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Smoking Cessation Rates After a Nurse-Led Inpatient Smoking Cessation Intervention

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Objective: To evaluate the effectiveness of inpatient brief counselling by a smoking cessation nurse compared to usual care (no advice). *Methods:* The subjects (*n* = 381, 245 men and 136 women) studied were in-patients, in four Flemish University Hospitals, who were daily smokers. Patients were randomised between 2005 and June 2006. Patients were allocated to an experimental group (EG) or to a control group (CG). Allocation and smoking cessation interventions of patients were stage-matched according to their stage of change as defined by Prochaska and Diclemente. Smoking cessation advice was administered by a qualified smoking cessation nurse. *Results:* The six-month self-reported continuous abstinence in the EG in 28/178 patients (15.7%) compared to the CG where 14/180 patients were abstinent (7.7%) was significantly better. The effect was most pronounced in the subgroup over 40 years old in the preparation and action stage. In this cohort in the EG, 44% of patients were abstinent at six months compared to 18%in the CG. All patients tended to smoke less after a hospitalisation. *Conclusion:* The intervention by a smoking cessation nurse during hospitalisation seems effective and is most rewarding in the smokers > 40 years old, and who were well motivated to stop.

Keywords: smoking cessation, integrated care, brief intervention, hospital

Any hospitalisation offers the opportunity to identify smoking patients and to encourage them to stop smoking. In view of the installation of a general smoking ban policy in Belgian hospitals, bedridden patients are forced to a period of abstinence during their admission (France, Glasgow, & Marcus, 2001). To take advantage of this opportunity, guidelines for the treatment of tobacco dependency recommend that healthcare institutions develop plans to support the consistent and effective identification and treatment of tobacco users (Fiore, 2000; West, McNeill, & Raw, 2000). The goal of the program is to increase the number of smokers who remain abstinent from smoking.

Opportunistic health education as the basis for a more specialised intervention on smoking needs to be introduced when patients are hospitalised for short periods of time. Irrefutable data exist that even brief counselling of 3 minutes can have a positive influence that moves the smoking patient further along the continuum toward quitting (Cahall, 2004).

When admitted with a smoking-related illness, smokers may be at a point in their life where they are prepared to consider quitting. Therefore, a nurse counsellor has the unique opportunity to provide this smoking cessation counselling.

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Different reviews (France et al., 2001; Munafo, Rigotti, Lancaster, Stead, & Murphy, 2001) and meta-analyses (Rice & Stead, 2004; Rigotti et al., 2003) evaluated the influence of hospital-based smoking cessation interventions. Rigotti et al. concluded that intensive interventions (contact during hospitalisation of > 20 minutes and follow-up for one month) were needed to obtain a statistically significant difference with usual care (*OR* 1.82 (95% CI 1.49–2.22). Follow-up of shorter duration (*OR* = 1.09; 95%CI 0.91–1.31) or shorter inpatient contacts (< 20 minutes) or longer inpatient contacts without any follow-up (*OR* 1.07; 95% CI 0.79–1.44) were not associated with a higher quit rate (Rigotti et al., 2003).

Among inpatients receiving a smoking cessation intervention, low nicotine dependence, the motivation to quit by sudden cessation and the initial reason for hospitalisation are the main independent predictors of smoking abstinence after discharge from hospital (Ong, Cheong, Prabhakaran, & Earnest, 2005).

Since cost-effectiveness becomes more important, stepped care — referring to the practice of initiating treatment with low-intensity intervention and then exposing treatment failures to successively more intense interventions — might be necessary to reach the goal of smoking cessation. Well-trained nurses should deliver the counselling, as this could guarantee the maximum impact (Stevens, Glasgow, Hollis, & Mount, 2000). Economic analysis showed that providing brief smoking cessation advice to hospitalised smokers is relatively inexpensive but cost-effective (Meenan et al., 1998). To deploy the limited resources in our hospitals in the best possible way we planned to use a randomised trial to study the effect of brief counselling during a hospital stay versus minimal advice (information booklet on smoking cessation) on wards where traditionally no smoking cessation advice was delivered.

Methods

Subjects

Inpatients admitted on surgical wards in four Flemish University Hospitals. Patients were recruited on orthopaedics, traumatology, as well as on wards with known clearly smoking-related diseases such as ear, nose and throat (ENT), head and neck surgery and neurosurgery wards. They were recruited within 24 hours of admission. Both scheduled and acutely admitted patients were recruited. Eligibility criteria were: adults between 18–70 years old with a life expectancy of > 1 year. All patients were Dutch-speaking. Patients who were physically or mentally unable to respond to the questions were excluded. Before admission, subjects smoked on average > 10 cigarettes/day to avoid occasional smokers. Telephone access 6 months after hospitalisation was warranted. All patients gave written informed consent.

Procedure

Demographic data regarding gender and age were recorded on admission.

The nicotine dependence was assessed by two questions (Baker et al., 2007; Piper, McCarthy, & Baker, 2006). Patients smoking > 20 cigarettes/day were attributed 2 points and those smoking between 10–20 cigarettes/day were attributed 1 point. Patients smoking their first cigarette within 5 minutes after arousal were attributed 3 points. Those smoking within 1 hour after arousal received 2 points and if they smoked their first cigarette after more than 1 hour after arousal 1 point was given.

Patients were questioned about the number of years smoking (< 5 years; 5–10 years; 10–20 years; > 20 years), previous smoking cessation attempts (yes/no), longest smoking cessation period (< 1 month; 1 month–1 year; 1 year–5 year, > 5 years). Consideration to stop smoking was evaluated with the following questions:

1. No motivation in considering smoking cessation. Patients who responded 'yes' on question 1 were considered precontemplators according to stages of change of Prochaska et al. (Prochaska, DiClemente, & Norcross, 1992).
2. I consider smoking cessation, not now but between 1–6 months from now. Those responding 'yes' on this question were considered contemplators.
3. I consider smoking cessation in the next 4 weeks. Those responding 'yes' were considered smokers in the preparation stage.
4. I want to stop smoking now. Those smokers were considered to be in the action stage.

To simplify processing based on these questions a web-based stage of change calculation was done and patients were randomised to two treatment groups: the control group (CG) and the experimental group (EG)

Confidence to stop smoking (*very high*, *moderate*, *low*), importance of smoking cessation (*very important*, *important*, *less important*) were also assessed.

The CG received a booklet with information on smoking cessation. The EG received a brief nurse-delivered intervention based on the 5'A's(Scanlon, 2006) (Ask, Assess, Assist, Advise, Arrange), depending on the stage of change according to Prochaska et al. ; those in the precontemplation stage were given additional information on the risks of smoking and on health gains after cessation. In the contemplation stage the nurse tried to detect barriers (withdrawal symptoms, weight gain) and pitfalls, hampering them to stop smoking. Self-efficacy was raised. The smokers in the preparation or action stage were referred to a smoking cessation counsellor or helped with a stop smoking plan.

The nurses performing the study were different for each facility, but all were trained in our mutual smoking cessation training program and were using the same methods in the four facilities minimising heterogeneity.

On admission exhaled carbon monoxide was measured using a Bedfont Smokerlyzer (Bedfont ltd, UK), provided by Pfizer.

Follow-up. The smoking cessation attitude and smoking status (self-reported continuous abstinence) was reassessed at discharge and at 6 months after discharge by a telephone call. No biological confirmation was performed. Patients who could not be contacted at 6 months were considered smokers.

Statistics. Based on previous work, we expected that the different stages of change in this smoking population would be present in the following proportion: precontemplators 50%, contemplators 35% and action/preparation phase 15%(Granda-Orive et al., 2004; Wewers, Stillman, Hartman, & Shopland, 2003). Assuming that the smoking cessation intervention has no effect (null hypothesis) or a positive effect (gain in smoking cessation rates) and taking into account that we expected the intervention to be especially important in the preparation and action stage, the sample size needed to provide 80% power at 5% significance, was 70 patients in the preparation and action stage. Statistic Package 'R' was used (R Development Core team, 2006. *R: A language and environment for statistical computing.* R foundation for statistical computing, Vienna, Austria. ISBN 3–900051–07–0, URL http://www.R-project.org). Wilcoxon Rank Sum test was used to compare independent numerical data of the two groups. Z test was used to compare means. A chi-squared test was used to compare independent categorical data of the two groups.

Data analysis. The primary outcome measure was self-reported continuous abstinence from any smoking, validated by a telephone call at 6 months after discharge. Secondary outcome measures were stage of change at entry, at discharge and after 6 months and attitude towards smoking at the same time points as scheduled above, as well as smoking reduction.

Ethical approval. The study was conducted according the Declaration of Helsinki and approved by the ethical committees of each hospital.

Results

A total of 381 patients were screened, of which 358 were finally enrolled in this study. We recruited 226 (63%) men and 132 (37%) women.

The mean age was 43.2 years. Their age distribution can be seen in Table 1. The age distribution was maintained and no statistically significant differences existed between the different stages of change at entry. There is an imbalance in the number of young women (less than 40 years old) enrolled in the study. We recruited 40 woman compared to 96 men under 40 years old (p value = .008).

Patient's smoking attitude distribution and study flow chart are shown in Figure 1.

Self-Reported Abstinence From Smoking

Results are shown in Figure 2.

Overall, 42/358 patients stopped smoking after hospitalisation (11.7%), 28/178 (15.7%) in the EG and 14/180 (8%) in the CG. This difference is statistically significant (p value = .0194).

Organised in the different stages of change the following results were obtained:

Table 1

Age Distribution of the Patients Studied

Age (year)	Number	% of total
18–29	69	20
30–39	67	19
40–49	97	27
50–59	83	23
>60	41	11

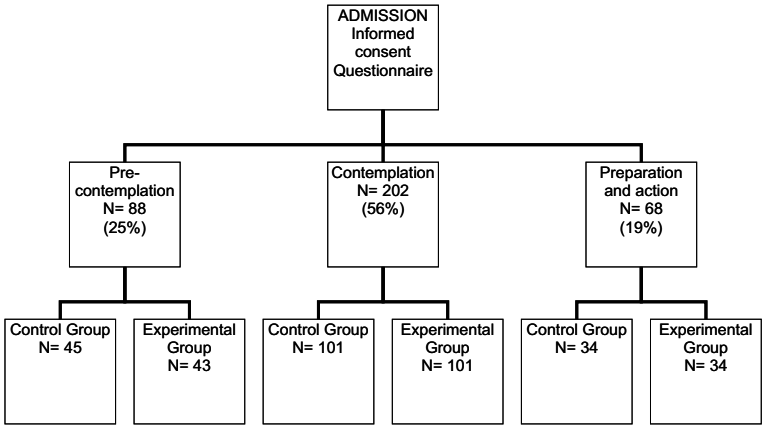

Figure 1

Flow chart of the patients recruited in the study.

Note: *N* = number.

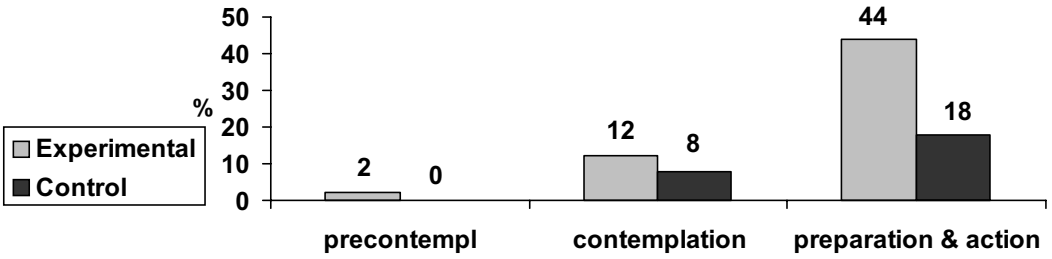

Figure 2

Smoking cessation rates according to stage of change expressed as a percentage of the respective stage group.

Note: Precontempl = precontemplators.

- In the precontemplation stage, one patient (1/43 or 2%) did stop smoking in the EG compared to none in the CG (NS, *p* value = .3)
- In the contemplation stage 8/101 (8%) patients were abstinent at 6 months in the CG, compared to 12/101 (12%) in the EG (NS, *p* value = .34)
- In the preparation and action stage (see Table 2) 15/34 (44%) patients stopped smoking in the EG compared to 6/34 (18%) in the CG. This difference was statistically significant (*p* value = .0182).The effect was most pronounced in those over 40 years old.

Nicotine Dependency Score

A total of 141(39%) patients smoked >20 cigarettes/day and 217 (61%) smoked between 10–20 cigarettes/day. One hundred and fifty (42%) patients smoked their first cigarette within 5 minutes after arousal, 141 (39%) after 1 hour and 67 (19%) after more than 1 hour. The distribution over the different stages of change according to their nicotine dependency is represented in Table 3. The mean nicotine dependency score in the CG compared to the EG was not statistically different (CG 3.58 (+ *SD* 1.06) points versus the EG 3.66 (+ *SD* 1.07) points (*p* value = .68).

Table 2

Self-Reported Abstinence at 6 Months for the Patients in the Preparation and Action Stage

Age category	Control group	Experimental group
18–29 years	1	1
30–39	1	2
40–49	2	5
50–59	1	4
+60	1	3

Smoking Reduction

A significant reduction in smoking, considered as a reduction of more than 10 cigarettes/day, was achieved in three patients in the precontemplator group (2 EG, 1 CG), in six contemplators (4 EG, 2 CG) and 10 patients in the preparation and action stage (8 EG, 2 CG)

Smoking reduction was more pronounced in the EG in the preparation and action stage than in the CG. This effect was statistically significant in those over 40 years old (*p* value = .009), see Table 4.

Use of Medication or Counselling

Of the 42 patients who did stop smoking, 13/42 (31%) did use some pharmacological aid to stop smoking (4 in the CG, 9 in the EG; *ns*, *p* value = .81). Only 5/42 (12%) used professional counselling to stop smoking (1 in the CG and 4 in the EG; *ns*, *p* value = .50). Only 7/42 (16.6%) had some social support in their stop smoking attempt (1 in the CG and 6 in the EG; *ns*, *p* value 0.24).

Smoking Cessation Attempt Before the Current Hospitalisation

Ninety-nine patients (28%) had never stopped smoking. Ninety-three patients (26%) had stopped for less than a month, 102 patients (28%) stopped between 1 month

Table 3

The Distribution Over the Different Stages of Change According to Their Nicotine Dependency

	Precontemplation		Contemplation		Preparation action stage	
			Number of patients			
Minimal NDQ	CG	EG	CG	EG	CG	EG
5ptn	16	13	24	31	4	8
4ptn	9	9	36	25	6	9
3ptn	14	13	27	30	11	11
2ptn	6	8	14	15	13	6

Minimal NDQ = Minimal Nicotine Dependency Questionnaire; ptn = points; CG = control group; EG = experimental group.

Table 4

Smoking Reduction in the Preparation and Action Stage at 6 Months After Discharge From the Hospital

	Smoking reduction in preparation and action stage: number of patients smoking < 11 cigarettes/day at 6 months after admission	
	< 40 years old	> 40 years old
Control group	16.6% (2/12)	18.2% (4/22)
Experimental group	23% (3/13)	57.1% (12/21)

Table 5

Number of Patients According to the Stage of Change who had a Previous Quit Attempt; Division Made According to the Length of the Quit Attempt

	Stopped smoking in the past		
	Precontemplators	Contemplators	Preparation and action phase
Never stopped	37 (42%)	53 (26%)	9 (13%)
< 1 month	21 (24%)	52 (26%)	20 (29%)
1 month–1 year	20 (23%	61 (30%)	21 (31%)
1 year–5 years	8 (9%)	21 (10%)	13 (19%)
More than 5 years	2 (2%)	15 (7%)	5 (7%)

and 1 year, 42 (12%) stopped between 1–5 years and 22 (6%) stopped more than 5 years.

Their distribution according to the stages of change can be seen in Table 5.

Of those who stopped smoking only 7/42 had never attempted to stop smoking before this study.

Evolution in Attitude Towards Stop Smoking

Of the precontemplators at admission, 8/45 (17.7%) in the CG and 14/43 (32.5%) in the EG, moved towards the contemplator stage at discharge (NS, p value = .38).This trend was confirmed at 6 months as respectively 11/45 of the CG and 18/43 of the EG moved to the contemplator stage. One moved into the action stage after 6 months in the CG, none in the EG. In the contemplator group only 5/101 (4.9%) in the CG and 9/101 (8.9%) in the EG moved into the preparation and action stage after 6 months; this trend did not reach statistical significance (p value = .09).

Discussion

This randomised controlled trial of a brief nurse-led smoking cessation intervention for hospitalised patients produced a significant difference in the self-reported cessation rates between the experimental and the control group at 6 months, mainly in the subset of patients prepared to take action to stop smoking. The difference was most pronounced in patients older than 40 years.

Brief smoking cessation intervention studies in hospitalised patients have been found to increase the long-term cessation rates in some studies, while others have not. A study of 650 patients with up to three weekly follow-up telephone calls (Rigotti et al., 1997; Rigotti, 2000),where nicotine replacement therapy was combined with counselling (Molyneux et al., 2003) — or in a more recent study of 1422 smokers (Nagle et al., 2005) — no advantage of brief intervention over usual care was shown. Our findings are also in contrast with a study of 540 patients admitted for a myocardial infarction, a clearly smoking-related disease, where no benefit of brief counselling was observed (Hajek et al., 2002). If counselling is more intense in these patients with smoking-related diseases, smoking cessation rates increase after admission for myocardial infarction (Dornelas et al., 2000) or after admission for coronary artery disease (Fonteyn, 2004) . A smoking cessation program, based on fear arousal, delivered by cardiac nurses without special training, and with a 5-month follow-up period, significantly reduced smoking rates 12 months after hospital admission for coronary heart disease (Quist-Paulsen & Gallefoss, 2003). In their review, France et al. (2001) reported an increase in quit rates for hospital-based interventions in cardiac patients compared to noncardiac patients.

Our study seems to be in line with a low-intensity smoking cessation intervention study, based on two visits without any further follow-up contact, which resulted in higher quit rates compared to historical controls (Bize et al., 2006).

In a stage-matched approach, comparable to the one in our patient groups, no increased smoking cessation rate could be obtained with brief counselling alone. Both the inclusion of precontemplators, even when this is a realistic reflection of a standard hospital population, as well as the absence of pharmacological support, contributed to the negative results obtained in this study (Hennrikus et al., 2005). Another stage-based study had some short-term effect in pregnant smokers in an outpatient setting (Lawrence et al., 2005).

Why This Disparity in Results?

Different factors are strongly associated with possible future smoking abstinence among hospitalised patients,

such as a high level of self-confidence to quit and multiple prior quit attempts (MacKenzie et al., 2004; Reid et al., 2006). Moreover, as mentioned previously, a low nicotine dependence, the motivation to quit by sudden cessation and the initial reason for hospitalisation are other independent predictors of smoking abstinence after discharge from hospital (Ong et al., 2005). All these factors differed within studies.

Our study proves that while focusing on patients prepared to stop smoking, more encouraging results can be obtained. The transtheoretic model of change (DiClemente et al., 1991; Prochaska et al., 1992), actually much criticised (West, 2005), still proves helpful in directing smoking cessation counselling. Of course, different objectives must be put to precontemplators compared to those smokers already prepared to take some action for smoking cessation. In this respect we tried to avoid a direct one-way communication but instead applied a more empathic and understanding approach where the stage-of-change model can be used as a prognostic tool for therapy compliance and evolution towards complete smoking cessation, rather than a model to decide whether or not to start therapy (Miller & Moyers, 2002).

Dedicated services with experienced stop-smoking counsellors perform better than counsellors who have to give smoking cessation advice in between their other tasks (West, 2002). A well-trained nurse is probably the best-placed person to do so as she/he often has a better relationship with the hospitalised patients (Rice & Stead, 2004). This does not exclude other health workers who have some interest in smoking cessation doing the job too.

Nicotine replacement therapy (NRT) increases the effectiveness of most smoking cessation programs (Mojica et al., 2004). The importance of access to pharmacological support is emphasised in other studies (Cahall, 2004; Hennrikus et al., 2005; Molyneux et al., 2003). Our study highlights that even in those prepared to stop smoking, we should pay more attention to prescribing first-line pharmacotherapy, as well as working out more detailed appointments with smoking cessation counsellors, both being regarded as validated tobacco dependence treatments and practices (Fiore, 2000). In our study, only one out of three patients used pharmacotherapy, and a professional tobacco counsellor took care of only about 12% of patients prepared to take some action.

It is evident that more is better in terms of counselling. If you have the resources to offer the full spectrum of smoking cessation care with follow-up calls or contacts, increased smoking cessation rates can be obtained in a broad range of patients (Smith et al., 2002). Follow-ups and the intensity of these follow-ups are very important components of inpatient smoking cessation (Rigotti et al., 2003). Previous studies demonstrated that the majority of hospitalised smokers (79%) indicated their desire to quit smoking (Emmons & Goldstein, 1992). Our study indicates that patients who are still undecided whether they want to stop smoking (contemplators) are experiencing higher self-confidence to stop smoking even after being given some brief advice. In this way we could possibly convince a few more to stop smoking by reminding them after hospital discharge. As telephone quit lines are being incorporated more and more often, telephone counselling is one of the ways to achieve this (Lando et al., 1992). More appealing for the youth and maybe equally effective are automated e-mail messaging systems (Lenert et al., 2004) or mobile phone text messaging (Rodgers et al., 2005).

As this study was conducted from 2005 till mid-2006, we were afraid that the introduction of a smoke-free workplace in Belgium on January 1, 2006 might have created a difference in smoking cessation rates between those patients recruited in 2005 and those recruited in 2006. This was not the case (figures not shown). The reduction in number of cigarettes by a substantial portion of the hospitalised smokers, although not statistically significant, is not attributable to a changing attitude in the community but probably a true hospitalisation effect. This once more stresses the important opportunity each hospitalisation can offer. Unfortunately, we do not have data on the spontaneous quit rate induced by the hospitalisation itself.

Our results might have been even more pronounced since the CG received much more than the usual care given in a daily standard hospital situation. The CG was assessed at bedside for smoking status and smoking history and was provided with an informative booklet. This partially explains the rather high self-reported quit rate (18%) in the CG of smokers in the preparation or action phase.

These favourable results must be tempered as the smoking status was based on self-report and was not validated using biochemical methods as originally intended. Neither measurement at baseline of the carbon monoxide (CO) level in expired air, to appreciate physical dependence, nor confirmation of the smoking cessation with a CO measurement at 6 months after hospitalisation were realistic goals in our study. The former because most patients had refrained from smoking several hours before the measurement due to the hospitalisation itself, so the obtained figure was not a realistic reflection of their dependence, the latter because most patients were reluctant to visit the hospital just to perform a carbon monoxide measurement and we did not have the resources to do measurements at home. We assumed that erroneous cessation reports would be equally distributed among both groups and so would not bias comparisons.

In conclusion, the first step in any smoking cessation intervention is to establish whether a patient smokes or not. If a structured smoking cessation program with high intensity follow-up is not a realistic goal for your

hospital than even brief advice to those who respond 'yes' to the question 'have you ever thought about quitting' can have some impact on the number of smokers giving up this addiction. Such interventions should not impose a large additional workload or even require substantial new resources. This does not preclude that hospitals can work closely together with established smoking cessation services to set up comprehensive referral systems. Ideally governments should make greater efforts on funding these resources.

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