

# Mortality Following Inpatient Addictions Treatment

## Role of Tobacco Use in a Community-Based Cohort

Richard D. Hurt, MD; Kenneth P. Offord, MS; Ivana T. Croghan, PhD; Leigh Gomez-Dahl; Thomas E. Kottke, MD; Robert M. Morse, MD; L. Joseph Melton III, MD

**Objective.**—To determine the impact of tobacco- and alcohol-related deaths on overall mortality following inpatient treatment for alcoholism and other nonnicotine drugs of dependence.

**Design.**—Population-based retrospective cohort study.

**Setting.**—Olmsted County, Minnesota (the Rochester Epidemiology Project), and the Inpatient Addiction Program (IAP) at Mayo Clinic, Rochester.

**Patients.**—All 845 Olmsted County residents admitted to an inpatient addiction program for treatment of alcoholism and other nonnicotine drugs of dependence during the period 1972 through 1983.

**Methods.**—Patients were followed up through the medical record linkage system of the Rochester Epidemiology Project through December 1994 to obtain vital status, and death certificates were obtained for those who died. The underlying cause of death was classified as alcohol related, tobacco related, both, or neither based on the classification from the Centers for Disease Control and Prevention. The observed number of deaths by underlying cause was compared with the expected number using cause-specific 1987 death rates for the white population of the United States. All-cause mortality was also compared with that expected for persons in the West North Central Region of the United States of like age, sex, and year of birth. Univariate and multivariate assessments were made to identify predictors of all-cause mortality from baseline demographic information.

**Results.**—At admission, the mean (SD) age of the 845 patients was 41.4 (14.5) years, and 35% were women. Altogether, 78% had alcohol as their only nonnicotine drug of dependence and 18% had alcohol and other nonnicotine drugs of dependence alone. At admission, 75% were current and 8% former cigarette smokers, 3% were current cigar or pipe smokers, and 2% were current users of smokeless tobacco. Follow-up after the index IAP admission totaled 8913 person-years (mean [SD] of 10.5 [5.6] years per patient). Death certificates were obtained for 96% (214) of the 222 patients who died. Of these 214 deaths, 50.9% (109) had a tobacco-related and 34.1% (73) had an alcohol-related underlying cause ( $P < .001$ ). The cumulative mortality significantly exceeded that expected ( $P < .001$ ); at 20 years, the observed mortality was 48.1% vs an expected 18.5%. Multivariate predictors of mortality, even after adjusting for expected mortality, were older age at admission ( $P < .001$ ) and male sex ( $P < .001$ ).

**Conclusions.**—Patients previously treated for alcoholism and/or other nonnicotine drug dependence had an increased cumulative mortality that was due more to tobacco-related than to alcohol-related causes. Nicotine dependence treatment is imperative in such high-risk patients.

(JAMA. 1996;275:1097-1103)

From the Nicotine Dependence Center (Drs Hurt and Croghan), Section of Biostatistics (Mr Offord and Ms Gomez-Dahl), Department of Health Sciences Research (Drs Kottke and Melton), and Department of Psychiatry and Psychology (Dr Morse), Mayo Clinic, Rochester, Minn.

Reprints: Richard D. Hurt, MD, Mayo Clinic, 200 First St SW, Rochester, MN 55905.

ADDICTIVE drug deaths account for one fourth to one third of all deaths in the United States, with the number of tobacco-related deaths being several times greater than those caused by alcohol.<sup>1,2</sup> There is a well-known associa-

tion between cigarette smoking and alcohol consumption, with the heaviest smokers also being the heaviest drinkers and vice versa.<sup>3</sup> The prevalence of smoking among substance abusers is two to three times that of the general population,<sup>4,5</sup> and alcoholics may constitute a quarter of all smokers.<sup>6</sup> Indeed, the relationship is so strong that intractable heavy smoking is a predictor of unrecognized alcohol abuse.<sup>11</sup> Despite this, efforts at smoking cessation receive little attention in most alcohol treatment programs.<sup>12</sup> If smoking contributes substantially to the mortality following treatment for alcoholism, then interventions aimed at nicotine dependence should be considered by the treatment community.

A key outcome of alcoholism treatment is mortality, but most assessments of death following treatment for alcoholism have limited sample sizes or short follow-up, and few have addressed the impact of tobacco-related diseases. For example, in a 20-year follow-up study of 99 men treated for alcoholism, 44 men had died, 29% due to circulatory disease and 25% due to lung cancer, for an observed/expected mortality ratio of 3.6.<sup>13</sup> Smoking and alcohol abuse may be independently associated with coronary death,<sup>14</sup> but controlling for smoking status may account for the increased risk of lung cancer among alcoholic veterans.<sup>15</sup> However, most studies have not considered the contribution that smoking makes to mortality in alcoholics.<sup>16-21</sup> Even in more recent years, tobacco use and the diseases it causes have been conspicuously absent in the assessment of predictors of mortality after alcoholism treatment despite the inclusion of almost every other possible factor.<sup>22-24</sup> Thus, there is a need for more definitive information on whether there is an excess of tobacco-related mortality in patients treated for alcoholism and/or other drug dependence.

This report focuses on the contribution of tobacco- and alcohol-related deaths to overall mortality in a cohort of Olm-