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

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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

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)

Value of smoking cessation

What do we mean by value?

- Cost per unit of benefit relative to standard care
- Incremental cost-effectiveness ratio
- Benefits measured as Quality Adjusted Life Years (QALYs)
- U.S. approves interventions that cost less than $100,000/QALY

Cost per quit

- Review of 14 studies found median cost of $3,000 per quit (Ronckers, 2005)

Cost Effectiveness Ratios

- 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)

Cost-effectiveness for psychiatric patients

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

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

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

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

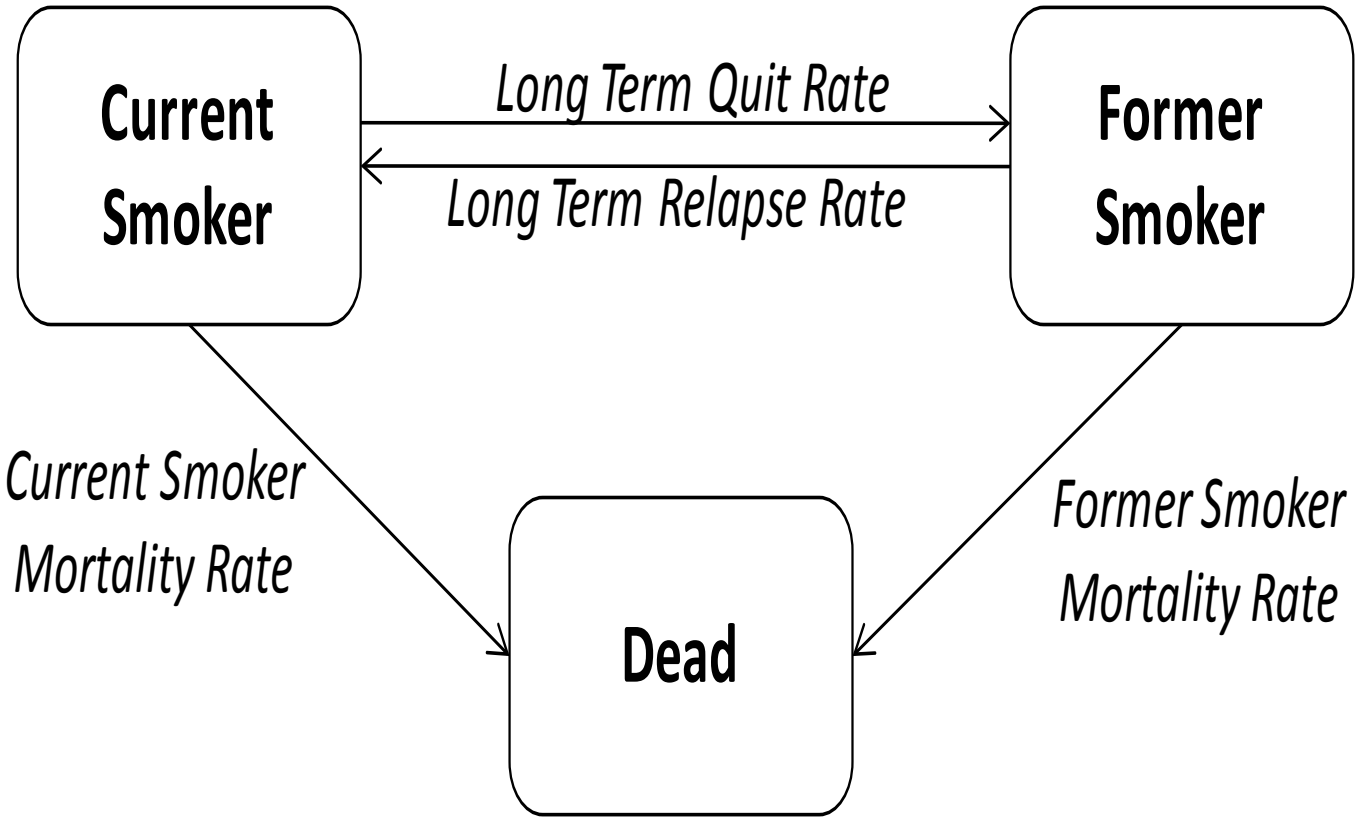
Quality of life measures

- 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

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 age & gender)
- Cost and qualify 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)

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

Trial 1: Randomization groups

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

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

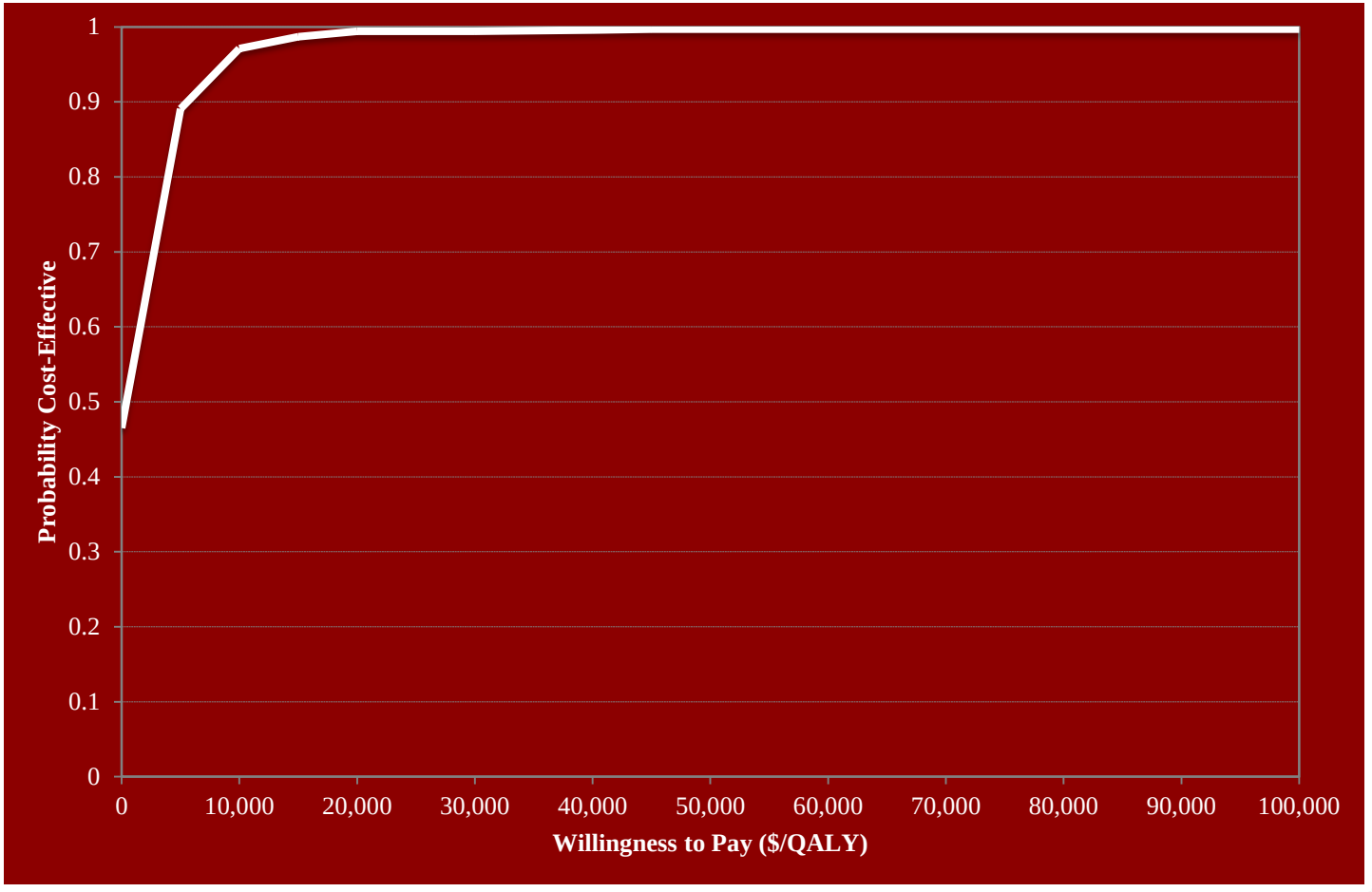
Other trial-specific model parameters

- Age
  - Mean 39.9 years
- Quality of life
  - Estimated from SF-12 (Brazier, et al)
  - 76% of age & gender norms

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

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

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

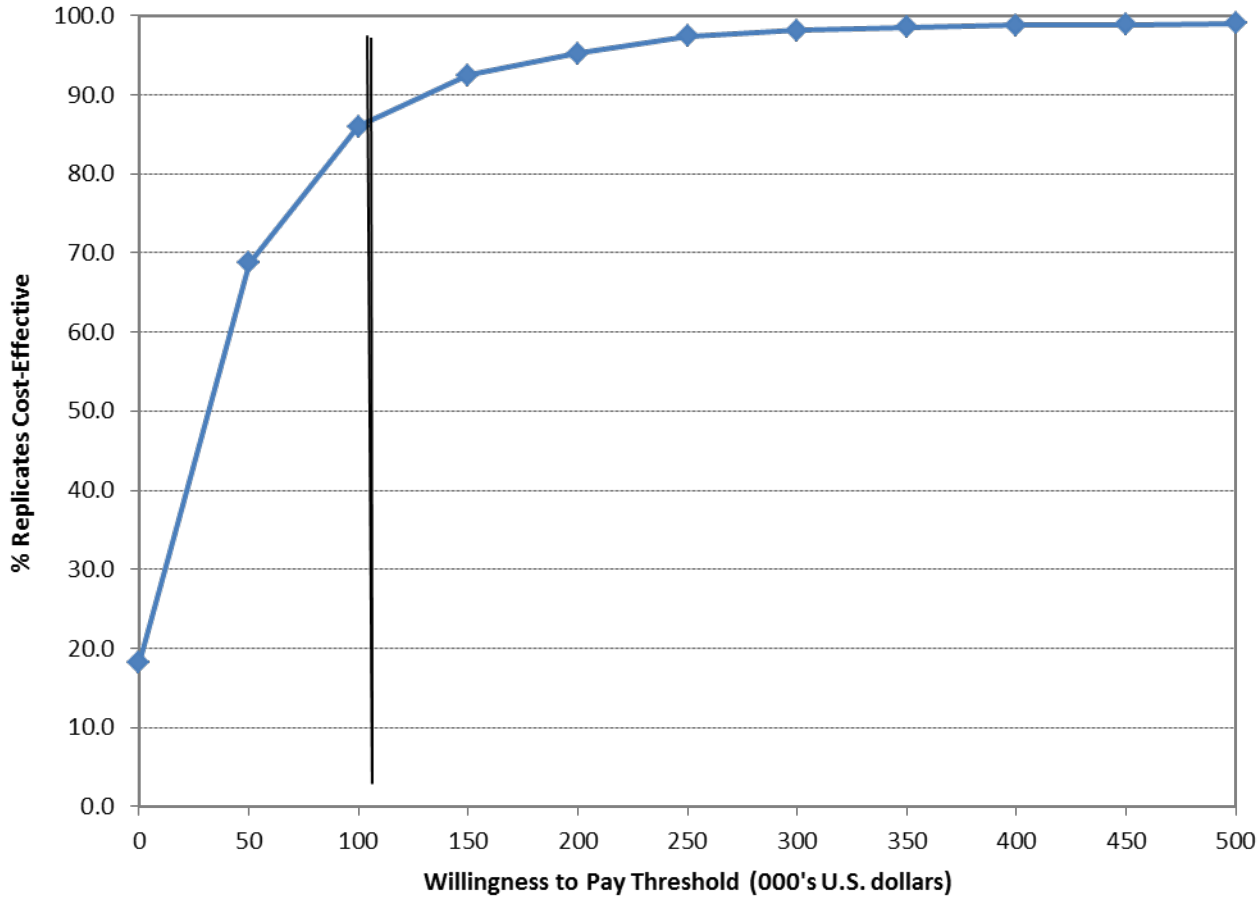
Other trial specific model parameters

- Age
  - Mean 54.6 years
- Quality of Life
  - Determined by Quality Well Being (QWB) assessment
  - 65.2% of age & gender norms

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

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

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

Trial 4: Intensive cessation services for alcohol-dependent smokers

- VA outpatient alcohol treatment program
- 162 smokers in treatment for alcohol dependence

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 surivival

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

References to the trials

- PG Barnett, A Jeffers, MW Smith, BK Chow, M McFall, A Saxon (2015a). Cost-effectiveness of integrating tobacco cessation into Post-Traumatic Stress Disorder treatment. Nicotine & Tobacco Research (in press)
- PG Barnett, W Wong, A Jeffers, SM Hall, JJ Prochaska (2015b) Cost effectiveness of smoking cessation treatment initiated during psychiatric hospitalization. J Clin Psych (in press)
- PG Barnett, W Wong, S Hall (2008) The cost-effectiveness of a smoking cessation program for out-patients in treatment for depression. Addiction 103:834-40 PMID: 18412763

Other references cited

- Boscarino, J.A., Posttraumatic stress disorder and mortality among U.S. Army veterans 30 years after military service. Ann Epidemiol, 2006. 16(4): p. 248-56.
- Brazier J, Roberts J, Deverill M. The estimation of a preference-based measure of health from the SF-36. J Health Econ 2002 Mar;21(2):271-292.
- Cromwell J, Bartosch WJ, Fiore MC, Hasselblad V, Baker T. Cost-effectiveness of the clinical practice recommendations in the AHCPR guideline for smoking cessation. Agency for Health Care Policy and Research. Jama 1997 Dec 3;278(21):1759-1766.
- Kelly DL, McMahon RP, Wehring HJ, et al. Cigarette smoking and mortality risk in people with schizophrenia. Schizophr Bull 2009 Jul;37(4):832-838
- Lasser K, Boyd JW, Woolhandler S, Himmelstein DU, McCormick D, Bor DH. Smoking and mental illness: A population-based prevalence study. Jama. Nov 22-29 2000;284(20):2606-2610.

Other references cited (continued)

- McClave AK, McKnight-Eily LR, Davis SP, Dube SR. Smoking characteristics of adults with selected lifetime mental illnesses: results from the 2007 National Health Interview Survey. Am J Public Health 2010 Dec;100(12):2464-2472.
- Ronckers ET, Groot W, Ament AJ. Systematic review of economic evaluations of smoking cessation: standardizing the cost-effectiveness. Med Decis Making 2005 Jul-Aug;25(4):437-448.
- Saha S, Chant D, McGrath J. A systematic review of mortality in schizophrenia: is the differential mortality gap worsening over time? Arch Gen Psychiatry 2007 Oct;64(10):1123-1131.
- Song F, Raftery J, Aveyard P, Hyde C, Barton P, Woolacott N. Cost-effectiveness of pharmacological interventions for smoking cessation: a literature review and a decision analytic analysis. Med Decis Making 2002 Sep-Oct;22(5 Suppl):S26-37.
- Taylor M, Leonardi-Bee J, Agboola S, McNeill A, Coleman T. Cost effectiveness of interventions to reduce relapse to smoking following smoking cessation. Addiction 2011 Oct;106(10):1819-1826.

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