

The Cost-Effectiveness of Smoking Cessation for Patients with Psychiatric Illness

Paul G. Barnett, PhD

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Overview of Presentation

1. Smoking in psychiatric illness
 2. Value of smoking cessation
 3. Methods
 4. Findings from four cessation trials
 5. Areas for future study
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Smoking in psychiatric illness

Smoking prevalence

- Current smoking prevalence much higher than general population (McClave, 2010; Kinder, 2008; Lasser, 2000)
 - 59.1% in schizophrenia
 - 46.4% in bipolar disorder
 - 31.6% in Veterans with PTSD
 - vs. 18.3% in those without mental health diagnosis

Smoking behavior

- Persons with psychological problems smoke more heavily
- Nearly half of all U.S. cigarette consumption is by those with mental illnesses (Lasser, 2000)

Health impacts of smoking

- Smoking is an important contributor to the excess mortality risk of persons with mental illness
- Schizophrenia
 - Mortality risk is 2.5 times the expected (Saha, 2007)
 - Smokers have 2.1 times the mortality risk of non-smokers with schizophrenia (Kelly, 2009)
- Veterans with PTSD have 2.1 times the expected mortality risk (Boscarino, 2006)
- After adjusting for smoking status, it is only 1.26 times the expected (Barnett, 2015b)

Poll question

- What is your primary interest?
 - Smoking cessation services
 - Methods for economic evaluation

Value of smoking cessation

What do we mean by value?

- Cost per unit of benefit relative to standard care
- Incremental cost-effectiveness ratio

Cost per quit

- Review of 14 studies found median cost of \$3,000 per quit (Ronckers, 2005)
- Is this sufficient value?
- How much should society pay for a “quit”?

Cost Utility Analysis

- Benefits measured as Quality Adjusted Life Years (QALYs)
- U.S. approves interventions that cost less than \$100,000/QALY

Cost per QALY

- Brief physician advice \$1,240-\$3,620/QALY (Cromwell, 1997)
- Addition of pharmacotherapies to counseling \$1,133-\$1,774/QALY (Song, 2002)
- Varenicline for prevention of relapse in recent quitters \$3,413/QALY (Taylor, 2011)
- Many smoking cessation interventions are high value (well below \$100,000/QALY)

Cost-effectiveness for psychiatric patients

- Cost-effectiveness in these patients not previously studied
- Smoking cessation may be less cost-effective in psychiatric settings than in primary care settings

Why may cessation services may be less cost-effective?

- Smokers with psychiatric illness:
 - less likely to quit
 - more likely to relapse
 - have lower quality of life
 - have a higher risk of death from non-smoking causes

Methods

Methods used in randomized trials of smoking cessation

- Costs
 - Micro-costing of intervention
 - Claims data
 - Patient self report of “outside of system” care
 - Quality of life measures
 - Model long-term effects of intervention
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Micro-cost via direct measurement

- Determine cost of innovative intervention
 - Activity survey to find hours of effort by different types of staff
 - Labor cost by type of staff
 - Supplies, equipment and space
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Claims data

- Care in system where patient enrolled
 - Sites included
 - Multi-site VA trial
 - UCSF Langley Porter Psychiatric Hospital
 - SF County Mental Health, Substance Abuse
 - Kaiser Permanente
 - Charges adjusted by ratio of costs to charges
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Patient self-report

- Utilization not in claims data
 - Patient self-report utilization
 - Obtain hospital bill for inpatient stays
 - Unit costs
 - Reimbursement schedule
 - Provider cost
 - Payer cost
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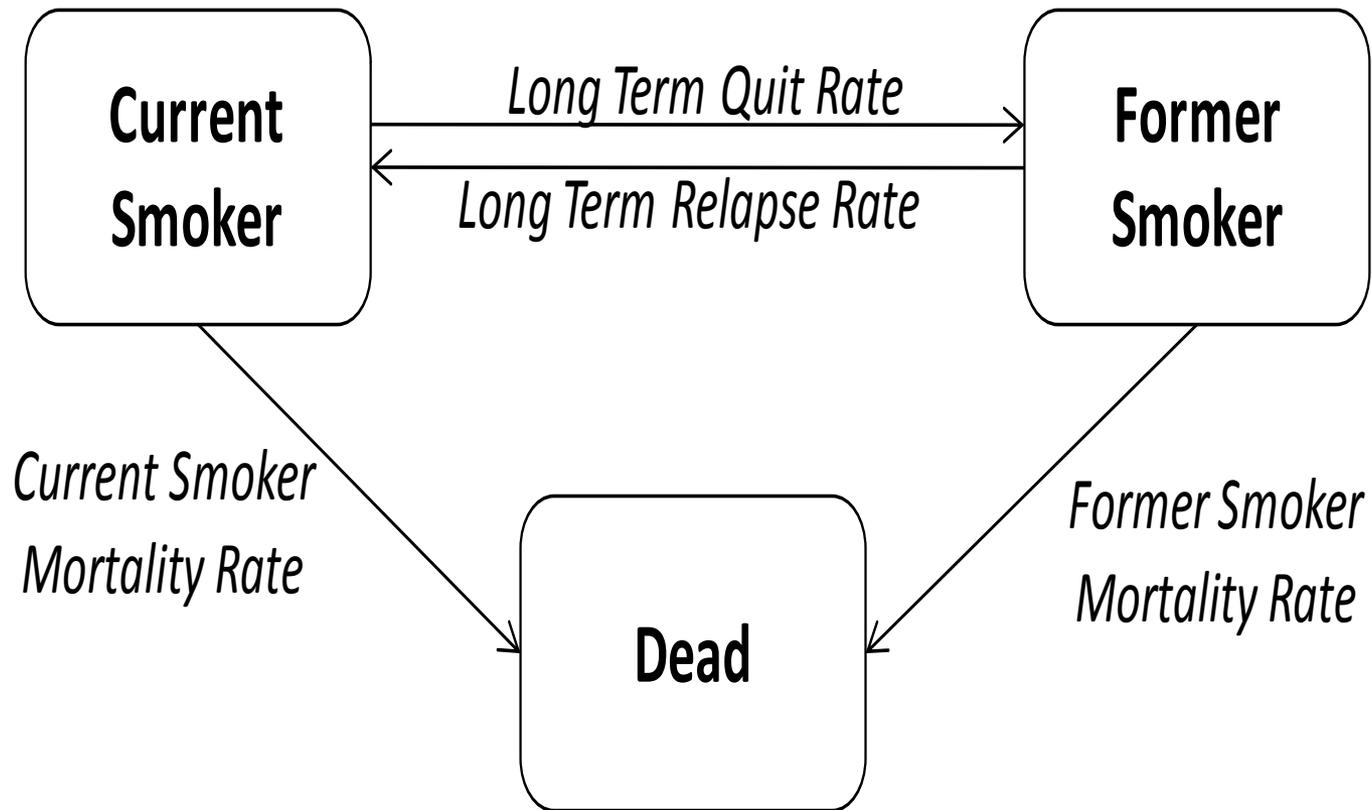
Quality of life measures

- Quality of Well-Being
- Health Utilities Index
- SF-12 mapped to utilities

Long-term costs and outcomes

- Cost are incurred at outset
 - Benefits of quitting realized over the long run
 - Markov model: projects long-run effect of quitting given age, gender distribution of trial participants
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Markov model of long-term effects of quitting



Parameters

- Relapse (varies with time since quit)
- Quit rates (varies with age)
- Mortality rates (relative risk by smoking status, age, & gender)
- Cost and quality of life in smokers and former smokers (vary by age & gender)

Uncertainty

- Is this result statistically significant?
 - Probabilistic sensitive analysis
 - Includes variance observed in trial
 - Estimated distribution of other model parameters
 - Repeated random draws (Monte Carlo simulation)
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Findings from Four Randomized Clinical Trials

The patients and treatment settings

- Psychiatric inpatients
- Veterans in PTSD treatment
- Outpatients seeking treatment for depression
- Veterans in alcohol treatment

Trial 1: Stepped care for psychiatric inpatients

- University psychiatric hospital
 - 223 smokers with Serious Mental Illness
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Trial 1: Randomization groups

- Experimental intervention:
 - Computer assessment of readiness to change + tailored feedback, workbook
 - 10 weeks of nicotine replacement therapy (NRT)
- Control intervention:
 - Pamphlet and brief advice to quit

Trial 1: Findings

	Experimental Group	Control Group	
Cessation services cost	\$189	\$37	$p < 0.001$
Mental health costs	\$15,728	\$22,185	n.s.
18 month abstinence	18.75%	6.80%	$p < 0.05$

Trial 1: Cost per quit

$$\frac{\$189 - \$37}{18.75\% - 6.8\%} = \frac{\$152}{11.95\%} = \$1,271/\textit{quit}$$

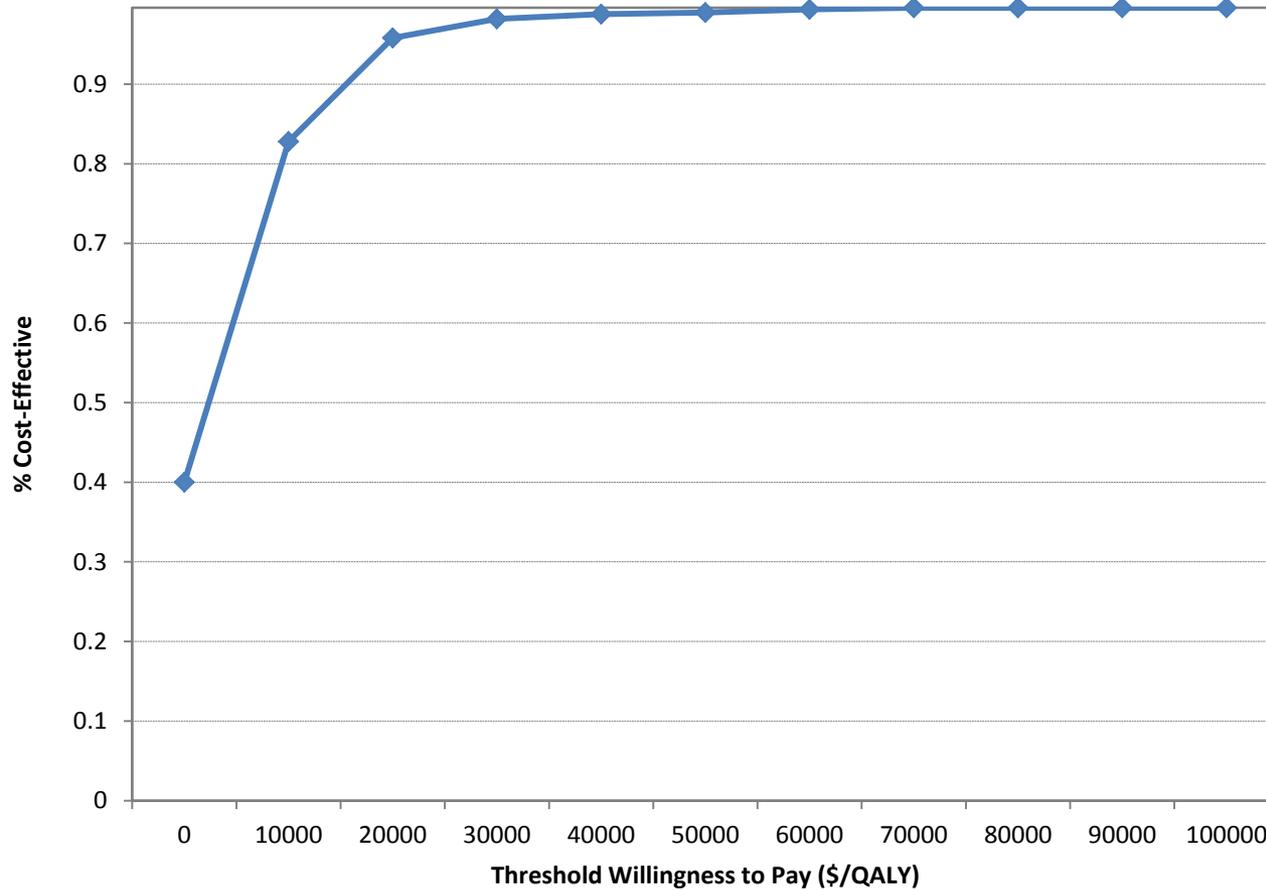
Other trial-specific model parameters

- Age
 - Mean 39.9 years
 - Quality of life
 - Estimated from SF-12 (Brazier, et al)
 - 76% of age & gender norms
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Trial 1: Incremental Cost-effectiveness Ratio

$$\frac{\$184,057 - \$184,014}{15.223 - 15.122} = \frac{\$43}{0.101} = \$428/QALY$$

Trial 1: CE acceptability curve



Trial 2: Smoking cessation integrated with PTSD treatment

- VA outpatient mental health programs
 - 943 smokers with PTSD motivated to quit
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Trial 2: Randomization groups

- Experimental intervention:
 - Smoking cessation services from PTSD provider
 - 8 counseling sessions + monthly boosters
 - NRT and other pharmacotherapy
- Control Intervention:
 - Referred to smoking cessation clinic

Trial 2: Findings

	Experimental Group	Control Group	
Cessation services cost	\$1,286	\$551	p < 0.001
All health costs	\$24,171	\$25,303	n.s.
18 month abstinence	8.9%	4.5%	p < 0.01

Trial 2: Cost per quit

$$\frac{\$1,286 - \$551}{8.9\% - 4.5\%} = \frac{\$735}{4.4\%} = \$16,697/\text{quit}$$

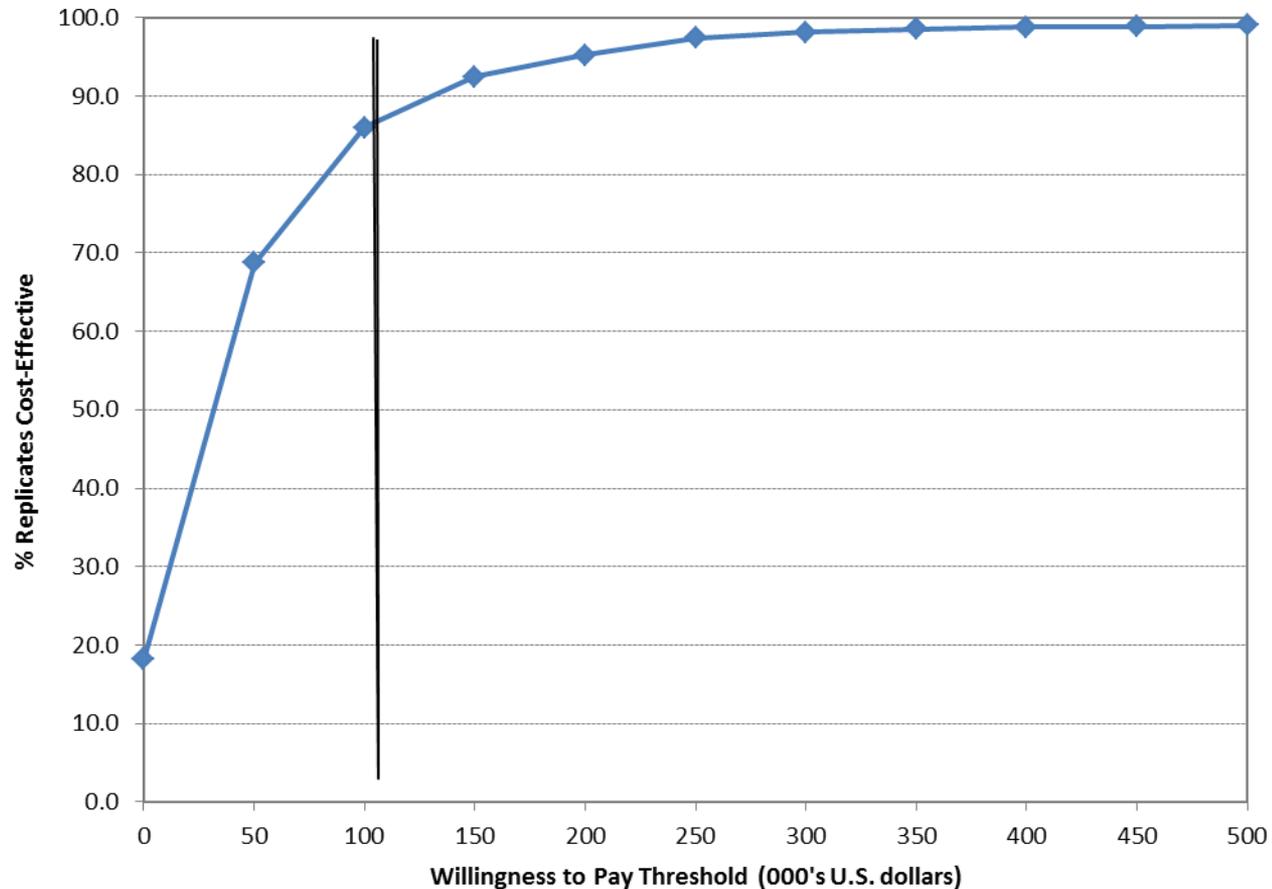
Other trial specific model parameters

- Age
 - Mean 54.6 years
 - Quality of Life
 - Determined by Quality Well Being (QWB) assessment
 - 65.2% of age & gender norms
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Trial 2: Incremental Cost-effectiveness Ratio

$$\frac{\$146,645 - \$145,809}{7.054 - 7.028} = \frac{\$836}{0.026} = \$32,257/QALY$$

Trial 2: CE acceptability curve



Trial 3: Stepped care for outpatients in treatment for depression

- University psychiatric clinic
- 163 smokers with unipolar depression

Trial 3: Randomization groups

- Experimental intervention:
 - 3 computer assessment of readiness to change + tailored feedback, workbook
 - Up to 6 counseling sessions
 - 10 weeks of nicotine replacement therapy (NRT) and bupropion for relapse
- Control invention:
 - Pamphlet and list of cessation programs

Trial 3: Findings

	Experimental Group	Control Group	
Cessation services cost	\$363	\$22	$p < 0.001$
Mental health costs	\$4,151	\$4,442	n.s.
18 month abstinence	24.6%	19.1%	$p < 0.05$

Trial 3: Cost per quit

$$\frac{\$363 - \$22}{24.6\% - 19.1\%} = \frac{\$341}{5.5\%} = \$6,204/\textit{quit}$$

Trial 3: Incremental Cost-effectiveness Ratio

- Tested “willingness to pay” based on assumption of 1.2 QALY gained per successful quit
 - This represents ICER of \$5,170/LY
 - Estimate did not consider effect of mental health on value of quitting
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Trial 4: Intensive cessation services for alcohol-dependent smokers

- VA outpatient alcohol treatment program
 - 162 smokers in treatment for alcohol dependence
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Trial 4: Randomization groups

- Experimental intervention:
 - 16 counseling sessions
 - 24 weeks of nicotine replacement therapy (NRT) and bupropion for relapse
- Control invention:
 - Referral to smoking cessation clinic

Trial 4: Findings

	Experimental Group	Control Group	
Cessation services cost	\$1,649	\$25	p < 0.001
Health care costs	\$47,685	\$33,620	n.s.
52 week abstinence	19.6%	15.8%	n.s.

Summary

	Smokers enrolled in psychiatric stay	Cessation integrated with PTSD	Cessation in outpatient psychiatry clinic	Integrated alcohol treatment
Control abstinence	6.8%	8.9%	19.1%	15.8%
Intervention abstinence	18.8%	4.5%	24.6%	19.6%
\$/Quit	\$1,271	\$16,697	\$6,204	NA
\$/QALY	\$428	\$32,257	\$5,170/LY	dominated

Areas for Future Study

Types of cessation services

- Integrated care vs. dedicated cessation services
- How much counseling?
- How long should the NRT last?
- All smokers vs. motivated smokers
- Use of initial “stage-based” counseling

Methodological challenges

- Variations in definition of quit
- Quality of life measures
- Costs other than cessation services incurred during the trial

Methodological challenges

- Better model parameters
 - Spontaneous quit and relapse
 - Cost
 - Mortality
- Exclusion of costs attributable to longer survival

Lessons

- Direct cost of smoking cessation services is what matters
 - Other health care costs not affected by treatment group assignment
 - Guidelines specify we gather these data
 - Many smoking models ignore other health care costs
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