



Universiteit
Leiden
The Netherlands

The effect of World Blood Donor Day on digital information seeking and donor recruitment

Kranenburg, F.J.; Kreuger, A.L.; Arbous, M.S.; Laeijendecker, D.; Kraaij, M.G.J. van

Citation

Kranenburg, F. J., Kreuger, A. L., Arbous, M. S., Laeijendecker, D., & Kraaij, M. G. J. van. (2017). The effect of World Blood Donor Day on digital information seeking and donor recruitment. *Transfusion*, 57(10), 2458-2462. doi:10.1111/trf.14228

Version: Publisher's Version

License: [Licensed under Article 25fa Copyright Act/Law \(Amendment Taverne\)](#)

Downloaded from: <https://hdl.handle.net/1887/115107>

Note: To cite this publication please use the final published version (if applicable).

The effect of World Blood Donor Day on digital information seeking and donor recruitment

Floris J. Kranenburg ^{1,2,3*} Aukje L. Kreuger ^{1,2*} M. Sesmu Arbous,^{2,3} Daphne Laeijendecker,⁴ and Marian G.J. van Kraaij^{1,4,5}

BACKGROUND: The purpose of World Blood Donor Day (WBDD) is to raise awareness for the importance of blood donation. The aim of this study was to quantify the impact of WBDD on digital information seeking and donor recruitment.

STUDY DESIGN AND METHODS: Google Trends data were used to quantify seeking behavior on “blood donation” and “blood donor.” Differences in relative search volume (RSV) between the 3 weeks surrounding WBDD and the rest of the year were calculated. Second, mean differences in RSV were compared to assess the additional effect of hosting using translated search terms. Third, we compared the period around WBDD with the control period regarding page views of the Sanquin website and Facebook likes and number of newly registered donors in 2016.

RESULTS: The mean RSV for “blood donation” in the period of interest was 78.6, compared to 72.1 in the control period (difference, 6.5; 95% confidence interval [95% CI], 1.2-11.8). For “blood donor” this was 78.9 compared to 65.9 (difference, 12.9; 95% CI, 8.1-17.8). We found no additional effect of hosting. In the period of interest, the website of Sanquin was visited 6862 times a day and 4293 times in the control period (difference, 2569; 95% CI, 1687-3451). In June 2016, 54.6% (95% CI, 53.0-56.2) more new donors were registered compared to the control period.

CONCLUSION: An international campaign like WBDD raises the awareness of blood donation and is effective in convincing people to register as blood donors.

The World Health Organization declared 7 days and 1 week as official global public health days, each addressed to a specific topic. One of these days is World Blood Donor Day (WBDD), which is celebrated on June 14, the birthday anniversary of Karl Landsteiner. The purpose of this day is to raise awareness for the importance of safe blood and voluntary and unpaid donation and to thank all blood donors for their effort. In addition, it intends to inspire people to donate blood voluntarily to reverse the declining trend of new blood donors over the past decade.¹ Each year, the day has a different theme and is hosted by a different country. In 2015, for instance, China launched the slogan “Thank you for saving my life” and the Netherlands in 2016 “Blood connects us all.”²

The effect of WBDD can be measured by the number of newly registered donors. Additionally, the awareness can be expressed by the amount of information seeking on Google for certain topics, the number of page views on the website of the Dutch blood supply Sanquin, and the number of new likes of the Facebook page of Sanquin.

ABBREVIATIONS: RSV = relative search volume; WBDD = World Blood Donor Day.

From the ¹Center for Clinical Transfusion Research, Sanquin Research Leiden; and the ²Department of Clinical Epidemiology and the ³Department of Intensive Care Medicine, Leiden University Medical Center, Leiden, the Netherlands; and the ⁴Unit Donor Affairs and the ⁵Unit Transfusion Medicine, Sanquin Blood Bank, Amsterdam, the Netherlands.

Address reprint requests to: Marian van Kraaij, Center for Clinical Transfusion Research, Sanquin Research, Plesmanlaan 1a, 2333 BZ Leiden, the Netherlands; e-mail m.vankraaij@sanquin.nl.

*FJK and ALK contributed equally to this study.

Received for publication April 13, 2017; revision received May 24, 2017; and accepted May 24, 2017.

doi:10.1111/trf.14228

© 2017 AABB

TRANSFUSION 2017;57:2458–2462

Each month, 1.6 billion unique visitors use Google, which accounts for more than 80% of all internet searches.^{3,4} Google Trends is a web tool that can be used to investigate how search behavior evolves over time. With this tool, it has been shown that around World Thrombosis Day more Google searches are performed on “venous thrombosis.”⁵

In this study, we aimed to measure the impact on public awareness of the WBDD by means of Google Trends data and the additional effect of hosting this day for several countries. Second, we aimed to quantify the effect of WBDD on number of page views on the website and new likes of the Facebook page of Sanquin. Finally, we aimed to investigate the effect of WBDD on recruitment of new donors in the Netherlands.

MATERIALS AND METHODS

We performed an observational study using three different sources of data.

Google trends

Google Trends is a free accessible web tool of Google, Inc. (www.google.com/trends) to quantify information on seeking behavior. The tool reports the number of searches for a certain term of interest divided by all searches on Google for the same location and period, thereby taking into account the variation in internet access and population size. Subsequently, the relative search volume (RSV) is normalized to range from 0 to 100, in which 100 represents the highest search proportion. Per week is the finest granularity of the available data and all data can be downloaded without any costs.⁵⁻⁷

$$RSV = \frac{\text{Google searches for term of interest}}{\text{Total Google searches for the same location and time}}$$

The main search terms of interest were “blood donation” and “blood donor.” The period of interest was defined as 3 weeks surrounding WBDD, that is, the week before, the week after, and the week of WBDD itself. The average seeking behavior during the rest of the year was used as reference. From August 16 to August 21, 2016, the Missing Type campaign was held and therefore the month August was excluded from the control period. Two weeks after the period of interest and the first 2 weeks of September 2016 were taken as washing out periods for both campaigns and were excluded from the control period. Mean differences in RSV between the period of interest and the control period were calculated with 95% confidence interval (CI). This was done for every year separately, starting from 2007 up to 2016, without any restriction in location. To verify whether seasonal variation in search behavior exists, we included the search term “hemochromatosis” as a negative control.

Several countries hosted WBDD: Argentina in 2011, South Korea in 2012, France in 2013, Sri Lanka in 2014, China in 2015, and the Netherlands in 2016. The terms “blood donation” and “blood donor” were translated by native speakers to investigate the additional effect of hosting WBDD on Google searches over time. The mean difference in RSV in the year of hosting was compared to the pooled mean difference in the non-hosting years. The used terms were:

1. Dutch: bloeeddonatie/bloeddonor
2. Chinese: 献血/献血者
3. Singalese: රුධිර පරික්ෂාගතය/රුධිර දායකයා
4. French: Don de sang/donneur de sang
5. Korean: 헌혈/헌혈인
6. Spanish: donación de sangre/donante de sangre

Website visits and Facebook likes

The website of the blood bank is an important source of information on blood donation and becoming a new donor. The number of page views on the Sanquin website during the campaign (June 1 through June 30, 2016) was compared with the mean number of page views in the rest of the year, excluding August and the washing out periods. The same was done for the number of new likes on the Facebook page of Sanquin.

Donor recruitment

The number of newly registered donors in June 2016 was compared with the mean number of newly registered donors per month in the rest of the year, excluding August. This included everyone that filled in the form to become a donor. As these data were only available per month, it was not feasible to exclude the washing out periods of 2 weeks.

RESULTS

Google trends

The RSV in the week of WBDD, the mean RSV in the 3 weeks surrounding WBDD and in the control period are depicted in Table 1. Data were downloaded on February 23, 2017. The mean RSV for “blood donation” in the period of interest was 78.6, compared to 72.1 in the control period (mean difference, 6.5; 95% CI, 1.2-11.8). For “blood donor,” the mean RSV was 78.9 in the period of interest and 65.9 in the control period (mean difference, 12.9; 95% CI, 8.1-17.8). Starting in 2011, the RSV for “blood donor” is significantly higher in the period of interest compared to the control period, with the largest difference seen in 2016, whereas this difference was not significant in the years 2007 until 2010. In the years 2011 to 2014 and in 2016, relatively the most searches for “blood donor” were performed in the week of WBDD, as reflected by a

TABLE 1. Mean RSV for Google searches on “blood donor” for the week of WBDD, the period of interest, and the control period

Year	RSV week of WBDD	RSV period of interest	RSV control period	Mean difference* (CI)
2007	83	85.3	75.4	10.0 (−2.7 to 22.6)
2008	78	74.0	70.3	3.7 (−8.0 to 15.5)
2009	95	87.7	80.4	7.2 (−4.6 to 19.1)
2010	91	84.3	77.3	7.0 (−3.0 to 16.9)
2011	100	77.0	62.7	14.3 (6.9-21.7)
2012	100	77.3	57.8	19.5 (10.8-28.2)
2013	100	78.7	61.9	16.8 (8.1-25.4)
2014	100	78.3	62.6	15.7 (7.5-23.9)
2015	82	84.3	66.8	17.5 (9.7-25.4)
2016	100	61.7	40.4	21.3 (11.9-30.7)
Overall	93.2	78.9	65.9	12.9 (8.1-17.8)

* Mean difference was calculated as the difference in RSV in the period of interest compared to the control period.

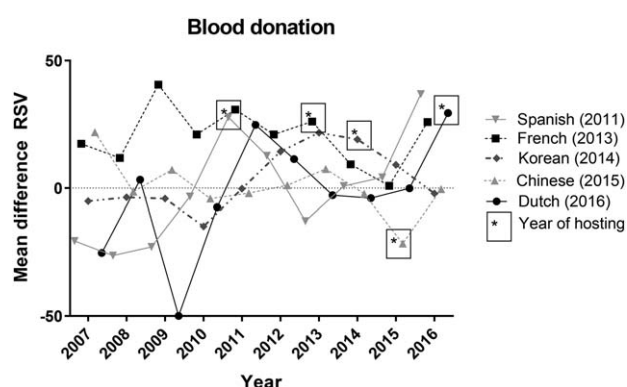


Fig. 1. The effect of hosting WBDD regarding searches on “blood donation.” Mean difference in RSV per year for Spanish, France, Korean, Chinese, and Dutch, related to year of hosting the WBDD.

RSV of 100 (Table 1). The results regarding “blood donation” are depicted in the supplemental data (Table S1, available as supporting information in the online version of this paper).

The effect of hosting WBDD is shown in Fig. 1. The mean differences in RSV between the period of interest and the control period for “blood donation” in the languages of the hosting countries were 27.8 (95% CI, 4.7-50.8) for Spanish in 2011, 26.1 (95% CI, 12.3-39.9) for French in 2013, 21.6 (95% CI, −52.3 to 9.1) for Chinese in 2015, and 29.4 (95% CI, 12.4-46.4) for Dutch in 2016. The mean differences in RSV between the period of interest and the control period for “blood donor” in the different languages were 38.7 (95% CI, 25.0-52.3) for Spanish in 2011, −1.5 (95% CI, −24.5 to 21.3) for French in 2013, and 31.1 (95% CI, 16.7-45.5) for Dutch in 2016. The translation of “blood donor” in Chinese and Korean and the translation of both terms in Singalese yielded not enough results in Google Trends (online supplemental data). For Spanish (2011) and Dutch (2016) the mean difference in the year of hosting was significantly higher than the pooled mean difference of the nonhosting years (online supplemental

data). No significant differences existed in RSV for “hemochromatosis” between the period of interest and the control period (online supplemental data).

Website visits and Facebook likes

In the period of interest, the website of Sanquin was visited on average 6862 times a day and 4293 times a day in the control period (mean difference, 2569; 95% CI, 1687-3451; online supplemental data). On June 14, 2016, the website was visited 22,648 times, 5.3 times the mean number of visits per day during the control period (Fig. 2).

The Facebook page of Sanquin was liked 35,267 times at January 1, 2016. On average 569 new likes per week were registered during the period of interest, compared to 167 per week in the control period (mean difference, 402; 95% CI, 125-679; online supplemental data).

Donor recruitment

In June 2016, a total of 5976 new donors were registered compared to 3866 new registrations per month on average in the rest of the year (difference, 2110; 95% CI, 116-4104; Fig. 2). This represents an absolute increase of 54.6% (95% CI, 53.0-56.2).

DISCUSSION

The purpose of the study was to quantify the effect of WBDD on digital information seeking and donor recruitment. During recent years in which WBDD was held, significantly more searches were performed for the terms “blood donor” and “blood donation” in the 3 weeks surrounding WBDD, compared to the rest of the year. In the period around WBDD 2016, the website of Sanquin was visited 50% more often and three times as many people “liked” the Sanquin Facebook page. This increase in awareness resulted in more than 2000 additional newly registered donors in June 2016 compared to the rest of this year.

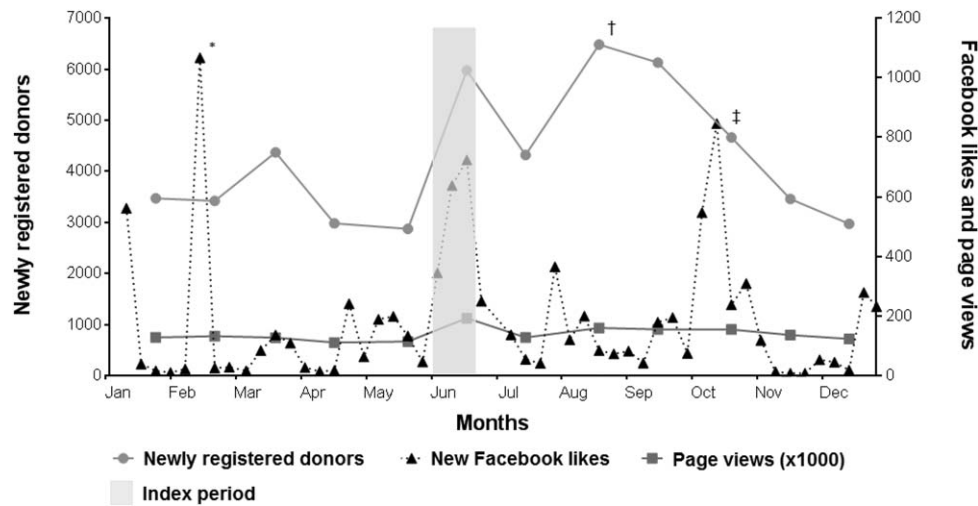


Fig. 2. Effect of WBDD on page views on the Sanquin website, like of the Sanquin Facebook page, and number of newly registered donors in the Netherlands in 2016. *National Valentine's day campaign. †International Missing Type campaign. ‡National donor week.

This is the first study that quantified the effect of WBDD on public awareness with Google Trends, web analytics, and donor registration data. In the digital age, these information sources can be useful for the evaluation of all types of campaigns, even though some of the data are proxies for the intended outcome, in this case donor recruitment. We found an increase in search behavior as well as an increase in the number of newly registered donors during the index period in 2016, suggesting that search behavior is an appropriate proxy.

In addition to WBDD, other national and international campaigns are launched to recruit new donors. One large international campaign was the Missing Type campaign, which attracted global media attention in 2016. Therefore, we excluded the period around this campaign from the control period. Other local or national campaigns could increase the awareness of blood donation in the control period. This is clearly seen in the increases in the number of Facebook likes in February and October, reflecting the national campaign surrounding Valentine's Day and the National Donor Week. These campaigns were mainly focused on social media and in contrast with WBDD these campaigns did not result in an increase in page views of the website nor in newly registered donors. Regarding the Google searches, we still found an increase in RSV from 2011 onward for the term "blood donor." If other campaigns were held during the control period, this reflects an underestimation of the true effect. We did not find a significant increase in the RSV for "blood donor" in the years before 2011. This could be explained by an increase in campaign scale during the past years.

Google Trends only reports a relative, normalized measure. Theoretically, the total number of searches

could vary over time and thereby influence the percentage of searches relative to the peak search volume for a certain term.⁶ It was not feasible to compare searching behavior in the same period of the year over the years, since Google Trends data are only available from 2004 onward, the same year as the first WBDD was held.² However, the lack of an association of WBDD with search behavior for "hemochromatosis" suggests limited influence of time.

To investigate the additional effect of hosting on Google searches, native speakers translated the search terms. No results could be shown regarding "blood donor" for Chinese and Korean, since these languages lack a uniform term for "blood donor." Although Google is the most used search engine worldwide, this is not the most popular search engine in all countries. For example in China, the most used search engine is Baidu and in South Korea Naver.⁸ Consequently, the Google Trends data may not reflect the entire population. However, the RSV is a relative measure and takes into account local differences in search engine preferences. The mean difference in RSV varies over the years, which could reflect differences in local or international campaigns, independent of hosting the campaign. Unfortunately, it was not feasible to investigate the additional effect of hosting with respect to the web analytics, as these data were only available for 2016. In this year, the Netherlands hosted WBDD and launched a large international campaign which resulted in a substantial increase in Google searches. The effect of this campaign was also seen in an increased number of visits to the website, likes of the Facebook page, and newly registered donors in the period surrounding WBDD.

To conclude, it seems that the WBDD campaign becomes increasingly successful in raising awareness for the importance of blood donation. Furthermore, it seems that global attention is more important than hosting the campaign. Finally, the Dutch campaign in 2016 was effective in convincing people to become a blood donor.

ACKNOWLEDGMENTS

We thank Camila Caram-Deelder, Jan Choi, Georgine Dat, Ruffang Li, and Manori Jayasinghe for their translations of the search terms. FJK designed research, performed research, collected data, analyzed and interpreted data, performed statistical analysis, and wrote the manuscript; ALK designed research, performed research, collected data, analyzed and interpreted data, performed statistical analysis, and wrote the manuscript; MSA designed research, interpreted data, and revised the manuscript; DL designed research, interpreted data, and revised the manuscript; and MGJvK designed research, interpreted data, and revised the manuscript.

CONFLICT OF INTEREST

The authors have disclosed no conflicts of interest.

REFERENCES

1. Missing type [Internet]. Watford: NHS Blood and Transplant; [cited 2017 Jan 4]. Available from: <https://www.blood.co.uk/news-and-campaigns/campaigns/campaign-archive/missing-type/>.
2. About: an opportunity to celebrate and thank those who give [Internet]. Geneva: World Health Organization; 2017 [cited 2017 Jan 17]. Available from: <http://www.who.int/worldblood-donorday/about/en/>.
3. Top 15 most popular search engines | May 2017 [Internet]. eBizMBA; 2017 [cited 2017 Feb 16]. Available from: <http://www.ebizmba.com/articles/search-engines>.
4. Desktop search engine market share [Internet]. Irvine (CA): Net Applications; 2006-2017 [cited 2017 Feb 16]. Available from: <https://www.netmarketshare.com/search-engine-market-share.aspx?qprid=4&qpcustomd=0&qpcd=1300>.
5. Scheres LJ, Lijfering WM, Middeldorp S, et al. Influence of World Thrombosis Day on digital information seeking on venous thrombosis: a Google Trends study. *J Thromb Haemost* 2016;14:2325-8.
6. Nghiem le TP, Papworth SK, Lim FK, et al. Analysis of the capacity of Google Trends to measure interest in conservation topics and the role of online news. *PLoS One* 2016;11: e0152802.
7. Nuti SV, Wayda B, Ranasinghe I, et al. The use of Google Trends in health care research: a systematic review. *PLoS One* 2014;9:e109583.
8. 2015 search engine market share by country [Internet]. Austin (TX): Austin Return on Now Internet Marketing LLC; 2009-2017 [cited 2017 Feb 16]. Available from: <http://returnnonnow.com/internet-marketing-resources/2015-search-engine-market-share-by-country/>. ■

SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's website.

Table S1. Mean relative search volume for Google searches on “blood donation” for the week of WBDD, the period of interest, and the control period. Mean difference was calculated as the difference in RSV in the period of interest compared to the control period.

Table S2. The effect of hosting World Blood Donor Day. Mean difference in RSV between the period of interest, compared to the control period for “blood donation” and “blood donor.” The terms are translated into native languages of the hosting countries.

Table S3. Effect of World Blood Donor Day on average number of page views per day on the Sanquin website, likes of the Sanquin Facebook page per week, and number of newly registered donors per month in the Netherlands in 2016 for the period of interest, compared to the control period.

Table S4. Mean differences in relative search volume for “blood donor” and “blood donation” with “hemochromatosis” as a negative control. RSVs for the terms of interest differ from the main result, since the terms of interest and “hemochromatosis” are normalized on the same scale.

Fig. S1. The effect of hosting World Blood Donor Day regarding searches on “blood Donor.” Mean difference in RSV per year for Spanish, France, Korean, Chinese, and Dutch, related to year of hosting the World Blood Donor Day. The translation of “blood donor” in Chinese and Korean and the translation of both terms in Singalese yielded not enough results in Google Trends.