Original article

# Smoking cessation among patients with head and neck cancer: cancer as a 'teachable moment'

L. SHARP, RN, PHD, *Department of Oncology, Karolinska University Hospital and Karolinska Institute, Radiotherapy Unit at Sodersjukhuset, Stockholm*, H. JOHANSSON, BA, *Department of Oncology, Karolinska University Hospital, Stockholm*, K. FAGERSTRÖM, PHD, *Smokers Information Centre, Helsingborg*, & L.E. RUTQVIST, MD, PHD, *Karolinska Institute, Stockholm, Sweden*

SHARP L., JOHANSSON H., FAGERSTRÖM K. & RUTQVIST L.E. (2008) *European Journal of Cancer Care* **17**, 114–119

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Many cancer patients continue to smoke past diagnosis and treatment, even though smoking in some cases may cause more side effects and increase the risk of treatment failure. We developed and evaluated a nurse-led smoking cessation programme on 50 patients with head and neck (H&N) cancer undergoing radiotherapy (RT) with 1-year follow-up. To evaluate the effectiveness of the programme (proportion of smoke-free patients), smoking status was tested by measuring carbon monoxide in expired air.

Thirty-seven patients (74%) were tested smoke-free weekly during the RT period. At the 1-year follow-up visit, 28 patients (68%) were tested smoke-free. The results indicated that even H&N cancer patients with a heavy smoking history and multiple abuses could quit smoking with systematic support but a more sophisticated evaluation including larger study populations and control groups are needed.

*Keywords:* head and neck neoplasm, radiotherapy, oncologic nursing, tobacco use cessation.

## INTRODUCTION

It is estimated that about one-fifth of all new cancer cases in Sweden are related to smoking (National Board of Health and Welfare 2004). The outcome among patients with these diseases might be improved if the patient quit smoking at diagnosis. However, smoking is often considered difficult to challenge in a patient who has just been diagnosed with a serious disease. Previous studies have shown that 14–58% of the patients continue to smoke after cancer diagnosis and treatment (Cox *et al*. 2003).

The benefits of quitting smoking when diagnosed with a smoke-related cancer vary depending on the type and stage of cancer, treatment options, co-morbidity and the patient's general health. Smoke-related co-morbidity such as coronary heart disease and chronic pulmonary disease may limit the options of cancer treatment (Yancik *et al*. 2001; Browman *et al*. 2002; Tammemagi *et al*. 2004) and may make treatments such as surgery too risky.

Smoking cessation may improve the results and reduce the side effects from cancer treatment (Browman *et al*. 1993; Bluman *et al*. 1998; Tammemagi *et al*. 2004). To quit smoking at diagnosis could also possibly reduce the risk of developing a new smoking-related cancer. This is particularly important for patients with head and neck (H&N) cancer, among whom approx. In total, 10–12% develop a new cancer in the H&N region within the first 2 to 3 years after the first cancer (Day *et al*. 1994). To give up smoking could also improve cancer patients' general health and quality of life (Cox *et al*. 2003).

To be diagnosed with a life-threatening disease may make smoking cessation a low priority. However, research

Correspondence address: Lena Sharp, Department of Oncology, Karolinska University Hospital and Karolinska Institute, Radiotherapy Unit at Sodersjukhuset 118 83 Stockholm, Sweden (e-mail: lena.sharp@karolinska.se).

Accepted 3 March 2007
DOI: 10.1111/j.1365-2354.2007.00815.x

*European Journal of Cancer Care*, 2008, **17**, 114–119

has shown that patients suffering from serious disease may be more open for smoking cessation advice than smokers without serious health problems since their motivation may be higher (Cox *et al*. 2003). General advice and recommendations to quit smoking from healthcare professionals, such as nurses or physicians, at diagnosis appears to have a limited effect but structured interventions, accessible for the patients and integrated into standard care may be more effective (Rice & Stead 2004). Many healthcare professionals are unaware of the benefits of smoking cessation for cancer patients and believe that it is too late to stop once being diagnosed with cancer (Sarna *et al*. 2000). Counselling in combination with alternative nicotine products (ANP) appears to be an effective strategy (Rice & Stead 2004).

Head and neck cancer patients are often heavy smokers, with a long history of nicotine addiction and high consumption of alcohol (Lewin *et al*. 1998; Schildt *et al*. 1998). Many H&N cancer patients live alone, have a limited social network and come from socially deprived environments. These factors, in combination with a poor general health, make H&N cancer patients an especially vulnerable group (Funk *et al*. 1997; Hays *et al*. 1999) that may need extra support and attention to manage smoking cessation.

In Sweden, in contrast to many other countries, nurses with 1-year postgraduate specific radiotherapy (RT) education plan, coordinate and deliver RT to cancer patients. Most RT units in Sweden practise a care delivery system in which one or two nurses are responsible for the care of each individual patient and their family during the RT period. Therefore, they have a daily contact with the patients during several weeks. In this setting, smoking cessation could be integrated into routine cancer care with relative ease.

We developed and implemented a nurse-led smoking cessation programme, which included systematic support and ANP. The programme was tailored for patients with H&N cancer and was integrated into the routine care at an RT unit at a university hospital. Details of the programme were published previously (Sharp & Tishelman 2005). The aim of the current report was to evaluate the effectiveness of the programme (the proportion of smoke-free patients). We here report results for the first 50 patients included in the programme, with a minimum follow-up of 1 year.

## METHODS

The study was a non-randomized consecutive patient study. The primary outcome was defined as continuous abstinence from smoking during the RT period, with at least five weekly test levels of expiratory carbon monoxide (CO) ≤4 parts per million (ppm). The secondary outcome of efficacy included continued abstinence from smoking 1 year after quit date. Self-reported smoking was validated with analysis of CO from expired air (EC 50 Micro Smokerlyser®, Bedfont Scientific Ltd., Rochester, UK). Patients who refused a test or missed follow-up appointments were assumed to be smoking. The following baseline characteristics were collected: age, cancer site, co-morbidity, cancer stage, type of RT treatment and family situation. The patients were also asked if they considered themselves as having any other type of substance abuse. These self-reported data were not further explored, for example regarding types or amount of alcohol used. A detailed smoking history including type and amount of tobacco, debut age, previous quit attempts, smoking within the home and information on other household smokers was recorded. Tobacco contains nicotine, which is a highly addictive but not carcinogenic substance (Dodgen 2005). Higher nicotine dependence may result in greater difficulty in cessation attempts. There are tests available to assess the level of nicotine dependence. In this study, the Fagerström Test for Nicotine Dependence (FTND) was used to (Heatherton *et al*. 1991) collect baseline information on nicotine dependence, as were baseline levels of CO in expired air. The FTND instrument contains six questions regarding smoking habits and history. The test results in a score from 0 to 10, with higher scores indicating higher levels of nicotine dependency. The average score in a representative sample of smokers is between 3 and 4.

The patients were recruited from the RT unit of a university hospital. All current daily smoking H&N cancer patients in whom RT with a curative intent was planned (January 2002 through January 2004) were approached. Patients who had already stopped smoking after diagnosis, had a history of psychiatric disease, or were scheduled for palliative RT were excluded. Out of 52 patients approached, regardless of their motivation to stop, 50 accepted to participate in the programme. During the study period, expiratory CO levels, the use of ANP and relapses were recorded.

The RT nurses followed the patients through the smoking cessation process and also actively informed and supported smoking family members, who wanted to quit smoking at the same time as the patients. Even if the RT nurses led the programme, the entire H&N team were involved in supporting the patients in their attempts to quit smoking.

The programme was based on a combination of the following two models for behavioural change: motiva-

tional interviewing (Rollnick & Miller 1995) and five As (ask, advice, assess, assist, arrange follow-up) (Agency for Healthcare Research and Quality 2005). Motivational interviewing was developed as a model for behavioural change for patients with alcohol abuse but has also been used in smoking cessation programme for cancer patients (Wakefield *et al*. 2004). The aim of this model is to help patients explore and resolve ambivalent feeling regarding tobacco smoking. The model suggests a negotiating rather than an advice-giving approach and viewing the patient as the expert, regarding their own personal health. The five-A model has been described as the 'golden standard' in smoking cessation, has been widely used, applicable to most care settings and is regarded to be efficient and effective (Sarna *et al*. 2003; Schroeder 2005). Before the data collection was initiated, the nurses involved in this study were educated in these two models of behavioural change. During the study period, the nurses had weekly meeting to discuss the patients progress in their smoking cessation attempts.

The patients received ANP for the first 10 weeks free of cost. The following ANP were used: nicotine patches (21, 14 and 7 mg/24 h), nicotine chewing gum (4 and 2 mg), nicotine lozenges (2 and 1 mg) and low nitrosamine smokeless tobacco (Swedish snus, in portions). At study entry, each patient was given the opportunity to test all different nicotine products. Later the patients choose the product/s and dosing ad libitum and were given weekly supplies for 10 weeks. The patients' preferences were documented weekly.

Measurement of CO in expired air was performed at baseline, weekly during the RT period and at 3, 6, 9 and 12 month past quit date. To be recorded as smoke-free during RT, the patient must have performed at least five weekly CO tests levels of 0–4 ppm. A level of 0–4 ppm is expected in a non-smoker living in an unpolluted environment, according to the manufacturer of the test instrument (Farren 2004). During the study, the CO instruments were tested weekly by non-smoking RT staff living within the city area and the instrument never showed CO levels over 2 ppm.

The Regional Research Ethics Board of Stockholm approved the study, including the informed consent procedures.

### Statistical methods

At the time for the study, our clinical impression was that approximately 30% of the patients could remain smoke-free during the RT period after general advice and recommendations to quit smoking from clinicians. To be able to detect an increase to 50% with a power of 80% and with a significance level of 5%, it was estimated that a study of about 50 patients was required. Comparisons of groups (smokers versus ex-smokers at 1-year follow-up) were based on the Mann–Whitney test for continuous data and on Fisher's exact test for categorical data. Results of the intervention are presented as the percentage smoke-free during the whole RT period and the percentage smoke-free 1 year after RT. Percentages are reported with associated exact 95% binomial confidence intervals.

## RESULTS

### Baseline characteristics

Patient characteristics are summarized in Table 1. Most of the patients were male and the most common cancer site was laryngeal cancer. The median age was 62 years. More than half of the patients had advanced disease (clinical stages III–IV) at diagnosis, 37 (74%) reported co-morbid disease and 20 (40%) patients lived alone. The RT doses varied from 50 to 68 Gy. The level of nicotine dependence was high (average 6.4). As many as 60% of the patients reported that they had other forms of abuse, with alcohol being the most reported form of other abuse (54%).

### Smoking cessation rates

A total of 37 patients (74%, 95% CI = 60–85) were tested smoke-free during the RT period. Out of the 41 patients alive at the 1-year follow-up, 21 (51%, 95% CI = 35–67) were reported and tested smoke-free at all nine tests during the first year (Table 2). At the 1-year follow-up visit, 28 patients (68%, 95% CI = 52–82) were tested smoke-free (Table 2). The baseline characteristics and smoking variables for these 21 patients did not differ substantially from those who were not smoke-free except for tumour site, whereas significantly more patients with laryngeal cancer ($P = 0.026$) were tested smoke-free, and the relapse patients used APN during a significantly shorter period (median 12 weeks) than the smoke-free patients (median 32 weeks, $P = 0.003$). There were also more patients who reported other types of substance abuse in the relapse group; however, the difference ($P = 0.058$) between the groups was not statistically significant (data not shown).

Most patients ($n = 46$, 92%) used ANP during the first year and a majority used more than one ANP (Table 3). The ANP were used in all kind of combinations and six patients used all available products during the first weeks of the smoking cessation period. The most commonly ANP was nicotine patches ($n = 42$, 91%) and a majority of patients combined the patches with other nicotine

**Table 1.** The baseline characteristics and smoking variables

| | $n = 50$ (%) |
|---|---|
| Sex | |
| Males | 41 (82) |
| Females | 9 (18) |
| Age at start of study (median, [min, max], years) | 62 [42, 88] |
| Site | |
| Larynx | 16 (32) |
| Oropharynx/hypopharynx | 13 (26) |
| Oral cavity | 8 (16) |
| Nasopharynx | 3 (6) |
| Salivary gland | 3 (6) |
| Metastasis from unknown primary cancer | 3 (6) |
| Other | 4 (8) |
| Stage | |
| I, II | 19 (38) |
| III, IV | 31 (62) |
| Type of radiotherapy, in gray (Gy) | |
| Single modality (66–68 Gy) | 38 (76) |
| Pre-op (50–54 Gy) or post-op (60–64 Gy) | 12 (24) |
| Co-morbidity | |
| Pulmonary disease | 6 (12) |
| Other cancer diagnosis | 7 (14) |
| Cardiovascular disease | 20 (40) |
| Psychiatric morbidity | 11 (22) |
| Diabetes | 3 (6) |
| Living alone | |
| Yes | 20 (40) |
| No | 29 (58) |
| Homeless | 1 (2) |
| Smoking debut age (median, [min, max], years) | 16 [7, 45] |
| Fagerström Test for Nicotine Dependence (median, [min, max]) | 6 [1, 10] |
| Earlier attempts to quit smoking | |
| Yes | 23 (46) |
| No | 27 (54) |
| Living with a smoker | |
| Yes | 13 (26) |
| No | 37 (74) |
| Other abuse than smoking, self-reported | |
| Any* abuse | |
| Yes | 30 (60) |
| No | 20 (40) |
| Alcohol (alone or in combination with other abuse) | |
| Yes | 27 (54) |
| No | 23 (46) |
| Multi-drug abuse (>1 substance except nicotine) | |
| Yes | 5 (10) |
| No | 45 (90) |

*Alcohol, benzodiazepine, morphine or amphetamine.

product/s. The second most used ANP was snus, which was used by 54% ($n = 25$) of the patients. The length of ANP use varied from 2 to 52 weeks and the median time of ANP use was 26 weeks. Ten (24%) of the 41 patients alive after 1-year follow-up still used ANP during at the 12-month visit. All these patients were smoke-free at the 1-year follow-up but two patients were tested as smokers at an earlier test occasion.

**Table 2.** Effect of intervention on smoking cessation during RT treatment and after 1 year of follow-up

| Smoking status | $n$ | Percent (95% CI) |
|---|---|---|
| During RT treatment | | |
| Smoke-free (five weekly CO tests) | 37 | 74 (60–85) |
| Smoke-free at the last week of RT | 39 | 78 (64–89) |
| One year after start of RT treatment* | | |
| Smoke-free (nine CO tests) during follow-up | 21 | 51 (35–67) |
| Smoke-free at the 1-year follow-up visit | 28 | 68 (52–82) |
| Total number of patients | 50 | |

*Calculations based on the 41 patients still alive after 1 year.
CO, carbon monoxide; RT, radiotherapy.

**Table 3.** Pattern of usage of alternative nicotine products

| Smoking status | $n$ (%) |
|---|---|
| Number of alternative nicotine products used | |
| Never used alternative nicotine products | 4 (9) |
| 1 alternative product used | 16 (35) |
| 2 alternative products used | 21 (46) |
| 3 alternative products used | 3 (6) |
| Used all 4 alternative products | 6 (13) |
| Total number of patients | 50 (100) |
| Patients choices of alternative nicotine products | |
| Patches, 7, 14 or 21 mg | 42 (91) |
| Lozenge, 1 or 2 mg | 14 (30) |
| Gums, 2 or 4 mg | 10 (22) |
| Low nitrosamine smokeless tobacco (snus), portions | 25 (54) |
| Total number of patients | 46* |

*Calculations based on the 46 patients using alternative nicotine products during the study.

## DISCUSSION

In comparison with some other smoking cessation studies for cancer patients (Wewers *et al*. 1997; Griebel *et al*. 1998; Wakefield *et al*. 2004), the quit rate in this study was high. Our results thus show that even cancer patients with multi-drug abuse and heavy nicotine dependence can quit smoking successfully with structured support. This indicates that cancer could be a 'teachable moment' for patients with H&N cancer. Even if the number of patients was limited and the intervention programme was time consuming, the quit rate remained high during the first year of follow-up, when the intervention was far less intense. However, relatively intense interventions might be appropriate and reasonable for this group of patients, since quitting smoking may be important for the outcome of cancer treatment.

The self-reported smoking status in our study was confirmed with biochemical tests, which makes the results more reliable. This is in line with a previous study (Gritz *et al*. 1999) on physician delivered smoking cessation to H&N cancer patients, showed that 64% of the patients in

the intervention group were smoke-free at the 1-year follow-up. Other randomized smoking cessation studies for cancer patients also showed high quit rates (Wewers *et al*. 1994) but these studies only included short-term follow-up (5–6 weeks). The characteristics of the patients that were tested smoke-free at all tests during the follow-up year did not differ significantly from the relapse patients, except for tumour site and the length of the time period for use of ANP. It is possible that more differences between the smoke-free patients and the relapse patients could be found in a larger study. The difference in time period for use ANP could be explained with the fact that the relapse patients continued smoking and therefore did not need any alternative nicotine.

Most patients (96%) who were asked to participate accepted and completed the programme. In other smoking cessation studies for cancer patients, the percentage of patients who declined to participate was high (Wakefield *et al*. 2004). The results of our study indicate that H&N cancer patients are interested in quitting smoking if support and help is being offered, even if it is possible that some patients felt obliged to accept participation to please the treating staff. However, a majority of the patients who stopped smoking during RT remained smoke-free during the first year after diagnosis, which indicates that their interest in quitting smoking was sincere. As many as 28 (68%) of the patients were tested smoke-free at the 12-month follow-up. Some of these patients reported earlier relapse/s during the year but stated now to be smoke-free; others reported that they did not manage to quit completely during the RT period but had since been smoke-free.

The patients in our study were heavy smokers and a majority also reported other types of substance abuse. These are factors known to create great difficulties in quitting smoking. Our intervention did not include treatment of other types of substance abuse.

The patients in our study used ANP for as long as they wanted. The products were free of costs, and thereby easily available, during the first 10 weeks. The patients chose the doses and combinations they preferred. The results indicated that most patients used more than one ANP and that the median time they used ANP was 6 months, which is longer than seen in most other studies. Still, most patients stopped using the ANP during the first year but 10 patients (24%) were still using nicotine after 1 year. All of these patients were tested smoke-free at the 1-year follow-up.

The role of low-nitrosamine smokeless tobacco, such as Swedish snus, in smoking cessation and the putative health risks involved have been widely debated. These products are banned in the European Union despite the fact that several studies have failed to show a relationship between H&N cancer and moist Swedish snus (Lewin *et al*. 1998; Schildt *et al*. 1998). These products were included here as a less harmful alternative to tobacco smoking (Levy *et al*. 2004). Our results show that just about half of the patients used these products at some point during the smoking cessation process and that most patients stopped using all forms of nicotine during the first year, indicating no great risk of shifting over to another form of nicotine and continuing the abuse. Our aim was to support the patients to be smoke-free during and after cancer treatment, rather than to be nicotine-free.

When testing CO in expired air, we chose to set a low level (0–4 ppm) for the patient to be recorded as smoke-free. With a slightly higher cut-point, which might be appropriate for a patient living with a smoking spouse, more patients could have been recorded as smoke-free at some occasions. However, our clinical impression was that most patients self-reported smoking history was correct because test levels around 5–6 ppm were typically associated with self-reported smoking. If the levels had been set as high as 10 ppm, as in some other studies (Glover *et al*. 2002), some patients would have been regarded as smoke-free, even if they reported that they were still smoking. There are other markers, such as cotinine, which are more reliable but they are not relevant if the patients are using ANP, as was the case in this study.

We believe that an important part of the intervention was the nurses' and other clinicians' attitude towards smoking and smoking cessation. A non-judgemental intention was implemented and all patients were informed, before entering the study, that the decision to quit smoking was theirs alone and that the staff would support them whatever decision they make.

In summary, even for patients with long history of nicotine dependence and multi-drug abuse, cancer can be a 'teachable moment' and smoking cessation may prove to be successful with structured nurse-led support and use of ANP. However, to more accurately evaluate the effect of this intervention programme, further studies are ongoing involving larger groups of patients and suitable control groups.

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