Voices in Education

Student Success: A National Focus

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Contents

Aims and Scope

Voices in Education is a scholarly journal that serves as a voice and resource for students, researchers, educators, and the community. It contributes to the realisation of Bermuda College's vision by addressing "the diverse needs of the community through research."

The aim of this publication is to heighten awareness of current trends, to encourage discourse and practice, to challenge thinking, and to widen and strengthen the scope of research in education. *Voices in Education* serves local and global audiences in academia by providing peer-reviewed, multidisciplinary articles.

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Foreword

Phyllis Curtis-Tweed
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Co- Editors

The theme for volume 6 is *Health Education: Institutional and Industry Structures as Well as Practices That Impact Individuals and the Community*. The genesis of this topic was a conversation between the BC Journal Editorial Committee and health care workers who asked to collaborate with Bermuda College on a special edition on health care and education. Who would have thought that only a few months later, the global upheaval of the coronavirus pandemic would have made our focus on health care so prescient? It is clear that science and research must be sustained and a new generation of scientists and educators must be cultivated to address current and future health concerns. A key feature of this edition is the inclusion of articles written by students in an effort to encourage their engagement in research. To ensure the integrity of the content of our articles, the BC Journal drafted healthcare experts to serve as Guest Editors.

At the heart of this issue is the interface of education and healthcare. The authors write on a variety of issues which have local and global import. Cancer, obesity, life skills for teens with mental challenges, understanding DNA in relation to disorders are all subjects of relevance worldwide.

Burch examines the rise of oropharyngeal cancer. She discusses the correlation between this cancer and oral sex, noting that the rate of this cancer had decreased relative to education on the impact of smoking and excessive drinking. She argues that education could once again lead to a decrease in incidents of this cancer by teaching communities about the components of the disease, transmission, and vaccination.

Chan highlights the role of nurses in educating the community by providing medical advice in particular situations. As an example, she discusses the possible impact of effective communication from nurses on the vaccine hesitant individual.

Information about the role and functions of occupational therapists can help individuals maximise the benefit of the services that they provide asserts Sampson and Richards. Additionally, the varied services from these practitioners, the authors relate, are needed to improve individuals' physical and mental health, well-being, and quality of life.

Boykin-Smith indicates that education could also mediate obesity, which is a major concern in Bermuda. She connects the use of nutrition labels and weight control, citing as an example the impact of displaying nutritional and caloric labels in the US in restaurants. This author suggests that labelling, in Bermuda, should be used in bakeries and restaurants to promote self -education on nutrition and caloric intake and possibly facilitate weight control.

Makomo's discussion regarding educational programmes on life skills could possibly provide the key to sustaining employment for teenagers who have a mental health diagnosis such as ADHD or depression. The author validates the importance of understanding and providing teens with life skills that will enable them to sustain a job. He provides a Bermuda-based model that can be applied globally.

Information about our DNA may help us to understand disorders like insomnia. Pacheco and Weldon analyse PER3 in relation to insomnia and indicate provocative findings that could be examined in further research.

This Volume of the BC Journal shows the reader that understanding health concerns is essential, but education in regards to mediating potential ill effects is key to our survival. Educating communities about research findings, effective interventions, and the characteristics and transmission of diseases can make the difference between illness and health.

Special thanks and our deep appreciation to the Journal's Guest Editors who fulfilled their job and life obligations as well as their commitment to editing articles.

Human Papillomavirus and Oropharyngeal Cancer

Shanna-Lee Burch

Abstract

Viruses are microscopic organisms that require a host to live and multiply. The Human Papillomavirus is a sexually transmitted virus with strains that are connected with cervical cancer and genital warts. Due to the risk of cervical cancer, women have traditionally been "pre-treated" with various vaccinations as a means of prevention. More recently, there has been an increase in oropharyngeal cancer, especially in the younger male population. A strain of the Human Papillomavirus has been identified as a causative factor in these cancers.

Why is oropharyngeal cancer on the rise? With public information regarding smoking and excessive drinking, the associated risk factors for this disease, oropharyngeal cancer, was decreasing. We now know there is a correlation between oral sex and the Human Papillomavirus being transmitted to the oropharynx. Some of these strains of HPV are directly linked to these cancers of the head and neck.

KEY WORDS: *Human Papillomavirus, Oro-pharyngeal Cancer,Vaccinations*

Introduction

The Human Papillomavirus is a sexually transmitted disease that has been associated with genital warts and cervical cancer. The mode of transmission for this sexually transmitted disease was thought to be primarily through vaginal intercourse. Research now shows that this virus can also be found in the head and neck region. Over the past decade, there has been an alarming increase in oropharyngeal cancer in a new demographic of the population who do not have the typical risk factors associated with oropharyngeal cancer. The typical factors that are commonly associated with oropharyngeal cancer are drinking and smoking/chewing tobacco (Spinelli, 2011).

The Human Papillomavirus possesses all the features of a typical virus. From the common cold to HIV, humans have been in a constant battle with viruses over the years! What are viruses? They are microscopic organisms with specific compositions. All viruses consist of genetic material, nucleic acid (RNA or DNA), are surrounded by a protein coat to protect the genetic information, and glycoprotein, or lipid. Viruses do not have organelles like cells, such as ribosomes, to make proteins, thus, they require a host to reproduce. The virus enters a host cell and inserts its genetic material into the host. The cell will now produce more viruses which will go on to infect other cells in a destructive cycle.

(https://courses.lumenlearning.com/trident-boundless-microbiology/chapter/structure-of-viruses)

Viruses can be categorised by their shape: Helical, icosahedral, envelope and other non-standard shapes that combine the other shapes. The Human Papillomavirus is a small, icosahedral DNA virus that is non-enveloped. These viruses exist without an envelope surrounding them for protection; this makes them more virulent and allows them to survive in harsh conditions. The HPV virus is surrounded by a protein-infuses capsid that functions to surround and protect the genetic material. This capsid aids in binding the virus to the host cells thus aiding in ensuring the proliferation of more viruses.

(https://courses.lumenlearning.com/trident-boundless-microbiology/chapter/structure-of-viruses)

Human Papillomavirus

The Human Papillomavirus (HPV) is the most prevalent sexually transmitted infection in the United States and worldwide (Stock, 2013, p.25). There are over 100 different strains of this virus with various presentations. Nearly all sexually active women and men will acquire this virus at some point in their lives. Most of these HPV infections are asymptomatic and self-limiting. Over 75% of these infections will be cleared by the body in approximately two years. HPV infections can sometimes persist in some individuals. These infections can be symptomatic and can manifest by presentation of genital warts (Stock, 2013).

Low risk strains (i.e. HPV6, HPV11) cause 90% of genital warts which can present clinically as lobulated bumps. This presentation may appear weeks, months, or even years after having sexual intercourse with an affected partner. These low risk strains of HPV are rarely associated with cancer. (https://www.healthline.com/health/sexually-transmitted-diseases/hpv-types)

There are 14 high-risk strains of HPV which are identified as cancer causing. Bosch and de Sanjosee's findings, as cited by Stock (2013) indicate that HPV-16 and HPV-18 have been recognised as causing approximately 70% of invasive cervical cancers. It must be noted that not all HPV-16 and HPV-18 infections progress to cancer; however, this percentage is a disturbing discovery. Medical research also reveals that oral Human Papilloma Virus infections can also cause oropharyngeal cancers. The Oral Cancer Foundation identified HPV-positive cases as the "fastest growing group of the oral cancers among Americans under 50 years of age" (Stock, 2013, p. 96).

There are many individuals with HPV who do not develop any symptoms, but these people can still infect others through sexual contact. HPV is spread through all forms of unprotected sex (vaginal, anal, and oral); however, more research must be completed in assessing HPV spread through nursing, labor and the blood/placental barrier.

(https://www.cdc.gov/cancer/hpv/basic_info/hpv_oropharyngeal.htm).

In the past 7 years, HPV has been prevalent in the news as a major cause of cervical cancer; however, research shows that HPV is no longer just a health threat transmitted through vaginal intercourse. Transmission of the virus through vaginal sex allows the genitalia of the partners to contact one another. Safe sex campaigns and public education have lent to heightened awareness and discouragement of unprotected vaginal intercourse for the spread of the HPV. Condom usage may decrease the spread of this virus; however, this method of protection is not 100% fail proof.

In the United States, exposure to HPV during oral sex presents as the highest risk factor for oropharyngeal cancers, while the most common cause for oral cancer worldwide is from chewing and/or smoking tobacco. According to Spinelli (2011), "More than 60% of the cancers of the mouth and pharynx are caused by HPV" (p. 46). Additionally, Genden (as cited by Belluz, 2011) states that the increase in the rate of oral sex is directly proportional to the increase in tongue, oropharynx and tonsil cancer rate.

With the introduction of HIV in the 1980s, there has been increased awareness of sexually transmitted diseases. Consequently, preventative measures such as more consistent condom usage and selective partners for sexual encounters has increased with many individuals. The practice of oral sex has increased as the younger population tend to discount oral sex as a sexual act that can transmit disease. The younger generation may also want to 'preserve their virginity' and may feel this is a safer means of intimacy. This sexual act, however, is a viable mode of transmission for HPV.

If an individual performs oral sex on an infected partner, the virus can be transmitted to the new uninfected host. Unlike other viruses such as hepatitis B and HIV, HPV is not spread through blood and bodily fluids, but rather by direct skin-to-skin contact. According to the Centres for Disease Control and Prevention, the virus embeds in the

oropharynx, which include the posterior pharyngeal wall, the palatine and lingual tonsils, the soft palate, and the posterior one-third base of the tongue. When the virus attaches to these oral structures, it may lay dormant for many years. Researchers are still trying to ascertain if there are other factors that may activate this virus from its dormant state.

(https://www.cdc.gov/cancer/hpv/basic_info/hpv_oropharyngeal.htm)

Discussion

A 2013 study was performed at Ohio State University to assess oropharyngeal cancer in three distinct decades. Dr. Maura Gillison, a medical oncologist and epidemiologist at Ohio State University first noticed an odd shift in patient profiles. She noticed younger men with virtually no history of heavy drinking or smoking being diagnosed with this cancer (Spinelli, 2011). 1984 to 1989, 16% of oropharyngeal cancers tested positive for Human Papillomavirus. In 2005, 73% of oropharyngeal cancers tested positive tested positive for Human Papillomavirus. It is estimated that by 2020, oropharyngeal cancer diagnoses will exceed those for cervical cancer in the United States. Some researchers have gone so far as to classify this growing trend as an epidemic (Pratt, 2018).

Several symptoms of HPV-caused oropharyngeal cancer are like other common illnesses such as the flu; however, they are usually more persistent in nature. Some such symptoms are ear pain, trouble moving the tongue, or fully opening the mouth, sore throat, voice changes, and enlarged lymph nodes may be present. The clinician should assess the patient for external asymmetry or swelling in the neck or jaw, but the most effective method to diagnosis this cancer is to have a tissue biopsy performed (Giacobbe,2 010). Belluz (2011) states that the body will fight the infection as it does a flu prior to it becoming a cancer. This lends to reason that the healthier the host when infected with HPV as with the flu virus, the more effective will be the initiation of and defensive response by the body to HPV.

Education of the public by the medical community is the most effective method for change. People are generally not fully aware of the pre-cancerous nature of the Human Papillomavirus other than on the cervix. If more awareness were made on the subject, there would be an increase in both abstinence from multiple sexual behaviors with multiple partners and implementation of the HPV vaccine on more individuals at an earlier age.

There are currently two vaccinations against HPV: Gardasil and Cervarix. Gardasil was first licensed by the Food and Drug Administration (FDA) in 2006 (Pratt, 2018). This initial quadrivalent vaccine prevents growth of strains of HPV 6, 11, 16, and 18. This vaccine is also effective against various pre-cancerous conditions caused by HPV31, 33, 45, 52 and 58. Gardasil vaccine was primarily promoted to prevent cervical cancers in females during sexual intercourse; however, since the mode of transmission is skin to skin contact, the transmission of the virus is still possible through oral and anal sex with a non-vaccinated partner (Pratt, 2018). Pratt also states that the initial research and evaluation or the vaccine efficacy against HPV was focused on females. Due to this focus, there has been an unintended adverse consequence of delaying an HPV vaccine recommendation for males until 2011 (2018).

The vaccine ideally should be administered to individuals between the ages of 9 – 26, thereby targeting people prior to exposure to HPV. It was not until 2011 that the recommendation for male vaccination was fully backed. This delay in vaccination of males caused an 'epidemic' of HPV associated head and neck cancers in men under the age of 35 (Wallis, 2018). Dr. Maura Gillison indicated that the burden of cancer caused by HPV is going to shift from women to men in this decade due to the lag in HPV vaccinations in males (The International Business Times, 2013). Dr. Nathan Fletcher (as cited by AmeriHealth Caritas, 2019) states that females get pap smears more regularly to diagnose their HPV status, but currently, there are no screening tests for men. This is one of the reasons that the death rate associated with oral and oropharyngeal cancers for men remains quite high: these cancers are often discovered too late.

The good news is the oropharyngeal cancers associated with HPV have a better survival rate in comparison to oropharyngeal cancers in individuals with additional risk factors such as heavy drinking and smoking. This is due partly to the better immune system of the younger patient with a healthier lifestyle.

Dr. Larry Paul (AmriHealth Caritias, 2019) emphasised that early detection is imperative for a positive outcome. Regular dental visits with oral cancer screening exams are one of the first line of detection of head and neck changes. Other practical ways to reduce risk of oral cancer are avoiding HPV infections by vaccination and reduction of multiple sexual partners, limit smoking and drinking, and eating a healthy diet.

Conclusion

This vaccination against HPV is a controversial subject as many parents feel conflicted to vaccinate their young children. There is oftentimes a negative stigma associated with the contraction of this disease; thus, many parents turn a blind eye to habits in which their children may indulge.

Unfortunately, this is how the HPV virus continues to live and thrive: lack of proactive measures due to misconceptions and miseducation. With proper education as to the modes of transmission of this virus, the pre-cancerous component of contraction with various strains, and the vaccination available to proactively counteract this growing increase of new cases, there could be a decrease in oropharyngeal cancers. It is the role of the medical community to make patients aware of this common, yet potentially dangerous virus, and provide advice on how to prevent the spread of and contraction of this sexually transmitted disease.

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Complexity of Communications with Vaccine Hesitant Patients for Nurses

Anna Chan

Abstract

Communication is a complex phenomenon. How people interpret information to make decisions relies on an infinite amount of data that is different for every individual based on experience, education, socioeconomics, and belief systems. The complexity is compounded with subjects such as vaccinations, when patients must make decisions that impact their lives and that of their family. Evidence based information regarding vaccinations is readily available from government institutions and international health agencies. An example is the World Health Organization (WHO). With the advancements in technology, the world also has access to misinformation, including opinions from anyone who wants to share, especially through social media platforms. All these complexities contribute to challenges nurses have as they try to educate the public on the importance of vaccinations and how they protect individuals and communities. Particularly, for the vaccine hesitant community, nurses must employ careful measures to ensure that the information conveyed is received in a manner that educates their patients to make informed decisions.

KEY WORDS: *Vaccination compliance, vaccine hesitancy, complex nursing communication, Nursing Education*

Introduction

Vaccine hesitancy is a multifaceted and complex public health issue; and a plethora of research has been conducted on patients' vaccine knowledge, attitudes, and beliefs that contribute to decreased public confidence in vaccines. This then decreases vaccine uptake, which ultimately has resulted in an increase of vaccine-preventable disease outbreaks. An example is measles. Research also illustrates that nurses are patients' primary source of vaccination information and that those who can communicate effectively with these patients are more likely to encourage adherence to medical advice and the adoption of preventative health behaviours, such as vaccination compliance (Courtney, 2019). As the world population approaches eight billion and access to information is readily available through media, technology, deliberate predatory and politically motivated behaviours, misinformation is becoming a serious public health concern. Now more than ever, nurses have a call of duty to mitigate vaccine hesitancy and provide evidence-based information within their community. Courtney (2019, p. iv) quoted Canada's Chief Medical Officer of Health, Dr. Theresa Tam:

> Healthcare providers are on the front lines of this battle between truth and misinformation. We must support parents as they tease apart fact from fiction. How we talk to parents who have questions about vaccines can have a direct effect on improving their confidence and supporting them in getting their children vaccinated.

This article will explore the challenges nurses have in effectively communicating with vaccine hesitant patients in a manner that is impactful.

Vaccine Hesitancy

Vaccine hesitancy is a reluctance to receive recommended vaccination because of concerns and doubts about vaccines that may or may not lead to delayed vaccination or refusal of one, many or all vaccines. Choosing to delay or refuse vaccination puts individuals and communities at increased risk of serious illness and possible death

from vaccine-preventable diseases; therefore, it is vital that recommended vaccines are administered on time and at the appropriate age. More importantly, it is vital that nurses have high quality communication skills in order to communicate effectively with vaccine-hesitant patients. Research indicates that a nurse's ability to communicate effectively with their patients has a profound effect on patients' adherence to medical advice and the adoption of preventative health behaviours (Courtney, 2019).

Vaccination compliance is a nuanced issue. In a review of 12 studies that was conducted on the beliefs and perceptions of practice nurses about the measles, mumps and rubella (MMR) vaccine, four themes were identified as influential factors on vaccination compliance: parental immunisation influencing factors, practice nurse characteristics, information and communication, and personal views and concerns (Aitken, Hill, & Salmon, 2019).

The medical community is acknowledging this resistance and possible links to cultural and religious beliefs to the anti-vaccination movement. Nurses have a responsibility to understand the patient's cultural and religious influences and answer all questions posed about vaccinations and prevention of disease and the risks associated with not getting vaccinations to themselves and the greater community. If mandates are issued within a community, it is a nurse's responsibility to report information collected from the patient regarding vaccination history (Smith, 2017).

Front line nurses must make the time to understand a patient's health history, cultural belief systems about healthcare, and specific concerns surrounding immunisations to appropriately inform their patients. As a result, patients are able to make educated decisions for their health and their families. This includes considering a patient's understanding and comprehension of misinformation, such as the discredited theory that the MMR vaccine increases the incidence of Autism.

Scientific Facts Support Sound Vaccination Decision Making

The year 2019 marked the return of measles after almost two decades of unprecedented successes in global vaccination programmes. Measles transmission due to sharp declines in MMR vaccination coverage is now widespread among nations that previously saw impressive public health gains including Philippines, Democratic Republic of Congo, Madagascar, Samoa, many in Europe, the United States, and Venezuela in the Americas. A key determinant for this is an increasing globalised antivaccine movement which is partly responsible for over 100,000 measles cases in Europe in 2019, and the re-emergence of measles to the United States almost twenty years after it was eliminated (Colwell, Hotez, & Nuzhath, 2020).

Psychologists have documented that when people are presented with ambiguous or mixed evidence, they tend to select and interpret information in a way that confirms their existing positions, a tendency termed confirmatory bias. For example, the notorious study by Wakefield in 1998 published in the Lancet, linked the measles virus to the inflammatory bowel disease found in autistic children, initiated the infamous MMR-autism controversy, and fueled an ongoing-anti-vaccine movement that continues today. This resulted in a delay of the MMR immunisation since 1998. This trend continues to be perpetuated even after scientific consensus has been reached that the MMR vaccine does not cause autism.

> Exposures to negative information about the vaccine strengthened existing biases more than exposures to positive information attenuated them. This finding provides evidence consistent with the implications of confirmatory bias documented by psychologists that in the presence of common bias in human reasoning, misinformation, once planted is hard to eradicate. Positive information, however, had strong impacts on vaccination decisions, suggesting that dissemination of vaccine safety information may mitigate misinformation. (Chou, Lai, & Qian, 2019, p.15)

The challenge for nurses is to truly understand the underlying belief systems of the patient. Nurses develop this skill over a period of time. Effective communication begins first with understanding. Only then can nurses provide information that will be comprehended and interpreted correctly, no matter how fact or evidence based it is. Facts

and scientific evidence do not always succeed emotion or belief systems. Evidence against an MMR-autism link has been accepted by leading US organisations such as the American Medical Association, the American Academy of Pediatrics, the Institute for Vaccine Safety at Johns Hopkins University, and the Centers for Disease Control and Prevention (CDCP). A patient still needs to be heard and understood on why their stance may be contrary in order to ensure they make the best decision for themselves and their families (Edwards, 2001).

Balancing Education and Sensitivity

In a study conducted by Deem, Kozak, and Navin (2019), 39 public nurse educators in Michigan were tasked with educating vaccine hesitant parents who requested non-medical exemptions from school or daycare immunisation mandates. The purpose was to gain perspectives of the educators on their observations following education sessions with these parents.

> Analysis of the transcripts from these interviews revealed that nurse educators have complex and nuanced observations and evaluations of parents' judgements and feelings about vaccines and vaccine education. They also have sympathetic attitudes about alternative vaccine schedules. Nurses have both critical and supportive evaluations of institution policies and background political context of immunisation education. Lastly, nurse educators were found to have consistent commitments to respect parents, affirm their values, and protect their rights. (Deem, Kozak, & Navin, 2019, p. 62)

These results show that public health nurses are sensitive to the burdens mandatory immunisation education places on families, the motivations for parents' requests for nonmedical exemptions, and the values implicated by personal immunisation decisions and government immunisation policies.

This study clearly outlines the complex role nurses have when educating patients on vaccinations and the implications it has on their lives and the greater community. They simultaneously must listen, interpret, and digest information provided to them and also communicate meaningful information based on what was shared with them to persons that may have a completely different understanding and belief system from themselves. This is to educate parents that the reservations they have regarding vaccinations are outweighed by the benefits that have been scientifically and factually proven. Nurses have an obligation to provide this information without bias or judgement to indicate why the information was not understood in its entirety without the education session. Thus, implicit biases involve associations outside conscious awareness that lead to a negative evaluation of a person on the basis of irrelevant characteristics such as race or gender.

In a review of 42 articles to examine evidence that healthcare professionals display implicit biases towards patients, 35 articles were found to have evidence of implicit bias towards healthcare professionals. All the studies that investigated correlations found a significant positive relationship between levels of implicit bias and lower quality of care (FitzGerald, & Hurst, 2017).

The evidence indicates that healthcare professionals exhibit the same levels of implicit bias as the wider population (FitzGerald, & Hurst, 2017). This makes the job of a nurse to communicate scientific, evidence-based information in a meaningful manner to patients who have a different view of the world from themselves extremely difficult. It is something that must be consciously considered in order for nurses to provide the best patient care possible, which means arming them with information in order to make the best decisions in any situation.

Bermuda: A Small Community Example

Fortunately, Bermuda has not had any reported cases of measles since the re-emergence of the disease.

> MMR vaccine is the most refused or delayed childhood vaccine in Bermuda, with a 30% refusal rate from the 400 people who were surveyed. There is indication of an anti-vaccination

> movement in Bermuda which led the Ministry of Health to develop a strategic framework for increasing vaccine coverage in Bermuda. This plan was guided by the WHO (Government of Bermuda Department of Health. (2019, pp. 9-10)

The World Health Organisation recommends 95% coverage in all vaccinations to protect both those vaccinated and unvaccinated. According to the Pan American Health organisations (PAHO) 2017 Expanded Programme on Immunisation (EPI) Country Report for Bermuda, vaccine coverage in Bermuda decreased from 94% in 2016 to 79% in 2017. Therefore, a survey was commissioned by the Department of Health in April 2018 which subsequently identified that 1 in 5 Bermuda residents with children have either refused or delayed vaccination. The survey further supports PAHO's 2017 EPI report that Bermuda's vaccine coverage is suboptimal dropping by almost 20% in one year (Government of Bermuda Department of Health, 2019, p.9).

From this study of Bermuda residents who were interviewed, the top two reasons people perceived childhood vaccinations as unsafe is that they do not believe or trust vaccines are safe, and that children will have adverse reactions (Government of Bermuda Department of Health, 2019, p.11).

In one interview conducted by a community health nurse, a 22-year old new mom was asked the following question during a primary well-baby check. What, if any, were her specific concerns regarding vaccinations? The woman was undecided on permitting CDC recommended vaccinations to her infant child. She indicated apprehension after reading information that lead her to believe that vaccines are not safe. When pressed further on specific concerns regarding safety measures, she concluded it was simply how she felt. When asked what her sources of information were, she stated it was the Internet. She was not certain of the specific resources. Upon further discussion about leveraging evidence based resources available from organisations like CDC and WHO and American Nurses Association (ANA), the young mother verbally indicated that more research was required on her part to be better informed to support her feelings. She intended to look at suggested materials to ensure she was making sound decisions for her new family (Community Health Nurse. Interview, October 9, 2019).

In another interview with a 20-year-old mom of an infant baby, the apprehension was similar and CDC recommended vaccinations were not desirable. The mother and her partner felt that vaccinations caused the disease that they were intending to prevent. When pressed for sources of information, no specifics were articulated, stating that it was just how they felt. When the health visitor discussed two recent cases of pertussis in Bermuda with the parents, they expressed a definite desire to get the diphtheria, tetanus, and pertussis (DTaP) vaccination for their baby but would hold off on the MMR vaccine (Community Health Nurse. Interview, October 9, 2019).

In both interviews discussed, the desired outcome of the health visitor was achieved. In the first scenario, the mother articulated a necessity for more fact-based information to support her feelings of apprehension towards vaccinations. This was achieved simply by providing relevant sources of information for the mother to research and digest on her own time. In the second scenario, the family decided to proceed with the DTap vaccination for their infant child who will now likely be protected throughout childhood from pertussis. This was achieved by simply communicating details about the incidence and distribution of pertussis in Bermuda.

Vaccination Advocates

The ANA has a position on immunisations. In order to protect the health of the public, all individuals should be immunised against vaccine-preventable diseases according to the best and most current evidence outlined by the CDC and the Advisory Committee on Immunisation Practices (ANA, 2015).

Personal belief systems and values should be respected for all individuals. Everyone has a right to an opinion and to interpret information in a manner that fits their value and belief systems. Science should also be respected when it is evidence based, tested, authentic and thorough. The WHO (2019) raised over 8 million dollars for the 2018-19 research and development programme for communicable diseases.

> The principles of the WHO state that the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition and that informed opinion and active co-operation on the part of the public are of the utmost importance in the improvement of the health of the people. These principles have been in place since 1948 into the constitution of the WHO that is dedicated to ensuring governments are responsible for the health of their peoples which can be fulfilled only by the provision of adequate health and social measures. (WHO, 2020, paras. 2,8-9)

Nurses' obligation to their community is to be knowledgeable and dedicated to sharing science and research, without bias or prejudice, that promotes health and safety based on evidence.

Nursing Matters

Nursing is a privilege. With it comes accountability. A nurse's opinion is valued in all aspects of life: clinically, professionally and personally. It is critical that nurses reflect the principles of the respective profession while providing education to vaccine hesitant patients in a manner that provides them with further insight and perspective, irrespective of changes to mindset. A nurse's ability and capacity to educate is tremendously complex and impactful. Most importantly, the focus revolves around saving lives. This happens one conversation at a time and makes a difference in communities as evidenced by the interviews presented in this article.

Conclusion

As scientists around the world work towards developing and testing vaccinations against COVID19, the global pandemic that has consumed the world in 2020 and taken over 180,000 lives (as of September 2020), the topic of vaccination hesitancy is more substantial than ever.

The success of any vaccine depends on the percentage of the population that gets vaccinated. In a study conducted by Ashworth, Finnoff, Newbold and Thunstrom, (2020), with a sample of 3,133 adults in the United States, 20% would decline a vaccination. Distrust of vaccine safety and vaccine novelty are among the most important deterrents to vaccination.

> Inconsistent risk messages from public health experts and elected officials reduce vaccine uptake. Survey results are used in an epidemiological model to explore conditions under which a vaccine could achieve herd immunity. Results show a middle-of-the-road scenario with central estimates of model parameters. A vaccine will benefit public health by saving many lives but nevertheless may fail to achieve herd immunity. (Ashworth et al., 2020, p.1)

During a global pandemic nurses have a plethora of responsibilities. As health care professionals, colleagues, friends, and valuable members of communities, nurses have the ability to save lives. They rely heavily on their ability to understand science based information at a rapid rate as well as digest facts in a manner that can be effectively communicated to a diverse group of people. Nurses have a complex set of tasks under ordinary conditions; however, during a global pandemic tasks become extraordinary. Providing people with science-based information regarding vaccinations allows families to make fact-based decisions and more importantly it saves lives.

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Practice Patterns: A Survey of Occupational Therapists in Bermuda

Pashé Douglas-Sampson and Courtney Richards

Abstract

Unlike some countries, there are currently no investigational studies of the Bermuda occupational therapy workforce. A survey study was conducted to capture the viewpoint of twenty Bermudian occupational therapists regarding current healthcare services. In search of a description of the Bermuda occupational therapy service, this article will explore the characteristics and practice patterns of the occupational therapy workforce to provide data to support the public's awareness and understanding of the range of occupational therapy services in Bermuda. Participation in a survey was requested of licensed occupational therapy practitioners with the Council for Allied Health Professions by The Bermuda Occupational Therapy Association (BOTA). Analysis of the results provided occupational therapy demographics, perceptions, and clinical practices in Bermuda. Indications proposed continued data collection for promotion of the profession, protection of the profile, and scope of occupational therapy practice.

KEY WORDS: *Bermuda, occupational therapy, workforce data, demographics, practice patterns*

Introduction

In healthcare systems, the workforce includes healthcare professionals, practitioners or providers (World Health Organisation (WHO), 2006) who maintain health in humans through the application of the principles and procedures of evidence-based medicine (International Labour Organisation (ILO), 2012; WHO, 2010) in order to deliver effective, quality, and safe health care. These professionals play an essential role in improving quality health by delivering healthcare services (WHO, 2017) to individuals based on their scope of practice. They advocate for health promotions to meet health needs and expectations of the population to improve outcomes (WHO, 2013).

The WHO describes advocacy for health as a "combination of individual and social actions designed to gain political commitment, policy support, social acceptance, and systems support for a particular health goal or programme" (1995, p. 2). As policies change, it is important to advocate for fairness in distribution of resources (Blank, Kimball, McDonald, & Merino, 2002; Hubinette, Dobson, Scott, & Sherbino, 2017) and inclusiveness in decision-making procedures to ensure consistency with current knowledge and practice (Canadian Nurses Association (CAN), 2002; 2017; International Council of Nurses (ICN), 2010).

Significance to occupational therapy. As the economy grows, the systems in which occupational therapy is practiced changes (Holmes & Scaffa, 2009). It is important for the profession to define how these changes enhance quality and provide value (American Occupational Therapy Association (AOTA), 2015b). According to AOTA's Centennial Vision 2017, occupational therapy is "envisioned as a powerful, widely recognised, science-driven, and evidence-based profession with a globally connected and diverse workforce meeting society's occupational needs" (AOTA, 2007 p. 613). Occupational therapy is practiced in a variety of settings where clients are actively involved in the therapy process (World Federation of Occupational Therapists (WFOT), 2010c; 2012c) which brings many variations on defining the profession. The WFOT defines occupational therapy as:

> A client-centred health profession concerned with promoting health and wellbeing through occupation. The primary goal of occupational therapy is to enable people to participate in the

> activities of everyday life. Occupational therapists achieve this outcome by working with people and communities to enhance their ability to engage in the occupations they want to, need to, or are expected to do, or by modifying the occupation or the environment to better support their occupational engagement. (2010c, para. 1)

Although the Occupational Therapy Practice Framework (AOTA, 2014) and many professional organisations (WFOT, 2013) define occupational therapy, an overall representation of occupational therapy practice is unable to be obtained due to the operations of healthcare systems in different countries. The Centennial Vision 2017 (AOTA, 2007) gives insight into the direction in which the profession has taken and defines how it has built on current knowledge and integrated expert information and concepts to evolve in practice by identifying factors of change. Considerations for healthcare costs and reimbursement, preventative care/medicine, technological advances, societal issues such as aging, lifestyle values, and increasing populations will determine the future needs of the profession (AOTA, 2007). In the collection of analytical data, justification for the profession can be achieved within a country's healthcare system and provide evidence of occupational therapy practice (AOTA, 2006) including current workforce data, practice patterns, and a description of patient care for a country.

Partnerships and promotion. The WFOT states that collaborative efforts between occupational therapists and consumers are essential to the philosophy and practice of occupational therapy (2010a). Partnerships and advocacy (Servaes and Malikhao, 2010) for improved quality of life in society are essential for awareness politically, culturally, publicly, and professionally. It also provides access to the occupational therapy profession (WFOT, 2010a). For decision-making and action-oriented activities, the ILO describes statistical delineation, description, and analysis as useful. The occupational therapy profession, with the combined assistance of statistical delineation (ILO, 2012) and strong advocacy can address policy change (ICN, 2010; WFOT, 2010a; 2016b) and health promotion (WHO, 2013).

The theoretical framework of the scope of practice can serve as an informative guide to practitioners, managers, academic course coordinators, employers, consumers, regulatory agencies, funding bodies, policy makers, etc. (AOTA, 2014; Occupational Therapy Australia, 2017). The WFOT argues for the importance of promoting the core and value of occupational therapy to government organisations, non-governmental organisations and the wider public (2010b). It is important for occupational therapists to have a clear definition of their professional identity. Lack of definition places the profession at risk of identity confusion or adoption of the identity by other allied health professions (Edwards & Dirette, 2010; Whitcombe, 2013; Turner & Knight, 2015).

Advocacy may differ in terms of the approach. Within the profession, practitioners may advocate for social change, globally as a group for populations or for an individual within their practice (Gruen, Pearson, & Brennan, 2004; Loue, 2006; Hubinette, Ajjawi, & Dharamsi, 2014; Dobson, Voyer, Hubinette, & Regehr, 2015). The choice of advocacy strategy will vary based on the concern and what is expected (Servaes & Malikhao, 2010). Despite this difference, advocacy serves as a key strategy in health promotion (Gould, Fleming, & Parker, 2012). Medical and health professionals can affect societal ideals and decisions in health by recognising the imperative need and benefits due to their expertise and working experiences (Marmot, Friel, Bell, Houweling, & Taylor, 2008). Understanding the range of expertise a healthcare professional possesses cannot be obtained solely through interpersonal communication. Although strong advocacy is critical in addressing policy changes (ICN, 2010), a combination of supportive professional and academic evidence (Servaes & Malikhao, 2010) such as statistical delineation, description, and analysis are useful for decision-making and action-oriented activities (ILO, 2012).

Occupational therapy practice. Periodically, data collection and identification of trends have been analysed in occupational therapy practice by surveys for the development and establishment of competencies (Occupational Therapy Board of New Zealand (OTBNZ, 2017; Technical Advisory Services (TAS), 2017), informing and advisement of consumers (OTBNZ, 2017), and assistance in strategic planning, decision-making or policy changes (Canadian Institute for Health Information (CIHI), 2016; Royal College of Occupational Therapy Practitioners (RCOT),

2016). Additionally, in 2012, the Australian Institute of Health and Welfare (AIHW) utilised the workforce data to create a National Health Workforce Dataset (NHWDS) for all registered health professionals (Commonwealth of Australia, 2017).

However, the AOTA and the OTBNZ sort to utilise the data within the profession, arguing that through unlimited data access, projections for further detailed investigations, systematic updates for the constantly changing profession (AOTA, 2015) and revisions to practitioner competencies in response to identified workforce challenges (OTBNZ, 2017) would be outlined. On the contrary, New Zealand and the Royal College of Occupational Therapists (RCOT) explored the recruitment and retention of the occupational therapy workforce (RCOT, 2016; TAS, 2017). As a result, these efforts to identify changes within the profession allowed for strategic employment relations advice (TAS, 2017) and the distribution of health care providers (CIHI, 2016).

A survey conducted in Hong Kong focused on researching the profile and scope of occupational practice (Tse, et al., 2005). The researchers identified with the future challenges of the new healthcare-services system in Hong Kong by proposing four strategic plans to ensure sustainable development and understanding of the profession within the local context (Tse, et al., 2005). A second study explored the current OT resources available in Beijing, China (Shi & Howe, 2016). Although a pilot study, the researchers plan to expand it nationwide to gain an in-depth and comprehensive understanding of the OT workforce in China (Shi & Howe, 2016). The findings of the study served as the first step in planning the response to the increasing demand for OT service and solutions in promoting occupational practice in China (Shi & Howe, 2016). Thus, data collection is crucial for identifying the occupational therapy characteristics and establishing an occupational therapy profile.

Practice patterns. The study, conducted in 2014 by Holmqvist, Ivarsson, and Holmefur, reported that the term practice patterns has been used to describe clinical practice. Much of the literature on occupational therapy practice patterns involves the exploration of interventions utilised in occupational therapy practice. Watling, Deitz, Kanny, & McLaughlin (1999) and Koh, Hoffmann, Bennett, & McKenna (2009) explored the use of theoretical frameworks and intervention techniques to guide practice. Similar studies, explored service delivery by compensatory strategies or remediation approaches (Spencer, Turkett, Vaughan, & Koenig, 2006; Koh et al., 2009; Cramm & Egan 2015) and team dynamics in practice patterns (Watling et al., 1999; Weintraub & Kovishi, 2004; Holmqvist et al., 2014). One of the major goals of examining practice patterns is to describe occupational therapy work, thereby developing a profile of occupational therapy practice.

Despite the evidence of workforce surveys, Bermuda has not examined its occupational therapy practice. The WFOT has collected information from WFOT delegates or alternate delegates of member countries on practice patterns since 1998 (Cipriani et al., 2003). Practice patterns included occupational therapy characteristics, work settings, client age ranges and health conditions, assessments, reimbursement systems, goals, changes to practice patterns, and suggestions for advancing practice standards with a goal in establishing recommendations for the advancement of the occupational therapy practice in the global market (Cipriani et al., 2003).

Therefore, data collection is important to the profession for establishing the scope of occupational therapy practice (AOTA, 2006). The collection of data can also promote international cooperation among associations, advance standards of practice and education, facilitate the exchange of information and promote research (Cipriani et al., 2003). In this study, the findings of Bermuda's occupational therapy workforce are highlighted providing an in-depth look into the occupational therapy practice in Bermuda.

Methodology

STUDY DESIGN

Approval to conduct research on individual or group characteristics or behaviour or research employing survey, interview, oral history, focus group, programme evaluation, human factors evaluation, or quality assurance technologies was attained through Quinnipiac University's Institutional Review Board (IRB) in accordance with

capstone requirements for the Online Post-Professional Occupational Therapy Doctorate (OTD). In order to conduct research in Bermuda or by a Bermuda researcher that involves human participants, approval was attained through the BHB Ethics Committee Research Ethics Sub-Committee. The study used an exploratory, survey design. Using a descriptive analysis approach, an online survey was conducted with Bermuda's occupational therapy practitioners. Participants filled out the questionnaire relating to the practise of occupational therapy including professional titles, initial licensing country, practice area, qualifications, years of experience and practice patterns.

POPULATION AND SAMPLING

The participants of the study population included registered Bermuda occupational therapy practitioners with the Bermuda Health Council. Of the 20 participants, 100% were occupational therapists and 0% were occupational therapy assistants. Participants were able to understand and respond to questions posed in English. Participants had access to a computer and had internet access in order to participate. Participants were not excluded based on their age, race, gender, sexual orientation, religion, or marital status.

DATA COLLECTION

Development of questionnaire. Through an extensive review of scholarly literature and a review of occupational therapy workforce surveys from several countries to reproduce concepts and devise questions on demographics and practice settings, a self-administered questionnaire was designed by the co-investigator. Similar surveys from other professionals were used as resourses to devise the questions on practice patterns and perceptions/professional satisfaction.

Pilot study to refine questionnaire. A pilot study using a convenience sample of eight participants (non-Bermudian occupational therapy practitioners with occupational therapy practice experience and other professionals) was conducted via SurveyMonkey in the same format as the final survey to establish face validity. The sample did not include a panel of experts demonstrating experience in research. Feedback from the sample was gathered regarding structure, flow, clarity, and concepts in the survey. On the basis of the recommendations received, revisions to a survey developed by Effgen and Kaminker (2014) and further review of the literature, the questionnaire was updated and modified. It consisted of closed-ended questions for the collection of demographics, work practice, occupational therapy service characteristics, and a Likert scale for job satisfaction. One open-ended question was used to provide data on the perceptions of occupational therapy in Bermuda.

Dissemination of questionnaire. The Bermuda Occupational Therapy Association (BOTA) e-mailed their membership on the co-investigators behalf. The recruitment e-mail included a brief explanation of the purpose and inclusionary criteria, link to survey URL and (snowball sampling) consideration of forwarding information to the invitee's colleagues. The membership were invited to click on a link to access the survey on SurveyMonkey, read the consent page, and denote consent by clicking next for the survey. A total of 36 occupational therapy practitioners are licensed under Bermuda Health Council (BHeC, 2017). There were twenty questionnaires returned. Participants that did not denote consent to participate were exited out of the survey. Following the consent, the second question exited out anyone that answered 'no' to currently practicing occupational therapy in Bermuda.

DATA ANALYSIS

The quantitative data received through the survey was analysed using SurveyMonkey and Microsoft Excel programme to generate descriptive analysis (e.g., frequencies and percentages) of trends, perceptions, and practices for final charting. Demographic information was calculated using descriptive statistics. A count was obtained for all questions and converted to a percentage to provide a ratio of responses to the total number of participants. Open-ended responses were summarised and themed.

ETHICAL CONSIDERATIONS

Data collection via SurveyMonkey was password protected. SurveyMonkey settings were adjusted to uphold confidentiality by not tracking IP addresses of the participants. In addition, no personally identifiable data was gathered. Access to the data within the SurveyMonkey database or the excel format was restricted to the researcher's password protected on the researcher's computer.

Results

DEMOGRAPHICS

Twenty survey participants completed the survey, which is just over half of the total workforce of thirty-six licensed occupational therapy practitioners in Bermuda (BHeC, 2017). Zero occupational therapy assistants completed the survey. Occupational therapists accounted for one hundred percent of the responses with ninety-five percent holding either a Master's degree (50%) or a Bachelor's degree (45%).

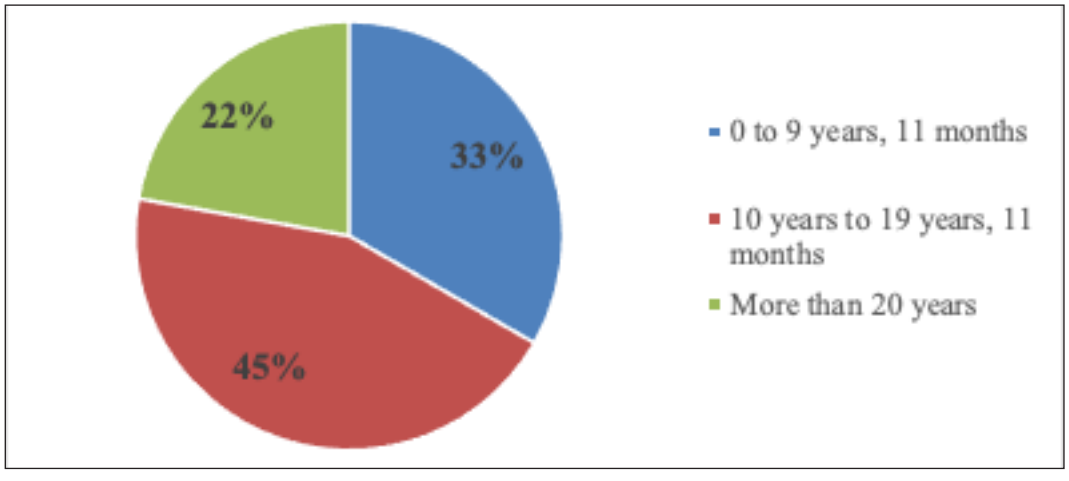
Table 1: Participants' Academic Degrees		
Highest degree earned	%	n
Associate's degree	0	0
B.A./B.S.	45	9
M.A./M.S.	50	10
OTD	5	1
PhD, EdD, or other non-OT doctoral degree	0	0

Note. $N = 20$. B.A. = Bachelor of Arts; B.S. = Bachelor of Science; M.A. = Master of Arts; M.S. = Master of Science; OTD = Occupational Therapy Doctorate; PhD = Doctor of Philosophy; EdD = Doctor of Education.

A wide range of clinical experience in the occupational therapy profession was reported indicating the majority to be skilled practitioners. The vast majority (67%) had more than 10 years of clinical experience with twenty-two percent possessing more than twenty years of clinical experience.

***Chart 1*: Participants' Years of Experience**

Chart 1. N = 20.



The occupational therapy practitioners practiced in all three service sectors (hospital-based, community-based and private practice) in Bermuda, but most (63.16%) practiced in the community.

***Chart 2*: Primary Practice Settings**

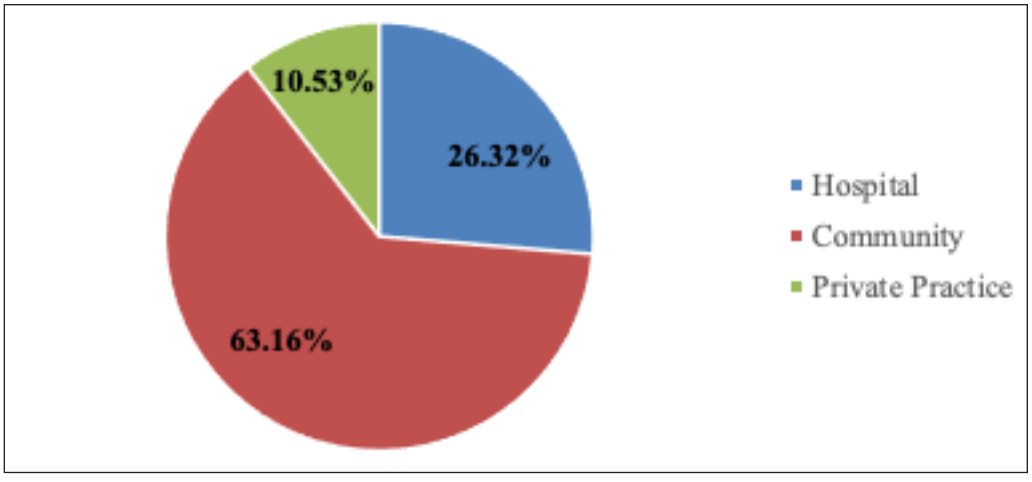


Chart 2. N = 19.

A variety of overseas jurisdictions was recorded as the initial licensing for the occupational therapy practitioners. The highest percentage of the occupational therapy practitioners (37%) were initially licensed in the UK. Data was not surprising as Bermuda is an overseas territory of the UK (Government of the United Kingdom, 2017). The next two highest countries reported were the USA (26.32%) and Canada (15.79%). The remaining participants (21.05%) reported that they had received their initial licensing from the Philippines (5.2625%), Australia (5.2625%), Zimbabwe (5.2625%), and Ireland (5.2625%).

***Chart 3:* Distribution of Responses by Initial Licensing Country**

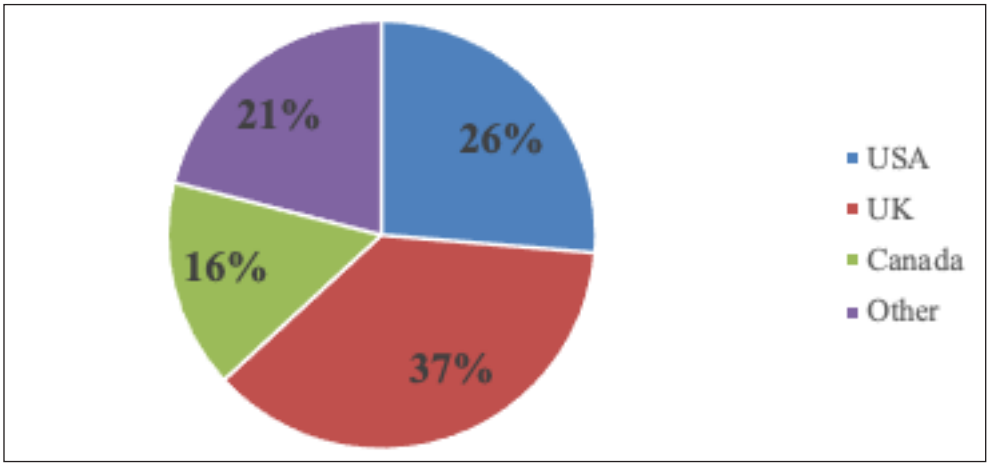


Chart 3. N = 20. Other = the Philippines, Australia, Zimbabwe, Ireland

PRACTICE PATTERNS

There were several important findings on practice patterns: the utilisation of occupation-based practice, team dynamics, the application of theoretical frameworks, and time management were explored. The findings indicated a high percentage (61.11%) of the occupational therapy practitioners utilised occupation-based practice in their evaluations and interventions which is a core fundamental foundation of the profession's service delivery (WFOT, 2010c, 2012a; AOTA, 2014).

Table 2: Occupational Therapy Practice Statistics for Evaluation

	Never		Rarely		Occasionally		Usually		Always	
Evaluation	%	n	%	n	%	n	%	n	%	n
Each discipline (OT, Physio, SLP) screens, evaluates and reports on the client separately	11.11	2	0.00	0	11.11	2	66.67	12	11.11	2
The primary use of occupation-based evaluations is to address the needs of each client	0.00	0	0.00	0	5.56	1	33.33	6	61.11	11

Note. N = 18. OT = occupational therapy; Physio = physiotherapy; SLP = speech-language pathology. Adapted from "Nationwide Survey of School-Based Physical Therapy Practice," by Effgen, S. K., & Kaminker, M. K., 2014, *Pediatric Physical Therapy: The Official Publication of the Section on Pediatrics of the American Physical Therapy Association, 26, 4,* pp 398-399. Copyright 2014 Wolters Kluwer Health, Lippincott Williams & Wilkins and the Section on Pediatrics of the American Physical Therapy Association.

The WFOT states that teamwork through client participation, family and caregivers support, and other healthcare professional collaborations are key for cooperation and holistic practice (2012b). Most occupational therapy practitioners reported that they participated in numerous collaborative duties. Approximately half of the occupational therapy practitioners (55.56%) reported that they usually participated in training other team members to help maintain the client's current level of functioning and half indicated that they usually collaborated to design and implement strategies to meet the needs of the client. Most occupational therapy practitioners (61.11%) reported they usually participated in duties related to discharge and/or transition planning.

Table 3: Occupational Therapy Practice Statistics for Team Dynamics

	Never		Rarely		Occasionally		Usually		Always	
Team Dynamics	%	n	%	n	%	n	%	n	%	n
OTs train other team members (professionals and disciplines) to help clients maintain their current level of functioning	5.56	1	0.00	0	22.22	4	55.56	10	16.67	3
OTs and other professionals collaborate to design and implement strategies to meet the needs of the client	11.11	2	0.00	0	5.56	1	50.00	9	33.33	6

OTs regularly attend scheduled meetings to discuss progress	5.56	1	16.67	3	22.22	4	44.44	8	11.11	2
OTs schedule training sessions with caregivers	0.00	0	0.00	0	16.67	3	61.11	11	22.22	4
OTs participate in decisions about discharge and/or transitioning	0.00	0	5.56	1	33.33	6	44.44	8	16.67	3

Note. $N = 18$. OT = occupational therapy. Adapted from *"Nationwide Survey of School-Based Physical Therapy Practice,"* by Effgen, S. K., & Kaminker, M. K., 2014, Pediatric Physical Therapy: The Official Publication of the Section on Pediatrics of the American Physical Therapy Association, 26, 4, pp 398-399. Copyright 2014 Wolters Kluwer Health, Lippincott Williams & Wilkins and the Section on Pediatrics of the American Physical Therapy Association.

Three frames of reference were identified as most commonly used; Developmental (61.11%), Neurodevelopmental Theory (44.44%) and Sensory Integration (44.44%).

Table 4: Theoretical Frameworks Most Commonly Used

Theoretical Frameworks	%	n
Developmental Frame of Reference	61.11	11
Neurodevelopmental Theory	44.44	8
Sensory Integration Frame of Reference	44.44	8

Note. $N = 18$.

When analysed by age population, in paediatrics, the most common theoretical framework utilised by occupational therapy practitioners was the Developmental. Sensory Integration was reported as second. The Biomechanical and Rehabilitative theoretical frameworks were most utilised for the adult population. However, in the older adult population, the Rehabilitative was also reported as most utilised.

Chart 4: **Reported use of Theories and/or Frames of References When Working with Older Adults, Adults and Paediatrics**

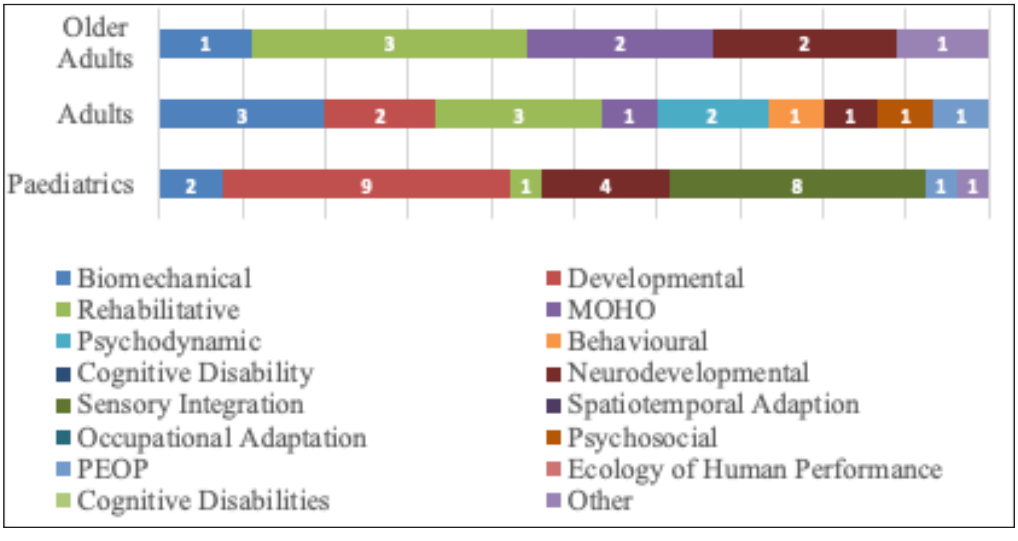


Chart 4. N = 18. Other = Cognitive-Behavioural (paediatrics), Needs Driven Dementia Model (older adult). Older adults were aged 65 years and up. Adults were aged 19 through to 64 years. Paediatrics were aged birth to 18 years.

These results indicated elements of a bottom-up approach (Trombly, 1993) which "tend to examine small, separate components of a client's skills or occupational performance components" (Brown & Chien, 2010, p. 95). These were frequently used, but top-down approaches (Trombly, 1993) were also prominent. Also referred to as remedial approach, "a bottom-up approach to assessment and treatment focuses on the deficits of components of function, such as strength, range of motion, balance, and so on, which are believed to be prerequisites to successful occupational performance or functioning" (Trombly, 1993, p. 253). While top-down (Trombly, 1993) or compensatory approaches focus on "critical roles as well as occupational performance issues, which include the ability to engage in activities of daily living, education, work, play, leisure and social participation," (Brown & Chien, 2010, p. 95).

Table 5: Occupational Therapy Practice Statistics for Service Delivery

	Never		Rarely		Occasionally		Usually		Always	
Service Delivery	%	n	%	n	%	n	%	n	%	n
The majority of OT service provision is occupation-based or is through participation in occupation	0.00	0	0.00	0	11.11	2	55.56	10	33.33	6
The majority of OT service provision is remediation of underlying skill deficits	0.00	0	5.56	1	33.33	6	50.00	9	11.11	2
The majority of OT service provision is providing caregivers with educational information, compensatory strategies or making modifications or adaptations	5.56	1	11.11	2	44.44	8	33.33	6	5.56	1
OTs participate in the client's transition process to the most appropriate setting	0.00	0	5.56	1	38.89	7	33.33	6	22.22	4

Note. N = 18. OT = occupational therapy. Adapted from *"Nationwide Survey of School-Based Physical Therapy Practice,"* by Effgen, S. K., & Kaminker, M. K., 2014, Pediatric Physical Therapy: The Official Publication of the Section on Pediatrics of the American Physical Therapy Association, 26, 4, pp 398-399. Copyright 2014 Wolters Kluwer Health, Lippincott Williams & Wilkins and the Section on Pediatrics of the American Physical Therapy Association.

In describing a typical day, ooccupational therapy practitioners divided their time during their most recent work week by estimating the percentage of time they had spent doing a variety of work-related activities. The greatest percentage of time was spent providing direct intervention (treatment sessions and hands-on) to clients (an average of 46.11% per week). Indirect intervention which consisted of education and consulting with the team and others consumed less time of the work week (an average of 10.63%).

Table 6: ***Average Percentage of Time Spent and Means in Most Recent Week for Each Activity***

Percentage of time	Assessments	Direct Intervention	Indirect Intervention	Preparation	Travel	Admin	Other
5	5	1	3	4	5	5	2
10	7	0	8	10	5	5	0
15	2	0	1	0	1	0	0
20	1	2	1	0	2	4	0
25	0	0	0	0	0	0	1
30	1	2	1	0	0	1	0
35	0	2	0	0	0	0	0
40	1	2	1	0	0	0	0
45	0	1	0	0	0	0	0
50	0	0	0	0	0	1	0
55	0	2	0	0	0	0	0
60	0	2	0	0	0	1	0
65	0	1	0	0	0	0	0
70	0	0	0	0	0	0	1
75	0	0	0	0	0	1	0
80	0	1	0	0	0	0	0
85	0	0	0	0	0	0	0
90	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0
M							
	8.89	46.11	10.63	7.78	10.63	11.11	37.50

Note. $N = 18$. Admin = Administration. Other = Project planning, informal CEU. Percentages of time are calculated based on the total number of hours spent in a work day.

Further analysis yielded results based on weighted averages. The weighted average assigns a weight to each observation (quantity) in the dataset prior to calculating to a single average value whereas the weight determines the relative importance of each quantity on the average (Matthews & Kosteiles, 2011; DePoy & Gitlin, 2015). By far, the greatest portion of a typical day was devoted to direct client intervention, inclusive of assessments, with a weighted average of 54.84%. Indirect intervention received a weighted average of 13.33%. A major finding indicated a significant amount of their time was spent completing administrative tasks (weighted average of 20.56%) and other functions (weighted average of 34.82%) such as meetings, phone calls, emails, stats, preparation, project planning or informal CEUs.

Chart 5: **Weighted Average Results of a Typical Work Week**

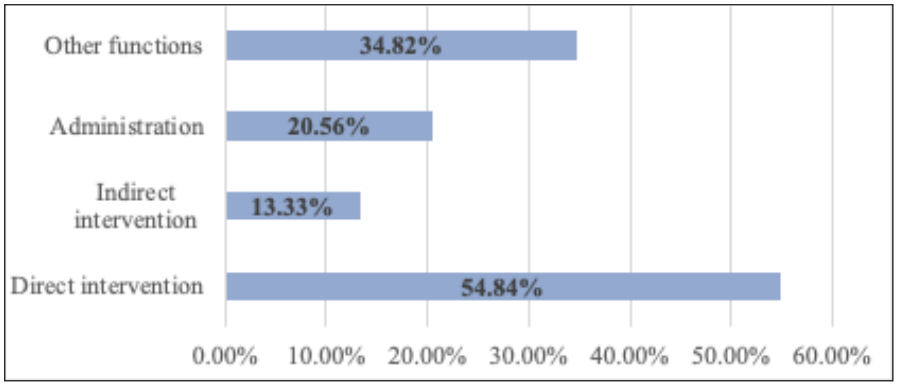


Chart 5. N = 18. Other functions = Project planning, informal CEU.

Perceptions of Bermuda Occupational Therapy Practice

In addition to the major findings in demographics and practice patterns, professional satisfaction was measured by each occupational therapy practitioner and further analysed by collapsing the categories into satisfied, neutral, and dissatisfied. The nature of the job was weighed by 88.89% of occupational therapy practitioners as satisfied in actual practice. The majority of occupational therapy practitioners (61.12%) reported they were satisfied with communication within the job; satisfied working with co-workers (83.33%); and satisfied with pay (66.67%). One relative concern or dissatisfaction reported was operating procedures at 44.44% of the OTPs.

Table 7: Professional Satisfaction

	Dissatisfied		Neutral		Satisfied	
Categories	%	n	%	n	%	n
Pay	11.11	2	22.22	4	66.67	12
Promotion	33.33	6	27.78	5	38.89	7
Supervision	27.78	5	27.78	5	44.45	8
Fringe Benefits	38.89	7	44.44	8	16.67	3
Contingent Rewards	38.89	7	38.89	7	22.22	4
Operating Procedures	44.44	8	33.33	6	22.22	4
Coworkers	5.56	1	11.11	2	83.33	15
Communication	5.56	1	33.33	6	61.12	11
Nature of Job	11.11	2	0.00	0	88.89	16

Note. N = 18. Adapted from *"Employee Voice and Job Satisfaction: An Application of Herzberg Two-factor Theory,"* by Alfayad Aburumman, Zaid & Mohd Arif, Lily, 2017, International Review of Management and Marketing. 7, p 150-156.

Limitations and Future Implications

When conducting survey research, there are known limitations. The use of an investigator-developed questionnaire may raise questions of validity and reliability. Definitions and instructions could have been clearer with effective wording. The pilot study sample did not use a panel of expert researchers for descriptive testing of the survey. Although snowballing was used to reach practitioners who were not BOTA members, the primary invitation was received by BOTA members. Therefore, the results may not accurately represent non-members. Furthermore, survey research designs are descriptive and do not determine underlying causes of the variables being examined

(Matthews & Kosteiles, 2011). More qualitative information may be useful in future research to understand occupational therapy practitioners' practice in each sector and how these responsibilities and duties impact occupational therapy practice. Other trends in this practice could be presented in the questionnaire, which can be helpful data to identify considerations for decision-making and action-oriented activities (ILO, 2012), and collaborative efforts with consumers (WFOT, 2010).

Discussion

The use of an online survey allowed for twenty of the thirty-six registered occupational therapy practitioners in Bermuda (BHeC, 2017) to participate; all occupational therapist (100%) despite employing the snowballing technique. Although a large percentage of participants practiced in the community (63.16%), there were fewer in private practice (10.53%) and hospitals (26.32%). Different facilities serviced particular patients; the majority of the occupational therapy practitioners who worked in the hospital attended adults (21.05%), while community-based practitioners' focus was paediatric care (31.58%). This reflected that the majority of paediatric occupational therapy care were offered in the community.

The survey results indicated that all participants were initially registered in overseas jurisdictions. Indeed, this finding was not astonishing for an international location like Bermuda. Furthermore, over 50% of the participants acquired a degree of Master's or higher and obtained more than 10 years of experience. This demonstrated that professional practices of occupational therapy are not localised and acquired outside of Bermuda. In comparison, the results from a similar survey conducted in Hong Kong in 2004 indicated that 49.6% of occupational therapists had obtained a Master's degree or higher (Tse, et al., 2005).

Concerning the scope of this therapeutic practice, the study indicated occupational therapists utilised a variety of methods in service delivery while maintaining the core concepts of the profession. When *always* and *usually* were combined, greater than three-quarters of occupational therapists (88.89%) ideally deliver occupation-based service or service through participation in occupation indicating occupational therapy in Bermuda is based on occupation-based practice. In addition, occupational therapist demonstrated the use of theoretical frames of reference to guide service. Despite that the majority of occupational therapists working in community-based paediatrics utilised two main theories, Developmental and Sensory Integration, a variety of theories in other facilities and settings guided practice indicating a wide spectrum service and diversity in the nature of the profession.

A sense of satisfaction amongst the surveyed occupational therapist was noted. Several factors may have contributed, as was revealed by the results; nature of the job, pay, co-workers, and communication. Adversely, a significant amount of time was spent completing administrative tasks, meetings, phone calls, emails, stats, preparation, project planning, or informal CEUs where participants reported their dissatisfaction with these operating procedures.

Conclusion

This study provided supportive information related to the occupational therapy practice which was used as a baseline to explore the true representation of the entire occupational therapy workforce in Bermuda. This research revealed that the occupational therapy workforce in Bermuda was not obtained as a result of limited access. Developing surveys for establishing evidence-based research and workforce data will often address advocacy and funding, allowing for resources to become available (Blank et al., 2002). AOTA has described benefits of increased responses and unlimited access to the data received for ongoing analyses and opportunities to continue to provide its association with up-to-date information on the changing population (AOTA, 2015b). Bermuda occupational therapy practice must incorporate similar aims of the Centennial Vision and the WFOT to ensure society value and promotion of the profession through individuals, policymakers and populations (AOTA, 2007; WFOT, 2016a). The WFOT supports and encourages proposed projects and partnerships aimed to promote internationally recognised research (2016a) and states the importance of promoting the core and value of occupational therapy practice to the community, government, and non-government organisations (2010b). Through evidence-based research, trends

in the population and occupational therapy practice can be identified to prepare for society's future occupational needs, guide challenges with change, and provide opportunities for the profession (AOTA, 2007).

A critical next step to identify challenges, changes, and trends in the Bermuda occupational therapy workforce would be data collection of workforce data and practice patterns of the profession on a regular basis (AOTA, 2015a). Stakeholders can utilise the data, along with the contribution of occupational therapy expertise with the following:

- developing and establishing competencies (OTBNZ, 2017; TAS, 2017) to improve quality of life outcomes (WFOT, 2010a);
- informing and advising consumers (OTBNZ, 2017) by advocating for client issues and raising cultural, public, professional, and political awareness (WFOT, 2010a);
- assisting in strategic planning, decision-making, or policy changes (CIHI, 2016; RCOT, 2016) to address occupational therapy practice enhancements (WFOT, 2010a).

The goal is to value and promote Bermuda occupational therapy practice of engaging in participation of the activities they value and ensuring an individual's ability to improve one's physical and mental health, well-being, and quality of life (AOTA, 2007). We plan to expand this study by presenting to the entire occupational therapy workforce in Bermuda to gain an in-depth understanding of the profession and its services.

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Health Promotion Benefits of Nutritional Labelling and Nursing Care to Prevent and Reduce Obesity

Anne Boykin-Smith

Abstract

Obesity is a global health challenge, with 39% of the adult population considered overweight and 13% considered obese as measured in 2016 (World Health Organization (WHO), 2018). The obesity rate in Bermuda was 34.4% in 2014. It is associated with many comorbidities such as cardiovascular disease, Type 2 Diabetes mellitus, musculoskeletal disorders and cancer (Bernews, 2017). In the United States, recent efforts have been made to provide the public with clearer information (kilocalories, portion size, salt, sugar and fat content) of the nutritional qualities of fast food and in restaurants.

Bermuda residents are lacking nutritional information on locally produced foods and in restaurants and thus are unable to make informed food choices. The addition of nutritional labelling and caloric details to locally-produced bakery foods and on restaurant menus (including take-away food) could be beneficial. Consequentially, there are potential opportunities for Health Promotion by healthcare professionals. Nursing diagnoses may provide patient-centred guidance for positive changes in food choices and nutrition that reduce the risk of obesity.

KEY WORDS: *Obesity, nutrition, food labelling, nursing diagnoses*

Introduction

Obesity is preventable according to the World Health Organization; however, there needs to be a wake-up call to the alarming reality that this condition has tripled since 1975 (WHO, 2018). In 1975, the rate of obesity in the United States was 12.1% (Metrocosm, 2016). In 2016, 39% of adults globally, 18 years and over were overweight (39% of men and 40% of women) and 13% (11% of men and 15% of women) were obese (WHO, 2018). Bermuda's Ministry of Health STEPS to a Well Bermuda Survey, conducted in 2014, found that 34.4% or approximately 21,940 adults were considered to be obese, and it is the main public health challenge for Bermuda (Bernews, 2017).

The United States Institutes of Health adopted the Body Mass Index (BMI) classification and added waist size cutoff points in 1998 (National Heart Lung & Blood Institute (NHLBI), 1998). The formula for BMI is calculated in pounds and inches: Divide weight in pounds (lbs.) by height in inches squared and multiply by a conversion factor of 703. For example: a person with weight = 150 lbs. and height = 65" would be calculated as: [150 divided by (65") squared] x 703=24.96 BMI (Centers for Disease Control (CDC), 2017). An example of Body Mass Index (BMI) classes is shown in Table 1.

***Table 1*: The BMI Chart for a 5' 9" Person, Independent of Sex**

Weight Range:	BMI:	Classed as:
125 lbs. to 168 lbs.	18.5 to 24.9	Healthy weight
169 lbs. to 202 lbs.	25.0 to 29.9	Overweight
203lbs. or more	30 or higher	Obese
271 lbs. or more	40 or higher	Morbidly Obese

In addition to this classification scheme, the combination of *overweight* (BMI between 25 and 30) and *moderate obesity* (BMI between 30 and 35) with a large waist circumference, ≥40 inches for men and ≥35 inches, for women, was added because abdominal girth is thought to increase risk of health challenges (NHLBI, 1998). Ethnicity should be considered as a variable in the BMI classes. For example, for a specific BMI, Asians might have very different levels of fatness and a unique fat distribution compared to Caucasians. This is why the abdominal fat distribution is so important in distinguishing between the range of overweight and obesity in terms of health risk within different populations (Seidell, & Halberstadt, 2015).

Being overweight or obese may cause a deterioration in health, contributing to high global incidences of cardiovascular diseases (heart disease, peripheral vascular disease and stroke), renal disease, Type 2 Diabetes mellitus, musculoskeletal disorders (osteoarthritis) and some forms of cancer, i.e. breast, ovarian, prostate, liver, kidney and colon (CDC, 2015). Seidell and Halberstadt (2015) state that obesity has a more pronounced impact on morbidity than on mortality because of the diseases and health conditions noted above. The Bermuda Ministry of Health has projected a 10-year cost of obesity estimated at $15.8 million in direct costs for medical care, such as physician's visits, diagnostic testing, prescription drugs, etc., based on insurance claims from 2013-2017 (Bernews, 2017). This affects ALL Bermuda residents, because as healthcare costs rise, the healthy population will be equally responsible for these costs.

Prevention and Reduction of Obesity Rates

How can Bermuda prevent and reduce the numbers of overweight and obese people on the island? There are no simple solutions to this question, but a sustainable approach is needed for success. This article will explore the idea that the addition of nutritional labelling and caloric details on local bakery foods and restaurant menus (including take away items), combined with Health Promotion, will help people make informed decisions about good nutrition. The goal is to reverse the trend of unhealthy food choices. Early detection of obesity is necessary, followed by a combination of lifestyle changes that involve behaviour modification, a healthy diet and more physical activity, which are shown to result in a good health-care outcome (Seidell, & Halberstadt, 2015).

Nutritional information is an important tool for maintaining healthy lifestyles. The United States Department of Agriculture (USDA, 2019) has enacted a series of nutritional guidelines and labeling requirements. The most recent legislation is designed to address the rising obesity rates, detailed at www.ChooseMyPlate.gov. United States legislation, enacted in 2018, Section 4205, of the U.S. Patient Protection and Affordable Care Act (ACA) (US Congress 2010), increases the awareness of healthy food choices available for everyone (Restrepo, & Minor, 2018). In Bermuda, promoting greater awareness of nutritional and caloric content in locally-produced foodstuffs will help prevent diseases and other conditions in adults who are considered overweight or obese (BMI of 25-35).

Reducing the number of calories consumed per day is a simple, uncomplicated way to achieve weight loss. If a person can decrease the number of calories from their diet by 500 calories per day, then in one week, they could potentially lose 1 pound of weight, in that 3,500 calories equals 1 pound (Mayo Clinic, 2017). Recommendations include reducing calories while eating a higher protein/low-carbohydrate diet, managing portion control and making minimally processed plant-based foods such as vegetables, fruits, whole grains, beans and seeds/nuts the mainstay of your food choices. Also, physical activity of at least 150 minutes of intense exercise per week which can be accomplished with 30 minutes of exercise 5 days per week (Mayo Clinic, 2017). The U.S. National Heart, Lung and Blood Institute's website provides healthy lifestyle recommendations such as heart-healthy eating, following *Choose My Plate* guidelines, behavioural therapy to try and identify emotional triggers that result in overeating, a commitment to regular exercise and a goal of 8 hours of sleep per night for the reduction of adverse health conditions related to being overweight or obese. Therefore, with a 10% body weight reduction, associated disease risk factors will decline (NHLBI, 2019).

Background on Nutritional Labelling

The U.S. Department of Agriculture issued the first dietary recommendations in 1894, but at that time, certain vitamins and minerals had not been discovered (Davis, & Saltos, 1999). Over the years, our knowledge about nutrition evolved, including establishing the correlation between nutritional deficiencies of vitamin C causing scurvy and vitamin B-1 causing beriberi (Smith, Collene, & Spees, 2018). With the knowledge of updated nutrition models, the health-care community is able to teach people about the risk factors for heart disease, diabetes, and cancer. In 1956, a food guide by USDA about the *Basic Four*, described choosing foods from four food groups: fruits & vegetables, meat, milk and grain products. From the 1970's to the 1990's, USDA researchers shifted the focus, guiding people away from over-consumption of cholesterol, saturated fat, sugars and sodium, which increase the risk of heart disease, stroke and other chronic diseases (Davis, & Saltos, 1999). The United States passed the Nutrition Labeling and Education Act of 1990, requiring nutrition labels to add information on high fiber, low fat, etc. (USA Congress, 1990). In 1992 the *Food Guide Pyramid* was revealed (USDA, 1992), expanding the Basic Four in a colourful graphic to making it easily understood by children and adults with a minimal high school education (Davis, & Saltos, 1999). The updated *My Pyramid* in 2005 added "Steps to a healthier you" suggesting the benefits of exercise along with nutrition (USDA, 2011). The current nutrition guide, *Choose My Plate*, published by the USDA in 2012 replaced the *Food Guide Pyramid* with a simplified representation of proportions of 5 food groups (USDA, 2019).

The Harvard T.H. Chan School of Public Health provides a website, https://www.hsph.harvard.edu/nutritionsource/healthy-eating-plate/, that illustrates how the *Choose My Plate* was enhanced to become the "Healthy Eating Plate" with supplemental information such as encouraging drinking water, tea or coffee (with little or no sugar), recommending whole grains, healthy oils like olive and canola oil, and discouraged consuming French fries, limiting red meat and cheese, etc. A graphic image of someone running encourages us to "Stay Active!" (Harvard T. H. Chan School of Public Health, 2019). A variation of the *Choose My Plate* nutrition guide, *EatWell Plate,* is promoted by the Ministry of Health in Bermuda (Government of Bermuda, 2019).

The U.S. Nutrition Labeling and Education Act (USA Congress, 1990) required packaged foods to disclose ingredients, nutrient and calorie content on labels. In 2003, the Menu Education and Labeling Act (MEAL Act) was introduced that required chain restaurants to disclose nutrition information (USA Congress, 2003). The U.S. Food & Drug Administration rule in 2016 approved a new food label that went into effect in July, 2019, incorporating added sugars and calories per serving as noted in larger type (USFDA, 2016). The new label (Figure 1) was aimed at helping people become more aware of serving sizes, of how much added sugar they are consuming and the calories per serving.

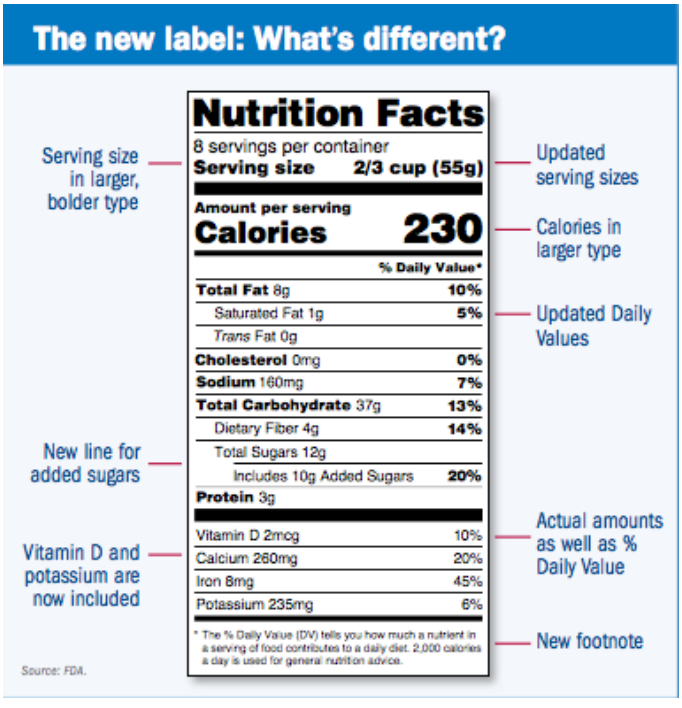

Figure 1: The 2020 U.S. FDA Nutrition Label

Further information can be found at https://www.fda.gov/food/food-labeling-nutrition/changes-nutrition-facts-label. Four distinct benefits of the enhanced label will allow consumers to improve their food choices and accrue health benefits.

Listed are benefits of including the additional nutrition information related to preventing obesity.

1. **Servings per container and serving size**: Important to teach people about serving sizes, servings per container in order to learn about portion control.

2. **Calories:** In bold, larger type to get your attention and avoid consuming too many calories per serving and the caloric impact of consuming the entire packaged item.

3. **Added Sugars**: contributes to Type 2 Diabetes risk, cardiovascular disease

4. **Vitamin D, Calcium, Iron and Potassium and the percentage of daily value:** important information for clients to be aware of bone health (Vitamin D and Calcium), lowering blood pressure (Potassium) and Iron as a key component of hemoglobin (CDC, 2019).

Weight Gain from Eating in Restaurants

In 2006 an article in the *American Journal of Public Health* suggested that if consumers ate just one restaurant meal per week, they would potentially gain approximately 9 lbs. annually, because the general public is not informed about caloric content of these foods and underestimate the caloric content. Their findings suggested that if nutritional information and caloric content are easily accessible, consumers prefer the healthier menu items over the less-healthful menu items (Burton, Creyer, Kees, & Huggins, 2006).

In 2018, food labelling mandated in the ACA (US Congress, 2010) went into effect, requiring nutrition information for foods at chain restaurants with 20 or more locations nationwide and vending machine items. It likewise required the calorie content posted of all standard items on the menu in a font and format similar to that of food items' name or price. Additionally, in order for consumers to understand the food in the context of a total daily diet, these establishments were required to post on the menus or on a sign near the self-service foods that 2,000 calories a day is used for general nutrition advice, although calorie needs vary.

Both the United States Food & Drug Administration and the U.S. Food, Drug and Cosmetic Act require that calorie and other nutrition data be provided in 'covered establishments' -further defined as chain restaurants or similar retail food establishments. The main goal of the menu labels is to provide nutritional information that will help consumers make informed decisions (USA FDA, 2019). The new national menu labelling laws concluded that calorie information on menus can help Americans to better assess the healthfulness of restaurant foods and adjust their food choices and behaviour (Restrepo, & Minor, 2018). Restaurant menus with calories provided alongside each item (Figure 2) can help consumers make informed choices if they are knowledgeable about total number of calories they need per meal/day.

Figure 2: Calorie Labels on Menu

More information related to calorie labels on menus is found at (https://www.wdwinfo.com/news-stories/quick-service-restaurants-add-calorie-counts-to-menus/)

A recent American Heart Association (2018) article supports menu labelling and quotes Dan Wainfan, Vice President Health and Wellness of Aramark, a major American food service corporation, about menu labeling being "just one part of the larger effort to address the obesity issue" (pg#). He believes the public needs to be provided with information and tools to feel empowered to change their behaviour.

Value of food Labelling in Bermuda

Bermuda could benefit from menu labelling in restaurants and for take-away foods and could choose to add a nutrition label to homemade (cookies, popcorn) and bakery items (banana bread, Portuguese doughnuts) that are sold in grocery stores, convenience stores, and gas stations. The minimum nutritional information should be servings per container or package, serving size, calories, total fat, total sugars, and total sodium. This information would inform people who are at risk for diabetes and cardiovascular disease on how to reduce calorie intake per day in order to reduce their weight.

As an example of how labelling could be useful in affecting consumption habits, I used a personal banana bread recipe and nutritional data available from two web sites (https://www.dietaryguidelines.gov/current-dietary-guidelines/2015-2020-dietary-guidelines; https://nutritiondata.self.com) to calculate the nutritional parameters in a loaf (Table 2).

Table 2: Nutritional Content of a Loaf of Banana Bread and an Estimate Per Average Slice, with Percentages of Recommended Daily Intake Per Slice (Natural Sugars in Banana Are Not Counted.

		Total	Total fat	Sat. fat	Protein	Cholesterol	Sodium	Added sugars
Ingredient	**Measure**	**Calories**	(g)	(g)	(g)	(mg)	(mg)	(g)
Butter (tbsp)	12	1200	132	84	0	360	1080	0
Sugar, white (cup)	1.5	1161	0	0	0	0	3	300
Flour, white (cup)	2	880	3.2	0.8	32	0	0	0
Eggs	2	140	9	9	12	370	140	0
Low-fat milk (cup)	0.5	74.5	1.3	0.7	4.0	7.2	62.5	11.0
Salt (tsp)	0.75	0	0	0	0	0	1770	0
Baking soda (tsp)	1	0	0	0	0	0	1280	0
Banana (cup)	1.5	300.0	1.1	0.5	3.8	0.0	3.5	(41.3)
Total loaf (~1kg, ~7 slices per loaf)		3755.5	146.5	95.0	51.7	737.2	4339.0	311.0
Average slice (143g)		537.0	20.9	13.6	7.4	105.4	620.5	44.5
Daily recommended intake (USDA)		2000	60	20	56	300	2300	37.5
Av. Slice, % of daily recommendation		**26.9**	**34.9**	**67.9**	**13.2**	**35.1**	**27.0**	**118.6**

For the purpose of this article, three packaged slices of a locally produce banana bread were weighed, and calculated estimates of the nutritional parameters per average slice (~143g) and the percentages of recommended daily intake determined, based on a 2000 calorie per day diet. The estimate total calories in a slice of banana bread could be over 25% of daily calorie s, 67% of saturated fats and nearly 120% of the recommended quantity of added sugars. A consumer who purchases a single slice of banana bread would benefit from a nutritional label that shows the approximate calories, saturated fat and sugar content, and recommends '2 servings per slice'. The health benefits of adding caloric and nutritional information to processed foods is not a new idea, as the United States government has been refining these details for over five decades (Institute of Medicine, USA, 2010). The FDA published the final rule for adding nutritional labelling to restaurant and fast-food menus on December 1, 2014 and the compliance date was May 7, 2018 (USA FDA, 2018). Bermuda should produce legislation to mandate

nutritional labelling on restaurant menus, take-way foods and locally produced foodstuffs to support healthy food choices, as one tool to tackle our high obesity rate.

Nursing Diagnoses and Management

Nurses have their own nursing diagnoses, which classifies health issues within the nursing domain, based on the North American Nursing Diagnosis Association International (NANDA-I). A nursing diagnosis is defined as "a clinical judgment concerning a human response to health conditions/life processes, or vulnerability for that response by an individual. It can be problem focused or a state of Health Promotion or potential risk" (Potter, Perry, Stockert, & Hall, 2017). Following the nursing diagnosis, a patient-centered plan of care is developed for each client, which is implemented and finally evaluated. It is an evolving evidence-based process, which involves critical thinking and regular assessment for positive outcomes. This article has focused on two Health Promotion nursing diagnoses described below:

(1) Readiness for Enhanced Nutrition *related to* a desire to comprehend food labels and select healthy food choices in restaurants to reduce daily caloric totals *as evidenced by* Bermuda's 34.4% obesity rates. A nurse starts with an assessment of the client's baseline knowledge about healthy food choices (Gulanick, & Meyers, 2014). This establishes a starting point for teaching the client about how to read a food label to understand more about serving sizes and caloric content. It also provides an opportunity for the nurse to learn more about any health condition the client has that may require reducing saturated or trans fats, sodium or sugar in their diet. The rationale for this action is to teach clients about the recommended serving size and the number of servings in the food item. Another important assessment would be understanding any potential barriers for improving the client's nutrition, such as the client's work or travel schedule, frequency of eating out, lack of culinary skills, and ability to afford fresh fruits and vegetables.

Another important consideration for Bermuda is to assess cultural aspects that promote eating 'traditional' foods that are high in fat, sugar, and carbohydrates, including fried fish and chicken, macaroni & cheese, Portuguese doughnuts, banana and ginger breads, and snowballs. None of these foods are labelled with nutritional or calorie details, servings sizes, or servings per piece. Often, people expect large portion sizes and do not appreciate the impact on daily calorie intake. Nurses can teach clients about better food choices including vegetables and salads, steamed, broiled, baked, roasted or grilled entrees that feature lean meats, chicken or seafood. Another teaching opportunity would be to assist the client in making healthier food choices when eating fast food, which is less expensive, very convenient, filling, and often not a healthy choice. Moderation is a learned behaviour. Nurses can assist clients with developing skills toward healthy eating by reviewing the *Choose My Plate* recommendations (Gulanick, & Meyers, 2014).

(2) Imbalanced Nutrition: More than Body Requirements *related to* unhealthy dietary patterns *as evidenced by* being overweight with BMI 25-30 or moderately obese with BMI 30-35. During annual physicals, a nurse conducts the assessment of a client's weight, height and waist circumference in order to calculate the BMI (Gulanick, & Meyers, 2014). The rationale for this action is informative to the client who may have been estimating their weight and BMI and is unaware that if their waist circumference is more than 40 inches (male) and 35 inches (female), then they are at a higher risk for obesity-related complications and diseases (NHLBI, 1998). For clients with an unhealthy BMI, a nurse can provide a referral to a registered dietician to conduct a baseline nutritional assessment, documenting their daily food intake, estimation of calories, feelings at time of eating, location of meals, snacking patterns, and social considerations. This assessment considers the environmental factors that influence obesity more than genetics or biological factors. A food diary will help identify poor dietary habits or misunderstandings about portion control as well as the use of food as a coping mechanism. This establishes a starting point for the client's lifestyle change that includes enjoying food but eating less, avoiding oversized portions, encouraging a higher consumption of vegetables, fruits, whole grains and low-fat dairy products in consultation with a registered dietician. Clients should be encouraged to drink water and avoid beverages with added sugars and calories (USDA, 2019).

Opportunities for Health Promotion

Nurses who are involved with outpatient facilities, schools, or community healthcare programmes are in a position to educate the public about good nutrition and healthy food options. Annual physical assessments of height and weight can be used to calculate the BMI so that nurses can teach clients to strive to maintain their BMI below 24.9 and to monitor their waist circumference according to sex.

Thus, nurses need to be knowledgeable about nutrition in order to refer clients to a registered dietitian and other community support groups for a detailed assessment of dietary requirements in order to prevent the onset of chronic diseases associated with obesity such as type 2 diabetes, cardiovascular disease, stroke, arthritis and cancers (Potter et al., 2017).

Conclusion

Nurses play a vital role in health promotion, illness prevention, and chronic disease management, related to the international rise in obesity rates, through health assessment screening and nutritional counseling (Sargent, Forrest, & Parker, 2012). Nurses can effectively re-teach basic health education if overweight or obese clients are at risk for comorbidities prevalent in Bermuda or recommend a registered dietician for detailed consultation. Therefore, the addition of nutritional labelling on bakery foods and restaurant menus (including take-away orders) is a starting point towards allowing residents of Bermuda an opportunity to make informed decisions about healthy food choices. Thus, positive expected outcomes can be achieved when clients are able to interpret food labels when purchasing food items, choose healthier options from menus, embrace eating a nutritious diet, and successfully maintain a BMI below 24.9.

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A Collaborative Path to Comprehensive Community-Based Adolescent Life Skills Programme

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Abstract

Community based programmes for adolescents receiving mental health services have been previously linked with the effective acquisition of knowledge, change in perceptions and attitudes, as well as change in behaviours. This article will detail how the new Teen Life Skills Programme was able to address some of the barriers and equip the participants with the skills they needed. Adolescents in this programme had mental health challenges such as attention deficit hyperactive disorder (ADHD), Autism spectrum disorder (ASD), depression, and anxiety. The programme consisted of morning workshops and afternoon job placements.

Creativity and adaptability in the practicing community will pave the way for innovations and divergent thinking approaches for adolescents receiving mental health services. This article will outline the process of the Teen Life Skills Programme from conception to implementation. A thorough evaluation will provide a global outline that can be used to initiate similar programmes worldwide. The process, objectives, benefits, and opportunities of the programme will be highlighted.

Since we are in an ever-changing world, addressing the needs of our community by developing services increases awareness of the benefit of life skills training for the adolescent population experiencing mental health challenges.

KEY WORDS: *Life skills, programme, mental health*

Introduction

Adolescent years can be a time for exploration and self-discovery, and they can be scary and daunting for adolescents. Puberty, social demands, and conformity are some of the factors adolescents encounter. Living on a small island does not make it easy either. Bermuda is a 21-square-mile, British Overseas Territory, located in the North Atlantic Ocean. According to the Bermuda Drug Information Network (2016), we live in an increasingly cohesive and fast-moving world in which Bermuda faces social and economic challenges on several fronts. Tuttle, Campbell-Heider, and David (2006) state the importance of factoring in that adolescents living in families impaired by drug and alcohol abuse, mental health problems, violence, and poverty may find it more difficult to access these resiliency factors and therefore are more vulnerable to risk-taking behavior. Therefore, the health, nutrition, and education of these young people as they develop from ages 5 to 19 years will have lifelong consequences for the adults they become and for their role in the development of the next generation. Will the world have prepared them well for this task? (Bundy, Silva, Horton, Jamison, & Patton, 2017).

Thus, adolescents who face personal, cognitive, and social skills deficits are prone to drug use, bullying, violence, sexually transmitted infections (STIs), human immunodeficiency virus (HIV), acquired immunodeficiency syndrome (AIDS), malnutrition and other socio-economic and environmental challenges. Specific emotional, cognitive, behavioural, and resilience skills play a vital part in ensuring an adolescent's personal and social success (Langford, Badeau, & Legters (2015); McWhirter, McWhirter, McWhirter, & McWhirter (2007); WHO, (1993). Life skills programmes for adolescents have been identified as essential for developing psychosocial, emotional,

cognitive, behavioural and resilience skills to go through everyday challenges and being productive citizens (Galagali, 2011). These skills are known to be key contributors to negotiating and mediating challenges that young people face in becoming productive citizens WHO, (1993). According to Nasheeda, Abdullah, Krauss, and Ahmed (2019) examining adolescent experiences within the embedded culture of the individual is important to understand how individuals from different backgrounds construct life skill knowledge into reality.

The Mid Atlantic Wellness Institute (MWI) is Bermuda's main provider of clinical mental health services. MWI is part of the Bermuda Hospitals Board (BHB). Unfortunately, due to the economic recession, there has been added pressure on families, resulting in altered family dynamics and relationships. In a National Longitudinal Study of Adolescent Health (Resnick, Bearman, Blum, Bauman, Harris, Jones, Tabor, Beuhring, Sieving, Shew, Ireland, Bearinger, and Udry (1997)) found that when adolescents felt connected to their families, they reported less risk-taking behaviour. Protective factors were associated with opportunities for adolescents to see caring adults role modeling conventional behaviours in the home and community. Although family support during adolescence tends to protect against drug use and its consequences (Tuttle, 1995), the adolescents at the highest risk frequently lack positive individual, family, neighborhood, community resources, and adult role models.

These socioeconomic, geographic, and mental health factors affecting the adolescent's services needed to be sought for those students not receiving therapeutic interventions in the community. There seems to be a growing demand to educate adolescents with life skills to assist them in dealing with their day to day life challenges and transitioning into adulthood with informed healthy choices. Life skills programmes have become a major part of many interventions for adolescents around the world, particularly those aimed at the prevention of alcohol abuse, drugs and smoking (Botvin, & Kantor, 2000; Huang, Chien, Cheng, & Guo, 2012; Mandel, Bialous, & Glantz, 2006). The article will examine how a team led by an occupational therapist at one of the local hospitals has developed a creative programme with community stakeholders to provide an identified gap in service provision.

Background

According to the Pan-American Health Organisation Bermuda profile 2017, there are 4254 adolescents between the ages of 15 and 19; this comprises 18% of Bermuda's population. The mortality rate due to road traffic accidents was reported by PAHO (2017) to be at 15.5 for 15-19-year-olds. It is also important to note that according to the National School Survey conducted in 2015, 66.3% surveyed students reported a prevalence of alcohol use among secondary school students with 24.6% reporting binge drinking. Could these behaviours be addressed and tackled in a specific programme set up for adolescents?

Students with mental health were not being accepted to many local Teen Life Skills programmes as their behaviours were reported to be challenging to manage. There was a gap in service for this group in the community. Those who were left out or could not access community programmes because of their mental health presentation could result in their feeling that nothing could be done by anyone to make their situation better, or that they themselves have no power to improve their situation.

A programme was needed that helped participants develop competencies to facilitate growth, develop their skills, and become healthy, responsible, and caring youth and adults. The programme would identify and be tailored to meet their needs and work with them in a non-judgmental, therapeutic setting. These adolescents continued to receive individual and group therapies to address their mental health and psychiatric needs from their therapist. These individual sessions typically focused on the goals of the treatment plan agreed upon by the therapist and the adolescent and or guardians and family. According to Michael and Crowley (2002), the overall findings of their meta-analysis indicated that several different psychosocial interventions for child and adolescent depression produced moderate to large treatment gains that were clinically meaningful for many afflicted youth.

Programme Development

The Teen Life Skills Programme focused on adolescents between the ages of 14 and 18 who were receiving mental health services. We initially identified a gap in services for this age group during the summer months. There was virtually no life skills group services for teens with mental health challenges during this time. Teens were identified by their individual therapists using a criteria which included being a client with a mental health diagnosis, age between 14-18, deficits in life skills, and about to transition to adult services. Consent from the participant and a legal guardian was always obtained as the service was voluntary. A treatment plan was discussed with all 10 (ten) involved participants. According to Chong, Aslani, and Chen (2013) shared decision-making, through collaborative treatment planning is an interactive process that emphasises the individual's values and promotes self-management, in line with the basic principles of person-centered care. Person-centered care is a holistic approach to a health system with respect for the individual person's abilities, preferences and goals. This treatment plan would be reviewed at the end of the four-week programme.

The programme worked under four main themes: trust, communication, sex and drugs, and the future. One of the themes was supported each week. The goal was to understand and build trust and for the adolescents to communicate effectively whilst understanding their sexual health and effects of drugs on their planned future. A career assessment with the Department of workforce development was completed and the information used to identify appropriate placement opportunities in the community.

The Life Skills Programme consisted of life skills workshops and job placement opportunities in the community. Examples of job placements were the following:

- Autostar which offers professional auto detailing for vehicles
- Bermuda Customs and Kinetix Bermuda which offers real yoga and summer programmes for children
- Davidsons Bermuda which is a retail store in Bermuda.

The main focus for the job placement was to focus on job soft skills. We included effective communication, team work, dependability, adaptability, conflict resolution, flexibility, leadership, and problem solving. The programme staff would follow up on each child to track their progress and goals at their attached work place. The morning workshops focused on topics such as, sex, drugs, apps for life, dressing for success, budgeting, and other topics. This was aimed at equipping the teen with the necessary skills for adulthood. There was a need to work on the participants competencies to ensure the transition to successful adulthood. These would be addressed during the morning workshops and modelled during the afternoon job placements.

Community Partnership

The programme sought for a network of job placements from the community that included Government and Non-Governmental organisations, Charities, and local businesses. A total of 16 stakeholders agreed to partner with the programme. The students spent half of the day practicing the soft skills taught and learning about opportunities for transitioning to adulthood. The Department of Workforce Development provided career assessments and a report for each participant.

According to Koc, Koncz, Tsang, and Longenberger (2015), the employability benefits of placements are impressive, students who had completed an internship, cooperative education or work experience received at least one job offer, compared to only 36.5% of those who had not. The outcome of the report was used to place the teens in their respective job placements. A study by Crisan, Paveleab, and Ghimbulus (2015) showed poor abilities in career explorations and also in the decision making process. They found that participants enter in a decision making faze without have any kind of understanding about themselves or about the career field. They are orientated to find a job

in their study related field without knowing their career abilities or interest. The work force development career assessment addressed this component.

There were presenters from within the organisation as well as from partner organisations:

- The Department of Child and Family Services focused on the topics safeguarding and staying safe.
- The Bank of Butterfield representative presented on budgeting and how to open a bank account.
- The hospital provided space for the meetings and workshops.
- Different businesses and companies, both public and private, assisted us with the job placements, including The Department of Customs, Kinetix, Davidsons Bermuda, Windreach Bermuda, Department of Ecommerce, Be Solar Bermuda, BSMART foundation, etc.

Implications and Impact

The team objectives of increasing knowledge, improving attitude, and developing positive behaviours of the participants were met and surpassed. Names in the case studies are fictional.

Box 1. Case study 1

Russell is a 18 year old boy seen by the psychiatrist in the outpatient service. He was diagnosed with Intellectual disability and a low IQ. He was referred for Occupational Therapy services to focus on Independent living skills. The therapist assessed him and made recommendations for instrumental ADLs. Russell expressed interest in helping people, videography and football. However Russell had challenges accessing outpatient services due to transportation issues and stigma associated with attending session at an institution. It was agreed by the team for Russell to be part of the Teen lifeskills programme. A treatment was written up and all prerequisites for the programme were completed. He attended all four weeks of the programme and reported enjoying every single day. Russell also managed to acquire a job soon after completing the programme and having met his treatment goals through the programme.

Box 2. Case study 2

Melanie a 17 year old female diagnosed with Autism spectrum disorder. She mainly struggles with social skills i.e. making and keeping friends, over shares personal information and struggles with the concept of future planning. She had challenges with making emotional connections and also had social anxiety. She was referred to the programme by her parents who thought everything else wasn't working and so maybe this program could. She had challenges with tardiness the first weeks of the programme. One of her goals was to attend 80% of the days. She ended up coming every day. She was able to make a friend whom she stayed connected to even way after the program. She is now reported to be less anxious in social situations.

Russell's poor prognosis, case study 1, was seemingly due to accessibility and acceptability concerns. The teen life skills program offered a platform that was accessible as the program was centrally located and as it was away from the mental health institution he felt less stigmatized and discriminated when attending the program. With the accessibility and acceptability barriers addressed by the program Russell was able to find meaning occupation after the program.

Melanie, case study 2, also seemed to have a poor prognosis in her recovery as all programmes she had attended were reported to have been ineffective. This could have also affected her volition to participate in the teen life skills program resulting in her tardiness. Participating in group activities would have been challenging for Melanie as she struggled with making and keeping frienships. It was evident that during and after attending the program Melanie made progress by being able not only to make friends but also keep the friendship going. She was able to meet treatment goals that were identified for her and intern improving her prognosis.

Acquired Knowledge

Facilitators carried out daily reviews with the adolescents as a group and individually. Participants would report on the practicality and helpfulness of the weekly topics - trust, communication, sex and drugs and the future. They would share how group discussions helped them in the learning process and the importance of being involved in diverse job placements. At each session, the participants were invited to share any newly learned information. Sharing was useful for maintaining and developing supportive relationships between the participants and the staff. This process also helped in forming their identities through self-expression, learning and vocalization and promoted a sense of belonging and self-esteem through sharing of stories, lessons, and experiences.

It is important to note that the adults overseeing the programme increased their knowledge on how to better serve the group of young people. According to a newspaper article published by Simpson (2017), one of the partners stated that the experience had exposed their department to students they do not normally reach. Another work placement partner also stated he enjoyed seeing what the programme did for the children and that he was able to teach someone to work and develop their work ethic. He said it was also important for young black men to see successful black businessmen role models.

Participants reported learning new information at their job placements: personal attributes, personal traits, and communication abilities which were needed for them to be successful at their job sites. Some of the new information included work ethics and problem solving. In some cases the experience caused them to seriously consider pursuing a career in that field. One student was able to immediately apply the skills he learned in mock interviews in the programme to an actual job interview. The practical experience helped him secure the real position for which he interviewed and even buoyed the confidence of others in the group.

Attitudes towards Life

Staff and students both identified changes: their attitudes in life and towards others and education. Some changes were instant some took time. In particular, there were cases where students with a history of not committing to volunteer placements attended their programme placements on time and even earlier than expected. These students were also willing to share their experiences with everyone in the programme. This created a safe, but supportive, environment designed to increase participation, expressiveness, share experiences and communication. These interactions allowed for peer relations to be built through peer acceptance and peer positive influence.

Conversely, some participants had challenges being positive. They focused on negatives when they spoke with peers and family. Through discussions with programme staff and employers, participants learned appropriate ways of conducting and expressing themselves that were not overly negative. Felitti and colleagues (1998) introduced the concept of adverse childhood experiences to account for the negative health and behavioural consequences of various forms of childhood abuse, neglect, and exposure to household dysfunction. The programme focused on improving the lives of participants by meeting developmental and social needs through the intentional group dynamics.

We picked the participants who would be able to positively influence each other and who were at the level of understanding the content taught. We also helped them to build the competencies needed to become successful adults by placing them at appropriate and selected job placement for their growth. Participants were equipped with skills and strategies to adapt and perceive their circumstance with an objective for recovery and healing and ultimately work on developing necessary skills to transition to adulthood.

There were verbal instructions as well as modelling from the job placement staff, as well as reinforcement from the programme staff by way of evaluation forms to track goal attainment.

Activities were analysed and graded to the participant's level of competence and calibrated to foster development

of positive attitudes. The focus was not the attitude portrayed by the participants but rather the function of the behaviour which would be addressed by the individual therapist.

Behaviours

The Life Skills Programme's focused on meeting developmental competencies for all participants, assuming that all teenagers must possess certain developmental skills to become successful adults. We also assumed that all behaviours are the teen's way of communication, so addressing behavioural presentations required us to find the reason behind the behaviour. The more we identified what the participants were trying to communicate through their behaviour, it was easier to identify replacement strategies to communicate their needs.

We sought to equip the participants by focusing on meeting developmental needs and building competencies, rather than solving problems and providing treatment. The needs that must be met and the competencies that must be built to ensure the transition to successful adulthood were addressed during the morning workshops and demonstrated during the afternoon job placements and perfected during group discussions.

The structured group aspect of the programme assisted with the behaviour and the use of existing community structures. This meant that any positive outcomes would be sustained after the programme was completed because the participants would still have access to them.

Facilitators saw positive changes in attitudes, behaviours, and overall presentation of the participants. Those with significant improvements were recognised during the programme's graduation ceremony. Other students were able to meet their treatment goals for the programme and their individual session targets.

The programme achieved successes that could not be made in individual clinical sessions or regular group settings. The holistic approach - combining workshops and placements - made the balance an effective tool for students to learn and practice, resulting in positive behavioural changes.

Conclusion

The participants gained skills from the workshops and the job placements. Some participants were able to use their technological strength to develop programme for the elderly. Most participants met their individual treatment goals; others became independent adults and their prognosis positively changed. Some participants were able to build on their social skills and learnt how to interact in new settings, develop empathy for other perspectives, and build teamwork and a sense of responsibility. We identified development in self-confidence, sense of personal efficacy, sense of empowerment and possibilities, and sense of social responsibility.

The collaboration between public and private partners resulted in the success of the programme and its goals. Community partners were useful in planning, implementation, and continuation of the programme. These agencies were a useful link in the recovery process of the participants and will continue to be an important part of the treatment process.

The Teen Life Skills Programme is a valuable service to the Bermuda community. Participants gained skills that allowed them to better integrate into society. Most have obtained permanent jobs; previously they had been ruled un-employable. Fulltime employment began as they graduated from high school, affording them a renewed sense of purpose and worth. They now see themselves as contributing members of the community.

Three yearly cycles of the Teen Life Skills Programme have been completed. Funding has been secure for successive programmes. The programme was so successful that it was nominated for an international recognition award, WOW What a Team Award Nomination in London (UK) Johnston-Barnes 2017. At that event, there were teams

that did not know the variety of roles that occupational therapists managed. It was a great way to showcase the benefits of an effective multidisciplinary approach led by an occupational therapist.

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Novel Potential Link between Sleep Pattern Per3 Gene and those with Insomnia in the Bermuda Population

Sierra Pacheco with Carika Weldon

Abstract

The objective of this study was to assess the correlation of the Per3 gene VNTR polymorphism to insomnia patients in Bermuda. Buccal swabs were taken, and DNA was extracted, after which the genotypes of volunteers were characterised by using polymerase chain reaction. There were 25 total volunteers (21 females, 4 males, aged 20-79) that participated in the pilot study. 15 control volunteers and 10 insomniac volunteers. All volunteers with insomnia were classified by a pre-determined ICD-10 classification. Controls were those without any ICD-10 insomnia diagnosis.

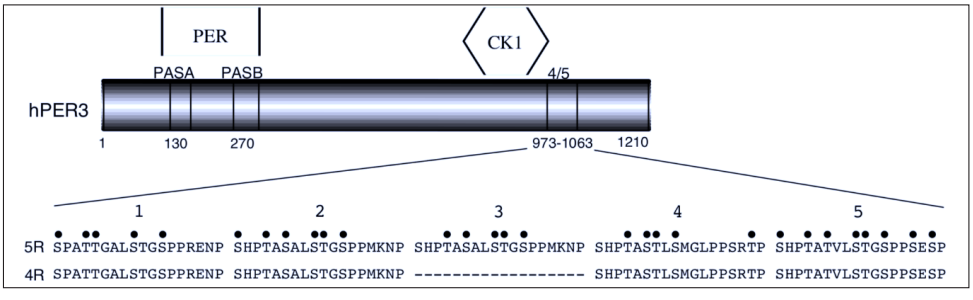
The frequency of the 4-repeat allele appears three times lower in insomniacs compared to the control group. However, this is not statistically significant in our sample size. When comparing our p-value of the Fisher's Exact Test to the cut off value of 5%, we see that there is not much difference, suggesting that a larger sample size could result in a significant result. When comparing the allele frequency for Bermudian insomniacs to the British patients with delayed sleep phase syndromes (DSPS), the 5-repeat allele is significantly higher (16 times greater) in Bermudian insomniacs. Thus, a larger sample size would distinguish if there is a statistical significance between those with insomnia and those without. Bermudian insomniacs vary distinctly in the Per3 allele frequencies to those in Britain with DSPS, suggesting a potential geographical or ethnic distinction.

KEY WORDS: *Per3 gene, insomniacs*

Introduction

Dijk and Czeisler (1995) indicate that the Per3 gene, or 'Period Circadian Regulator 3', codes for a protein that is involved in the regulation of the circadian clock, the body's internal time-keeping system. Per3 has a variable number of tandem repeats (VNTR) downstream of its CK1 domain (Figure 1). This yields two main Per3 alleles: the 4-repeat allele and 5-repeat allele. If a person is carrying two copies of the allele 4-repeat allele they may be classified as a night person as they may tend to have a higher preference for evening activities and stay up later. Those who carry the allele with 5 repeats may be classified as morning people as they tend to have a higher preference for morning activities and wake up earlier (Archer, Robilliard, Skene, Smits, Williams, Arendt, & von Schantz, 2003). The same study showed there was a differing genotype distribution in those who suffered from sleep disorders than control patients as noted in Figure 1.

Figure 1: **Structure of PER3 Protein (adapted from Archer et al., 2003)**



Insomnia is generally when a person has difficulty falling asleep or staying asleep, even when they have the chance to do so (https://www.sleepfoundation.org/insomnia/what-insomnia, 2019). This pilot will be the first if its kind in Bermuda and may shed light onto any genetic basis for insomnia.

This report suggests that there may be a novel link between the Per3 and those with insomnia in the Bermuda population. The Per3 genotype was studied both in control volunteers and those with insomnia.

Method

Insomnia patients were determined by ICD-10 testing at a local physician's office prior to the pilot study. 25 total volunteers (21 females, 4 males, aged 20-79) participated in the pilot study. 15 control volunteers and 10 insomniac volunteers provided buccal swab samples after informed consent was obtained.

The study was granted approval by the Bermuda Hospitals Board Research Ethics Committee. DNA was extracted from each sample to determine the presence of the two alleles via a Per3 specific polymerase chain reaction (PCR) provided by an online lab (the miniPCR Sleep Lab Kit). Agarose gel electrophoresis was used to determine if volunteers were homozygous for the 4-repeat allele (night person), heterozygous (no preference) or homozygous for the 5-repeat allele (morning person).

Results

Demographics of our volunteers showed the majority to be female (84%), suggesting that perhaps male participation needs to be more encouraged in the future. The highest participation (32%) came from the 60-69 age range, with the lowest participation (4%) from extreme age groups (20-29 and 70-79). The sample also included 28% in the 50-59 age range, 20% in the 40-49 age range, and 12% in the 30-39 age range.

All 9 parishes were represented in the data, with Devonshire and Warwick having the highest portion at 20% each. Based on this, we consider our results to be representative of the island, however skewed towards the female population. The results of the study is also limited due to the small size. Specifically, the small cell size by age which would preclude comments on the relation between per3, age, and insomnia.

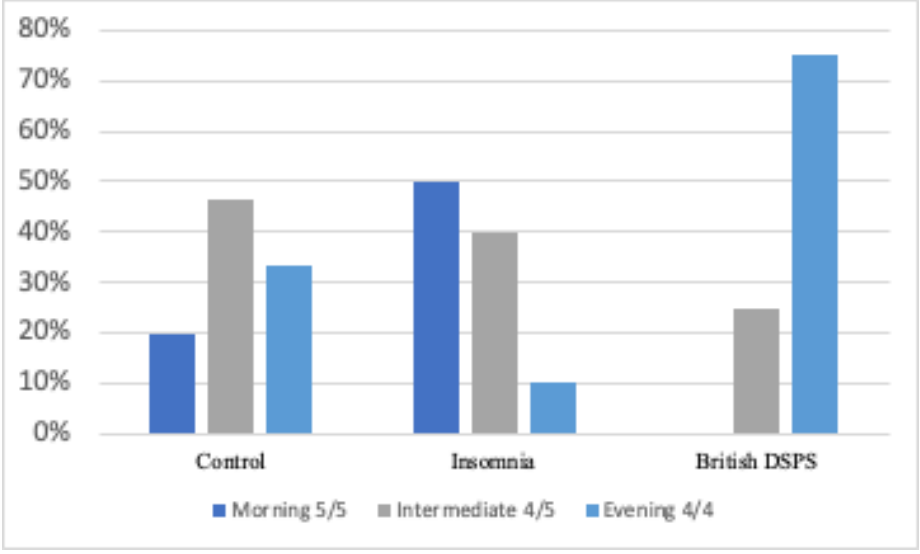
Each participant genotype was clear to determine via gel electrophoresis and the frequency of each was recorded below in Table 1. From first observation, it is clear to see that the distribution of the genotypes is different between the two groups, which presents a clear distinction in the two homozygous genotypes.

Table 1: **Genotype Frequencies for Control and Insomnia Groups**

Genotype	**4/4**	**4/5**	**5/5**	**Total**
Control	5 (33.3%)	7 (46.7%)	3 (20%)	15
Insomnia	1 (10%)	4 (40%)	5 (50%)	10

As expected, genotype frequencies fell into the Hardy-Weinberg equilibrium for both the control (p-value=0.982) and insomniac groups (p-value=0.989). When graphing these data to include the British sleep disorder patients, it is even more striking that there is a drastic difference between the Bermuda insomniacs and British with DSPS as noted in Figure 2.

Figure 2: **Percentage of participants with each of the Per3 repeat genotypes in the control insomniac and British DSPS groups**



As each participant has two copies of an allele, that would mean that if they have 4/4 (or 5/5), that is 2 copies of the 4-repeat (or 5-repeat) allele, and if they have 4/5 that is one copy of both the 4-repeat and 5-repeat alleles. Following this logic of Mendelian inheritance, the expected percentage of each allele present in the population would be 50-50. However, the following observed results were achieved.

Table 2: **Statistical ratios of the different repeat alleles**

	4-repeat	5-repeat
Expected	0.5	0.5
Control	0.567	0.433
Insomnia	0.3	0.7
British DSPS	0.88	0.12

When conducting a Fisher's exact test, the frequency of the 4-repeat allele appears three times lower in insomniacs compared to the control group. However, this is not statistically significant in our sample size (n=25, Fisher's Exact Test, p=0.086, odd ratio=0.3277). When comparing our calculated value of the Fisher's Exact Test to the threshold value of <5%, we can see that there is not much a difference, suggesting that a larger sample size could result in a significant result.

Discussion

When comparing the allele frequency for Bermudian insomniacs to the British patients (4-repeat: 0.88, 5-repeat: 0.12) with delayed sleep phase syndromes (DSPS) in the Archer study, it resulted in the 5-repeat allele being extremely significantly higher (16 times greater) in Bermudian insomniacs (Fisher's Exact Test, p=0.0000345, odd ratio=16.3).

There has been a suggestion that geographical location may play a role in Per3 allele frequencies in a population but this was not conducted for those with sleeping disorders (Nadkarni, Weale, von Schantz, Thomas, 2005). To date only the British and Japanese populations (Nadkarni, Weale, von Schantz, Thomas, Hida, Kitamura, Kadotani, Uchiyama, Ebisawa, Inoue, Kamei, and Mishima, 2018) have done a correlation study, with the Japanese finding no correlation at all with Per3 and sleep disorder.

Conclusion

Our results show that there seems to be a very strong correlation between those who are homozygous for the 5-repeat allele (morning preference) and those with insomnia in Bermuda. A larger sample size would distinguish if there is a statistical significance between those with insomnia and those without. Bermudian insomniacs vary distinctly in the Per3 allele frequencies to those in Britain with DSPS, suggesting a potential geographical or ethnic distinction. Overall, further study is warranted to determine if these suggested links indeed exist.

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