

Media Flight Schedules and Seasonality in Relation to Quitline Call Volume

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ABSTRACT

Context: Given the high profile, cost, and vulnerability to budget cuts of mass-reach health education campaigns, researchers have cited the need for media buying strategies.

Objective: The objective of the current study is to fill a gap in the literature by comparing the impact of media flight schedule types in relation to tobacco quitline call volume.

Design: The retrospective study was designed to determine whether type of media flight schedule (eg, flighting, continuous, pulsing) impacted number of calls to the Maine Tobacco Helpline, while accounting for number of gross rating points (GRPs), seasonality, holidays, and other factors.

Setting: Maine has 3 designated market areas (DMAs): Portland/Auburn, Bangor, and Presque Isle.

Main Outcome Measures: Daily call volume was matched with weekly GRPs.

Methods: A negative binomial regression model was created to examine the relationship among media flight schedules, number of GRPs, and call volume. Gross rating points reflect national networks and local cable TV media buys. A second model examined the association between GRP dose levels and call volume.

Results: The number of GRPs was a significant predictor of call volume ($P < .001$). Weekly number of GRPs within a media flight schedule was the most important indicator for potential effectiveness. Weekly low-dose GRPs were not effective in increasing calls, indicating a minimum threshold. For every 250 GRPs, 29% (or 73) more calls per week were attributed to the media campaigns ($P < .001$). Weekly quitline call volume was 21% (or 53 calls) lower during the weeks of Christmas, US Thanksgiving, and US Independence Day.

Conclusion: Type of media flight schedule should be considered in the context of purchasing sufficient weekly, as well as quarterly, rating points to increase tobacco quitline call volume. In addition, our study is the first to quantify and report on lower tobacco quitline call volume during several US holidays.

KEY WORDS: cessation, health communication, mass media, public education, tobacco

The promotion of telephone-based tobacco cessation quitlines through media campaigns has been clearly identified as an effective strategy to increase tobacco cessation.¹⁻⁶ Most recently,

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the Centers for Disease Control and Prevention's national tobacco education campaign, *Tips From Former Smokers*[®] (*Tips*[®]), provides evidence for the use of quitline campaigns to further reduce adult smoking in the United States.^{1,4,5} Mass-reach health communication campaigns are the most visible, among the costliest parts of a program, and vulnerable to budget cuts.^{7,8} To increase the likelihood of building an effective media campaign, it is critical to utilize proven methods and assess program outcomes.⁸ Numerous studies describe types of effective or perceived effective tobacco cessation messages.^{1-6,9,10} Several other studies have examined television advertising strategies to increase tobacco cessation through number of gross rating points (GRPs, an indicator of potential audience exposure),^{2-5,9-13} advertisement placement time of day, day of week,¹³ type of media channel,^{14,15} and TV show content.¹⁶ Identified as vital to an overall strategy, media buying involves the strategic use of paid placement of advertising on identified media channels resulting in a flight schedule.²

We found no published literature that compares the different types of media flight schedules (eg, *flighting*, *continuous*, *pulsing* as defined in the methods section). Researchers have cited the need for this “overdue” research to build a stronger evidence base to guide media buying.^{6,11,17}

The objective of the study is to fill a gap in the literature by comparing media flight schedules in relation to the Maine Tobacco Helpline (MTHL) call volume, while accounting for number of GRPs, seasonality, holidays, and other factors. While the US national median for quitline utilization among US tobacco users is 1%, in the state of Maine, approximately 2.2% of all tobacco users (ie, 4457) annually obtain telephone counseling, cessation medications, or both from the state quitline.¹⁸

Methods

The retrospective study included statewide call volume and GRP data between January 2010 and June 2014 to determine whether there were differences in quitline calls associated with 3 types of media flight schedules, also known as media buying strategies. The American Marketing Association has identified them as *flighting*, *continuous*, and *pulsing* (Figure 1).¹⁹ Based on references and for the purpose of this study, we placed specific attributes to the 3 marketing terms to create clearly defined variables, that is, timing and pattern of GRPs per strategy.

Each period of advertisements airing is called a *flight*.¹⁹ Within each flight, there are 3 types of media flight schedules. *Bursting*, also called *flighting*, is a pattern in which advertisements run intermittently with concentrated media and then no media.^{19,20} For the purpose of this study, the number of GRPs was equivalent for each week of air time. A *continuous* buy, also referred to as a *continuity* buy, was defined as a consistent media pattern over an extended period of time with the same number of GRPs.^{19,20} As defined in this study, a *continuous* media buy ran a minimum of 24 weeks (approximately a 6-month period), with no more than a 3-week off-air period, also known as a *hiatus*, at an interval. *Pulsing* is a combination of a *bursting* and a *continuous* buy, where a *continuous* base is enhanced with bursts of advertisements with varying numbers of GRPs.^{19,20} To increase the reliability of the definitions used in this study and the coding of media buys, 2 media buy experts from a US national advertising agency and a network television station vice president participated in an interrater reliability test in which a 100% consensus was reached. All television advertisements promoting the MTHL feature people from Maine providing 30-second smoking cessation testimonial messages.

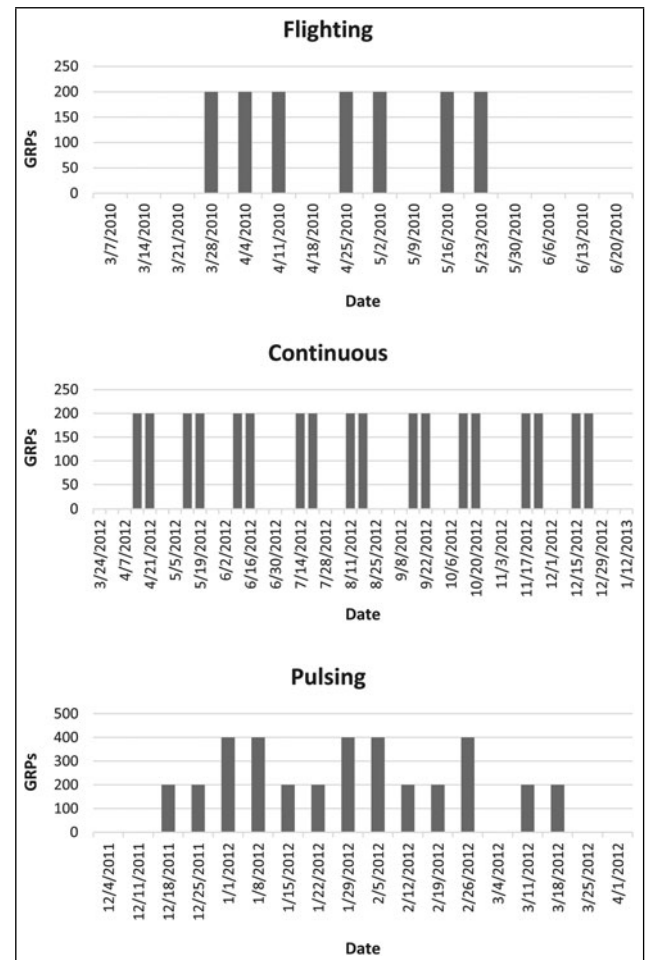


FIGURE 1 Media Flight Examples. Patterns of the 3 Types of Media Buy Schedules. Examples of *Flighting*, *Continuous*, and *Pulsing* Media Buys With Information on Average GRPs by Week. Abbreviation: GRPs, gross rating points.

Analysis

Maine has 3 designated market areas: Portland/Auburn, Bangor, and Presque Isle. Media buys have been coordinated so that campaign messages in all 3 designated market areas reach all television viewers in the state. This study combined and averaged GRPs to measure state impact on call volume. Gross rating points were provided by CD & M Communications in Portland, Maine, and consisted of a Monday through Sunday media buy week. Gross rating points reflected Maine-sponsored MTHL advertisements aired on national networks and spot cable TV. Weekly call volume was matched with the GRP data by week. Call volume was provided by the Center for Tobacco Independence in Portland, Maine, and includes all calls to the MTHL.

Since call volume counts were the dependent variable in the study, a negative binomial regression was

used to examine the association among media flight schedule types, number of GRPs, and MTHL call volume. A second model was developed to examine the association between GRP dose levels and MTHL call volume. The overall model fit was slightly improved in this second model compared with the original, as determined by the Akaike information criterion. The Akaike information criterion is an estimate of the quality of a statistical model commonly used in negative binomial regression.

The dependent variable in both models was weekly statewide call volume to the MTHL. Independent variables included the type of media flight schedule and GRPs. An indicator variable for the week immediately following the end of a media campaign was also included as an independent variable to test whether media flight schedules had a residual effect that extended past the week in which they occurred. Month was included in the model to control for seasonality effects on call volume, and US holidays were controlled for as well, including Thanksgiving (ie, fourth Thursday in November), Christmas, Independence Day (ie, 4th of July), Memorial Day, Labor Day, and Columbus Day.

Because of the nature of negative binomial regression, rate ratios were used to measure effect size for the independent variables. In our analysis, rate ratios were expressed in terms of 250 GRPs a week, or the difference in weekly call volume that can be expected with an additional 250 GRPs of media. This level of GRPs corresponds to approximately the average weekly media buy (ie, 238 GRPs) for the study time period.

Results

A total of 63 090 calls were made to the MTHL from January 2010 to June 2014. The average weekly call volume was 268. Average call volume peaked every January (with an average of 333 calls per week) and tended to be lowest in the US summer months (June, July, and August) with a weekly average of 229 calls. During January 2010 through June 2014, total media buy weeks consisted of 32 weeks of flying, 31 weeks of continuous, and 39 weeks of pulsing media buys (Figure 2).

Media flight schedule type

The number of GRPs was a significant predictor of call volume ($P < .001$), indicating that calls to the MTHL increased when a Partnership for a Tobacco-Free Maine television media campaign aired (Table). After adjusting for seasonality, time trends, and residual effects of GRPs, the model indicates that for every 250 GRPs in a media buy, 29% (or 73) more calls per week can be attributed to the media campaign (rate ratio per 250 GRPs: 1.29, 95% CI: 1.20-1.38) (Table). While overall GRPs were significantly associated with increased call volume, there were no significant differences in call volume between bursting ($P = .42$), pulsing ($P = .32$), or continuous ($P = .22$) media buys.

An additional analysis based on GRP levels provided support for the importance of sufficient dose of GRPs in relation to media flight schedule to increase call volume (Table). For example, a low dose of GRPs,

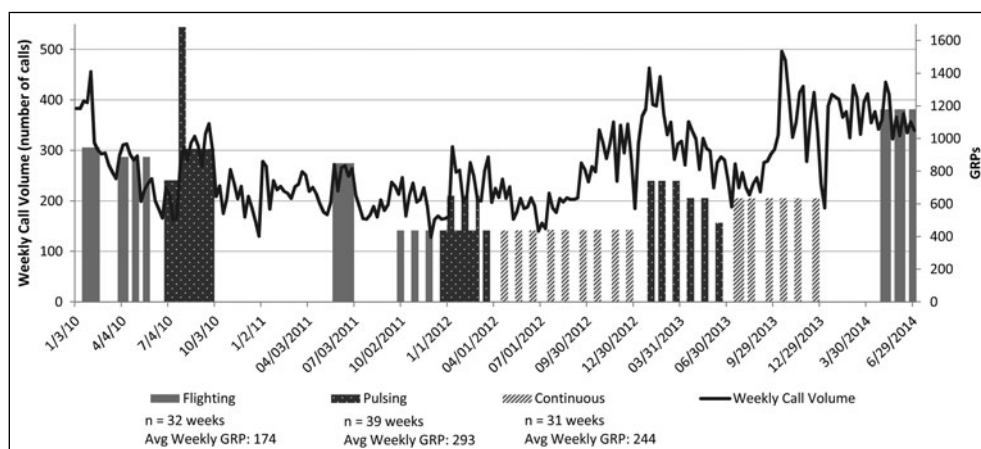


FIGURE 2 Weekly Call Volume and Media Buy Campaigns for Maine Tobacco Helpline (MTHL) (2010-2014). Average Weekly MTHL Call Volume From January 2010 to June 2014 With Media Buy Periods Flagged for Flying, Continuous, and Pulsing. From Maine Tobacco Helpline, CD&M Communications

Abbreviation: GRPs, gross rating points.

TABLE
Negative Binomial Regression of Weekly Maine Tobacco Helpline Call Volume by Media Flight Schedule Type and Dose

| | Model 1: Flight Schedule Type | | Model 2: GRP Dose | |
|---|--|----------------|--|----------------|
| | Odds Ratio (Regression Coefficient) (95% CI) | P ^a | Odds Ratio (Regression coefficient) (95% CI) | P ^a |
| Trend | | | | |
| Year | 1.11 (1.09-1.13) | <.001 | 1.11 (1.09-1.13) | <.001 |
| Seasonality^b | | | | |
| January | 1.13 (1.01-1.26) | .03 | 1.10 (0.99-1.22) | .07 |
| May | 0.82 (0.72-0.92) | <.001 | 0.80 (0.72-0.89) | <.001 |
| June | 0.79 (0.70-0.89) | <.001 | 0.80 (0.72-0.90) | <.001 |
| July | 0.73 (0.64-0.84) | <.001 | 0.74 (0.65-0.83) | <.001 |
| August | 0.81 (0.72-0.92) | <.001 | 0.77 (0.68-0.86) | <.001 |
| Flag for major holiday week | 0.79 (0.69-0.90) | <.001 | 0.79 (0.71-0.90) | <.001 |
| Flight schedule^c | | | | |
| GRP level | 1.29 (1.20-1.38) | <.001 | ... | ... |
| Flag for flighting campaign | 0.96 (0.86-1.06) | .42 | ... | ... |
| Flag for pulsing campaign | 0.96 (0.88-1.04) | .32 | ... | ... |
| Flag for continuous campaign | 0.95 (0.87-1.03) | .22 | ... | ... |
| GRP dose level^c | | | | |
| Low (<165 GRPs/wk) | ... | ... | 0.96 (0.90-1.03) | .30 |
| Medium (166-300 GRPs/wk) | ... | ... | 1.19 (1.12-1.27) | <.001 |
| High (301+ GRPs/wk) | ... | ... | 1.54 (1.41-1.67) | <.001 |
| Residual impact of media buy | | | | |
| Flag for week following end of media campaign | 1.05 (0.91-1.21) | .51 | 1.03 (0.91-1.18) | .62 |

Abbreviations: CI, confidence interval; GRP, gross rating point.

^aValues in boldface indicate statistical significance (P < .05).

^bMonths not significant in the model at P < .05 have been removed from the table.

^cScaled to 250 GRPs/wk. This level of GRPs corresponds to approximately the average weekly media buy (ie, 238 GRPs) for the study time period.

165 GRPs or less per week in Maine, was not significant, resulting in no effect on call volume (rate ratio: 0.96, 95% CI: 0.90-1.03), while a midrange of GRPs between 166 and 300 GRPs per week significantly increased call volume by 19% (rate ratio: 1.19, 95% CI: 1.12-1.27) and a high dose of GRPs of 301 and more significantly increased call volume by 54% (rate ratio: 1.54, 95% CI: 1.41-1.67). Indicator variables for the type of media buy were included in the dose model but were not significant. This suggests that higher GRP levels are significantly associated with higher call volumes regardless of the type of media buy.

Given that GRPs are purchased as part of a multiweek media buy for MTHL campaigns and not 1 week at a time, both models are needed to enhance the relevance of findings. Specifically, while the average weekly GRPs were 293 for a bursting media buy and 244 for a pulsing media buy, continuous media buys had the lowest weekly average of 174 (Figure 2).

Weeks that immediately followed the end of a media campaign had no association with increased call volume, an indication that MTHL GRPs have no lingering effect on call volume beyond the week in which they occurred.

Seasonality/holidays

Both seasonality and holiday effects were significant in the model. Weekly call volume is lower by approximately 21% (or 53 calls) during the weeks of Christmas, Thanksgiving, and the 4th of July (rate ratio: 0.79, 95% CI: 0.69-0.90). This appears to be true of all media flight schedules that were explored in a separate model but collapsed here for simplicity. Other US holidays, including Memorial Day and Labor Day, were not significant predictors of weekly call volume and were removed from the final model.

Call volume is significantly lower from May through August ($P < .001$) while call volume in January is higher than average ($P = .003$) (Table). The remaining months were not significant in the model. Year had a significant and positive association with call volume, which we controlled for in our model (rate ratio: 1.11, 95% CI: 1.09-1.13).

Discussion

The analysis found MTHL advertising (in terms of GRPs) when sufficiently purchased corresponded to a significant increase in call volume for the MTHL regardless of the media buy strategy (ie, flighting, continuous, and pulsing), which is consistent with research that demonstrates the effectiveness of adult cessation media campaigns to increase calls to quitlines.¹⁻⁵ Most importantly, we also found that number of GRPs within a media flight schedule is an important indicator for potential effectiveness. Specifically, we found that weekly low-dose GRPs (fewer than 165 GRPs per week) were not effective in increasing calls to the MTHL, indicating a minimum threshold regardless of media strategy. This is important for program planners because several studies have recommended using a cumulative number of GRPs per quarter to determine effectiveness. However, our study builds on this to further clarify that type of flight schedule needs to be taken into consideration to make sure that the number of GRPs does not fall below a minimum threshold of effectiveness. For example, 700 to 1200 GRPs per quarter have been recommended as a minimum amount of GRPs for effectiveness.^{2,3} If a continuous-type media buy is used in that quarter with as few as 54 GRPs each week for 13 weeks, then a continuous media buy may not be as effective as using a pulsing or bursting schedule during that quarter.

Previous research argues for advertisement placement with lower rating points over a prolonged period of time,¹³ which may be interpreted as a continuous media flight schedule. Our findings raise caution and provide support for purchasing high enough weekly rating points as part of a media buy to observe a measured behavioral response, such as calling a tobacco quitline. We found that a weekly high dose of GRPs (300+) within a media buy in Maine resulted in 51% higher call volume to the MTHL. Durkin and colleagues³ reported that an average of 1200 to 2560 GRPs per quarter was associated with quitting smoking. The objectives of a mass-reach media campaign need to be considered, as well as other campaign components. For example, adult tobacco cessation campaigns may require greater campaign exposure than youth-focused campaigns.³

Furthermore, seasonality may also impact the media buy strategy within a given quarter. We observed a suppression of weekly call volume by an average of 21% during the holiday weeks of Independence Day, Thanksgiving, and Christmas. Data from the Centers for Disease Control and Prevention's National Quitline Data Warehouse²¹ also indicate that the lowest call volume nationally is during the same weeks. While the MTHL is closed on Thanksgiving and Christmas, all calls to the MTHL are logged and low call volume may additionally be explained by factors such as holiday-related stressors²² and stage of readiness to quit.²³ Lower call volume during the week of Independence Day, as well as summertime, may also be explained by tobacco industry promotions^{1,2,6} and vacations,²⁴ factors that also contribute to smoking uptake. In addition, cigarette sales and tax revenues peak in the summer months.²⁵ Given these factors, summer may be a critical time to conduct effective tobacco reduction interventions.

A strength of this study is the use of weekly call volume data in the analyses, rather than monthly or quarterly data.^{3,17,22,26} The use of weekly data allows a close match between the timing, level, media flight schedule, and related call volume information. Our results suggest that GRPs have no residual impact in the week after they occur, a finding that contributes to research addressing decay of effects^{2,3} and highlights the importance of sustaining a tobacco control mass media campaign.^{3,6,9,27} In keeping with proven best practices, sustained tobacco control mass media campaigns are needed to observe tobacco use behavior change^{1,2,14,28} and shift to smoke-free social norms. This has profound implications for public health because, in direct competition, the US tobacco industry spends more than \$1 million every hour on promotional efforts, which is more than \$9 billion annually.²⁹ Tobacco marketing, including the advertising of e-cigarettes on television, and tobacco addiction recapture the social norm.³ If an environment is without a tobacco control mass media campaign, it is perceived as a protobacco environment.^{2,30} In fact, tobacco industry promotions reduce the ability of addicted smokers to quit and cause smoking among young people.¹

This study is subject to at least 3 limitations. First, in Maine, mass-reach health communication campaigns run in conjunction with other community interventions and it is difficult to control for this. Additional factors that contribute to call volume include physician and health care referrals and other partners who promote the MTHL, as well as influences such as policy changes, advertising and placement characteristics, and other community efforts. However, the observed impact on call volume, as well as

Implications for Policy & Practice

- Type of media flight schedule needs to be taken into consideration to make sure the number of weekly GRPs does not fall below a minimum threshold of effectiveness.
- Due to decay of effects, ongoing tobacco control mass media campaigns are needed to sustain tobacco use behavior change, such as calling a tobacco quitline.
- Lower call volume during the weeks of Independence Day, Thanksgiving, and Christmas highlights the need for tobacco reduction interventions.

the decrease in calls observed immediately after a media buy ends, points to a causal relationship between GRPs and MTHL call volume. While the number of calls reflects call attempts—not the number of unique callers, completed calls, or callers receiving services—research shows that number of calls to a quitline is associated with quitting behavior.^{4,8} A previous report from Maine found that 87% of all calls to the MTHL are from smokers who intend to quit smoking.³¹

Finally, while the Centers for Disease Control and Prevention Tips campaign ran concurrently with MTHL advertisements during March 19 to June 10, 2012, and March 4 to June 23, 2013, each campaign promoted a different phone number. While phone calls from the national campaign are channeled to the MTHL, they are not counted under the unique MTHL phone number and are not included in this study. These campaigns may work synergistically to increase calls.³² Future analyses should examine the synergistic effect of state and national campaigns, including tracking of media flight schedule types, placement details, and number of GRPs.

In conclusion, we found that GRPs corresponded to a 29% increase in MTHL call volume, no significant difference in call volume by media buy type, and that GRP dose during the respective time period is critical. Our study fills a gap in the literature by comparing the 3 media flight schedule types and GRP doses. Commercial marketing literature varies in its recommendations regarding media flight schedules.³³ Implications of our study for tobacco control and public health provide support for the consideration of all 3 media flight schedule types based on the ability to adequately purchase a minimum weekly dose to effectively impact program objectives.

Planning is a critical component to the success of mass-reach health communication interventions.² Public health program planners should consider the effect of type of media flight schedule in the context of purchasing sufficient rating points to observe

a behavioral response, such as calling a tobacco quitline, or to effectively impact other program objectives. In addition, our study is the first to quantify and report on the suppression of tobacco quitline call volume during several US holidays and highlights the need for summertime tobacco reduction interventions.

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