



Predicting the relative risk of death over 9 years based on treatment completion and duration of abstinence

Christy K Scott, Michael L. Dennis, and Rodney R. Funk, Chestnut Health Systems, Chicago and Bloomington, IL



Poster 119 at the College of Problems on Drug Dependence (CPDD) Annual Meeting, San Juan, PR, June 16, 2008. Supported by National Institute on Drug Abuse Grant (NIDA) No. DA15523. Christy K Scott, Ph.D., Chestnut Health Systems, 221 W. Walton, Chicago, IL 60610, (312) 664-4321, www.chestnut.org Available at cscott@chestnut.org or cscott@chestnut.org

Introduction

Substance use is increasingly recognized as a leading malleable cause of death in the U.S. (Darke et al., 2007; Hser et al., 2001; Mokdad et al., 2004; Rehm et al., 2003; Webb et al., 2003). Yet, there has been only a handful of studies examining the impact of addiction treatment and years of abstinence on reducing the risk of death. Using data from a recently completed (Scott et al., 2005; Dennis et al., 2007) 9-year longitudinal study, we examined the reduction in the relative risk of death associated with weeks of treatment during the first 6 months and the duration of abstinence over a 9-year period after controlling for baseline risk factors.

Data Source

Between 1996 and 1998, a total of 1,326 people were recruited from sequential admissions to a central intake and 12 treatment units on the west side of Chicago. Participants were interviewed at intake into substance abuse treatment and again at 6 months, 2, 3, 4, 5, 6, 7, 8, and 9 years post intake. Follow-up rates ranged from 94% to 97% over the 9 years. Using a modified Addiction Severity Index (ASI; McLellan et al., 1992; Scott et al., 2005) supplemented with selected scales from the Global Appraisal of Individual Needs (GAIN; Dennis et al., 2003), members of the research team interviewed the majority of participants on-site in the research offices. Detailed psychometrics and comparisons to urine data have been previously presented (Scott et al., 2005; Dennis et al., 2007).

Sample Characteristics

At intake, participants were on average 34 years of age and mostly African-American (87%), female (59%), never married (65%), unemployed (92%), and had less than a high school education (51%). The average participant first used drugs or drank to intoxication at age 17, reported 14 years of regular substance use, had been in treatment before (53%), and used drugs/alcohol on 18 of the past 30 days. Participants regularly used cocaine (35%), alcohol (21%), heroin (31%), and cannabis (8%). Several participants reported symptoms of 1 or more pre-existing chronic physical illness [i.e., asthma (16%), high blood pressure (11%), head injury (6%)], major depression or severe anxiety (41%), victimization (44%), homelessness (32%), a history of convictions (50%), current probation/parole (25%), and were living with another substance user (16%).

Correlates and Risk of Death

Over 9 years, a total of 131 (9.9%) participants died, with deaths being confirmed by collaterals or death certificates. All of these deaths occurred after the 6-month interview. Results from univariate analyses indicated that at intake, when compared to participants in the living group, participants in the deceased group were significantly more likely to be male (49% vs. 40%), older (12% vs. 3% over 50), non-African American (21% vs. 12%), report more years of regular use (17 vs. 14 years), more use at intake (21 vs. 18 of 30 days before intake), regular heroin use (44% vs. 30%), and injected drugs (13% vs. 3%).

Cox Proportional Hazards Regression Model was used to examine the predictors of death univariately and multivariately with stepwise selection. The analysis examined the above baseline variables and several other baseline variables and five post intake factors with a univariate relationship with death.

For the prospective variables that stayed in the multivariate model, we then conducted multiple regression (or multiple logistic regression) to examine which variables before or at the same time predicted them.

Results

Table 1. Factors Related to Death

Table 1 shows the univariate variables that we found to be significantly related to the risk of death. Variables are divided into those measured at intake (baseline risk), after the first 6 months (impact and early outcome of treatment), and years of abstinence at the last observation at risk of death (long-term outcome of treatment). The amount of treatment (higher for higher severity people) was actually associated with slightly higher risk of death. Being in treatment at month 6 (via retention or readmission), the number of self help sessions attended in the first 6 months, and the years of abstinence prior to the last wave were associated with reduced risk of death. Since many of these predictor variables are correlated with each other, to the right are the results of a Cox regression using step wise selection to generate a simpler multivariate model. Here the risk of death was significantly higher for each 10 years of age at baseline, 1 or more pre-existing chronic illnesses, weeks in the hospital prior to intake, making less than 50% of the poverty line, days of illegal activity for profit and a history of violent acts. The risk of death was significantly lower the more days of self help attended in the first six months and the years of abstinence prior to the last observation.

Table 1. Factors Related to Death in the Nine Years Following Substance Abuse Treatment

Factors (Min-Max)	Univariate			Multivariate ^a		
	RR ^b	X ²	p-value	RR ^b	Wald X ²	p
At Intake						
Age in Decades (1.8 - 6.3) ^c	1.90	36.05	<0.0001	1.45	7.81	0.0052
Female (0=no, 1=yes)	0.71	3.93	0.0474	—	—	—
Years of regular use of primary substance (0 - 60)	1.03	6.85	0.0088	—	—	—
Years of regular heroin use (0 - 41)	1.05	19.84	<0.0001	—	—	—
Year between first use and first treatment episode (0 - 54)	1.04	13.57	0.0002	—	—	—
Ever overdosed or had DT's (0=no, 1=yes)	1.77	5.88	0.0153	—	—	—
Disabled (ADA) (0=no, 1=yes)	2.21	15.03	0.0001	—	—	—
Pre-existing chronic illness (0=no, 1=yes)	2.48	26.69	<0.0001	1.87	11.48	0.0007
Weeks in PH hospital in prior 6 months (0-9) ^e	1.30	5.63	0.0177	1.26	5.49	0.0192
ASI Medical Composite Score past month (0-1)	2.70	16.27	<0.0001	—	—	—
Living alone (0=no, 1=yes)	0.58	8.48	0.0036	—	—	—
Live with children (0=no, 1=yes)	0.60	5.58	0.0182	—	—	—
Unprotected sex with 2+ partners past 6 mon (0=no, 1=yes)	1.87	7.30	0.0069	—	—	—
Less than 50% of Poverty Line (0=no, 1=yes)	2.80	27.66	<0.0001	1.71	4.99	0.0254
Months of illegal acts for profit in the past 6 months (0-6)	1.18	9.15	0.0025	1.14	7.04	0.0080
History of violent acts (0=no, 1=yes) ^d	1.51	5.02	0.0251	—	—	—
Between Intake and 6 Months						
Weeks in Substance Abuse Treatment (0-26)	1.02	4.61	0.0318	—	—	—
In treatment at Month 6 (0=no, 1=yes)	0.47	6.52	0.0106	—	—	—
Months of Self Help Sessions Attended (0-5)	0.80	14.35	0.0002	0.88	4.27	0.0388
At last Observation at Risk of Death						
Years abstinent from drugs or alcohol (0-9 years)	0.81	23.124	<0.0001	0.83	12.66	0.0004

^a Based on stepwise selection with p in = .05 and p out = .10.

^b Risk Ratio (RR) of the hazard of death of those who responded "Yes" versus those who responded "No" or for continuous variables (e.g., Age, Nights in Hospital, Days Abstinent) is the ratio of the hazard of one unit difference.

^c Lifetime history of arrest for violent acts or self reporting violent acts in the 6 months before intake.

Figure 1. Death Rate by Years of Abstinence

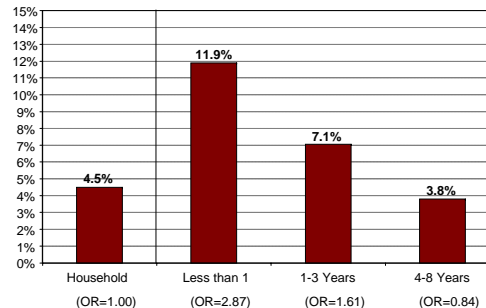


Figure 1. Impact of Abstinence on Death

Figure 1 shows the rate of death by the duration of abstinence at the last observation. To put this in perspective, the first column shows the expected rate of death (60 deaths or 4.5%) for people in the community matched on age, gender and race based on numbers from the CDC (2007). For people with less than a year of abstinence, the death rate in the next year was significantly higher (11.9%; OR=2.87). This rate dropped to 7.1% after 1-3 years of abstinence and 3.8% after 4-8 years of abstinence.

Predictors of Abstinence

Of all the variables in Table 1, the only two significant predictors of the duration of abstinence at the last wave are the days of self-help at 6 months (b=.007, p=.000) and being in treatment at month 6 (b=.429, p=.000).

Predictors of Self Help Sessions

The days of self help attendance in the first six months were significantly lower for people with a history of chronic illness, living below 50% of the poverty line, and with more years of regular heroin use. They were significantly higher for people with more years of regular use, those having unprotected sex with multiple partners, and those still in treatment at month 6.

Implications

After controlling for age, health problems, poverty, and illegal activity, this analysis demonstrated that the risk of death was reduced based on being in treatment at month six, the number of self help sessions attended in the first 6 months and the years of abstinence achieved. It is important to note being in treatment at month 6 could have been through retention, readmission or checkup and that this variable was a better predictor than simple weeks of treatment or absolute dosage of treatment.

While much of the past several decades have focused on the medicalization and professionalization of substance abuse treatment, this analysis also demonstrates the importance of linkage to self help programs. This is very consistent with models for other chronic care conditions that increasingly include patient self management and support as critical components for long-term care.

Finally, the focus of both treatment and self help is generally on achieving and sustaining long-term abstinence. This analysis demonstrates the long term value of doing so in terms of reducing the risk of death. Thus, these findings suggest the potential value of large scale screening and referral programs targeted at substance use.

Limitations. This study did not experimentally manipulate the amount of treatment or self help and it is neither feasible or ethical to experimentally manipulate the duration of abstinence, so these findings are observational. Data are mostly from self report and ideally should be validated using death certificates on all. While conducted in a large metropolitan area, this sample was not a nationally representative sample and was predominantly African American; ideally, it should be replicated with other population types.

Next Steps. We are currently conducting a series of randomized experiments testing the effect of ongoing monitoring and early re-intervention. Hopefully this will also help us evaluate the extent to which this basic public health model can increase the duration of abstinence and reduce the risk of death.

References. Available on request from the author.