Smoking Among Yale Medical School Faculty

MARK W. LEGNINI, M.P.H.,* AND ELIZABETH B. CLAUS, M.A.¹

*Department of Epidemiology and Public Health, Yale University School of Medicine; ¹Division of Biostatistics, Yale University, New Haven, Connecticut

Received July 17, 1986

A 1985 survey of a random sample of faculty at the Yale University School of Medicine investigated smoking prevalence and attitudes. The overall prevalence of cigarette smoking was estimated to be 9.8 percent, much lower than the prevalence in the general population. A higher proportion of women than men were current cigarette smokers. With regard to department affiliation, surgeons were most frequently current cigarette smokers, with psychiatrists having the lowest prevalence of current cigarette smoking and the highest percentage of people who had never smoked. In general, attitudes toward smoking were negative.

INTRODUCTION

There exists a substantial literature on the smoking habits of physicians; the data base of the U.S. Office on Smoking and Health contains over 150 citations on the subject. The literature on smoking among medical school faculty, however, is scant, consisting mainly of the work of Baric (1976) and Elkind (1979), both reporting on surveys done at the University of Manchester, England.

Baric and colleagues [1] found that the professional environment of a medical school faculty failed to exert enough pressure on the students who smoked to stop their smoking. Elkind [2] reported that the long-term health risks and expense of cigarette smoking were the main reasons faculty tried to quit; the need to set an example, in particular for students, was not stressed. Fewer than half of Elkind's respondents thought students should be persuaded not to smoke, and 40 percent felt that faculty smoking does not deter students from quitting. Degree of contact with students influenced these attitudes less than did the faculty member's age.

The study reported here surveyed a sample of faculty of the Yale University School of Medicine in 1985. Medical school faculty should have more information about the health hazards of smoking than members of the general public [3,4], by virtue of their training (especially physicians) and the many clinical or research activities in which they engage. Also, even though not substantiated by Elkind or Baric et al., we were looking for some evidence that responsibility for training physicians might make faculty more sensitive to the issue of smoking's health risks, since faculty serve as role models for physician behavior and teach physicians-in-training how to communicate such issues to patients.

Consequently, we assumed the prevalence of smoking among the faculty should be lower than in the general public [5]. The U.S. Surgeon General's 1980 Report on the Health Consequences of Smoking for Women estimated the prevalence of cigarette smoking in 1979 among adults ages 17 and older in the U.S. to be 36.9 percent for males and 28.2 percent for females [6]. Various studies of smoking among physicians...
during the 1970s estimated the prevalence of their current cigarette smoking to be anywhere from 18 percent to 21 percent [7,8,9,10].

The attitudes and beliefs of smoking faculty should differ significantly from those of the non-smoking faculty [11], given the overwhelming proof of smoking’s harm. In addition, certain professional characteristics [12,13,14] might be related to smoking behavior. For example, the California Medical Association, in a 1967 study of cigarette smoking among California physicians, categorized physician specialties with respect to their probable exposure to pathology associated with smoking. They found a higher prevalence of current cigarette smoking among physicians in their “unpredictable exposure” category (general practice, preventive medicine, public health: 23.0 percent) than in their “maximum probable exposure” category (anesthesiology, cardiology, gastroenterology, pathology, pulmonary medicine, radiology, thoracic surgery: 20.1 percent [15].

The objectives of the study were then defined as follows:

1. To determine the current prevalence of smoking in a sampling of Yale medical school faculty
2. To describe, in relation to their smoking habits, certain characteristics of the Yale medical school faculty:
   a. Demographic characteristics such as age, sex, and marital status
   b. Professional characteristics such as academic training, amount of teaching responsibility, and department affiliation
   c. Attitudes toward smoking as a habit with attendant risk

METHODS AND MATERIALS

The faculty to be included in the frame or list of elements in the sample were identified from the Bulletin of Yale University for the School of Medicine [16]. The Bulletin was complete as of December 2, 1984, and was found to be the most comprehensive listing of the desired individuals. The following persons were included in the study:

a. Ladder Faculty
   1. Assistant professor (of department or section)
   2. Associate professor (of department or section)
   3. Professor (of department or section)

b. Research Faculty

These categories do not include those individuals with the title “professor emeritus,” because they were rarely available for contact. Adjunct faculty were included as they are considered to be full-time employees of Yale University although they may be externally funded. Clinical faculty and lecturers were not included, as these positions are either voluntary or held by persons whose primary responsibilities are either other than at Yale or other than research and/or teaching. The categories were chosen on the basis of definitions of faculty status in the Yale University Faculty Handbook.

There were 833 individuals in the frame. A simple random sampling scheme was implemented for the following reasons: (1) simplicity, (2) availability of a list of all elements to be sampled, (3) ease of obtaining estimates for subdomains (e.g., departments), and (4) low cost. The sample size was calculated using the exact sample size formula for proportions given by Levy and Lemeshow [17] (see Appendix); it was computed to be 410. A sequence of 450 random numbers was generated; 40 of these
were randomly selected for a pre-test, and the remaining 410 comprised the selected sample. There were 47 (11.5 percent) invalid listings (individuals on sabbatical, deceased individuals, those no longer employed at Yale, and professors emeritus) in the original sample. These were subtracted from the original sample of 410, leaving an adjusted sample of 363 eligible faculty.

The instrument used was a mailed questionnaire of 31 questions; skip patterns held the total questions any respondent would answer to a maximum of 20, which could be completed in less than five minutes. Questions fell into three categories:

1. Demographic and professional characteristics (seven questions)
2. Smoking behavior (23 questions)
3. Attitudes toward smoking (one question in ten parts)

The smoking behavior questions were adapted from the Connecticut Blood Pressure Survey [18], and the attitude question was adapted from the Smoking Control Research Project, reported by Schwartz and Dubitsky in 1968 [19].

To examine the attitudes of the medical school faculty toward smoking, the questionnaire contained a ten-item scale used by Schwartz and Dubitsky; this was, in turn, a modification of one developed by Horn and Waingrow [20]. Equal numbers of items represented positive and negative attitudes toward smoking, and these items were in random order. The possible total scores ranged from a minimum of 10, indicating the most negative attitude toward smoking, to a maximum of 50 for the most positive attitude. The scale as a whole was also partitioned into two subscales: (1) subscale A, consisting of questions 1, 2, 4, and 5, which deals with the general qualities of smoking as a habit; and (2) subscale B, consisting of questions 7 through 10, which attempts to measure the extent to which the respondents felt smoking was a cause of disease and/or disability. Possible scores on each of these subscales range from four to 20 with the lower scores indicating negative attitudes toward smoking.

The pre-test was distributed by campus mail on February 28, 1985. In general, the survey instrument was determined to be adequate based on the results of the pre-test (response rate of 71 percent), and, after minor modifications (correcting typographic errors, highlighting instructions), the actual survey was begun. The survey was conducted in three waves: an initial mailing, a follow-up mailing to non-respondents, and a final telephone follow-up. The survey period extended from March 8, 1985, to April 19, 1985. The first mailing yielded an overall response of 65 percent; the second mailing yielded an additional 13.5 percent of the surveys. The remaining individuals were contacted by telephone. Thirty-one of the remaining 78 non-respondents were successfully contacted by phone. The remaining 47 faculty members either could not be reached or refused to participate. The overall response rate was 316 or 87 percent of those surveyed.

RESULTS

Demographic Characteristics

The tobacco smoking status of the faculty of the Yale medical school by demographic and professional characteristics is presented in Tables 1 through 3. Smoking status was categorized as current cigarette smoker, current cigar/pipe smoker, past cigarette smoker, and never smoked. In the sample surveyed, 9.8 percent of the faculty were classified as current cigarette smokers, 11.4 percent current cigar/pipe smokers, 28.2 percent as former cigarette smokers, and 50.6 percent as
|               | Sample | Current Cigarette | Current Cigar/Pipe | Past Cigarette | Never Smoked |
|---------------|--------|-------------------|--------------------|----------------|--------------|
|               | N      | %                 | (C.I.)*            | %              | (C.I.)       | %            | (C.I.)       |
| **Total**     | 316    | 100               | 9.8 (7.3–12.4)     | 11.4 (8.7–14.1)| 28.2 (24.5–31.9)| 50.6 (46.5–54.7) |
| **Sex**       |        |                   |                    |                |              |              |              |
| Male          | 246    | 77.8              | 8.5 (6.2–10.9)     | 14.6 (11.7–17.5) | 26.8 (23.1–30.5)| 50.0 (45.9–54.1) |
| Female        | 70     | 22.2              | 14.3 (11.4–17.2)   | 0              | —             | 32.9 (29.0–36.8)| 52.9 (48.8–57.0) |
| **Age**       |        |                   |                    |                |              |              |              |
| <35           | 67     | 21.2              | 10.5 (8.0–13.0)    | 10.5 (8.0–13.0) | 10.4 (7.1–13.7) | 66.6 (62.9–70.3) |
| 35-44         | 141    | 44.6              | 11.4 (8.7–14.1)    | 9.9 (7.4–12.5) | 26.2 (22.5–29.9) | 58.5 (54.4–62.6) |
| ≥ 45          | 108    | 34.2              | 7.4 (5.2–9.6)      | 13.9 (11.0–16.8) | 41.7 (37.6–45.8) | 37.0 (32.8–41.1) |
| **Marital Status** |     |                   |                    |                |              |              |              |
| Single        | 35     | 11.1              | 17.1 (14.0–20.2)   | 8.6 (6.2–11.0) | 25.7 (22.0–29.4) | 48.6 (44.5–52.7) |
| Married       | 252    | 79.8              | 7.1 (4.9–9.3)      | 11.9 (9.2–14.6) | 29.0 (25.3–32.7) | 52.0 (47.9–56.1) |
| Divorced      | 22     | 6.9               | 22.7 (19.2–26.2)   | 0              | —             | 22.7 (19.2–26.2) | 54.6 (50.5–58.7) |
| Widowed       | 3      | 0.9               | 33.3 (29.4–37.2)   | 0              | —             | 66.7 (62.8–70.6) | 0              |
| Separated     | 4      | 1.3               | 25.0 (21.5–28.5)   | 75.0 (72.5–78.5)| 0              | 0              |

*95 percent confidence interval
never smoked. The prevalence of cigarette smoking among the female faculty was 14.3 percent, which is almost twice as high as the prevalence of cigarette smoking among the male faculty (8.5 percent). While the prevalence of male current cigar/pipe smokers was estimated to be 14.6 percent, there were no reported female current cigar/pipe smokers. If we combine the two current smoking categories, the prevalence of all current smoking among the male faculty members is higher (23.1 percent) than the prevalence of all current smoking among the female faculty members (14.3 percent). The percentages of males and females who had never smoked were approximately the same (50.0 percent of males and 52.9 percent of females). It is interesting to note, however, that more females than males had quit cigarette smoking (32.9 percent to 26.8 percent).

In an attempt to distinguish between younger and older smokers, age was divided into three categories: <35, 35–44, ≥45. Current cigarette smokers tend to be younger than current cigar/pipe smokers. The prevalence of individuals who had never smoked decreased significantly with age. However, the rate of current smokers was higher for the <45 age categories than for the ≥45 age category.

Regarding smoking behavior by marital status, currently married faculty smoked cigarettes less than did faculty who were not currently married. However, currently married faculty tended to smoke a cigar/pipe slightly more frequently than did their never married counterparts (11.9 percent to 8.6 percent).

*Professional Characteristics*

We investigated three areas regarding professional characteristics:

1. Whether physicians might smoke less than non-physicians, because of their medical training and involvement in treatment of smoking-related disease
2. Whether smoking might decrease as the amount of time one spends teaching increases, because teachers are role models for physicians-in-training
3. Whether smoking might vary by department, with some departments having significantly more smokers than others

Regarding medical versus non-medical training, 52 percent of the sample were medically trained, 48 percent not. Table 2 contains the estimated population prevalences and 95 percent confidence intervals for medical versus non-medical training and smoking status. The only significant difference between these groups was in current cigar/pipe smoking (14.5 percent of M.D.s versus 8 percent of non-M.D.s).

Time spent teaching was measured by three categories: less than 5 percent, 5–25 percent, and over 25 percent. Table 2 contains the estimated population prevalences and 95 percent confidence intervals for these categories of teaching effort and smoking status. There was a significant difference in current cigarette smoking between the first and second categories (14.1 percent versus 7.8 percent), and for past cigarette smoking the first category was significantly lower than both other groups.

Department affiliation showed some clear differences in smoking status. Table 3 contains the estimated population prevalences and 95 percent confidence intervals for our five department affiliation categories and their smoking status. To summarize, Surgery was most often significantly higher than other department categories for current cigarette smoking; both Surgery and Epidemiology and Public Health (EPH) were significantly lower than the others for current cigar/pipe smoking; Psychiatry was significantly lower than all others among past cigarette smokers; and Psychiatry
### TABLE 2
Smoking Status by Type of Training and by Time Spent Teaching

|                  | Current Cigarette | Current Cigar/Pipe | Past Cigarette | Never Smoked |
|------------------|-------------------|--------------------|----------------|--------------|
|                  | N     | %    | (C. I.)* | %    | (C. I.)* | %    | (C. I.)* | %    | (C. I.)* |
| **By Type of Training** |       |      |         |       |      |       |      |      |       |      |
| M.D. or equivalent | 165   | 9.1  | (6.7–11.5) | 14.5 | (11.6–17.5) | 28.5 | (24.7–32.3) | 47.9 | (43.7–52.1) |
| Non-medical training | 151   | 10.7 | (8.1–13.3) | 8.0  | (5.7–10.3)  | 27.3 | (23.6–31.1) | 54.0 | (49.8–58.2) |
| **By Time Spent Teaching** |       |      |         |       |      |       |      |      |       |      |
| Less than 5 percent | 78    | 14.1 | (11.2–17.0) | 11.5 | (8.9–14.2)  | 21.8 | (18.3–25.3) | 52.6 | (48.4–56.7) |
| 5–25 percent     | 154   | 7.8  | (5.5–10.0) | 12.3 | (9.6–15.1)  | 29.9 | (26.0–33.7) | 50.0 | (45.8–54.2) |
| More than 25 percent | 184  | 9.5  | (7.1–11.9) | 9.5  | (7.1–11.9)  | 30.9 | (27.1–34.8) | 50.0 | (45.8–54.2) |

*95 percent confidence interval

### TABLE 3
Smoking Status by Department Affiliation

|                  | Current Cigarette | Current Cigar/Pipe | Past Cigarette | Never Smoked |
|------------------|-------------------|--------------------|----------------|--------------|
|                  | N     | %    | (C. I.)* | %    | (C. I.)* | %    | (C. I.)* | %    | (C. I.)* |
| EPH              | 27    | 11.1 | (8.5–13.7) | 3.7  | (2.1–5.3)  | 37.0 | (32.9–41.1) | 48.1 | (43.9–52.3) |
| Internal Medicine | 37    | 8.1  | (5.8–10.4) | 13.5 | (10.7–16.4) | 29.7 | (25.9–33.6) | 48.6 | (44.5–52.8) |
| Psychiatry       | 35    | 5.7  | (3.8–7.7)  | 14.3 | (11.3–17.2) | 17.1 | (13.9–20.3) | 62.9 | (58.8–66.9) |
| Surgery          | 25    | 20.0 | (16.7–23.3) | 4.0  | (2.4–5.6)  | 24.0 | (20.4–27.6) | 52.0 | (47.8–56.2) |
| Other            | 142   | 9.4  | (6.9–11.8) | 12.5 | (9.7–15.2)  | 29.2 | (25.4–32.9) | 48.9 | (44.8–53.1) |

*95 percent confidence interval
had a significantly higher prevalence of those who never smoked than all other department categories.

Attitudes

We analyzed the mean total scores for the smoking attitude scale by demographic, professional, and smoking status. Each respondent's score could range from a low of 10 points, indicating the most negative attitude toward smoking, to a high of 50 points, indicating the most positive attitude toward smoking. The mean scores in general were low and varied little, which suggests an overall negative attitude among the medical school faculty toward smoking; scores by various demographic and professional characteristics ranged from 14.3 to 18.0.

There was a significant difference in mean score between those respondents aged less than 35 and those aged ≥45, with the older group showing a higher mean score than the younger group. By medical school department, the mean scores for EPH were significantly lower than the mean scores for all other departments with the exception of Internal Medicine. The other departments did not differ significantly from one another. Regarding tobacco smoking status, current cigarette and cigar/pipe smokers showed similar mean scores (20.0 and 18.4, respectively). However, both of these groups showed higher mean scores than did either past cigarette smokers (15.2) or individuals who had never smoked, with individuals who had never smoked showing the lowest mean score (14.0).

Differences among respondents by survey wave (i.e., first mailing respondents versus second mailing respondents) were categorized by smoking status (current smokers of all types versus a combined category of never and former smokers). The percentage of smokers, although slightly higher for the later survey waves than for the first wave, did not differ significantly by survey wave. Nineteen percent of those who responded to the first mailing were current smokers versus 28.6 percent of those who responded to the second mailing. Among those who responded via a telephone follow-up, 26 percent were current smokers.

DISCUSSION

Demographic Characteristics

The Surgeon General's 1980 Report on the Health Consequences of Smoking for Women estimates the prevalence of regular cigarette smoking in 1979 among adults aged 17 and older in the United States to be 36.9 percent for males and 28.2 percent for females. Our sample, contrary to the national data [6], showed a higher prevalence of current cigarette smokers among females (14.3 percent) than among males (8.5 percent), although both are significantly lower than the national figures.

In our survey, the percentage of females who had quit cigarette smoking was higher than the percentage of males who had quit. In the general population, women have traditionally had lower quit rates than have men; in a 1975 survey conducted by the National Clearinghouse for Smoking and Health (NCSH), the quit rate for males was listed as 43 percent while the quit rate for females was found to be 34 percent [10]. Among health professionals surveyed in the 1975 sample, the quit rate among physicians (of whom 92.2 percent were males) was 64 percent, and the quit rate among nurses (of whom 97.5 percent were females) was 36 percent. The national figures correspond to our findings for females but differ greatly from our findings for the male faculty (26.8 percent).
The patterns of smoking according to marital status matched very nearly the national figures, although the rates are much lower in our sample, indicating once again that physicians are more likely to be aware of the hazards of smoking. The NCSH survey showed decreasing rates of smoking and increased rates of quitting for older age groups. Our study showed the same trends. The rate of current cigarette smoking was higher for the younger age groups (10.5 percent for <35, 11.4 percent for 35–44, 7.4 percent for ≥45). This result is interesting in light of the fact that younger persons would be exposed to information about smoking hazards for a greater proportion of their lives.

Professional Characteristics

Although results were inconclusive for the other categories of smoking, current cigar/pipe smoking was significantly higher among those with medical training than among those without medical training.

Regarding time spent teaching, in only one smoking category were there significant results in the direction of a negative association between teaching (and thus student contact) and smoking: prevalence of current cigarette smoking among those teaching less than 5 percent of the time was significantly higher than for those who teach 5–25 percent of the time.

Finally, faculty affiliated with Psychiatry were most likely to have never smoked and least likely to be current cigarette smokers. Surgeons, most directly involved with treating pathology related to smoking, were the most prevalent current cigarette smokers. Faculty affiliated with EPH, who might be expected to have low smoking prevalence because of their interest in disease prevention, were least likely to have never smoked and had the second highest prevalence of current cigarette smoking.

Attitudes

The attitude scale section of the questionnaire was designed with two objectives: (1) to measure the attitudes among the medical school faculty regarding the general qualities of smoking as a personal habit (i.e., how much they agreed or disagreed with a statement such as “Smoking is pleasurable”); and (2) to assess belief in the disease causation hypothesis (i.e., how much they agreed or disagreed with a statement such as “Cigarette smoking increases the risk of dying from respiratory disease”). With these two objectives in mind, two subscales (taken from the overall scale) were determined a priori to measure the above subgroups of attitudes.

The overall mean scores were fairly low, as were those for the two subscales, pointing to overall negative attitudes toward smoking among the medical school faculty. In addition, the observed range of values for all of the scales was generally narrow, although there was greater agreement among the faculty members on the health hazards of smoking than on the qualities of smoking as a habit. This difference is brought about by the fact that the current cigarette and cigar/pipe smokers felt more positively about the general qualities of smoking as a personal habit than did past or never smokers. In summary, the medical school faculty is in agreement about their attitudes regarding smoking as a possible health hazard: smoking is thought to cause disease and/or disability. In general, the faculty’s response indicated a negative attitude toward smoking as a habit, although all current smokers did respond in a slightly more positive manner.
CONCLUSION

The prevalence of smoking was much lower among Yale medical school faculty than among the general public; contrary to national figures, current cigarette smoking was more prevalent among females in our sample than among males, and the quitting rate among females was higher than among males. Past cigarette smoking and never smoked differed significantly by age groups. Current cigarette smoking was significantly lower for married faculty than others.

Regarding professional characteristics, there was no consistent trend of decreased smoking with increased teaching load (student contact). Among specialties, surgeons were the most frequent current cigarette smokers, and psychiatrists were the least frequent, as well as most often never having smoked.

Past cigarette smokers and those who had never smoked had significantly more negative attitudes about smoking than current smokers. With respect to their belief in smoking as a cause of disease, past cigarette smokers were more convinced of this than those who had never smoked.

APPENDIX

Calculation of the Sample Size

To calculate the sample size $n$, under simple random sampling we used the exact size formula for proportions given by Levy and Lemeshow [17:56]:

$$n \geq \frac{z^2 N p (1 - p)}{z^2 p (1 - p) + (N - 1) e^2 p^2}$$

where $z = $ the reliability coefficient, an ordinate of the normal distribution (specified as 1.96 for 95 percent certainty)

$p = $ the proportion of the population who smoke (A review of the literature suggested that among physicians this would be in the vicinity of 15 percent.)

$e = $ the accuracy expressed as a percentage of $p$

$N = $ population size (established initially at 833)

The formula gives the smallest $n$ such that with probability 100 $(1 - a)$, the estimate will be accurate to $e$ percent.

To select a value of $n$, a program was written to compute a table of sample sizes for a range of values of $p$ and $e$. Each entry in the table was divided by 0.80 to inflate for the expected response rate. Inspection of this table showed that $n = 412$ would be accurate to $e = 20$ percent with probability 0.95 if the true prevalence of smoking was as low as 15 percent. This value of $n$ was rounded to 410. A sequence of 450 random numbers was generated. Forty of these were selected (randomly) for the pre-test. The remaining 410 comprised the selected sample.

ACKNOWLEDGEMENTS

We would like to thank the following members of the Research Team for their assistance and support: Daniel Freeman, Ph.D., Sarianne Gruber, Tatsuyuki Kakuma, Edward Nelbach, Grael O’Brien, Iris Payne, Philip Rosenberg, and Luis Varela.

This work was supported in part by USPHS Grant 2-T32-ES07085.
REFERENCES

1. Baric L, MacArthur C, Fisher C: Norms, attitudes and smoking behaviour amongst Manchester students. Health Education J 35:142–150, 1976
2. Elkind AK: Smoking among the staff of a medical school. Medical Education 13:163–171, 1979
3. Knopf A, Wakefield J: Effect of medical education on smoking behavior. Brit J of prev soc Med 28:246–251, 1974
4. Bates LH: Smoking control from the oncologist's point of view. J Indiana State Med Assn 75:322–324, 1982
5. Enstrom JE: Trends in mortality among California physicians after giving up smoking. Brit Med J 286:1101–1105, 1983
6. Garfinkel L: Cigarette smoking among physicians and other health professionals. CA—A Cancer Journal for Clinicians 26:373–375, 1976
7. Westling-Wikstrand H, Monk MA, Thomas CB: Some characteristics related to the career status of women physicians. Johns Hopkins Med J 127:213–286, 1970
8. Burgess AM Jr, Casey DV, Tierney JT, DePalo P: Cigarette smoking by Rhode Island physicians: A fifteen year update. Rhode Island Med J 63:345–347, 1980
9. Bureau of Research and Planning, California Medical Association: The smoking study: A report of the attitudes and habits of California physicians with respect to cigarette smoking. California Medicine 109:339–344, 1968
10. Bulletin of Yale University, Series 80, Number 11, 30 December 1984
11. Levy PS, Lemeshow S: Sampling for Health Professionals. Belmont, CA, Lifetime Learning Publications, 1980
12. Freeman DH Jr, Ostfeld AM, Hellenbrand K, Richards VA, Tracy R: Changes in the prevalence distribution of hypertension: Connecticut adults 1978–79 to 1982. J Chron Dis 38:157–164, 1985
13. Schwartz JL, Dubitsky M: Psycho-Social Factors Involved In Cigarette Smoking And Cessation. Appendix G. Berkeley, CA, Institute for Health Research, 1968
14. Horn D, Waingrow S: Questionnaire Study Of Behavior And Attitudes. PHS T278, Study Number 1-466. Bethesda, MD, US Public Health Service, 1964