INCREASING PUBLIC AWARENESS OF VENOUS THROMBOEMBOLISM THROUGH SOCIAL MEDIA

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Abstract

This paper investigates the problem of public awareness of venous thromboembolism (VTE) from a nursing perspective. VTE encompasses deep vein thrombosis (DVT) and pulmonary embolism (PE). It is a major public health problem as 600,000 people suffer from VTE annually and 100,000 deaths are attributed to it. The aim of this research study was to investigate and attempt to quantify the general public's knowledge level of VTE. The research study included a survey in which 325 people participated. Of the 242 participants who identified themselves occupationally as nonmedical, less than 30% were familiar with both DVT and PE. Participants who identified as having medical careers had much higher levels of knowledge. The findings suggest the need for health professionals to educate patients and the public about VTE in order to decrease its incidence. A website (www.dvtaware.net) and public education campaign employing social media tools were launched to increase awareness of VTE.

Keywords: awareness, deep vein thrombosis, public health education, public health nursing, pulmonary embolism, social media, venous thromboembolism

Increasing Public Awareness of Venous Thromboembolism Through Social Media

Background

Every year in the United States, thousands of people die from a condition of which many of them have never even heard. Imagine a condition that kills more people than car accidents, AIDS, and breast cancer combined (Le Sage, McGee, & Emed, 2008). Now imagine that the causes and methods of prevention are known, treatments are available, and in many cases, this condition could be prevented altogether. This is the case with venous thromboembolism (VTE).

Venous thromboembolism encompasses two conditions, deep vein thrombosis and pulmonary embolism. Deep vein thrombosis is a term used to describe a blood clot that forms in a vein in the extremities, usually the lower leg. Pulmonary embolism is a severe complication that may happen following a deep vein thrombosis. It occurs when a portion of the blood clot breaks off and travels to the pulmonary artery in the lungs. This can be fatal (Smeltzer, Bare, Hinkle, & Cheever, 2010).

According to the United States Centers for Disease Control and Prevention (CDC), it is estimated that between 300,000 and 600,000 people suffer from venous thromboembolism each year, and up to 100,000 people die as a result of it (CDC, 2013). It is the most common cause of preventable death in hospitals in the United States (Le Sage et al, 2008). Based on the Surgeon General's report, there is little information that exists about the cost associated with venous thromboembolism. It is, however, estimated to be substantial because many people suffer from severe complications requiring lengthy hospitalization and treatment (USDHHS, 2008, p. 18). Patients are also likely to have

recurrent deep vein thrombosis, and some remain on anticoagulants for years, or even for the rest of their lives (Emanuale, 2007). This further increases the financial burden.

Due to the high morbidity, mortality, and costs attributed to venous thromboembolism, increasing efforts are underway to raise public awareness of VTE. In 2008 the United States Surgeon General, along with the Department of Health and Human Services, published the "Call to Action to Prevent Deep Vein Thrombosis and Pulmonary Embolism" (USDHHS, 2008). Based on projected data, it is estimated that with the increasing population of older adults in the US, the rates of VTE will increase if efforts are not made to prevent it. Former Secretary of Health and Human Services Michael Leavitt stated, "the Institute of Medicine has classified the failure to provide appropriate screening and preventive treatment to hospitalized, at-risk patients as a medical error" (USDHHS, 2008, p. 1). The report suggests a gap between the knowledge that exists regarding these conditions and the application of this knowledge in evidence-based practice. The goals for the future identified include increasing public knowledge, employing evidence-based care and screening, and continuing to research and utilize the findings in practice.

The US Department of Health and Human Services along with the Office of Disease Prevention and Health Promotion created Healthy People, a strategic plan that defines objectives regarding the health of people in the United States. The initiative collects research on the epidemiology of various diseases and creates goals to improve public health by decreasing the incidence and prevalence of these conditions (USDHHS, 2008). Two Healthy People 2020 objectives are directly related to venous thromboembolism. The first one is to "reduce the number of persons who develop

venous thromboembolism (VTE)" from a baseline of 54.3 per 10,000 to a goal of 48.9 per 10,000 persons. The second objective is to "reduce the number of adults who develop venous thromboembolism (VTE) during hospitalization" (USDHHS, 2008, pp. 23-24).

In addition to Healthy People 2020, various other private organizations share the common goal of increasing knowledge of and decreasing the occurrence of VTE. The Vascular Disease Foundation, the Spirit of Women, the Venous Disease Coalition, and the Centers for Disease Control and Prevention together created a campaign, entitled "This is Serious," specifically targeting VTE in women (Vascular Disease Foundation, 2013). Another partnership, the Coalition to Prevent DVT, is led by Melanie Bloom, widow of NBC news reporter David Bloom who died of a pulmonary embolism while covering the war in Iraq (Sanofi-Aventis U.S. LLC, 2012). This coalition among the American College of Chest Physicians, the American Public Health Association, and the Society of Hospital Medicine aims to increase awareness of VTE on the local and national levels.

Elizabeth Nabel, director of the National Heart, Lung, and Blood Institute at the National Institutes of Health claims, "There are few public health problems as serious as DVT/PE, yet these diseases receive so little attention" (USDHHS, 2008, p. 5). Together, they are a major public health concern because venous thromboembolism kills so many people, yet it is to a large extent a preventable condition. Lack of awareness and understanding of the general public is one of the biggest problems. Although it is a condition with which medical personnel are familiar, many other people are not. The good news is that with adequate knowledge of venous thromboembolism, people will be

able to take the proper steps to advocate for and protect themselves from this silent killer.

Literature Review

A literature review was conducted utilizing the CINAHL and PubMed databases. The key terms and phrases searched included: advertising, blood clots, deep vein thrombosis, knowledge, public awareness, public education, public health, public health campaign, public health teaching, pulmonary embolism, recognition, social media, thromboembolism, and thrombosis. Over sixty articles were identified that were related to these topics. Upon closer examination nineteen were chosen to be included in this literature review because they pertained most directly to this research project.

The nineteen articles can be grouped into five main themes: (1) general information regarding venous thromboembolism, (2) healthcare provider adherence to prevention programs, (3) patient awareness and understanding of venous thromboembolism, (4) social media and health promotion, (5) social media related to venous thromboembolism.

General Information Regarding Venous Thromboembolism

The first category of literature includes general information regarding venous thromboembolism. The literature review elicited many articles about what venous thromboembolism is, the signs and symptoms, and how it is prevented, diagnosed, and treated.

Emanuele, an occupational health nurse, describes deep vein thrombosis (DVT) in great depth including the signs and symptoms of DVT which can range from pain, cramping, warmth, redness, edema, to no clinical signs at all. The author emphasizes the importance of recognizing these symptoms early and seeking medical care to prevent

serious complications. Examples of these include pulmonary embolism and post-thrombotic syndrome (Emanuele, 2008).

Another focus of the literature is the etiology of VTE. Dutta (2009) presents three main factors that causing blood clots to form, commonly referred to as Virchow's Triad. The first, venous stasis, can occur with travel, injury, or surgery. The second is damage to the lining of the blood vessels that can happen with various events such as with the insertion of intravenous catheters. The last factor, hypercoagulability, can arise when taking estrogen, while pregnant, or in people who regularly smoke (Dutta, 2009). Emanuale (2008) adds that people are at high risk if they are suffering from any of the following: recent trauma, genetic clotting disorders, immobility, dehydration, hormone replacement, oral contraceptive use, cancer, obesity, pregnancy, or if they have a personal history or family history of venous thromboembolism.

Emphasis on the risk factors for venous thromboembolism and the need to reduce the risk through prophylactic treatments is another area of focus in the literature. Several medications are available such as heparin, low molecular weight heparin, warfarin, aspirin, clopidogrel, and fondaparinux to prevent blood clots in patients considered to be at risk. In addition to these pharmacological methods, there are also mechanical methods to prevent blood clots. Examples of these include pneumatic compression devices or elastic compression stockings to help maintain adequate blood flow in the extremities. Additional interventions can include leg and foot exercises, staying hydrated, and ambulation (Duggan-Keen, 2010).

Another focus area in the literature is risk assessment and diagnostic tools available. One risk assessment tool is the Wells Score, which assigns numerical values to

various risk factors. The numbers are totaled, and the value suggests how great the risk is that a patient may develop a deep vein thrombosis or a pulmonary embolism (El Tabei, Holtz, Schurer-Malu, & Abholz, 2012).

If deep vein thrombosis is suspected, several tests can confirm a diagnosis. These include ultrasound, venography, D-dimer blood tests, spiral computed tomography, magnetic resonance imaging, and plethymography (Meetoo, 2010). The accuracy of diagnostic tests was explored in a study conducted in Europe. The results indicated that using a combination of the Wells Score algorithm along with either a D-dimer test or imaging method was the most accurate way to diagnose venous thromboembolism (El Tabei et al., 2012).

A severe complication of VTE, pulmonary embolism (PE), is another area of focus in the literature. Drumright, Julkenbeck, & Judd (2013) describe it as occurring when a DVT or a piece of a DVT breaks off and migrates to the pulmonary artery. Various types of PE exist depending on the clot's location in the lungs and the timing of onset. Once in the lungs, a clot may block blood flow and, if not treated immediately, can lead to death. The signs and symptoms include shortness of breath, decreased blood pressure, fever, cough, coughing up blood, chest pain, increased heart rate, increased respiratory rate, and decreased breath sounds. PE is often diagnosed by pulmonary angiography, a ventilation-perfusion scan, in addition to other lab and imaging tests (Drumright, Julkenbeck, & Judd, 2013). Drumright et al. (2013) emphasize the critical nature of awareness of pulmonary emboli in saving lives, stating, "Prevention and education are absolutely essential" (p. 49). Recognizing the signs, symptoms, and risk factors is extremely important.

No shortage exists of information for healthcare providers about venous thromboembolism. A problem arises for patients, however, because the majority of the research is geared to medical professionals rather than laypersons. Mathias (2010) raises the issue faced by many people seen as outpatients who are not surrounded by the doctors and nurses who know how to recognize and treat venous thromboembolism. She states, "We can monitor patients when they're in ambulatory surgery, but the real risk is when they get home and they are immobilized" (Mathias, 2010, p. 30). With shorter hospital stays and more patients being seen as outpatients, this will become an even bigger concern. It is imperative for people to be educated about venous thromboembolism since it is responsible for hundreds of thousands of deaths each year.

Healthcare Provider Adherence to Prevention Programs

The second category of research addresses healthcare provider adherence to prevention programs as well as staff knowledge and attitudes. Overall, the research demonstrates doctors, nurses, and pharmacists recognize that venous thromboembolism is a problem, yet many medical facilities still do not comply with prophylactic measures to prevent VTE. Gao and Kause (2010) conducted a study of fifty hospital staff members, including physicians, nurses, and pharmacists, who answered a questionnaire about how large of a problem they considered VTE to be and how often they used prophylaxis with their patients. Approximately 90% of the staff members recognized venous thromboembolism as a problem, and 90% also were aware of the prevention tools available at their facility (Gao et al., 2010).

Unfortunately, the level of awareness was not matched by preventative activity by providers. Only 52% of physicians completed VTE prophylaxis labels on admission at

the two facilities where this study took place (Gao & Kause, 2010, p. 1177). The source of this lack of adherence was found to be the tendency for medical professionals to assume that it was someone else's job to prevent venous thromboembolism in their patients. For example, 68% of staff reported that they had seen prophylaxis used inappropriately or erroneously, and only 70% of them attempted to do anything about it (Gao et al., 2010, p. 1177). The authors also reported, "nurses generally believed that it was not their role to monitor the thromboprophylaxis use among patients" and "senior doctors generally believed it was the role of the junior doctors" (Gao et al., 2010, p. 1177).

Years of experience practicing medicine correlated with the likelihood that physicians would prescribe venous prophylaxis. Dabbagh, Adams, Haddadin, Jaouni, Karpman, Nusair, Botdorf, Spear, Matz, Cohen, & Hall found that the longer the physician had worked, the more likely they were to prescribe prophylaxis. The researchers attributed this to "a higher level of knowledge" (Dabbagh et al., 2009, p. 954).

System-wide plans by hospitals to increase the percentage of patients being evaluated for and receiving prophylaxis for venous thromboembolism was another area noted in the literature. Al-Tawfiq & Saadeh (2011) reported on a study that utilized reminders for staff, audit, and feedback to improve adherence. The prophylaxis rate in the first two weeks was 63% and by fourteen weeks it had risen to 100%. This hospital also went eleven consecutive months without one single patient acquiring a venous thromboembolism (Al-Tawfiq et al., 2011, p. 83).

A similar study using audit, feedback, risk assessment tools, provider education, and a new hospital policy also showed good results. At the start of the program, 49% of patients received appropriate prophylaxis. This increased to 68% of patients when it was reevaluated in twelve months. In terms of risk assessment, 0% of patients had any risk assessment at the start, and by the time of follow-up, 35% were receiving them. The hospital showed improvement in the number of patients being assessed for and treated to prevent VTE. The rates of prophylaxis were higher among surgical patients, which the researchers suggested was due to the planned nature of the surgeries conducted in this facility. Medical patients had lower rates because many of them were admitted during emergency situations (Duff, Walker, & Omari, 2011, p. 37).

Schleyer, Schreuder, Jarman, LoGerfo, & Goss (2011) specifically reviewed adherence to prophylaxis guidelines in teaching hospitals in the United States. Confirming other study findings, the authors demonstrated the suboptimal rates of thromboprophylaxis. The results varied among medical and surgical patients, but only 59% of medical patients and 41% of surgical patients received prophylaxis based on the guidelines. Of particular concern to the authors is the standard to which teaching hospitals should be held. They state, "[academic medical centers] provide the majority of training for the next generation of physicians and should, theoretically, set and reflect the standard of care" (Schleyer, Schreuder, Jarman, LoGerfo, & Goss, 2011, p. 178)

Patient Awareness and Understanding of Venous Thromboembolism

The third category of literature pertains to patient awareness and knowledge of venous thromboembolism. The previous findings demonstrate the importance of people being aware of venous thromboembolism and the risk factors. If not all facilities and

physicians are conducting risk assessments on every patient, then patients need to be able to advocate for themselves. They also need to be educated to understand the care that they are receiving. "Only if patients understand the rationale of a treatment, are they likely to be compliant" (Gao et al., 2010, p. 1178). Only two research articles addressed patient knowledge, both of which were published in *The Journal of Vascular Nursing*.

Le Sage, McGee, & Emed (2008) explored a group of forty-eight hospitalized patients who were all receiving prophylactic treatment to prevent blood clots. They examined how much the patients knew about venous thromboembolism, and concluded that roughly 65% of patients had heard of DVT and 65% had heard of PE. Approximately 83% of the patients knew that their treatment was to prevent blood clots. The remaining 17% did not know why they were receiving low molecular weight heparin injections. Fewer than 42% of the patients knew what a DVT was, and only 32% could identify risk factors for it. Only three patients out of the forty-eight knew that a pulmonary embolism was a possible complication of a DVT. When it came to providing information on the topics, 23% of patients could not give any information about DVT, and 52% could not give any about PE. The authors note that this is "of particular concern because [PE] is a potentially life-threatening complication that can follow a DVT…patients may not fully understand the gravity of developing a DVT" (Le Sage et al., 2008, pp. 111-112).

Alzoubi, Khassawneh, Obeidat, Asfoor, & Al-azzam (2013) focused on Cesarean section patients, surveying 230 women about their knowledge level of venous thromboembolism. The authors note that "[venous thromboembolism] is the main reason for maternal death during pregnancy and the postpartum period" (Alzoubi et al., 2013, p.

15). All of the women included had undergone a Cesarean section. The results indicated that only 46% of the women knew what a DVT was. Of this 46%, 44% identified immobility as a risk factor. Less than 23% knew that a C-section could put one at risk for a VTE, and only 25% knew pregnancy could do the same. Approximately 10% of the women identified oral contraceptives as a risk factor. Women with higher income and higher education level were able to correctly identify more factors. Less than 19% of women surveyed knew what a PE was (Alzoubi et al., 2013, pp. 17-18).

Both studies investigated how patients who knew about venous thromboembolism came to learn about it. LaSage et al. (2008) found more patients learned of it from friends, family, or media sources, rather than from medical professionals. They also reported that patients were not satisfied with the amount of information provided to them about VTE while in the hospital (Le Sage et al., 2008). The second study found that women who received their information from medical professionals were able to provide more correct information about VTE (Alzoubi et al., 2013). Both of these studies identify the need for further patient education about venous thromboembolism.

Social Media and Health Promotion

The fourth category in this literature review relates to social media and health promotion. Social media can be defined as "communication forms that are digital, networked, and interactive" (Goodman, Wennerstrom, & Springgate, 2011, p. 94) including "digital technologies such as the Internet, digital video, and mobile devices" (Abroms & Lefebvre, 2009, p. 415). According to the United States Census Bureau, over 75% of households in the US have computer access (US Census Bureau, 2011). With

this widespread access to computers and social media, it can become a tool for health education and health promotion campaigns.

Several articles address how social media has the ability to reach a large target audience quickly and inexpensively. Kim (2012) states, it "allows viral communication" and can be a source of health information (p. 40). The author reports that its use is widespread, stating roughly "61% of people get medical advice online" (Kim, 2012, p. 41). This number is also expected to rise throughout the future with advances in technology (Kim, 2012). Vance, Howe, & Dellavalle, (2009) estimated that more patients seek medical advice on the Internet rather than directly from physicians (p.133). Every day "over 100 million videos are viewed on Youtube" making this a possible platform to direct health promotion efforts (Vance et al., 2009, p. 134). "The young adult demographic using social media sites are attractive to media for spreading public health messages targeting this population, such as sun safety awareness, tobacco cessation, and human papillomavirus vaccination education" (Vance et al., 2009, p. 133).

Two articles included in this review addressed how President Obama's 2008 campaign can serve as a model for public health campaigns. His campaign made use of an official website, a television channel, social networking sites like Facebook and Myspace, text messaging and Twitter, along with supporter-created content. Together these various dimensions of media were able to reach more people than in any previous presidential campaign, and it could be done quickly and easily (Abroms et al., 2009). The author states, "The Obama campaign was better able to realize the health communication adage that it is best to reach people multiple times, from multiple sources, and in multiple settings" (Abroms et al., 2009, p. 419).

The researchers additionally reported that many people learned about various campaign aspects from friends and family who shared and emailed messages. This demonstrates the potential for information to be spread virally. Various articles pointed out the benefit of people sharing information horizontally. Numerous online support groups exist that allow people to connect with other people who have similar health conditions or concerns. One example referenced in several places is patientslikeme.com (Kim, 2012).

In addition to the volume of connection, the ability of social media to reach those who have been marginalized is presented by Goodman et al. (2011) who states, "The use of social media allows public health efforts to creatively engage hard-to-reach populations in symptom recognition, help seeking, and adherence to treatment" (p. 96). The authors state further that one of the most important things for public health campaigns to draw from this is that "the greatest strength of social media is not its capacity to simply send information to large segments of the population, but rather to engage previously underserved groups in accessing health information and becoming proactive consumers of health information" (Goodman et al., 2011, p. 98).

Despite the many possible positive implications of social media in public health, there are also some hazards to using it. There is the potential for misinformation and the promotion of unsafe behaviors across social media. "A review of 1,434 medical-related blogs revealed that only 297 were written by medical professionals" (Kim, 2012, p. 42). There is also the risk that this misinformation may become viral and spread quickly. A specific example of this is an online community "advocating a surgical treatment that has not yet been proven effective" (Lau, Gabarron, Fernandez-Luque, & Armayones, 2012, p.

32). Members of this community believe that is a cure for multiple sclerosis. There are also issues related to sharing of patient information through electronic media and violations of privacy or patients' rights (Lau et al., 2012). Another point made by several researchers is that social media marketing is not regulated, therefore it is not always considered to be reliable (Vance et al., 2009).

The potential problems of social media in public health campaigns are real, but should not deter its use. Lau et al. (2012) state, these hazards "[do] not mean that we should not engage in the use of new technologies to improve the way we communicate and learn about health" (p. 34). Social media can be extremely beneficial to public health campaigns. Through various types of social media, millions of people can be reached. The CDC has published guidelines to aid healthcare workers in the use of social media (Centers for Disease Control and Prevention, 2011). Through social media, people can learn about their health, about illnesses that may affect them, ways to protect themselves, and many other important topics.

Social Media Related to Venous Thromboembolism

The last category involves social media related to the topic of venous thromboembolism. Only one result turned up in this part of the literature review in which medical professionals summarized various websites and sources for information about DVT. The paper classifies the sources into categories such as "easy-to-read articles," "brochures," "quizzes," "blogs," and other sources. They were all considered to be accurate and reputable sources to which healthcare providers could direct their patients (Crisan, Crisan, Buzdugan, Vesa, & Pestrea, 2010). The problem with this paper, however, is that it is accessed through medical or nursing journals, allowing only

subscribers to view it. This excludes most of the general public since it is unlikely that they would be utilizing such sources.

Summary

Overall, the literature review revealed that extensive information about venous thromboembolism is available for medical providers. The problem needs to be recognized by every healthcare provider encountering a patient. It is the role of all, not just one sole provider, to take steps to prevent venous thromboembolism. Another major problem is the lack of information being conveyed to patients and the general public about these conditions. Additional research does not need to be conducted regarding risk factors, preventative methods, diagnosis, or treatment of venous thromboembolism. Public health officials do, however, need to take this information and determine the best ways to educate people. The utilization of social media could potentially be a great tool to widely distribute information about venous thromboembolism. Through education, people can become their own advocates, and the morbidity and mortality of venous thromboembolism could be reduced.

Media Review

In addition to the literature review, a review of popular media sources was conducted. The purpose was to determine what information related to venous thromboembolism is available to the general public through several commonly utilized forms of media. These sources include newspapers, magazines, health-related websites, and social media websites. The rationale for this type of search is that many of the medical and nursing journals utilized in the literature review are not easily accessible to

the public. Many journals require academic or medical subscriptions, limiting their availability.

Newspapers

The New York Times is ranked second on a list of the top twenty-five most read newspapers in the United States. With an average circulation of 1,865,318 copies per day, it is read by millions (Alliance for Audited Media, 2013). Due to this large readership, this newspaper was chosen as the sample newspaper for the media review. It is available online for free and in many public libraries. An online catalogue accessed through the LexisNexis database returned *New York Times* articles dating back to 1973. The catalogue was searched with the terms *deep vein thrombosis, pulmonary embolism, venous thromboembolism,* and *blood clot*. There were 102 results in the online category. Nineteen were obituaries, thirty-one contained some form of informational or educational material, twenty-five were various celebrity news articles, and twenty-seven were related to blood clots or bleeding but were unrelated to venous thromboembolism (Proquest, LLC, 2013).

Magazines

A list of the top 100 US magazines in circulation was accessed and those likely to include health information were identified. Eighteen magazines fit the criteria of publishing health related information and were investigated further. The websites for these magazines were then searched (The Association of Magazine Media, 2010) for general health information as well as information related to VTE. The search terms on all sites included *deep vein thrombosis, pulmonary embolism,* and *blood clots.* The results are categorized as follows in Table 1.

Table 1

Magazines Containing Information about VTE

Magazine	Ranking	Subscribers	Health Related Information	Information Related to VTE
AARP Magazine	1	23,735,051	Yes	Yes
AARP Bulletin	2	23,574,230	Yes	Yes
Better Homes and Gardens	3	7,660,754	Yes	Minimal
Reader's Digest	4	5,822,924	Yes	Yes
Good Housekeeping	7	4,423,181	Yes	No
Woman's Day	8	3,907,651	Yes	Yes
Family Circle	9	3,845,395	Yes	No
Ladies' Home Journal	10	3,834,461	Yes	Minimal
Time- The Weekly Newsmagazine	12	3,313,739	Yes	Yes
Cosmopolitan	15	2,975,944	Yes	Minimal
Prevention	16	2,914,002	Yes	Yes
Redbook	27	2,229,416	Yes	Minimal
Men's Health	40	1,881,148	Yes	Yes
Shape	47	1,661,039	Yes	Minimal
Women's Health	50	1,585,418	Yes	Minimal
Fitness	54	1,525,675	Yes	No
Health	59	1,381,428	Yes	Yes
Travel & Leisure	93	985,019	Yes	Minimal

Note: *Yes = >5 hits, Minimal = 1-4 hits, No = none*

Health Websites

A list of the top fifteen most frequently visited health websites was compiled. People would be likely to utilize these sites if they were seeking specific health information. The websites were searched for information regarding venous thromboembolism (eBizMBA, Inc., 2013). The search terms included *deep vein thrombosis, pulmonary embolism,* and *blood clots.* The results are contained in Table 2.

Table 2

Health Websites with Information about VTE

Website	Rank	Estimated Monthly Visitors	Extent of Information on VTE
Yahoo! Health	1	21,500,000	Extensive
National Institutes of Health	2	20,000,000	Extensive (Offered in Spanish)
WebMD	3	19,500,000	Extensive (Read-Speaker available)
Medicine Net	4	10,500,000	Extensive
Mayo Clinic	5	7,000,000	Extensive
Drugs	6	6,000,000	Minimal (Thorough coverage of drugs, little on anything else)
Everyday Health	7	5,700,000	Adequate
Med Help	8	4,600,000	Minimal (Personal blogs, health information poorly organized)
Health Grades	9	4,200,000	None (Used to find/rank physicians)
Real Age	10	4,000,000	Minimal (Q&A, poorly organized)
Well Sphere	11	3,900,000	Minimal (Little medical information, poorly organized)
Better Medicine	12	3,000,000	None (Used to find holistic practitioners)
Rx List	13	2,400,000	Minimal (Information about drugs)
Healthline	14	1,900,000	Adequate
Prevention	15	1,150,000	Minimal

Note: *Extensive* = Definitions, risk factors, signs and symptoms, treatment, medications, prevention, travel, news articles, tips, references, risk calculators/symptom checker, videos, interactive media, links, clinical trials
Adequate = Risk factors, signs and symptoms, treatment, prevention
Minimal = Incomplete information
None

Social Media Websites

Five commonly accessed social media websites were also searched for information about venous thromboembolism. Due to the differing styles of each website, a short description of the results was generated in Table 3.

Table 3

Social Media Sites with Information about VTE

Website	Information related to VTE	Results/extent of information
Facebook	Yes	Search returned 3 people, 2 non-profit organizations liked by roughly 500-600 people, DVT and PE disease pages, 2 awareness groups, 4 communities, and 0 apps.
Twitter	Yes	Search returned tweets from the CDC, tweets from several news stations' and magazines' accounts, and some personal tweets.
Youtube	Yes	Search returned thousands of hits including educational videos, commercials, interviews with physicians, personal stories, and tips to prevent VTE.
Pinterest	Yes	Search returned 7 boards and hundreds of pins containing information, warnings about risk factors, videos, and awareness.
Tumblr	Yes	Search returned hits and hashtags including #DVT, #deep vein thrombosis, #pulmonary embolism, #venogram, #air travel, #disease, #CTscan, #pulmonary infarction among other things. No definitive number of hits could be obtained.

Methods

Approval for this research project was granted through the Institutional Review Board at Rhode Island College in August 2013. Participants were recruited via email and various social media websites, including Facebook and Twitter. The participants were given an informational letter describing the survey and the research study (Appendix A). They had the option to complete the survey or to opt out of it. The survey could also be abandoned at any time if the participants felt uncomfortable completing it. Review of the informational letter and completion of the survey was done at the convenience of the participants in whatever setting they chose. The researcher was not present during completion of the survey. Participants remained completely anonymous.

The research project included a thirteen-question survey to assess the knowledge level of the general public about venous thromboembolism (Appendix B). The survey

was hosted through Surveymonkey.com. It was a mixed method study. The first twelve questions collected quantitative information related to the participants' demographics, knowledge of deep vein thrombosis (DVT) and pulmonary embolism (PE), and typical sources of health information. The last question was an optional comment box employed to gather some qualitative information about participants' experiences with venous thromboembolism. The survey was available online for a three month period. During this time 325 people completed the survey.

Results

Demographics

Participants were asked to identify their age, educational level, and occupation. One participant skipped the first question categorizing age. Of the 324 participants who responded, 41% identified themselves as being in the 18-24 year old category. The second highest age category were 40-64 year olds with 34%, followed by the 25-39 year old category with 17%. The lowest category was participants over the age of sixty-five years old (8%).

Highest educational level to date was assessed for each participant. Eight participants did not answer this question. Of the 317 that did, 36% identified themselves as having a high school diploma or GED. Twenty seven percent had obtained a bachelor's degree, 24% a graduate degree, and 12% of participants an associate's degree or certificate.

The last piece of demographic information gathered was occupation or field of study. Participants had six categories to choose from along with the option of "other." Thirty participants skipped this question, leaving 295 responses. The greatest number of

participants identified themselves as being in education, at 31%. The second largest group was medical at 26%. Business came next at 16%, followed by liberal arts at 15%, and science at 8%. The smallest group was trades with only 3% of participants selecting this option. Approximately 4% of occupations were undetermined due to participants skipping the question. Other category participants identified fields of study and occupations such as journalism, government, network engineering, social work, sociology, human services, communications, animal welfare, holistic practitioner, interior design, musician, fine art, engineering, construction management, and psychology.

Awareness of VTE

Survey participants were asked whether they knew what a deep vein thrombosis and a pulmonary embolism were. Less than half of participants indicated that they knew what a DVT was. Only 47% answered yes to this question. The remaining participants responded that they did not know what DVT was (38%) or that they were unsure (15%). Four participants skipped this question.

A larger percentage of participants stated that they knew what a pulmonary embolism was. Sixty percent of participants indicated that they knew what a pulmonary embolism was, and of the remaining 40%, 25% said they did not know what a PE was and 15% were unsure. Three participants skipped this question.

The results were then filtered further to evaluate how many participants were aware of both DVT and PE. Through this process, it was determined that only 137 of the 325 participants (42%) were familiar with both DVT and PE.

To determine awareness of the general public, those participants that identified themselves as “medical” had to be excluded. When medical personnel were eliminated, a

total of 242 participants remained. Seventy-two nonmedical participants answered yes to knowing what both deep vein thrombosis and pulmonary embolism were. This equates to only 30% of nonmedical people that were familiar with both DVT and PE. Further analysis of individual results revealed that seven of these participants knew about it because they or close family members suffered from it. Over 70% of the general, nonmedical participants involved in the survey were not familiar with both DVT and PE.

Awareness levels of VTE among medical participants were significantly higher than general participants. When asked to identify an occupation or field of study, eighty-three out of 325 (26%) participants identified themselves as "medical." Of these eighty-three medical participants, sixty-six answered yes to both questions claiming that they knew what deep vein thrombosis and pulmonary embolism were. The remaining seventeen participants answered either no or unsure to both of the questions, or they answered no or unsure to one of the two. All seventeen were in the 18-24 year old category and fifteen (88%) had a high school diploma or GED. Of the remaining two participants, one held a bachelor's degree and the other held an associate's level degree or certificate. Table 4 demonstrates the results of those identified as medical.

Table 4

Medical Participants' Awareness

	Number of participants	Percentage
Total medical participants	83	100 %
Medical participants that knew what DVT & PE were	66	80 %
Medical participants that did not know what either were	9	11 %
Medical participants that did not know what DVT was	4	5 %
Medical participants that did not know what PE was	4	5 %

How Participants Learned About VTE

Participants were asked how they learned about venous thromboembolism. Fifty-three participants skipped this question. Of the 272 that answered, 33% chose the option that they had never heard of DVT/PE. Of those who had, 25% heard about it from a family member or friend and 24% learned about it from a healthcare professional. The remaining participants stated that they learned about VTE from television (10%), Internet (4%), and magazines or newspapers (4%). "Other" was an option for participants to choose. Fifty-eight participants chose this option and wrote in how they learned about it. Forty-four out of fifty-eight participants stated that they learned about VTE through school or work in a healthcare setting. Three out of the fifty-eight stated that they had heard of it but had no idea what it was. Seven participants either personally had venous thromboembolisms or had immediate family with VTEs.

One participant responded, "I had read about it several times over the last several years because I travel frequently, and internationally on business. I know that DVT can happen during long flights, so I have read about it as a precaution. Also, I remember a lot of headlines when it killed NBC reporter, David Bloom." An additional participant stated, "[My] mother is a pharmaceutical rep; [she] sold Lovenox and another PE drug." Another said, "My mother died from DVT after abdominal surgery."

Signs & Symptoms of VTE

The next few questions sought to determine how much participants knew about the specific signs and symptoms of venous thromboembolism. Participants were prompted to select all of the symptoms of VTE with which they were familiar. Three participants skipped the question that asked about signs of deep vein thrombosis. Of the

322 who answered, 54% said they were unsure of any signs. Those that correctly identified signs included 45% who chose swelling of a limb, 43% who chose pain, 39% who chose warmth, 37% who chose redness, and 20% who chose increased pain with pointing the toe up.

Three participants also skipped the next question about signs of a pulmonary embolism. Out of the 322 who responded, 50% were unsure of any signs. Those that correctly identified signs included 50% who chose shortness of breath, 45% who chose chest pain, 28% who chose breathing faster than normal, 23% who chose coughing, 23% who chose anxiety, 21% who chose coughing up bloody sputum, and 11% who chose fever.

The sixty-six medical participants who were familiar with both DVT and PE demonstrated high levels of knowledge of the signs of DVT and PE. They were asked to select the signs of DVT and PE from a list provided. Both questions had an option of "unsure." Over half of the medical participants correctly identified all of the signs of deep vein thrombosis. Only six (9%) were unsure or identified less than half of the signs and symptoms. For pulmonary embolism, 25% of medical participants chose all of the correct signs and symptoms. The majority (43%) chose four to six of the seven possible signs. Only 32% chose unsure or identified less than half of the signs and symptoms. The results from medical participants are contained in Table 5 and Table 6.

Table 5

Recognition of the Signs of DVT by Medical Participants

Number of signs correctly identified	Number of participants	Percentage
2 or less (<50%)	3	5%
3-4 (>50%)	23	35%
All 5 (100%)	36	55%
Participants who chose unsure	4	6%

Table 6

Recognition of the Signs of PE by Medical Participants

Number of signs correctly identified	Number of participants	Percentage
3 or less (<50%)	18	27%
4-6 (>50%)	28	42%
All 7 (100%)	17	26%
Participants who chose unsure	3	5%

Risk Factors & Prevention of VTE

The next part of the survey addressed factors that increase a person's risk for venous thromboembolism. One participant skipped the question. Three hundred twenty four participants responded and out of those, 38% said they were unsure. More than half of participants correctly identified three risk factors. Immobility after surgery or injury was chosen by 59% of participants, history of blood clots by 57%, and airplane rides by 53%. Smoking and tobacco use was correctly identified to increase risk by 49% of participants and 45% chose obesity. There were fewer participants that chose birth control pills (38%), dehydration (32%), pregnancy (30%), and hormone replacement therapy (25%) as risk factors.

When it came to ways to decrease a person's risk for VTE, two participants skipped the question. Out of the 323 participants, 36% stated that they were unsure of risk reduction measures. More than half of the participants correctly identified five out of the six options presented to them. Walking around was selected by 58% of participants, compression stockings by 54%, and leg exercises by 53%. Quitting smoking was chosen by 51% of participants and drinking adequate fluids by 51%. Only 40% chose medication as an option to reduce the risk of VTE.

The results of the sixty-six medical participants who answered yes to having knowledge of both deep vein thrombosis and pulmonary embolism were analyzed further. When recognizing risk factors for venous thromboembolism, fifty-six out of sixty-six medical participants (85%) were able to identify more than half of the risk factors. Sixty-four out of sixty-six (97%) medical participants correctly identified greater than half of the options. This indicates substantial knowledge on the part of participants who identified themselves occupationally as "medical."

Source of Health Information

Participants were asked how they usually obtain health information and what their most preferred method of obtaining health information would be. Three hundred sixteen participants answered the question on how they typically obtain health information. The majority of participants preferred to get information from a healthcare professional (95%). The next most common source of information was the Internet (59%). Family and friends was selected by 47% of participants. Fewer participants said that they sought information from magazines/newspapers along with television, at 18% and 17% respectively. The option of "other" was given for this question. Several participants identified school and textbooks as other sources of health information.

When asked what the number one preferred method of learning about health information would be, 321 participants responded. The majority of participants (87%) answered that they preferred to gain information from healthcare providers. Internet was the second choice, selected by 31% of participants. Family and friends was chosen by 13%, magazines and newspapers by 5%, and television by 3% of participants. For the

option of "other," school, textbooks, and family members who were in the medical field were listed as other possible sources of health information.

Qualitative Data

The last question was an open response box prompting participants to share any thoughts or personal experiences they have had with VTE. Participants who chose to fill in this section shared personal stories of their own experiences with VTE. Additionally, they shared stories of their families' experiences with it. There were several participants that used this box to state how little they felt that they knew about the topic. Table 7 contains the participants' responses.

Table 7

Shared Experiences of VTE

My husband experienced a PE after a surgery. That is how I became aware of this.
This topic is very critical since many patients can develop these symptoms during a hospital stay. If nurses and other health care professionals are aware of this complication these can be prevented.
No clue about any of this.
I recall a frightening scenario my mother once shared about how most doctors do not issue anticoagulants as a general pre-surgery practice-- only to high-risk patients. As a result a tremendous number of people get PEs after surgery because they were borderline risk cases. In short my mother always suggests to friends and family that they specifically ask for an anticoagulant prior to any major surgery. A preventative anticoagulant from my limited understanding has a low risk of side effects.
I didn't know anything about this until my husband injured his knee and nearly died about three weeks later when he developed a DVT/PE. I had to learn a lot after it happened. I wish we would have known in advance, so we might have prevented it.
My mother has deep vein thrombosis.
My grandfather died of embolism.
I went to a play with a friend, who became very short of breath and pale when we climbed the stairs to the parking garage. She could not recover her breath, and we stopped at a walk-in clinic. They transferred her immediately to Miriam hospital ER - diagnosis was PE. Very scary!!
I have had both.
Having experienced a DVT and PE, I agree that it can be a preventable condition. My experience may have been different if I knew about the risk factors and preventive measures beforehand.
I used to work at a job that required sitting at a computer 8-10 hrs/day. I started

developing some symptoms of DVT and had to start wearing compression stockings and getting up to walk every hour.
I was very concerned about blood clots in leg after knee replacement.
I would like to know more about this deep vein thrombosis and pulmonary embolism
As I suffer from Restless Leg Syndrome (RLS) for which there is no known cause, I am particularly aware DVT as I expect it is related to of circulatory issues, and while the "cause" of RLS is not specifically known, I feel like there is a circulatory connection. Therefore, I try to stay abreast if I see something in the news and read up on it.
I know it's very serious and can or will lead to death. And uncle of mine passed from pulmonary embolism.
I am aware that both of these exist and I have heard of them before but do not know much about.
I don't know what it is.
My roommate had a blood clot in her leg that developed on an airplane ride. That's how I know anything about deep vein thrombosis. Pulmonary embolism sounds like a blood clot in the lungs, but I don't have any personal knowledge or experience with it.
I feel dumb :(
Scary ailment that can strike at any time.
HOW QUICKLY IT CAN OCCUR EVEN FROM A VERY SLIGHT INJURY.
What is the age range for concern? Young people? Middle aged? Older folks? Thanks!
My sister had DVT earlier this year. Blood clot in her leg. She's been on warfarin. Didn't realize how little I knew about the condition until now.
It sounds terrifying whatever it is.
My father had a PE.

Discussion

The demographic information indicated that a varied sample of participants responded to the survey. The largest group was people aged eighteen to twenty-four years old followed by forty to sixty-four years old. There were fewer participants in the twenty-five to thirty-nine year old category as well as the sixty-five year old and older category. Since the survey was administered via the Internet, it is not surprising that more young people responded than older people. It is also reasonable to assume that fewer participants fell into the twenty-five to thirty-nine year old category than the forty to sixty-four year old category, because it is a narrower age range. Over one-third of participants had a high school diploma or equivalent and the remaining two-thirds had obtained some level of higher education. It is probable that the results of the survey may

indicate greater awareness than would be found in the general population. Participants from a wide range of occupations and educational backgrounds responded. A large percentage of people identified their occupational fields as education or medical. Together these two groups accounted for 59% of participants, but there were many other professions represented providing a general sample.

Overall, the results revealed that public awareness of venous thromboembolism is suboptimal. Less than half of the participants were familiar with deep vein thrombosis. There was a greater awareness of pulmonary embolism than DVT, with a little over half of the participants indicating that they knew what a PE was. It is possible that more people are familiar with PE because it is has the potential to be fatal and therefore receives more media coverage. Regardless, less than half (42%) of participants claimed to know about both conditions.

To better quantify public knowledge of venous thromboembolism, the responses to the survey were analyzed separately, as medical versus nonmedical participants. It was postulated prior to the study that individuals who identified occupationally as medical would be more aware of VTE than the average person. The hypothesis was supported when approximately 30% of nonmedical participants were able to identify both a deep vein thrombosis and pulmonary embolism. This highlights the lack of awareness of the general public about VTE. A small number of people stated that they learned about VTE through a personal experience or a family member's experience with it. Although these participants answered yes to both questions, it is possible that prior to their personal experience they would not have been aware of venous thromboembolism.

It is significant that these people are now aware of VTE, but it could have benefited them more if they had known about it sooner and perhaps prevented its occurrence.

As suspected by the researcher and indicated in the literature, the medical participants had a much higher knowledge level about venous thromboembolism. It is likely that many of these people received training about VTE through their professional education. Of the eighty-three participants identified as medical, 80% of them knew what both DVT and PE were. Only 11% either did not know, or were unsure about both. Of the seventeen participants who answered no or unsure to either question, they were all between eighteen and twenty-four years old. Fifteen of them had high school level education and did not hold any official licenses in the medical field. It is probable that these fifteen participants were either nurses' aides or medical assistants. They may also have been in their first few years of a nursing or pre-medicine program at the undergraduate level. Of the remaining two participants, one participant had a bachelor's degree and the other had an associate's degree or certificate. The specific careers, as well as degrees, of these two participants were unknown to the researcher.

The high level of knowledge among medical participants and low level of knowledge of general participants indicate that it is very important for healthcare providers to teach their patients about venous thromboembolism. This evidence suggests that nursing schools and schools of medicine do, in fact, perform an adequate job teaching about the topic of venous thromboembolism. There seems to be no lack of knowledge among the majority of those who identified as medical. The problem appears to be conveying the information from healthcare professionals to the general public.

When participants were asked to identify signs and symptoms of venous thromboembolism, the knowledge deficit of the general participants continued to be highlighted. More than half of participants (54%) were unsure of any signs of deep vein thrombosis. Approximately half of participants (50%) were unsure of the signs of a pulmonary embolism. Some of the participants were able to correctly choose several answers, but the research tool was formulated without any distractors. It is possible that had the option been fill in the blank, rather than select all that apply from a list, that the knowledge level would have been even lower.

The results of the medical participants were analyzed further to determine their knowledge level, aside from the responses of nonmedical participants. Of the medical participants, more than half were able to identify all of the signs of a deep vein thrombosis. Approximately 90% were able to identify over half of the signs and symptoms of DVT that were presented. Additionally, for pulmonary embolism 68% identified over half of the correct signs and symptoms. There were four or less medical respondents who answered that they were unsure of the signs and symptoms of DVT or PE. The data once again indicated that the overwhelming majority of medical respondents were extremely knowledgeable about both topics.

When risk factors and prevention of venous thromboembolism were assessed 38% of participants were unsure of risk factors. Similarly, 36% of participants were unsure of how to decrease one's risk. After filtering the results and analyzing medical participants alone, 88% and 97% were able to correctly identify more than half of the risk factors and risk reduction measures, respectively. This data is significant because it demonstrates that medical professionals have the knowledge and skills to accurately predict what

patients might be at an increased risk for venous thromboembolism. They also are aware of what to do to prevent it from happening. These results continue to emphasize how much medical personnel know about venous thromboembolism and how important of a resource they are.

The vast majority of participants responded at the end of the survey that they preferred to get health information directly from their providers and medical professionals. This reinforces the importance of medical professionals being aware of venous thromboembolism in order to educate their patients. As indicated by the study results, there is no lack of knowledge about venous thromboembolism among healthcare providers. A systematic and concerted effort on the part of medical personnel to inform their patients and to educate the public about VTE is essential. The second most common source of health information chosen by participants was the internet. This is increasingly an avenue to educate people about health issues, and expansion of education on venous thromboembolism could significantly impact outcomes. It is essential however for the information on the internet to have come from credible medical sources in order for information to be accurate. Regardless of the route used to inform people about venous thromboembolism, it is clear that there is a need to educate people about VTE. If more people become aware of it through the efforts of medical professionals and public health officials, then they will be able to take measures to protect themselves from VTE.

Limitations

There were several limitations to this study. Some participants skipped certain questions within the survey. Over fifty participants skipped the question about how they learned about venous thromboembolism. Most of the participants who skipped this

question probably did so because they did not know what VTE was, but this cannot be assumed without risk of discrediting the research results. Additionally there were several flaws with the research tool. The option of "I do not know" was not presented consistently. In one question it was presented as the first answer and in other questions it was last. For one of the questions, over fifty participants skipped the question because they may not have seen this as an option. Another factor with the research tool that may have been a problem was that there were no distractors or wrong answers. In the questions regarding signs and symptoms, risk factors, and prevention, all of the answers listed were correct. Participants had to select whatever choices they thought applied. It is possible that they could have guessed and either way what they selected would have been correct, even if they were not that knowledgeable about it. In addition, the last question related to participants' most preferred source of health information was meant to gather only one answer from participants, but the survey tool allowed them to pick more than one. Some participants selected more than one option for this question.

There were several limitations related to the sample of respondents. Those who responded had access to computers and knowledge of how to use the internet. They also had time to spend on the computer taking the survey. It is likely that many of the participants were technology-savvy. These participants may in fact be more aware and more knowledgeable than other people, making the results less generalizable but even more significant. Additionally, the participants who identified themselves as medical did not have to specify what their jobs were. Some participants wrote in that they were nurses, nursing students, or worked in a hospital setting, among other things. Some of the participants who chose medical were nurses, doctors, and other licensed

professionals. It is also possible that some of the participants were unlicensed staff such as secretaries, medical assistants, nurses' aides, medical billers, or similar professions. The educational background and knowledge levels of these participants would most likely vary greatly. It is probable that those who did not know about both DVT and PE were not licensed professionals.

Conclusions

The results of the study demonstrated a lack of awareness of venous thromboembolism among the general public. At the same time, the results showed great awareness by medical professionals. The gap in the knowledge between the two groups is so vast that it is undeniable that medical professionals have the knowledge needed to prevent VTE. This information stresses the need for medical personnel to give more information to patients about VTE and educate the public about the topic. Venous thromboembolism is a condition that can be prevented, recognized, and treated if people are aware of it. It is clear who has the knowledge, and it is clear how people would like to obtain information about medical topics. The next step to decreasing the incidence of VTE is to determine how best to educate the public about venous thromboembolism. Further research about the best methods to conduct this education is critical.

Next Steps

It was hypothesized at the start of this research study that there was a significant lack of knowledge about venous thromboembolism among the general public. Based on the results of the research that support this hypothesis, a public education campaign about venous thromboembolism was launched by the researcher. As indicated in the literature, social media has the potential to be an extremely effective tool in the realm of public

health (Kim, 2012). Social media has increasingly been used in the distribution of health related information and health education. Recent research by the Pew Research Center indicates that social media is used most often by younger people, women, minorities, those with lower incomes, and those with lower educational levels (Brenner & Duggan, 2013). These statistics suggest that social media could be a great tool to get health information to these populations who are sometimes difficult to reach. The CDC has also created a "Social Media Toolkit" containing information for distributing health information through social media avenues (Centers for Disease Control and Prevention, 2011). This public education campaign about venous thromboembolism includes various social media tools.

A new, nonprofit website containing accurate, clear, and concise information about VTE was established specifically to accompany this research study. It is designed so that any person, medical or nonmedical, can visit the site and find simple and easy to understand information. The website was launched during the fall of 2013. It can be accessed at www.dvtaware.net. It contains information about deep vein thrombosis and pulmonary embolism including the signs and symptoms, prevention methods, risk factors, and common treatments. It also contains helpful links to the websites of several other reputable medical sources. In addition to the website, the campaign also employs a Twitter account, @DVTAware. This account "tweets" to its followers facts, statistics, and new information about DVT and PE.

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References

AARP (n.d.) *AARP Search.* Retrieved from http://www.aarp.org/

Abroms, L. C., & Lefebvre, R. C. (2009). Obama's wired campaign: lessons for public health communication. *Journal of Health Communications, 14*, 415-423.

Alliance for Audited Media. (2013, April 30). *Top 25 U.S. newspapers for March 2013*. Retrieved from http://www.auditedmedia.com/news/blog/top-25-us-newspapers-for-march-2013.aspx

Al-Wawfiq, J. A., & Saadeh, B. M. (2011). Improving adherence to venous thromboembolism prophylaxis using multiple interventions. *Annals of Thoracic Medicine, 6*(2), 82-84.

Alzoubi, K. H., Khassawneh, B. Y., Obeidat, B., Asfoor, S. S., & Al-azzam, S. I. (2013). Awareness of patients who undergo cesarean section about venous thromboembolism prophylaxis. *Journal of Vascular Nursing, XXXI*(1), 15-20.

American Express Publishing Corporation. (2013). *Travel + leisure search results.* Retrieved from http://www.travelandleisure.com/

The American Media, Inc. Fitness & Health Network. (2013). *Shape search*. Retrieved from http://www.shape.com/search/site/

American Psychological Association. (2010). *Publication manual of the American Psychological Association*. Washington, DC: American Psychological Association.

The Association of Magazine Media. (2010). *Average total paid & verified circulation for top 100 ABC magazines*. Retrieved from:

http://isites.harvard.edu/fs/docs/icb.topic1023499.files/circulationsmagazines2010 2009ABC.pdf

BetterMedicine.Net. (2013). *Better medicine*. Retrieved from http://bettermedicine.net/

Brenner, J. & Duggan, M. (2013). *The demographics of social media users – 2012*. Retrieved from http://www.pewinternet.org/~/media//Files/Reports/2013/ PIP_SocialMediaUsers.pdf

Centers for Disease Control and Prevention. (2013, October 23). *Breast cancer statistics*. Retrieved from http://www.cdc.gov/cancer/breast/statistics/index.htm

Centers for Disease Control and Prevention. (2013, February 5). Data & Statistics. Retrieved from http://www.cdc.gov/ncbddd/dvt/data.html

Centers for Disease Control and Prevention. (2011, July). *The health communicator's social media toolkit.* Retrieved from http://www.cdc.gov/socialmedia/tools/guidelines/pdf/socialmediatoolkit_bm.pdf

Centers for Disease Control and Prevention. (2013, April 23). *Statistics overview*. Retrieved from http://www.cdc.gov/hiv/statistics/basics/index.html

Crisan, D., Crisan, S., Buzdugan, E, Vesa, S., & Pestrea, C. (2010). Deep vein thrombosis – online methods of patient education. *Medical Ultrasonography, 12*(4), 311-316.

Dabbagh, O., Adams, L., Haddadin, S., Jaouni, H., Karpman, C., Nusair, M., Botdorf, J., Spear, J., Matz, S., Cohen, E. & Hall, L. (2009). Effect of time of admission on compliance with deep vein thrombosis prophylaxis in a tertiary medical intensive care unit. *Journal of Thrombosis and Haemostasis, 7*, 950-954.

Drugs.com. (2013). *Search results*. Retrieved from http://www.drugs.com/

Drumright, K., Julkenbeck, S., & Judd, C. (2013). The ABCs of acute PE. *Nursing made incredibly easy!* Philadelphia, PA: Lippincott, Williams, & Wilkins.

Duff, J., Walker, K., & Omari, A. (2011). Translating venous thromboembolism (VTE) prevention evidence into practice: A multidisciplinary evidence implementation project. *Worldviews on Evidence-Based Nursing, First Quarter*, 30-39. doi:10.1111/j.1741-6787.2010.00209.x

Duggan-Keen, M. (2010). Reducing the risk of VTE: the new NICE clinical guideline. *Nurse Prescribing, 8*(12), 589-594.

Dutta, T. K., & Venugopal, V. (2009). Venous thromboembolism: the intricacies. *Journal of Postgraduate Medicine, 55*(1)*,* 55-64. doi:10.4103/0022-3859.48442

eBizMBA, Inc. (2013, July). *Top 15 Most Popular Health Websites*. Retrieved from: http://www.ebizmba.com/articles/health-websites

El Tabei, L., Holtz, G. Schurer-Maly, C., & Abholz, H. H. (2012). Accuracy in diagnosing deep and pelvic vein thrombosis in primary care. *Deutsches Arzteblatt International, 109*(45), 761-766.

Emanuele, P. (2008). Deep Vein Thrombosis. *American Association of Occupational Health Nurses Journal 56*(9), *389*-394.

Everyday Health Media, LLC. (2013). *From the everyday health network*. Retrieved from http://www.everydayhealth.com/

Facebook. (2013). *All results*. Retrieved from https://www.facebook.com/

Gao, F., & Kause, J. (2010). Thromboprophylaxis awareness among hospital staff. *British Journal of Nursing, 19*(18), 1175-1178.

Goodman, J., Wennerstrom, A., & Springgate, B. F. (2011). Participatory and social media to engage youth: from the Obama campaign to public health practice. *Ethnicity & Disease, 21*(Summer), 94-99.

Health Grades, Inc. (2013). *Health grades*. Retrieved from http://www.healthgrades.com/

Healthline Networks, Inc. (2013). *Results*. Retrieved from http://www.healthline.com/

Health Media Ventures, Inc. (2013). *Health results*. Retrieved from http://www.health.com/health/

Hearst Communications, Inc. (2013). *Good housekeeping search results.* Retrieved from http://www.goodhousekeeping.com/

Hearst Communications, Inc. (2013). *Woman's day search result*. Retrieved from http://www.womansday.com/

Hearst Communications, Inc. *Cosmopolitan search results*. Retrieved from http://www.cosmopolitan.com/

Kim, D. S. (2012). Harness social media, enhance your practice. Retrieved from contemporaryobgyn.net.

Lau, A. Y. S., Gabbaron, E., Fernandez-Luque, L., & Armayones, M. (2012) Social media in health – what are the safety concerns for health consumers? *Health Information Management Journal, 41*, 30-35.

Le Sage, S., McGee, M, & Emed, J. D. (2008). Knowledge of venous thromboembolism (VTE) prevention among hospitalized patients. *Journal of Vascular Nursing*. *XXVI*(4), 109-117. doi:10.1016/j.jvn.2008.09.005

Mathias, J. M. (2010). Steps to preventing DVT for outpatients. *OR Manager, 26*(11), 27-30.

Mayo Foundation for Medical Education and Research. (2013). *Search results*. Retrieved from http://www.mayoclinic.com/

MedHelp International. (2013). *MedHelp search*. Retrieved from http://www.medhelp.org/

MedicineNet, Inc. (2013). *Results.* Retrieved from http://www.medicinenet.com/script/main/hp.asp

Meetoo, D. (2010). In too deep: understanding, detecting and managing DVT. *British Journal of Nursing, 19*(16), 1021-1027.

Meredith Corporation. (2013). *Better homes & gardens search results.* Retrieved from http://search.bhg.com/

Meredith Corporation. (2013). *Family circle search results*. Retrieved from http://www.familycircle.com/

Meredith Corporation. (2013). *Fitness search results*. Retrieved from http://www.fitnessmagazine.com/

Meredith Corporation. (2013). *Ladies' home journal search results*. Retrieved from http://www.lhj.com/

Paiz, J. M., Angell, E., Wagner, J., Lawrick, E., Moore, K., Anderson, M., Soderlund, L. Brizee, & Keck, R. (2013, March). *General format*. Retrieved from http://owl.english.purdue.edu/owl/resource/560/01/

Paiz, J. M., Angell, E., Wagner, J., Lawrick, E., Moore, K., Anderson, M., Soderlund, L., Brizee, A., Keck, R. (2013, August 5). *Reference list: electronic sources (web publications).* Retrieved from http://owl.english.purdue.edu/owl/resource/560/10/

Paiz, J. M., Angell, E., Wagner, J., Lawrick, E., Moore, K., Anderson, M., Soderlund, L., Brizee, A., Keck, R. (2012, August 26). *Reference list: other print sources.* Retrieved from http://owl.english.purdue.edu/owl/resource/560/09/

Pinterest. (2013). *Search results for "thrombosis."* Retrieved from http://pinterest.com/search/?q=thrombosis

Polit, D. F., & Beck, C. T. (2010). *Essential of nursing research: appraising evidence for nursing practice*. Philadelphia, PA: Lippincott, Williams & Wilkins.

Proquest, LLC. (2013). *Proquest historical newspapers: The New York Times*. Retrieved from http://0search.proquest.com.helin.uri.edu/hnpnewyorktimes/advanced?accountid=13507

The Reader's Digest Association, Inc. (2013). R*esults*. Retrieved from http://www.rd.com/

Remedy Health Media, LLC. (2013). *WellPages*. Retrieved from http://www.wellsphere.com/detailedSearch.s?keyword=dvt

Rodale, Inc. (2012). *Men's health search results*. Retrieved from http://search.menshealth.com/vignette/mh/search.jsp?q=&submit=

Rodale, Inc. (2013). *Prevention search*. Retrieved from http://www.prevention.com/search/

Rodale, Inc. (2013). *Woman's health search results.* Retrieved from http://search.womenshealthmag.com/vignette/wh/search.jsp?q=

RxList, Inc. (2013). *Search results*. Retrieved from http://www.rxlist.com/script/main/hp.asp

Sanofi-Aventis U.S. LLC. (2012, February). *About the coalition to prevent deep vein thrombosis*. Retrieved from http://www.preventdvt.org/coalition/about.aspx

Schleyer, A. M., Schreuder, A. B., Jarman, K. M., LoGerfo, J. P., & Goss, J. R. (2011). Adherence to guideline-directed venous thromboembolism prophylaxis among medical and surgical inpatients at 33 academic medical centers in the United States. *American Journal of Medical Quality, 26*(3), 174-180.

Sharecare, Inc. (2013). Sharecare results. Retrieved from http://www.realage.com/

Smeltzer, S. C., Bare, B. G., Hinkle, J. L., & Cheever, K. H. (2010). Brunner and Suddarth's textbook of medical surgical nursing (12th ed.). Philadelphia, PA: Lippincott, Williams, & Wilkins.

Time, Inc. (2013). *Search results.* Retrieved from http://www.time.com/time/

Tumblr, Inc. (2013). *Find and follow posts tagged #dvt*. Retrieved from https://www.tumblr.com/tagged/dvt

Twitter. (2013). *Twitter results*. Retrieved from https://twitter.com/

US Census Bureau. (2013, May). *Computer and Internet use in the United States*. Retrieved from: http://www.census.gov/prod/2013pubs/p20-569.pdf

US Department of Health and Human Services. (n.d.). *National Institutes of Health search*. Retrieved from http://nih.gov/

US Department of Health and Human Services. (2008). The Surgeon General's Call to Action to Prevent Deep Vein Thrombosis and Pulmonary Embolism. Retrieved from http://www.surgeongeneral.gov/library/calls/deepvein/call-to-action-on-dvt-2008.pdf

US Department of Health and Human Services. (2012). *Topics & objectives index-healthy people*. Retrieved from http://www.healthypeople.gov/2020/topicsobjectives2020/default.aspx

US Department of Transportation. (2011). *Traffic safety facts*. Retrieved from http://www-nrd.nhtsa.dot.gov/Pubs/811706.pdf

Vance, K., Howe, W., & Dellavalle, R. P. (2009). Social internet sites as a source of public health information. *Dermatology Clinic, 27*, 133-136. doi:10.1016/j.det.2008.11.010

Vascular Disease Foundation. (2013). *About this is serious*. Retrieved from http://www.thisisserious.org/about/

WebMD. (2013). *Results*. Retrieved from http://www.webmd.com/

Yahoo! Inc. (2013). *Yahoo health*. Retrieved from http://health.yahoo.net/

Youtube. (2013). *Search results*. Retrieved from http://www.youtube.com/yt/about/

Appendix A

Dear Participant,

You are being asked to participate in a research study entitled "Assessment and Intervention to Prevent Venous Thromboembolism." This study is designed to investigate the knowledge level of the general public about venous thromboembolism or blood clots, which may cause serious complications. Every year in the United States, thousands of people die from a condition that many of them have never even heard of. Imagine a condition that kills more people than car accidents, AIDS, and breast cancer combined. Now imagine that in the majority of cases, this condition could be prevented. This is the case with venous thromboembolism. It is estimated that between 300,000 and 600,000 people suffer from venous thromboembolism each year, and up to 100,000 people die of it.

We are requesting that you participate in this research study by completing this survey. The survey should take approximately 5-10 minutes to complete. We will not be collecting any information, such as your email or IP address that can be linked back to you, and no one will know who chose to complete the survey or who declined to do so. You have the right not to complete this survey. All data will be treated as confidential, and will be safeguarded according to the policy of the Rhode Island College Institutional Review Board.

The researcher conducting this study is Kathryn Lavall. If you have any questions, you may contact her at klavall_3179@email.ric.edu. You may also contact her Honors Faculty Advisor, Dr. Joanne Costello at jcostello@ric.edu or 401-451-6559.

If you think you were treated unfairly or would like to talk to someone other than the researcher about your rights or safety as a research participant, please contact Dr. Christine Marco, Chair of the Rhode Island College Institutional Review Board, at IRB@ric.edu, or by phone at 401-456-8598, or by writing to Dr. Christine Marco, Chair IRB, c/o Department of Psychology, Horace Mann Hall 311; Rhode Island College; 600 Mount Pleasant Avenue; Providence, RI 02908.

Thank you for participating.

Appendix B

1. Age.
    a. 18-24
    b. 25-39
    c. 40-64
    d. >65

2. Highest education level to date.
    a. High school diploma/GED
    b. Associate's degree or certificate program
    c. Bachelor's degree
    d. Graduate degree
    e. Other. Please specify.

3. Occupation/field of study. Select the best option.
    a. Medical
    b. Science
    c. Liberal arts
    d. Education
    e. Business
    f. Trades
    g. Other. Please specify.

4. Do you know what deep vein thrombosis (DVT) is?
    a. Yes
    b. No
    c. Unsure

5. Do you know what a pulmonary embolism (PE) is?
    a. Yes
    b. No
    c. Unsure

6. How did you learn about DVT/PE?
    a. I have never heard of DVT/PE
    b. Doctor/healthcare professional
    c. Family or friend
    d. Television
    e. Internet
    f. Magazine/newspaper
    g. Other. Please specify.

7. Which of the following are signs of a deep vein thrombosis? Select all that apply.
    a. Redness
    b. Swelling/increased limb circumference

   c. Warmth
   d. Pain
   e. Increased pain with pointing your toe up
   f. I am unsure of the signs

8. Which of the following are signs of a pulmonary embolism? Select all that apply.
   a. Shortness of breath/difficult breathing
   b. Breathing faster than usual
   c. Coughing
   d. Coughing up bloody mucus
   e. Fever
   f. Chest pain
   g. Anxiety
   h. I am unsure of the signs

9. What factors increase your risk for a deep vein thrombosis or pulmonary embolism? Select all that apply.
   a. Being immobile after injury or surgery
   b. Long airplane rides
   c. Birth control pills
   d. Pregnancy
   e. Obesity
   f. Smoking/tobacco use
   g. Hormone replacement therapy
   h. Dehydration
   i. History of blood clots
   j. I don't know

10. What can be done to decrease your risk for a deep vein thrombosis/pulmonary embolism?
   a. Leg exercises
   b. Compression stockings/socks
   c. Walking around
   d. Drinking adequate fluids
   e. Quitting smoking
   f. Medication
   g. Other. Please specify.
   h. I don't know

11. How do you usually obtain your health information? Select all that apply.
   a. Doctor/healthcare professional
   b. Family and friends
   c. Television
   d. Internet
   e. Magazines/newspapers
   f. Other. Please specify.

12. Which would be your most preferred method of obtaining heath information?
    a. Doctor/healthcare professional
    b. Family and friends
    c. Television
    d. Internet
    e. Magazines/newspapers
    f. Other. Please specify.

13. Is there anything else about your experiences with deep vein thrombosis or pulmonary embolism you would like to share at this time?

INCREASING PUBLIC AWARENESS OF VENOUS THROMBOEMBOLISM THROUGH SOCIAL MEDIA

An Undergraduate Honors Project

By

Kathryn Lavall

To

The School of Nursing

Approved:

Project Advisor — Date: 4/23/14

Chair, Department Honors Committee — Date: 4-23-14

Department Chair — Date: 4/23/14