Objective: To evaluate the socioeconomic effect of and risk factors for work-related disability due to head and neck cancer and its treatment.

Design: Cross-sectional analysis of a consecutive series of patients.

Setting: Tertiary cancer center hospital.

Patients: Eligible patients had squamous cell carcinoma of the upper aerodigestive tract, were employed or had an active professional career at the time of initial diagnosis, and were disease free for at least 2 years at the time of interview. The survey instruments were a specific questionnaire to evaluate patient socioeconomic status and a Portuguese version of the University of Washington Quality of Life questionnaire.

Main Outcome Measures: Descriptive analysis of the results and associations between clinical, social, and quality of life variables with work disability.

Results: A total of 301 patients were studied. There were 236 (78.4%) men (median age, 52 years). The tumor sites were the oral cavity in 158 (52.5%), oropharynx in 55 (18.3%), larynx in 78 (25.9%), and hypopharynx in 10 (3.3%). Most patients presented with advanced clinical disease and underwent surgical treatment initially. There were 36 (12.0%) illiterate patients, and only 23 (7.6%) patients had completed college. Ninety-nine patients (32.9%) became unable to work, and 126 (41.9%) reported a significant decrease in household income. Multivariate analysis showed that advanced clinical stage ($P = .02$), alcohol consumption ($P = .02$), and low educational level ($P = .007$) were associated independently with work disability.

Conclusions: We observed a high rate of work-related disability that led to significant decrease in household income. Several clinical, social, and quality of life variables were associated with this degree of disability. These results could be used to better define who should undergo more intensive rehabilitation aiming to reduce work disability. If intensive rehabilitation is unsuccessful, these patients should receive more comprehensive social support.

The objective of this study was to evaluate the socioeconomic effect of and risk factors for work-related disability due to head and neck cancer and its treatment in patients treated at a tertiary cancer center hospital in a developing country.

**METHODS**

This was a cross-sectional study of a consecutive series of patients treated at the Head and Neck Surgery and Otorhinolaryngology Department of the Centro de Tratamento e Pesquisa, Hospital do Câncer A. C. Camargo, São Paulo, Brazil. The eligibility criteria included squamous cell carcinoma of the oral cavity, oropharynx, larynx, and hypopharynx treated in the institution between January 1, 1974, and December 31, 2000, in patients who were employed and working at the time of initial diagnosis and were disease free for at least 2 years at the time of interview. Patients previously treated and patients who were not working at the time of initial diagnosis were excluded from the study. All enrolled patients signed an informed consent form, and the study was approved by the institutional ethics committee.

Patients were interviewed by 2 trained registered nurses (J.T. and I.S.G.K.) using as survey instruments a specific questionnaire designed to evaluate the educational, social, and economic status of the patients and their families and a Portuguese version of the University of Washington Quality of Life (UW-QOL) questionnaire. Even though the UW-QOL questionnaire was designed for patients to use themselves, the instrument was used by health professionals because of the substantial number of illiterate patients in the study population. The questionnaires were given to the patients by the nurses before or after routine follow-up consultations in the institution. The interviewers completed the questionnaires by directly reading the questions to the patients and recording their responses.

Patients who reported that they lost their jobs or were retired secondary to the disease or its treatment were considered unable to work. Patients who retired after treatment at the usual age (65-70 years in Brazil) were not considered disabled.

Statistical analyses were performed with version 10.0 of the SPSS statistical program (SPSS Inc, Chicago, Ill) for Windows. The UW-QOL questionnaire domain scores were calculated according to its guidelines, which varied from 0 (worst) to 100 (best). The composite score was calculated as the mean of the domain scores. Associations between the variables and disability were calculated with a $\chi^2$ test, and multivariate logistic regression was performed to establish the set of independent variables associated with work-related disability.

**RESULTS**

Among the 671 patients interviewed, 301 fulfilled the inclusion criteria and were included in this study. There were 236 (78.4%) men and 65 (21.6%) women with ages ranging from 18 to 71 years (median, 52 years). There were 36 (12.0%) illiterate patients, 206 (68.4%) with elementary or incomplete high school, 36 (12.0%) with complete high school or incomplete college, and only 23 (7.6%) who completed college.

The tumor sites were the oral cavity in 158 (52.5%) patients, oropharynx in 55 (18.3%), larynx in 78 (25.9%), and hypopharynx in 10 (3.3%). One hundred seventy-seven patients (58.8%) presented with disease at an advanced clinical stage (clinical stage III or IV). The treatment performed was surgery in 158 patients (52.5%); radiotherapy in 34 (11.3%); surgery and radiotherapy in 98 (32.6%); surgery, radiotherapy, and chemotherapy in 9 (3.0%); surgery and chemotherapy in 1 (0.3%); and chemotherapy alone in 1 (0.3%).

Alcohol consumption before diagnosis of head and neck cancer was reported by 228 (75.7%) of the patients, and 64 (21.3%) were still consuming it after treatment. Two hundred forty-three patients (80.7%) reported previous tobacco use, and 38 (12.6%) maintained this habit after treatment.

Ninety-nine patients (32.9%) became unable to work as a result of the disease or its treatment, and 126 (41.9%) reported a significant decrease in household income. Almost two thirds of the patients were the main source of familial income before cancer diagnosis and treatment, and only 10 (3.3%) were noncontributors to the familial income. After treatment, 159 (52.8%) patients remained the main source of income, and 23 (7.6%) became noncontributors. This difference was significant statistically (Table 1).

At univariate analysis, the variables associated with an increased risk for work disability were advanced clinical stage ($P = .006$), combined treatment ($P = .005$), low score for pain (ie, a lot of pain) ($P = .04$) and composite score ($P = .007$) on the UW-QOL questionnaire, alcohol consumption ($P = .002$), and low educational level ($P < .001$) (Table 2). There were no significant differences regarding sex, age, tumor site, use of chemotherapy, and perma-

### Table 1. Comparison of the Number of Patients as the Main Source of Familial Income Before and After Treatment*

<table>
<thead>
<tr>
<th>Income Before Treatment</th>
<th>Patient and Familial Income After Treatment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Source</td>
<td>Contributor</td>
<td>Noncontributor</td>
</tr>
<tr>
<td>142 (47.2)</td>
<td>45 (15.0)</td>
<td>5 (1.7)</td>
</tr>
<tr>
<td>15 (5.0)</td>
<td>72 (23.9)</td>
<td>12 (4.0)</td>
</tr>
<tr>
<td>2 (0.7)</td>
<td>192 (63.8)</td>
<td>6 (2.0)</td>
</tr>
<tr>
<td>159 (52.8)</td>
<td>119 (39.5)</td>
<td>23 (7.6)</td>
</tr>
</tbody>
</table>

*Data are given as number (percentage) unless otherwise indicated. The difference between before and after treatment was significant ($P < .001$).
Cancer is one of the most frequent chronic diseases associated with workdays lost and disability. Head and neck cancer and treatment can result in several levels of cosmetic and functional impairments that can involve swallowing, communication ability, and shoulder movement. These effects can be more frequent and more significant for minorities in developed countries and people in developing countries where the disease usually is diagnosed at advanced stages, mostly because of poor access to a high-quality health care system. Late diagnosis results in an increased number of patients with disabilities, with a tremendous effect on the socioeconomic aspects of the patients, their families, and society.

Several authors reported significant numbers of patients with head and neck cancer who became disabled after diagnosis. Terrell et al reported a 34% disability rate. Taylor et al reported a 52% disability rate in their series, which also described factors associated with such impairment. The rate was higher in patients who underwent chemotherapy or neck dissection or those with high pain level according to their responses to a quality of life questionnaire. Nalbadian et al studied patients with laryngectomy and found a 58.5% retirement rate and 50% of patients reporting a worsening of their financial state. Terrell et al reported a 52% disability rate in their series, which also described factors associated with such impairment. The rate was higher in patients who underwent chemotherapy or neck dissection or those with high pain level according to their responses to a quality of life questionnaire. Nalbadian et al studied patients with laryngectomy and found a 58.5% retirement rate and 50% of patients reporting a worsening of their financial state. Terrell et al reported a 52% disability rate in their series, which also described factors associated with such impairment. The rate was higher in patients who underwent chemotherapy or neck dissection or those with high pain level according to their responses to a quality of life questionnaire. Nalbadian et al studied patients with laryngectomy and found a 58.5% retirement rate and 50% of patients reporting a worsening of their financial state. Terrell et al reported a 52% disability rate in their series, which also described factors associated with such impairment. The rate was higher in patients who underwent chemotherapy or neck dissection or those with high pain level according to their responses to a quality of life questionnaire. Nalbadian et al studied patients with laryngectomy and found a 58.5% retirement rate and 50% of patients reporting a worsening of their financial state.

In this series, the work-related disability rate was 32.9%, and a higher number of patients (41.9%) reported a significant decrease in familial income after treatment. Advanced clinical stage, alcohol consumption, and low educational level were the variables independently associated with disability rate. In contrast with results from a recent article addressing disability in patients with head and neck cancer, we did not find an association between the use of chemotherapy and neck dissection with disability; however, it is obvious that the more advanced the tumor stage, the higher is the chance of using chemotherapy and neck dissection as part of a multimodal therapy. Harrison et al also showed a significant association between disability and

**Comment**

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socioeconomic effect in patients with early-stage base of tongue cancer.

Low educational level and income status were reported as important factors associated with a low level of quality of life in patients with chronic diseases,12 nasopharyngeal carcinoma,7 prostate cancer,13 colorectal cancer,14 and breast cancer.15 In this series, a strong relationship was found between educational level and disability rate, which suggests that the higher the social and cultural level of individuals, the better is their capability of coping with cancer and its consequences. Another explanation is that patients from lower educational levels tend to work in activities that require more physical strength and are not usually candidates for re-adaptation because they are not prepared to change.

Alcohol consumption is related to more than 60 medical conditions and accounts for about as much disability worldwide as do tobacco use and hypertension.16 In this series, alcohol use was an independent factor associated with work disability. About one fourth of patients continued drinking after treatment. Taylor et al2 did not find a significant association between alcohol use and disability, crediting this finding to a possible population bias in their study. However, patients who continued to consume alcohol after treatment had a lesser risk of disability than patients who consumed alcohol only before treatment. This finding could be in accordance with those of the study by Allison,17 which reported that alcohol consumption is associated with better health-related quality of life in posttherapeutic patients with head and neck cancer and which could reflect the association of alcohol consumption with recovery from the disease and its treatment.

Pain is considered an important factor associated with health-related quality of life and disability.2,18,10 In the present study, pain and the composite score of the UW-QOL questionnaire were associated with disability in the univariate analysis. Even though these factors have not been associated independently with disability, this finding suggests that socioeconomic status and disability are strongly associated and are important contributors to the decrease in health-related quality of life in patients with head and neck cancer. This finding was also reported by Fang et al12 who studied patients with nasopharyngeal cancer; those of higher economic status and educational levels and those who were employed tended to have better health-related quality of life.

In conclusion, we observed a high rate of work-related disability that led to substantial decrease in household income. Several clinical, social, and quality of life variables were associated with this degree of disability. These results could be used to better define who should undergo more intensive rehabilitation aiming to reduce work disability. If intensive rehabilitation is unsuccessful, these patients should receive more comprehensive social support.

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REFERENCES