 174, 74-78 (reviewed for further details of the methodology of Walsh et al. 2001).