

Impact of Telephone Numbers on Cigarette Packets on Call Volumes to Quitlines

Sander M. Bot PhD

Regina M. van der Meer MPH

Marc C. Willemsen PhD



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Accommodation Address

P.O. Box 16070

2500 BB Den Haag

Telefoon + 31 (0)70.312 04 00

E-mail sbot@stivoro.nl / rvandermeer@stivoro.nl

Internet

www.stivoro.nl

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Summary

In 2001, the European Commission enacted a Directive (2001/37/EC) stating that member states were required to make laws amongst others concerning the labelling of tobacco products. Article 5 stated that, apart from general health warnings, additional health warnings had to be placed on the packets. One out of 14 of these additional warnings held the contact information of the local smoking quitline.

In this report we analysed whether the appearance of contact information of stop smoking quitlines on cigarette packets (as a result of European legislation) increased the numbers of phone calls to these quitlines. We did this by doing trend analyses on weekly call volumes to each of the participating quitlines. In these analyses, we first identified the nature of the call volume sequence by analysing the call volumes of one year before the introduction of the numbers on cigarette packets. All quitline call volume sequences turned out to be autoregressive in nature, signifying that the best predictor of a week's call volume is the call volume in the week before. Secondly, we assessed the absolute and relative impact of the introduction of the quitline telephone numbers on packets (and other significant events affecting call volumes during the same period) by determining the baseline level of call volumes, and the extra calls that can be assigned to the impact of the numbers on packets (and other events). To obtain an understanding of the impact of the numbers on packets over time, we did the assignment separately for the first and second year after the number was introduced.

We found that in most cases, in the first year after introduction the telephone numbers on packets had a significant and relatively strong impact on quitlines' call volumes. In the second year this impact generally was a lot less strong, yet call volumes were still significantly higher than before the introduction. Between countries, effects were rather different; both with respect to relative increases in call volumes per quitline and with respect to number of callers relative to smoker population. Differences may possibly be attributed to variations in population's initial familiarity with the country's quitline before the numbers on packets were introduced.

Numbers of quitlines on cigarette packets are likely to have an effect on call volumes on at least the medium term. The effect decreases over time, however, and it is uncertain whether it will remain influential over longer time periods. It is therefore desirable to further examine whether other ways of portraying messages on tobacco packages can increase quitline call volumes over time.

Introduction

Visibility of and smokers' familiarity with smoking quitlines and their aims are of crucial importance for quitlines' value in helping to reduce smoking among the European population. The effect of a perfectly functioning quitline that is unknown by or not marketed to its target group will be nil (see e.g. Glasgow et al., 1993) in the case of reactive quitlines (where communication is initiated by the client).

Considering that all European smoking quitlines are reactive in nature when it concerns first client contacts, the first communication is always initiated by the smoker. Once this communication has taken place, smokers generally know how to reach the quitline, or client and quitline agree on a proactive approach by the quitline. The potential difficulty to achieve the first communication stresses the importance of the potential client's knowledge of the existence and availability of quitlines.

To facilitate this knowledge, marketing instruments similar to those used by other client or customer-oriented organisations are available, such as advertisements and television commercials; however, these may not always be feasible due to high costs. Because of recent political initiatives to further reduce smoking, various tobacco control measures have been suggested (see e.g., Joossens, 2000), some of which have been implemented in recent years. One of these activities is to oblige the tobacco industry to print health warnings on cigarette packets, which are considered to lead to better informed smokers (Borland & Hill, 1997). From January 1 1992, in all countries of the European Community (that became the European Union in the same year) such messages became mandatory (European Directive 89/622/EEC). In 2001 (Directive 2001/37/EC Article 5; see Appendix) it was, amongst other regulations, agreed that countries were also obliged to implement laws to print general warnings and additional warnings on all tobacco products. The general warnings were: 1). Smoking kills/Smoking can kill,' and 2). 'Smoking seriously harms you and others around you'. They are to be rotated in such a way as to guarantee their regular appearance, and have to be printed on the most visible surface of the packet. The additional warning had to be rotated in such a way as to guarantee their regular appearance, and had to be printed on the other most visible surface of the unit packet. One of the additional warnings to be rotated was an incitation to get help to stop smoking, often accompanied by information on web pages and telephone numbers of quitlines. Examples of messages are "Find help to quit smoking: "STIVORO 0900-9390; or www.stoppen-met-roken.nl or consult your general practitioner or pharmacist" (Translated from Dutch), and "Faites-vous aider pour arrêter de fumer : téléphonez au 0 825 309 310 (0,15 euro/min) (Help yourself quit smoking: call 0 825 309 310)" (France). These warnings were printed on the back of one out of every 14 packets. Primary goal of the messages referring to quitlines is to facilitate growth of call streams. Since it takes time before EU directives are implemented into national laws, the first cigarette packets with the new EU health warnings began to appear in May 2002, while in some countries the new messages were not introduced until 2006.

Simple calculations show that an average tobacco user, smoking 15 cigarettes a day, will consume 22.5 packets of cigarettes (of 20 cigarettes) per month, and will therefore be confronted with

the telephone number of the quitline over 1.5 times per month on his own packet, and possibly a few times more via packets of fellow smokers. Although a recent study (Willemsen et al., 2007) reported that only a few (0.2%) of the callers to quitlines in 9 European countries decided to quit smoking because of the warnings on cigarette packets, 23.9% of the callers in countries that had telephone numbers on cigarette packets said that they had seen them. Therefore, although printing messages on cigarette packets may not be a direct source of quitting smoking, they may facilitate quit-related behaviour, such as contemplating, discussing with others, and calling quitlines. Smokers who receive proactive counselling from quitlines may be more likely to be successful in quitting smoking (Stead, Perera & Lancaster, 2006). Therefore, it is important to assess the effect of the introduction of the quitline telephone number on cigarette packs within the EU on increases in call volumes among the European Quitlines.

The 'European Smoking Cessation Helplines Evaluation Research' (ESCHER), part of the European Network of Quitlines (ENQ), evaluates the effectiveness of the Quitlines operating throughout Europe. In this report, we assess the impact of quitline telephone numbers on cigarette packets on call volumes of EU quitlines, which was one of the ESCHER objectives. Shortly after the introduction of the telephone numbers, there is often a clear increase in call volumes. It is less clear, however, whether their appearance also has an effect on the longer term, or whether it the quitline numbers need to be presented in a constantly changing way, rather than in a static fashion. If the effect on call volumes is not a lasting one, this may indicate the need to occasionally change the portrayal of the numbers on the packets, or to present the quitline number in different ways to compensate for a "familiarity" effect. To gain insight into the course of the impact on call volumes, in this report we analysed increases in the first year and the second year after introduction independently.

Even though an increase in call volumes may be expected, the impact of telephone numbers on cigarette packets may not be the same for all participating countries. It may, for example, depend on how well known a quitline is in a country, since marketing and advertising theory states that the lower the baseline level of knowledge, the stronger the consumer response will be. Quitlines that are relatively unknown may therefore benefit from campaigns that facilitate familiarity of quitlines, whereas this effect may be smaller in countries in which the quitlines are well known and where earlier campaigns have taken place. Also, in absolute terms, the total smoking population of a country may affect the impact of printing telephone numbers on packets; it is unlikely, however, that this will also be the case in relative terms.

Studies have shown that strong seasonal variations exist in e.g. initiating smoking (Colwell, Ramirez, Koehly, Stevens, Smith & Creekmur, 2006) and the stage of change of callers to quitlines (Delnevo, Foulds, Vorbach & Kazimir, 2006). It is not unlikely that this will apply to call volumes to quitlines. Since in our analyses we only have data of a small number of years, and seasonality can be expected to be a yearly scenario, assessment of seasonality cannot be done in a systematic manner. We will however take it into account in an ad-hoc manner, by taking note if and when seasonal effects are likely to have occurred (e.g., because of new years' resolutions). We will also take into account other events that may have coincided with the introduction of telephone numbers on packets in

affecting call volumes. Examples of such events are other (e.g. mass media) campaigns, smoking-related items in the media, and price increases. The impact of such events may influence the effects found for the numbers on packets We separately assess and statistically control for this. Finally, by taking into account random variations in call volumes we aim to correct for variations in call volumes that cannot be attributed to the quitline numbers on cigarette packets.

Method

In 2003, the year in which the European Directive on numbers on packets was introduced, 15 countries were part of the European Union, and 10 were to become member states in 2004. Of these, 15 had a quitline in the period that the new warnings were introduced and thus were eligible for this study (i.e., Belgium, Denmark, Finland, France, Germany, Great Britain, Hungary, Iceland, Latvia, Malta, Netherlands, Norway, Poland, Sweden, and Switzerland (not part of the EU)). Between August 2005 and April 2007, representatives of these quitlines were asked in meetings of the European Network of Quitlines (ENQ) and by e-mail if they were willing to fill in a questionnaire on the effects of quitline numbers on cigarette packets. The majority of quitlines were willing to participate in this study. However, in Britain the NHS helpline numbers (and not that of Quit) appeared on packets, Hungary had started services after the introduction of the health messages on packets, Malta was unable to report on call volumes, Finland and Latvia did not have the resources to complete our questionnaire, and in Belgium, Germany, and Switzerland the numbers on the packets were introduced shortly before this study, thus precluding assessment of changes in call volumes. In the end, a total of 7 quitlines participated in this study.

Representatives from the 7 participating quitlines were sent a questionnaire via e-mail. The questionnaire consisted of 30 questions, asking about e.g. the introduction date of the numbers on packets, call volumes, and media campaigns running at the time of the introduction of the number on packets. All data were analysed with SPSS 14.0.

Measures

Introduction by law - For each country, information was gathered on the date on which it was obliged by law to have introduced the numbers on packets.

Actual introduction date –The (approximate) date on which the numbers on packets were actually distributed (and could therefore be read by consumers) was based on the quitline representative's appraisal, together with an examination of the call volumes around that date. This was necessary in order to thoroughly scrutinise the impact of the telephone numbers, and may actually differ between countries. In some countries, the tobacco industry chose to introduce the numbers before the mandatory date, whereas in other countries the introduction was much slower. Also, in some countries it took some time before the old stock of cigarettes (without the new warnings) were sold and the new ones started to appear in the shops. The actual introductory situation of each country is described in the Results section.

Duration of introduction – The Quitline representative's indication of the time period between the first introduction of the numbers on packets and the moment that all cigarette brands had actually distributed them. We assessed this for descriptive purposes, but treat the first date of introduction as the date to analyse, in order to obtain a conservative estimation of the results of the introduction.

Changes in operating hours— Whether the operating hours of the quitlines were changed during the study period and whether this was due to anticipated callers because of the telephone number on packets, or due to other reasons.

Changes in the number of counsellors / phone lines - Whether the number of counsellors or phone lines was changed during the study period and whether this was due to anticipated callers because of the telephone number on packets, or due to other reasons.

Call volumes – Call volumes were asked for each week in a 12-month period before and a 24-month period after the telephone numbers appeared on the packets. However, in some countries, call volumes were available on a monthly basis only. Since results can be distorted by the fact that quitlines are not always able to accommodate increased numbers of calls, we asked the quitlines to report the total volume of incoming calls irrespective of whether these calls were actually answered by the quitline staff.

Potentially coinciding events – We asked the representatives to indicate any other events that may have affected call volumes, such as smoking cessation campaigns and tobacco control policies like price increases. To correct for these, we included such events in the analyses and controlled for their effects on call volumes. For descriptive purposes, we reported the effect sizes of the coinciding events.

Strategy for Analyses

On a country-by-country basis we first showed, in sequence graphs, the call volumes of each quitline in the year before and two years after the introduction of the numbers on packets. This was done to provide insight into actual call volumes, trends over time, and to visualise effects described in the subsequent analyses indicating whether changes could be attributed to the numbers on packets.

We entered the weekly call volumes into a separate data set with variables “week” and “call volume” and ran ARIMA (*AutoRegressive Integrated Moving Average*) analyses in SPSS to examine whether variations in call volumes to the quitlines could be attributed to the introduction of quitline numbers on the packets. ARIMA-analyses are time series analyses, which can be used, amongst other things to evaluate the effect of some event that intervenes and changes the normal behaviour of a series (SPSS Trends 10.0, 1999). It is essential to do this in a systematic manner since even if on face value effects seem to have occurred, in reality effects of an event may be difficult to confirm, since random variations may explain (part of) the observed effects. Also, it may be more difficult to confirm effects over a longer time period and in cases where effects are small. ARIMA-analyses allow drawing conclusions about trends in time-lines taking into account whether subsequent values are correlated, whether differences between subsequent values vary over time, or whether values are determined by the average of the current disturbance and one or more previous disturbances. For this report, we only describe, and not explain, our identification of the model for each quitline. In each case, we checked the model identification by evidence of accuracy by an observation of plots of the autocorrelation and partial autocorrelation. More specifically, diagnosis of the model was done by

checking that the autocorrelation and partial autocorrelation of the residuals do not significantly differ from 0, and are without pattern (i.e., an insignificant Box-Ljung Q statistic).

The first step in an ARIMA analysis is to identify the baseline model. We did this by using the call volume data collected 52 weeks before introduction of the numbers on the packets. However, in some countries the full 52 weeks period could not be used, because other events that may have an important impact on number of calls occurred within these 52 weeks. In these countries, we identified a period of stability (as lengthy as possible) directly before introduction of the numbers and used this period to identify the baseline model. When this period was shorter than 30 weeks, we used another period before the introduction in which at least 30 weeks were free from such influences.

To assess the impact of the numbers on packets (the estimation), we added the date of the actual introduction of the numbers on packets as predictor (i.e. a dummy variable with value 0 before introduction and value 1 after introduction). Since we were also interested in the impact after a longer time period, we added another dummy variable which scored 1 from exactly one year after the introduction. The dummy variable indicating the first year after introduction scored 0 from there. To control for other events affecting call volumes we entered other dummy variables indicating when such events (e.g. media campaigns or price increases) took place. Because it is difficult to capture annual seasonality based on only a few years, we assessed at face value whether this took place. When we judged this to be the case, we also added a dummy variable in which seasonal higher call volumes were indicated.

We defined the actual moment in time when the cigarette packets containing the new warnings began to appear in a country by examining the call volume data around the date of introduction mentioned by the quitline representative, and identifying at which point in time an increase in calls began. When this increase could not be attributed to other events affecting the call volumes in that country at that time, we assumed it was because of the numbers on packets. When no increase in call volumes was perceived around the mentioned date, we used the exact dates that were provided by the quitline representatives in the questionnaire.

Finally, our findings were summarised in Table 8 and mean effect sizes were calculated, to attain an overall picture of the effects of the numbers on packets on call volumes in the participating countries. To allow cross-country comparisons we also calculated the relative increase of call volumes in comparison to the smoking population of that particular country.

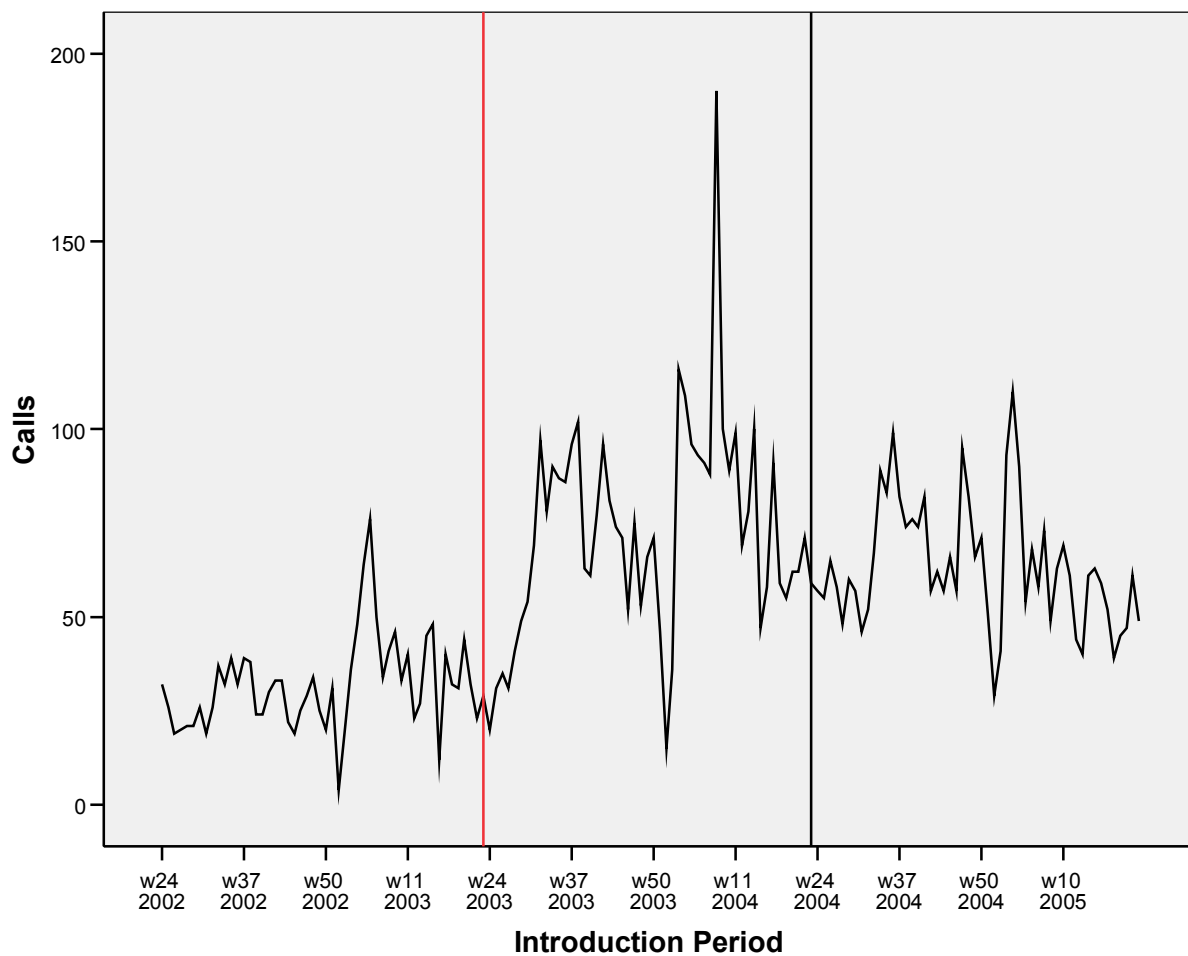
Results

Results of the seven participating countries (i.e. Denmark, France, Iceland, The Netherlands, Norway, Poland & Sweden) are described in alphabetical order of the countries' names. First, we describe the changes in call volume per country, then we summarise our findings and describe the overall impact of printing quitline numbers on cigarette packets.

Call Volumes per Country

1 Denmark (STOP- liniens Rådgivning)

The Danish quitline started counselling services in October 1999. The official introduction date (by Danish law) of the numbers on packets was September 30, 2003 (week 40); However, the moment at which they actually began to appear in the shops was in week 23 of 2003. The quitline representatives were unaware of any factors, other than the numbers on packets, that may have coincided with the number of phone calls. The sequential call volumes until week 23 of 2003 indicated an autoregressive (ARIMA 1, 0, 0) model. The results of the ARIMA show that the quitline's baseline level was 33 calls per week before introduction of the numbers on packets; these numbers increased to an average of 71 (38 extra calls) per week in the first year after introduction and an average of 63 (30 extra calls) per week in the second year after the introduction.



— = Date of introduction number on packet
 — = One year after introduction number on packet

Figure 1. Time sequence of call volumes to the Danish quitline

Table 1: Estimations of Baseline Level and Impact on call volumes of the Danish quitline

	Estimate	S.E.	Significance
Baseline Level	33.33	5.13	p < .001
Number on packet 1 st year	37.59	7.02	p < .001
Number on packet 2 nd year	29.67	7.18	p < .001

Note: Outcomes of an ARIMA(1,0,0)-analysis with constant and 2 independent series.

2 France (Tabac Info Service)

In France, several campaigns have affected the quitline's call volumes in the period before and after the numbers were introduced on the packets around week 33 of 2003. First, a radio campaign with advertisements denouncing the tobacco industry's strategies targeted at young people took place in 2003 (weeks 41 through 43). This campaign was broadcast on all main radio stations aimed at young people, but did not include the quitline number. Therefore, and because no changes in call volumes were seen in these weeks that could not be accounted for by other events (e.g. the tobacco price increase in October 2003 mentioned below), we did not enter this campaign in the analyses.

In that same period, a TV campaign focused on the numerous disadvantages of smoking on girls (e.g. it smells bad, it's bad for the skin, it alters your beauty). This campaign comprised short clips (a few minutes each) released every day on a national channel (M6) from September 15 to October 11 (weeks 38 through 41), and from November 22 until December 30 (weeks 48 through 53). The quitline number was displayed at the end of each clip.

From weeks 23 to 28 of 2004 weeks 43 to 47 of 2004, and weeks 4 to 6 of 2005, a large radio campaign focused on Tobacco Info Services and broadcast the quitline number.

In week 22 of 2005 a website dedicated to tobacco issues and providing tools to help smokers quit was launched (www.tabac-info-service.fr). It was publicised through a large online campaign.

The final media campaign possibly affecting the number of phone calls to Tabac Info Service ran from weeks 22 to 26 of 2005 and was a TV campaign denouncing passive smoking. The number of the quitline appeared at the end of the TV advertisement (in small characters)

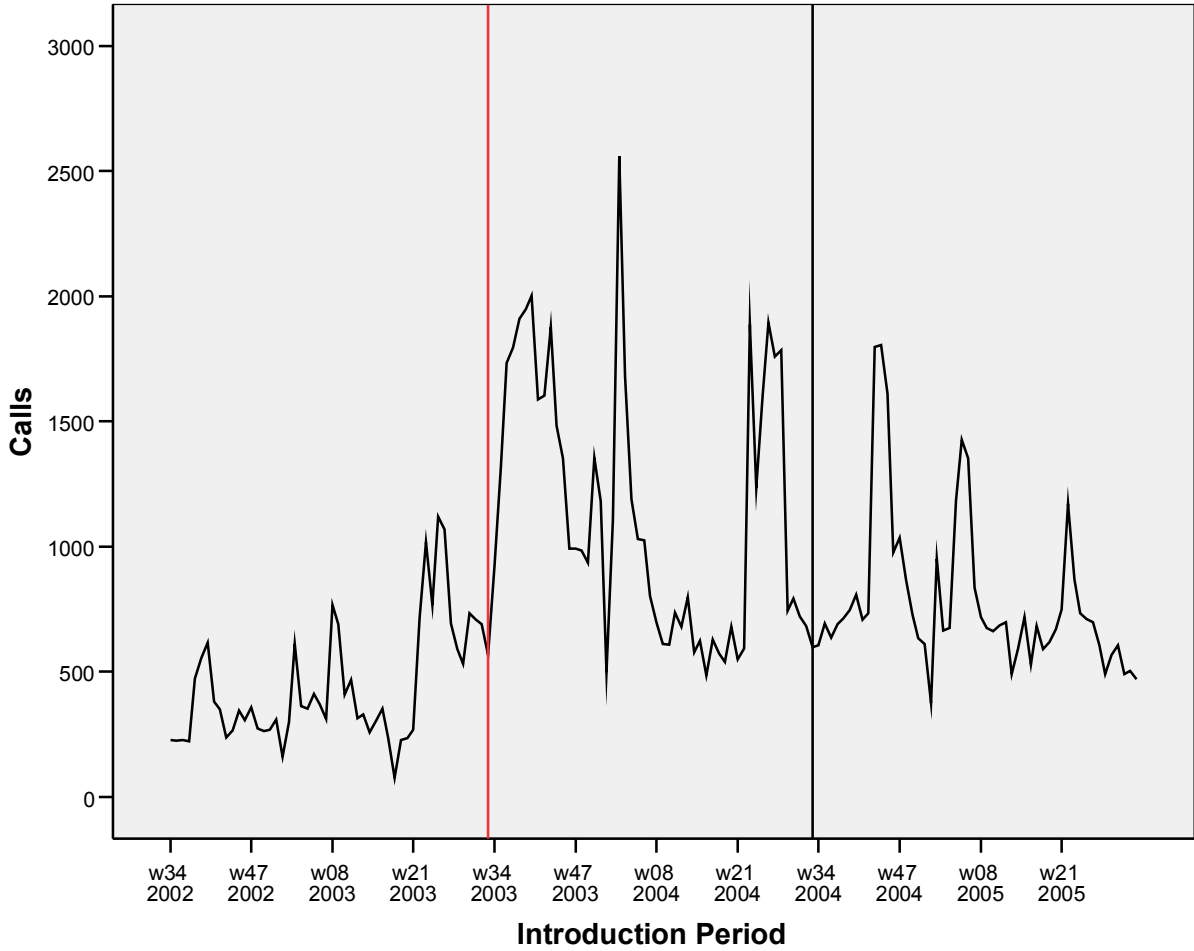
Around the time of the introduction of the numbers, the French government implemented several increases (of at least 10%) in the price of tobacco; these took place on January 6, 2003 (week 2), October 20, 2003 (week 43) and January 5, 2004 (week 1). We took an arbitrary period of 3 weeks after the price increases for which we assumed increases in call volumes.

As a reference period to identify the model, we took the period from week 31 of 2002 (directly after the decline of high call volumes) through week 21 of 2003, after which call volumes increased again (both increases probably due to the campaigns running at that time). The model was identified as an ARIMA 1, 0, 0, indicating an autoregressive aspect.

The intervention analysis was done on week 33 of 2002 through week 53 of 2004. Ideally we would have had call volume data until week 33 of 2005, but those of the first weeks of 2005 were missing. For this reason the analyses on the second year after introduction were based on 20, instead of 52 weeks. The campaigns and price increases were entered as dummy variables in the analyses, together with the introduction of the numbers on packets in week 33 of 2003. Results were displayed not only for the impact of numbers on the packets, but for descriptive purposes for all three variables and the baseline (which indicates the call volume when none of the three variables apply).

Table 2 shows that the numbers on packets, as well as the campaigns and price increase in January 2004, had a significant effect on the baseline call volume (approximately 297 calls per week). The numbers on the packets had a strong effect (an increase of 646 calls per week) over the total first year of introduction, and a slightly weaker, but still highly significant impact in the second year (385 extra calls per week). Further, the temporary effects of media campaigns (approximately 461 extra

calls per week) and the price raises (450 extra calls per week in during a three week period) were a strong predictor of calls to the French quitline.



— = Date of introduction number on packet
— = One year after introduction number on packet

Figure 2. Time sequence of call volumes to the French quitline

Table 2: Estimations of Baseline Level and Impact on call volumes of the French quitline

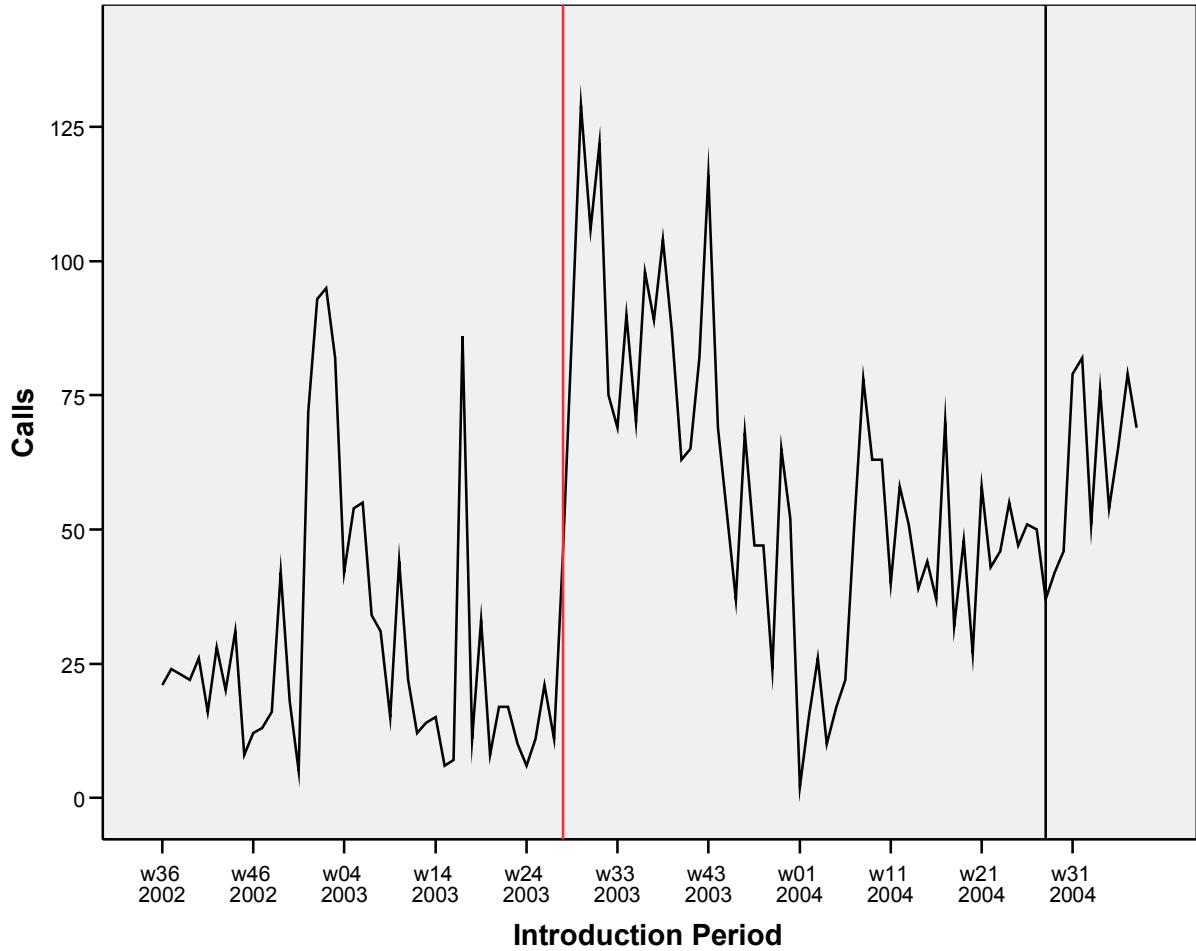
	Estimate	S.E.	Significance
Baseline Level	296.61	76.91	p < .001
Number on packet 1 st year	645.68	101.47	p < .001
Number on packet 2 nd year	384.97	105.02	p < .001
Campaigns	461.25	65.13	p < .001
Cigarette Price Increases	449.66	107.57	p < .001

Note: Outcomes of an ARIMA(1,0,0)-analysis with constant and 4 independent series.

3 Iceland (Ráðgjöf í reykbíndindi)

In Iceland it was required to have the new health warnings (including the Quitline number) on the cigarette packets in week 40 of 2003. The quitline representative claimed that the first packets began to appear at approximately week 30. However, data on the call volumes show clearly that in week 28 in 2003 call volumes increased dramatically; therefore, this week was identified as the one in which the numbers on packets appeared. Neither campaigns, nor price increases were indicated by the quitline representative close to the introduction of the numbers on packets. A large government campaign took place throughout 2002, but mainly during the first part of the year. This campaign comprised personal stories about some of the most common rationalisations for smoking, and was aimed at promoting smoking cessation in middle-aged people. Since the intensive part of this campaign took place more than one year before the introduction of the numbers on packets, and no clear increases in call volumes were observed at the end of 2002, we did not take this campaign into account in our analyses.

The sequence of the call volumes was available from week 37 of 2002 on, and was identified as autoregressive (ARIMA 1, 0, 0). Call volume data were only available until week 40 of 2004, so the estimate of the impact of the number on the packet was based on 12 weeks, instead of 52. For Iceland, the appearance of the numbers on packets led to a significant estimated increase of calls of 31 calls per week from a baseline level of 28 in the first year (to a total of 59), and an increase of 33 calls in the second year after introduction of the numbers on packets.



— = Date of introduction number on packet
 — = One year after introduction number on packet

Figure 3. Time sequence of call volumes to the Icelandic quitline

Table 3: Estimations of Baseline Level and Impact on call volumes of the Icelandic quitline

	Estimate	S.E.	Significance
Baseline Level	27.87	7.22	$p < .001$
Number on packet 1 st year	31.27	9.47	$p < .01$
Number on packet 2 nd year	33.10	14.25	$p < .05$

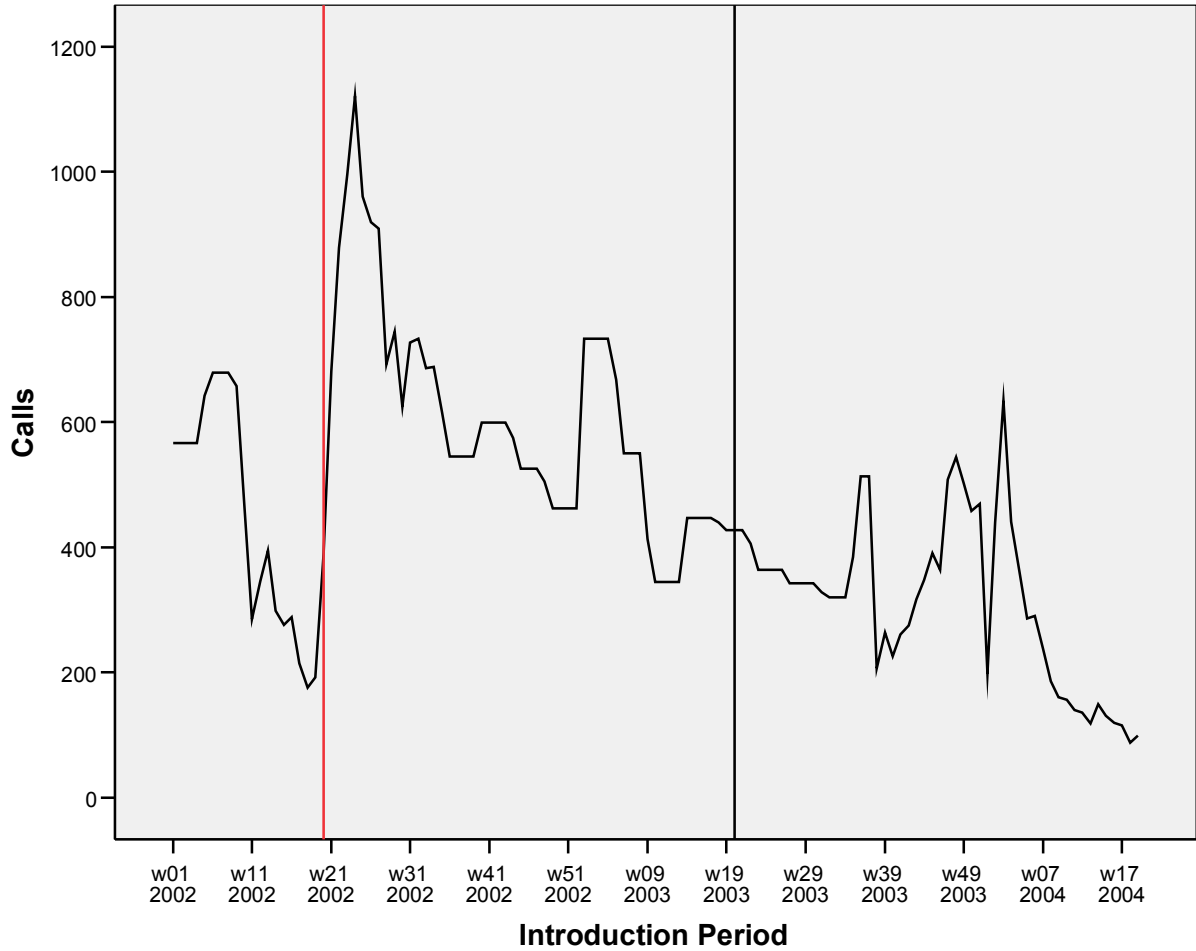
Note: Outcomes of an ARIMA(1,0,0)-analysis with constant and 2 independent series.

4 The Netherlands (Stivoro Roken Infolijn)

The Dutch smoking quitline can be contacted via two telephone numbers. In this report we only review the call volumes to the telephone number that was printed on the cigarette packets (0900- 9390). For some periods (i.e. weeks 1 through 9, 2002; and weeks 35, 2002 through 37, 2003) only monthly call volumes were available relating to the period at which the numbers on the packets were introduced. For those periods we estimated the weekly call volumes by using the already known weekly call volumes of the specific month and dividing the total month's call volumes through 4,33 (weeks per month).

Dutch law required the numbers on packets from week 35 of 2002, but they already started to appear in the shops from week 20 (halfway May). No large media campaigns took place before or after the time of the introduction. In January of each year, however, call volumes increase because of stop-smoking campaigns and smokers' New Year's resolutions. Therefore, weeks 1 through 5 of 2002 and weeks 1 through 5 2003 were entered in the analysis as dummy variables.

Too few call volumes were available to correctly identify the model; therefore, we assumed that (like all other countries' call sequences in this study) the Dutch call volumes were autoregressive in nature. We ran an ARIMA (1, 0, 0)-analysis to estimate the impact of the numbers on packets and higher call volumes in January and found that, above a baseline level of 331 calls per week, the January campaigns resulted in 126 extra calls and the numbers on packets to 167 weekly extra calls in the first year, and suggested 75 weekly extra calls in the second year (non-significant). Since the residuals (autocorrelations and partial autocorrelations) are randomly distributed and do not exceed 95% confidence limits, and the Box –Ljung statistic is not significant at any lag, we assume that our assumption of an autoregressive model was correct. Therefore we accept our results as the best estimation of the increase in call volume.



— = Date of introduction number on packet
 — = One year after introduction number on packet

Figure 4. Time sequence of call volumes to the Dutch quitline

Table 4: Estimations of Base Level and Impact on call volumes of the Dutch quitline

	Estimate	S.E.	Significance
Baseline Level	330.56	95.03	$p < .01$
Number on packet 1 st year	166.50	78.39	$p < .05$
Number on packet 2 nd year	74.80	101.78	$p = n.s.$
Campaign	125.95	49.29	$p < .05$

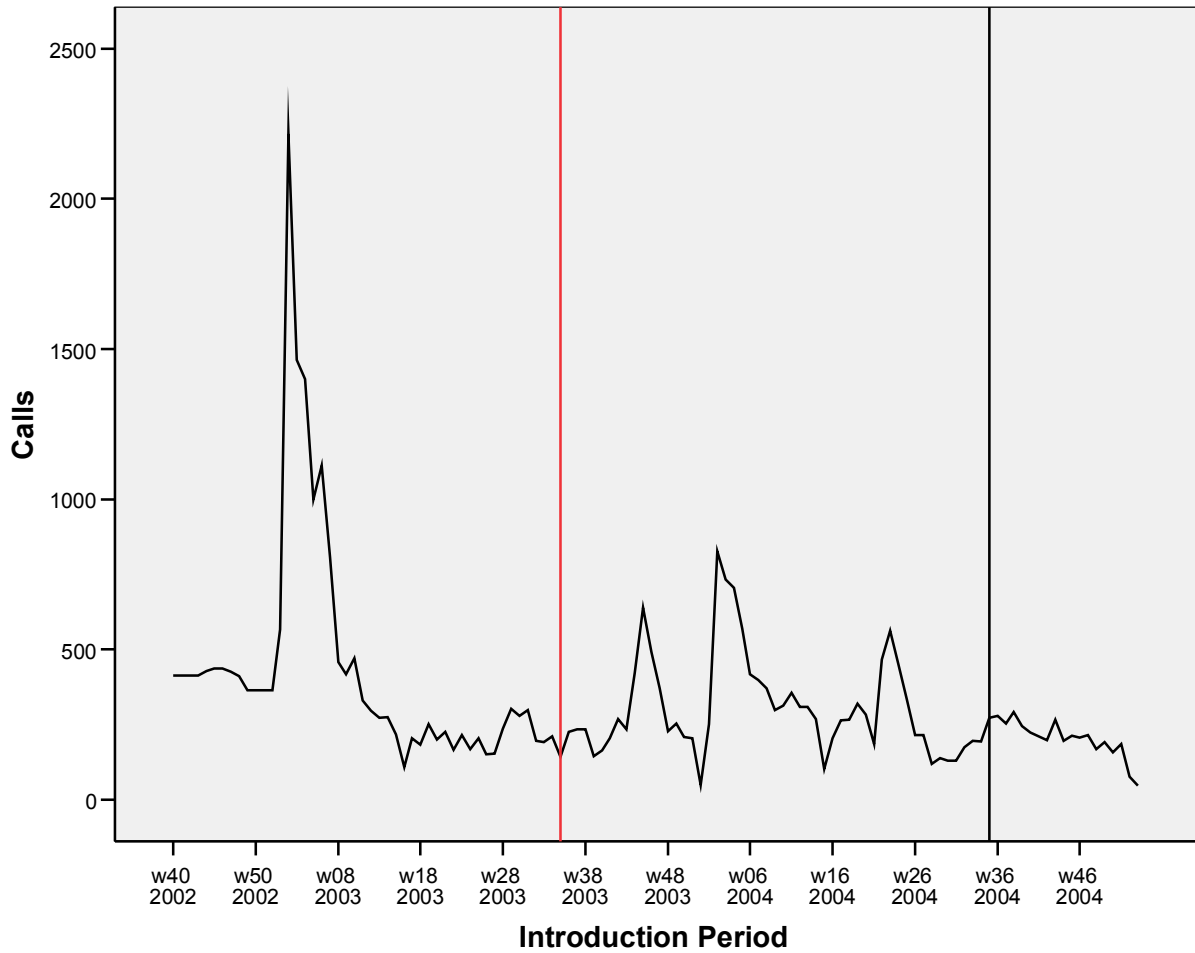
Note: Outcomes of an ARIMA(1,0,0)-analysis with constant and 3 independent series.

5 Norway (Røyketelefonen)

The Norwegian quitline started providing counselling in May 1996. In Norway, it was required by law to have the numbers on packets in the first week of 2004. However, the quitline representative's estimation of the actual introduction of the numbers on packets is week 35 of 2003. This estimation resulted from feedback of callers who reported to have seen the numbers on packets. According to the call volume sequence, it seems that the actual introduction of the number was somewhat later than indicated, so these callers may have reacted to news items related to the numbers on packets. However, for a conservative estimation, we remain with the quitline representative's evaluation. At the time of introduction of the numbers on packets, several media campaigns were launched by the Norwegian Directorate for Health and Social Affairs, often in cooperation with the Cancer Society and Heart and Lung Association. In January and February 2003 the campaign "Every cigarette is doing you damage" ran. From October 24 to November 21 2003 another campaign was launched against the tobacco industry. In 2004, from half May to half June a media campaign informing on the smoking ban in public bars and restaurants appeared. In all of these campaigns, the number of the quitline was communicated to the public.

Call volumes of 2002 were not available, except for the monthly call volumes of November and December, and the year's total. We estimated the weekly call volumes of October, November and December with this information.

Too few call volumes were available directly before introduction of the telephone number on the cigarette packs to correctly identify the model. Therefore, we assumed that the Norwegian call volumes were also autoregressive in nature, and we ran an ARIMA (1, 0, 0)-analysis to estimate the impact of the numbers on packets. No significant impact was found from the numbers on packets on the call volumes. Surprisingly, the tendency seemed to be that the numbers on packets led to fewer calls. Possibly, this is due to other events not taken in the analyses. It is also likely that the baseline level of calls was unreliable due to the limited time period between the intensive mass media campaign and the introduction of the telephone number on the cigarette packs. The campaigns described above did significantly affect call volumes (Table 5).



— = Date of introduction number on packet
 — = One year after introduction number on packet

Figure 5. Time sequence of call volumes to the Norwegian quitline

Table 5: Estimations of Base Level and Impact on call volumes of the Norwegian quitline

	Estimate	S.E.	Significance
Baseline Level	367.71	58.63	$p < .001$
Number on packet 1 st year	-141.89	76.39	$p = n.s.$
Number on packet 2 nd year	-158.62	102.78	$p = n.s.$
Campaign	307.00	63.33	$p < .001$

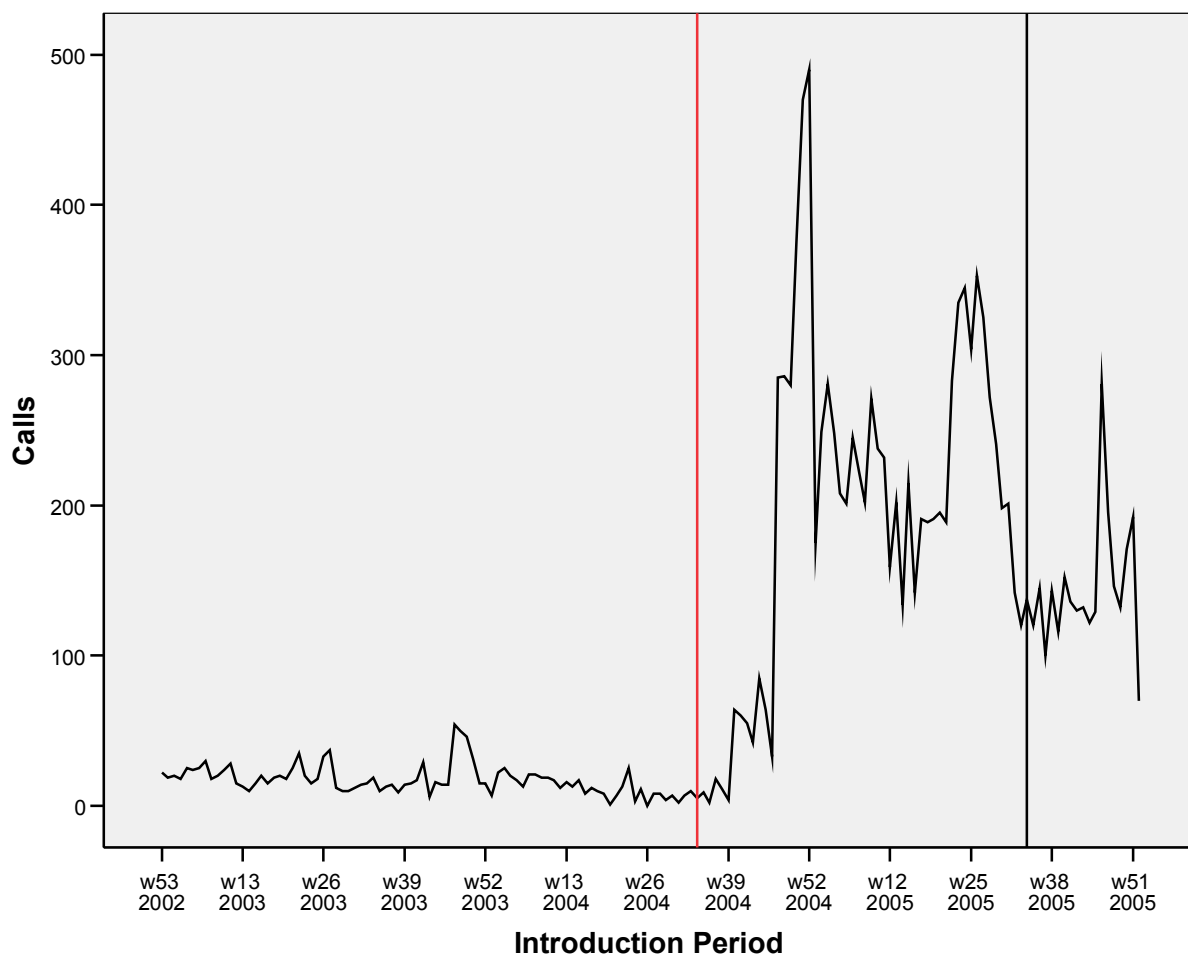
Note: Outcomes of an ARIMA(1,0,0)-analysis with constant and 3 independent series.

6 Poland (Fundacji Promocja Zdrowia)

The Polish Quitline started providing counselling in November 1996. The legal introduction date of the numbers on packets was week 34 of 2004 (August 22). It appeared, however, that the actual introduction date was later for many of the tobacco producers. This was the impression of the quitline representative and could also be observed in the call volume data (table 6). To achieve a conservative estimation of the impact of the numbers on call volumes, we used the legal introduction date as the one to analyse.

At the time the numbers on packets were introduced, two media campaigns took place. One was centred on World No Tobacco Day (May 31), running from May 15 to June 15, 2003. The other was the Great Polish Smoke Out, running in November and December 2003. Both these campaigns were taken into the analyses.

The call sequence was identified as an ARIMA (1, 0, 0) and analyses showed a baseline level of 45 calls per week. The media campaigns reported did not show effects on the call volumes, possibly because the quitline phone number was not included. The quitline number on the packets did however lead to a significant increase of 90 extra calls per week in the first year, and 83 extra calls in the second.



— = Date of introduction number on packet
 — = One year after introduction number on packet

Figure 6. Time sequence of call volumes to the Polish quitline

Table 6: Estimations of Base Level and Impact on call volumes of the Polish quitline

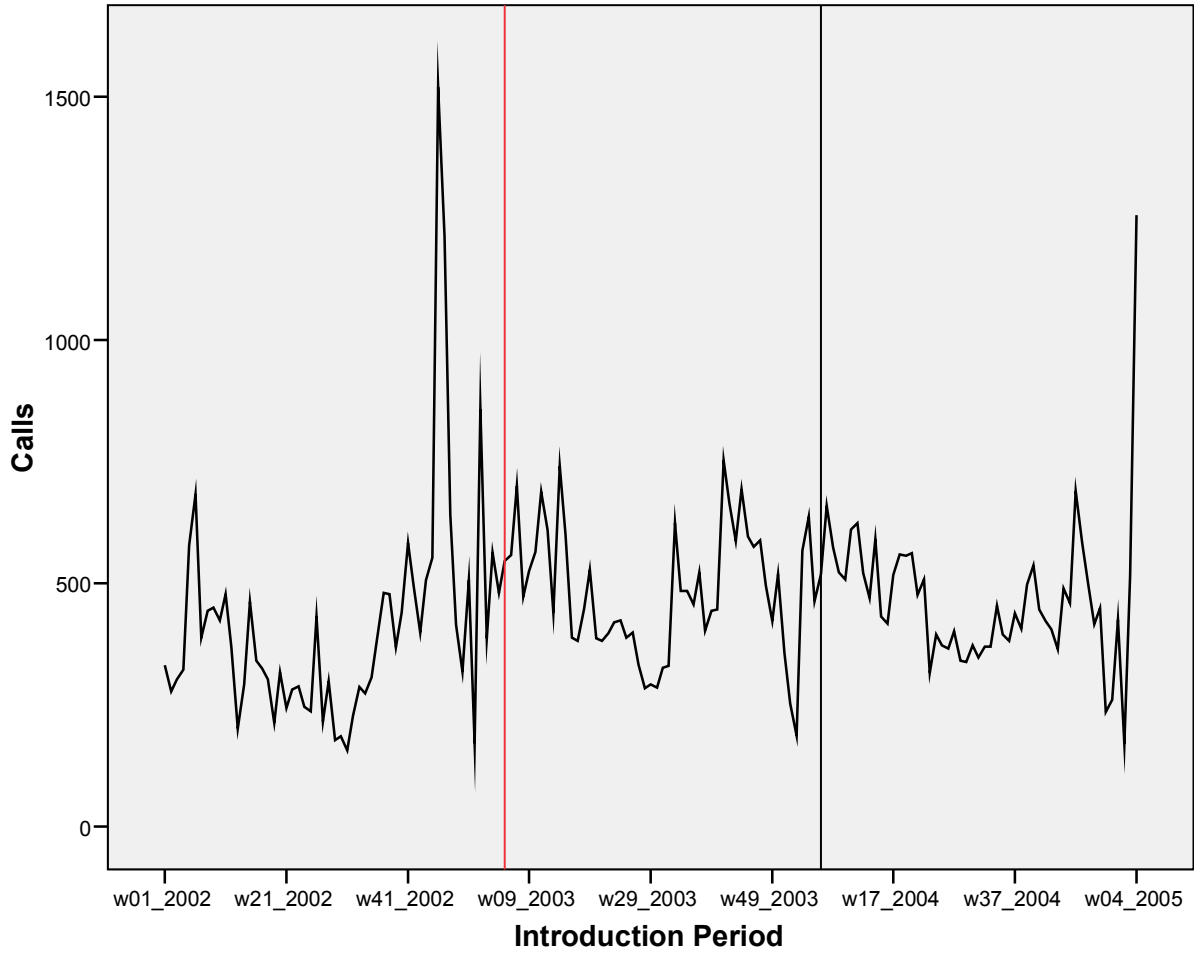
	Estimate	S.E.	Significance
Baseline Level	45.31	23.32	$p < .10$
Number on packet 1 st year	89.99	29.77	$p < .01$
Number on packet 2 nd year	82.60	34.75	$p < .05$
Campaign	-0.01	22.22	$p = \text{n.s.}$

Note: Outcomes of an ARIMA(1,0,0)-analysis with constant and 3 independent series.

7 Sweden (Sluta-Röka-Linjen)

The Swedish quitline started counselling services in May 1998. According to Swedish law, the numbers on packets had to be printed from October 1, 2003 (week 40) onwards. According to the quitline representative, however, they started to appear from February (week 5) 2003. We identified the Swedish model as an (ARIMA 1, 0, 0), and entered the dummy variable in the analyses indicating the introduction of the numbers on packets in week 5 of 2003. We indicated the second year after introduction by putting another dummy variable at 1 from the first through the second year after introduction. At the same time interval, three pharmaceutical companies ran TV campaigns for nicotine replacement products. However, since the quitline number was not shown in these campaigns, we assumed they did not affect call volumes. No other campaigns in 2002 and 2003 were mentioned that could have an effect on call volumes. Examining the call volumes in the sequence graph (figure 7) showed that in weeks 46 and 47 of 2002, and week 4 of 2003 call volumes peaked drastically above the mean number of calls. It is highly unlikely that this will be the result of spontaneous variations in call volumes and therefore we assumed that a campaign or price increase was the case at the time. These call volumes at these weeks were entered in the analyses as campaigns. Nevertheless the results should be interpreted with caution; the outcomes would not be as strong in the case we would have interpreted the high call volumes from weeks 46 and 47 as normal variation.

According to the intervention analyses, the introduction of the numbers has led to an increase in callers from 375 to 477 callers per week (102 extra) in the first year, and an increase of 85 callers in the second. The campaigns we indicated led to 725 extra calls per week.



— = Date of introduction number on packet
 — = One year after introduction number on packet

Figure 7. Time sequence of call volumes to the Swedish quitline

Table 7: Estimations of Base Level and Impact on call volumes of the Swedish quitline

	Estimate	S.E.	Significance
Baseline Level	374.53	30.07	p < .001
Number on packet 1 st year	102.17	42.04	p < .05
Number on packet 2 nd year	84.70	42.87	p < .05
Campaign	724.91	55.91	p < .001

Note: Outcomes of an ARIMA(1,0,0)-analysis with constant and 3 independent series.

Summary of Impact on Call Volumes

Overall, we observed significant increases in quit line call volumes that can be attributed to the introduction of the telephone number on the cigarette packs in all but one country (Norway). We summarised these findings in Table 8. The introduction of the numbers on packets in some countries leads to increases in call volumes of over 100%. In addition, we found that mentioning the quitline number in media campaigns, also has a significant impact on call volumes to quitlines.

Of course these observed increases related to the quitline's own baseline levels must also be appreciated in the context of a population's familiarity with the quitline (quitline penetration). A high increase in call volumes is not very spectacular when a quitline's activities are marginal in a country. In Table 8 we therefore also calculated the impact on each participating country's smoker population in pro mille increases of call volumes related to the adult smoking population of each country. According to these calculations, large differences exist between the reach of various countries. In Iceland, for example, the reach is spectacular, whereas in Poland, the reach is quite low (even though the increase is large in relation to the quitline's level). The differences may possibly be attributed to the population's initial familiarity with the country's quitline's before the numbers on packets were introduced, but the picture is not very clear.

For Norway a negative effect was found. Since it is unlikely that this effect will be the result of the introduction of the numbers on packets, we assume our baseline measurement was not reliable enough due to the short time period between mass media campaign and introduction of new health warnings on cigarette packs. Another possibility is that campaigns or news events took place before the numbers on packets were introduced that the quitline representatives were unable to recall. However, the quitline representatives were generally well able to mention events that had an impact on call volumes.

Table 8.

Increase in quitline call volumes by country and reach of the adult smoking population.

Country	Baseline Level	Absolute increase calls		Relative increase calls		Adult smoking prevalence (2003) *	No. Adult Smokers	Reach per year **	
		Per week		in %				(% of country's smoking pop)	
		Year 1 / Year 2	Year 1 / Year 2	Year 1 / Year 2	Year 1 / Year 2			Year 1 / Year 2	Year 1 / Year 2
Denmark	33	38	30	115	91	25 % (of 4,405,357)	1,101,339	1.79	1.42
France	279	646	385	232	138	25,4 % (of 49,255,843)	12,510,984	2.66	1.60
Iceland	28	31	33	111	118	19,8 % (of 229,443)	45,430	35.82	37.77
Netherlands	331	167	75	50	23	28 % (of 13,300,692)	3,724,194	2.33	1.05
Norway	368	-142	-159	-38	-43	26 % (of 4,163,544)	1,082,521	-	-
Poland	45	90	83	200	184	32 % (of 31,991,459)	10,237,266	0.46	0.42
Sweden	375	102	85	27	23	16 % (of 7,394,317)	1,183,090	4.48	3.74
Mean (per country)	208	133	87	100	76	24,6 % (of 15,820,092)	4,269,261	6.79	6.57
Total ***	1,459	932	532	64	36	27,0 % (of 110,740,655)	29,884,824	1.62	0.93

Notes: * Data retrieved from: <http://data.euro.who.int/tobacco/Default.aspx?TabID=2444>; 16 years and older.

** Reach: % of smokers' population contacting the quit line after exposure to the telephone number on cigarette packet; i.e. absolute increase per week x 52 divided by no. adult smokers.

*** For the 7 participating quitlines

Discussion

This study addresses the question whether the introduction of quitline telephone numbers on cigarette packets in European countries (according to European Directive 2001/37/EC) has led to higher call volumes to quitlines and, if so, the extent of this effect. We analysed this by performing ARIMA analyses on call volumes one year before and two years after the introduction of the numbers on packets in each country studied (called intervention in ARIMA analyses). We found that, in general, initiatives that boost call volumes to quitlines (such as media campaigns and price increases) have a strong effect on call volumes, but these effects vanish shortly after the activity has finished. The numbers on the packets, however, are not a temporary campaign but will be printed on the packets until the European Commission decides differently. Therefore we analysed whether these numbers had an impact on the short term (i.e. one year after introduction), and also on the longer term (i.e. the second year after introduction). It was found that both in the first year and, to a lesser extent, in the second year after the introduction, call volumes were higher than in the previous period. This result was found when correcting for other events that may affect call volumes, like media campaigns and tobacco price increases. On the other hand, since the highest call volumes were observed directly after introduction and the impact on call volumes decreased over time, we conclude that people tend to become accustomed to the messages and do no longer perceive them properly after a certain period. It is however also possible that the call volumes increased because of media attention directed to the introduction of the texts and the numbers on packets.

Estimated number of quitters related to additional calls to the quitlines

Since the increases in call volumes could be observed over longer periods of time, we believe that it is likely that they help reduce smoking in the European population. For this report it was not possible to track the characteristics of the callers calling attributable to the numbers on the cigarette packets, but considering that in e.g. the smoker population of the U.K. 2.4% to 2.8% has quit within one year, and of the callers receiving counselling this is 7,5% (in the Netherlands; Willemsen, Wagena & Van Schayck, 2003), quite a few people might have quit because of this directive. To give an example, when approximately 50% of the callers receive counselling, of this group 5% (7.5% minus 2.4 / 2.8%) more will have quit. In the first year this may have led to $50\% \times 5\% \times 932 = 23.3 \times 52 \text{ weeks} = 1212$ quitters together in the participating countries. In the second year, this would have still been $50\% \times 5\% \times 532 = 13.3 \times 52 \text{ weeks} = 692$ quitters. We do not know, however, whether callers to quitlines are a selection of smokers that are more likely to quit in the near future whatsoever, as compared to other smokers, so these statistics should be interpreted cautiously.

Interference from other events

Theoretically, our results may have been confounded by other events that may account for the observed increase in call volumes, such as media campaigns or seasonal variation. However, because we assume that the quitline representative in each country has a good inside knowledge of 'interfering' events, by statistically controlling for such important co-occurring events in the study period, we believe that the results provide a good indication of genuine effects of the introduction of the new health warnings.

Caller Characteristics

We also wanted to establish whether this method of advertising quitlines attracts a specific sub-sample of smokers. More precisely, the messages on packets may be perceived differently by different sub-groups of smokers, and this may affect the characteristics of the callers to the quitlines. Below, we describe the indications that three quitline representatives gave of changes in characteristics of callers.

Denmark: The representatives noted that the callers are at an earlier motivation stage and that there were more impulsive calls.

Norway: An increase in men from 2002 to 2004 (35% vs. 41%), more from the 50 to 69 age group, and a 4% increase of heavy smokers.

The Netherlands: Lower socio-economic groups; growing number in the contemplation phase; slightly higher number in the preparation stage; slightly more males. Further: "Our impression is that we now get many more callers from lower socio-economic groups who are still uncertain about whether they really want to quit smoking and whether they are able to quit smoking. Moreover, many contact us with questions about the truthfulness of the new health warnings. We also get callers who are not so serious or who are aggressive. Because our phone number is on the package, many think that our organisation is responsible for the health warnings. They call us for an explanation or just want to tell us that they are angry." (Willemsen, Simons & Zeeman, 2002).

Actual appearance of quitline numbers on each fourteenth packet.

The effect of the numbers on packets on call volumes of course depends on whether the numbers actually do appear on each 14th packet. It is unclear whether this is the case. Even though it is understandable that, for practical production reasons not each 14th *produced* packet will be one with a number on it, there are indications that producers tend to print other no-smoking messages more often than the one containing contact information about the local quitline. In Belgium ("Niet alle waarschuwingen", 2007) 2 out of 15 of the tobacco producers examined by the Belgian authorities (by checking 13,000 packets from four brands) were fined, because contact information of quitlines was printed only half as often than required. The Belgium experience suggests that the observed increases in call volume may in fact represent only a conservative estimate of the real potential effects should

the industry fully comply with the European Directive. Furthermore, this may point at a necessity for authorities to not only verify if the labelling of cigarette packs is done correctly, but also if the 14 different texts on the packs are distributed evenly.

Impact possibly related to smoker population's familiarity with the quitline

Table 8 shows that the relative increase in call volumes differs between countries, which may be due to differences in the preceding familiarity of a quitline in a country. For many smokers, the numbers on packets may relate to a line they already knew existed, and this may temper the effect of introducing the telephone number of call volumes. In countries where the quitline was previously less well known, more people may be attracted to this "new" service.

For this report we only explored call volumes. It is of course possible that a larger part of increases in call volumes were due to calls from healthcare professionals, students, or even hoax calls, rather than for calls from people seeking help with smoking cessation. It was impossible to fully assess such effects, but we assume that higher call volumes to quitlines can be considered positive, whoever the caller may be, since hoax callers may become smokers wanting to quit in the near future (Willemsen et al, 2002) and positive first contacts may be crucial to encourage later calls.

In some countries, call volumes seem to decrease over time. It is not unlikely that this is the result of the growth of other information sources such as e-mail services and internet pages, which also offer opportunities for support when trying to quit smoking. This does not seem problematic for the conclusions of the current report, since overall tendencies of increasing and decreasing numbers of calls have been taken into account in the analyses. However, this indicates the necessity to also take into account e-mail correspondence and visits to web pages when investigating the impact of campaigns on patronage in the future, since it is likely that these means will become more and more dominant in the field of quit smoking over time.

To conclude, the introduction and continued presence of telephone numbers of quitlines on cigarette packets has an ongoing effect on call volumes to quitlines. The novelty value of this information may account for an increase in calls, as well as the fact that it remains available to smokers until the moment they want to quit smoking or call for other purposes. If this is the case, telephone numbers on the packets can be considered a simple but effective way to decrease smoking in society by facilitating calls to quitlines.

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Appendix

European Directive 2001/37/EC Article 5; Labelling

1. The tar, nicotine and carbon monoxide yields of cigarettes measured in accordance with Article 4 shall be printed on one side of the cigarette packet in the official language or languages of the Member State where the product is placed on the market, so that at least 10 % of the corresponding surface is covered.

That percentage shall be raised to 12 % for Member States with two official languages and to 15 % for Member States with three official languages.

2. Each unit packet of tobacco products, except for tobacco for oral use and other smokeless tobacco products must carry the following warnings:

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(a) general warnings:

1. 'Smoking kills/Smoking can kill,' or
2. 'Smoking seriously harms you and others around you.'

The general warnings indicated above shall be rotated in such a way as to guarantee their regular appearance. The warning shall be printed on the most visible surface of the unit packet, and on any outside packaging, with the exception of additional transparent wrappers, used in the retail sale of the product; and

(b) an additional warning taken from the list set out in Annex I.

The additional warnings referred to above shall be rotated in such a way as to guarantee their regular appearance. That warning shall be printed on the other most visible surface of the unit packet, and on any outside packaging, with the exception of additional transparent wrappers, used in the retail sale of the product.

Member States may determine the positioning of the warnings on those surfaces in order to accommodate language requirements.

3. The Commission shall, as soon as practicable and in any event not later than 31 December 2002, in accordance with the procedure laid down in Article 10(2), adopt rules for the use of colour photographs or other illustrations to depict and

explain the health consequences of smoking, with a view to ensuring that internal market provisions are not undermined. Where Member States require additional warnings in the form of colour photographs or other illustrations, these shall be in accordance with the abovementioned rules.

4. Tobacco products for oral use, where their marketing is permitted under Article 8, and smokeless tobacco products shall carry the following warning:

'This tobacco product can damage your health and is addictive.'

This warning shall be printed on the most visible surface of the unit packet and on any outside packaging, with the exception of additional transparent wrappers, used in the retail sale of the product.

Member States may determine the positioning of the warning on that surface in order to accommodate language requirements.

5. The general warning required pursuant to paragraph 2(a) and the warning for smokeless and oral tobacco products referred to in paragraph 4 shall cover not less than 30 % of the external area of the corresponding surface of the unit packet of tobacco on which it is printed. That proportion shall be increased to 32 % for Member States with two official languages and 35 % for Member States with three official languages. The additional warning required pursuant to paragraph 2(b) shall cover not less than 40 % of the external area of the corresponding surface of the unit packet of tobacco on which it is printed. That proportion shall be increased to 45 % for Member States with two official languages and 50 % for Member States with three official languages.

However, in the case of unit packets intended for products other than cigarettes, the most visible surface of which exceeds 75 cm², the warnings referred to in paragraph 2 shall cover an area of at least 22,5 cm² on each surface. That area shall be increased to 24 cm² for Member States with two official languages and 26,25 cm² for Member States with three official languages.

6. The text of warnings and yield indications required under this Article shall be:

(a) printed in black Helvetica bold type on a white background.

In order to accommodate language requirements,

Member States shall have the right to determine the point size of the font, provided that the font size specified in their legislation is such as to occupy the greatest possible proportion of the area set aside for the text required;

(b) in lower-case type, except for the first letter of the message and where required by grammar usage;

(c) centred in the area in which the text is required to be printed, parallel to the top edge of the packet;

(d) for products other than those referred to in paragraph 4, surrounded by a black border not less than 3 mm and not more than 4 mm in width which in no way interferes with the text of the warning or information given;

(e) in the official language or languages of the Member State where the product is placed on the market.

7. The printing of the texts required by this Article on the tax stamps of unit packets shall be prohibited. The texts shall be irremovably printed, indelible and shall in no way be hidden, obscured or interrupted by other written or pictorial matter or by the opening of the packet. In the case of tobacco products other than cigarettes, the texts may be affixed by means of stickers, provided that such stickers are irremovable.

8. Member States may stipulate that the warnings referred to in paragraphs 2 and 4 are to be accompanied by a reference, outside the box for warnings, to the issuing authority.

9. To ensure product identification and traceability, the tobacco product shall be marked in any appropriate manner, by batch numbering or equivalent, on the unit packet enabling the place and time of manufacture to be determined.

The technical measures to apply this provision shall be adopted in accordance with the procedure laid down in Article 10(2).

2. Each unit packet of tobacco products, except for tobacco for oral use and other smokeless tobacco products must carry the following warnings:

L 194/30 EN Official Journal of the European Communities 18.7.2001

(a) general warnings:

1. 'Smoking kills/Smoking can kill,' or
2. 'Smoking seriously harms you and others around you.'

The general warnings indicated above shall be rotated in such a way as to guarantee their regular appearance. The

warning shall be printed on the most visible surface of the unit packet, and on any outside packaging, with the exception of additional transparent wrappers, used in the retail sale of the product; and

(b) an additional warning taken from the list set out in Annex I.

The additional warnings referred to above shall be rotated in such a way as to guarantee their regular appearance.

That warning shall be printed on the other most visible surface of the unit packet, and on any outside packaging, with the exception of additional transparent wrappers, used in the retail sale of the product.

Member States may determine the positioning of the warnings on those surfaces in order to accommodate language requirement.