JOURNAL OF CLINICAL RESEARCH BEST PRACTICES
Vol. 14, No. 4, April 2018 "Happy Trials to You"

A/B Testing for Digital Audience Optimization for Clinical Study Enrollment

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Advertising on Facebook, Instagram, Pinterest, Google and other emerging digital platforms is not only an effective tool for finding clinical study participants, but it also makes it possible for advertisers to quickly and inexpensively optimize their advertising campaigns with A/B testing. In A/B testing, two variants of one variable are compared, while all other variables are held constant. With A/B testing, graphics, messaging, timing, duration, frequency, channel, audiences, budget and other variables can be compared. Typically, multiple A/B tests are performed to fine tune a campaign.

A/B testing enables methodical, data-informed decisions that help optimize a clinical study enrollment campaign and improve campaigns over time. With A/B testing, instead of saying "we think," we can say, "we know."

The two variants, A and B, can be compared based on the number of impressions, number of clicks, click-through-rate, cost per click, number of registrations, cost per registration, and any other metrics that might be available and useful in ascertaining performance. Ultimately, enrollment, adherence and retention are the most important metrics. It takes much longer to collect that data, so initial A/B testing enables early campaign optimization.

While the results of A/B testing often carry over from one campaign to the next, they often do not, so it is a good idea to perform A/B testing before any campaign and also during longer ones. There might be news stories, unexpected seasonal effects, new competitive studies, or other factors that can affect an advertising campaign.

Normally, A/B testing of a digital campaign is a live test, not a dry run, so we need to be prepared to enroll people in the study. Before starting an A/B test, we therefore need to prepare the following (with the necessary IRB approvals):

1. Two variants of the variable to be tested.
2. An online pre-screener to help qualify respondents that are likely to meet the study criteria.
3. A lead management system or strategy to manage respondents.
4. Study sites to follow up and enroll respondents.

Performing a Digital Audience A/B Test

To perform an audience A/B test, the first step is to think through the audience variables that would be most meaningful for the campaign. In audience testing, the following could be the parameters to consider:

- **The size of the target audience**
  Possible question for testing: For a breast cancer clinical study, should we use key words that target a very focused audience (e.g., "metastatic breast cancer") or should we use key words that target a more general audience (e.g., "Pink Ribbon")?
- **The gender of the target audience**
  Possible question for testing: For a prostate cancer clinical study, should we target men only, or should we also include women, as the latter might act in a caregiver or influencer role?

- **The age of the target audience.**
  Possible question for testing: For a uterine fibroids clinical study, should we target women in their 20s-30s, or women in their 40s-50s?

Once we have selected variants A and B of the first parameter to be tested, we set up the test on the advertising platform, in which ads are generally organized into groups of ads, called "adsets." Audience A/B testing for takes place at the adset level. This means that two adsets (for variants A and B) will be deployed. The adsets will differ only with respect to the parameter being tested. All other parameters of the adset (timing, platform(s), text, images, etc.) will be identical.

The A/B test might run for four days, during which time, performance data will be collected by the platform. (In general, digital media A/B tests should run for at least three days and no longer than 14 days. Tests shorter than three days might produce insufficient data to confidently determine a winner, and tests longer than 14 days might be wasteful, since a test winner can usually be determined in 14 days or sooner.)

Advanced advertising platforms like Facebook, Instagram and Google provide numerous metrics by adset, such as the following:

- Impressions: how often an ad appeared on a person's screen
- CPM (cost per 1,000 impressions)
- Link Clicks: how often users clicked on the ad
- CTR (click-through-rate): clicks divided by impressions
- CPC (cost per click)
- Complete Registration: the number of times users completed the pre-screener on the website
- Cost per Complete Registration: amount spent on adsets divided by the number of complete registrations

The number and cost of Complete Registrations are the best indicators of campaign performance. If A and B results for these metrics are similar, we then look at CTR and CPC.

Case Study

In this case study, we report on the results of a digital campaign for a clinical study in metastatic breast cancer. The clinical study was conducted by a large biopharmaceutical company in the United States and was seeking to enroll women with metastatic breast cancer who also tested positive for a genetic modifier.

Ads on Facebook directed those interested to an online pre-screener. Potential participants that passed the pre-screener were immediately connected with a clinical study site to continue screening for the study.

We employed A/B testing to help determine the best audience for this campaign. Given the various breast cancer interest tags available on Facebook, we first used A/B testing to determine whether we should target a focused or broad audience. We targeted the focused audience with tags like "metastatic breast cancer," and the broad audience with tags like "Pink Ribbon." We ran an A/B test for six days, and obtained the results shown in Figure 1:

Figure 1. A/B Test Results

Adset	Small Audience	Large Audience	Small/ Large
Impressions	395,040	386,920	102%
CPM	11.6	11.84	98%
Link Clicks	6,579	2,892	227%
CPC ($)	0.33	0.56	59%
CTR	1.67	0.75	223%
Started Pre-Screener	1,831	894	205%
Completed Pre-Screener	353	143	247%
Completed/Started Pre-Screener	19%	16%	121%

This A/B test showed that the number of impressions and CPM for the two adsets were almost identical, as would be expected. On all the performance metrics, the Focused Audience variant performed about twice as well as the Broad Audience. The Focused Audience variant performed best on the most important metric: Completed Pre-Screener.

This A/B test not only provided a clear answer for audience optimization but also generated 496 potential participants. The campaign continued, using the Focused Audience adset until enrollment was complete. As a result, the study completed enrollment three months ahead of the sponsor's plan.

Conclusion

While A/B testing can be used with television, radio, print and other media, it provides the best data fastest with digital platforms.

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