Cost Effectiveness of a Community-Based Crisis Intervention Program for People Bereaved by Suicide

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Abstract. *Background:* Postvention services aim to ameliorate distress and reduce future incidences of suicide. The StandBy Response Service is one such service operating in Australia for those bereaved through suicide. Few previous studies have reported estimates or evaluations of the economic impact and outcomes associated with the implementation of bereavement/grief interventions. *Aims:* To estimate the cost-effectiveness of a postvention service from a societal perspective. *Method:* A Markov model was constructed to estimate the health outcomes, quality-adjusted life years, and associated costs such as medical costs and time off work. Data were obtained from a prospective cross-sectional study comparing previous clients of the StandBy service with a control group of people bereaved by suicide who had not had contact with StandBy. Costs and outcomes were measured at 1 year after suicide bereavement and an incremental cost-effectiveness ratio was calculated. *Results:* The base case found that the StandBy service dominated usual care with a cost saving from providing the StandBy service of AUS $803 and an increase in quality-adjusted life years of 0.02. Probabilistic sensitivity analysis indicates there is an 81% chance the service would be cost-effective given a range of possible scenarios. *Conclusion:* Postvention services are a cost-effective strategy and may even be cost-saving if all costs to society from suicide are taken into account.

Keywords: cost effectiveness, suicide, postvention

Background

Around 2,000 deaths are attributable to suicide in Australia each year (Australian Bureau of Statistics, 2012) and for every death it is estimated that at least six people are directly affected (Shneidman, 1973). This has serious repercussions for society, not only in terms of the enormous human suffering but also the major economic consequences such as increased medical care, time off work, and lost productivity.

The StandBy Response Service provides an intervention to people bereaved by suicide in multiple centers throughout Australia via a 24-hr crisis response telephone number. The service provides face-to-face outreach and telephone support offered by a professional crisis response team and referral to other community services matched to need. The service also supports emergency and community service providers and the broader community, aiming to build community capacity in suicide postvention and prevention. StandBy only responds to those people who have requested the service and is available at any time after the loss.

There are few studies that have reported estimates or evaluations of the economic impact and outcomes associated with the implementation of bereavement/grief in-

terventions, particularly in relation to suicide bereavement (Foster, Porter, Ayers, Kaplan, & Sandler, 2007; Genevro & Miller, 2010; Onrust, Smit, Willemse, van den Bout, & Cuijpers, 2008).

One study compared a bereavement intervention for widows (mostly over the age of 55 years) in The Netherlands with that of "care as usual" (i.e., provision of a written brochure about depression; Onrust et al., 2008). The intervention involved a series of home visits by trained volunteers and service coordinators to high-risk widows in which the volunteer provided emotional support and a better understanding of the grieving process. The results of the study showed that, while there were no significant differences in health-related quality of life over time between the groups, participants who received the intervention used health-care services less than those in the control group did. Another economic evaluation of a bereavement intervention (Foster et al., 2007) used an analysis of the Family Bereavement Program (Sandler et al., 2003) to illustrate the key issues and challenges in economic evaluation of preventive interventions. In this study, the researchers focused primarily on measuring and analyzing the costs associated with the intervention, with little discussion regarding the economic value of any benefits stemming from the intervention. Other researchers (Genevro & Miller, 2010)

have developed a framework for evaluating the emotional and economic costs of bereavement and bereavement care in health-care settings. The framework demonstrates the stages of a proposed bereavement intervention and the potential economic costs associated with these stages. Overall, evidence about the effectiveness and efficiency of bereavement interventions generally, including suicide postventions, remains scarce (Onrust et al., 2008).

The aim of this study was to measure the incremental costs and incremental benefits of the StandBy Response Service as compared to usual care when assessed from a societal perspective.

Method

Study Population

People who had experienced suicide bereavement were invited to participate in a study of health and economic outcomes. Participants were recruited from current and previous StandBy clients and a control group was drawn from people who responded to advertisements in national newspapers and social media sites. Participants filled out an online questionnaire using Qualtrics™ survey software or a hard copy if requested. The questionnaire collected information on demographics, contact with StandBy, psychological distress, suicidality, quality of life, health services usage, and work performance. Cases (those who had received the postvention service) were matched with controls (those who had not received the service), using the time since bereavement and the relationship to the deceased to ensure comparability of groups. Given the much larger number of control group participants ($n = 670$), the 90 intervention participants were matched with controls at a ratio of 4:1 to maximize the power of the study in detecting differences between groups based on accepted methodology (Taylor, 1986). Intervention participants were on average 45.7 (15.8) years old, 82% were female, and 65% listed their relationship to the deceased as a close relative (spouse, parent, sibling, or child). Control participants were slightly younger, average 40.1 (13.4) years, 88% female, with 50% listing their relationship to the deceased as a close relative. Approximately equal percentages of participants in both groups were employed (42% StandBy and 44% control). Based on the Kessler Psychological Distress Scale (K6) – score > 12 (Furukawa, Kessler, Slade, & Andrews, 2003) – the proportion of people in severe postbereavement distress was 34% for those who had received the StandBy Response Service and 47% for the control group.

Study Design

A cost-utility analysis (CUA) was conducted to compare the StandBy Response Service versus usual care (control

group). Economic evaluations compare the additional costs of an intervention program such as StandBy with the incremental benefits it generates. Cost-effectiveness can be presented with a clinical outcome (e.g., the cost per fall prevented or cost per cardiac event averted), or with a common metric such as quality-adjusted life years (QALYs). QALYs are a measure that combines both quantity of time lived and the quality of life (measured as utility) in that time period. For example, 1 year in perfect health is worth 1.0 QALYs and 1 year in less than perfect health scores less than 1.0 – the lower the score, the worse the perceived quality of life is. The advantage of CUA is that it allows comparison of the economic efficiency of health-care programs across interventions (e.g., counseling services with falls prevention strategies or cancer treatment) and/or across settings (community or hospital).

The results of a CUA are presented as an incremental cost-effectiveness ratio (ICER), represented in Equation 1.

$$ICER = \frac{Cost_{standby\ service} - Cost_{usual\ care}}{Effectiveness_{standby\ service} - Effectiveness_{usual\ care}}$$

Costs to society, including direct costs of providing the service and costs for health care, as well as the value of lost production from morbidity or premature death, are included. Data were drawn from people bereaved by suicide aged 18 years and over accessing the StandBy service who consented to be in the study and from a control group drawn from the general Australian population. The group studied included close relatives, distant relatives, friends, and work colleagues of the deceased person.

Design of the Markov Model

An economic model was constructed to synthesize the available data on the bereaved person's pathway of recovery, their quality of life outcomes, and costs over time. Markov models are used in economic analysis to model events where the timing of these events is important (Sonnenberg & Beck, 1993). A Markov model is able to simulate the real-world situation, where bereaved people enter different stages of grieving at different times along their journey of recovery, and is able to predict what impact different interventions are likely to make. The model used in this analysis was constructed in Treeage™ 2011 using states derived from Bonanno's model of grieving events (Bonanno, 2004; Bonanno & Mancini, 2008; Bonanno, Westphal, & Mancini, 2011). Based on this theory of grieving, the five states of the Markov model are as follows: (1) acute grief (the first week immediately following bereavement); (2) normal bereavement; (3) complicated grief; (4) recovered state; and (5) death. Figure 1 demonstrates the possible transitions in the model.

Possible transitions are denoted in Figure 1 by the arrows. Both *death* and *complicated grief* are absorbing states. This means that once an individual transitions to these states there is no possibility of leaving them. We acknowledge that people may recover from complicated
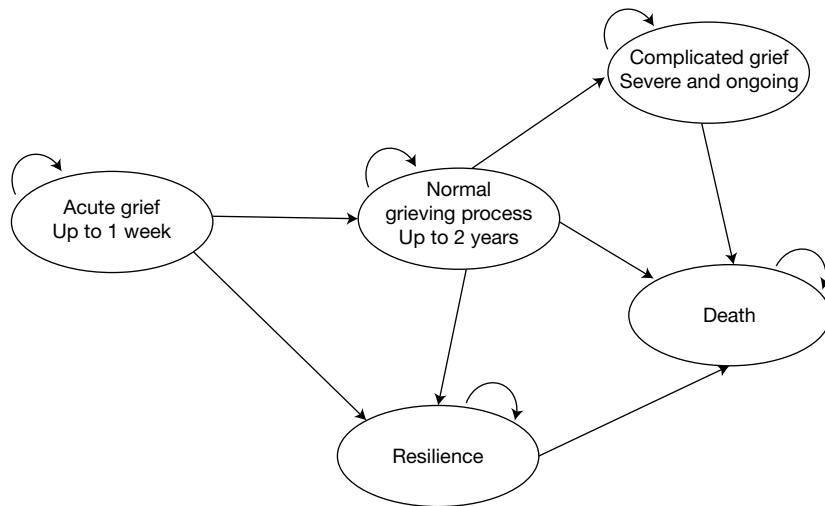
Figure 1. Model used in the economic analysis.

grief; however, for the purpose of this analysis, it is expected that an individual is unlikely to have any recovery from complicated grief in the timespan of this model.

Time Horizon

A 1-year analysis was used for the base case. This was extrapolated to 5 years in a sensitivity analysis. People could move between health states (e.g., from grief to recovered) once a year. Extrapolations of costs and outcomes beyond 1 year were discounted at 5% annually. A half cycle correction was applied to costs and outcomes.

Costs

Health and work performance were measured using the World Health Organization Health and Work Performance Questionnaire (HPQ; Kessler et al., 2003). The HPQ is a self-report instrument designed to estimate the workplace costs of health problems in terms of reduced job performance, absence due to illness, and work-related accidents-injuries, and has been used previously in Australia to measure the effects of mental health on absenteeism and presenteeism (Hilton, Scuffham, Sheridan, Cleary, & Whiteford, 2008; Holden et al., 2011).

Absenteeism

Participants were asked whether they were employed or not. Those employed were asked to give a category of work. Average earnings for each category of work were estimated using average weekly earnings data from the Australian Bureau of Statistics (Australian Bureau of Statistics, 2011). Cost of time off work was calculated using self-reported days off work in the last 4 weeks multiplied by the average earnings of the different categories of work.

Presenteeism

Presenteeism is defined as the situation where an employee is present at work but is not performing at their full capacity. The respondents were asked several memory-priming questions around different aspects of job performance (e.g., quality of work, concentration). Following these questions, the respondent was asked to rate the performance of an average person working in a similar job to their own on a scale of performance from 0 to 10 (*worst* to *best*). This was followed by the respondents then ranking their own performance over the last 28 days on the same scale. The formula used to calculate presenteeism (Equation 2) is:

$$Presenteeism = \left[\frac{P_{average} - P_{own}}{10} \right] \times 100$$

The average wage of the individual was adjusted by this factor in order to give a value for productivity lost due to presenteeism.

Unpaid Work

Labor input loss is important to measure in both paid and unpaid work since loss of unpaid work also incurs economic costs. This work must be sourced out, provided by others, or lost (Zhang, Bansback, & Anis, 2011). The lost productivity of unpaid work was measured by asking participants to estimate how many days in the past 4 weeks they had been unable to perform usual activities such as housework, leisure, or caring. Cost of unpaid work time was valued at the current Australian minimum wage of AUS $15.00 per hour.

Health-Care Costs

Participants were asked to enter the times they had seen various health practitioners including general practitioners

Table 1. Medicare schedule items

Description of health service	Medicare schedule	Fee (in AUS $)
General practitioner consultancy	GP level B	34.90
Urgent after-hours attendances	Item 597	122.45
Specialist	Item 131	76.70
Other health professional (e.g., optometry)	Allied Health Items	68.35
Psychiatric attendances	Item 316	88.50

Table 2. Costs and outcomes used in the economic model

Variable	Intervention	Control
Costs (in AUS $) – Mean (95% CI)		
Cost of intervention	2,333.77 (1,385; 3,283)	0
Time off work	1,399.45 (406.12; 2,392.91)	2,465.19 (1,343.94; 3,586.57)
Presenteeism	2,819.31 (82.81; 5,721.3)	3,999.97 (1,801.41; 6,198.66)
Time off usual activities	4,737.07 (2,620.54; 6,853.6)	5,310.11 (4,238.91; 6,381.44)
Health-care costs	2,239.64 (1,578.2, 2,901.08)	2,635.36 (2,029.04; 3,241.81)
Utility values – Mean (*SD*)		
Recovered	0.935 (0.11)	0.874 (0.2)
Grieving	0.700 (0.25)	0.670 (0.24)
Complicated grief	0.553 (0.21)	0.536 (0.24)

(GPs), specialists, allied health and psychological and psychiatry services over the past 4 weeks. The January 2011 Medicare Benefits Schedule was used to estimate the cost of these consultations to construct total health-care costs.

Table 1 presents the Medicare schedule items used in the economic evaluation.

Intervention Costs

The costs of the intervention (i.e., costs associated with the operation of the StandBy Response Service) were estimated for the period April 2010 to March 2011 using a top-down approach from budget information provided by the sites that StandBy operates in. Annual operating costs were divided by the clients seen during the same period to derive a cost per client. Annual operating costs include both costs associated with providing interventions and those associated with community development, engagement, and training, since both aspects of the program are seen as integral to providing an effective and efficient service.

Health Outcomes

Quality of life was measured using the EQ-5D (or European Quality of Life – Five Dimensions), a standardized instrument covering five domains (mobility, self-care, usual activities, pain, and anxiety/depression), which measures generic health-related quality of life.

The five domain scores were converted to a summary score (utility) for each person using an algorithm developed for Australia (Viney et al., 2011). Utility is scored up to a maximum of 1 and is scaled so that a score of 0 represents *death* and 1 represents *full health*. Negative values of the EQ-5D are possible – these states exist in recognition that some people value certain health states as being worse than death. Utility was measured in each of the health states – normal grieving, resilient, and complicated grief. The utility value for complicated grief was assessed by taking the average of those individuals who scored over 12 on the K6 indicating high distress (Furukawa et al., 2003) and were more than 2 years bereaved. Individuals were assessed as recovered if they scored under 5 on the K6 (*low* or *no distress*), and all others were included in the utility value for the grieving group. The utility values were converted into QALYs by multiplying the utility value by the time lived in each health state.

Table 2 presents the final cost and outcomes used in the economic model.

Transition Probabilities

Initial state probabilities were 0 for complicated grief and death. The resilient state proportion was set at the proportions of people who had been recently bereaved (< 1 month) and had scored less than 5 on the K6 and the grief state was 1 – *resilient*. Transition probabilities were estimated using the Bonnano grief model in which after each year, approx-

Table 3. Transition probabilities used in the model

State	Group	Initial*	After 12 months
Grieving	Intervention	0.645	0.215
	Control	0.759	0.253
Resilient	Intervention	0.355	0.655
	Control	0.240	0.594
Complicated grief	Intervention	0	0.129
	Control	0	0.152
Death	Intervention	0	0.001
	Control	0	0.001

Note: * The initial state started at 1 month after bereavement.

Table 4. Sensitivity analysis

Cost effectiveness of the StandBy response service	Incremental costs/savings (in AUS $)	Incremental effect	ICER (in AUS $)
Base case (1-year analysis)	-803.00	0.02	dominant
One-way sensitivity analyses			
Cost of service (95% CI)	145.88; –1,752.12	0.02	6,662.00; dominant*
Cost of absenteeism SB (95% CI)	166.01; –1,772.22	0.02	7,581.00; dominant
Cost of absenteeism control (95% CI)	–1,897.20; 290.98	0.02	13,288.00; dominant
Cost of presenteeism SB (95% CI)	2,028.44; –3,633.52	0.02	92,629.00; dominant
Cost of presenteeism control (95% CI)	–2,947.31; 1,342.22	0.02	61,293.00; dominant
No presenteeism included	349.01	0.02	15,938.00
Two-way sensitivity analyses			
Time off work (high SB low control), (high control low SB)	1,260.10; –2,866.31	0.02	57,583.00; dominant
Presenteeism (high SB low control), (high control low SB)	4,173.00; –5,778.00	0.02	190,572.00; dominant
Other analyses			
5-year extrapolation analysis	–11,886.00	0.07	dominant
Monte Carlo simulation	–667.70	0.02	dominant

Note: * Dominant represents the case where the intervention (StandBy) is both more effective and less costly than the alternative. *ICER* = incremental cost-effectiveness ratio; *95% CI* = upper and lower limits of the 95% confidence interval for the mean; *SB* = StandBy Response Service.

imately one third of people remain in a grief state, 20% of people move to a complicated grief state, and the remainder move to a resilient state (Bonanno, 2004). Resultant proportions for each state in each cycle are given in Table 3.

Results

Base Case

The base case economic model calculated the costs to the StandBy group to be AUS $13,255.00 and the control group to be AUS $14,058, showing a cost saving from delivering the StandBy Response Service to bereaved people of AUS $803. The QALYs gained were 0.79 by the StandBy group and 0.77 for the control group. This analysis demonstrates that the StandBy Response Service is both more effective and costs less than the alternative. In this scenario we say that the strategy is "dominant."

Sensitivity Analysis

A range of costs and benefits of the StandBy Response Service were varied to test the robustness of the results of the model and to identify the key factors influencing the results. The results of this sensitivity analysis are presented in Table 4.

If the upper range of intervention costs are used instead of the average costs, with the cost of the StandBy Response Service set to the upper limit of AUS $3,283, the ICER is no longer cost saving. However, the program shows an ICER of under AUS $7,000 per QALY, which is considerably less than the generally accepted thresholds for cost-effectiveness for government subsidy in Australia (Harris, Hill, Chin, Li, & Walkom, 2008).

The major driver of change in the model is presenteeism owing to the large confidence intervals and uncertainty associated with this variable. Therefore, a further analysis was conducted where presenteeism was excluded from the analysis. This analysis demonstrated that the ICER, while no longer cost saving, remains acceptable at AUS $15,938 per QALY.

Probabilistic Sensitivity Analyses

In order to assess the likelihood or probability of the model being cost-saving, a second-order probabilistic sensitivity (Monte Carlo) analysis was conducted. This analysis samples random values from the distributions around each of the variables, thus more accurately representing what may happen to a cohort of people experiencing suicide bereavement in real life. Beta distributions were assigned to probabilities (with Dirichlet distributions where there were more than two possible pathways), gamma distributions to costs, and beta distributions to utility weights. Figure 2 represents the cost-effectiveness pairs estimated from the probabilistic sensitivity analysis of the StandBy Response Service, plotted on a cost-effectiveness plane.

A little over 52% of all points lie in the superior SE quadrant. Only around 6% of points lie in the inferior NW quadrant. The remainder of the points lies in the other two quadrants, where a decision must be made on whether the

cost is worth the benefit gained. If we assume a willingness to pay AUS $50,000 for an additional QALY, which is a typical value used in Australian studies (Harris et al., 2008), a further 29% of points lie below the acceptable willingness-to-pay threshold. Overall, 81% of all points are cost-effective, indicating a high probability that the StandBy Response Service intervention is indeed cost-effective.

Discussion

This economic analysis demonstrates that the StandBy Response Service is not only effective in improving outcomes for people bereaved by suicide but is also cost-saving on a range of important economic indicators. People who received the service were less likely to miss work, had less contact with health professionals, and were more likely to be able to continue with normal activities on a day-to-day basis. This has important economic implications, not just for the individual, but for society as a whole. The cost of suicide bereavement can be passed on to employers by way of time off work or reduced productivity at work.

This is the first analysis attempting to cost the impact of suicide bereavement on an individual. This study demonstrates that it is not only possible to cost this, but it is also possible to show a meaningful difference in these measures in a group of people offered a specific suicide bereavement intervention (the StandBy Response Service) compared with those who were not.

The economic, social, and emotional cost of these adverse outcomes to society is immense. Calculations in this analysis show that, on average, people bereaved by suicide incur a cost to society of more than AUS $14,000 per person, per year. This figure does not take into consideration
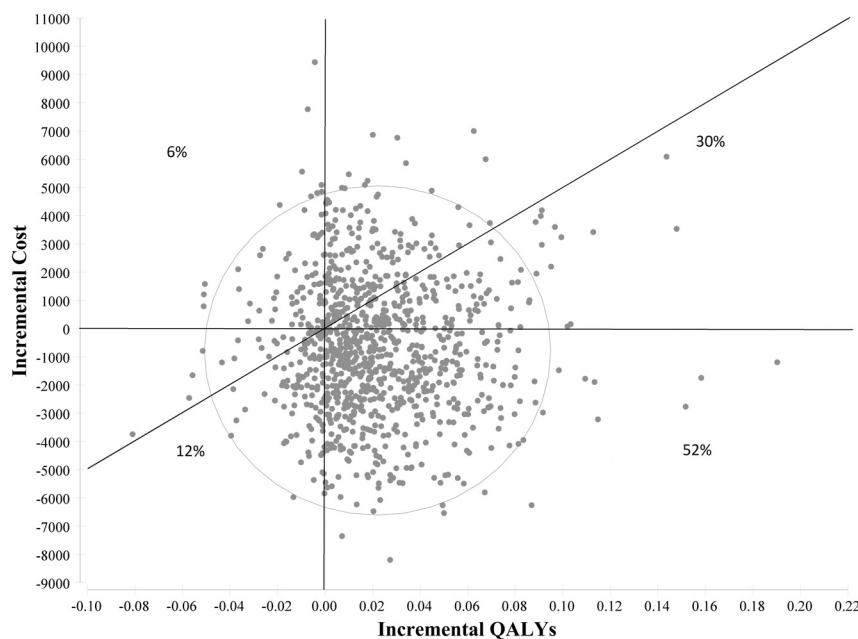

Figure 2. Cost effectiveness plane of StandBy versus control. Incremental cost is in Australian dollars. Percentage of points in each quadrant shown on figure, sloping line, represents a willingness to pay AUS $50,000 per quality-adjusted life year (*QALY*) gained.

the social and emotional costs, which are difficult to value in economic terms. With around 10,800 people significantly impacted by a suicide death each year in Australia, suicide bereavement is estimated to incur a cost to the Australian community of approximately AUS $155 million each year. These costs will fall on many sectors of society, including individuals, employers, the health-care system, and governments. The impact of suicide bereavement may be potentially greater for rural and remote communities, where the total workforce is smaller and the capacity to respond appropriately may be diminished because of reduced capacity and/or collective grief. This warrants the need for effective, efficient postvention services that can reduce the burden of grief for people bereaved by suicide and support them to return to healthy, productive lives (Jordan & McMenamy, 2004).

Rates of health-care usage were relatively high for both groups, with an average of one GP visit in the previous 4 weeks. This result may, in part, be due to the fact that the StandBy Response Service often recommends that clients visit their GP for a general check-up and precautionary measure. It is also important to note that, although visits to the GP have an economic cost, they may also be a positive indicator, signaling help-seeking activity. There is also the possibility that a visit to the GP may prevent further health service usage through early intervention and/or treatment.

A societal perspective was taken for this study. However, not all potential benefits accruing as a result of the StandBy program were able to be estimated. The StandBy Response Service provides community training and support to workers in contact with suicide, such as police and emergency personnel. We were not able to measure wider costs and benefits to society that may be attributed to these interventions; for example, reduced stress leave by police and increased community capacity to deal with suicide. Therefore, we believe the analysis presented is a lower estimate and the potential economic and social benefits of the program may be much greater than demonstrated in this analysis.

The StandBy Response Service is a program that is readily adaptable to different settings. Currently in Australia, this service operates in metropolitan, rural, and remote settings. This program could potentially be adapted for use in overseas settings.

Limitations

The cohort in this study was self-selected in both arms and, therefore, there may be systematic differences between this group of people and all those affected by suicide bereavement. It could be the case that those more affected by unresolved complicated grief were more likely to volunteer for this study.

Differences were evident between the StandBy group and the control group. The control group subjects were more likely to have fewer close relatives and were more likely to have been friends with the deceased compared to the StandBy group. Control subjects also had, on average, a longer period of bereavement. These differences are more likely to bias the results against StandBy, since it could be expected that grief is worse if the deceased is a close family member and that grief naturally resolves over time. Therefore, these factors are not expected to alter the conclusions of the study.

Conclusion

Overall, the StandBy Response Service has measurable, significant, and positive benefits for both people bereaved by suicide and the communities in which it is established. These results support the provision of postvention care for people bereaved by suicide and, specifically, the StandBy Response Service, showing that the program can significantly lessen the burden of grief for people bereaved by suicide.

Debate exists about whether outcomes from these types of services are able to be effectively measured, let alone quantified. We have shown that it is not only possible to quantify the effects of this service over a number of different important economic outcomes but also to demonstrate measureable differences on these outcomes. This type of information is valuable for decision-makers in forming decisions on whether funding these types of programs is worthwhile.

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