Smoking-Related Health Behaviors of Employees and Readiness to Quit
Basis for Health Promotion Interventions

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Abstract
This report describes patterns of cigarette smoking and interest in smoking cessation programs among employees in a public worksite (n = 6,000) and a private worksite (n = 14,000). Of the 622 employees who attended an employee assistance program (EAP) orientation, 110 (18%) were current smokers. A significantly greater proportion of public employees smoked cigarettes, smoked more heavily, and evaluated their health more poorly compared to private employees. Smokers in both sites were over-represented in unskilled positions. Regardless of worksite, respondents who smoked had similar desires to quit or cut down and were annoyed by the comments of others, felt guilty about smoking, awakened with a desire to smoke, and felt they had a smoking problem. Overall, more than one third of individuals were interested in joining a smoking cessation program. Occupational health nurses may use these findings to design and implement smoking cessation interventions in their workplaces.

Cigarette smoking, the most important modifiable risk factor for preventable disease and disability, contributes to a wide range of health problems including cancer, cardiovascular disease, and chronic respiratory conditions (American Cancer Society [ACS], 2002; American Heart Association [AHA], 2004; Centers for Disease Control and Prevention [CDC], 2004a). Smoking-related illnesses continue to occur at alarming rates among American Indian/Alaska Native and African American populations and some groups of Southeast Asian men (CDC, 2004b; Kim et al., 2000; Piper, Fox, Welsch, Fiore, & Baker, 2001). Multiple factors contribute to tobacco use in ethnic minorities, including socioeconomic status, cultural characteristics, acculturation, limited access to health care, stress, and biological vulnerabilities (Piper et al., 2001; U.S. Department of Health and Human Services [USDHHS], 1998). Annually, cigarette smoking accounts for more than 400,000 premature deaths among American men and women. The largest proportion of these deaths is from cardiovascular disease (AHA, 2004; CDC, 2004a).

Approximately 50 million American adults currently smoke, and of these, most are in the work force (CDC, 2000, 2004b). Compared to non-smokers, cigarette smokers accrue a greater number of lost-work days due to tobacco-related illnesses (ACS, 2002; USDHHS, 2000a). Tobacco-related lost work days cost businesses approximately $5,000 per smoker annually in addition to health and life insurance premiums and claims (Delucia, 2001).

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### DESIRE TO QUIT SMOKING AND PROFESSIONAL INTERVENTIONS

Research findings indicate that 70% or more of adult smokers want to quit smoking (CDC, 1997, 1999). Each year approximately 46% of individuals who smoke try to quit, but only 7% remain abstinent 1 year later (USDHHS, 2000a). Failure to maintain abstinence is thought to be caused by a number of factors, including lack of access to effective smoking cessation treatment and cigarette smokers’ and clinicians’ failure to recognize the chronic nature of tobacco addiction. As a result, a pattern of quitting and relapsing can persist over many years (USDHHS, 2000a).

Studies have shown that advice from respected professionals such as physicians and nurses can motivate an individual to quit smoking (USDHHS, 2000a), but clinicians often fail to consistently and effectively assess and treat tobacco use (Jaen, Stange, Tumiel, & Nutting, 1997; Thordike, Rigotti, Stafford, & Singer, 1998). Although some research has shown that cigarette smoking status is identified in approximately two thirds of clinic visits, other studies indicate that smoking cessation counseling is provided for only 15% to 22% of individuals who smoke (Thordike et al., 1998; USDHHS, 2000a).

### ADDITIONAL CONCERNS ABOUT SMOKING IN THE WORKPLACE

Although smoking involves well-known risks to the individual’s health, there are additional reasons why it is imperative to reduce smoking among workers. First, cigarette smoking interacts with some occupational hazards (e.g., asbestos, radon) to produce considerably greater health risk than either substance alone. For example, asbestos-exposed workers who smoke have a greater risk of lung and other cancers, ischemic heart disease, and all causes of mortality (Gustavsson et al., 2002; Koshinen, Pukkala, Reijula, & Karjalainen, 2003). Active smoking and environmental tobacco smoke in the workplace present risks to workers and business owners because of smoking-related “accidents” and other property damage, smoke pollution, and increased morbidity and mortality among workers including non-smokers (DeLucia, 2001). Workers who smoke also can increase their potential for biological uptake of hazardous substances at work through hand-to-mouth behavior (Cohen & Balzer, 1996). Workplace exposure to environmental tobacco smoke varies—blue collar, service, and hospitality worksites lag behind other sectors in creating smoke-free environments (Ong & Glantz, 2004).

### PROFESSIONAL MANDATES

Twenty-one of the nation’s health objectives put forth in Healthy People 2010 relate to tobacco use, including reducing use to less than half of the current rate and decreasing exposure to secondhand smoke (USDHHS, 2000b). The American Association of Occupational Health Nurses (2004) includes worksite health promotion and prevention programs as a critical area of professional practice. The effect of these workplace initiatives has been the subject of several studies. Some workplace
smoking cessation studies indicate positive behavioral changes (Moher, Hey, & Lancaster, 2003; Rodriguez-Artaulejo et al., 2003; Thompson, Fries, & Hopp, 1995). The literature on worksite smoking cessation lacks information linking target worksite populations to smoking cessation interventions tailored to the workers. To be successful, occupational health nurses need to be aware of the sociodemographic characteristics of employees who smoke and their readiness to quit. The purpose of this article is to describe characteristics of individuals in two different worksites who smoke and their willingness to participate in a smoking cessation program.

METHOD
Participants
This report is part of a larger cross-sectional study of alcohol problems in the workplace. The purpose of the larger study was to identify the feasibility of implementing a brief alcohol intervention program through employee assistance programs (EAP). The study was approved by the University Institutional Review Board for the Protection of Human Subjects.

Participants were recruited from two employment sites. The public worksite is a county government employing approximately 6,000 individuals in an urban Midwestern setting. The other site is a pharmaceutical company that employs approximately 14,000 individuals in a suburban Midwestern setting. Three hundred and three of 364 public employees and 319 of 383 private employees who attended an EAP orientation program participated in this study.

Public employees were significantly older (M = 43.7 years, SD = 8.3) than the private employees (M = 33.8, SD = 8.9) (t(552) = 13.61, p < .001). In addition to the private employees being younger, a greater proportion reported their health to be Very Good to Excellent (60.6%) compared to the public employees (43.1%). In turn, approximately twice as many public employees reported their general health to be Fair or Poor (12.8%) than private company employees (6.7%) (X² [2, N = 600] = 19.71, p < .001).

Significant differences existed in education, gender, and job status between the private and public site employees. Private company employees held more skilled positions, such as managerial and technical (78.9%), compared to the public employees (57%) (X² [1, N = 451] = 25.02, p < .001), whereas public employees held more service and unskilled positions. The public employees included more men (79.1% vs. 45%; X² [1, N = 614] = 75.18, p < .001), and fewer had earned a college degree, (X² [1, N = 595] = 91.85, p < .001). The two groups were similar in the proportion of African American, Asian, and Hispanic employees (34% public vs. 31% private) and marital status (60.4% public vs. 61% private). The overall racial composition of the two groups is representative of the respective counties in which the two worksites are located. The prevalence of current smoking among the total sample was 17.7%. Those currently smoking (n = 110) at the time of the initial screening are the focus of this analysis.

Measures
The revised Health Screening Survey (HSS) by Fleming and Barry (1991) is a 22-item questionnaire, used in this study to assess general health and smoking-related risk behaviors. The HSS is designed to screen for problematic alcohol use by imbedding alcohol-related questions among general health questions, which include questions about smoking, nutrition, and exercise behaviors. The smoking-related questions are the focus of this report.

The internal consistency (alpha coefficient) of the smoking-related questions in this study was .86. Seven items in the HHS addressed cigarette smoking: two items about the quantity and frequency of cigarette smoking in the prior 3 months, four items about cigarette use following the CAGE format (Ewing, 1984) used in screening for alcohol abuse (i.e., Cut down, Annoyed, Guilt, Eye-opener), and one question assessing the respondent’s perception of having a smoking problem. Responses to CAGE-format smoking questions were based on a 4-point Likert scale with larger numbers indicating greater tobacco use. In addition to sociodemographic items and the seven items related to cigarette smoking, there were four questions about perceptions of health and readiness to participate in a smoking cessation program. These questions also were based on a 4-point Likert scale with higher scores indicating higher perceptions of health and smoking cessation readiness.

Procedures
At both worksites, all employees who attended a voluntary orientation to their company’s EAP services during a 7-month period were invited to participate in the study by filling out the HHS survey. A letter that explained the purpose of the study and assured participants that their responses would be confidential accompanied the survey. Data were collected at 15 EAP orientation sessions held at each of the two companies. Approximately 25 to 30 individuals attended each session. A total of 622 of 747 individuals who attended an EAP orientation completed a survey for a response rate of 83%.

Data Analysis
Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL) for Windows (Microsoft, Redmond, WA) 12.0.2 was used to compute descriptive statistics, to test differences in proportions, and to determine differences between groups. Spearman’s rho non-parametric correlations were computed to examine the relationships between health status and interest in changing health habits, smoking habits, and joining a smoking cessation program. The four possible responses to each of the four CAGE smoking-related questions (i.e., desire to cut down, annoyed by others telling you to cut down, feeling guilty, and desire for an eye-opener cigarette) were dichotomized into Never or Sometimes and Often or Always.
RESULTS

Characteristics of Smokers and Smoking Behavior

For purposes of this analysis, a “current smoker” was an individual who reported smoking at least one cigarette daily for the prior 3 months. This description follows the CDC (1994) criterion of “current smoker,” an individual who reported smoking at least 100 cigarettes over their lifetime and who currently smoked every day or some days” (p. 2). Of the 622 survey participants, 110 (18%) were identified as current smokers (see Table 1). In comparing current smokers at the two worksites, more individuals met the criterion for a “current smoker” in the public site than at the private site ($X^2_{[1, N = 622]} = 28.46, p < .001$). Compared to the private site, a larger proportion of public site employees were men ($X^2_{[1, N = 110]} = 10.79, p < .01$) and older ($t_{[95]} = 3.35, p < .001$). Of the public site employees who smoked, 54% reported smoking more than one pack of cigarettes per day compared to 29% of the private sector employees ($X^2_{[1, N = 110]} = 6.95, p = .008$). A greater proportion of public site employees who smoked reported either “fair” or “poor” health compared to individuals who smoked in the private worksite ($X^2_{[2, N = 105]} = 6.87, p < .05$).

Health Status

A two-way analysis of variance indicated that current smokers rated their health as significantly worse among both public ($M = 2.20, SD = .74$) and private employees.
(M = 2.70, SD = .62) compared to non-smokers at both the public (M = 2.50, SD = .89) and private (M = 2.75, SD = .89) sites (F[1, 590] = 5.73, p < .05). There was no significant interaction due to smoking status and site (F[1, 590] = .315, p = .575).

**Readiness for Smoking Cessation**

There was a significant difference between sites in terms of interest in improving smoking habits. Public employees were more likely to indicate an interest compared to private employees (50.7% and 26.7%, respectively) (Mann-Whitney U = 819.5, p < .05). Although not statistically significant, a smaller proportion of public employees (30%) were interested in joining a smoking cessation program than private employees (43%).

Although there were differences between the two samples related to demographics and desire to improve smoking habits, there were no significant differences in responses to any of the CAGE smoking-related questions by site. For the analysis of the CAGE questions, smokers from the two sites were combined into one group. Forty-one percent of the combined sample of employees who smoked felt they should cut down or stop smoking (44.3% at public site, 35.5% at private site). Seventeen percent of employees who smoked felt guilty or bad about how much they smoked (23.4% at public site, 19.4% at private site). Twenty-two percent of employees who smoked indicated that they woke up in the morning wanting to smoke a cigarette (34.6% at public site, 22.6% at private site), a sign of nicotine dependence. The majority (70.9%) of employees who smoked felt they had a problem with smoking.

Spearman’s rho correlations were computed to examine the relationship between the smoking questions and self-reported health status, and the desire to join a health promotion program or a smoking cessation program. Interest in participating in a smoking cessation program was significant, but modestly correlated with the CAGE questions (see Table 2). Health ranking was inversely related to these factors, but only the annoyance factor reached statistical significance. That is, the more negative a current smoker’s self-reported health status, the more the individual was annoyed by others telling him or her to cut down or stop smoking and the greater the interest in joining a smoking cessation program. Interest in a general health promotion program was significantly correlated with feeling guilty about smoking.

**DISCUSSION**

There were 110 employees who smoked among the 622 public and private employees who participated in this health survey. This sample reported a somewhat lower prevalence of smoking (18%) than national data, which show that 22% of adults 18 and older are current cigarette smokers (25% men and 20% women) (CDC, 2004b).

Some sociodemographic and behavioral differences were noted between employees who smoked at the two worksites. The employees who smoked in the public worksite were older, less educated, and included a greater proportion of men. Employees who smoked, smoked more heavily, reported being less healthy, and indicated more interest in improving their smoking habits than those in the private worksite. The characteristics of employees who smoked in this study are consistent with previous research (Kopstein, 2001; Piper et al., 2001; US-DHHS, 2000a).

In spite of these differences, the attitudes related to smoking and the desire to quit or cut down were similar in both worksites. A substantial portion of employees who smoked and showed interest in EAP services appeared motivated to quit and expressed a willingness to participate in a formal smoking cessation program. Information about workers’ attitudes toward their smoking behaviors is important for occupational health nurses to assess so they may develop smoking cessation services tailored to their employees.

<table>
<thead>
<tr>
<th>Question</th>
<th>Desire to Join a Smoking Cessation Program</th>
<th>Rating of Health Status</th>
<th>Desire to Join a Health Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut down</td>
<td>.24*</td>
<td>–.09</td>
<td>.14</td>
</tr>
<tr>
<td>Annoyed</td>
<td>.33†</td>
<td>–.29†</td>
<td>.05</td>
</tr>
<tr>
<td>Guilty or bad</td>
<td>.48†</td>
<td>–.12</td>
<td>.21*</td>
</tr>
<tr>
<td>Waking up in morning</td>
<td>.22*</td>
<td>–.13</td>
<td>–.11</td>
</tr>
</tbody>
</table>

* p < .05
† p < .01
‡ Fleming & Barry (1991)
§ Ewing (1984)
The small proportion of employees (approximately 5% public and 2% private) who availed themselves of the EAP orientation during the 7-month period indicates that one-to-one contact is necessary to reach employees. Therefore, occupational health nurses may need to use other venues, such as annual health examinations and other occupational health-related visits, to address smoking behaviors.

**Limitations**

The researchers recognize a number of study limitations including the use of only two worksites, the small sample size, and the use of EAP orientation sessions to recruit participants. Despite a large number of employees at both worksites, only a small portion participated in the EAP orientation during the 7-month period. The low participation rate for the orientation, together with the lower-than-expected smoking prevalence, yielded a small sample size. Although the study yielded a high participation rate (83%) for the survey, the lower prevalence of smoking suggests that more health-oriented employees may have attended the EAP orientations.

Information was not collected on the overall prevalence of smoking among all employees at the two worksites to determine the extent that selection bias may have operated. Therefore, the level of motivation indicated by respondents in the survey represents an upper limit of employees motivated to quit smoking at these worksites. Despite these limitations, which affect generalizability, the findings indicate that the data are both reliable and internally valid.

Another limitation is the use of CAGE-format items for smoking. Although much is known about use of the CAGE format to identify alcohol abuse and dependence (Fleming & Barry, 1991), further research on the use of modified CAGE questions formatted to evaluate cigarette smoking is necessary. Another potential shortcoming is the use of self-reported smoking behavior. However, studies have shown that self-reported smoking in adults is reliable when validated with urine cotinine levels, except during pregnancy (Britton, Brinhaupt, Stehle, & James, 2004; Caraballos, Giovino, Pechacek, & Mowery, 2001; Vartiainen, Seppala, Lillsunde, & Puska, 2002; Webb, Boyd, Messina, & Windsor, 2003).

**Implications for Practice**

The mandate from Healthy People 2010 challenges health care professionals to incorporate prevention strate-

<table>
<thead>
<tr>
<th>Brief Assessment</th>
<th>Pharmacotherapy Guidelines</th>
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<tr>
<td><strong>Ask about tobacco use.</strong></td>
<td>All smokers trying to quit, except in the presence of special circumstances.</td>
</tr>
<tr>
<td><strong>Advise to quit.</strong></td>
<td>Special consideration should be given before using pharmacotherapy with selected populations: those with medical contraindications, those smoking fewer than 10 cigarettes per day, pregnant and breastfeeding women, adolescent smokers.</td>
</tr>
<tr>
<td><strong>Assess willingness to make a quit attempt.</strong></td>
<td>All five of the FDA-approved pharmacotherapies for smoking cessation are recommended, including bupropion SR, nicotine gum, nicotine inhaler, nicotine nasal spray, and the nicotine patch.</td>
</tr>
<tr>
<td><strong>Assist in quit attempt.</strong></td>
<td>Because of the lack of sufficient data to rank-order these five medications, choice of a specific first-line pharmacotherapy must be guided by factors such as clinician familiarity with the medications, contraindications for selected clients, client preference, previous client experience with a specific pharmacotherapy, and client characteristics.</td>
</tr>
<tr>
<td><strong>Arrange follow up.</strong></td>
<td>All smokers trying to quit, except in the presence of special circumstances.</td>
</tr>
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Table 3

The Five A’s for Brief Assessment of Motivation For Smoking Cessation and Pharmacotherapy Guidelines

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Adapted from U.S. Department of Health and Human Services (2000a).
gies into their practice and research agendas (USDHHS, 2000b). The mandate also obligates businesses and communities to support prevention policies in worksites and other settings. The American Association of Occupational Health Nurses (2005) supports the key role of occupational health nurses in improving the health of employees through prevention efforts that include screening individuals and aggregates, counseling individual workers, and providing smoking cessation programs.

The HHS tool, which uses a CAGE format, may be an effective screening instrument to identify employees’ smoking behaviors, as well as readiness to quit. In this study, nearly half of employees who smoked indicated an interest in altering their smoking habits. The most critical factor in smoking cessation is the individual assessment and intervention at each contact with occupational health services (USDHHS, 2000a). Smoking cessation programs may provide additional support to those who make use of these sessions during the process of quitting.

Employee office visits. Although most employees using occupational health services are not seeking smoking cessation assistance, the first step in treating tobacco use and dependence is to identify tobacco users (USDHHS, 2000a). In this study, 71% of individuals who smoked felt they had a problem with their smoking, and almost half indicated a desire to cut down or stop smoking. Although this figure might be somewhat inflated because of self-selection, this percentage does imply that employees who smoke are open to discussing their smoking habit. Helping employees adopt healthy behaviors, such as smoking cessation, is an important area of occupational health nursing practice. When an employee seeks assistance for a health problem, the visit provides an opportunity to discuss smoking habits and possible interaction with occupational hazards, as well as readiness to quit.

Occupational health nurses can assess an employee’s readiness to quit using cues found in this study. Individuals who were ready to quit smoking (i.e., willing to join a smoking cessation program) were more likely to be annoyed by comments of others to quit, felt guilty about the amount they smoked, and desired a first cigarette upon waking (31% of smokers). Smoking cessation services need to include access to individual counseling, behavior modification, and pharmacotherapy for those with dependency (i.e., those wanting a cigarette upon waking except those with medical contraindications), as well as support including follow-up telephone contact (DeLucia, 2001; USDHHS, 2000a).

Occupational health nurses can use a cost-effective method called the Five A’s for brief intervention to assess motivation and help individuals make behavioral changes to quit (USDHHS, 2000a). This intervention can be implemented at all levels of contact including the initial visit. This 3-minute intervention (see Table 3) consists of simple steps that substantially improve the quit rate among smokers (USDHHS, 2000a). The guideline panel’s meta-analysis of 58 studies estimated the abstinence rate as 10.8% when no format was used, 12.3% with self-help, 13.1% with proactive telephone counseling, 13.9% with group counseling, and 16.8% with individual counseling (USDHHS, 2000a p. 18). Table 3 also contains pharmacotherapy guidelines for effective smoking cessation.

Worksite Smoking Cessation Programs. In this study, approximately 40% of all employees who smoked indicated that they would be very interested in joining a smoking cessation program. Smokers who rated their health as poor also reported a desire to join a smoking cessation program. For those who quit cigarette smoking, evidence is clear that clients experience improved health, decreased absenteeism, decreased use of insurance, decreased mortality, and improved quality of life following cessation (Lightwood, 2003; Lightwood & Glantz, 1997). Research on the effectiveness of worksite smoking cessation programs, however, is mixed. Some studies indicate a decrease in the prevalence of smoking in employee populations who attend smoking cessation programs at work, while others report no significant differences (Moher et al., 2003; Rodriguez-Artalejo et al., 2003; Smedslund, Fisher, Boles, & Lichtenstein, 2004; Thompson et al., 1995). There is wide variability in the types of workplace interventions reported in the literature. Many of the workplace interventions do not meet the current evidence-based criteria for successful cessation—one-to-one contact (USDHHS, 2000a).

Smoking cessation programs at the worksite can be both convenient and a source of support. Although members of a group might not be close friends, they may be able to derive support from peers who are also experiencing similar difficulties associated with cessation (McMahon & Jason, 2000). When smoking cessation programs are offered, they should be held on an ongoing basis because of the chronic nature of cigarette smoking and potential for relapse (USDHHS, 2000a).

Indoor Air Quality Policies. In addition to the effectiveness of the Five A’s approach, and possibly, formal smoking cessation programs, stronger indoor air quality policies in the workplace have been shown to decrease the number of cigarettes smoked, as well as significantly increasing the success rate of those employees who attempt to quit (Brownson, Hopkins, & Wakefield, 2002; Chapman et al., 1999; Fichtenberg & Glantz, 2002). In addition, smoke-free worksites significantly reduce exposure to environmental tobacco smoke and associated health risks for non-smokers (Ong & Glantz, 2004). Occupational health nurses need to be strong advocates for indoor air quality policies that protect the health of all employees.

CONCLUSION

Occupational health nurses can help employees quit smoking through individual and aggregate-targeted services, as well as by encouraging implementation of indoor air quality policies that protect the health of the entire work force. Knowledge of employees’ sociodemographic profiles and readiness to quit can aid in developing appropriate smoking cessation services.

REFERENCES


