How does a hospital website branding have positive effects of patients visiting and hospital recruitment?

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Background: Medical institutions use websites for practical purposes such as patient education and information provision. Smartphone penetration established the website as the most useful tool for information retrieval. Therefore, adapted rather than conventional website management is demanded by smartphone users for extensive dispatch of information. Social marketing, which is commonly used as an intervention strategy in global health, provides adequate information. A decision-making process based on exposure to information is the key to a good strategy. We aim to show how the behavior of a person (new patient or job applicant) could be changed through a website branding strategy of regular updates.

Methods: Since November 2015, we increased the number of pages of a website of a certain hospital by regular website updates. This study forecasted the monthly website log, number of new patients, and job applicants. Google Analytics was used to obtain, store, and maintain website usage data for the period of November 2014 to October 2016. The website was updated every Monday, Wednesday, and Friday since November 2015. The 19 departments updated their information more than once a month. The update contents consisted of symptoms of illness, illness mechanisms, lifestyle advice, diagnosis processes, each department's education program, and the welfare of employees. The achievement or underachievement of the conversion was distributed to website visitors.

Results: The website log for each parameter increased monthly during the intervention period. The monthly average for new patients was 97 prior to the intervention, and increased to 121 during the intervention (i.e., an increase of 1.25 times). The proportion of job applications via the hospital website increased from 10.9% prior to the intervention to 27.8% during the intervention. The successful applicant rate increased significantly during the intervention. Furthermore, the visit duration per web page increased during the intervention period, and the number of page views per session decreased.

Conclusions: This study indicates that novel website branding, through regular updates and aggressive information dissemination, contributed to more new patients and job applicants. This vertical communication can positively influence established human behavior by increasing reach and effectiveness, thus establishing the consumers as partners.

Keywords: Human behavior; health communication; social marketing; content management systems; decision-making process

Introduction

In 1978, Herbert A. Simon won the Nobel Prize in Economic Sciences, the same prize that was won by Daniel Kahneman in 2002. Simon applied psychological ideas to economic theorizing to define behavioral economics. His ideas percolated through the economic community, so that Kahneman, whose research advanced Simon's broad perspective, could be the psychologist who won the Nobel Prize in economics (1). Behavioral economics, such as Nudge behavior change, is a relatively new field with approaches that supplement conventional approaches to improving health behaviors, [which rely on education or standard economic theory (2)]. Indeed, Nudge's inflection of behavioral economics towards a policy is expressed by US President Obama: "*A growing body of evidence is accumulating to shows that behavioral science insights research findings about how people make decisions and act on them. Behavioral science insights can support workers to find better jobs, by improving the effectiveness and efficiency of Government*" (3). Nudge is used in healthcare science to modify her behavior by changing choice architecture (4) and a good case of behavioral science.

Similarly, social marketing is commonly used as an intervention strategy in global health (5). Social marketing is a technique used to analyze, plan, execute, and evaluate programs aimed to influence the behavior of target audiences, so as to improve their personal welfare or that of society (6). Social marketing provided adequate information to determine if the program met at least one of the Social Marketing Benchmark Criteria (7). In sum, decision-making processes due to exposure to information are the key to good strategy.

In the context of medical institutions, websites are utilized for practical purposes such as to educate patients and provide information (8-10). The advertising benefits of websites can also be used to secure new patients and job applicants, to contribute to the profitability of the institution. The penetration of the smartphone established the website as the most useful tool for information retrieval. Smartphones (both iPhone and Android devices) have been rapidly adopted in Japan since 2011, leading to a change in information gathering behavior. The publishing world uses content management systems (CMS) to manage content development, and to review and facilitate concurrent publication in paper and electronic formats. Therefore, adapted rather than conventional website branding is demanded by modern smartphone users for extensive dispatch of information. We aim to show how behavior modification of a person (that is, a new patient or job applicant) can take place, using

regularly updating hospital website management as vertically communicated information (which is one of the social marketing techniques).

Methods

Study design

We increased the number of pages of a website by regular website updates in a certain hospital, which is located in Hyogo prefecture, from November 2015. This study forecasted the monthly website log, number of new patients, and job applicants. Website statistics Google Analytics (https://www.google.co.jp/intl/ja/analytics/) collected, stored, and maintained site usage data for the period of November 2014 to October 2016, inclusive. We defined November 2014 to October 2015 as pre-intervention period, and November 2015 to October 2016 as intervention period.

The website code allows information to be collected by Google Analytics, which is then separated by community (Hokkaido, Tokyo, and other prefectures in Japan) and stored under specific profiles. In brief, Google Analytics was used to gather website indicator data on the number of page views, sessions, website visitors, local website visitors, bounce rate, new session rate, and visiting time. We defined "local" to mean that the website visitor came from the same prefecture as the hospital.

Prior to the intervention, the website displayed doctor profiles, treatment philosophy, and practice information. The website was updated every Monday, Wednesday, and Friday from November 2015. The 19 departments updated their information more than once a month. The updated contents consisted of symptoms of illness, illness mechanisms, lifestyle advice, diagnosis processes, the education program of each department, and the welfare of employees. Each update consisted of more than 1,000 characters, and included more than one photograph of people to provide a warm and personable perspective.

All data were anonymous and aggregated, and analyses were performed at group level; thus, individuals could not be identified. No studies of patient records were undertaken. Therefore, an ethics approval was not required as per clinical guidelines and national laws and regulations.

Definition of website conversion

We recorded and communicated achievement or non-

Table 1 Characteristics of number of patients, job applicants, and website logs

Period	Month	New patient	Job applicants from website	Website visitors	Sessions	Page views	Local website visitors
2014–2015 pre-intervention	11	82	1	2,849	3,861	14,898	1,377
	12	139	2	3,072	4,194	15,658	1,463
	1	113	1	3,397	4,719	17,975	1,539
	2	78	0	3,032	4,193	15,607	1,346
	3	69	2	3,380	4,663	17,712	1,371
	4	79	0	3,466	4,820	18,460	1,470
	5	92	0	3,546	5,006	19,213	1,366
	6	87	1	3,525	4,874	18,053	1,519
	7	96	0	3,276	4,642	16,946	1,393
	8	119	0	3,289	4,477	16,900	1,429
	9	72	0	3,018	4,248	16,920	1,197
	10	132	0	3,124	4,244	15,526	1,340
2015–2016 intervention	11	109	1	3,918	5,229	14,760	1,435
	12	114	2	3,235	4,427	12,453	1,136
	1	132	0	4,323	5,779	14,482	1,279
	2	137	0	5,640	7,480	16,573	1,417
	3	131	1	6,615	8,749	19,226	1,586
	4	142	1	7,623	9,942	20,416	1,471
	5	100	2	9,613	12,156	22,892	1,738
	6	130	3	10,916	13,676	24,718	1,644
	7	135	0	10,062	12,621	22,622	1,603
	8	121	2	10,584	13,423	23,997	1,690
	9	96	0	11,463	14,391	25,343	1,881
	10	101	3	12,214	15,077	25,202	1,662

achievement of website conversion as a basis for evaluation. Conversion is defined as a local website user visiting a designated web page. In this study, website users visited the hospital for guidance or job opportunities.

Statistical analyses

Continuous variables are expressed as means ± standard deviations (SDs), and categorical data are expressed as sums and percentages. We compared the website log with the entry route of job applicants before and after the intervention. Inter-group comparisons were performed using unpaired Welch's *t*-tests for continuous variables and

Fisher's exact tests for categorical variables. All statistical tests that had differences with a P value of <0.05 were considered statistically significant. Statistical analyses were performed using the R software ver. 3.2.3 (http://www.r-project.org).

Results

Hospital management information and Google Analytics characteristics

Table 1 provides monthly logs of hospital management information, new patients, or job applicants, and the

Table 2 Comparison of website logs per period, separated by conversion elements in hospital guidance

Conversion of hospital guidance	Conversion (–)			Conversion (+)		
	Pre-intervention period, mean ± SD	Intervention period, mean ± SD	P value	Pre-intervention period, mean ± SD	Intervention period, mean ± SD	P value
Visitors	1,155±79	1,257±202	0.125	246±28	288±22	<0.001
Sessions	1,579±129	1,788±310	0.048	292±35	341±37	0.003
Page views	5,524±717	5,209±570	0.248	2,549±355	1,571±203	<0.001
Bounce rate (%)	49.2±2.10	48.8±4.12	0.752	7.41±2.06	16.1±4.53	<0.001
New session rate (%)	56.1±1.71	55.5±2.24	0.491	52.9±3.72	56.8±4.66	0.032

Period-related differences were analyzed using the Welch *t*-test.

Table 3 Comparison of website logs per period, separated by conversion elements in job applicant

Conversion of job applicant	Conversion (–)			Conversion (+)		
	Pre-intervention period, mean ± SD	Intervention period, mean ± SD	P value	Pre-intervention period, mean ± SD	Intervention period, mean ± SD	P value
Visitor	1,249±85	1,311±187	0.314	134±19	231±42	<0.001
Session	1,706±139	1,854±290	0.131	164±21	274±53	<0.001
Page view	6,439±681	4,922±496	<0.001	1,634±219	1,858±250	0.029
Bounce rate (%)	45.8±1.61	49.2±5.21	0.052	9.73±3.53	4.7±1.35	<0.001
New session rate (%)	56.1±1.89	55.5±2.40	0.492	49.3±5.21	56.5±4.66	0.002

Period-related differences were analyzed using the Welch *t*-test

Google Analytics data. In the pre-intervention period, Google Analytics characteristics did not change significantly in every month. In contrast, each parameter increased on a monthly basis during the intervention period.

Influence of regularly updated medical content on new patients and job applicants

This intervention led to a change in the behavior of new patients or job applicants. Website visitors were classified according to achievement or non-achievement of conversion, which refers to local website visitors that visited a designated web page. This definition follows because a new patient could possibly visit the hospital after accessing hospital website information. Similarly, a potential job applicant could apply after accessing information about job opportunities. To demonstrate the achievement of conversion, *Tables 2,3* shows the website log during the intervention period, indicating increased website visitors,

sessions, and bounce rates, and decreased page views; the website is structured so that requested information is immediately available. Similarly, achievement of conversion for job applicants is shown through increased page views and a decreased bounce rate. The monthly number of new patients from November 2015 to October 2016 is shown in *Figure 1*, indicating an increase in the average monthly number of new patients of 97 during pre-intervention to 121 during the intervention—an increase of 1.25 times (*Figure 2*).

Table 4 summarizes the entry route of job applicants from November 2014 to October 2016. Job applications via the website had a significantly higher success rate compared to other systems. *Table 5* shows a job application rate of 10.9% for successful job applicants through the hospital homepage during pre-intervention period, while the rate during the intervention period was 27.8%. Website-based applications increased significantly during the intervention period. These results indicate that updates to the number of pages
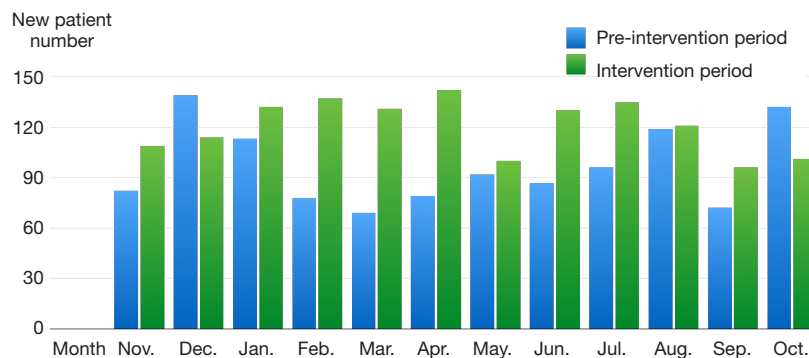
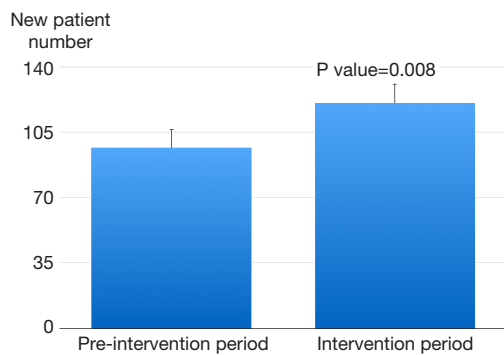**Figure 1** The monthly number of new patients from November 2015 to October 2016.

Figure 2 The average monthly number of new patients of during pre-intervention and intervention.

Table 4 Route of job applicants from November 2014 to October 2016

Job applicants	Job application from other origins (n=96)		Job application from website (n=22)		P value
	n	(%)	n	(%)	
Newcomers	57	59.4	19	86.4	0.025
Unsuccessful applicants	39	40.6	3	13.6	

Table 5 Route of successful job applicants before and after intervention

Job applicants	Pre-intervention period (n=64)		Intervention period (n=54)		P value
	n	(%)	n	(%)	
Applications from website	7	10.9	15	27.8	0.031
Applications from other origins	57	89.1	39	72.2	

of a website lead to a change in the behavior of new patients and job applicants.

Associations between human behavior and website indicator

We used qualitative indicators such as visit duration, page views per session, and visit duration per page as a means of demonstrating the specific website log indicators that would lead the next-generation behavior modification. *Tables 6,7* indicate that website visitors and visit duration per page increased during the intervention period, while the page views per session decreased.

Figure 3 showed the schema in this study. We demonstrated medical staff increased pages of website by regularly website update of medical contents. To make use of website intervention, the number of page views was increased. The new patients and job applicants were significantly increased due to the website intervention. These meant the continuous website update of medical contents increased new patients and job applicants.

Discussion

The information found on a website can be seen at any time of day from anywhere; enabling a person to find and select desired information requires strategies to direct them towards that information. The purpose of this study was to show how the behavior of a person (new patient or job applicant) could be changed through a website branding strategy of regular updates. In this study, it was found that regular website updates led to an increase in the number of new patients and job applicants. Regular updates to the number of pages of the hospital website, as an aggressive

Table 6 Comparison of qualitative website logs among period, separated by conversion elements in hospital guidance

Conversion of hospital guidance	Conversion (–)			Conversion (+)		
	Pre-intervention period, mean ± SD	Intervention period, mean ± SD	P value	Pre-intervention period, mean ± SD	Intervention period, mean ± SD	P value
Visit duration (seconds)	120±12.9	144±10.5	<0.001	280±27.2	257±22.7	0.091
Page views/session	3.49±0.20	2.95±0.27	<0.001	8.76±0.90	4.62±0.46	<0.001
Visit duration/page (seconds)	34.3±2.87	48.9±3.53	<0.001	32.2±2.69	55.8±4.52	<0.001

Period-related differences were analyzed using the Welch *t*-test.

Table 7 Comparison of qualitative website logs among period, separated by conversion elements in job applicant

Conversion of job applicant	Conversion (–)			Conversion (+)		
	Pre-intervention period, mean ± SD	Intervention period, mean ± SD	P value	Pre-intervention period, mean ± SD	Intervention period, mean ± SD	P value
Visit duration (seconds)	129±10.0	140±15.1	0.050	314±40.8	327±25.8	0.38
Page views/session	3.77±0.16	2.69±0.25	<0.001	10.0±1.28	6.87±0.79	<0.001
Visit duration/page (seconds)	34.2±1.97	51.3±3.65	<0.001	31.8±4.47	48.0±4.16	<0.001

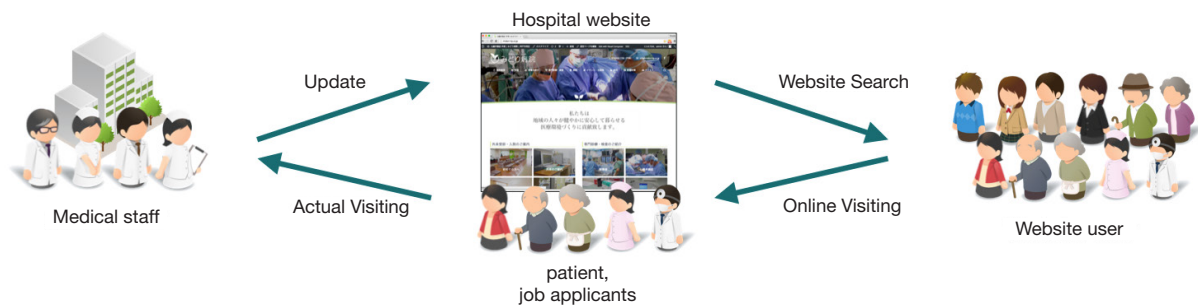Period-related differences were analyzed using the Welch *t*-test.

Figure 3 The schema in this study.

means of dispatching information, leads to a change in human behavior.

A recent study showed that selected website factors—which were warm and personable and consisted of answers to visitor's key questions—lead prospective patients to make appointments with practices, while other website factors caused them to reject practices (11). The website was updated more than 19 times in a month by every department in this study. The updates were made to benefit patients and job applicants, and consisted of information about illness, the hospital education program, and welfare. Furthermore, the contents of each update consisted of a regular volume (more than 1,000 characters), and provided

a warm and personable perspective, through the inclusion of photographs of the people. We assume that these contents satisfied website visitors' needs and concerns.

Mobile and tablet internet usage exceeded global desktop usage for the first time in November 2016 (12). The website creator must ensure that the website is designed appropriately for mobile access. This includes paying attention to screen size, ensuring that the site is easy to navigate with a keypad, and recognizing that most searches performed will be simple (13). When consumers visit the website, information must be easily accessible and understandable. In this study, the content design was conscious of CMS, and content was designed to

accommodate increased sessions and increased visits from smartphone users. Furthermore, website log indicators such as visit duration per page increased, while page views per session decreased, following the intervention. Above all, we thought that visit duration per page was the specific website log indicator to lead next-generation behavior modification. If the website is structured so that requested information is immediately available, the number of page views per session would decrease and the information search time would be shortened. Visitors would then carefully read a page that satisfies their interest, because the website contents have a high attraction for visitors' interest. As a result, the visit duration per page is the specific website log indicator to lead next-generation behavior modification.

The key limitation of this study is that we utilized a single website. For a hospital in a different location, the number of page views, website visitors, new patients, and job applicant trends may differ. Google Analytics does not acquire complete data; it has a few minor errors, which do not affect the main results. Further, the survey period was delimited by a fixed interval; future work should therefore include an examination of the long-term trends of changes in the number of new patients and job applicants. We assumed these confounders, such as clinic relocation, types of treatments covered, treatment dates and times, and changes in the number and availability of medical staff. One of the strengths of this research is that there were no structural changes, such as hospital relocation or changes to the number of departments.

Conclusions

In general, the social marketer's challenge is to harness the consumers' collective wisdom and interest about the product. Most social marketing programs directly target behavior change of a specific consumer of interest, using a range of communications channels to do so (14). In this study, we used the multi-directional communication model with the website as a social marketing method (13). In the multi-directional communication model, information is communicated vertically to consumers who actively seek information. The reach or impression of viral communication method, such as social networking service's, is more difficult to measure. Even more challenging is assessing the impact that this communication has on actual behavior. While website page views are the best-accepted measure of affinity of website visitors, we speculate that the specific website indicator to use was visit duration per page.

In this study, the anonymity of data prevented individual follow-up of website visits. However, we obtained results that indicated a change in the number of website logs and in the actual human behavior.

This study indicates that novel website branding (i.e., by regularly updating the website as an aggressive approach to information dispatch) contributed to an increase in new patients and job applicants. This vertical communication approach could influence established novel human behavior change positively, by increasing reach and effectiveness, and establishing consumers as partners.

Acknowledgments

Footnote

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