Acta Scientific MEDICAL SCIENCES (ISSN: 2582-0931)

Volume 6 Issue 6 June 2022

Review Article

Utilization of Infographics for Breast Cancer Awareness: Another Look

Asefeh Kardgar and Raji Sundararajan*

Purdue University, West Lafayette, USA

***Corresponding Author:** Raji Sundararajan, Purdue University, West Lafayette, USA.

DOI: 10.31080/ASMS.2022.06.1266

Received: February 16, 2022

Published: May 5, 2022

Abstract

Breast cancer is the most frequent malignancy among women worldwide. It affects about one in every eight women at some point in their lives. In the U.S., women younger than forty-five years old account for about nine percent of all affected individuals. Breast cancer in young females is more likely to be inherited than breast cancer in aged females, and if it is diagnosed late, there will be progression of the disease, and it will be more invasive and harder to treat. Several young women are unaware of their breast cancer risk or how to reduce it. For this, more awareness of the disease is needed. Towards this, in this research, utilization of infographics is reviewed. It compares various infographics used for breast cancer awareness.

It is also of practical interest to evaluate the parameters and factors that can improve the effectiveness of the breast cancer infographics and know why we need to design a new infographic for breast cancer and what the characteristics should be. Hence, the current study suggested designing an infographic related to the early diagnosis of breast cancer awareness.

The early diagnosis-based breast cancer infographic will educate and/or enhance their previous knowledge the women, especially those at higher risk, about examining the symptoms, like lump formation, excessive secretions from the nipples, and pain. The novel infographic should be a combination of motion and static infographics (such as interactive infographics) that will present the breast examination video from time to time in a short video clip with background audio. The pink or blue color scheme, pictures, icons, logos, and fewer words should be used to design a new infographic. As a result, the current study focuses on the potential for increasing health awareness about breast cancer to influence early diagnostic strategies adherence favorably.

Keywords: Breast Cancer; Infographics; Interactive Infographics; Static Infographics

Introduction

Cancer has become a severe issue of the century due to an increase in its prevalence in recent decades and its effects on various physiological, psychological, and social areas of human existence. Some cancers promote rapid cell proliferation, whereas others proliferate and develop more slowly. In addition, various genetic and epigenetic factors are involved in causing and progression of carcinoma [1]. In industrialized countries, the prevalence of this condition ranges from one to twenty percent, with a nearly five percent annual increase in under developing countries. Cancer killed over seven million people worldwide in 2015 [2] and almost 10 million in 2020.

Of all cancers, with over two million new cases each year, breast cancer is the most common cancer of women worldwide. According to statistics issued by the International Agency for Research on Cancer in December 2020, breast cancer has already surpassed lung disease as the most frequently diagnosed cancer globally [3]. In 2020, the United States was anticipated to see 1,806,590 new cases of cancer and 606,520 fatalities, which equates to around 4,950 cases reported and over 1,600 fatalities every day [4].

Breast cancer is the most common cancer in Iranian women too, accounting for 21.4 percent of cancer cases. Breast cancer is the most frequent cancer across women in the United States, with

a 12.5% incidence and mortality rate (compared to 1/35 death rate of all causes [5]). Breast cancer will affect 2.3 million women worldwide in 2020, with 685000 fatalities (Figure 1). Most breast cancers originate in the lobules (milk glands) and the ducts that join the milk glands to the nipple. Considering that breast cancer is not a single disease, but a group of diseases, more women need to be aware of it and take suitable actions against its occurrence.

Figure 1: Incidence, mortality, and survival rate of Breast Cancer in 2020 [3,6].

Non-Hispanic white women had the most occurrence rate of 130.8 per 100,000, followed by non-Hispanic blacks with 126.7 per 100,000 incidence rates. However, non-Hispanic black women have the highest breast cancer mortality rate (occur within the 28.4 per 100,000), which is more than twice as high as in Asian females (11.5), who have the minor incidence and mortality rates of breast cancer. Before the age of forty, non-Hispanic black women have a higher prevalence of breast cancer than white women, and they are more prone to death from breast cancer at any age (Figure 2).

Figure 2: The incidence and mortality rate in non-Hispanic white women, Asian women, and Non-Hispanic Black women in 2013-2017 [7].

The lack of education about treatment decision-making, diagnosis, and preventive strategies against breast cancer, including good nutrition, physical activity, less exposure to carcinogens, improving poor socioeconomic lifestyles, and early screening for genetic abnormalities, could be one reason for this rise. In light of the relevance of this issue, the current study looked into breast cancer and searched the visualization data tools to spread awareness in people around the world but specifically in African American females [7].

Breast cancer awareness through data visualization

In the past, incidence and death rates were given in datasets and tabular form, which were easy to understand by statisticians and epidemiologists, but did not suit the demands of all possible data users and the common public [8]. Data visualization is a new way of visualizing the impact of breast cancer on several stages (State, ethnic groups, region, and different underdeveloped countries) to spread awareness among females around the globe. Therefore, presenting accurate information in the form of dynamic and interactive graphical presentations of the breast cancer burden at the sub regional level is crucial [9].

Once patients and public members develop a better understanding of breast cancer, it allows them to be more self-reliant in their healthcare and supports therapeutic decision-making. Although the Media is cost-effective, approachable, and has the power to bring populations together, opinions on its suitability as a reliable news source are mixed [10]. The design of smartphone apps, multimedia, videos, animations, electronic messages, and different infographics has been demonstrated to help cancer patients know breast cancer treatment, diagnosis, etiology, symptoms, and preventive measures [11].

Multimedia for data visualization

Multimedia is a highly presented experience consisting of text, pictures, sounds, animations, and video conveyed to the public via computers, electronic, and other digitally modified techniques. The multimedia application presents everything from fundamental breast oncogenesis, early diagnostic and therapeutic education for the general public to high-level scientific research ideas, molecular visualizations, and information for researchers and physicians [12]. The multimedia visualization focuses on breast cancer at the systemic, neoplasm, and cellular levels. Breast morphology, the application also includes information about breast cancer

screening and treatment [13]. Another research study looked at how well a site-specific video training material helped patients comprehend and trust their radiation therapy treatment plan [14].

An essential requirement is to realistically depict tumor progression, growth, cell modifications, and dissemination and educate on various treatment or examination procedures. We need to design visual animations with sounds and text and a friendly primary graphical interface with activities to make things easy to grasp and the program user experience easy to use [15]. A system's usability is a criterion for its overall quality. The application is considered to be used for educational and recreational purposes only. As a result, both the material and the user interface must be simple to use and comprehend. The application also includes a lot of content extensions possibilities. The experts chose Flash to create the application because of its ability to manage multimedia material and user interface friendliness. The Flash application is beneficial for incorporating interactive elements into animations (Figure 3) [16].

Figure 3: Multimedia data visualization for Breast Cancer [12].

Mobile and smartphone applications

Patients can be connected over great distances using mobile technologies. A mobile phone is owned by 92% of young adults in the U.S. Because of the widespread use of mobile phones because of the potential to significantly impact various health issues through conveying risk factors, impacting patient's condition, and fostering clinician-patient interactions. Smartphone applications for better health monitoring and medication compliance could be developed by integrating mobile phones with the Internet [17]. For instance, the usefulness of a program named "Telehealth," inconsistent supply of health care, patient and physician instruction, and global health management was examined [18].

Telehealth

Telehealth uses digital and telecommunication technologies to help individuals with chronic kidney disease and global health professionals who work with chronic kidney disease patients. According to [19], Telehealth has the potential to increase disease-related education and drive behavioral change in both health practitioners and patients [19].

Text-messaging platform

A text-messaging platform was created to educate undergraduate (college/university) students about the dangers of conventional and new smokeless tobacco. Thirty-one tobacco smokers and non-users between the ages of eighteen participated in five target groups to identify the efficacy of text messaging. In addition, students provided input on the message's function and context. Prokhorov., *et al*. (2017) found that the messages were engaging and appropriate for the pupils. They had previously been unaware of the risks associated with tobacco cigarettes [18]. In addition, a previous study conducted on obesity supported this evidence that text messaging can influence health-related practices [20].

Smartphones

Another mobile strategy for overall health awareness gaining traction is smartphone applications. For example, individuals trying to reduce their weight have been proven to have higher retention and compliance to smartphone apps than website apps

or traditional paper journals. Furthermore, smartphones have demonstrated their ability to assist smokers in cessation. Although, users need time to become accustomed to the interface until it becomes common practice [17].

Internet strategy for breast cancer awareness

The use of the Internet to transmit cancer information has elicited mixed reactions. Some people have found using the Internet for cancer facts difficult and daunting, while others have found it beneficial in strengthening healthcare professional and patient interactions. Additionally, Internet usage in British countries has been fast increasing. Understanding the Online services is critical because it is a low-cost and readily available source of cancer data. In addition, it can educate people and develop public health groups [21].

Social media

Although Social Media is becoming a more important source of cancer knowledge, the Internet still lacks cancer prevention information. Furthermore, smartphone apps to track medication compliance are becoming increasingly common among patients. Therefore, an ongoing online center of cancer professionals could be a good place for people with cancer to learn more and participate in conversations, primarily through social media. Maddock., *et al*. (2011) conducted a survey to get input from cancer patients regarding finding cancer information online, primarily through social media. The survey's respondents wanted easy access to factual data about cancer and how it would affect them individually [22].

For instance, Ewing Sarcoma Awareness is a group on Facebook for Ewing Sarcoma sufferers designed to share data among patients and caregivers. Ewing Sarcoma Awareness has demonstrated its ability to guide patients in their treatment approaches. It was also promoted as a resource for ongoing psychological and emotional care [23]. Smartphones and social media may enhance people's education and awareness strategies related to breast cancer. However, they lack essential data (disease management, early diagnosis, and prevention data) necessary to provide the patients and their family members [24].

The utilization of internet resources, on the other hand, is questionable. Infographics represent the essential information connected to breast cancer in a gathered and comprehensive form. Hence, infographics are a successful visualization data technique for breast cancer awareness [11].

Infographics for breast cancer awareness

An infographic is a picture or diagram with words that show data or information. Infographics can be animated/dynamic or static, and there are conflicting opinions on which is more successful in public health communication [25]. It is a visual presentation of data that uses little language to illustrate facts, clarify ideas, streamline presentations, map linkages, highlight trends, and provide critical insights. Including attractive imagery in an infographic can help people understand an otherwise complex concept. Massive amounts of data are simplified through infographics, which provide a broad opinion and make them easier to understand at first sight. In addition, they aid in the transmission of data in a compact and shared format [26]. Stonbraker., *et al*. (2019) further emphasize the importance of infographics by spreading HIV infection among people. The study stated that a recognized aspect of high-quality healthcare coverage that contributes to higher health outcomes is compelling patient-provider interaction and communication. When there are cultural, linguistic, or cognitive disparities, well-designed infographics can help effective communication [27].

Another recent study found through experimental studies that the primary goal of infographics is to draw users' focus, assist them in effectively understanding the information offered, improve their capacity to remember and retrieve the message, and motivate them to know that information. As a result, infographics are gaining some traction as a promising scientific or health information distribution tool for reaching a wide range of knowledge users, including healthcare personnel, patients and their family members, decision-makers, and the general public. As a result, numerous research communities' projects have been launched to create and disseminate infographics in scientific publications and social networks (e.g., Twitter, LinkedIn, Facebook, Instagram, Pinterest) [25]. Infographics are also used to improve data visualization education and evaluation [28]. A novel, more thorough rubric for use in the classroom was created by assessing four current graphical rubrics. This criterion considers population, size, structure, subject and consistency, narrative and flowing, research validity, and presentation among six significant categories in data visualization [29].

Impact of color and visual intricacy on breast cancer infographic interpretation

Self-breast exam and diagnosis procedures of breast cancer are best conveyed through visuals. Instructional information regarding skin cancer presented through visual formats, including infographics, could be helpful. It is suggested that Color and visual intricacy were significant determinants of information interpretation in infographics, and they should be deliberately selected in infographic design [30]. The aesthetic sense in infographic designs is crucial since it can emphasize a message. According to current studies, two aesthetic aspects, including colors and visual intricacy, both impact people's perceptions of the aesthetic worth of websites because they are the initial stuff they view. According to a recent research, these two variables account for one-third of the diversity in people's ratings of the attraction of infographics [31].

Impact of color scheme

The use of colors in infographics aid in the clarification of the information contained within them. Investigators looked at three criteria to determine color preference: cool/warm, active/passive, and heavy/light. They discovered that cool/warm was the most accurate indicator of color preferences. People in North America commonly note that cool colors like blue are their favorite. According to scientists, cool colors are associated with peaceful, soothing, and good experiences and items like the water, sky, and ocean.

On the other hand, warm colors were thought to generate higher levels of stress and excitation since they symbolized anticipation and desire. In another research, warm colors have also been linked to happiness, satisfaction, and enthusiasm. Color has been shown to influence an individual's decision-making and impression in the past [32]. Figure 4 a (Soft Color) and Figure 4 b (Calm Color) indicate the characteristics of Soft and calm colors.

The pink color ribbon is most commonly presented in breast cancer campaigns. It is a well-known breast cancer awareness symbol around the world. Generally, ribbons and pink associate the bearer or supporter with the breast cancer cause and indicate emotional support for women diagnosed with the disease. Ribbons are most visible throughout National Breast Cancer Awareness Month (Figure 5). Dread of breast cancer, optimism for the rest, and the philanthropic kindness of individuals and businesses who openly support the breast cancer cause are all represented by the pink ribbon. It has shown support for women who constantly fight breast cancer [33]. In addition, the pink ribbon is used by breast cancer organizations to link themselves with the disease, increase awareness, and encourage donations. The pink ribbon is a significant indication of some breast cancer-associated organizations, including Pink Ribbon International [34].

Figure 2: The incidence and mortality rate in non-Hispanic white women, Asian women, and Non-Hispanic Black women in 2013-2017 [7].

Impact of visual intricacy

The viewer can readily access information in a compelling infographic with a well-structured style. The intricacy of infographics is determined by how visual images are spatially structured. Furthermore, visual clarity is highly prized in the display of quantitative data. The content of an infographic is simplified when the variety of visual items in the infographic is kept to a minimum. Infographics with less attractive images and more useful visuals were more highly valued. People's priorities for visual complexity vary according to age, gender, and educational level- with females, the elderly, and those with a high degree of education having a modest preference for visual infographics with minimal visual complexity (Figure 5) [35].

Types of infographics

Infographics come in various types and forms and shapes, but they are often divided into three categories: data graphics, diagrams,

Figure 5: Visual complexity in designing the Breast Cancer infographic based on age, gender, and educational level [36].

and maps. They can either be a static form (for printing or display), video/animated (for the screen), or interactive infographics (for screen use) [37]. In addition, they are divided into categories based on the goal, the objects employed, and the information flow. It is worth noting that an infographic will not always fit neatly into one of these categories. Many infographics will have features from several infographics [38]. Figure 6 shows an illustration of Word Cloud infographics for breast cancer awareness. [39].

Figure 6: Illustration of word cloud infographic for breast cancer awareness [39].

Table 1 shows the similarities and differences common in various types of infographics [40-44] and Table 2 shows the pros and cons of different kinds of infographics [30,37,38,43,45].

Infographic Type	Similarities	Differences
Informational	Logos, patterns, colors, and other visual components may complement the graphic. It is used for blogs, the Internet, and social media services like static infographics.	The informational infographic stands out for its extensive use of text. It is most versatile and common. Most commonly used for seminars and to emphasize the event with extensive use of words and descriptive data. The informative infographic is for a specifically defined group of audience. In addition, it is used for social media and Blog purposes.
Timeline	Timeline infographic also employs icons, photos, and visual components—minimal use of text.	An infographic depicting occurrences or acts in chronological sequence. They are frequently used to show the advancement of a historical trend, a product, and an idea. The format of the timeline can be horizontal, vertical, or circular. Best used in advertisements, presentations, and posters representation.
Charticles	In Charticles, the use of text is minimal, and its presentation is in the form of a circle with colorful parts like other infographics.	A charticle is made up of appealing colors, easy-to-understand wording, and significant charts or graphs that help to convey a central idea. Also include information made up of numerical data. The combination is usually of pie charts and arrays.
Wordcloud	It also simplifies complex and huge data in one confined form.	A word cloud is a unique visualization method for highlighting essential textual data elements. It can make boring data sparkle and deliver crucial information quickly. A grouping or cluster of words shown in various sizes, the big/bold word depicts its importance.
Static	A common feature with other infographics is the big focus on illustration and simplifies the complex data into a comprehensive and effective way with colorful icons, images, and pictures. It is also used for social media, the Internet, and blog purposes.	The static infographic is designed to be seen on a smartphone or computer in a prolonged scrolling manner. A static infographic is a photograph, similar to a snapshot, that captures a storyline at a specific point in time—offering high-level descriptions of a product, service, or problem on web pages, blogs, and other social media venues. Static infographics use a narrow set of visual methods.
Motion/Video	Interactive infographics, like static infographics, employ visuals to construct narratives from large amounts of data. Like other infographics, it presents data with images, charts, and pictures with users' interest.	A motion infographic narrates a story using multimodal and multifunctional animations (music, audio, short films, etc.). Motion graphics are far more versatile, unlike static form. A 60-90 second motion video clip often includes graphics, animations, narration, sound, and sound editing. Motion graphics are excellent instruments for eliciting an emotional response from spectators, which makes them essential in many marketing campaigns. Motion infographics are more costly than static or interactive designs
Interactive	Interactive infographics, like static infographics, employ visuals to construct narratives from large amounts of data. Like other infographics, it presents data with images, charts, and pictures with users' interest.	In contrast to static infographics, interactive infographics do not take a gradual linear approach to information-driven narratives. Instead, readers can play with a wide range of features in interactive infographics, ranging from simple clicking icons and buttons to glide information and animated charts. In addition, an interactive infographic allows you to display and enhance a story by changing various parameters over time.

Table 1: The differences and similarities among infographics.

Infographic Type	Pros	Cons
Informational	It is more versatile and common. It presents data in an extensive text but wrong and effective way.	Extensive use of words than images.
Timeline	The goal is to draw attention to specific pieces of data by linking them with specific periods while also addressing the material to be shown in detail. The timeline infographic type is quite popular, particularly in presentations.	Much time is required to connect the events in the sequel, which shows data complicatedly.
Charticles	A charticle is made up of appealing colors, easy-to-understand wording, and significant charts or graphs that help to convey a central idea.	Also include information made up of numerical data that can be misinterpreted by most of the audience.
Wordcloud	It can make boring data sparkle and deliver crucial information quickly. Text clouds are great for extracting essential pieces of textual material, such as blog posts and databases.	Word clouds are not ideal in every circumstance. For example, users cannot use a pie chart to represent the growth of a company's income statement throughout time, and Users cannot use word clouds for every application.
Static	It is a cost-effective infographic. In addition, it offers high-level descriptions of a product, service, or problem on web pages, blogs, and other social media venues.	Static infographics use a narrow set of visual methods. Therefore, its content cannot be readily modified like in motion infographics.
Motion/Video	A motion infographic narrates a story using multimodal and multifunctional animations (music, audio, short films, etc.). Motion graphics are far more versatile, unlike static form. In addition, motion graphics are excellent instruments for eliciting an emotional response from spectators, which makes them essential in many marketing campaigns.	Motion infographics are the most costly. They might be impersonal at times. A motion graphics video is more than an illustrated advertisement when done incorrectly.
Interactive	In contrast to static infographics, interactive infographics do not take a gradual linear approach to information-driven narratives. Instead, readers can play with a wide range of features in interactive infographics, ranging from simple clicking icons and buttons to glide information and animated charts. In addition, an interactive infographic allows you to display and enhance a story by changing various parameters over time.	Not very SEO-friendly. Taking the time and excessive budget.

Table 2: The pros and cons of different types of infographics.

How to improve and design an effective infographic

The primary goal of designing a compelling infographic is to summarize massive data into eye-catching, colorful and images containing a single visualization form. However, when compressing a massive report of complex science investigation into a single visualization, there is the risk of oversimplification. Furthermore, infographic design sometimes entails analyzing numerical data, which can easily be skewed or misled unintentionally. The least successful infographics are aesthetically overpowering, include excessive or unnecessary material or noise, and present information in a misleading or inconsequential manner. Hence, it is imperative to design infographics to encourage audiences to carefully consider an issue or data set in specific observations and more significant trends [24].

Various ways can improve the design of infographics. The infographics should contain minimal words, narrative way information, icons, cartoons, images, and specific eye-catching pictures through which people can interpret and comprehend the

data in a minute. It should be memorable. Usually designed well, infographics combine aesthetics, narrative, and data elements to create a more easily digestible graphical display. Most people prefer images, pictures, and a good aesthetic sense (color scheme) based on data visualization. Because the human brain absorbs textual data in a "linear" fashion while visual data is processed more quickly, the extensive wording and texting-based infographics bored the people, and they avoided interpreting the data of noisy infographics. For example, informative and didactic infographics contain more text than images and pictures and are limited to a specific group of audiences [30].

A numerical infographic also depicts confusing data because of numerical numbers, facts, and percentages. Numerical numbers and percentages mostly lead to people's misinterpretation of data. So, while designing an infographic, avoid noisy explanations, poor aesthetic color schemes, and numbers and be open to everyone. The audience will understand the picture-based depiction of information rather than using words such as in interactive and video infographics. Video and interactive infographics are commonly used to present the data effectively. Video/motion infographics present the data in a dynamic form with 60-70 seconds of video with attractive background music.

In contrast, interactive infographics combine static and dynamic infographics to present the data in an eye-catching and impressive way to attract the audience. Both infographic types are not limited to only a small group, depending upon the type of data presentation [9]. They are used to capture a person's attention and interests to pay attention to messages. They can display a significant volume of information with complex architecture in a short amount of time. Visualizations have been explored as an effective format for conveying qualitative disease and risk information with these benefits in breast cancer risk and prevention communication [45].

Targeted audience for breast cancer awareness infographics

In the U.S, breast cancer is the most frequent malignancy among women. It affects about one in every eight women at some point in their lives. Breast cancer affects women under the age of forty-five in uncommon circumstances, despite the majority of cases being detected in older women. In the U.S., women younger than forty-five years old account for about nine percent of all affected individuals. Breast cancer in young females is more likely to be inherited than breast cancer in aged females, and it might be due to late diagnosis of the disease's progression when it is more invasive and harder to treat. Several young women are unaware of their breast cancer risk or reduce it [5].

As a result, women aged eighteen to forty-four are the target group for the breast cancer infographic data visualization, especially those whose family background and genetic history expose them to a greater risk of breast cancer at an early age. In addition, it covers Ashkenazi Jewish women and females with a family history of breast and ovarian cancer. The infographics advise women at average risk to follow a healthy lifestyle regarding their breasts. It also seeks to teach healthcare practitioners about the risk variables for early-onset breast cancer and help young female patients manage and understand their risks [46].

Publication of infographics

Due to their digital formatting, most infographics may be viewed on various social media platforms, including Pinterest. Therefore, the Internet and social media are viable options to spread infographics. Numerous research communities' projects have been launched to create and disseminate infographics in scientific publications and social networks (e.g., Twitter, LinkedIn, Facebook, Instagram, Pinterest) [25]. Other than social media, there are several other sites where infographics can be published and submitted, including Slideshare, visual.ly, Flickr, infographic bee, and Reddit (Infographic Submission Sites to Increase Your Reach).

Disadvantages of infographics

There are a few disadvantages of multimedia use along with the positive implications. The human interface is responsible for the basic layout of extracting useful information, which means the data which becomes the basis of perception could be one-sided. The person delivering the information for the equivalence may only consider an essential part of the information or the information that needs to be focused on and may ignore the rest of the material, resulting in wrong conclusions [47]. The flash player has been used in the multimedia app to store and present the data, but some flash disk' write protection features are missing. Because of their small size, they are easily misplaced. Even the costs of storage are exorbitant. To use the flash drives, you will need a different version of the apps [48].

Future Perspectives

In future, Infographics could raise awareness of preventive breast cancer screening techniques among young (24-40-year age) women. Previous research estimated that women in the 18–29 age group scored the lowest on average when seeing Infographics than females in older age groups [7]. Therefore, new Infographics, educational programs, and campaigns should raise awareness and early breast cancer diagnosis. In addition, Infographics could be used in conjunction with community outreach programs to raise breast cancer awareness. Although young women have a lower risk of breast cancer, the incidence rate and mortality rate for the young age group are increasing. Therefore, future efforts should pay more attention to the young age group of women to lessen the burden of breast cancer among them.

In future breast cancer early diagnostic Infographics, interactive aspects should be included to increase audience interaction and participation. Encouraging online interactive aspects (social media or the Internet) and the use of smartphone apps for breast cancer interaction and consultation are mentioned in the current study. By combining Infographics with smartphone apps and sharing them on social media, young women would have easier access to early diagnosis screening and self-examination at home.

Conclusion

The review study indicates that the type of infographic media used to transmit breast cancer information should be less important than the data presented. Most of the data presented in Infographics are related to the treatment strategies, while very few early diagnosis-based awareness Infographics are designed. Breast cancer in young females is more likely to be inherited than breast cancer in aged females, and it is of practical interest to enhance the awareness of breast cancer among all women, especially young women. With time, the disease progresses and it is difficult to treat when it is in advanced stage and more invasive. In addition, many women are not well aware of the early examination of the breast to evaluate the risk of breast cancer.

It is hoped that creating an infographic about breast cancer early detection and awareness will enhance the awareness of it and utilize the available resources. The early detection-based breast cancer infographic could teach high-risk and other women how to analyze the symptoms. The novel infographic should be a mix of motion and static infographics (such as interactive infographics) that will show a breast examination video at intervals in a brief video clip with background audio. When creating a new infographic, utilize a pink or soft or elegant color scheme, graphics, icons, logos, and fewer words. As a result, there is a possibility of raising health awareness about Breast Cancer in order to improve adherence to early diagnostic procedures.

Bibliography

1. "Cancer: Overview, causes, treatments, and types" (2020).
2. Ataollahi M., *et al*. "Breast cancer and associated factors: A review". *Journal of Medicine and Life* 8 (2015): 6-11.
3. Breast cancer now most common form of cancer: WHO taking action (2021).
4. CDCBreastCancer. "An Update on Cancer Deaths in the United States. Centers for Disease Control and Prevention" (2021).
5. Akram M., *et al*. "Awareness and current knowledge of breast cancer". *Biological Research* 50.1 (2017): 33.
6. "Breast Cancer—Statistics". Cancer.Net (2012).
7. Street W. "Breast Cancer Facts and Figures 2019-2020". 44.
8. Rocque G B., *et al*. "Visualization of Sequential Treatments in Metastatic Breast Cancer". J*CO Clinical Cancer Informatics* 4 (2020): 1-8.
9. Ben Ramadan A A., *et al*. "Improving Visualization of Female Breast Cancer Survival Estimates: Analysis Using Interactive Mapping Reports". *JMIR Public Health and Surveillance* 4.2 (2018): e42.
10. Spiegelhalter D., *et al*. "Visualizing Uncertainty About the Future". *Science* 333.6048 (2011): 1393-1400.
11. Chin G. "Infographics to Communicate Dietary Information for Colorectal Cancer Prevention" (2018).
12. Miller C A., *et al*. "Breast Cancer Voices on Pinterest: Raising Awareness or Just an Inspirational Image?" *Health Education and Behavior* 46 (2019): 49S-58S.
13. Almerdhemah H., *et al*. "Site-Specific Education Using Digital Media to Improve Patient Understanding of the Radiotherapy Trajectory: An Interventional Study". *Advances in Radiation Oncology* 6.6 (2021): 100742.

14. Moses M E., *et al*. "Revisiting a Model of Ontogenetic Growth: Estimating Model Parameters from Theory and Data". *The American Naturalist* 171.5 (2008): 632-645.

15. Adobe Flash CS3 Professional Read Me. (n.d.). 4.

16. Poushter J. "Smartphone Ownership and Internet Usage Continues to Climb in Emerging Economies". Pew Research Center's Global Attitudes Project (2016).

17. Prokhorov A V., *et al*. "Developing mobile phone text messages for tobacco risk communication among college students: A mixed-methods study". *BMC Public Health* 17.1 (2017): 137.

18. Tuot DS and Boulware LE. "Telehealth Applications to Enhance CKD Knowledge and Awareness Among Patients and Providers". *Advances in Chronic Kidney Disease* 24.1 (2017): 39-45.

19. Sharifi M., *et al*. "Leveraging text messaging and mobile technology to support pediatric obesity-related behavior change: A qualitative study using parent focus groups and interviews". *Journal of Medical Internet Research* 15.12 (2013): e272.

20. Kirkovits T., *et al*. "eHealth in Modern patient-caregiver Communication: High Rate of Acceptance Among Physicians for Additional Support of Breast Cancer Patients During Long-Term Therapy". *JMIR Cancer* 2.2 (2016): e14.

21. Maddock C., *et al*. "Online information needs of cancer patients and their organizations". *Ecancermedicalscience* 5 (2011): 235.

22. Ruckenstuhl P., *et al*. "Like or Dislike? Impact of Facebook on Ewing Sarcoma Treatment". *JMIR Cancer* 2.2 (2016): e5367.

23. Otten JJ., *et al*. "Infographics And Public Policy: Using Data Visualization To Convey Complex Information". *Health Affairs* 34.11 (2015a): 1901-1907.

24. Mc Sween-Cadieux E., *et al*. "Use of infographics as a health-related knowledge translation tool: Protocol for a scoping review". *BMJ Open* 11.6 (2021): e046117.

25. What Is an Infographic: Types, Examples, Tips. (2017).

26. Stonbraker S., *et al*. "Developing Infographics to Facilitate HIV-Related Patient-Provider Communication in a Limited-Resource Setting". *Applied Clinical Informatics* 10.4 (2019): 597-609.

27. Kardgar A. "Measuring the Impacts of Developing Strategies for Instruction and Assessment of Infographics for First-Year Technology College Students". Theses and Dissertations Available from ProQuest (2017): 1-132.

28. Kardgar A., *et al*. "Developing Strategies for Instruction and Assessment of Infographics for First-Year Technology Students". 2017 ASEE Annual Conference and Exposition (2017).

29. Park SE and Tang L. "How color and visual complexity affect the evaluation of skin cancer infographics: An experimental study". *Journal of Visual Communication in Medicine* 42.2 (2019): 52-65.

30. Reinecke K., *et al*. "Predicting users' first impressions of website aesthetics with a quantification of perceived visual complexity and colorfulness". *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (2013): 2049-2058.

31. Borkin M A., *et al*. "What makes a visualization memorable?" *IEEE Transactions on Visualization and Computer Graphics* 19.12 (2013): 2306-2315.

32. Balkac M and Ergun E. "Role of Infographics in Healthcare". *Chinese Medical Journal* 131.20 (2018): 2514-2517.

33. "Cancer ribbon colors: Chart and guide" (2018).

34. Krum R. "Cool Infographics: Effective Communication with Data Visualization and Design (1st edition)". Wiley (2013).

35. Breast cancer infographic D. (n.d.). Breast cancer infographic, Royalty-free Breast cancer infographic Vector Images and Drawings | Depositphotos®. Depositphotos. Retrieved December 12, (2021).

36. Otten J J., *et al*. "Infographics And Public Policy: Using Data Visualization To Convey Complex Information". *Health Affairs* 34.11 (2015b): 1901-1907.

37. McCrorie A., *et al*. "Infographics: Healthcare Communication for the Digital Age". *The Ulster Medical Journal* 85.2 (2016): 71-75.

38. Breast cancer - word cloud, D. (n.d.). Breast cancer—Word cloud. Depositphotos 13, (2021).

39. Krum R. "Cool infographics: Effective communication with data visualization and design" (2014).

40. Guzmán-Cedillo Y I., *et al*. "An experience of elaborating didactic infographics on sexual diversity". *Revista Latina de Comunicación Social* 70 (2015): 961-981.

41. Tra E. "Understanding Infographics". Killer Visual Strategies (2016).

42. Locoro A., *et al*. "Static and interactive infographics in daily tasks: A value-in-use and quality of interaction user study". *Computers in Human Behavior* 71 (2017): 240-257.

43. "Timeline infographic: How to create one + examples and ideas". Rock Content (2020).

44. Shin H. "Epidemic and risk communication: An analysis of strategic and graphic characteristics of infographics". [Master of Science, Iowa State University, Digital Repository] (2016): 8943264.

45. "Targeted audience for breast cancer awareness" | CDC. (2021).

46. Flash Website: Advantages and Disadvantages (2021).

47. Fentiman I S., *et al*. "Male breast cancer". *Lancet (London, England)* 367.9510 (2006): 595-604.

48. Zhang J., *et al*. "An online visualization and data analysis system for social and economic data based on flash technology". 38 (2011): 5.