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Impact of Internet of Things on Urban Mobility

Iulia Vaidian
Vienna University of Economics and Business, Austria

Muhammad Azmat
Vienna University of Economics and Business, Austria

Sebastian Kummer
Vienna University of Economic sand Business, Austria

Abstract

The urban population is predicted to increase to 66% by 2050. The rapid growth of urbanization and increasing congestion are significant challenges faced by the world today. Innovative solutions in urban mobility are key for a successful development and a sustainable future. The new paradigm, Internet of Things (IoT), facilitates the need for new approaches in urban transportation, leading to a modern concept: Smart Mobility. The boom of technology and innovation from recent years allowed a great expansion of IoT. Furthermore, the number of smart devices that communicate, cooperate and complement each other, grows rapidly in every domain broadening the scope of IoT applications. This paper sets to discuss the impact that IoT might have on urban mobility, mentioning its implications, challenges and technical solutions. It further reviews the advancements made in the transport infrastructure along the years that support the emergence of Smart Mobility. Three main research questions stay at the forefront of this paper which are drafted in pursuit of the solutions for the problems and challenges currently faced by urban transportation. Which leads to a sustainable future with efficient and effective urban transportation system. The paper uses a mix-method approach, using on one hand qualitative research for literature review (State of the field) and on the other hand quantitative research to assess public opinion on the research topic, through an online questionnaire. To answer the research questions with proper arguments, both research methods were necessary, which lead to optimal results. The results of the questionnaire were interpreted based on Spearman's correlation and descriptive statistical analysis. They brought an in-depth view on the public opinion regarding IoT and the developments enabled by this paradigm within the urban mobility sphere. The output of the questionnaire highlights the eagerness of participants usually stuck in traffic to see innovation within urban mobility. Over all the results based on the opinions suggest that the public strongly believes in the Internet of Thing's applications and its adaptation will benefit the urban transportation system. Furthermore, new developments in the urban mobility sphere will be largely embraced.

Keywords: *Internet of Things, Urban Mobility, IoT Implications, Sustainability, Smart Mobility, opinion*

Introduction

One of the most important developmental challenges faced today is managing the rapid growth of urbanization and congestion, as the world's population that lives in urban areas is predicted to increase to 66% by 2050. Sustainable cities are key to a successful development (UN, 2014). A crucial aspect for a sustainable city is the urban mobility, which in its current state is not able to support in an efficient way the increase in traffic and commuters flow. This calls for new approaches in urban transportation and here it is where IoT meets urban mobility, transforming it into Smart Mobility (Narayanaswami, 2017).

At this point we already know the internet has transformed almost every aspect of our day to day life, by linking the physical and virtual world. A new paradigm that adds an advanced dimension to the current network is emerging, called the Internet of things (Atzori, et al., 2010). There are almost no limitations to the domains and applications of this connected technology, new smart technologies being launched almost daily. This opens a new world full of possibilities, making IoT a representative of the future (Gubbi, et al., 2013).

The boom of technology and innovation from recent years has allowed the concept of IoT to develop even further with estimates that by 2020 there will be 30 billion smart devices (IHS, 2017). This paper will give an insight into the technology of IoT in relation with the urban transport system, as it is important to determine the impact that innovation and technology have, especially on urban mobility and urban development. They influence and affect directly one's experience within a city (Rikken, 2016).

Objective and research questions

In pursuit of the solutions for the problems and challenges currently faced by urban transportation, as discussed above. The focus of this research paper is on the mobility of people in the urban settings. This paper aims to answer the following research questions (RQ):

1. What are the foreseeable advantages of IoT on urban mobility?
2. What are the possible challenges in application of Internet of things on urban mobility?

State of the field

The following section summarizes important aspects in relation with Internet of things and urban mobility, the core points of this paper. Based on the findings from the available resources in regards with this field, topics like transport infrastructure developments, Smart Mobility, IoT implications and technical solutions, challenges and sustainability will be discussed more in depth.

Urban mobility

The term mobility indicates both the willingness and capability for movement from point A to point B, with the objective to fulfill the demand for accessibility for multiple activities. There

are more types of mobility, such as intellectual, social, professional or spatial mobility (Wegener, 2013). As the population continues to grow, it is projected that by 2050 the world's urban population will grow by 2.5 billion more people. In this context, the urban mobility plays a key role in the development and adaptation of cities to accommodate such a rapid growth in congestion and urbanization. Sustainable development solutions are being increasingly demanded in cities to facilitate a better urban experience. Cities increasingly face problems caused by traffic and transport, with needs for mobility to reduce congestion, accidents and pollution. (UN, 2014).

A Brief overview of evolution of urban mobility and transport infrastructure

Table 1

Brief overview of evolution of urban mobility and transport infrastructure

Phase	Explanation	Authors
Early transport infrastructures	Generations ago the transportation of people and goods was difficult, time consuming and hard. The automobile was just a luxury item, roads and bridges were almost nonexistent in that era. Significant turns in history were the construction of the first railways, highways and the apparition of automobiles and planes.	Grübler and Nakicenovic, (1991)
Semi-automated infrastructures	This refers to the current infrastructure of roads, tunnels, turnpikes, bridges and modern amenities available to complement the innovation in mobility. The past decade has seen the emergence of concepts and tools to support automation, which brings agility in development and operations. One of the most prominent and visible application of automation in urban transportation is the automated vehicle. The prime objective of such technology is eliminate congestion and accidents by making automobile safer, effective, efficient and environment friendly. Though we stand on the edge of complete automation in road transportation, still, there are multiple levels of automation that have to be passed in order to reach full automation.	ISA, (2017) Azmat, et al., (2018) Azmat, et al., (2016) ECSEL Europe, (2016)
Fully Integrated and intelligent infrastructures	This refers to the modernization of existing infrastructure and adapting technological innovations in both automobile and information technology a leap towards fully integrated and intelligent infrastructures. Due to challenges caused by congestion and urbanization, intelligent infrastructure presents a solution to optimize cities, transforming everything	Siemens AG, (2017) Siemens AG, (2014)

	in smart technologies, from architecture, environment and transport to economy and governance. According to some researchers smart mobility should be viewed, as an organic whole – as a network, as a linked system. Where people, infrastructure and vehicles are the most important nodes. People must play an active role in the transformation towards a smart mobility and the fulfillment of their needs in an intelligent and efficient manner. Transforming the current transport system into one that allows seamless, efficient and flexible travel across various modes is the future of urban mobility.	Kanter and Litow (2009) Papa and Lauwers, (2015) Benevolo, Dameri, and D'Auria, (2016)

Internet of things and its implications on urban mobility

The researchers like Atzori, et al., (2010) and Mishra, et al., (2016) highlight the variety of application domains of IoT. They claim, differences will be seen in logistics and transportation, health care, environment, industrial manufacturing and social domains. The devices mentioned above already exist in the majority of these environments with different levels of smartness. The goal is to bring all these items to the same level of intelligence and communication capability. The term "things" refers to any physical and virtual object that can be identified, located and controlled by using "Internet". These smart devices will influence not only one's day to day life but also the economic activity and the way business and industry will act further in the digitalized world. They further explain IoT will allow the circulation of information in real time to provide accurate traffic status, best route and vital information for all participants in traffic to facilitate a better management and control of traffic and safety.

The implications of Internet of things on transportation will have an impact on the following:

Table 2

A brief overview of implications of internet of things on transportation

Implications	Explanation	Authors
Smart infrastructure layers	The emergence of IoT added several layers to the traditional infrastructure: The operational technology (collects data from the physical infrastructure), the communications technology (enable real time communication with all the nodes within the infrastructure) and the information technology (enables the use of intelligent transport system). These all enable smart devices to function properly within the urban mobility context.	Schneider Electric, et al., (2014)
Mobility as a service	Together with IoT and its application on urban mobility, a multitude of possibilities that benefit travelers, transport operators and urban planners have emerged. Examples of	Schneider Electric,

	smart mobility services are smart parking, smart ticketing, journey planer and vehicle sharing service. These solutions represent the future of urban mobility, which is mobility on demand. Users can to plan in an efficient and effective manner each trip and have easy access to different transport modes and related information.	et al., (2014) Azmat, et al., (2018)
Interoperability	Due to the integration of multiple domains and several smart devices. The interoperability challenge between these devices has surfaced lately. To keep innovation on track manufacturer of different devices and operating systems need to develop a standard IOT integration platform for seamless usage of IoT technology.	Valerio, (2015) Prophet, (2016)
Digital divide	It refers to the gap between people who use/ have access to digital and smart devices and those that do not. The most prominent digital divide is between the emerging and developed countries and rural and urban communities. A solution to this fragmentation is highly needed to bring the advantages of the Internet of things everywhere in the world	Valerio, (2015)

Internet of things and its technological Solutions

There are multiple technological solutions for the urban mobility that are based on the Internet of things technology, with the aim to enable a better life and experience in a city for individuals. The urban mobility is headed towards a smart future and all technological solutions work to achieve and develop a smart mobility. Public, integrated and on-demand transport are key aspects of urban mobility in the future. Access to real time information from traffic and efficient transport management are both fundamental objectives in a Smart Mobility.

INTEGRATED mobility platform

An integrated mobility platform offers the opportunity to connect all modes of transport, increase their functionality and implement new services. The goal of this platform is to be one step closer in reaching the full potential of Smart Mobility by giving the user access to information about all the available modes of transport, the chance to book, plan, pay and use them. This platform tries to combine all challenges of urban mobility: efficiency, integration, easy access, sustainability and safety. The future of mobility is being able to rely on a variety of transport alternatives and use them on demand, whether it is a car, taxi or bicycle (smile mobility, 2014).

VEHICLE-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication

The idea behind V2V and V2I is the autonomous communication between electronic systems, without human intervention. This goal is achievable, due to the emergence of IoT (Booysen, et al., 2012). V2I means that the transport infrastructure sends valuable information to vehicles regarding traffic and road conditions, collision danger, speed limitations, traffic jam at intersections, etc. and recommends certain actions to vehicles situated in traffic. The communication between two or more vehicles, V2V, aims at the interaction and collaboration between them. The information that is interchanged is based on the on-site traffic aspects (Glielmo, 2011). The main goal of using these technologies is to avoid accidents mainly caused by human errors and provide a safer transport system with strong incentives for the further development of these concepts. Moreover, an intelligent traffic and infrastructure management are highly needed to support a sustainable transport environment (Booysen, et al., 2012).

Challenges

One of the main challenges faced by the internet of things today concerns the security and privacy of the collected data, resulting in the need for new guidelines, rules and regulations to accommodate the changes in the transportation system (Azmat, et al., 2018) .The communication between devices puts in danger data authentication and integrity. This kind of wireless communication is still vulnerable to cyber-attacks. IoT connects so many items, making it an extremely large smart network, where the method for data collection and distribution will be completely different to the one that users are currently used to, making data privacy a significant concern. There will be a change in the extension that individuals can control the disclosure of personal information provided by them to different devices. Data privacy should be a top priority in regards with IoT and it should be clearly established what personal details are being collected, by whom, over which time period and for what reason. Improving the security of the IoT technology should be one of the priorities in the further development of this network, as only by achieving top security and privacy of data, IoT could be used at its full potential (Atzori, et al., 2010).

Sustainability

Sustainability stays at the core of the Smart Mobility. With the pressure of climate change problems, it is important for all the advancements in technology to come with solutions for a sustainable environment and future. Smart Mobility poses to be a valuable answer for the reduction of fuel consumption and CO2 emission, traffic congestion, air pollution caused by vehicles, or the transfer of transportation from fossil-based energy to renewable energy. Together with the advancements in urban mobility, a sustainable transport structure is increasingly being promoted with alternatives to the classic system. Mobility on demand and the integration of all modes of transport are trends towards which the urban mobility is headed.

Stressing the importance of public transport for day to day life not only on occasional option should achieve the Smart Mobility goals for a better and sustainable life (Wegener, 2013).

Methodology

The paper uses a mix-method approach, using on one hand qualitative research for literature review (State of the field) and on the other hand quantitative research to assess public opinion on the research topic, through an online questionnaire. To answer the research questions with proper arguments, both research methods were necessary, which lead to optimal results (Brannen, 2005).

Methods of data collection

The secondary data for the qualitative part of this research was extracted from different articles and journals that were published in relation with the searched field. Most of the papers cited in this paper were easily available and accessible at databases like EBSCO Business Source Premier, web of science and Google Scholar. The following keywords were used to gather most of the secondary data for this research: internet of things, IoT, implications, infrastructure development, transportation, urban mobility.

Apart from the qualitative studies a part of this research concludes analysis of participants in a survey on the impact that the Internet of things has on Urban Mobility, considering its implications, technical solutions and challenges. The aim of the questionnaire was to give a better insight into the public perspective on Internet of things as a solution in the global challenges of urban mobility.

Analysis technique

The survey was followed by the correlation and descriptive statistical analysis using SPSS to interpret the results. Spearman's correlation was chosen, as it is one of the most common statistical tests to assess the relationship between two statements. To ensure coherence in interpreting the correlation coefficient r_s, the scale proposed by Cohen was used: 0.1 is for a small correlation, 0.3 for a medium one and a 0.5 coefficient represents a large correlation. The size of the population is indeed important, as even if the correlation coefficient is rather low for some statements, for a large participation pool (181 participants for this survey), the result is still very significant (Cohen, 1988).

Results and analysis

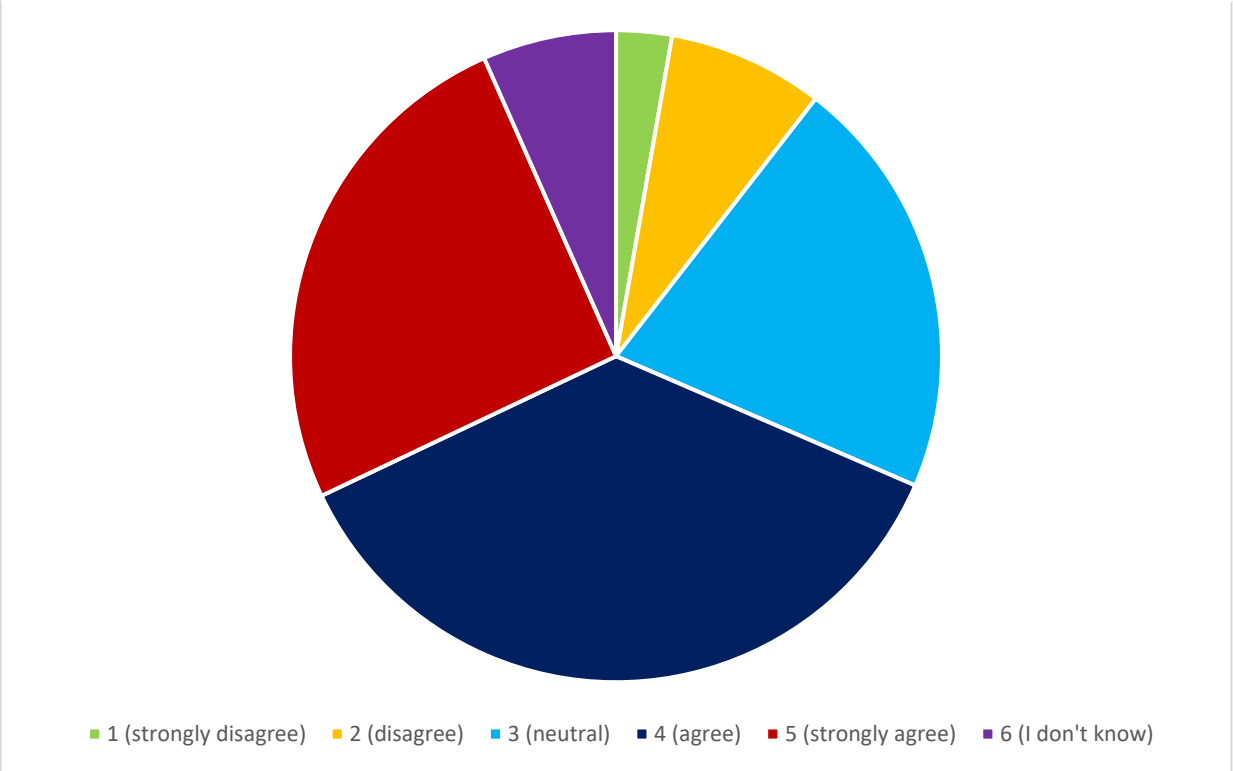
The paper aimed from the beginning to answer three main questions, which are recurring in relation with its central topics, the Internet of things and urban mobility. This chapter focuses on the peoples' opinion on the implementation of IoT within the urban transportation system through analyzing the survey results based on the Spearman's rank order correlation and descriptive analysis.

RQ1: What are the foreseeable advantages of IoT on urban mobility?

The responders (highly) agreed (62.98%) that the urban transportation system is too crowded. The correlation between the power of IoT to enable modern alternatives and the agglomeration in public transport is relatively strong. Moreover, it is no surprise that there is a strong and significant correlation between IoT and the public transport system. It shows that people strongly believe in the integration of IoT within urban mobility and how beneficial the modern alternatives for transport will be to accommodate the constant growth of population in cities. It is largely recognized that the problem of congestion in cities is rapidly increasing and the IoT presents itself as a suitable source to help release traffic and public transport congestion. This is proved also by the strong correlation between IoT as a facilitator of modern alternatives in urban mobility and the congestion in cities. The core point of Smart Mobility should be to tackle the problem of congestion in cities, that is increasing everyday due to urbanization.

One last correlation between the benefits brought by Smart Mobility and the importance to use sustainable urban transportation depicts a significant and rather strong relationship between these two. An impressive number, 115 out of 181 participants, recognized the importance of using sustainable and environmentally friendly modes of transport.

Figure 1 Smart Mobility as an enabler for the reduction rate of road congestion, road



In view of the above results, can be considered that people understand what Smart Mobility is and the opportunities brought by this concept and are confident in its powers and significance within urban transportation. People associate IoT with a key player in providing a sustainable future in transport. Sustainability holds an important role in all technological developments, including Smart Mobility.

Table 3

RQ1 Spearman's Correlation

Statements		**Spearman's correlation coefficient (0.01 significance level, N = 181)**
"Internet of things" has the power to enable modern alternatives for the urban mobility.	The urban transportation system is too crowded.	0.390
	The public transport system will benefit from the implementation of IoT.	0.608
	One pressing problem nowadays is congestion in cities. IoT could help identify the cause of congestion and work towards eliminating it.	0.569
Smart Mobility proposes to reduce road congestion, road accidents rate and reduce costs across all modes of transport. Thus, the full implementation of Smart Mobility has to take place in the near future, as will benefit the urban experience.	In the context of climate change, it is vital to provide a sustainable future in urban transportation.	0.431
	Sustainability is important for me. I make sure that the modes of transport I use are sustainable and environmentally friendly.	0.404

RQ2: What are the possible challenges in application of IoT on urban mobility?

One of the major challenges that is starting to be sensed by people is about data security and privacy, it is not surprising that 61% of participants (highly) agreed. The results of the questionnaire show general agreement that the safety and privacy concerns within IoT must be taken seriously and acted upon solving them. Often there are problems of connectivity, compatibility and general annoyance that one must use multiple providers to satisfy one's needs. A Spearman's correlation was run to determine the relationship between the compatibility of different smart devices and the need to use multiple smart platforms and service providers to achieve a certain task/ goal, which resulted in a moderate and significant correlation. More than 55% of responders (highly) agreed with the statements below, showing that the compatibility problem still exists among devices powered by IoT and it can be an impediment in daily activities performed in urban mobility.

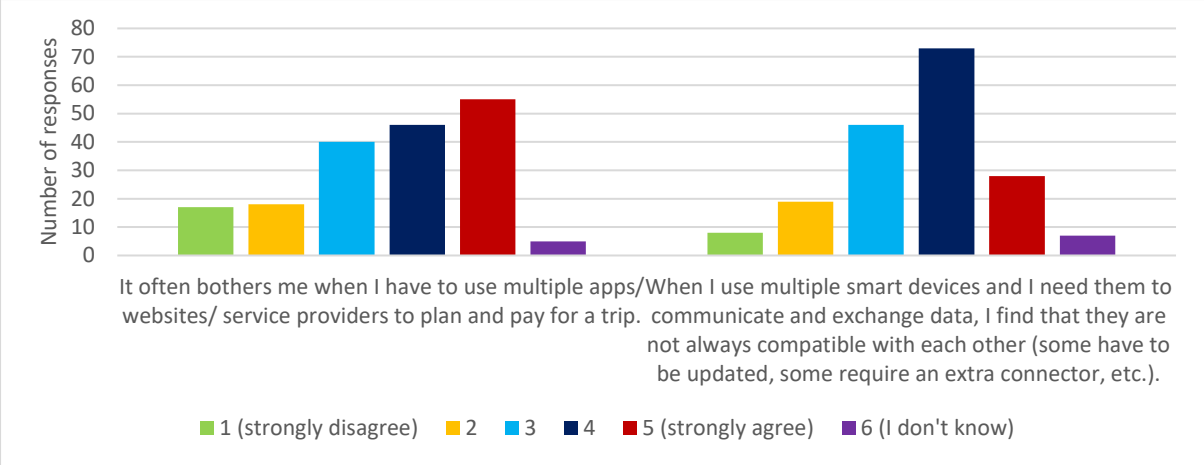


Figure 2 Consumer view point on challenges associated with IOT applications

The correlation between the need for real time travel behavior data and connectivity problems of smart devices is rather medium. The responses show that the majority of participants at the questionnaire agreed with both statements, namely that real time travel behavior data is highly requested to improve the urban transportation planning and facilitate optimality in urban mobility, but users often have problems with the connectivity of their smart devices which makes it hard to track data immediately.

Table 4

RQ2 Spearman's Correlation

Statements	**Spearman's correlation coefficient (0.01 significance level, N = 181)**
It often bothers me when I have to use multiple apps/ websites/ service providers to plan and pay for a trip.	0.307
When I use multiple smart devices and I need them to communicate and exchange data, I find that they are not always compatible with each other (some have to be updated, some require an extra connector, etc.).	
To improve the urban transportation planning, travel behavior data is required. Together with the emergence of IoT, transmission of real-time data is possible. This facilitates optimality in urban mobility and ultimately improves user's experience.	0.221
I expect to have access to Internet and to be able to use smart objects everywhere (within and outside my city/ country), but I often have problems to find good connection or service.	

Conclusion

The new dimensions added to the power of Internet and the capability of devices to exchange information and cooperate with each other will have a significant impact on the world. Digitalization is a term that is nowadays on everybody's mouth and leads to a total connection between the physical world and the cyber world. IoT is continuously transforming the urban mobility as we know it into a modern, efficient and sustainable system, that offers a better life for citizens and a better experience in the city for all participants in traffic. It brings technological solutions in the urban transportation sector, that will ultimately revolutionize all modes of transport and change commuter's habits and approaches towards urban mobility.

Additionally, the survey results have brought an in-depth view on the people's opinion regarding the Internet of things and the developments facilitated by this paradigm within the urban mobility sphere. The outputs have underlined even more the problem of congestion in cities, with the urban transportation system being unable to accommodate the rapid growth of population. Even though the majority of the participants were accustomed with Internet of things, the public still requires more awareness on the benefits that this technology can bring and its possibilities to transform the urban mobility into an efficient and optimal system. The results of the survey proved to be in favor of the technological implications of IoT on urban mobility, the participants being especially eager about the idea of Mobility as a Service. Naturally, the public is conscious of the security and privacy concerns that come together with this technology and a rapid solution to this challenge is very much requested.

The impact of Internet of things on urban mobility was thoroughly shown in this paper, discussing on one hand the advantages that come with this connected technology, such as the emergence of Smart Mobility and the technological solutions that influence positively the urban mobility, and on the other hand it mentioned the current flaws of IoT, like interoperability problems, the danger of creating a bigger digital divide and concerns related to data privacy and security.

To conclude, the analysis of the survey has undoubtedly shown the increased interest of the participants in IoT and their confidence in this paradigm that it can help the urban mobility to expand its capacity and keep up to date with modern times. The full implementation of IoT within the urban transportation is a must to be able to continuously respond to the commuter's needs.

Research limitations

Although this paper covers a multitude of aspects regarding Internet of things, urban mobility and the impact that this technology has on urban transport, there are still elements that weren't included. The topic of IoT is very broad and complex, therefore this paper focused on the most important elements that have a direct impact on urban mobility. As only one research database was used, this limited the amount of references. The keywords had a direct influence as well, as perhaps another combination of words would have given other references.

Implications for further research

Internet of things offers a great variety of research possibilities. As this technology is rather new there are a lot of domains and aspects that weren't fully investigated until now. The need to conduct such researches comes from the necessity to explore the impact that IoT has on multiple elements that influence the day to day life. There is a gap in papers that bring evidence-based examples, not only theoretical aspects in relation with IoT. Although a few experts, scientists and researchers started to study the IoT and its impact on the world, there are still a lot of possibilities to expand these studies and bring a much deeper insight on this topic and everything that it implies.

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Child Abuse Prevention and Education (CAPE) Program

Dr. Rubina Rahiman
Lehigh University

Abstract

Child maltreatment prevention efforts have moved beyond a public awareness approach to one that emphasizes the vital role of community, early intervention services, and caregiver education to help keep children safe from abuse and neglect. There is growing recognition that child maltreatment is a substantial public health concern as well as a serious social problem. The enormous societal consequences of child abuse and neglect make it imperative for the child welfare field to continue building on its knowledge and implementation of evidence-informed prevention practices. The purpose of this paper is to provide a basic understanding of the school-based approach to child maltreatment prevention strategies, including implementation, and outcomes. This paper describes the rationale for school-based interventions approach to child maltreatment. It also provides an overview of the scale of the problem, its consequences and costs, and child maltreatment prevention strategies.

Child Abuse Prevention and Education (CAPE) Program

The Substance Abuse and Mental Health Services Administration (2014) provides the following definition of trauma (sometimes referred to as the three Es): individual trauma results from an event, series of events, or set of circumstances; that is experienced by an individual as physically or emotionally harmful or life threatening; and that has lasting adverse effects on the individual's functioning and mental, physical, social, emotional, or spiritual well-being. Trauma exposure among children is linked to post-traumatic stress disorder (PTSD), anxiety, depression, poor school functioning, decreased rates of high school graduation, and aggressive and delinquent behavior (Santiago, Raviv & Jacox, 2018).

The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013) has revised the definition of events that qualify as "traumatic" (i.e., those that can lead to trauma- specific diagnoses, such as PTSD) to include those that the child directly experiences, witnesses, or learns about that involve actual or threatened death, serious injury, or sexual violence (American Psychiatry Association, 2013, p. 271). Some examples include, but are not limited, to child physical, emotional, or sexual abuse or neglect; witnessing or being the direct victim of domestic, community, or school violence; severe motor vehicle and/or other accidents; natural and human-made disasters; violent or accidental death of a parent, sibling, or other important attachment figure; exposure war, terrorism, or refugee conditions; and multiple or complex traumas (Cohen, Mannarino & Deblinger, 2016).

Rates and of trauma exposure delinquent behavior among children indicate that traumatic experiences are very common. Trauma exposure among children is linked to PTSD, anxiety, depression, poor school functioning, decreased rates of high school graduation, and aggressive (Costello et al., 2002; Lynch, 2003; Overstreet & Mathews, 2011). Although children are resilient, some students need intervention to reduce distress and support healthy functioning. Thus, it is critical for school mental health providers to consider trauma exposure when working with students (Cohen et al., 2018).

One particular trauma, child maltreatment (CM) is a significant public health problem, affecting hundreds of millions of children globally. Child maltreatment is defined by the World Health Organization (WHO) as the following:

"All forms of physical and/or emotional ill-treatment, sexual abuse, neglect or negligent treatment or commercial or other exploitation resulting in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust, or power" (WHO, 1999).

Child Abuse Prevention and Treatment Act (CAPTA) defines child maltreatment as any recent act or failure to act on the part of a parent or caretaker which results in death, serious physical or emotional harm, sexual abuse or exploitation; or an act or failure to act, which presents an imminent risk of serious harm. Neglect makes up the largest percentage of children who experience maltreatment, and constituted 78.3% of the maltreatment reported in 2009, with a total of 543,035 cases reported. Sexual abuse made up 7.6% of the maltreatment reported (U.S. Department of Health and Human Services, 2010).

According to WHO (2016), violence against children by adults within the family is one of the least visible forms of child maltreatment. It is nonetheless widely prevalent in all societies. Child maltreatment by parents and caregivers gives rise to difficulties when designing strategies for prevention and victim services, since the perpetrators of the maltreatment are also the source of nurture for the child. Any global approach to child abuse must take into account the differing standards and expectations for parenting in the range of cultures around the world. Different cultures have different rules about what are acceptable parenting practices. Research indicates that there appears to be general agreement across many cultures that child abuse should not be allowed, and virtual unanimity where very harsh disciplinary practices and sexual abuse are concerned.

Many children are exposed to multiple types of child maltreatment. This is especially troubling in the context of studies that show the negative effects of child maltreatment rise with the number of types of maltreatment to which a child is exposed. Although some children who experience traumatic events are resilient, many others develop trauma symptoms that can have a profound and long-lasting negative impact on their development, health, and safety. These trauma symptoms include affective, behavioral, biological, interpersonal, cognitive, and complex trauma problems, among others. Children may develop childhood traumatic grief, a

condition in which children develop trauma symptoms that interfere with typical grief and lead to maladaptive grief responses (Cohen et al., 2018).

Modern child maltreatment prevention efforts can be traced to pediatrician Henry Kempe's 1962 article on "battered child syndrome," which attributed the excessive use of physical punishment or failure to meet a child's basic physical or emotional needs to parents or caregivers who were experiencing undue stress or serious depression in their day-to-day lives (Child Welfare Information Gateway, 2016). While child abuse and neglect usually occur within the family, the impact does not end there. Society as a whole pays a price for child abuse and neglect, in terms of both direct and indirect costs.

Child maltreatment is more costly on an annual basis than the two leading health concerns, stroke and type 2 diabetes (Xiangming, Brown, Florence, & Mercy, 2012). Indirect costs include costs associated with increased use of our health-care system, juvenile and adult criminal activity, mental illness, substance abuse, and domestic violence. Prevent Child Abuse America estimates that child abuse and neglect prevention strategies can save taxpayers $104 billion each year. Given recent research on the profound negative impact of child maltreatment, particularly on brain development, in addition to the costs of remediation of the effects of child abuse and the intergenerational cyclic nature of maltreatment, it is easy to make the argument

that preventing child maltreatment in the first place is more efficient and cost-effective

than treating it later (Kilburn & Karoly, 2008).

Proposed and effective prevention should address removal of environmental barriers, development of personal competencies, coping skills, social support and self esteem to resist the negative effects of oppression. Child maltreatment prevention means to reduce the frequency of new cases through direct efforts to remove or reduce the causes and risk factors. Effective child maltreatment prevention programmes usually address specific sub-types of child maltreatment such as inflicted traumatic brain injury, physical abuse and sexual abuse.

To break the cycle of maltreatment and reduce the likelihood of long-term consequences, communities across the country must continue to develop and implement strategies that prevent abuse or neglect from happening. Even though the experts agree that the causes of child abuse and neglect are complex, it is possible to develop prevention initiatives that address known risk factors. While the priority is to prevent child abuse and neglect from occurring, it is equally important to respond to those children and adults who have experienced abuse and neglect. Therefore, it is imperative for communities to provide a framework of prevention strategies and services before abuse and neglect occur and to be prepared to offer remediation and treatment when necessary.

Exploration and Goal Setting Stage

Every child and adolescent in the Middle East and North Africa (MENA) have the right to be protected from violence, whether inflicted on them by parents, teachers, friends, intimate partners or strangers and whether occurring in times of peace or crisis. All forms of violence,

regardless of the nature or severity of the act, are harmful and intolerable. Beyond the immediate hurt and pain, it causes, violence undermines children's and adolescents' sense of self-worth and hinders their future development. Witnessing violence can also cause distress and harm (UNICEF, 2016).

UNICEF reports that violence in the home is widespread in the region, between 82-88% on average. Over 46 million children under 5 (88% average) experience/or are impacted by some forms of violence in MENA. After child marriage has been steadily declining in the MENA region there is now disconcerting evidence that it is increasing once again as a result of protracted conflict and prolonged displacement (e.g., child marriage in Syria's refugee hosting countries tripled in the last few years). A recent study by UNICEF found that 77% of adolescents and youths moving through the Central Mediterranean route reported exploitation with those from sub-Saharan countries facing considerably higher protection risks, including trafficking. In the Middle East and North Africa, around 106 MILLION (more than 8 in 10) children aged 2 to 14 are regularly subjected to violent discipline at home; 87 MILLION (around 7 in 10) are punished by physical means. Child maltreatment prevention designates measures taken to prevent child maltreatment occurring in the first place.

Child Abuse Prevention and Education (CAPE) Program in Kuwait

The CAPE program encourages the development of comprehensive prevention strategies using a school based intervention approach. The program was developed to raise awareness, campaign for child safety, and prevent child abuse in Kuwait. The Educate2Empower program will target to provide psychoeducation to all schools in Kuwait by reaching out to children, parents and educators. CAPE aims to influence our society's attitudes toward child abuse as well as develop engaging communities in Kuwait. The vison is to see every child in Kuwait safe, and the mission is to educate and empower as many children as possible through collaboration with the school administrators, educators, parents and community organizations.

Primary prevention—stopping child abuse before it begins—is the cornerstone of the CAPE program. Program activities are guided by a set of principles that include:

- Preventing first-time occurrence of child abuse;
- Reducing risk factors and enhancing protective factors linked to child abuse perpetration and victimization;
- Using the best available evidence when planning, implementing, and evaluating prevention programs;
- Incorporating behavior and social change theories into prevention programs so that behavior patterns, cultural values, and norms contributing to child abuse will change over time;
- Analyzing state and community data, such as health and safety data, to inform program decisions and monitor trends; and

- Evaluating prevention efforts and using the results to improve future program plans.

CAPE recipients are currently engaged in a range of activities, including:

- Delivering school-based primary prevention programs that educate children on body ownership
- Training students from elementary to high school to intervene when they see someone engaging in unhealthy behaviors;
- Working with communities to implement social norms approaches to promote safe, stable, and nurturing relationships and environments;
- Strengthening the ability of communities to plan, implement, and evaluate their child abuse prevention efforts;
- Using WHO capacity building Child Maltreatment Prevention course to implement evidence-based strategies and approaches in the communities.

Additionally, CAPE will be working to strengthen its ability to collect program evaluation data about chid abuse prevention strategies and use that data to improve the work. Ultimately, the innovative work of CAPE programs will contribute further to our knowledge, understanding and practice to prevent child abuse in Kuwait. To further prevent and treat, it is imperative to focus on additional trauma and loss intervention strategies.

Intervention

Pre-intervention Strategies for School Mental Health Providers

Ensuring support from principals and other administrators is critical to success and sustainability of trauma-informed support for students. School based providers will find it critical to partner with administrators before and during the implementation of school-based intervention. School mental health providers can share toolkit's fact sheets with principals and other administrators as a way to begin a conversation about the need for school-based interventions for trauma (Santiago et al., 2018). Providing an in-service training for teachers and administrators may be another way to share key information. In addition to increasing awareness of trauma and the need for school-based interventions to address trauma, it may also be important to consider how intervention might fit into existing structures and school contexts.

Prior to implementing a school-based intervention, increasing parent or caregiver awareness of available services can pave the way for successful partnership during an intervention. Providing services in schools is more acceptable to families, and school-based providers can take additional steps to reduce stigma and increase awareness about programs. Many schools hold "Back to School" events or other informational sessions for caregivers which provide an opportunity to familiarize caregivers with available school-based programs for trauma (Santiago et al., 2018). Including information about interventions in school newsletters and

publications can also increase familiarity with available interventions. Some schools have parent leaders and advocates who could raise awareness for existing programs.

Attachment, self-Regulation, and Competency (ARC) Framework

The ARC model incorporates interventions at the individual, family, and systemic levels. A major component of any intervention for caregivers is gaining a better understanding of child development, including accurate interpretation of their child's thoughts, feelings, and behaviors, and learning how to manage their own affect in response to the child so that they are not just reacting to the child's behavior. This can be accomplished with psychoeducation and

training regarding the impact of complex trauma, supplemented with consultation to help

parents and teachers accurately read and respond to the child's cues and the emotional

needs underlying the child's potentially distressing behaviors (Sandoval, 2013).

Many children also need education and training in how to express their emotions in an adaptive manner as many have learned maladaptive means such as explosive anger, avoidance, and dissociation. Trauma-focused cognitive-behavioral therapy (TFCBT) focuses on education regarding child maltreatment (with an emphasis on sexual abuse), coping skills training, parenting skills including appropriate disciplinary strategies, conflict resolution, and how to manage strong emotions. Although this approach is not a component of the ARC model, it would seem to fit nicely with the ARC's goals of improving regulation and attachment relationships (Sandoval, 2013). Thought-stopping, positive self-talk, and positive imagery are strategies that can help children to interrupt intrusive and distressing thoughts, and to learn how to have control

over their thoughts and emotions.

Implementation

Child maltreatment prevention services can be organized into a framework of primary, secondary, and tertiary programs. Primary prevention programs are directed at the general population to prevent maltreatment before it occurs; secondary prevention programs are targeted to individuals or families deemed to be at greater risk for potential abuse or neglect; and tertiary programs are directed at families in which maltreatment has already occurred.

Parent education programs attempt to prevent child maltreatment by improving parenting

skills, increasing parental knowledge of child development, and training parents in positive

behavior management. Researchers found that family support, increased parental involvement, maternal educational attainment, and decreased family problems all contributed significantly to the reduction of actual child maltreatment. This suggests that improving parental involvement through school-home collaboration and helping to provide access to counseling for families who are experiencing difficulties may be helpful in reducing maltreatment.

Outcome

Children's post-traumatic adjustment reflects a wide range of emotional and behavioral reactions. The outcomes typically used in assessing the efficacy of interventions included PTSD and posttraumatic stress reactions, depression, anxiety, functioning, behavior problems, anger, somatic complaints, fear, and traumatic grief. Studies of intervention efficacy have used both pre/ post assessment and controlled trials. To define, classify, and measure child maltreatment, a number of survey instruments have been developed. These can be incorporated into more extensive surveys that include assessments of types of abuse, social and health risk factors, and educational consequences. Among the many types of survey instruments used in population-based studies of child maltreatment, four are particularly suitable for yielding information that is useful for designing prevention polices and programmes. These instruments are:

• Parent-Child Conflict Tactics Scale

• Adverse Childhood Experiences Questionnaires

• Lifetime Victimization Screening Questionnaire

• ISPCAN Child Abuse Screening Tools

Advantages of School-based Services

Children spend a substantial portion of their time in schools. Schools have the potential to reduce barriers to accessing treatment and serve as a non-stigmatizing entry point of treatment. By addressing student's mental health needs, schools are better able to support their educational development and learning. They eliminate many burdens of families related to transportation, time, cost and availability. School based services can address many of the perceptual barriers by having trusted known school personnel engage the family in a familiar non-stigmatizing setting. Thus, schools have been identified as an ideal entry point for improving access to mental health services for children (Santiago et al. 2018).

Discussion

An overreliance on the assessment of PTSD and posttraumatic stress reactions is imprudent as it fails to address the complexity and the spectrum of stress responses (e.g., internalizing, externalizing, and somatic symptoms) that emerge over the months and years that follow children's exposure to a disaster and to the ensuing secondary adversities. It is possible that natural recovery and/or some common factors among interventions accounted for the benefit found with some interventions. Moreover, not every traumatized child requires structured intensive mental health treatment. Many children exposed to disasters will recover with basic public health interventions such as psychoeducation and social support.

I do believe with conviction that school psychologists can provide effective services to help children and youth succeed academically, socially, behaviourally and emotionally. Building

key partnerships with administrators, teachers, and caregivers provides a solid foundation for getting support throughout the intervention and increasing referrals and collaboration. Selecting an appropriate screening strategy that fits within school context is also a key first step. Careful selection and administration of screening measures support group formation and enable tracking student outcomes. The first movement to improve child mental health in schools is to incorporate social emotional learning (SEL) into school curricula and learning standards, and the second is to support students through multitiered system of intervention so that they can receive the appropriate level of support to be successful (Santiago et al., 2018).

An advantage of intervention groups in schools is that discussions of common trauma and loss related problems brings students together and makes them feel less isolated and alone. Mental, physical and emotional well being of all children is our priority. This endeavour will require action on all our parts — parents and teachers, leaders in government and industry, and communities large and small.

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Water resource challenges in the United Arab Emirates

Maryam Chahwan

Postgraduate Student at Hamdan Bin Mohammed Smart University, Department of Health and Environment

1.0 Introduction

Economic, technological and demographic trends happening all over the world has enhanced our ability to modify the environment that we currently live in. As humans, we have become the main driver of change for the environment. The actions we do and decisions we make are all impacting the global environment and climate. As a result, the amounts and distribution of precipitation falling on watersheds are affected. Currently, both the quantity and quality of freshwater resources are altered (Export.gov, 2018). It is estimated that, around 70% of the earth surface is made of water; out of which 96 percent is saline and only 4 percent is fresh water. The amount of fresh water (4%) is mostly trapped in glaciers and ice caps while the remaining amount is found in groundwater aquifers. Furthermore, one of the main important factors associated with water resources managment is the ability for countries to supply clean and safe water to ensure socioeconomic developments and safety as well as security of human health (Cosgrove and Loucks, 2015). Consequences of lack of safe water include the spread of water related diseases such as malaria and diarrhea. Moreover, the term "water crisis" has been widely used all over the world. This term is defined as the overall scarcity of good quality water as compared with demands required to meet the needs of domestic, agricultural, industrial sectors and the requirements for maintaining ecology, environment and recreation. Another term that is also widely used is "water stress", which is defined as the imbalance between water demands and availability for meeting the requirements. This relationship is measured using an indicator known as the "water stress indicator (WSI)". This indicator was developed by Falkenmark and is used by the United Nations (UN). The UAE is considered to fall within the high range, with a WSI of greater than 1.0 (Szabo, 2011). Recently, the percentage of water use has increased at a rate twice that of population growth. This has resulted in regions all over the world being subjected to water stress. Increased water demands are driven by the increase in population and hence, increased water consumption in industrial, domestic and urban sectors. Globalization has also negatively impacted water resources due to contamination and environmental degradation.

1.1 Water resources in the UAE

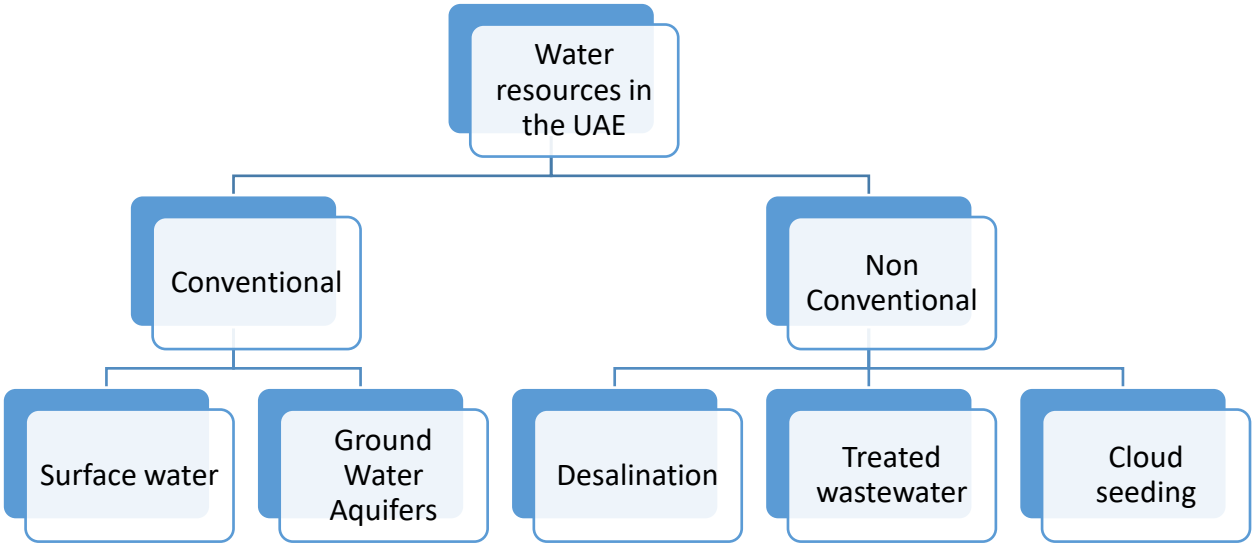


Figure 1: Water resources in the UAE (Fao.org, 2008)

Water resources in the UAE can be classified into two different categories(figure1), one being conventional water resources (Surface water and groundwater aquifers) and the other being non-conventional water resources (desalination, cloud seeding and treated wastewater) (Fanack Water, 2017). Surface water resources in the UAE are of limited quantity mainly due to the location of the country being in a dry belt region that is characterized with limited rainfall. In order to replenish surface water resources, several dams are built to help store surface water and harvest rain water. In the UAE, the total renewable water resources available per year are 150 million m^3 (Fao.org, 2008). Furthermore, groundwater resources in UAE are considered as the main natural water resource. These resources are further subdivided to renewable resources (shallow aquifers) and non-renewable resources (deeper aquifers). The quantity of groundwater resources available is known to be around 640 billion cubic meters (BCM), out of which only three percent is fresh and the rest is saline water. Most of these resources are located in the eastern part of the country (Bajada region) and consist of upper aquifers (made of silt and gravel sand) and lower aquifers (made of dolomite and limestone). The quality of water available in these aquifers ranges between 600 to 2000 ppm with thickness of about 200 to 800 meters (Fao.org, 2008). During the year 2003, a number of dams (around 114) were built with storage capacity of 118 million m3. This was beneficial to help in groundwater recharge which is currently estimated to be around 120 million m3. Additionally, desalination is also an important source of water particularly in the UAE. It was during the year 1976 when the first desalination plant was built in the city Abu Dhabi with a capacity of about 250 cubic meters per day. This number was then increased to about 4 725 346 cubic meters per day in 2002 and about 950 million cubic meters in 2005 (Fao.org, 2008). There are currently about 33 desalination plants in the UAE that use a combination of Multi-effect distillation (MED),

Multi stage flash (MSF) and Reverse Osmosis (RO). This is considered a beneficial source of water for industrial sectors since they are willing to pay higher costs for water than agricultural or domestic sectors. In addition to desalination, treated wastewater is an additional water resource that can help meet the water demand. There are currently 79 medium to large sized waste water treatment plants that produce about 615 million cubic meters (Moccae, 2015). This treated water is mainly used for landscaping and irrigation of gardens.

Table 1

Current and future forecasted quantity of water resources in the UAE (Fanack Water, 2017).

Water resources (million cubic meters)	2002	2005	2010	2015	2020	2025	2050
Surface Run off	150	150	150	150	150	150	150
Groundwater feed	125	125	125	125	125	125	125
Desalination	720	945	1,488	2,342	3,688	5,806	11,612
Treated Wastewater	1,222	1,493	2,150	3,232	4,717	7,134	13,993

Table 1 shown above summarizes the quantities of water resources available from the year 2002 until the year 2015; it also summarizes the forecasted quantities for future years of 2020 until the year 2050. By looking at these values, we can conclude that the volumes of desalinated water as well as treated wastewater continue to increase each year and are also forecasted to increase even further for the year 2050 (Fanack Water, 2017).

2.0 Aim of the research

The main aim of this paper is to address the current status of water scarcity in UAE, discuss the possible reasons behind it and suggest solutions to hopefully reduce such issue.

3.0 Methodology

In order to assess the current status of water scarcity in the UAE, a set of secondary data sources were used. These sources included data retrieved from the Food and Agriculture organization (FAO), World Health Organization (WHO), United Nations Development programme (UNDP) and World Bank data. Additionally, for primary data sources, a set of ten different questions were prepared as part of an online survey that was filled by 20 respondents from all over the country. Results from this survey will be discussed in section 4.4.

4.0 Literature Review

4.1 Water resource Challenges in the UAE

Water resources in the UAE continue to face significant threats that will eventually affect the future sustainability of resources in the country. Current trends indicate that there is a huge decrease in groundwater production and a significant increase in desalinated water (Murad, 2010). This means that current water resources are limited to nonconventional water resources. The main challenges currently faced in the UAE with regards to water management include water scarcity, decreased levels of groundwater, limited wastewater treatment and reuse outside urban areas, increased salinity levels of groundwater and increased cost of drinking water production (Export.gov, 2018). Some of the main reasons why the sustainability of resources is decreasing include location of the country, increase in population growth, industrial and agricultural activities, deterioration of groundwater and tourism (Murad, 2010). Each year, demands for water supply keep increasing; this places significant pressure on the country to invest more on water infrastructure as well as technology that can help meet the increasing demands. It has been forecasted by Environment Agency in Abu Dhabi (EAD) that by 2030, both brackish and fresh underground water in the UAE will be exhausted if immediate remedial measures are not implemented. Additionally, the UAE is considered to have one of the highest rates of water consumption in the world of about 550 L/day. This as a result also places great pressure on the government to meet the high water demand (Export.gov, 2018). Another issue that the country is facing with regards to water resources is unavailability of data and lack of data management which can affect the interpretation and results of any research. Currently, the main sources of information with regards to water resources include DEWA, FEWA, SEWA, EAD and Ministry of water and Environment. It is important that the data from such sources is organized in one place in order to ensure the information provided is coherent and also help decision makers when information is required (Murad, 2010).

4.1.1 Decrease in groundwater levels

Groundwater resources in the UAE are becoming depleted. This is evident from the differences between the recharge rates (of about 21.8 to 32.7 million cubic meters) and abstraction rates (of about 880 million cubic meters per year) of groundwater. Currently, water is being withdrawn from groundwater aquifers without any recharge to replace that amount. This has resulted in deterioration of water quantity for underground aquifers. Different cones of depression (of about 50 to 100 km) now exist in Hatta, Al Ain, Al dhaid and Liwa (Rizk and Alsharhan, 2003). Additionally, agricultural activities are also considered as one of the factors that affect quantity of groundwater resources. These practices are known to consume more than 70% of groundwater produced (Murad, 2010). Moreover, Around 75 percent of rainfall that reaches the country is actually lost due to evaporation losses; this means that rain water will eventually evaporate before reaching the groundwater reserves (Murad, 2010). As a result, infiltrated water will be less due to evaporation and hence, groundwater quantity will be deteriorated.

4.1.2 Deterioration of Ground water quality

Groundwater quality in the UAE continues to deteriorate due to the increased water demand and the decrease in rainfall rates. Additionally, groundwater salinity is one of the problems that developed over time. Salinity of groundwater has increased by triple the amount in northern and southern part of the region specifically during the time period 1985 to 1996. Possible sources of salt water intrusion include the lateral movement of saline water from sabkha regions and lower stratigraphic units. In order to evaluate the salt water intrusion, the ratio between the chloride ion and bicarbonate ion is used. In UAE, the most abundant anion is the bicarbonate ion in groundwater. In Al-Ain region, salt water intrusion has increased due to the excessive pumping of groundwater. For this region, salt water intrusion is assessed by looking at dominant NaCl and MgCl2 salts. In seawater, Na/Cl ratios are less than one (about 0.85) while in groundwater this ration is greater than one (Rizk and Alsharhan, 2003). Currently, areas that are affected by salt water intrusion include Dibba, Kalba, Al Dhaid, Ras Al khaima, Liwa, Dubai Jabal Al Dhanah and Al Ain. Ground water salinity started to increase in Bu Hasa during the year 1964 to 1985. The levels of salt increased from 3500 mg/l up to 5,500 mg/l. This has further increased to triple the amount during the year 1985 to 1996 (Rizk and Alsharhan, 2003). Additionally, nitrate is also considered an important parameter for water quality in the UAE. According to the world health organization (WHO), the limit of nitrate in drinking water is 45 mg/l as nitrate and 10 mg/l as nitrate nitrogen. Regions with high nitrate in the UAE include Al Ain, Liwa, Madinate Zayed and Wadi Al bih. The concentrations of the nitrate ion can reach up to 1000 mg/l for shallow groundwater aquifers. Due to the relation between nitrate ion and intensive farming, agriculture appears to be the main reason behind the increase of concentrations in groundwater (Rizk and Alsharhan, 2003).

4.1.3 Water scarcity in the region

One of the main reasons why the country is currently facing shortage of water resources is mainly due to the location. UAE is known to be located in arid environments with less yearly rainfall. The amount of rainfall is estimated to be around 78 mm/year (Fao.org, 2008); this is considered less when compared to other countries worldwide. Additionally, demands for freshwater resources are increasing as a result of increase in population. The recent birth rate in the country is increasing the population, which as a result has increased the consumption and production of water resources. Population in the UAE has increased from 324700 in the year 2000 to about 9,541,615 in 2018. This increase in population has led to an increase in agricultural activities in order to grow crops and supply food for the general public. As a result, there has been an increase in desalination and a decrease in groundwater production (Murad, 2010). Moreover, Tourism can also affect the water resources and will lead to an increase in water production. This is because as tourists increase, hotels and recreational facilities will demand for more fresh water to be supplied and hence, contribute to the current shortage of water resources in the country. Increase of water demand in the country can also be linked to industrial, agricultural and economic developments that attracted more immigrants. As a result of water scarcity, the government has implemented a national environmental strategy that is

aimed at planning and managing the water resources through a policy (Murad, 2010).

4.2 Current Status of water scarcity in the UAE

Water scarcity in any country can be categorized as “physical” water scarcity or “economic” water scarcity. The main difference between the two is that physical water scarcity is scarcity in water resources as a result of inadequate natural water resources, and economic water scarcity refers to scarcity due to poor management of water resources (Un.org, 2015). The two main phenomena that drive water scarcity include; the amount of natural water resources withdrawn and the amount of renewable water resources available for use. Due to the importance of water scarcity in several countries across the world, the United Nationals has set Millennium Development Goals in 2015 that state the need to reduce the proportion of people unable to afford or reach safe drinking water by half(Un.org, 2015).

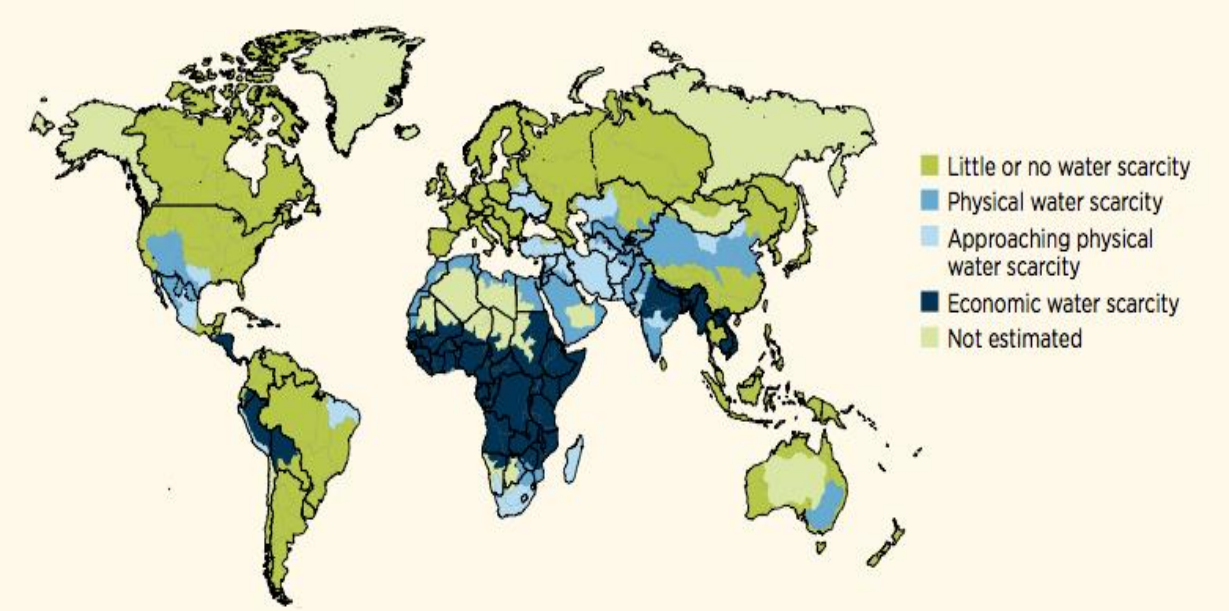


Figure 2: Global Economic and Physical Scarcity (Un.org, 2015).

According to a world water development report published by the United Nations and as shown in (figure2) above, UAE is considered to be facing physical water scarcity with annual water supplies of less than 1000m3 per person(Un.org, 2015). Although the UAE is abundant in natural resources such as oil, it is currently facing issues with regards to sufficiency of water resources. One of the main reasons is the geographic location; being in a dry region with little rainfall is contributing to scarcity of water resources. Additionally, population growth is also another major contributor on increasing pressure to existing natural resources such as water. As a result of this, governments in UAE are forced to rely on desalination. The main reasons behind scarcity of water resources are discussed in future detail in below sections.

Table 2:

Water withdrawal Parameters in the UAE (Fao.org, 2008)

Parameter	1995	2000	2006
Agricultural water withdrawal (10^9 m3/year)	1.408	2.279	3.312
Industrial water withdrawal (10^9 m3/year)	0.2	0.1113	0.069
Municipal water withdrawal (10^9 m3/year)	0.5	0.5138	0.617
Total water withdrawal (10^9 m3/year)	2.108	2.904	3.998
Agricultural water withdrawal as % of total water withdrawal (%)	66.79	78.48	82.84
Industrial water withdrawal as % of total water withdrawal (%)	9.488	3.833	1.726
Municipal water withdrawal as % of total withdrawal (%)	23.72	17.69	15.43
Total water withdrawal per capita (m3/inhab/year)	812.3	855.6	665.2
Total freshwater withdrawal (primary and secondary) (10^9 m3/year)	1.723	2.334	2.8
Desalinated water produced (10^9 m3/year)	0.385	0.385	0.95
MDG 7.5. Freshwater withdrawal as % of total renewable water resources (%)	1149	1556	1867

Table 2 shown above summarizes the main parameters for water withdrawn by various sectors in the UAE. As shown in table 2, the amounts of water withdrawal keep increasing each year. During the year 1995, only 2.108 Billion cubic meters (BCM) of water was withdrawn. This number increased to an amount double than that in 1995 to about 3.998 BCM during 2006. Additionally, table 2 also summarizes the volumes of desalinated water produced for three different years. Desalinated water produced increased from a value of (0.385 BCM in 1995) to about (0.95 BCM in 2006). Finally the table also summarizes the freshwater withdrawal as a percentage of total renewable water resources.

Table 3:

Availability of water resources (Fao.org, 2014)

Long-term average annual precipitation in depth (mm/year)	78
Long-term average annual precipitation in volume (10^9 m3/year)	6.521
National Rainfall Index (NRI) (mm/year)	51.95
Surface water produced internally (10^9 m3/year)	0.15
Groundwater produced internally (10^9 m3/year)	0.12
Overlap between surface water and groundwater (10^9 m3/year)	0.12
Total internal renewable water resources (IRWR) (10^9 m3/year)	0.15
Total internal renewable water resources per capita (m3/inhab/year)	16.38
Total renewable surface water (10^9 m3/year)	0.15
Total renewable groundwater (10^9 m3/year)	0.12
Total renewable water resources (10^9 m3/year)	0.15
Dependency ratio (%)	0
Total renewable water resources per capita (m3/inhab/year)	16.38
Total dam capacity (km3)	0.0611
Dam capacity per capita (m3/inhab)	6.672

Table 3 shown above summarizes the main parameters used to calculate the WSI and hence, help assess the situation for water scarcity in the country. Main parameters used for this calculation include the annual precipitation, renewable water resources and total dam capacity. These values were collected during the year 2014 by the FAO.

4.3 Main reasons behind water scarcity in the UAE

4.3.1 Location of the Country

As mentioned earlier, the United Arab Emirates is located in dry regions that are characterized with weather conditions having high evaporation rates and hence, less rainfall. As shown in table 3 above, the amount of precipitation per year is about 78 mm, which is less compared to other worldwide countries. As a result, the conventional water resources are not able to fulfill the increasing demands of water resources. This then places great pressure on the government to supply water using non-conventional techniques such as desalination.

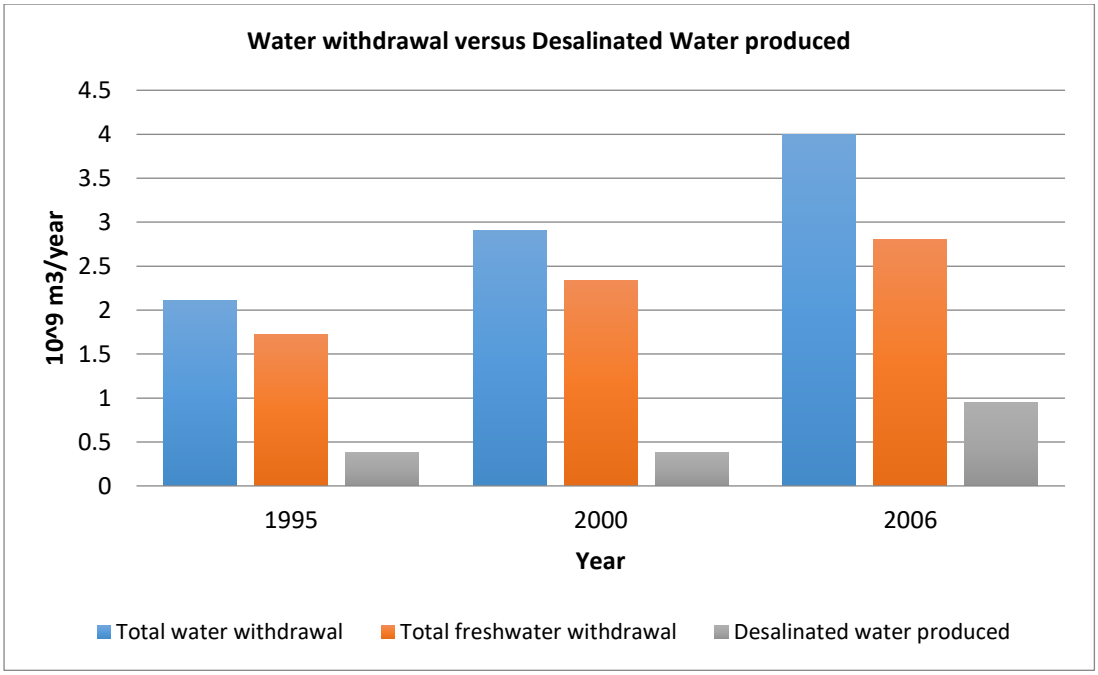


Figure 3: Water withdrawal versus Desalinated water produced (Fao.org, 2008)

As shown in figure 3 above, the amounts of desalinated water produced each year keep increasing; this is mainly to balance the increasing amounts of water withdrawn. The UAE along with other gulf countries face immense droughts and high usage of water for agricultural sector. The UAE is expected to run out of its water resources in 50 years time due to the nature of location that this country lies in.

4.3.2 Increased Population

It was during the year 1962 when demand for foreign labor started to increase as a result of commercial exploitation of oi (Szabo, 2011). Currently, the UAE is ranked the top amongst the wealthiest nations of the world. This has then led to a huge increase in population with many expatriate residents from all over the world.

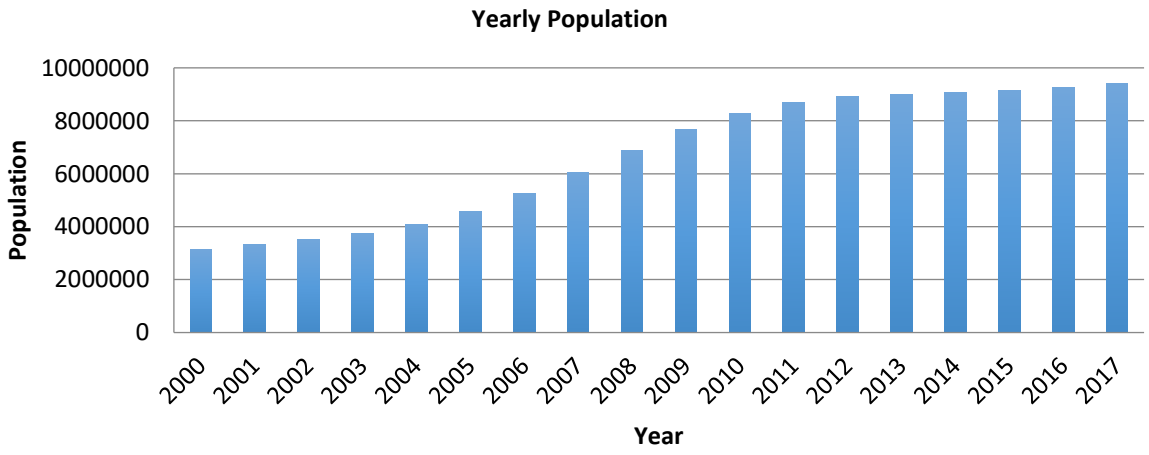


Figure 4: Yearly Population growth in the UAE (World Bank)

As shown in figure 4, the population growth in UAE keeps increasing each year. In 2009 alone, about 70 percent of UAE included foreigners looking for job opportunities. With the increase in population and the increase in expatriates, both water and electricity demands began to increase in the country. In the UAE, the total arable lands account for only 0.1 percent of the total area, this means that scarcity of natural resources and the high consumption lifestyles is a major concern for the future. According to a recent report published by the WWF, the "Ecological Footprint: of an average UAE resident is about four times larger than that of the global average and ten times larger than the budget available locally (Barton, 2013).

4.3.3 Inefficient water use

One of the main reasons why there is an imbalance between supply versus demand of water is due to the high water intake by people for agricultural and domestic reasons. The fact that water in the UAE is supplied for free makes people waste water without any concerns.

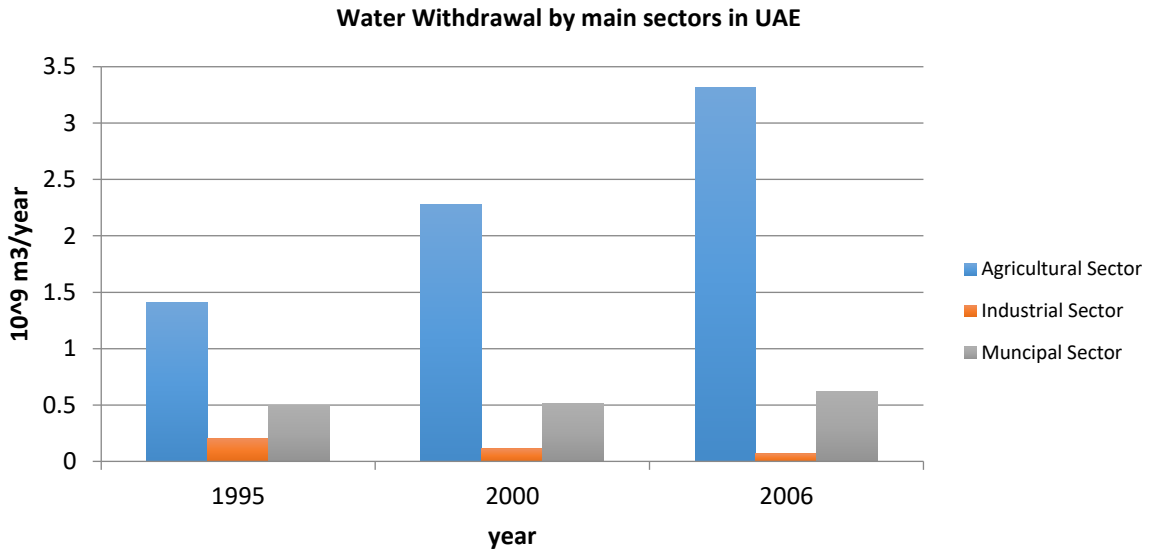


Figure 5: Water withdrawal by various sectors in the UAE (Fao.org, 2008)

As shown in figure 5 above, agricultural sector is considered to be the most water consuming sector when compared to both industrial and municipal sectors. In a report by the Italian Trade Commission during 2011, it was stated that UAE is one of the biggest consumers of water for agricultural sector. The consumption rate is about 67% for agricultural, 24% for households and only 9% by industries. It is estimated that by 2050, the water availability will fall by half in the MENA region (Barton, 2013). With the current weather conditions and the rapid growth in population combined with urbanization, the demands for water keep increasing. Additionally, increased usage and wastage of water is also attributed to lifestyle and attitude of residents in UAE. Residents in the UAE are known to in luxury lifestyles with lack of any water conservation measures. As mentioned earlier, the current usage of water per capita per day is about 550 liters; this is considered high when compared to the global average of water consumption, which is about 250 liters per person per day. This high consumption is mainly

due to the fact that water in UAE is cheap, and subsidized (Everist, 2018). As a result, high consumption patterns for water will follow for domestic, agricultural and industrial sectors.

4.4 Survey Results

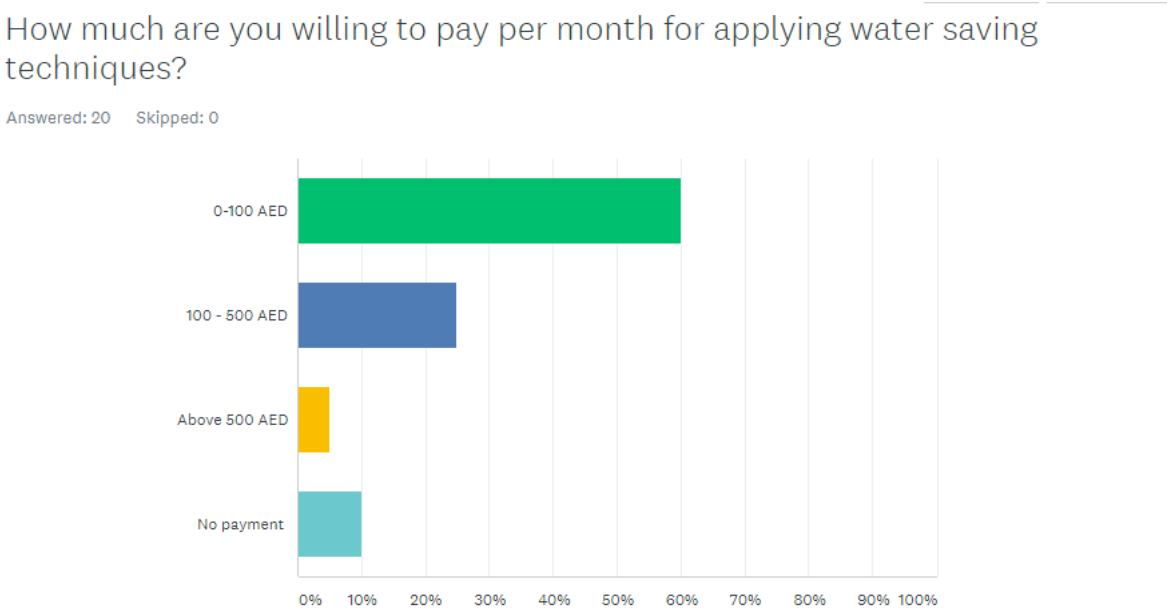


Figure 6: Survey responses for water scarcity survey

Results shown from figure 6 indicate that some people are actually willing to pay higher amounts of money (greater than 500 AED) in order to implement water saving techniques, while others prefer to pay fewer amounts or not pay at all.

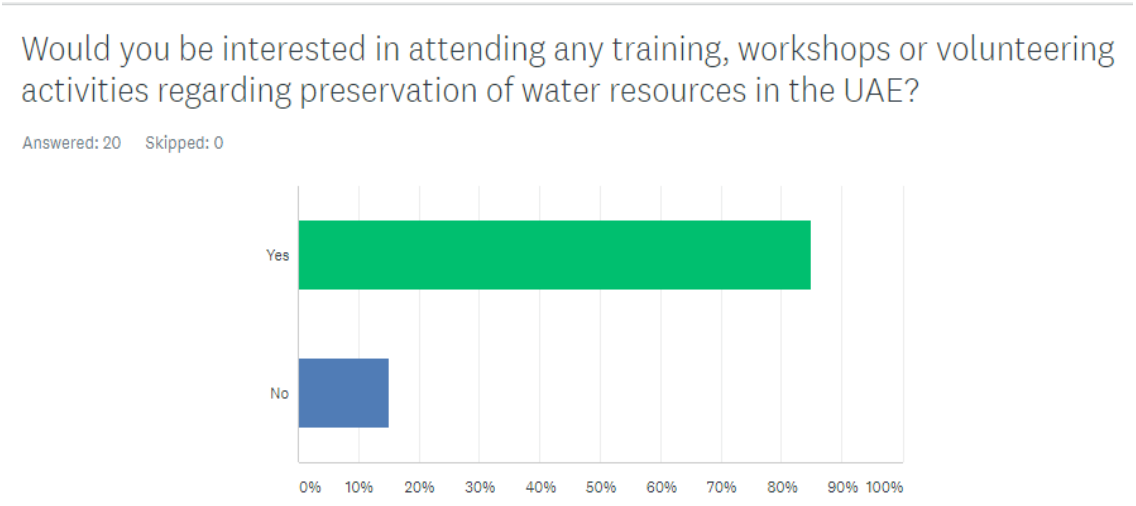


Figure 7: Survey responses for water scarcity survey

As shown in figure 7, 85% of people answered that they would be interested in attending workshops and training with regards to water resources. This is considered a positive result and indicates that people are willing to learn more about water resources in the UAE.

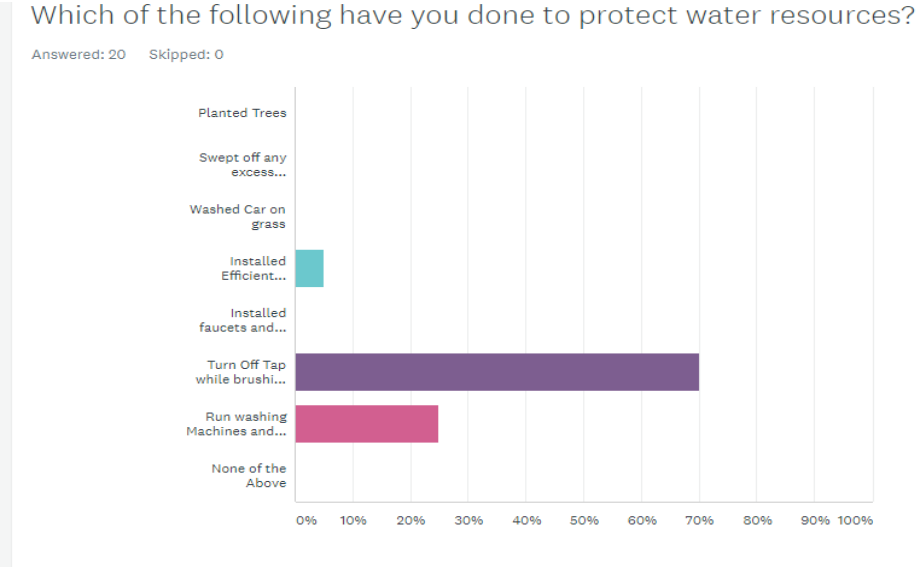


Figure 8: Survey responses for water scarcity survey

Results from figure 8 above indicate that there are a lot of water conservation practices that can still be implemented by people at their houses.

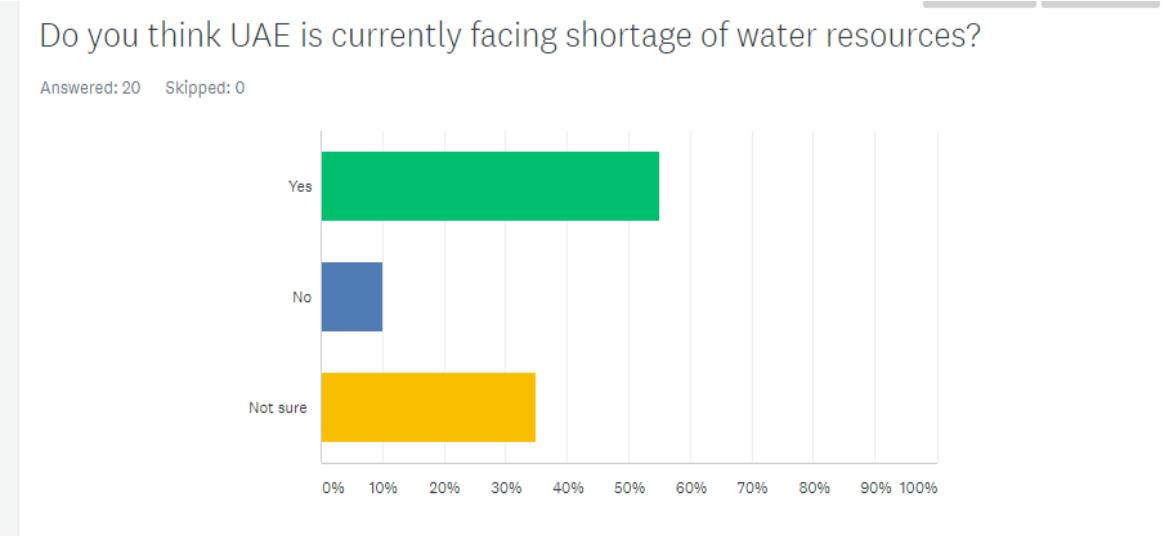


Figure 9: Survey responses for water scarcity survey

As shown in figure 9, around 50 % of respondents were not aware that UAE is facing water shortage of resources. This means that more efforts are required in order to ensure people are fully of aware of the current situation with regards to water scarcity.

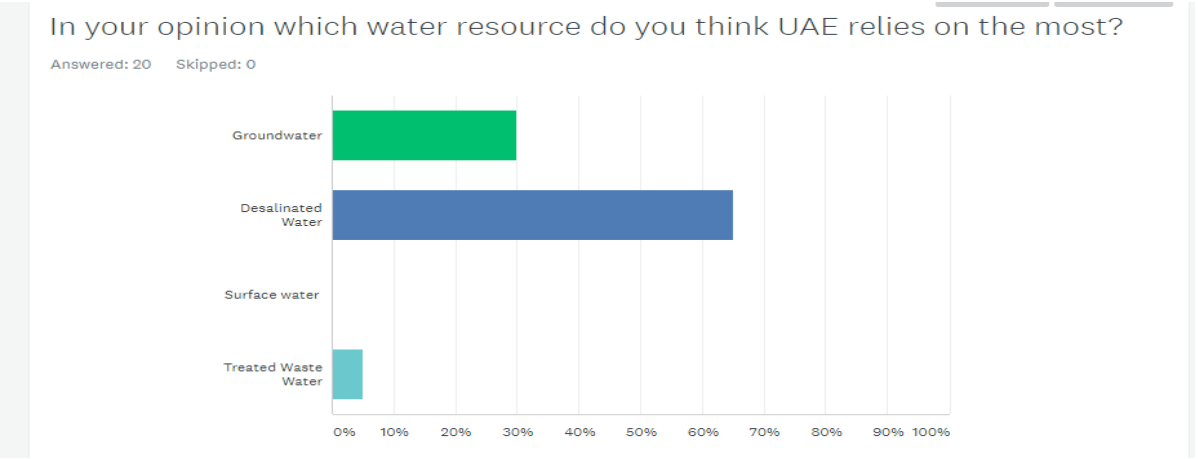


Figure 10: Survey responses for water scarcity survey

As shown in figure 10, respondents were aware that desalinated water and groundwater are the mostly consumed water resources in the UAE.

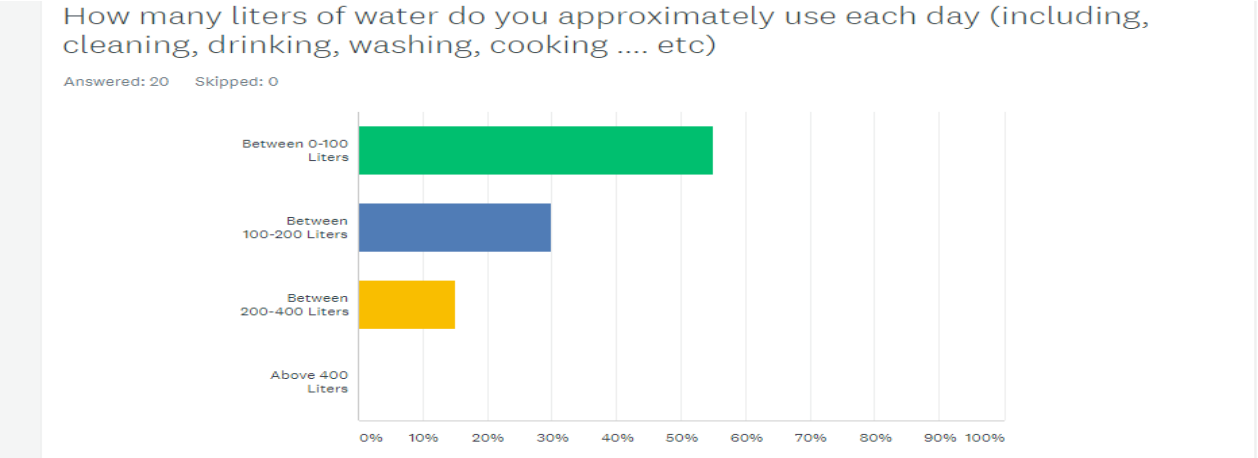
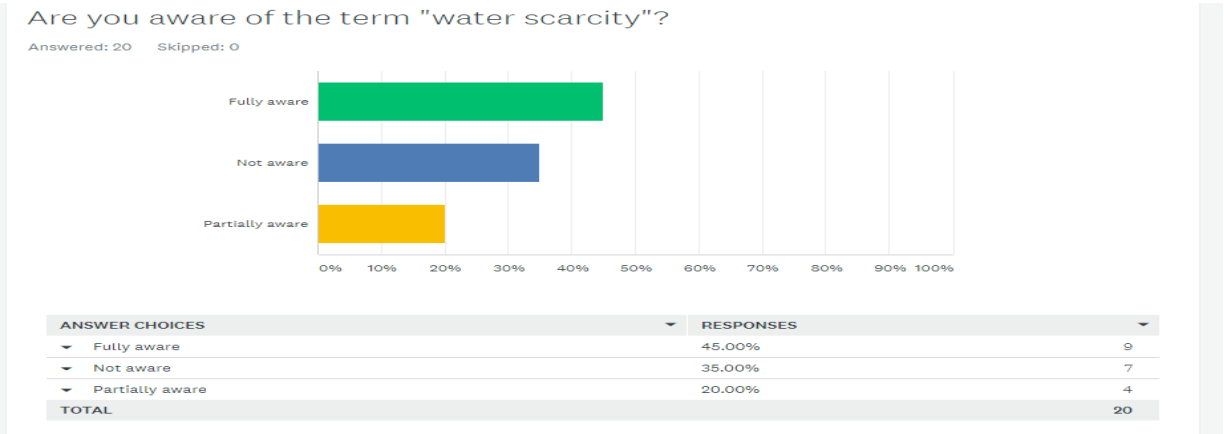


Figure 11: Survey responses for water scarcity survey

Results summarized in figure 11 show that people are not actually aware of the high amounts of water they consume each day. Many respondents seem to have underestimated this number when according to literature review residents in the UAE consume around 550 L/Day.



ANSWER CHOICES	RESPONSES	
Fully aware	45.00%	9
Not aware	35.00%	7
Partially aware	20.00%	4
TOTAL		20

Figure 12: Survey responses for water scarcity survey

Results from figure 12 indicate that more than 50% of respondents are either partially aware or not aware at all of the term water scarcity. This proves that more efforts are required to educate people about the current situation of water scarcity and the required measures to help conserve water resources.

5.0 Suggested solutions

As shown in section 4.4, the main results of the survey conducted show that people are not aware of the current situation of water scarcity; they are also not fully implementing different water saving techniques. Results have also indicated that people are willing to learn more about water saving techniques and actually spend money on such technologies. As a result, it is important for the government to prepare public awareness sessions in order to educate people about the water shortage UAE is currently facing. Furthermore, in order to solve the ongoing problem of water scarcity in this region, additional investments will be required. In a report published by ADSSC, it was explained that additional investments are required in order to connect the volumes of recovered waste water from treatment plants to irrigation sites at an aim in reducing quantities of desalinated water being used. Additionally the different regulating agencies in UAE for the water sector include Abu Dhabi Water and Electricity Authority (ADWEA), Environment Agency in Abu Dhabi (EAD), and Abu Dhabi Sewerage Service Company (ADSSC). Companies need to be aware of the requirements of such regulatory agencies, and must comply with them. Likewise, Monitoring Equipment such as flow meters and auto samplers, efficient flushing toilets, faucets and pipes with less leakage are all required as initiatives to reduce water usage. Currently, there are technologies that help capture rainfall, store it and then pump it to underground water. Such technologies will reduce reliance on desalinated water and eventually reduce consumption of fresh water resources (Export.gov, 2018). Additionally, in order to develop a long-term solution that will help in increasing the sustainable use of water resources, GCC countries including the UAE need to close the gap between cost of production and price of water. This will become the main driving force that will require companies and people to consume less. Abu Dhabi already began implementing this by introducing the tariff in 2017. Moreover, it is important to also introduce efficiency requirements in agricultural and industrial sectors to encourage the adoption of sustainable water measures and innovative farming practices. Examples of such practices include wastewater usage and grey-water recycling (Everist, 2018) and the use of bio-saline agriculture where salt water can be used to irrigate crops (Bardsley, 2018). Agricultural sectors can also use hydroponic during which gravel or sand can be used instead of soil to reduce the water usage (Bardsley, 2018). Even though reduced water consumption will not fully solve the water scarcity problem, it will buy governments more time to be able to develop sustainable and comprehensive water policies as well as influence a shift from excess consumption of energy and water (Everist, 2018). In addition, the Federal Electricity and Water Authority (FEWA) are also researching into a new technology that can use algae to absorb salt from water; which if proved effective UAE will be the first to implement it. Another important approach involves recycling of wastewater, in a report by the World Bank, it was concluded that 82 percent of the MENA waste water is not recycling. This could be a great opportunity for reducing water

shortage (Worldfutureenergysummit.com, 2018). All these initiatives mentioned are part of a greater overall commitment that is shown by the governments and private sectors to help tackle the issue of water scarcity in the region. By addressing the issue head on and being proactive, the UAE may be able to keep pace with the increased demands and hopefully eliminate and reduce the water scarcity issue.

6.0 Conclusion and Recommendations

The current status of water resources in the UAE shows that there is an increase in volumes of desalinated water and decrease in groundwater aquifers. The main issues currently faced with regards to water resources management include decrease in groundwater level, deterioration of groundwater quality and water scarcity. The rapid increase of population, inefficient water use and nature of the geographic location of the country are amongst some the main reasons for the increased scarcity of water resources. In order to reduce the increased scarcity of water resources governments need to take steps to ensure the population is aware of the current status of water scarcity. This can be ensured through public events and activations to inform citizens of the country regarding water saving techniques that can be applied from their side. Governments should also develop policies and possibly install meters at points of consumption to monitor the volumes of water utilized. Finally, in order to eliminate and deal with the issue of water scarcity, combined efforts are required from various domestic, agricultural and industrial sectors. As residents of the country, we need to keep working for eliminating the cause in order to ensure sustainability of water resources for our current and future generations to come.

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Strategy and Models for Partnership for Pharmaceuticals with Health Insurance Companies- UAE

Dr. Husam Al-Majali

Abstract

Objective: To explore previous partnership strategies globally between pharma and private payers: barriers, types and future trends. This will help to propose strategy for pharma industry in United Arab Emirates (UAE) to adapt to the changing reimbursement ecosystem due to private health insurance dominance.

Method: Systemic literature review for models of partnerships between pharma industry and private payers for papers in English during the period 2000-2018. 1525 relevant paper was extracted from used databases, screened for eligibility. Papers selected if it were non-price based agreements, non-biased or branded and serves the objective of the search. A survey for 20 health insurance leaders in UAE was also conducted to contest research suggested partnerships to local environment.

Results & Discussion: Twenty one papers on partnerships were reviewed. Barriers of partnerships found are: mistrust, legal, privacy threats and the operational factors. Main four models identified; data sharing, joint discussions & knowledge sharing, health promotion & patients support, and performance-based agreements. The future trends are mainly in spread of new technologies, health technology assessment, value based care and the new expensive therapies. Survey for local health insurance leaders showed promising towards successful implementation of these models and trends.

Conclusion: Pharma industry in UAE can adopt successful partnerships with private health insurance using global previous best practices explored in this review. This will help manage the challenges on pharmaceutical reimbursement due to health insurance pressure in UAE. A roadmap is proposed for planning and execution of stakeholder's engagement plan based on global experience and local feedback.

1. Introduction & Background

The United Arab Emirates (UAE) was established in 1971 from the union of 7 small oil-rich emirates located in the Gulf region. Total 2016 population is 9,270,000 while the estimate GDP is 357 Billion USD (1). This high-income country status is mainly due to the quick economic growth fueled by high oil prices and the ambitious wise development plans across all sectors in UAE economy especially tourism and regional trading hub.

The UAE healthcare system had also developed exceptionally through the last 30 years, it has progressed from very basic inadequate one to the current situation where the health outcomes are the same or sometimes better than developed countries (2). The growth in health expenditure have been also going massive changes during the last 10 years reaching to around

2405 Int.$ per capita and 3.6% of GDP in 2014 (3), which make it the highest in the Middle East region.

The Healthcare financing environment specifically has been going substantial frequent transformations in search for the most efficient system, with high quality healthcare standards (4-5). The following lists some of these changes in addition to some inherent background complexities in local healthcare environment:

1) Rapid multi-stage rolling of mandatory health insurance regulation to all population in Abu Dhabi (AD) in 2007 and Dubai in 2014, with different structure in each individual Emirate which resulted in creation of different independent reimbursement systems accompanied by wide variations in legal rulings, technical & coding systems, licensing, reimbursement rules and pricing, this huge segmentation is manifested by regulatory fragmentation between 4 distinct regulatory bodies; (Department of Health (DOH) in AD, Dubai Health Authority in Dubai, Health insurance authority (IA) and Ministry of Health (MOH) on federal level in the remaining 5 emirates).

2) The adoption of the most updated technical & digital systems in health insurance administration and payment reforms in very short successive intervals, moving from simple primitive practices into state 0f the art digital technologies & systems in Electronic Medical Records (EMR), International Coding of Diseases (ICD-9, ICD-10), Pharmacy Benefit Management System (PBM), Full E-prescription and Diagnosis Related Groups (DRG). This rapid transition created many operational difficulties and cost challenges for all stakeholders.

3) Unique demographic structure of the UAE population: 90% are expatriates who are mandated by the residency law to be covered by employer-funded health insurance schemes. The remained 10% are locals who get free healthcare services funded from the government; however, it is also delivered through the private insurance model.

4) The private insurance schemes are widely diversified in benefits & design, this mix result in the complexity of implementation, movement of health insurance contracts from one insurer to another, shopping for lower price premiums and result in a non-regulated price war among insurance companies.

5) AD market is dominated by the semi-government DAMAN insurance company. controlling 80% of the emirate market of 3 million policies, creating the challenge of a single payer in the market yielding many challenges to providers & suppliers in AD. In the adjacent emirate, Dubai market 4 million policies are widely distributed among more than 60 different insurance companies, this is ripping this market into very small portions and consequent inability to unify many of the administrative & clinical protocols governing the market.

6) The enormous variation in medical practice across the country due to the variation of medical schools and international medical partners managing the major healthcare

organizations (Cleveland Clinic, Imperial College of London, Seoul University, Johns Hopkins...etc.), this uniformity is reflected in overutilization of resources and increased expenditure.

Pharmaceutical sales in UAE are expected to grow by around 6.5% in coming 2 years to reach around $2.6 Billion in 2019 with only 10-15% portion coming from domestic manufacturers (6-7), this forecasted growth in drug expenditure is due to factors like aging population, high incidence of sedentary life diseases, high rate of population net growth, the coverage of prescription drugs in all health insurance schemes (but with policy limitations as formularies, tiering policies and contractual exclusions).

The UAE Pharmaceutical markets is valuable for international manufacturers which is evident by the fact that majority of these firms have based their Middle East regional offices in UAE, this is due to: 1) high market forecasted growth, 2) lessened registration and licensing for multinational companies, 3) world-class infrastructure with easy accessibility to nearby countries, 4) the dominance of market by patented imported drugs, with generic prescribing is only about 9% market share due to strong preference of patients to use patented imported products (8).

The current drug coverage policies in UAE are becoming more intricate with ongoing introduction of new drug coverage guidelines and restrictions by all insurers. In the last 2-3 years many new cost containment policies implemented: Dept. of Health (DOH) implementing generic prescribing policy and support of Rational Drug Use (RDU) initiatives (9), major insurance companies implementing multitier drug lists, closed formularies, and reference reimbursement pricing for medications. These actions are leading to unpredictable harsh impact of on pharmaceutical industry.

Pressure from private payers created an urgent need to understand and work with these new stakeholders due to their influential role in formulary management, prescribers' behaviors trends, and drug purchasing decisions in providers.

2. Hypothesis and Objectives

Aim of this study is to research the best previous partnerships between private payers & pharma industry that were implemented globally and study its adaptability to the local market. This will help the multinational manufacturer's regional offices in UAE to find the best answer on the query on how to understand and manage the challenge for drugs reimbursement in the emerging dominant private payer environment.

Results can draw the roadmap to adapt the pharma business model to the new reimbursement rules & policies, thus the outcome here will prove the theory on the availability of optimum Pharma-Health insurance partnership initiatives, projects and maneuvers that will fit the UAE distinctively healthcare market, complexities, regulations, and promote mutual objectives. Specific objectives from our research could include:

1. Better understanding the business acumen of health insurance when dealing with drug reimbursement, as in formulary management rules and pharmaceutical policies in approvals or coverage.
2. Identify novel approaches in improving access of patients to innovative medications through working collaboratively with health insurance industry.
3. Study the pharma experience in similar private payers' dominant markets, learn and use their best practices locally after surveying unmet need of local private payers.

3. Data and Methods

A systemic literature review was conducted according to PRISMA guidelines, obtained by means of search of the following databases: PubMed, EMBASE, and Scopus. Search done in September 2018. The keywords used were: private payer, pharmaceutical reimbursement, engagement, risks sharing, disease management program, pay for performance, partnership, value-based healthcare, health insurance.

Additional papers were identified by manual review from Google Scholars, bibliographies of the included articles, numbers of other sources were reviewed from consultancy firms as in PwC and Deloitte. The duplicate records were identified and removed. Titles and abstracts were screened using the following inclusion criteria; 1) English language, 2) Publication data from 2000 to 2018, 3) Non-price discount or rebate agreements. For the abstracts that met these criteria, the full-text articles were reviewed and analyzed.

Post the literature review; a questionnaire survey (Appendix-1) was conducted for 20 key decision makers in top 15 UAE Private Health Insurance (PHI) companies to explore local market trends and applicability of findings to UAE private payers market.

4. Results

More than 1432 papers were extracted from the described search in these databases (Appendix-2), additional 436 paper identified from other sources as mentioned above, Duplicates were removed: 343 papers. The remaining 1525 screened for eligibility; 52 were appropriate for full text assessment to match full inclusion criteria and matching the purpose of understanding previous work in areas of possible pharmaceutical-private payers partnerships. Only 21 articles were included eventually for analysis (11-31), those were only who addressed more than one specific partnership project to avoid bias or marketing/commercial content.

Analysis of the included studies showed that six of these were produced by consulting or legal office to advice pharmaceutical and payers on scope and boundaries of such collaboration (11,19,21,23,24,29). Five papers were reports coming from pharma industry specialized publications that address the commercial aspects in pharmaceutical business models (12,15,17,18,20). Six articles were coming from specialized insurance and managed care journals (10,13,14,22,26,27), the remaining 3 papers came from journals related to health policy and affairs (16,25,28).

Most information on concepts and challenges of partnership were based on interviews conducted with pharma and insurance leaders related to these types of partnerships (13,15,17,20) which highlight the reliability of such information delivered from actual people working on such models.

Most studies addressed the value and necessity of this partnership, general guidelines, discussing many types of partnerships with possible barriers and way to overcome these challenges (10-20,23,25,29-30). The other papers mainly addressed one type of partnership as in performance risk-sharing partnerships (22-28,31) or real-world data sharing (21).

Majority of papers source is US (80%), this is mostly due to the relative big private payers size compared to other markets.

The survey outcome for the local UAE private payers survey was positive; although only 40% of the interviewed decision makers have worked in partnerships previously with pharma, all respondents (100%) were willing to collaborate with pharma industry in the future. Most favored areas (fig.1) are disease management programs (85%), cost containment & utilization review support (75%), digital solutions (75%), data sharing (50%) and performance based agreements (20%). Challenges for partnerships (fig.2) are: legal & compliance (90%), no comprehensive business model from pharma (80%), mistrust and intents not clarified (75%), lack of innovation (60%), no clear benefit for insurance company (60%).

In the survey, barriers identified for innovative medications access into private payers' formularies (fig.3) are: high price (100%), available generics (90%), value proposition not communicated by manufacturer (85%), basic policy with low insurance premium (75%), low medications sub-limit for basic policies (75%), condition or product not covered (40%).

Fig.1. Q3: What areas you prefer to explore in collaboration with pharma?

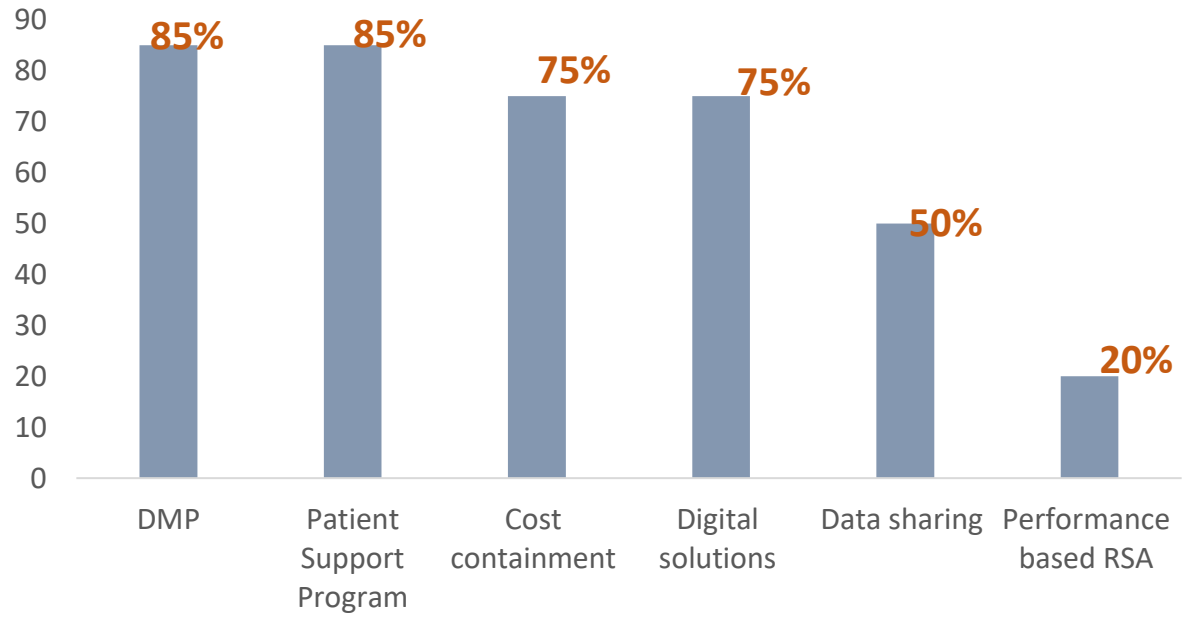


Fig.2. Q4: What are the Obstacles that may prevent you from partnering with pharma?

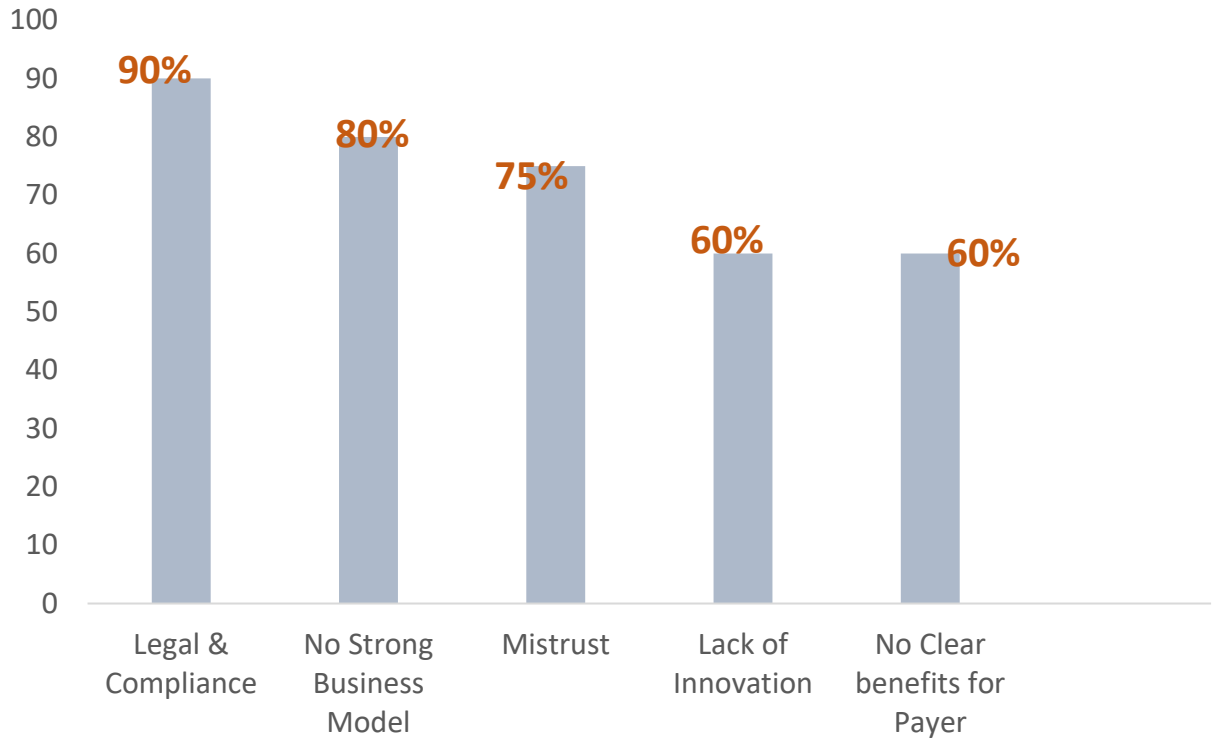
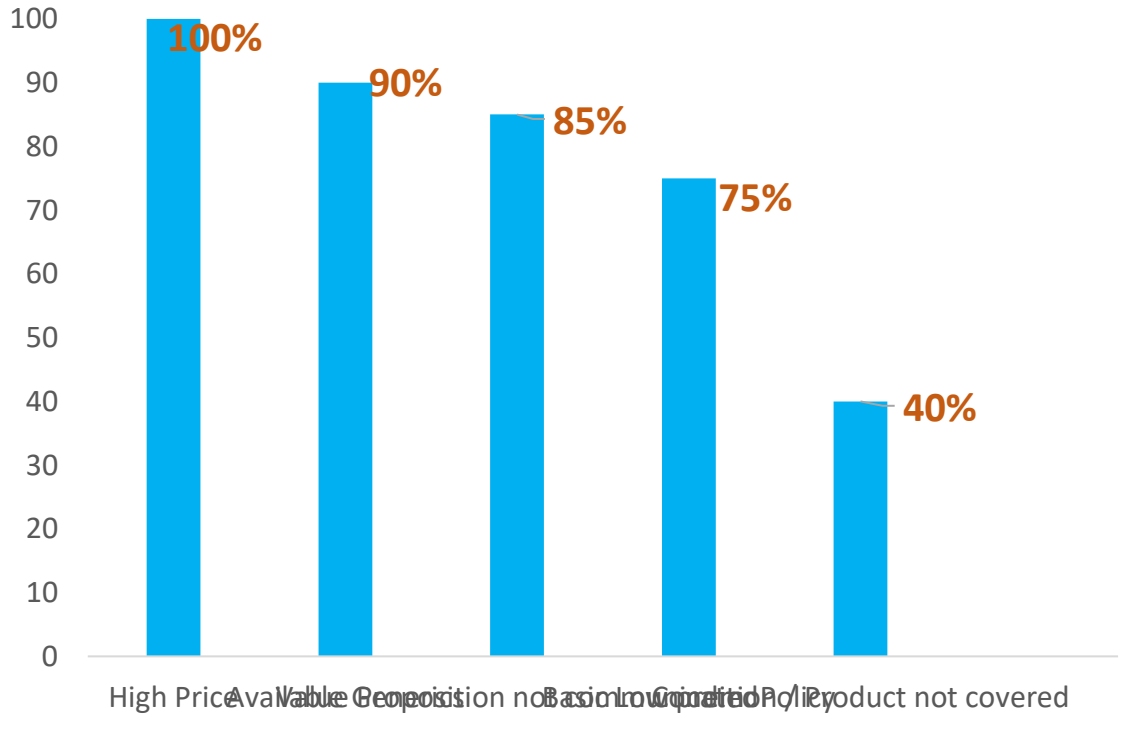


Fig.3. Q5: What are the barriers for access of innovative medicine in formularies?



5. Discussion

During the last 3 decades, there was huge growth in size of health insurance industry in global markets, it offered financial risk-mitigation against healthcare costs and minimized the risk of incurring unexpected medical bill. However, there is growing concern about the affordability and sustainability of this industry, the cost of health insurance has surge: the average annual premium for US family coverage in 2015 was $17,545, a 27% increase from 2010 and a 61% increase from 2005 (32).

Pharmaceutical industry and drug expenditure had been a target for intensive campaigns towards scrutinizing its cost-effectiveness and role in spiking of healthcare costs. The drug companies mission faced "a tsunami of change" (10), moving from its role to provide regulators of a product's safety and efficacy to obtain marketing licensing, to the new additional roles of fulfilling the value perception of the new segments of stakeholders.

Payers (public & private) had acquired more power to control access of patients through physicians to prescription medications (12,16,18,19,23), this is achieved in so many direct and indirect policies; 1) formulary inclusions, 2) step-therapy, 3) pre-authorization, 4) utilization review, 5) pharmacy benefit capping (39). These pharmaceutical management policies can be sometimes disturbingly non-transparent, ambiguous, and non-evidence based, enabling payer to become the uncontested dominant decision maker in pharmaceutical market.

Pharmaceutical industry reacted to payer environment changes; creating the new units of Market Access who are working hard to build mechanisms to deal with this seismic change in healthcare; the model is changing from a volume-based into a value-based payment for drugs (11).

Pressure from private payers had led to much innovation thinking and search for new winning engagement strategies and partnership models with health insurance industry (16) seeking to build trust, improving access and better mutual understanding.

5.1. Aim of Partnership:

The initial aim and motivation came initially in response from the pharmaceutical companies, craving for better understanding of the private payers' business strategy and tactics regarding the pharmaceutical expenditure, earn payers trust, lessen the growing cost-containment policies, and gain traction for other more constructive solutions as in the "beyond-the-pill" adherence programs (17). Gaining trust target have been stressed in almost of the literature articles reviewed (11-30).

Partnerships and working together make pharma grasp how payers make the decisions for formulary restriction and how to influence it (12,19,29). It also helps to enhance market access, drive better innovation recognition, better sense of customer need and shape healthcare policy development (29-30). The aim was to learn how to move from fast wins mindset into earned

trust that eventually will grow into better business opportunities and favored positioning in formulary listing (11).

The aim of private insurance is mainly development of innovation and technologies for cost management, understanding the demand-supply model of pharma expenditure, and strongly shaping future of healthcare as a value-based reimbursement away from the traditional volume-based model (17,18,20,21,22,26,30).

However, there are many common shared goals that should be investigated and highlighted in any partnership which are; patient centricity, mutual benefit & trust, financial sustainability for the private health insurance model, joint working and improve innovation in healthcare delivery (12,19,33). The mutual aspiration should be towards Value Based Care (VBC) triple aim consensus: better outcome and patient experience at lower sustainable cost (18).

5.2.Barriers to Partnership:

5.2.1. Trust Gap:

The mistrust is the result of the long history of inescapable tendency to view one another as adversaries due to the opposing financial interests that exist between any buyer and seller (12). Working on different sides of healthcare financing (supplier vs payer) had created solid barrier to communicate or see the other part point of view. Mistrust is the most important barrier to start communicating any initiative, any business proposal for partnership should address this factor; it is sensible to address the aim of partnership, clarify all aspects that can resolve the mistrust factor.

5.2.2. Compliance, Legal & Regulatory:

This is the most important factor to consider at early stages of designing the partnership. Although there are no specific legal or regulatory laws to regulate the partnership agreements between the pharma and private payers in most countries, there are many non-specific regulations govern partnerships as we see in US for example: federal anti-kickback law prohibits, unfair trade practices, consumer protection statutes, patients' privacy and data security regulations (14). Similar regulatory constraints are found in European Medicine Agency (EMA) and other healthcare systems. The early focus is to get the partnership project plan passed and agreed through legal (19).

Pharma industry in general is also under immense compliance & regulatory acts and laws by federal and state levels, especially in dealing with managed care organizations (14), or private entities that will include: private payers, Pharmacy Benefit Managers (PBM), and even the third-party companies. EMA & FDA mandates much compliance in many areas as data sharing or communicating clinical trial progress (20).

Special attention should also be made when dealing with huge diversity of third parties that are usually involved in most partnerships, as consultant, access agencies, adherence solution

providers, IT providers, charities. They play important role in providing expertise in many specialized areas, and serve as bridge between the different stakeholders, but working with them still fall under regulations as Foreign Corrupt Practices Act (FCPA) in US or the UK Bribery Act, proper Due Diligence investigation should be taken to mitigate such risks (34).

5.2.3. Privacy, Security:

Patient's privacy and information security is at risk in partnership models involving utilization of claims data or big data analytics tools (20), this is a risk that should be addressed and mitigated inherently in any partnership proposal, contracts or technical details. Insurance clients don't like that their electronic medical records or personal information are under the threat of cyberattacks or mined for commercial or political purposes, additionally; many will not feel comfortable that their employers are aware of their depression or sever uncontrolled diabetes.

Direct-to-consumers advertising is non-legal in most countries and the subtle use of partnership privilege to facilitate such practices should be avoided completely (14).

Having the compliance & legal department on both sides of the partnership aligned and concurred on the process and details of data transactions or sharing is essential, it govern the project against such privacy/security violations threats (21).

5.2.4. Operational & Technical Difficulties:

Establishing a shared operational platform of partnership between the two different industries is difficult; IT integration of many systems, diversity of insurance contracts and benefits design, heterogeneity of coding systems and electronic medical records, unavailability of information systems to measure agreed metrics and outcomes and many other relevant details in the partnership proposal.

Having senior account managers on both sides who are experts in such details is valuable and could be critical in the many aspects that we will discuss later in this paper (11,12). Training of the staff working in the partnership on these aspects are crucial for success, another option is to outsource the partnership technical part implementation to a third-party agency or consultants.

5.3.Models and Types of Partnerships:

After settling on the definite value of such partnerships, efforts have been always on the move exploring new innovative models and shapes for such collaboration, which should meet the goals of partnership: build trust, improve business relationships, mutual benefit, patient centric, value-based, responds to legal and compliance domains on both industries, cost effective and help to reduce healthcare expenditure.

5.3.1. Data Sharing

This form of partnership has been well-established in many cases along the last few years (10,11,20). It is basically focused to identify mutual benefits of sharing both partners' data, as in research date by the pharma or aggregate anonymized Real World Data (RWD) as in claims data by the payers. Data analytics and flow in both directions are essential as the move into value-based healthcare is dependent on proper utilization of data streams, this will identify usefulness of any product in improving outcome in cost-efficient way (20).

The benefits will be helpful for pharma in many areas; 1) improved development of new products. 2) providing scientific reimbursement guidance in early phases of new drug development for pharmaceuticals enabling that such innovations are meeting payers concern (10,16,17,18,20,21,31,33). 3) better understanding of trends and behaviors of the disease management and physician response to these changes in treatment (21).

The payers will benefit from pharma rich experience in data utilization and planning, so it will help in 1) future costs planning regarding pharmaceutical expenditure, 2) clinical trials and drug development data help them better planning and benefit design for different population, 3) development of tools for health technology assessment and basis for decisions in evidence-based reimbursement (21), 4) the data transparency and accuracy are the cornerstones for development of different performance based or risk sharing payment partnership agreements (11,17,18,20).

The privacy, transparency and security challenges are massive in this domain of partnership; the model should be based on 100% compliance with regulators guidelines (20). Shared data should respect patient's anonymity and prescriber's individual trends. Technical difficulties are also enormous due to heterogeneity of medical records systems, costs of cleaning data to the level they can be shared, another important element is the risks of revealing proprietary strategic objectives and tactics on both sides, early drug development secrets or real world performance (20,21).

Development of trust and improving health IT systems to capture the value-based care ecosystem is essential. Data sharing link all players in the value chain, strategic or on even going to lower level, to help in patient education and adherence programs, it is the language to help both pharma & payers to share the assets of their industry performance and how they can integrate for better healthcare (30).

5.3.2. Joint Discussions and Knowledge Sharing:

This territory of partnership is huge and extremely varied, which reflects the complexity and miscellany of healthcare know-how itself, and the value of collaboration among all stakeholders to achieve the synergy. The aim will be building trust (as always), lowering cost, better quality, sustainability in the face of surge of medical practice complexity, expenditure and R&D costs (11,17,19,20).

This branch of partnership is immensely diversified and innovation is infinite; 1) workshops & focus groups fostering consensus on unmet priorities and difficulties to help identify common ground and objectives, develop aligned strategies and tactics (17), 2) Payer Advisory Boards in certain disease areas to address guidelines and relation to current practices in coverage, formularies, payer surveys and webinar discussions (12), these can provide important payer prospective advice in earlier stages of drug development, 3) building capabilities in emerging trends of telemedicine or Mobile Health (M-Health) (16,29), 4) studying cost drivers in healthcare and joining forces to identify inefficiencies and eliminate them, 5) shared task forces to compete fraud and improper utilization of resources (including medications), 6) prescriber's Continuous Medical Education Educations programs (CMEs), 7) development of medical practice guidelines to reduce inconsistency and variation in medical practice, 8) development of clinical software or IT capabilities in areas of shared interest; as improving quality of electronic medical records or doctors coordinated implementation of clinical guidelines, 9) much of expertise sharing developing in fields like Pharmacoeconomics, Health Technology Assessment (HTA), Budget Impact Analysis (BIA), pharmaceutical pricing (17).

5.3.3. Health Management and patients support programs:

The superb mix of expertise, knowledge of pharmaceuticals in disease management, therapeutic guidelines and cost effective therapies, along with wealth of private payers' data, cost containment thinking and legal compliant access to patients data can lead to a successful partnerships in the areas of adherence promotion, Disease Management Programs (DMPs), 24/7 patient support or monitoring programs, tele-health support and all sort of health promotion programs (12,17,36).

DMPs are usually long-term projects that may run for years for certain chronic conditions, it is widely used across all countries and represent one of the most widely adopted partnership program as it gather important benefits; improving the well-being of expensive long-term ailments, improved customer satisfaction, lowers costs, and promote the valued manufacturers concept of adherence (15).

Multiple manufactures with complementary product portfolios or even partners from medical devices can share same DMP, supplying broader range of needed medicines or medical devices and demonstrate that partnership is not commercially oriented or captive to one manufacturer (36).

Special therapeutic areas are more attractive for DMPs partnerships; chronic diseases, expensive therapies, diseases that need intensive coordinated multidiscipline interventions, diseases with necessity for patient education and commitment. DMPs are on top of attractive partnership programs that can bring many benefits to patients in serious chronic diseases, overcome affordability and adherence barriers.

Another subset of partnership in area of patient support programs may come in the form of providing financial support for less privileged patients; with insurance policy benefits lacking the cover for certain expensive therapy, or in case the annual limit has consumed. Third party

firms are increasingly available globally to help all forms of patient support initiatives, and much literature have been published to detail proposed structures and mechanisms for such different models (36).

The patient support programs will provide much needed financial support to less fortunate patients without compromising listed prices of drugs.

5.3.4. Performance Based Risk-Sharing Arrangements (PBRSAs):

These are diversified types of agreements between a payer and a pharmaceutical manufacturer where level of reimbursement/price is variable and will depend partially on future performance of this drug in either research or real world (31). This variety includes "risk sharing agreement" "outcome-based contracts" "conditional reimbursement" "Coverage with Evidence Development (CED)" and other terminologies.

The main feature of these agreements is linkage of full reimbursement or future coverage to evidence of efficiency and proved outcome (24). These schemes are working on the basic principle of sharing cost of uncertainty of performance for the newly launched products and granting outcome "warranty" to the health insurers. The interest in such "Risk-Sharing" arrangements is still growing globally, and expectation that increasing number of these schemes will be the trend, manufacturers and payers satisfactions are high (22).

These types of agreement have many challenges and inadequacies; 1) wide variability in design and terminology, 2) too much technical details and requirements should be clarified and agreed to avoid confusion and deviation from the basic targets for both parties, 3) require well-developed outcome measurement systems to compute effectiveness as in claims data (24), 4) the potentially actionable outcomes are restricted to those that can be measured in short term (24,28), 5) the significant legal & administrative barriers, such as excessive resources and costs associated with data collection or execution (22,25,26,28).

Benefits are many; 1) better early patient's access to new treatments, especially if the alternative is noncoverage (28), 2) better "value-based" pricing without changing the global price or published list price (26,28), 3) rewarding innovation for manufacturers, 4) generating evidence on what works in the real world (27), 5) reducing uncertainty in payers' decision & cost reduction (26,27,28,31).

Although high number of different schemes are being agreed and conducted in many parts of the world and still rising till today, the balance between pros and cons of such partnership schemes are still debatable (12,24,27,31). Successful PBRSAs require selection of the proper drugs and diseases that meet required criteria for importance, financial payment approach, and availability of outcomes measurement data (22). Meticulous revisions of the appropriateness, barriers of such agreements to private payers are examined in many papers in our systemic review (27,28,31).

5.4.Future trends and Recommendations:

5.4.1. New Technologies:

There is progressive emergence of new technologies; increased use of big data, health data analytics usage in detections of overutilization trends, artificial intelligence, use of mobile phones and other wireless technology in medical care (M-health), new patient-empowering information technologies and widespread social media (10,17,18,20). Partnerships based on utilization of such technologies to improve outcome and sustain the health insurance cost will be welcome by all parties.

The digitalization in healthcare arena at all levels is a game-changer trend in helping to manage the diseases and healthcare financing solutions-including private health insurance industry (41). Incorporating such technologies in shared projects is very helpful for sustainability and feasibility of partnership concept as it aligns with the rapid innovation in healthcare, align the current trends for client's attachment to digitalization and usage of their smartphones applications.

5.4.2. Widespread use of Health Technology Assessment (HTA):

HTA & other pharmacoeconomics methodologies will be more commonly used in future private payers' reimbursement decisions, this is creating the tools for payers for more empowerment through evidence-based reimbursement decisions and coverage. It is important to remember that quality-of-life or many other HTA basic concepts definitions & issues don't translate into value for private payers as for society or public payers (15). Pharmacoeconomic discussions with private payers to improve coverage should be strictly tailored to their own perspectives (38).

5.4.3. Value Based Care (VBC):

Value-Based Care (VBC) reimbursement is growing rapidly in US & Europe but less frequently in other emerging markets. The trend is moving from fee-for service payment systems to pay-for-performance models, and the challenge is that it is payers taking the steer in defining value (15,17,18).

The pharma should partner & innovate to expand concepts & practices of value-based care far beyond limited pricing and entry-agreements contracting, into more wide range of activities and practices that support value proposition story. Building the capabilities, responsibility, and transformation toward this change is essential for adapting to this major transformation in pharmaceutical reimbursement (35).

The pressure to adopt VBC also extends to providers through DRGs & managed care solutions, and recently to patients through more cost awareness and sharing, through higher differential copayment levels based on patient selection, this can be over spilled and risk the access to innovative medications.

The payer request for a tangible outcome is the new paradigm, collaboration among all stakeholders to ease these pressures is the core to move forward.

5.4.4. New Innovative Expensive Therapies:

There are more innovation and activity of R&D in specialty medications, oncology, biosimilar, targeted therapies (12), biomarkers & genomic-based treatments. These areas of therapies are much different and more expensive than primary healthcare medications. This innovation specificity requires more tailored solutions, and market access initiatives to serve the basic concepts of successful partnership. Helping the payers adapt, accept, and share the transformation into these therapies are vital in this era of therapeutic innovations (15).

Early communication to payers and enabling affordability of these therapies for insurers (12,16) will help avoid more stringent actions as step-therapy, tiered formularies, and prior-preauthorization (37).

5.4.5. Dedicated Senior Insurance Expert Account Lead:

Better understanding of private payer's environment and mindset requires more specialized work to establish the trust, meticulous understanding of their needs which are not necessary matching those of public payers. Pharma should have the ability to put itself into payer's shoes (20).

Payers have different policies and tendencies that color their interaction with pharmaceuticals (12), development of capabilities within a specialized team or dedicated, well informed, senior account person who can effectively bring the different parts of the organization to the private payers in a meaningful way; someone with enough experience in private payer environment, good leverage within his company to impact decision-making (11,12,20).

Payers have more different and complicated decision-making processes than those of usual pharmaceutical customers, skills to fully understand the private payers' business acumen should be actively investigated and incorporated within the market access capabilities.

5.5.Survey:

The survey was conducted for 20 key decision makers in top 15 UAE Private Health Insurance (PHI) companies; they were either the pharmaceutical unit manager, network leaders or business development managers. This was through face to face interview.

a) Although only 40% had previous experience partnering with pharma in the last 3 years, all participants (100%) are willing to collaborate with pharma in future partnership initiatives, which confirms the hypothesis that local models of partnerships are welcome and can be supported by payers.

b) Most favored areas for partnerships are models that will involve either patient experience, lowering costs, or both: DMPs, cost containment support, digital solutions, patient support

programs. The appetite is much less for models that are dependent on high level data sharing, compliance sensitive or involves financial transactions as in performance based agreements.

c) Top rank barriers for innovative medications access in formularies as high prices availability of generics, and low value proposition are mainly due to traditional supply-demand relationship dynamics, these can be minimized by proper communicating the evidence-based value. Other barriers are mainly due to policy benefit design: as in condition or product not covered, basic policy with low insurance premium: such challenges can be tackled in models like patient support programs or PBRSA.

d) Challenges for partnerships with pharma are mainly to factors that can be studied and solved through starting trust-building partnerships, better communication, analysis and drafting an action plan with relevant stakeholders.

6. Conclusion

Private Health Insurance (PHI) model is dominating in United Arab Emirates (UAE). It holds a special complexity, cost constraints pressure and access challenges regarding the pharmaceutical reimbursement.

We aimed for development of a local PHI stakeholders engagement strategy to help manage challenges for drug coverage in PHI. This is through exploring the pharma previous partnerships with this industry stakeholders, reviewing best practices and concluding outcomes.

We successfully explored the global experience in improving access of patients to innovative medications through working collaboratively with health insurance industry.

The review discussion successfully identified and listed: 1) barriers to successful partnerships, 2) varieties of models, 3) pros and cons of each prototype, 4) future trends for such collaboration. Based on review findings, we surveyed 20 UAE health insurance leaders to investigate local readiness for such initiative.

Conclusion indicates that pharma-health insurance partnership and collaboration are welcome by local private payers and can be applicable UAE healthcare. However, such efforts should be structured and planned to make it appealing and fruitful.

A roadmap for such partnerships in UAE can be recommended based on our review and survey outcomes: 1) Identify priorities and long term needs based on your organization strategy and portfolio of products, 2) Private payers market understanding and segmentation, 3) Higher leadership commitment and resources allocation, 4) Building or acquiring relevant capabilities, 5) Understand local payers unmet needs, communicate with payers positively and effectively, 6) Selection the appropriate partnership model for each product, 7) Identify and solve barriers with the partner, 8) Explore future trends and transform for better outcome, 9) Never to miss the basic principles: Building Trust, Mutual benefit, Patients centricity, Cost-efficiencies, Innovation.

7. Appendices:

7.1. Appendix 1:

Questionnaire Content for Health insurance senior management:

Q-1: Have you been engaged in the last 3 years in a partnership program with a pharmaceutical manufacturer? Y/N

Q-2: Do you see possible collaboration opportunity between your company and pharma manufacturer? Y/N.

Q-3: What area(s) you prefer to explore in any collaboration with pharma industry?

a) Disease Management Programs.

b) Patient Support Program (financial).

c) Performance Based & Risk Shared Agreements.

d) Data Sharing.

e) Digital solutions.

f) Cost containment, Fraud & Utilization review Support.

Q-4: What are the obstacle(s) that might prevent you from partnering with pharma?

a) Legal or compliance with internal regulations or regulator.

b) Mistrust and intents not clarified.

c) No clear benefit for insurance company.

d) No comprehensive business model from pharma.

e) Lack of innovation

Q-5: What hurdles you see in providing better access to innovative medicines in private insurance formularies?

a) High price.

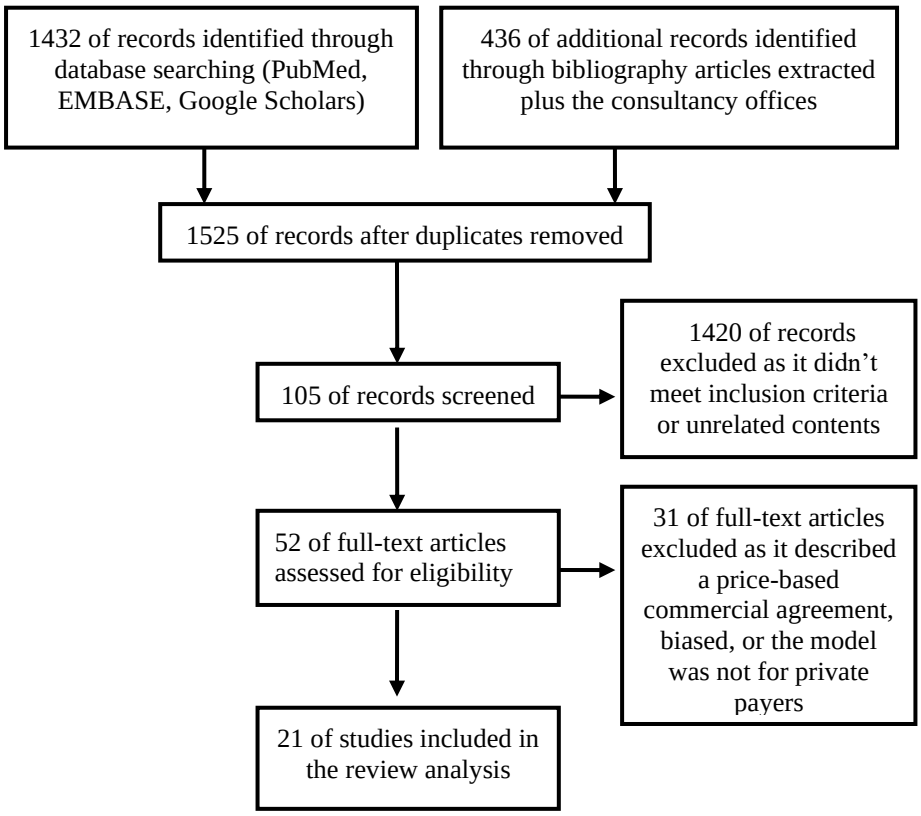
b) Availability of generics.

c) Condition or product not covered.

d) Basic policy with low insurance premium/Low medication sublimit.

e) Value proposition not communicated by manufacturer.

7.2. Appendix 2: PRISMA Flow Diagram.



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Whistleblowing to expose criminal activity in the health sector

Niyi Awofeso, PhD and Lubna Darwish (HBMSU BScHA learner)
Affiliation: Professor of Health Administration, Hamdan Bin Mohammed Smart University, Dubai, United Arab Emirates.

Abstract

A whistleblower is an employee who alleges wrongdoing by his or her employer (or any organization) of the sort that violates public law or tends to adversely affect the public or at least some members of the concerned organization. The imagery of whistleblowing is reflected in football referees blowing their whistle during matches mainly to indicate illegal conduct, as well as police officers blowing their whistle at an escaping criminal. The word whistleblowing was elevated into popular discourse in the United States following Ralph Nader's 1970's "whistleblowers' conference" in Washington, in part to avoid the negative connotations found in earlier synonyms such as "leakers", "rats", "traitors", and "snitches". Whistleblowing to expose criminal activity is an oxymoron in the sense that in certain circles, a whistleblower is regarded as a traitor, a criminal. In other contexts, a whistleblower is a hero, a patriot. Some whistleblowers are both simultaneously, as with the martyrs and cowards labels of terrorists. The World Health Organization cites healthcare-related fraud as one of 10 leading causes of inefficiency in health systems. Despite the potential of whistleblowing to reduce healthcare fraud and unearth criminal negligence with respect to patient safety, it remains a highly controversial approach for exposing criminal activity and improving patient safety in the health sector. This chapter discusses the main aspects of health care fraud – billings for services not provided, duplicate claims, kickbacks, embezzlement of health budgets, service and items upcoding, and deliberate performance of medically unnecessary services for the purpose of financial gain. Also discussed are cover-ups of criminal negligence in clinical care, research fraud, as well as the potential of whistleblowing to address such widespread health system deficiencies. The author favours internal whistleblowing for criminal misdeeds in the health sector as a first resort, provided that health organizations' "raising concerns" policies and procedures attenuate the threat of retaliation, sullied reputation and/or ostracization, outline a thorough and transparent review process, and provide appropriate incentives for those who elect to report crimes and misdemeanors in health sectors. Veracity of whistleblowing allegations should not be taken for granted, and due process must be accorded all individuals accused of criminal negligence or fraud.

Keywords: Whistleblowing, Healthcare fraud, Patient Safety, Raising concerns policy

Introduction

Whistleblowing is the non-obligatory act of disclosing information about unethical or criminal activity in an organization. Although most instances of whistleblowing in the health sector relate to patient safety issues such as reporting on poor clinical outcomes involving a single individual over a period (Dyer, 2005; Bolsin et al, 2011), the health sector is not immune from

criminal activity. Health care fraud – defined as an intentional deception or misrepresentation that the individual or entity makes knowing that the misrepresentation could result in some unauthorized benefit to the individual, or the entity or to some other party - is a major crime in most nations, accounting for 2% to 10% of total healthcare costs. In countries with universal health insurance such as UAE, health insurance fraud may account for up to 10% of total health insurance claims (Awofeso, 2017). The World Health Organization has cited fraud as one of 10 leading causes of inefficiency in health systems (WHO, 2010). The current global average loss rate of 6.19% attributable to health system fraud expressed as a proportion of 2013 global health budget of $7.35 trillion equates to $455 billion (Gee and Button, 2015).

The role of the whistleblower in detecting healthcare fraud is perceived as important in some industrialized nations such as the United States, Australia and United Kingdom. For example, in the United States, Medicare processes over one billion fee-for-service claims per year through its contracts with regional insurance companies. Given the enormous volume of claims submitted under the Medicare program, the federal and state governments are not sufficiently staffed to effectively detect the fraud and abuse perpetrated by dishonest physicians, healthcare providers and suppliers. The Whistleblower Protection Act was made into federal law in the United States in 1989. The US Securities and Exchange Commission (SEC) has awarded more than $262 million to 53 whistleblowers since issuing its first award in 2012. All payments are made out of an investor protection fund established by Congress that is financed entirely through monetary sanctions paid to the SEC by securities law violators. Whistleblowers may be eligible for an award when they voluntarily provide the SEC with original, timely, and credible information that leads to a successful enforcement action. Whistleblower awards can range from 10 percent to 30 percent of the money collected when the monetary sanctions exceed $1 million. In December 2017, Australia introduced The Treasury Laws Amendment (Whistleblowers) Bill 2017, which introduces a specific whistleblower protection and compensation regime for those who expose misconduct in public health and safety, tax and corporate fraud affairs. Public companies and large private companies that fail to set up internal whistleblower policies before 1 January 2019 risk facing penalties of up to 60 penalty units (currently A$63,000 for a body corporate).

It is helpful to distinguish between internal whistleblowing, which entails employees reporting criminal or patient safety concerns to managers internal to their organization, from classic (external) whistleblowing, when an employee reveals information externally (or publicly) about wrongdoing within the organization, due to the ethical and consequential differences between both variants of whistleblowing. External Whistleblowers often end up choosing between failing in a duty to the public and failing in a duty to their employer, and they chose to fail in their duty to their employer, irrespective of whether the employer has a legitimate or moral standing in the issue concerned. Such violation of the *pro tanto* obligation to the employer impairs the moral standing of whistleblowers (MacDougall, 2016).

In most other nations, (external) whistleblowing – leaking information to the press or independent healthcare complaints boards, for example, is discouraged due to reputational

effects on the organization. Pertinent in this regard is the impact of vexatious whistleblowing, in which whistleblowers may accuse healthcare personnel of, for example, research fraud, without substantiating their claims – leading to incalculable damage to professional and organisational reputation (Wright, 2010). There is also a somewhat paternalistic reason why some organizations appear to discourage (external) whistleblowing – whistleblowers suffer substantial ostracization from colleagues and senior management, even if the whistleblower's accounts are true. (van de Verden et al, 2018). Whistleblowing situations are stressful and may cause physical and emotional health problems for both whistleblowers and non-whistleblowers (McDonald & Ahern, 2002).

Ethical and legal aspects of whistleblowing in health sector

Health care ethics is the field of applied ethics that is concerned with the vast array of moral decision-making situations that arise in the delivery of health services. Essential to the comprehension of moral issues that arise in the context of the provision of health care is an understanding of the most important ethical principles and methods of moral decision-making that are applicable to such moral issues. There are several core ethical approaches to understand whistleblowing in the health sector – utilitarian ethics, virtue ethics, organizational ethics, and deontological ethics. Utilitarianism is a variant of rule consequentialist ethics, which posits that the morally right action is one with the best overall consequences. Whistle blowing may be supported by utilitarianism if it will benefit a significant number of people. A hedonic calculus may be applied to evaluate the harms and benefits of whistleblowing, but this approach is likely to underestimate the harms given that whistleblowing settings tend to affect an overwhelming majority of individuals in such settings. Internal whistleblowing reduces the harms caused by exposing misconduct (Wilmot, 2000).

Virtue ethics is one of three major approaches in normative ethics. It may be described as an approach that emphasizes techniques promoting an agent's character and instructing their conscience, may motivate whistleblowing particularly among individuals with a dominant (benevolent) superego (Nair, 2002). Integrity is a virtue that aligns with motivations to report wrongdoing. Most healthcare professionals code of ethics and conduct include the value of integrity. Thus, reluctance to engage in whistleblowing when there are compelling reasons to do so may violate the integrity virtue. Ironically, loyalty to organizations is one of the conditions of employment in many health organizations, and external whistleblowing may violate such employment condition, expressed as betrayal of trust (Pellegrino, 1995; CNA 1999).

Organization ethics includes various guidelines and principles which decide the way individuals should behave at the workplace. Fiduciary relationships (i.e. relational ethics) are integral to organizational ethics as they underscore loyalty, integrity and organizational structures. Fiduciary relationships exist between employer and employee, as well as between healthcare providers and patients. A conflict of loyalty usually implies a failure of organizational ethics and accountability since, under normal circumstances, both fiduciary

relationships should be well aligned. Healthcare organizations that do not support whistleblowers reporting fraud or violations of professional standards suffer from a failure of organizational ethics. (Fletcher, Sorrell and Silvia, 1998; Ray, 2006).

Deontology is a variant of normative theories regarding which choices are morally required, forbidden, or permitted. It guides and assesses our choices of what we ought to do, and posits that that the morality of an action should be based on whether that action itself is right or wrong under a series of rules, rather than based on the consequences of the action. Whistleblowers who align with a deontological approach view the act as a duty that needs to be undertaken as part of their moral and professional obligations, irrespective of its consequences. External whistleblowing in the health sector regarding criminal, fraudulent or patient safety grounds prioritizes loyalty duties to patients over and above loyalty to implicated colleagues or the organization as a whole. However, deontology is related to moral rules, not legal ones. In line with studies in other sectors (Keenan, 2000), deontological rules significantly motivate whistleblowing in healthcare settings.

The high profile media attention which whistleblowing has attracted across the world in recent years has underlined its relevance to all organizations. For instance, in 2013, an anonymous whistleblower sent an email to British pharmaceutical company GlaxoSmithKline (GSK) board members, external auditor, Chinese government and senior executives, describing fraudulent activities in China. The whistleblower stated that medical professionals were given all-expenses-paid trips under the pretense of attending professional conferences. Also, that the drug Lamictal was being heavily promoted as a treatment for bipolar disorder, despite being approved only for treatment of epilepsy by Chinese regulators. Bribes totaling $9000 were allegedly paid to a patients who experienced adverse reactions to Lamictal in order to keep the patient's silence. In 2014, the company was fined $489 million by Chinese courts for bribing doctors and hospitals to use its products and bribing government officials and regulators to ease monitoring of GSK. It is not clear what motivated the anonymous whistle blower, and whether he received any pecuniary benefit, or sanctions, for his actions. In the United States, The Securities and Exchange Commission won new powers in the 2010 Dodd-Frank Wall Street reform law to entice whistleblowers with monetary awards. A record $30 million was paid to an anonymous whistleblower for helping to uncover large-scale fraud, essentially 10 – 30% of total amount recovered by the US government (Rickman, 2017). Among G20 nations, whistleblower protection laws are most explicit in USA, UK, Japan, and China but are less so in Germany and France. Australia's explicit whistleblowing protection law is currently undergoing deliberations in its parliament. Only USA, Japan and China explicitly provide protections for external whistleblowers. In the Middle East region, Bahrain has the most restrictive whistleblower laws. In the United Arab Emirates, whistleblowing is not currently protected at a federal level and in certain circumstances whistleblowing may potentially lead to both criminal and civil liability for breach of confidentiality and criminal liability for defamation. However, in Dubai, Dubai Law 4/2016 on Financial Crimes has some modest protections for whistleblowers in respect of certain financial crimes. The mapping of whistleblowing legislation for selected countries is shown below in Figure 1 (Piper, 2015).

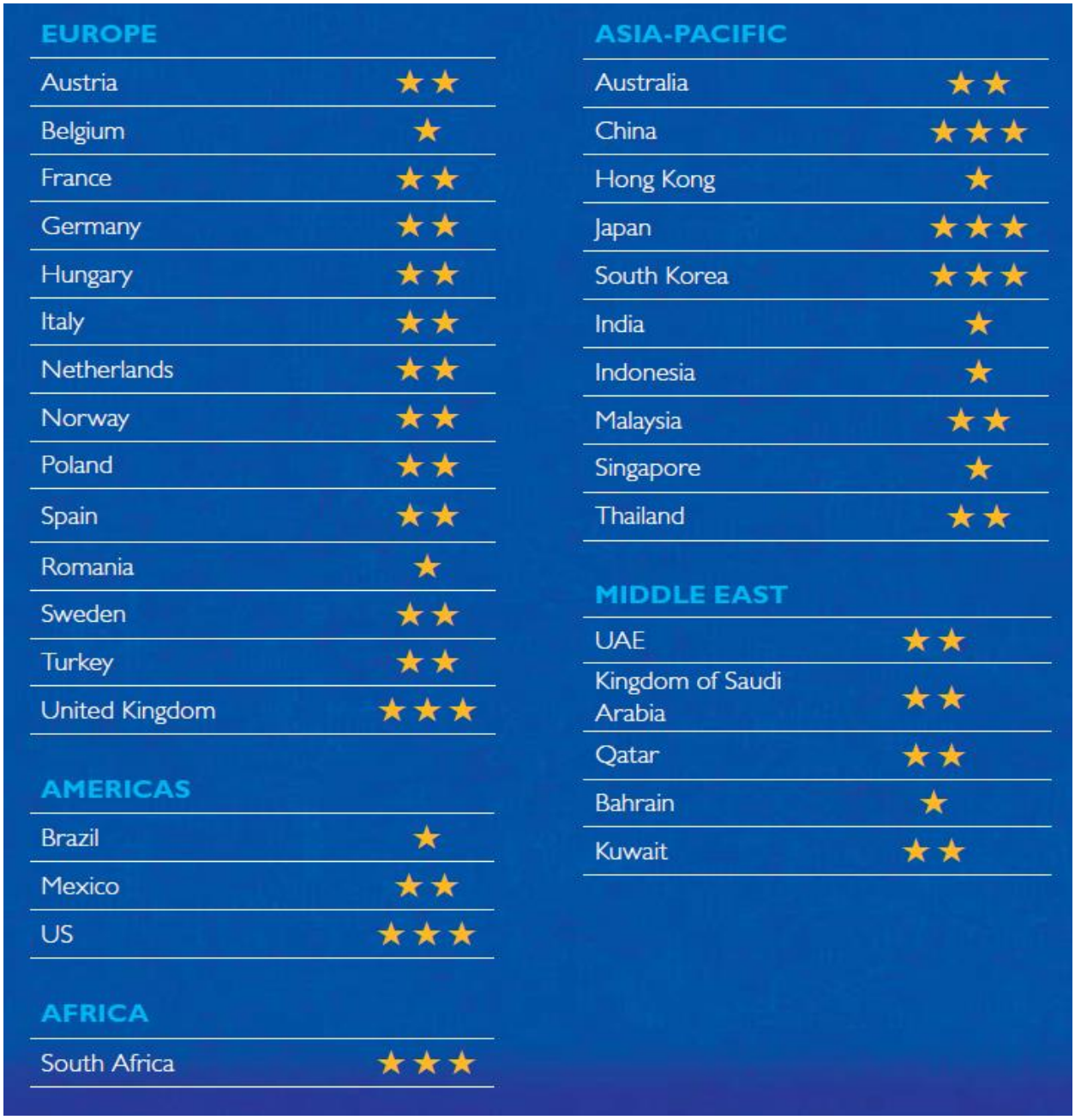

Figure 1: Whistleblowing protection ratings across the globe. Little or no protection - *; Some protection through general laws - **, Express protection - ***

Whistleblowing and patient safety violations

Patient safety is essentially about policies, procedures and practices that guarantee the prevention of harm to patients - those that reduce the risk of adverse events related to exposure to medical care across a range of diagnoses or conditions (Clancy, Farquhar & Sharp, 2005). In the context of patient safety, whistleblowing commonly entails identifying incompetent, unethical or illegal situation in the workplace, and reporting it to someone who may have the authority to stop the misdeed. Often ‘whistleblowing’ is used as a term when a concern feels unwelcome or when it’s external, and ‘freedom to speak up’ or ‘raising concern’ are seen as

being at the softer end of the spectrum, when a staff member first identifies and reports incompetent practices which may or may not be illegal. In most countries, laws determine whether breaches in patient safety can have legal consequences for individuals and institutions. Major patient safety breaches fall under the category of tort, or personal injury. Negligence as a tort is the breach of the legal duty to take care which result in damage, undesired by the defendant, to the plaintiff. Tort law seeks to compensate victims of certain actions or inactions based on the breach of a legal duty that caused damages (Ramanathan, 2014).

Two interesting Australian cases of whistleblowing in relation to patient safety concerns occurred in the Macarthur Health Service in New South Wales and Bundaberg Base Hospital in Queensland. The nurse whistleblowing in both cases occurred consequent to dysfunctional clinical governance and incident reporting processes. The Macarthur health service is located in South-West Sydney, and incorporates Camden hospital, Campbelltown hospital and Queen Victoria memorial nursing home. On 5 November 2012, four employee nurses of the health service met with the state health minister, and reported cases of substandard clinical practices resulting in patient deaths and injuries. These nurses have previously utilized internal reporting systems such as incident reports, reports to line managers or referral of cases to relevant peer-review committees. However, they felt that their efforts were both unwelcome and ineffective in changing the health services' unsatisfactory patient safety trends. Even reports sent to the senior executive level of the health service as well as the New South Wales nurses association were forwarded to the hospital middle management to investigate. The minister referred the case to the State's Health Care Complaints Commission (HCCC) to formally investigate. The investigation resulted in an analysis of 47 clinical incidents alleged to have occurred between June 1999 and February 2003. After 13 months of investigation, the HCCC report was delivered to the Director general of the health Department in December 2003. The published report strongly supported most of the allegations made by the nurses, e.g. "in some instances the care was so poor that patients suffered serious deterioration in health" (HCCC 2003, p4, part 1). In spite of these adverse findings, no prosecution or disciplinary action was recommended against those found to have breached their duties of care. The new health minister, Mr. Morris Iemma, decided to sack both the HCCC board and the then HCCC commissioner, Ms. Amanda Adrian. In all, there were five major inquiries costing many millions of dollars, and the devastation of scores of careers. At the end of it all, there have been big changes and more money for the Macarthur Health Service. Yet only eight doctors faced disciplinary action. The outcome of the first case to go to the Medical Tribunal was announced this week. The doctor was reprimanded, but the judge said "his failure to act was in no way a gross dereliction of duty. In those circumstances it is somewhat surprising that a complaint was made to bring him before the Medical Tribunal." In September 2015, the New South Wales Independent Commission Against Corruption produced the second of two reports into claims made by the four whistleblower nurses. It found that not one of the 39 serious allegations was substantiated. All four whistleblower nurses resigned from the Campbelltown hospital within two years. They reported adverse emotional consequences directly related to the case. According to one of them – Nola Fraser – "The personal effect was devastating: I couldn't sleep

for two years; I cried myself to sleep to think that those patients could have been saved if somebody just cared". In late 2001 she went into intense therapy for 12 months. In March 2002, after yet another fight with her superiors, she walked out and went on extended sick leave due to depression and stress. As for Fraser's former colleagues, most of whom won't speak on the record, they are bitterly resentful. There are many stories of lives disrupted and long periods of depression. One said: "You'd think being investigated would be OK if you're innocent. But it's not. It's traumatic." By making many claims that were later proved to be wrong, the whistleblower nurses caused many people anguish. Nevertheless, they highlighted problems that deserve to be better known.

The Bundaberg Base hospital whistleblowing episode revolved around an Indian-born American surgeon, Jayant Patel, who was found guilty of gross negligence in 2005 whilst working at the 136-bed Bundaberg Base Hospital in a remote region of Queensland, Australia. Dr. previously worked with the renowned Kaiser Permanente hospital in Portland, USA. In his application to practice surgery at Bundaberg base Hospital, Dr. Patel fraudulently answered "No" to all application questions related to history of suspension or cancellation of his medical registration. Yet, the New York medical board for professional conduct suspended his license for 6 months and placed him on 3-year probation for entering patients' histories and physical findings without actually examining patients, failing to maintain patients' records, gross negligence, and harassing patients who were cooperating with the New York Board's investigation (Bundaberg Hospital CoI Report, 2005). Patel was employed at the Bundaberg hospital between 2003 and 2005, during which he operated on about 1000 patients and performed about 400 endoscopic procedures. Nurses working with Dr. Patel repeatedly complained through internal channels such ans occurrence variance reports about his sub-optimal level of surgical competence and associated high post-operative complications. Nurse Toni Hoffman formally complained about Dr. Patel to Bundaberg hospital directors of nursing and medical services in 2003 when he performed a complex operation – oesophagectomy – on two patients (P18 and P34) – although the ICU at the hospital was not equipped to provide artificial ventilation for more than 48 hours. Patient 34 died a few hours following surgery, while patient 18 suffered serious complications. After about a dozen other adverse clinical incidents involving Dr. Patel, an external clinical audit review was commenced at Bundaberg hospital in January 2005.

However, evidence for investigating the scope of practice and quality of Dr. Patel's surgical outcomes were not initially collected. He even had his contract "temporarily" extended from 2005 to 2009. Following multiple ignored internal reports, Toni Hoffman decided to report Dr. Patel to Mr. Rob Messenger, local member of the Queensland Parliament, seat of Burnett. At the meeting with Mr. Messenger on 18 March 2005, Hoffman requested whistleblower status and expressed a desire to remain anonymous. On 22 march 2005, Mr. Messenger tabled Ms. Hoffman's complaint at the Queensland parliament, leading to the implementation of two inquiries into Dr. Patel and Queensland hospital starting 26 April 2005. The health systems review highlighted a failure of organizational ethics in the Queensland health system, with

strong themes highlighting bullying, intimidation, blaming and avoiding responsibility (Forster, 2005).

The Bundaberg hospital Commission of Inquiry (2005) was initially terminated on 2 September 2005 following a reasonable apprehension of bias against inquiry commissioner Morris. Following public pressure instigated by whistleblower Toni Hoffman, the inquiry was reinstated and a new commissioner, Geoff Davies was appointed. The inquiry castigated Bundaberg hospital management for failure to properly check Dr. Patel's background, and failure of credible incident reporting and complaints system. Commissioner Davies detailed nine specific charges against Dr. Patel, including performing surgical procedures restricted by previous medical boards and failure to report 13 deaths to the coroner. Davies recommended Dr. Patel to be investigated by Queensland police for "fraud", "negligent acts causing harm" and "manslaughter". Patel was extradited from the US to Australia and was convicted and jailed on all 3 counts. After two years of imprisonment, Patel was granted bail in 2012 after it was concluded that his trial was tainted by highly emotive and prejudicial evidence. In November 2013, Patel was given a two-year suspended sentence.

The head of a royal commission-style inquiry, former Supreme Court judge Geoff Davies, lauded Toni Hoffman as a hero in late 2005. He found her care, passion and courage were key in bringing to light a disaster, that led to at least 13 deaths and injuries to dozens of patients. At a personal level however, Toni Hoffman lamented that her career, health and psychiatric wellbeing were now severely affected because bureaucrats and successive ministers caused her to be increasingly shunned and ostracized. She claimed that she is being portrayed by Queensland Health and its corporate chiefs as "the untrustworthy nurse who embarrassed us all". Although she received the Order of Australia medal and Local Hero recognition in 2006, she claimed that she was threatened with "performance management" and left in no doubt that her career was at a standstill or worse. She eventually negotiated a payout compensation package with Queensland health service.

Whistleblowing and health research ethics violations

There is no generally agreed definition of research; however, it is widely understood to include at least investigation undertaken to gain knowledge and understanding or to train researchers. Human research is conducted with or about people, or their data or tissue. Human participation in research is therefore to be understood broadly, to include the involvement of human beings through taking part in surveys, interviews or focus groups, undergoing psychological, physiological or medical testing or treatment, being observed by researchers, and researchers having access to their personal documents or other materials. The relationship between researchers and research participants is the ground on which human research is conducted. Important ethical values in research include respect for human beings, research merit and integrity, justice, altruism, respect for cultural diversity and beneficence. These values help to shape that relationship as one of trust, mutual responsibility and ethical equality (NHMRC, 2018).

Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. Research misconduct violates research ethics and integrity, and may mislead, harm and discredit the research community and the general public. Among ethics values, respect is central. It involves recognising that each human being has value in himself or herself, and that this value must inform all interaction between people. A classic example of violation of research ethics is the Tuskegee syphilis study among African American males - the longest nontherapeutic experiment on human beings in medical history. Begun in 1932 by the United States Public Health Service (USPHS), the study was purportedly designed to determine the natural course of untreated latent syphilis in some 400 African American men in Tuskegee, Macon County, Alabama. The research subjects, all of whom had syphilis when they were enrolled in the study were matched against 200 uninfected subjects who served as a control group. The subjects were recruited with misleading promises of "special free treatment," which were actually spinal taps done without anesthesia to study the neurological effects of syphilis, and they were enrolled without their informed consent. The subjects received heavy metals therapy, standard treatment in 1932, but were denied antibiotic therapy when it became clear in the 1940s that penicillin was a safe and effective treatment for the disease. When penicillin became widely available by the early 1950s as the preferred treatment for syphilis, this therapy was again withheld. On several occasions, the USPHS actually sought to prevent treatment (Heintzelman, 2003).

The project was reluctantly terminated after Peter Buxtun, a former PHS venereal disease investigator, shared the truth about the study's unethical methods with Associated Press reporter Jean Heller. Congressional hearings into the conduct of the study led to legislation strengthening guidelines to protect human subjects in research (i.e. The Belmont Report). Fred Gray, a civil rights attorney, filed a $1.8 billion class action lawsuit that resulted in a $10 million out-of-court settlement for the victims, their families and their heirs. The research was generally adjudged to be so unethical that when in 1997 President Clinton was apologizing for it, he described it as "deeply, profoundly, and morally wrong" (Thomas 2000). Was the action by Buxtin of exposing the malpractices in the Tuskegee Study morally right or wrong? On what grounds do we judge this act of whistle blowing (and the press reporting by Jean Heller) as morally right or wrong? For a Kantian who believes that moral agents have a duty to be morally upright based on the notion of goodwill, such an action could be judged to be morally good (Ogungbure, 2011).

Peer review of research work submitted for publication in scientific journals is a longstanding approach for preventing publication of fraudulent data. However, peer reviewers cannot be expected to detect deliberate and blatant attempts to deceive them. Scientists generally trust that fabrication will be uncovered when other scientists cannot replicate (and therefore validate) finding. However, scientists struggle to replicate and reproduce findings from even highly cited journals. In a landmark article, Stroebe, Postmes, and Spears (2012) highlighted the importance of whistleblowers in uncovering criminal activity in research publications. For 21 of these forty cases they list a "whistle-blower" as the mode of discovery. A further two of the studied cases also entailed whistleblowers: William Summerlin was caught "painting his

mice" but it needed the technician who caught him to report this misconduct to prompt Summerlin's suspension and the formal misconduct inquiry. In the case of Ranjit Chandra, Stroebe and colleagues indicate that journal peer review was a contributor to his unmasking as a data fabricator in 2002. However, a whistle-blower (Marilyn Harvey) had reported him to the Memorial University authorities in 1994 and a subsequent confidential university committee report found him guilty of research fraud. However, no action was taken and he continued to publish fraudulent data for almost another decade.

Rather than being applauded, the experiences of the whistleblowers, as painstakingly documented by Dr. Geoffrey Webb (2018), paint a mixed picture. For example, in 2006, Eric Poehlman was became the first scientist in the USA to receive a prison sentence for activities relating to research fraud. He was convicted by a federal court in Vermont of making a false statement in a US federal grant application and was sentenced to a year and a day in prison. He had previously been fined $180,000 and banned for life from receiving federal research funding. This case is highlighted because the whistle-blower received a $22000 share of the $180000 recovered from Poehlman by the federal authorities. Also Michael Briggs, a Professor at Deakin University, Australia, was unmasked a a fraudulent researcher by Dr. James Rossiter, then chair of the ethics committee at Deakin University. Rossiter's first action was in October 1983 when he reported his suspicions to the chancellor of the university along with a file of supporting evidence. It was not until 1988 that a final report on the Briggs affair was eventually produced by the university – Briggs resigned from the university in 1985. Rossiter endured several years of intimidation and harassment for his whistleblower activity, but was eventually vindicated in the Deakin university's report (Rossiter, 1992). Also in Australia, the first case of criminal conviction for research fraud occurred in 2016 when Dr. Murdoch and Dr. Barwoood of the University of Queensland were convicted on 5 and 17 charges of research fraud and attempted fraud respectively, following the actions of a whistleblower who demonstrated that the data were fabricated (QCCC, 2016)

Whistleblowing to expose health care fraud

Health care fraud is a type of white-collar crime that involves the filing of dishonest health care claims in order to turn a profit. Fraudulent health care schemes come in many forms. Practitioner schemes include: individuals obtaining subsidized or fully-covered prescription pills that are actually unneeded and then selling them on the black market for a profit; billing by practitioners for care that they never rendered; filing duplicate claims for the same service rendered; altering the dates, description of services, or identities of members or providers; billing for a non-covered service as a covered service; modifying medical records; intentional incorrect reporting of diagnoses or procedures to maximize payment; use of unlicensed staff; accepting or giving kickbacks for member referrals; waiving member co-pays; and prescribing additional or unnecessary treatment. Members can commit health care fraud by providing false information when applying for programs or services, forging or selling prescription drugs, using transportation benefits for non-medical related purposes, and loaning or using another's insurance card (Legal Information Institute, 2018).

When a health care fraud is perpetrated, the health care provider passes the costs along to its customers. Because of the pervasiveness of health care fraud, statistics now show that 10 cents of every dollar spent on health care goes toward paying for fraudulent health care claims. The World Health Report (2010_ estimated that about 20-40% of all health sector resources are wasted and highlighted health care leakages-waste, corruption and fraud-as the ninth leading source of inefficiency of health systems.

In the United States, according to the Federal Bureau of Investigation, healthcare fraud costs taxpayers over $80 billion annually. From January 2009 through September 2013, the US federal government recovered $17 billion in false claims alone. Federal and state laws that may involve whistleblowing include: False Claims Act (Qui Tam), 31 U.S.C. § 3730(h) – fraudulent billing by Medicare healthcare providers (hospitals, nursing homes, physician practices, etc.), drug and medical device manufacturers and suppliers; Georgia False Medicaid Claims Act, O.C.G.A. § 49-6-168 et seq. – fraudulent Medicaid claims submitted to the state Medicaid program; Fair Labor Standards Act, 29 U.S.C. § 218C (enacted Sec. 1558 of the ACA) – whistleblower protection for insurance company employees and others reporting violations of insurance reforms under Title I of ACA (e.g., prohibited coverage denials); False Claims Act (Qui Tam), 31 U.S.C. § 3729 – fraudulent bills or payments involving federal funds sent or made through a healthcare exchange established under the ACA; Stark Law/Anti-Kickback Statute, 42 U.S.C. § 1395nn (Stark), 42 U.S.C. § 1320a-7b(b) (AKS) – illegal referral fees or kickback arrangements between hospitals, surgery centers and healthcare facilities and physicians or other persons or entities for treating and referring patients for treatment; Sarbanes Oxley Act, 18 U.S.C. § 1514A – financial or other misrepresentations and fraud by public healthcare companies (for example, hospital operators); Occupational Safety and Health Act (OSHA), 29 U.S.C. § 660(c) – protection for employees and others reporting serious safety violations at healthcare facilities affecting patients or employees (violence against patients, inadequate care, unsafe conditions, etc.).

In an extreme case, a Detroit based oncology physician, Dr. Farid Fata, gave unnecessary treatments to 553 patients at a Detroit-area cancer center (Michigan, USA) in order to benefit from substantial health insurance claims totaling at least 17 million dollars. He was unmasked as a fraud by George Karadsheh, who took a job in 2011 as an office manager for Dr. Fata's rapidly expanding oncology practice in suburban Detroit. He was informed by another oncologist working in the practice and two nurse practitioners that patients were given chemotherapy and other treatments by Dr. Fata when they didn't have cancer. Karadsheh contacted an attorney – David Harron - he knew who handled whistleblower cases. Haron wasted no time and called the Department of Justice. George Karadsheh was willing to put everything on the line. "My job was at stake. My livelihood," he explained. "Even my own personal safety. "I wasn't looking at the patients anymore as being treated," Karadsheh said. " I looked at it as a burning building with people inside. …I had to make it stop and I had to make it stop quickly. When he filed a lawsuit under the False Claims Act on Aug. 5, 2013, the so-called qui tam civil lawsuit joining Karadsheh and the government as co-plaintiffs — he triggered a legal process. Dr. Fata was convicted and sentenced to 45 years in prison for health

care fraud. Dr. Fata pleaded guilty to sixteen counts—thirteen counts of health-care fraud, one count of conspiracy to pay and receive kickbacks, and two counts of promotional money laundering. He is currently appealing his sentence (US Sixth Circuit, 2016). George Karadsheh had been a federal whistle-blower before, and was very familiar with the legal processes involved. Government whistle-blower laws, including the False Claims Act used in this case, create a path for private citizens to help the government. The law requires secrecy for two reasons: to protect the government's investigation, and to protect the whistle-blower from retaliation and from contest to a financial stake in the outcome. In the Fata case, where the convicted doctor has surrendered more than $10 million to the government, Karadsheh's share of 15-30 percent is at least $1.5 million. The financial reward is rarely the sole motivation. The reward is taxable; lawyers typically get 20 to 30 percent; and whistle-blowers typically lose their jobs.

Conclusion

Whistleblowing may count as a crime or a virtue depending on the setting. Paramount in whistleblowing activities is the need to ensure that a violation has indeed been committed before reporting internally or externally. Healthcare workers have a responsibility to raise concerns about patient safety and unethical or illegal conduct. Yet, as shown by several of the case studies discussed in this chapter, those who raise serious concerns are often treated badly by senior colleagues, their employing organisations and the bodies that should protect whistleblowers. This paradox is because whistleblowers raise concerns that, if made public, would embarrass the organisation or senior and powerful individuals, who are considered less dispensable than the whistleblower. This chapter shows that whistleblowing is a vital instrument in uncovering criminal activity in the health sector, and may be superior to traditional approaches such as the longstanding use of peer review in excluding fraud in research work.

In nations where expressly stated legal whistleblower protections exist, and where external whistleblowers who correctly report criminal conduct are duly compensated financially, external whistleblowing may be worth the risks. Generally, internal whistleblowing represents the ideal approach to raising concerns about criminal activity. For internal mechanisms to be credible, high standards of organizational ethics and governance are indispensable. Criminal activity in the health sector is rare but carries significant risks for patient safety and financial sustainability of healthcare organizations. Internal and, rarely, external whistleblowing may facilitate risk management efforts for this significant leakage of health care resources.

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Wastewater Reuse in United Arab Emirates

Roudha Al Jaziri

1. Introduction

Water is a scarce resource in UAE and with the rapid growth of population and the increase in agriculture and urbanization, the water demand is continuously. Therefore, alternative solutions such as wastewater reuse is needed. This paper discusses the importance and situation of wastewater reuse in UAE besides the international, regional and local practice for wastewater reuse, advantage and disadvantage of wastewater reuse, and finally analysis the case of UAE.

1.1. Importance of wastewater reuse in UAE

Commonly, major number of countries in the world are facing chronically shortage in water resources and predicting to suffer several level of water scarcities internationally in the future. The UAE is one of the top poorest countries in the world in terms of water availability. The current population of UAE in 2018 is 9.54 million and studies expect to reach 11 million by year 2022. This will result with larger demand of water as population is increasing, high number of tourists, urbanization growth, huge economic development this will contribute to more use of electricity, higher the consumer goods, more food production. Thus, wastewater reuse is very important and significant for UAE due to the water stress conditions and water scarcity situation in the country where is the availability of water is minimized and very low annual rainfall. Moreover, treating and recycling wastewater for reuse is a substantial strategy that will help in minimizing the water scarcity and reduce water stress issues in the area. Therefore, with the water scarce in UAE, population growth, rapid urbanization, and increase in industrialization. One of the best solutions for decreasing recurring droughts and water scarcity in UAE is to recycle and reuse of wastewater (Makki, 2018). Furthermore, wastewater will have high beneficial operation on the natural water cycle this is due that wastewater will not go into an aquifer or a river and this and instead of waiting years and years to reuse the wastewater again after water recovery. Thus, treating and reusing of wastewater will result in faster and direct reuse of water without interfering the water cycle. In addition, considering alternative water sources for usage such as wastewater is important to reduce the pressure on the water resources used in the country such as groundwater and help countenance of severe water shortage. Consequently, reusing wastewater is a need for regions suffers from water scarcity such as UAE (Todorova, 2014).

1.2. Situation of wastewater reuse in UAE

UAE is considered as one of the widely developed countries in the world where the water demand is very high among the region due to the great comfort and extravagant lifestyle living. The UAE obtain 72% of water from the ground, 21% from desalination processes, and 7% of treated water (Leijen, 2012). The wastewater generation condition in UAE is very high with

elevated level of attaining billions cubic meters. Additionally, experts anticipated that the total production of wastewater will reach 2.19 billion m^3 by year 2019. Besides the high amount of wastewater produce the reuse of the wastewater is in low rates (Qadir, *et al.*, 2010). Studies shows that in the Middle East, 55% of wastewater is treated and of that only 15% of wastewater is officially used. However, UAE and few other Gulf countries and Jordan, are special situation, which produces high proportions of treating and reusing wastewater. Moreover, most emirates such as Abu Dhabi, Dubai, Ajman and others are working effectively aiming to reuse 100% of the wastewater produced from all sectors to deliver the needs of water by producing high quality of recycled waster and reuse them to avoid discharging of wastewater in the environment and avoid water shortage in the coming years (Todorova, 2014).

Furthermore, local municipalities in the UAE such as Abu Dhabi Sewerage Services Company, Dubai Municipality, Bee'ah in Sharjah, Municipality and Planning Department in Ajman, Umm Al Quwain Municipality, Fujairah municipality, and Public Services Department in Ras al Khaimah are responsible and in charge for collecting, managing, disposing, treating, and reusing of wastewater in each emirate (UAE Government, 2018). The wastewater is treated to the tertiary level in the UAE and almost 45% of the wastewater is reused for non-potable uses such as agricultural practices, farming, growing crops, and industrial activities. In addition, the wastewater is treated using modern treatment plants that transfer performance to treatment standards by removing solids particles to low-level and removing any biodegradable organics besides converting odors of ammonia compounds. There are many wastewater treatment plants found in UAE using advanced technology for wastewater treatment such as membrane (fat) based treatment system which helps treating to reach high-quality water production. Moreover, using reverse osmosis treatments as well as disinfection to contribute safe and reusable water output. Further, there are three main steps and stages for wastewater treatments in the UAE. Firstly, collection stage by collecting wastewater using a network of pipes, manholes and lifting stations to deliver sewage to the treatment facilities. Secondly, treatment stage by using various technologies such as extended aeration, fixed bed bioreactors, and membrane bioreactors, concerning on the desired quality of Treated Sewage Effluent. Thirdly, Drainage stage, by discharging the treated water into the environment whether for irrigation, industrial practices, filling aquifers, or return it back to the marine environment (Roberts, 2013).

2. Literature Review

2.1. International, regional and local practice for wastewater reuse

International practices for wastewater reuse

Internationally, essential projects are being created for wastewater treatment and developed facilities for reusing wastewater. Reusing wastewater was firstly utilized in northern Europe when sewage farms were first existed and in common, using treated wastewater throughout the world has been for agricultural irrigation purposes. In Europe, wastewater is reused in four main areas, firstly for agricultural irrigation, secondly for aquifer recharge and urban,

recreational, and environmental purposes, thirdly for industrial activities such as cooling, and fourthly might be used for multiple purposes as for irrigation besides industry, and recharge aquifers. In France, wastewater reused was allowable from the government for only agricultural irrigation (Bixio, *et al.*, 2006). In Unites States, wastewater reused in high rates in public and private sectors such as industrial productions, irrigation activities in farms, golf courses, and also has been used for drinking water supplies (Yusuke Kuwayama & Kamen, 2016). In Mediterranean countries, wastewater reused for landscapes, golf courses irrigation, public parks irrigation, school yards irrigation, irrigation of trees and forests, irrigation of non-potable food production, recharging artificial aquifers, in commercial and industrial toilet flushing, for cooling purposes, for fire hose, and few Mediterranean countries used treated wastewater for producing vegetable crops, cereals, and forage by utilizing the drip irrigation system to maximize growing crops (Hirich, *et al.*, 2013). Further, 44% pf projects in Mediterranean countries focusing on treating wastewater to reuse primary for agricultural activities such as irrigation while 37% of projects was on treating wastewater to reuse in recreational and eco-management applications. In addition, countries of Mediterranean with temperate climate such as Northern and Central Europe are implementing 51% of projects for reusing wastewater in practices related to urbanization and eco-managed applications whereas 33% of projects for reusing wastewater in industrial purposes (Bixio, *et al.*, 2006).

Regional and local practices for wastewater reuse

Nowadays, recycling and reusing related waste water is a widespread practice among regional and local areas, particularly in the gulf due to its arid and semiarid climate where water resources are very limited and in pressure (Abusam & Shahalam, 2013). Most Arab countries and GCC countries that adopt wastewater reuse are treating the wastewater at tertiary treatment level and mainly reuse for irrigation purposes (Bahadir, *et al.* ,2016). The first wastewater reuse in Arab countries was applied in Morocco for irrigating the golf courses. In addition, Jordan is considered as the most developed country in terms to wastewater quality control and safety reuse due to the application of safety control system for agricultural activities to confirm the safety of crops growing on a mix of freshwater and treated wastewater and 90% of wastewater is reused in agriculture practices. Other countries such as Egypt and Tunisia are implementing very severe reuse criteria which limits wastewater reuse to green spaces, forest irrigation, and industrial crops production. In Egypt, all wastewater is reused in one way or another example, all treated and untreated wastewater is disposed into the Nile Delta river or canals and the reused once more in further downstream. In Tunisia, most treated wastewater reused mainly in irrigation, few in golf courses, and green spaces while the rest is disposed into wetlands and rivers. In Syria, all treated and untreated wastewater was reused in agriculture activities. In Lebanon, there are very poor wastewater reuse and almost no reuse where very few rates of raw wastewater are used in the Beqaa valley (ACWA, 2010). Moreover, in Gulf countries they developed policies and campaigns to ensure the reuse of treated municipal wastewater for irrigation such as in Kuwait (Abusam & Shahalam, 2013). On the other hand, some Gulf countries such as Yemen is considered the poorest country in terms of wastewater reuse and

safety control of wastewater where it contains mostly of rural region with limited sewer connection and inefficient wastewater treating plant which do not meet national quality standards besides unsustainable farmers practices for reusing water from plants or downstream of the effluent discharge point. Furthermore, particularly in UAE they have a great interest and focus in improving and implementing wastewater reuse besides adopting policies and regulations to develop alternative water resources for the country. In UAE, the treated wastewater is reused mostly for green space irrigation such as in Abu Dhabi city where 52% of wastewater is recycled and produced to irrigate landscapes, gardens, public parks, gold courses, decorative plants, palm trees, fodder crops, growing dates, different fruit tress and vegetables production that is safe to grow with treated wastewater at tertiary level of recycled water. Additionally, reusing wastewater could be implemented to solve some of environmental issues such as for creating artificial wetlands, increase streamflow, and recreating ponds and lakes (Environment Agency Abu Dhabi, 2013).

2.2. Advantage and disadvantage of wastewater reuse

Advantages of wastewater reuse

There are several advantages of wastewater reuse particularly on human health, on the environment and on the economy. Advantages on the human health by help increase and enhance production of food crops in sufficient quantities to fulfil human needs of nutrition, saving fertilizer cost and enrichment of soil nutrients such as enrichment of nitrogen, phosphorus, and potassium which will help develop crop yield and decrease in use of fertilizers in agriculture. Thus, reducing eutrophication events in water bodies by reducing agrochemicals used in the farms. Additionally, advantages on the environment where wastewater reuse will contribute to have less pressure and conserve abstract on the freshwater and underground resources which will participate in reduction of environmental degradation as well as the contribution of environment protection by reducing pollution from desalination plants, providing replacement to chemical fertilizers besides protection of agricultural soil from irrigation with highly brackish or saline water. In addition, assist to reduce wastewater discharge and increase the quality source of water bodies alongside with maintaining groundwater reservoirs and reuse of wastewater with top quality water. Finally, wastewater reuse has great advantages on the economy by suppling a cheaper alternative strategy to irrigate instead of using expensive desalinated water besides to the contribution to the constitute and optimization of treatment facilities to develop effluent of a coveted quality for irrigation activities as an economic advantage for sanitation projects. For instance, reusing wastewater in several countries benefit them to decrease the municipal cost of searching for water sources. In addition, saving costs for contribution to develop justifiable policies and criteria to prevent and control pollution (Jaramillo & Restrepo, 2017). Furthermore, reusing treated wastewater will help water scarce countries to avoid water shortage in future and to have sufficient, reliable and steady water supply throughout the coming years (Abusam & Shahalam, 2013). In addition, will associate in saving time by getting highly water quality faster instead of extracting water from the environment for treatment. Wastewater reuse is a great solution for

the enormous usage of water in agriculture and with reusing wastewater along with various water resources is perforable way to meet the demand for the population growth besides the increase in agriculture and industrial development where the water will be available for any place and at any time with needed quantity and safe quality (Paola, *et al.*, 2018).

Disadvantages of wastewater reuse

Wastewater reuse can cause serious human health risks and may harm the environment by causing environmental degradation. Human health risks emerge from the release of many different microbial pathogens as well as chemical pollutants in wastewater (Pasqualino, *et al.*, 2011). Moreover, reusing wastewater for irrigation purposes has limitations this is due to the risks connected to the various exposition ways of concentrations from different physicochemical and microbiological parameters (Khan, *et al.*, 2018). There are various chemical pollutants and biological pathogens that could be connected with raw wastewater in agricultural practices and may release to cause enormous health risks for humans. Chemical risks may be due heavy metals such as mercury, arsenic, or cadmium, hydrocarbons such as dioxins, furans, or PCBs. In addition, chemical risks from pesticides such as aldrin or DDT. Whereas, the biological risks can be from bacteria such as E. coli, Vibrio cholerae, Salmonella spp., or Shigella spp., helminths such as Ascaris, Ancylostoma, or Tenia spp., protozoans such as Intestinal Giardia, Crysptospridium, or Entamoeba spp., virus such as Hepatitis A, Hepatitis E, Adenovirus, Rotavirus, or Norovirus Schistosoma, or from blood-flukes. These pathogens and trace pollutants can be carried with reused wastewater in agriculture and contribute to many serious Wastewater- borne diseases that could be acute or chronic such as Typhoid fever, Paratyphoid fever Gastroenteritis, Cholera, Bacillary dysentery, Amebiasis, Giardiasis, Cryptosporidiosis, Cyclosporiasis, Infectious hepatitis, Gastroenteritis, Infantile paralysis, Leptospirosi, Ear infections, Trachoma, Schistosomiasis, Malaria, Yellow fever, and Dengue (Jaramillo & Restrepo, 2017). Therefore, it is very significant to adopt legal polices that are decisive and accurate to avoid microorganisms and chemical pollutants contaminations of reused wastewater.

3. Analysis

UAE perform various of projects and regulation for wastewater reuse management and can get enormous benefits of the available technologies to treat and reuse wastewater by contributing to sustainable practices and avoid water shortage and scarcity in future (Makki, 2018). Obtainable technology will possess a stead availability of water and meet the needs of the entire population and needs of water in all fields and various aspects as well as economic benefits in which will make it easier for treating and reusing the wastewater and reduce the costs spend by UAE's government on environmental problem projects in future and achieve excellence in the wastewater sector. In addition, the technology associated with wastewater treatment plants will be well monitored and controlled with remote control system which will contribute to efficient and effective production of wastewater treatment. In addition, mechanical and electrical equipment will help acquired and preserve water with safe high quality (Maradona & Valdez,

2012). Moreover, will lead to reduce UAE's waste production through the recycle of wastewater and the amount of wastewater that is released into the environment will decrease therefore will benefit the environmental health. Also, maintain water loss will reduce pollution on water bodies and assist water cycle to work effectively (Biswas & Biswas, 2017). Furthermore, there are three main benefits to the country due available technology such as minimizing environmental risks as well as minimizing health risks and supplying of high-water quality. First, minimize environmental risks by reducing of wastewater discharge rates and recycling the water for necessary needs. In addition, implementation of eco-friendly practices by having the potential to protect wildlife and fish by supplying clean water to local rivers and streams. Besides having safe water that will support the water bodies in UAE with clean treated water. Additionally, promote attraction to the citizens as well as tourists with the clear water free from contaminant along with high abundance of water availability to eliminates tree's dry conditions in the UAE and more water that expand the growth of trees and contribute to climate change issue which will reinforce positive impact on the environment by reducing carbon dioxide rates released (Barrett, 2014). Second, minimize health risks by reduction of diseases infection due to assistance of removal dangerous bacteria and chemicals. Consequently, available technology for wastewater treatment and management plays an essential role in using filters that will block contaminants and kill harmful organisms by removing 97% of microbial and chemical contaminants from water and prevent any harmful contaminants to be absorbed or introduced in any water sources and protect human's health, plants as well as animals (Khalid, *et al.*, 2018). Third, supplying high water quality with available technologies will contribute to removing excess of used water by filtering out hazardous contaminants besides taking off all aridity, water shortages, and removing excess of dangerous water supplies and obtain safe and clean water source that will be reused continuously for all population in UAE and help sustain the availability of water by producing more water with larger quantity and higher safer quality for every individual, for agriculture purposes such as producing more food crops, as well as for industrial activities such as increasing domestic industries production (Jhansi & Mishra, 2013). Further, available technology will contribute to natural fertilizers production which can implemented effectively in the agricultural sector, and participate in rising and developing of crop yields in the country. In addition, help reduce less pollutants on water surface and underground resources from chemical fertilizers (Meghari & Omar, 2017). Additionally, UAE will have useful outcomes to reduce environmental and health risks by turning wastewater to significant resource for the country, a source that will contribute in the production of energy such as reproduce from waste Methane gas that will help invest for generating electricity as well as can be used in powering the wastewater treatment plant itself leading them to be self-sustainable and driving to reduce stress on the supply of non-renewable energy such as fossil fuels. In addition, will contribute to reduce UAE's carbon footprint besides producing Methane from wastewater for reuse will help the country to have excess of energy production and can distribute the energy over all Emirates (Saleh, 2016).

4. Conclusion and Recommendations

In conclusion, enhancing and developing the domestic recycle and reuse of wastewater are easy and significant to be implemented in UAE which will help the country to have continues available water and prevent to be one of the poorest countries in the world by having its own sophisticated and safe source of water for food production and generation of electricity. In addition, it is highly recommended for UAE to expand their domestic wastewater reuse to reduce pressure on freshwater resources for agricultural and other activities. This is due that freshwater is founded in very low amount worldwide particularly in the Gulf region due to the arid climate and low annual rainfall rate. As UAE is a developed country and facing population growth with increasing in water demand due to the development leading to generate high wastewater. Therefore, UAE are proceeding various practices for wastewater reuse such as treating wastewater to the tertiary level which make it safe to reuse and could be used for various purposes other than irrigation to fulfill all demands. Thus, expanding the practices of wastewater reuse with the available technology found will largely benefit the country such as producing high safe water quality, protecting the environment health by reducing waste and contribute to reduce health risks, and will contribute to minimize water scarcity that might face the country in future. Although, UAE may face several challenges connected along with expanding of wastewater reuse such as microbial and chemical contamination contributes to various environmental and health risks associated with reusing the wastewater. However, the available technology in the country will help managing the environmental and health risks besides possessing different benefits that will be notice such as economic benefits and high availability of water sources that will solve the scarcity problems that may face the country in the future. Briefly, reducing the use of freshwater as well as recycling and reusing of wastewater are the main factors that will lead to sustainability in the UAE from aspects of societally, economically, and environmentally as well as preventing future water shortage.

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Correlates of Engagement With Self-Paced Learning Materials in HBMSU of Health Programs' Courses, 2016- 2017.

Niyi Awofeso
School of health studies, Hamdan Bin Mohammed Smart University, Dubai, UAE

Zahour Al Haj Rabih
School of health studies, Hamdan Bin Mohammed Smart University, Dubai, UAE

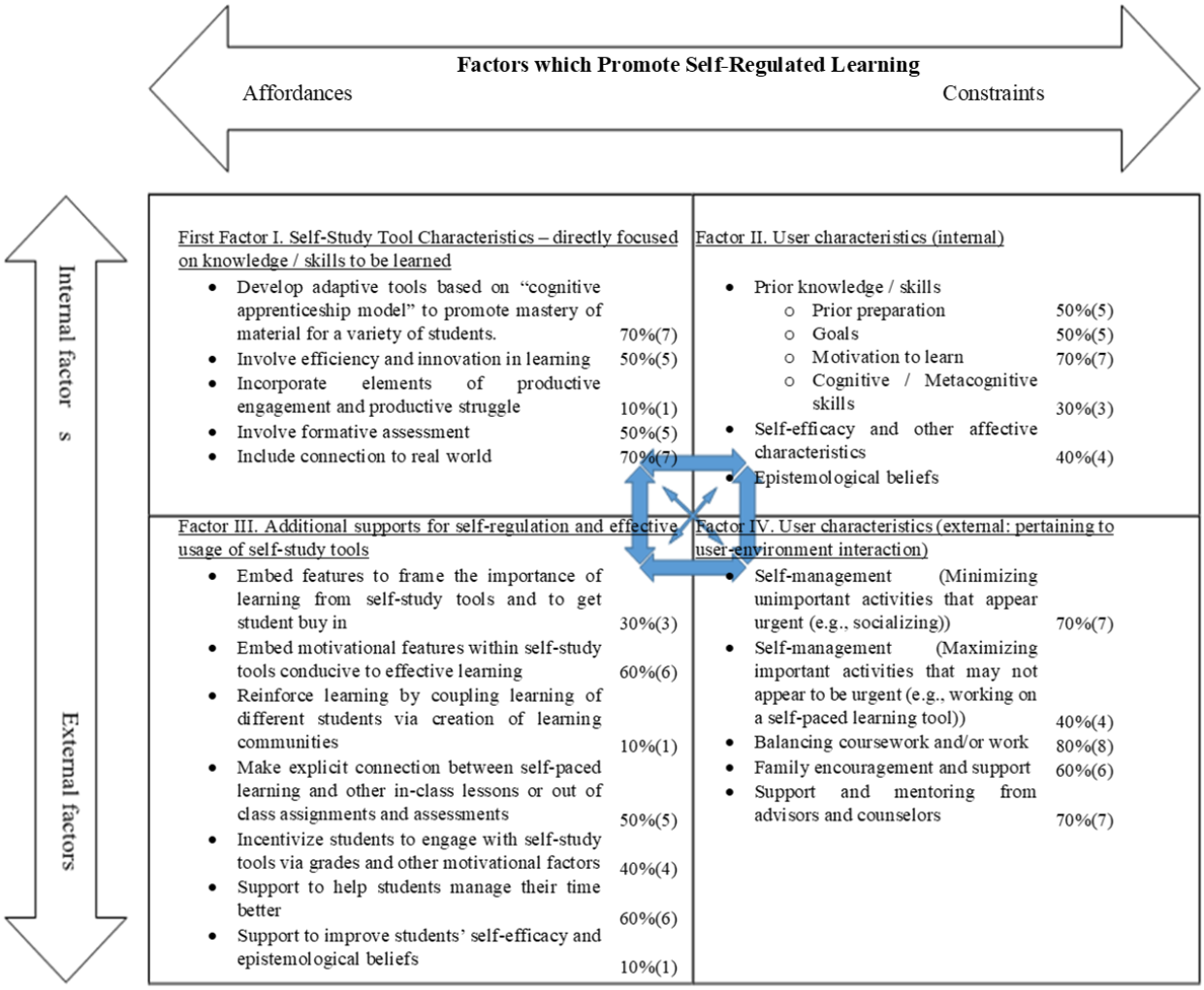
Abstract

Self-Paced learning encompasses Independent Learning, Self-Directed Learning, and Self-Regulated Learning domains. is essentially a teach-yourself method of learning that is initiated and directed by the learner, thus enabling students to proceed with learning activities at their own speed. Engaging learners with self-paced learning strategies is consistent with the life-long goal of education, which is teaching learners to have the "will" as well as the "skill" in becoming an independent with regards to life-long learning (Weinstein et al, 2011). Self-paced learning is a core component of learning in both online and on-campus courses. While self-paced learning approaches have substantial advantages related to efficiency, convenience, scalability, effectiveness and reusability (Tullis and Benjamin, 2011), results of its implementation have been mixed. For example, the average proportion of learners who completed self-paced Massive Open Online Courses in its first five years of operation was less than 10% (Jordan, 2015). Ensuring optimal learner retention and engagement is particularly important in online tertiary education programs, which rely significantly on self-paced learning modes. It is therefore important for determinants of self-paced learning success or encumbrances to be determined, and for learners, course instructors as well as education authorities to take actions that improve the potentials of self-paced approaches.

This study examines the influences of policy, online and instructor support, as well as learners' characteristics and learning environment on engagement with self-paced learning materials in a sample of undergraduate and postgraduate health program courses at Hamdan Bin Mohammed Smart University, Dubai, UAE. A policy is a projected program of goals, values and practices. Policies explain & validate action. Effective Spring semester 2017, the HBMSU management introduced a policy mandating formal assessment of participation in self-paced classes. The impact of this policy on learner engagement in 2017 summer semester was compared with learners engagement in the same courses prior to its introduction in 2016 summer semester. In both undergraduate and post graduate courses, the self-paced classes policy is associated with significantly higher views of learning materials during self-paced week [$C^2 = 24$, $p < 0.0001$ and $C^2 = 33$, $p < 0.0001$, respectively].

For online and instructor support, as well as learners' characteristics and learning environment on engagement with self-paced learning materials, a survey was conducted on 10 "positive deviants" – the minority of learners who engaged with all reading materials provided for the health courses at undergraduate and postgraduate levels – to determine – factors which they

considered significant in facilitating their engagement, based on the framework provided by Devore, Marshman and Singh, (2016). Survey results are shown below:



In summary, this study showed that policies that mandate formal assessment of learning activities in self-paced classes have significant potential in improving learner engagement with learning materials and potentially improved learning outcomes in courses. Important course design and online/instructor support principles, from the perspective of the surveyed learners include highlighting connections between learning materials and the real world, adaptive learning tools, and embedding motivational features in self-study tools. From learners characteristics and learning environment perspectives, literature reveals eight factors that facilitate learning – suitable environment, readiness to learn, analyzing and information provided or accessed, attention, feedback, repeated and varied practice, prompting, and information storage/retrieval. In this survey, self-management to minimize unimportant activities which may impede learning (such as excessive socializing) and balancing coursework with private life or/and employment-related activities featured high on the list of personal factors.

Learning in self-paced mode is affected by internal and external factors. Internal factors include readiness to learn, thought distractions and the ability to create accurate mental representations of the information in self-paced materials. External factors include enabling institutional policies to promote learning, quality of virtual learning environment, appropriate resources and equipment, prompt and comprehensive feedback, clear instructions, regular online interaction with teachers and other learners, and opportunities for practice of learned skills.

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HIV and AIDS

Saeed Hussein
Prof Adi Arida

Introduction

Human Immunodeficiency Virus (HIV) is the virus that causes HIV infection. acquired immunodeficiency syndrome (AIDS) is the most progressive stage of HIV infection. HIV is spread through contact with the blood, semen, pre-seminal fluid, rectal fluids, vaginal fluids, or breast milk of a person with HIV. Antiretroviral therapy (ART) is the use of HIV medicines to treat HIV infection. People on ART take a combination of HIV medicines on daily bases. ART unable to cure HIV infection, but HIV medicines help people with HIV live longer, healthier lives. HIV medicines can also decrease the risk of HIV transmission. The advances in (Human Immunodeficiency Virus) HIV treatment in the last three decades using combination antiretroviral therapy (ART) leads to improve health, prolong life and reduce the risk of HIV transmission.

Objective

Recommend patient-specific antiretroviral therapy (ART) for managing HIV infection, with an emphasis on the pharmacokinetic factors that affect efficacy and safety. Describe the different mechanism of action of antiretroviral therapy. Develop an optimal occupational postexposure prophylaxis regimen for a health care worker according to practice guidelines. Determine appropriate treatment and primary and secondary prophylaxis for Pneumocystis Jiroveci Pneumonia (PJP), Mycobacterium avium complex (MAC), cryptococcal meningitis, toxoplasmic encephalitis, and TB infections and recommendations for ART initiation.

Method

To do literature review related to the best option of medication to treat HIV naïve patient and its impact on morbidity and mortality, HIV transmission and the development of antiretroviral therapy resistance.

Results

Dual Nucleoside Reverse Transcriptase Inhibitors (NRTIs) combined with Integrase Inhibitor-based regimens or Protease Inhibitor regimens boosted with cobicistat or ritonavir are among the first line option for HIV naïve patient. This combination may reduce HIV-related morbidity and mortality, improve immune function and delays disease progression, prevent HIV transmission and reduce the development of ARV resistance. Treatment initiation is urgent for the following patients: pregnant, early HIV infection, AIDS-defining conditions, CD4 counts less than 200 cells/mm3, HBV or HCV coinfection, and HIV-associated nephropathy. Guidelines recommend HIV for all infected patients, regardless of CD4 count (A1). START

Study showed that early ART was also safe and effective. About 98% of people who started treatment had an undetectable viral load at the end of their first year of treatment (START, TEMPRANO) (RCT). Post-exposure prophylaxis (PEP) involves taking HIV medicines very soon after a possible exposure to HIV to prevent becoming infected with HIV. PEP should be taken with 72 of exposure to be effective. Introduction of ARV for patient with AIDS may lead to Immune reconstitution inflammatory syndrome (IRIS) because of improve the immune system in presence of the opportunistic infection.

Conclusions

The smart selection of the best combination ART able to reduce the complications of AIDS where the acute HIV patients are no longer the dominant problem in many parts of the world. The ART regimen for treatment of naïve patients generally consists of two nucleoside reverse transcriptase inhibitors (NRTIs) in combination with a third active ART drug from one of three drug classes: (Integrase Inhibitor) INSTI, Non-nucleoside reverse transcriptase inhibitors (NNRTI), Protease Inhibitor (PI) with pharmacokinetics enhancer (Cobicistat, Ritonavir. It is important to treat opportunistic infection before treatment of HIV to avoid Immune reconstitution inflammatory syndrome (IRIS).

Keywords

Human Immunodeficiency Virus, HIV, acquired immunodeficiency syndrome, AIDS, antiretroviral therapy, ART)

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Initiatives for Public Mental Health Promotion

Abstract

Public health is usually defined by the wellbeing of the whole population. One of the major attributes to it; is Mental Health. In the recent years a growing attention has been granted for the mental health research. This is mainly driven by the fact that a community with a well-maintained mental health has better chance to develop a safer, more developed, enhanced lifestyle for the citizen. In this paper, a brief introduction about the mental health definition, statistics about current status in the UAE and legislations /laws enforced by the UAE government will be mentioned. Several surveys were conducted then, creative innovative initiatives were suggested. After that another survey to get the feedback on these was conducted. At the end some recommendation for future researches was stated.

Introduction

Public health is defined as the science of protecting the safety and improving the health of communities through education, policy making and research for disease and injury prevention. (American Public Health Association, 2018). Mental health being a major sector of public health includes our emotional, psychological and social well-being. It affects the way we think, feel and act. Despite its importance, a lot of people don't recognize it as a major sector of the public health. Moreover, some people consider it even shameful to discuss mental health or seek help with reference to such symptoms.

Although mental health satisfaction is one of the key performance indicators of the pillar of world-class healthcare in the UAE National Agenda. It is not an easy task to promote and raise the acceptance among various segments of the community.

In 2018, UAE has a population of 9,541,615 (Worldmeter, 2018) that have a high diversity; as people come from more than 45 countries, 28% of the population are female while 72% are male. This fact makes it even harder to promote the mental health awareness. As men readiness to discuss and talk about their feelings is much less than women which makes it even harder to identify and resolve mental health issues. However, over the last five years, more people are ditching the stigma attached to seeking help for psychological problems and getting their lives back on track. (Achkhanian, 2018).

The denial of mental health troubles symptoms comes with a heavy price to pay. All of the above-mentioned reasons led to this paper objective which is to study the extent of people acceptance and understanding of mental health issues. Another objective is to propose new initiatives that can be implemented in various sectors to enhance the mental health of the UAE population.

Methodology

To achieve the research objectives and after going through the literature review to have a better understanding of the current situation of the mental health status in the UAE, a survey was designed to figure out to what extent are people aware of it, how do they deal with it and to which extent is it acceptable. The surveys were posted online, and replies were collected anonymously as most people were not open to discussing such information publicly. In addition, and after analyzing the results from the first survey, initiatives were created and agreed upon. The second stage of the research was aimed to getting feedback about the initiatives which were mainly focusing on enhancing the Occupational Mental Health and Raising Awareness in the schools among the students, teachers and parents.

Results and Discussion

One hundred participant from various age groups and backgrounds were surveyed. Most of the participant were from the youth and young adult as they are said to be the ones mostly fighting to deal with their feelings. 36% were under 20 years old and another 34% aged between 20 to 29 years old. Most of the participant were single,70 %, since they were young adults however, around 26 % were married. As for the educational level it ranged from high school to PhD holders.

The subjects were asked about how would they rate their mental health and how knowledgeable are they about mental health issues, the responds are shown in Figures 1 and 2, Surprisingly, it shows that to some extent people consider their mental health good and that they are aware of mental health issues and its existence in the community.

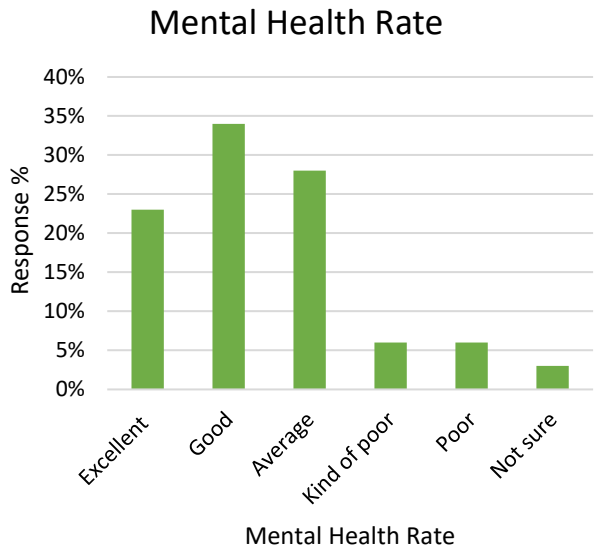


Figure 1: Mental Health Rate 1

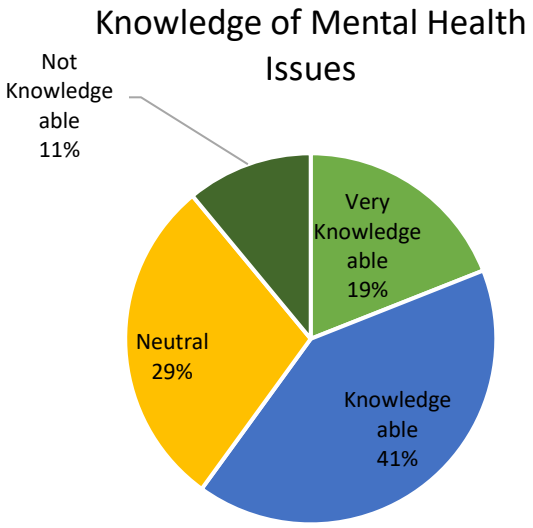


Figure 2: Knowledge of Mental Health Iss

The second part of the survey focused on getting information of how people deal with personal suffering from mental health and how they think mental health should be promoted.

When the subjects were asked if they think a person with a mental health is dangerous 30% agreed and 48 % disagreed while 22 % were not sure. This can show that a large portion of the people even if they don't admit, are not fully aware of the large range of mental health and its severity.

This finding was confirmed by the response's subjects gave when asked on how should the community and families deal with personals suffering from mental health issues, as 54% thought that social exclusion is the way the community should deal with personal suffering from mental health issues. While 35% and 32% choose discrimination and stigmatization respectively. However, 67 % believed that stigmatization should be stopped as it can make the problem can become worse.

Finally, when the subjects were asked how do they think mental health should be fought, 64% preferred to raise awareness about this especially among young youth through social media campaign.

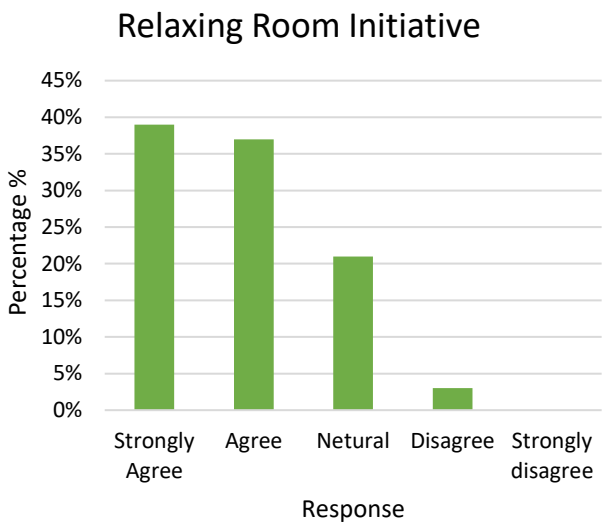
Stage Two was related to suggesting ways to enhance overall mental health of the UAE. In This paper we focused on two main groups which are the workers (employees) and the young youth in schools and universities.

As per the survey conducted 60% of respondents declared that they are not happy in their work. This is mainly coming out of being stressed and feeling overwhelmed during the working hours without dealing with their emotions and feelings on spot which eventually compromise their mental health. This was confirmed when 97% related their mental well-being to the happiness in work place as they spend most of their day at work. In addition, 91% of the employees surveyed preferred to deal with the stress on the spot as they believed that this will reduce the burden on their mental Health.

Figure 3 shows the percentages of agreement with the positive effect of the Relaxing Room initiatives. While Figure 4 illustrates the statistics of the respondent acceptance of the second initiative which is the Happy Hour. 75% of the respondent encouraged the idea and mentioned that it will help them feel appreciated, connected and treasured which will not only maintain their mental well-being but also enhance it.

Figure 3: Relaxing Room Initiative

Figure 4: Happy Hour Initiative



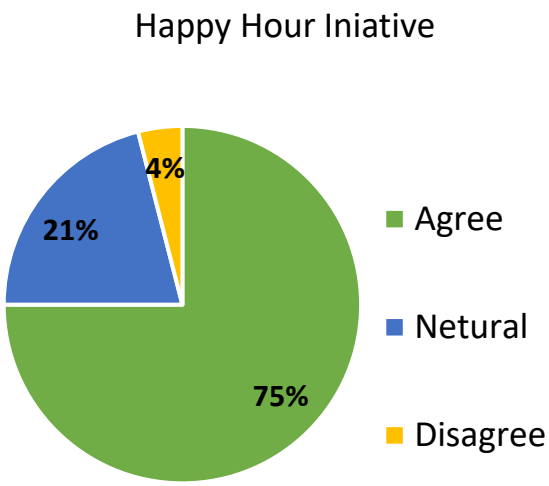


Figure 3: Relaxing Room Initiative

Figure 4: Happy Hour Initiative

Recommendations and Initiatives

UAE always aim to be up to date and to lead the way for all Arab countries in implementing new initiatives to ensure the well-being of its citizen. After conducting the surveys and with reference to the results and discussions made in the previous section, our team have come up with three initiatives that are further explained below. The first and second initiatives are aimed to enhance the occupational mental health of the employees. As this will help in improving the overall mental health of the population since most of the employee are care provider, especially the working women, who are more likely to suffer from anxiety, so if they are happy and their mental health is maintained by reducing their stress they will be able to deal with all level of crises on the family level in much better way. The third initiative dealt with proposing innovative methods to raise awareness among the school students, teachers and parents.

Relaxing Room

Have you ever had a bad day at work but still couldn't leave and needed to finish you work? Didn't you wish you could pose for an hour and let the stress all out? Well, we came with the golden solution; the Relaxing Room.

It is a place designated by each company for the employees to relax and vent out. The space will be designed and occupied with stress relief mechanism to help people to bring out their stress in a beneficial and socially acceptable way. It could be used individually by reserving it solely or a group of people could enjoy the various activities and games to help them regain the power to continue their tasks especially when they are dealing with large projects that contains a lot of tasks.

Different people have different ways of relieving their stress that is why the room will be subdivided into corners and each corner will be occupied with required elements. It has been proven that coloring is one of the most peaceful and effective ways to deal with stress, so one corner will be equipped with coloring books, wooden colors, watercolors and paint. Moreover, large white paper rolls will be fixed on the wall so that a person can use the paint and paint a way his worries and troubles.

Big comfy sofas to clear your mind and a corner with all types of books to take a stressed person into a new world of peace and relief. Moreover, although most of us don't admit it but hitting or smashing something every once and a while can help in relaxing. Hence, a corner with a hitting box and some boxing gloves will be supplied also. If all of the previously mentioned mechanisms don't work and the person just prefer to be alone to shout, sing or even cry, the relaxing room provide the perfect solution with the insulation capsule. It is a capsule that will be sound proof and will have shades so that stressed person could express himself freely.

All of what we have mentioned can be used by a person solely but still some people prefer to deal with their stress in groups. Hence, group activities will be provided such as a billiard table which is a fun way to interact with people. Moreover, Gaming PC, Ps4, Xbox and Wii, people who love electronic games will be satisfied in this room too because they will find the most popular games to compete and play with their colleagues. More traditional personal will also be satisfied as there will be card games like Uno and Blackjack so they can enjoy their time there. Relaxing room will be a wonderful place with amazing activities that can reduce the employees stress and bring them joy and happiness to elevate their productivity.

Happy Hour

Some small sized companies could find it hard to implement the relaxing room initiative, so we came up with another solution that can be less costly however, will serve the same goal and help increase the productivity and reduce the stress levels which will eventually enhance the mental health.

Happy Hour is, and hour celebrated weekly among employees and management. It will be designated to celebrate achievements and personal occasions. This will be a good time to increase the connection and enhance the well-being of employees. Moreover, it will enhance the appreciation levels for each achievement.

Innovative Awareness Campaign

From the results of the first survey, it was noticed that people preferred to fight mental health illness through raising awareness especially through social media.

Social Media programs have gained increasing importance through the last five years. Nowadays, young adults spent 35% of their time on using social media. Almost all of the

information they gain is through social networking programs such as; Facebook, Instagram, Twitter, WhatsApp and Snapchat. Having that in mind, starting an awareness campaign through social media and by social media influencers will be very effective.

The campaign can have several videos, posters and stories that introduce and define mental health issues, it can highlight the symptoms and the effects. Moreover, it should have the prevention ways or the ways of reducing the risks and behaviors that could lead to a severe mental health. Another way of spreading the word is to make an online quiz, with information relative to the mental health, similar to the fun quizzes the students usually take to know their preferences or their personalities. Last but not least SMS messages could be used to send short information regarding mental health. The main idea is to implement the concept of mental health, show the causes and how to deal with it, reduce the feeling of sham and emphasis that a person with mental health is just another patient that can be treated and cured.

Conclusion

Mental Health and well-being is a major sector of the public and occupational health. It was shown that through small yet effective initiative the mental health of the population can be increased significantly. Moreover, having awareness campaign will be a major step to increase the understanding and acceptance of the mental health issues. UAE is known for being pioneer in most of the sectors and that is why there have been several new laws and regulations that grantee the mental health of its citizen. Having said that further researches should be conducted to evaluate the mental health of young youth especially and to raise awareness and acceptance of opening up and admitting struggles that a person might have with his emotions and feelings.

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Waste Segregation Perceptions and Practices Among Sharjah's Higher Education Community

Moahmad Al Housani
UAE

In many parts of the world including the UAE, most of the valuable resources in waste are lost to landfills, where only small fractions of collected municipal waste are recovered and recycled. The engagement of the community in waste segregation at the household level is essential to the success of any waste recycling program. Thus, the objective of this research is to elucidate the driving forces behind community engagement in waste segregation within university campuses in Sharjah, for the purpose of devising successful on campus waste segregation programs.

The sample population for this study was the academic community of the Emirate of Sharjah covering four main academic institutions, where questionnaire surveys were distributed to cover students, faculty, and staff from different colleges within these institutions. A total of 525 respondents participated in the questionnaires that were designed to obtain information on the knowledge, attitude and practice of respondents with regards to waste segregation and recycling. Statistical analysis tests were run using IBM's Statistical Program for Social Sciences (SPSS) and included descriptive statistics, normality, internal consistency of the questionnaire using the Cronbach Alpha reliability test, factor analysis, and linear regression.

The study has found significant differences among respondents' knowledge, perception, and practices in waste segregation, as well among their recommendations for successful recycling programs. Although the majority of respondents were students within the age group of 18-25, they differed in their perceptions and practices based on several demographic factors including gender and educational fields. There were also differences among the respondents in terms of their views on number and design of recycling bins on campus, reward programs, and ways to enhance on campus recycling. The study shows that successful recycling programs can be devised only when there is a complete understanding of the community's knowledge, attitude and practices in terms of waste segregation and recycling. The design of waste recycling programs should take into consideration community demographics as well as community views on existing programs.

Keywords

waste segregation, waste recycling, community engagement, resource recovery, situational factors, personal factors, municipal solid waste

Phytic Acid: An Alternative Root Canal Chelating Agent

Mohannad Nassar
UAE

Introduction

During root canal treatment, rotary and/or manual instruments are used to clean the root canal and this will result in the formation of smear layer on the dentin surfaces. In the literature, there is a consensus on the importance of smear layer removal before root canal filling procedure is performed. Chelating agents are used regularly during teeth root canal treatment to facilitate cleaning the root canals and remove the smear layer. Ethylene diamine-tetra-acetic acid (EDTA) has been the most commonly used chelating agent since 1957 (1). It is synthesized on an industrial scale from ethylenediamine, formaldehyde, and sodium cyanide. This method results in the formation of impurities that are detrimental to most applications of this chelating agent (2). This synthetic persistent, EDTA, material is being overused and is considered one of the major organic pollutants discharged in water of lakes and rivers (3). It is noteworthy to mention that EDTA is used in cosmetic formulations in a concentration less than 2% while it is used in a concentration of 17% in dentistry. Because EDTA is not readily biodegradable, there have been some concerns about its leakage to the tissue around the tooth which is mainly composed of bone. Considering these facts, an alternative agent for smear layer removal is warranted, and the search for more biocompatible material to replace EDTA is still going on. Phytic acid (IP6, inositol hexakisphosphate) is the major storage form of phosphorus in plant seeds and bran that contributes in a variety of cellular functions. It is also omnipresent in mammalian cells, with a concentration ranging from 10 to 100 mmol/L (4). IP6 can be extracted with low cost and simple procedure from rice bran. This agent has multiple negative charges, making it an effective chelating agent (5). On the basis of these properties, we speculate IP6 to have the potential to replace EDTA as a root canal chelating agent.

Objectives

The objectives of this study were to determine the efficacy of IP6 in removing the smear layer from root canals and to assess IP6 effect on the viability, alkaline phosphatase activity and the morphology of osteoblast cells.

Materials and Methods

The universally accepted chelating agent EDTA was used as the control in all conducted experiments. Instrumented root canals of human canines received a final rinse of 17% EDTA (1 minute), 1% IP6 (1 minute or 30 seconds), or distilled water. The presence or absence of smear layer was evaluated with scanning electron microscopy. Cell viability (MTT) after 24 hours and alkaline phosphatase assays (ALP) after 1, 7, and 14 days were performed to evaluate the effect of IP6 and EDTA on cultured osteoblasts cells. The morphology of the cultured cells

was observed by using phase contrast microscope. For statistical analysis, the mean optical density of the MTT test and ALP activity of the control group at 24 hours was set to represent 100%, and results of the experimental groups were expressed as percentages of the control. Statistical analysis was performed by applying two-way analysis of variance (ANOVA) by using the tested irrigants and dilutions or incubation periods as 2 factors. In case of significance, statistical analyses were performed by Tukey multiple comparison test (alpha = 0.05).

Results

The results demonstrated the ability of IP6 to remove the smear layer from instrumented root canals surfaces. When compared with EDTA, IP6 was less cytotoxic and did not affect the differentiation of osteoblast cells. Morphologically, osteoblast cells in the control media showed the polygonal appearance, whereas cells treated with certain dilutions of EDTA exhibited contracted, spherical morphology and increases in intercellular spaces, which are indicators of cellular death and decreased proliferation. For the various dilutions of IP6, cells retained their normal polygonal morphology.

Conclusions

The findings of this study showed the potential of IP6 to be used as a chelating agent in root canal treatment. IP6 proved to be an effective agent in removing the smear layer, while being biocompatible to osteoblast cells. Further studies are warranted to evaluate other aspects of the use of IP6 in root canal treatment such as the reaction with sodium hypochlorite which is the main antimicrobial used during root canal treatment.

Clinical and Environmental Significance

Several dental materials used in dental clinics are known for their toxicities and their negative impacts on the environment, our research gives insights on the possible future use of IP6 which would positively impact both the success of the treatment and the environment; moreover, it might reduce the cost of the root canal treatment as phytic acid cost of production is less than EDTA.

Keywords

Chelating agent, EDTA, phytic acid, root canal, smear layer, osteoblast cells.

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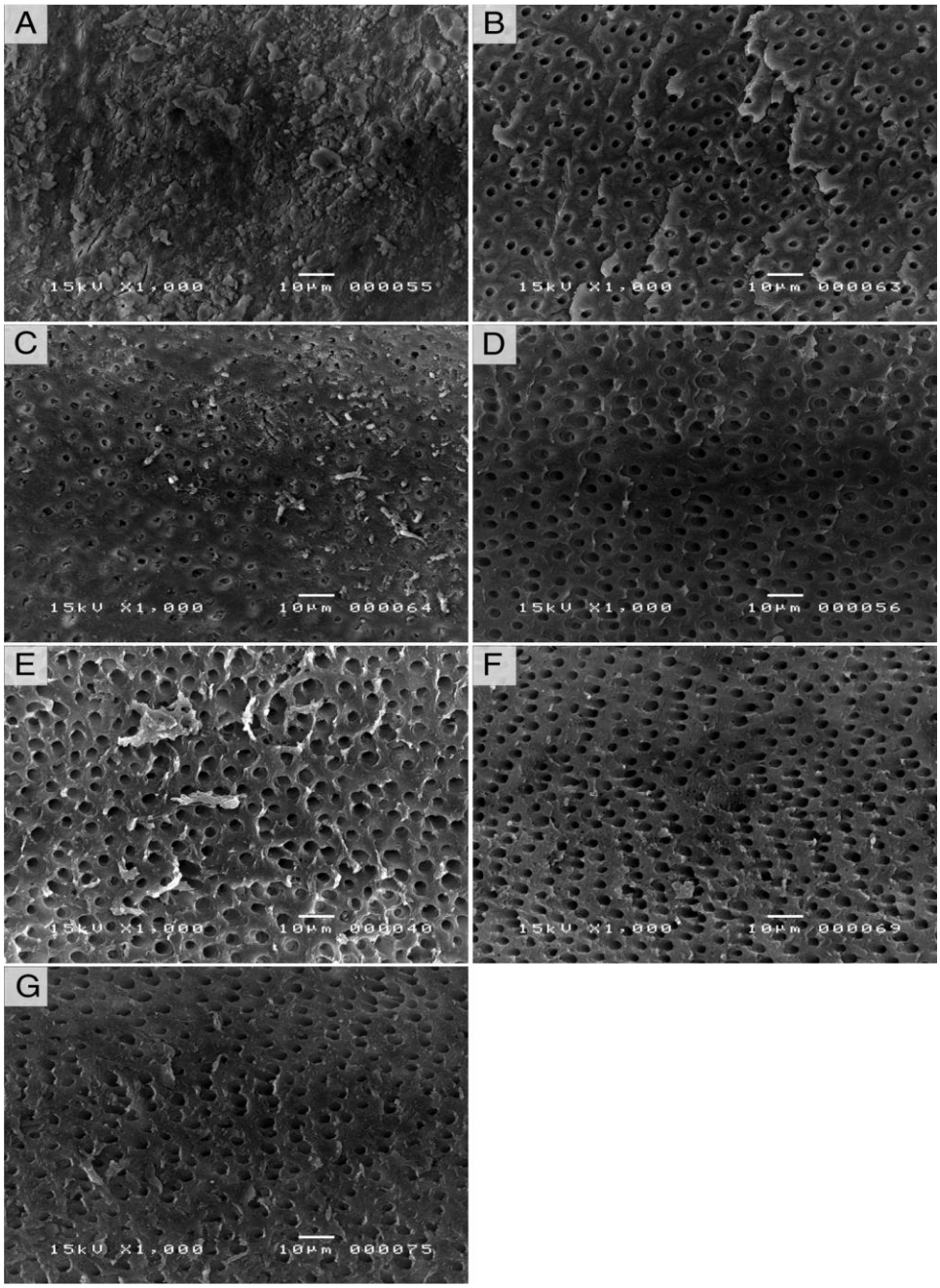

Figure 1

Figure 1: Representative scanning electron microscopy images of effect of different irrigation regimens on removal of smear layer from middle and apical thirds of instrumented root canals.

(A) Smear layer produced on root canal surface after instrumentation and irrigation with 5% sodium hypochlorite with final rinse of distilled water. (B and C) Smear layer removal of instrumented root canals that received final rinse of 17% EDTA for 1 minute, middle and apical thirds, respectively. (D and E) Smear layer removal of instrumented root canals that received final rinse of 1% IP6 for 1 minute, middle and apical thirds, respectively. (F and G) Smear layer removal of instrumented root canals that received final rinse of 1% IP6 for 30 seconds, middle and apical thirds; respectively.

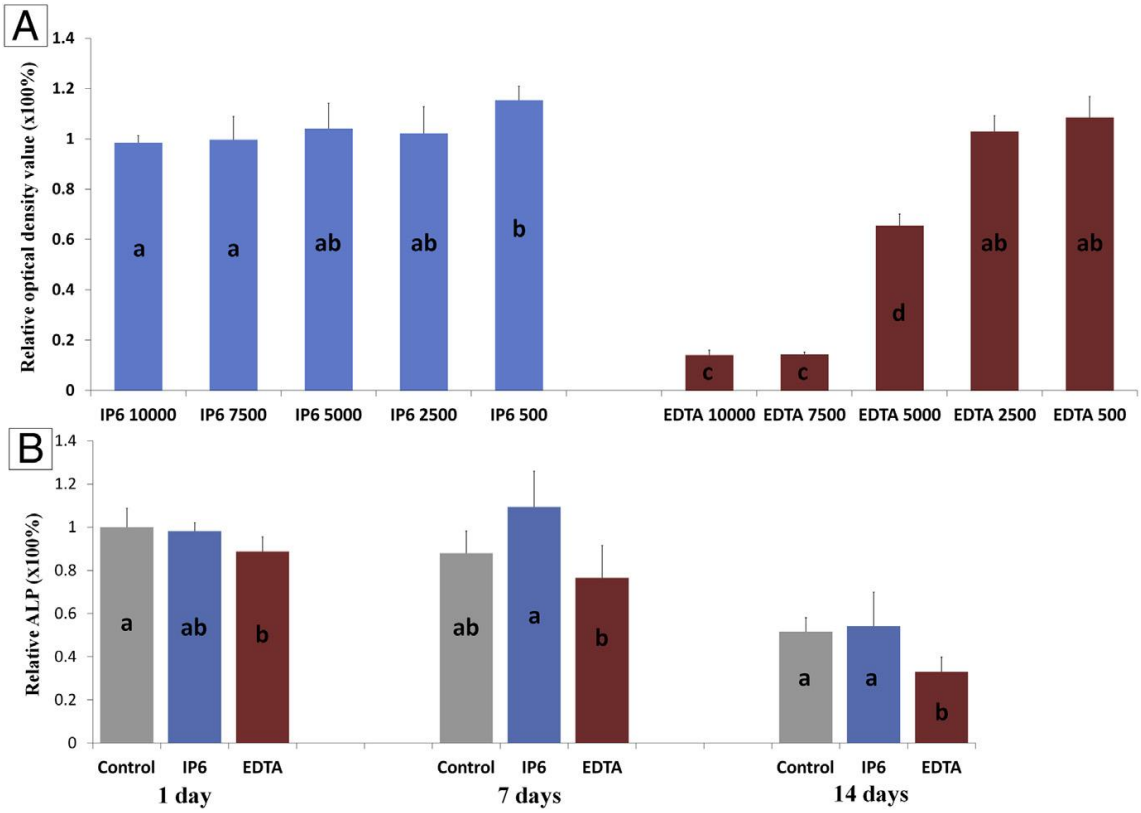

Figure 2

Figure 2: (A) Cytotoxicity of culture medium containing different dilutions of test solutions of 1% IP6 or 17% EDTA on osteoblast cells after 24 hours of incubation. Cell viability was determined by using MTT assay. Two-way ANOVA indicated interaction between irrigants and dilutions. The same lowercase letter indicates no significant difference ($P > .05$). (B) ALP activity of osteoblast cells cultured with 500 mg/mL 17% EDTA or 1% IP6 for 1, 7, and 14 days. Data were expressed as percentage of ALP activity in control cells on day 1. Data were analyzed by using one-way ANOVA. The same lowercase letter indicates no significant difference ($P > .05$).

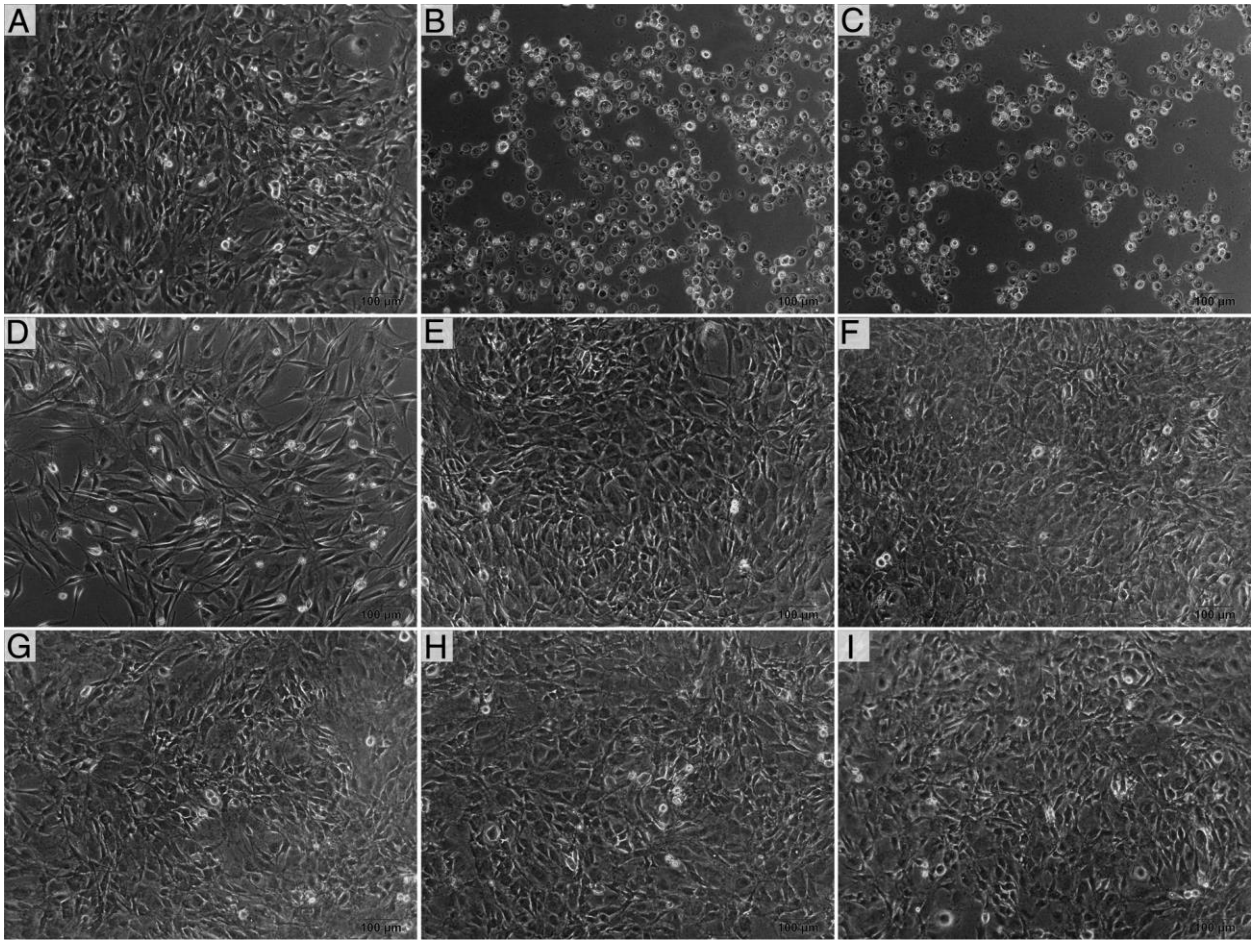

Figure 3

Figure 3: Morphologic changes of osteoblast cells after 24 hours of exposure to test solutions. (A) Control: polygonal-shaped cells. (B–E) Cells treated with 10,000, 7500, 5000, or 2500 mg/mL culture medium of 17% EDTA, respectively. Contracted, spherical morphology and increases in intercellular spaces were observed at 2 highest dilutions (B and C), whereas at 5000 mg/mL, some cells exhibited normal polygonal morphology; however, decreased cellular density and increased intercellular spaces were also observed (D). Normal polygonal morphology of the cells was retained at 2500 mg/mL (E). (F–I) Cells treated with 10,000, 7500, 5000, or 2500 mg/mL culture medium of 1% IP6, respectively. Cells retained normal polygonal morphology at various dilutions of IP6

Wastewater Reuse in the United Arab Emirates

Maryam Chahwan
Postgraduate Student at Hamdan Bin Mohammed Smart University

1.0 Introduction

Wastewater reuse has recently been drawing increased attention on a local and global scale. This is mainly due to two key factors: increased scarcity of fresh water resources available and the increased environmental concerns with regards to current techniques of water supply. Gulf countries like United Arab Emirates (UAE) continue to rely on desalination of seawater, followed by extraction of water from underground aquifers. The main desalination technology used in this region includes the use of multi flash distillation (MSF) which is applied to about 78% of desalination plants (Aleisa and Al-Zubari, 2017). In order to supply energy to the desalination plants, fossil fuels such as oil are used. As a result, several health and environmental impacts continue to follow due to emissions of different greenhouse gases and presence of heavy metals such as mercury and nickel. Additionally, the current percentage of dependence on groundwater as a source of water supply in the UAE is 70% (figure 1).

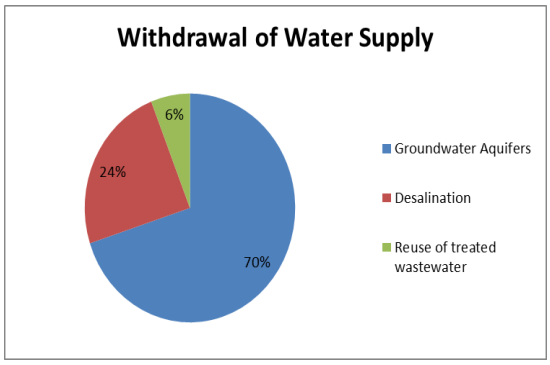

Figure 1: Sources of water supply in the UAE (Fao.org, 2008).

Due to the high percentage of dependence on groundwater aquifers and the high cost and negative health and environmental effects of energy intensive desalination, the UAE is looking into alternative ways in which reuse of treated wastewater can be increased from a current 6% (figure 1) dependence. This heavy reliance on groundwater aquifers supported by shortage in annual recharge rates has resulted in depletion and deterioration of groundwater quality as a result of seawater intrusion (Aleisa and Al-Zubari, 2017). Currently, the UAE has about 79 medium and large sized wastewater treatment plants. In 2013, the treated wastewater produced was about 615 Mm3, out of which 64 % was used mostly in irrigating green areas and landscaping (Moew.gov.ae, 2015). Recently, the UAE have started to adopt the approach of using treated wastewater for landscaping activities such as reforestation of tress, irrigation of gardens and green spaces (Moew.gov.ae, 2015). Consequently, Dubai Municipality has been planning and implementing major sewage treatment plant projects for the past 25 years. The

typical processes involved in treatment of wastewater in Dubai include Mechanical treatment to remove physical waste, biological treatment to remove biological substances and tertiary treatment to disinfect the water. Table 1 below shows a summary of the water quality parameters that were reported by Dubai Municipality in 2011(Z.Arulogun et.al, 2014).

Table 1

Water quality parameters

Parameter	Effluent water from STP
Flowrate (m3/day)	350, 640
Conductivity M.Mhos/cm	1932
Residual Chlorine mg/L	2.5
pH	6.6
Suspended solids mg/L	4.0
T.D.S mg/L	969
Chlorine mg/L	400
Sulphates mg/L	148
Phosphates mg/L	3.7
CaCO3 mg/L	70
Hardness mg/L	250
Nitrite mg/L	0.56
Nitrate mg/L	19.3
BOD5 mg/L	0.7
COD mg/L	24
Calcium mg/L	41.6
Magnesium mg/L	35

Currently, there are two major water treatment plants (WTP) that were constructed in 1990 and 2009 with capacities of about 260,000 and 300,000 m3/day. At present, these plants provide about 700,000 m3/day of treated water for irrigation purposes (Najem, n.d.). In addition to irrigation, these plants also help in treating the water from Dubai Sea water Creek, hence, ensuring good standards of health for the public and environment (Najem, n.d.). Additionally, other major WTP projects include Al Wathba wastewater treatment plant (WWTP) in Abu

Dhabi and Al Aweer WWTP in Dubai (ACWUA, 2010). The main focus of this paper will consequently highlight the different wastewater reuse techniques that are currently applied in the UAE as well as other techniques that can be applied in order to maximize the utilization of treated wastewater.

2.0 Literature review

Wastewater is known to be made of approximately 99% water and around 1% suspended, dissolved and colloidal solids. Even though compositions will vary between different sources (e.g. domestic sewerage, industrial process water), water will still remain the main constituent. Wastewater management is known to receive little political and social attention, particularly from the perspective of water scarcity. It is important to note that, by neglecting wastewater management countries will face different impacts on human health, economy, sustainability of water supplies and the environment (UNESCO, 2017). Wastewater volumes have been increasing in many regions around the world. This increase is mainly attributed to urbanization, increase in population, economic development and better living conditions (Sato et al, 2013). As a result, great emphasis is currently being placed on wastewater reuse as a means of reducing the volumes of wastewater being disposed. Wastewater reuse can be divided into Planned, and Unplanned reuse. Unplanned reuse of wastewater refers to situations where waste water is returned back to the "natural" systems and then extracted again for reuse downstream (Sharma and Sanghi, 2013). Additionally, planned reuse involves the deliberate reuse of treated wastewater.

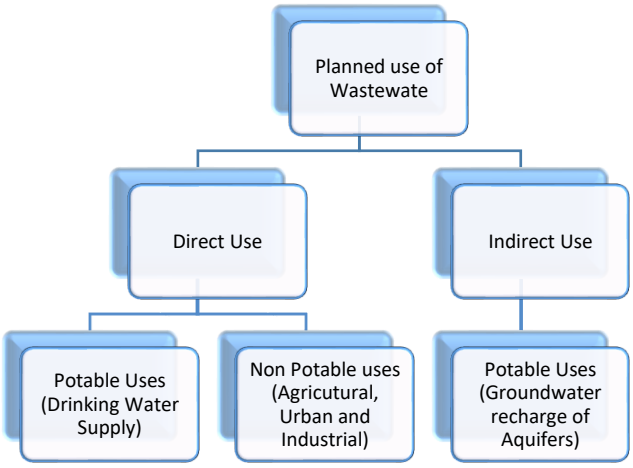

Figure 2: Types of Wastewater reuse (Sharma and Sanghi, 2013).

As shown in figure 2 above, planned reuse of wastewater can be direct or indirect. In order to reuse wastewater directly, the water is directly delivered into a water treatment plant or a distribution point. On the other side, indirect use of water involves reusing water that is delivered back into the hydrogeological environment e.g. reservoirs, rivers or aquifers through a water supply that is at a downstream point. Figure 3 below summarizes the percentage of

wastewater reuse for various sectors. As shown in figure 3, Agricultural sector is considered to have the highest percentage of wastewater reuse (32%). This is true for many regions across the world where waste water is being used for irrigation purpose. Moreover, it is estimated that about 4.5 million ha worldwide use wastewater for irrigation. Additionally, other estimates also suggest that about 200 million farmers around the world use both treated and untreated wastewater to irrigate about 20 million ha. These estimates emphasize the global importance of using treated wastewater for irrigation purposes (UNESCO, 2017).

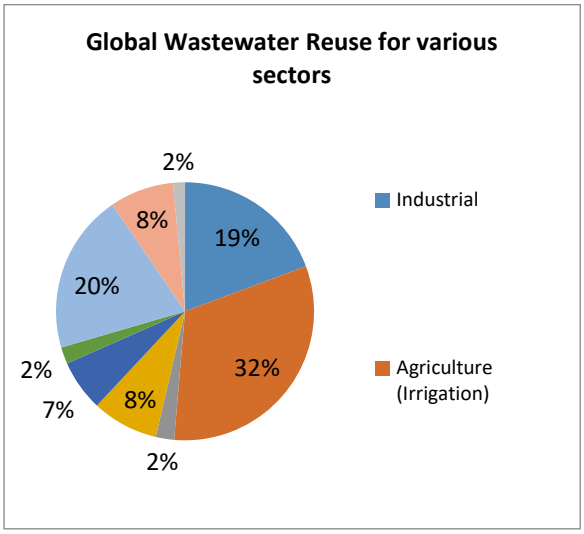

Figure 3: Global wastewater reuse (UNESCO, 2017).

Wastewater is also currently being reused in various sectors across the world. Industrial sectors use about 19% of treated wastewater, followed by landscape irrigation (20%) and Non-Potable Urban reuse (8.3%). These percentages also suggest that, treated wastewater can still be utilized in activities with low percentages of reuse such as Recreation, Indirect potable reuse and groundwater recharge (UNESCO, 2017). In the Middle East and North Africa, the current estimated volume of wastewater reuse is about 22.3 km^3 /year, out of which 51% (11.4 km^3 /year) is, treated. Wastewater treatment in the MENA region is considered to be highly variable with several design limitations for treating domestic and industrial wastewater. Countries with high-income in the MENA region also use treated wastewater for both landscape and agriculture irrigation. Currently, 51% of treated wastewater is used for irrigation. Some countries in the region are planning to increase the use of treated wastewater. Likewise, in the UAE 16,950 ha are currently irrigated using treated wastewater, out of which 15,000 ha are public gardens, shrubs, trees, urban forests and grasses (Sato. et. al, 2013).

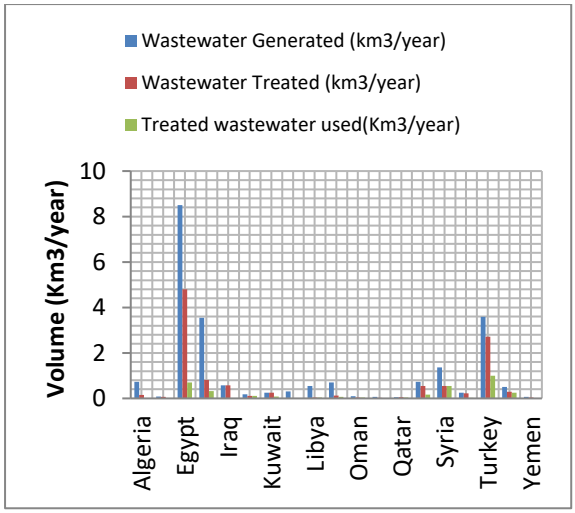

Figure 4, wastewater reuse for the MENA region (FAO, AQUASTAT 2012).

Figure 4 above summarizes the volumes of wastewater generated, treated and reused for countries across the MENA region. As shown in figure 4, Egypt has the highest volume of wastewater generated of about 8.500km3/year, out of which only 4.8km3/year is treated and 0.700 km3/year is reused. Likewise, the UAE generates about 0.500km3/year with only 0.289 km3/year treated and 0.248km3/year reused. These values suggest that; not all wastewater generated is currently treated and reused (Sato. et. al, 2013). There is a huge gap in many countries across the MENA region between the treated and reused wastewater. This means that, if countries begin to treat more of their wastewater, reuse it, and develop the required infrastructure; this could be an additional source of water supply that will help in solving water scarcity. Although the use of treated wastewater is beneficial for most sectors there are some drawbacks involved. This is discussed in further detail below.

2.1 Urban Sectors

Treated wastewater can be directly or indirectly used for urban applications. Examples of indirect uses include retaining wastewater and diluting it with ground or surface water then collecting and treating it for human consumption. Furthermore, direct uses include collection of reclaimed wastewater effluent to a drinking water distribution network right away. This however has huge treatment costs due to the stringent water criteria that are required prior to distribution. Reuse of waste water in urban areas is also beneficial for suppling water to non-potable applications. Examples include: Irrigation of residential, public and commercial areas. Irrigation of school yards, recreation centers and highway. It is also beneficial since it can be used for fire protection and toilet flushing for industrial and commercial buildings. This also saves cost of having to develop additional sources of water supply (Hespanhol and Helmer, n.d.). Treated wastewater can also be beneficial for use in recreational purposes. Examples include boating, fishing, swimming and landscaping.

2.2 Industrial Sectors

Wastewater reuse is common in the industrial sector, especially in uses involving the evaporation of cooling water, feed water for boilers and irrigation of land surrounding the plant. This is beneficial since it can save cost for industries that do not require the use of potable water and also if the industry is located near urban areas that already have secondary effluent (Hespanhol and Helmer, n.d.).

2.3 Agricultural Sector

The use of treated wastewater for irrigation has been increasing for the past two decades. This is mainly due to increase in water scarcity of resources, increase in cost of fertilizers, increase in cost of discharge for wastewater effluent and the recognition of the value this practice has by water planners. The main benefits this practice has can be divided into economic and environmental benefits. Some of the economic benefits include increase in productivity and increase in income for areas with limited crops. Additionally, environmental benefits include preservation of groundwater resources and protection from salt water intrusion, prevention of discharge of wastewater effluent into surface water, aesthetic improvement of urban conditions and irrigation of green spaces (Hespanhol and Helmer, n.d.). Although the use of treated wastewater for the agricultural sector is beneficial, there are some drawbacks involved. Examples of such drawbacks include groundwater contamination with nitrate, buildup of different organic and inorganic compounds and increasing the salinity of unsaturated layers (Hespanhol and Helmer, n.d.). Negative health effects can also occur due to the transmission of different communicable diseases and the presence of toxins such as heavy metals to farm workers and people that consume the crop.

3.0 Analysis of Results

As mentioned earlier, one of the main uses of treated wastewater is irrigation. In order for wastewater to be used for irrigation purpose, secondary treatment technologies such as membrane bioreactor (MBR) and reverse osmosis can be used to produce effluent of suitable quality for irrigating gardens and agricultural lands. Nevertheless, unrestricted irrigation will require tertiary treatment in order to protect the environment and human health (Sharma and Sanghi, 2013). Currently, Abu Dhabi is implementing the reuse of wastewater for irrigation. Investments of around 547.5 Million AED were made in order to use treated wastewater from Al Mafraq treatment facility to irrigate approximately a quarter of the land in the city (Nepis.epa.gov, 2012). In addition to agricultural uses, treated wastewater can also be used in several industries across the region. Examples include the use of water in dairy industries, which use process wastewater that is known to be of comparable quality to treated wastewater. Additionally, textile industries can also use treated wastewater in processes including bleaching, dyeing, washing and printing. In Jordan, treated wastewater effluent is currently used as boiler feed water and for cooling purposes (Sharma and Sanghi, 2013). Furthermore, it is also possible to use wastewater for aquaculture as fish feed. According to the guidelines set by WHO, the level of fecal coliform required should not be more than 10,000 MPN/100 mL. The effluent that comes from primary treatment stage is already rich in essential nutrients such

as phosphorus and thus, can help in production of fish. Likewise, wastewater effluent can also be transformed into beneficial fertilizers that can be used on agricultural lands. Wastewater coming from households was found to contain high nutrient values that can be used as fertilizers. Groundwater recharge is also one of the important issues that can be reduced by using treated wastewater. This is particularly valid in the UAE, since the country relies heavily on groundwater. The artificial recharge of aquifers will be beneficial and will serve as additional emergency storage of water supply. There are currently pilot projects that are being examined for recharging aquifers using treated wastewater (Nepis.epa.gov, 2012). As mentioned earlier, the use of treated wastewater in various sectors has several environmental and health risks. In order to minimize these risks, proper disinfection, treatment and control of effluent must be ensured (Sharma and Sanghi, 2013). Several water quality objectives need to be set in order to meet international standards and guidelines. Most of the standards currently used in the UAE are based on guidelines from California (USA) and WHO. Although this is ensured, the main issue is the increased construction growth at rates more than infrastructure development. This resulted in 42% of untreated sewage discharged to deserts/ seas and 37.6 % treated sewage not being utilized

4.0 Conclusion and Future Recommendations

In order to secure the continuous supply of water resources in this region, reuse of treated wastewater is becoming an important topic. In this region, the reduced rates of wastewater reuse are mainly attributed to variations in effluent quality, absence of adequate treatment and distribution infrastructure and psychological dislike towards treated wastewater. Although the UAE is currently planning on future projects that maximize the utilization of wastewater, there is still potential for improvement as an opportunity to reduce the major issue of water scarcity in this country. In order to promote wastewater reuse, the below future recommendations are suggested (Aleisa and Al-Zubari, 2017):

1. Having a legislative framework that can promote sustainable consumption along with political support to increase utilization of treated wastewater.
2. Enhanced efforts in reducing water consumption.
3. Possibly implement tariffs on municipal water supply along with the collection of different water bills.
4. Public awareness and education in order to ensure public acceptance of using treated wastewater.
5. Further studies to be conducted regarding the recharge of coastal aquifers.
6. Upgrading efficiency of treatment stages in order to maximize the options of reuse that were discussed in the Analysis section.

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Wastewater Reuse in United Arab Emirates

Roudha Abdulla Aljaziri

Background

A regional concern, water resources is limited and it is becoming less and less which in the way that it is contributing to result in water scarcity and water shortage issues in the UAE. This is due to several factors that participates to over consuming the water resources such as increasing in population growth and human development. All those constitutes may lead to decrease in the water resources and contributes to serious issues regarding the availability of the water resources across all emirates in the country which will negatively impacts the population as well as other living organisms. Therefore, quick solution must be taken. This research paper aims to create a solution for the limited water resources focusing on wastewater reuse in United Arab Emirates.

Objective

The objectives of this research paper are to ensure that water resources are not decreasing to impact the country, to contribute to limited water resources issue, and to promote a solution ensuring that water are available for future generations by applying a cost-effective solution to stable the availability of water in the country by wastewater reuse and recycle.

Methods

This research paper used one methodology. An extensive review of the literature, secondary research methods used available books, journal articles, magazines, creditable websites, and studies that has been applied and studied from different countries for reusing and recycling of wastewater.

Results

Results showed that many studies and researches identified that wastewater reuse and recycle has a major role in solving water scarcity and water shortage issues found in regions suffers from limited water resources or decreasing in water resources availability. In addition, wastewater reuse will positively assist the country to continuously possess water for domestic use, agriculture production, and industrial activities to fulfill the needs for all sectors and every individual in the country. Further, will help the country to develop external water resources for the country's benefit.

Conclusion

In brief, wastewater reuse and recycle are one of the most significant solution to ensure the availability of water resources across all emirates and ensure the stability of water for all sectors

and population as well as contribute to solve water scarcity and water shortage issue that are expected to occur in the future.

Infection Control in Child Day Care Centers: Knowledge and Practices of Caregivers

Dr. Nessrin El-Nimr

Introduction

The number of children in out-of-home daycare centers (DCCs) has increased significantly all over the world.(1) DCCs provide a unique setting conducive to transmission of infectious agents. Children attending DCCs are at high risk of contracting respiratory infections, acute otitis media, diarrheal disease, invasive bacterial disease, hepatitis A, CMV and varicella-zoster infections.(2) In Alexandria, Egypt, the prevalence rate of parasitic infections among children in DCCs in 1995 was 56.0%.(3)

An overlooked aspect in child care is the impact the caregiver has on the child's health. (1) A positive relationship has been established between caregivers' knowledge about infection prevention and control practices (IPC), their hygienic training and the reduction of illness.(4)

Objectives

To assess the knowledge of the DCC caregivers about infectious diseases and their modes of transmission and to assess the IPC of the DCC caregivers in Alexandria.

Subjects and methods

Using a cross sectional design, 402 caregivers working in 59 DCCs in three districts in Alexandria were included. Each caregiver was observed for 3 times consecutively with a total of 1206 observations.

Data were collected using a structured interviewing questionnaire and an observational IPC practices checklist. The questionnaire was used to collect data on caregivers' personal characteristics, knowledge regarding infectious diseases, modes of transmission and the possible ways of IPC and knowledge regarding IPC practices. A special scoring system was constructed and the total knowledge and practice scores were calculated by summing scores of all questions.

Statistical analysis

Multiple Analysis of Variance was used to test the difference in two or more vectors of means (mean knowledge scores about infectious diseases and about IPC). Post hoc test using Tukey Honest Significant Difference was used to determine which groups in the sample differ. Regression analysis models were used to identify factors affecting knowledge score of caregivers, and to estimate the magnitude of the association between different variables and the level of practice of caregivers (poor/fair and good).

Results

Only 2.5% of caregivers had good level of knowledge. Studying the effects of the personal characteristics of caregivers on their knowledge regarding infectious diseases and IPC measures, one-way MANOVA indicated only a statistically significant difference between caregivers with different levels of education on the combined dependent variables (infectious diseases and IPC mean knowledge score): F= 3.788, p= 0.005, Wilks' Lambda= 0.958 and partial Eta squared =0.021. Given the significance of the overall test, the univariate main effects were examined. Significant univariate main effect for education was statistically associated only with infectious diseases knowledge after using a Bonferroni adjusted alpha level of 0.025 (F= 6.545, p= 0.002). Caregivers with university education had a higher significant knowledge score about infectious diseases compared to those with other educational categories as revealed by the Post hoc test results. Level of education was the only significant predictor of the caregivers' knowledge score as shown by the multiple linear regression analysis, table 1.

In 31.6% of the IPC observations, caregivers had a poor practice score percent. Being from district X and the working hours/day were the predictors of the IPC practice as shown by the results of the logistic regression analysis, table 2.

Conclusions and recommendations

The level of knowledge and practice of caregivers regarding infectious diseases and IPC measures were below optimum. Raising awareness of caregivers about infectious diseases and IPC practices is recommended. All workers in DCCs should be certified in child care and related IPC practices. Provision of national guidelines and regular monitoring and supervision of DCCs, particularly those with large number of children is required.

Key words

Caregivers; day care centers; infection control; knowledge; practice

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Table 1

Results of multiple linear regression of studied factors on caregivers' knowledge score regarding infectious diseases and IPC practices (Alexandria, 2015)

Independent variable	Parameter Estimate	P value	Standardized Estimate	95% Confidence Limits	
Age	0.07593	0.3743	0.07102	-0.09190	0.24376
Years of experience	-0.10362	0.6235	-0.02794	-0.51833	0.31109
Level of education					
Below secondary vs. university	8.22774	0.0136*	-0.41776	-14.75402	-1.70146
Secondary vs. university	6.64894	0.0321*	-0.27834	-12.72499	-0.57290
Teacher vs. other jobs	-0.45370	0.8895	-0.02586	-6.86924	5.96185

* Significant (p<0.05)

Table 2

Predictors of infection control practices of caregivers in DCCs (Alexandria, 2015)

Independent variables	Odds ratio	p value	95% Confidence interval	
District X vs. Y	2.514	0.0007*	1.474	4.287
Daily working hours	2.246	0.0010*	1.387	3.637

* Significant (p<0.05)

Evaluation of Consumer Participation in the United Arab Emirates Health Care System as Volunteers

Aisha Al Saraidi

1. Introduction

Health consumers are people who use health services, as well as their family and caregiver. This includes people who have used a health service in the past or who could potentially use the service in the future (Health Consumers NSW, 2017). Health consumers have been defined as patients, caregiver, service users, users, lay persons, clients, and citizens (Payne, et al., 2011).

Customer participation has been conceptualized comprehensively in line with emerging trends that multiple concepts in contemporary healthcare management build on actively involving consumers, for example, patient-centered care, patient empowerment, shared decision-making, self-management, consumer-directed healthcare, and consumer-driven health plan. These concepts have different origins but are related (Engstrom, 2014). In contrast, proactive consumers can be catalysts for improving their own health while improving the healthcare system along the way (Olsen, Aisner, & McGinnis, 2007), five levels of consumer participation will be considered in the proposed study which are:

1. Consumer participation in healthcare policy-making.
2. Consumer participation in healthcare research.
3. Consumer participation in self-care.
4. Consumer participation as a caregiver.
5. Consumer participation as volunteers.

in the general health context, consumer participation models typically incorporate varying de grees of involvement in service planning and delivery,ranging from the sharing of informatio n and opinions about services to engaging in shared problem-solving and joint decision-making (NationalResource Centre for Consumer Participation in Health (NRCCPH), 2002)(C ommonwealth of Australia, 2018). In this section, we will focus on consumer participation as volunteers.

1.1 Volunteer definition

Volunteering defines as any activity that involves spending time, unpaid, doing something that aims to benefit the environment or someone (individuals or groups) other than, or in addition to, close relatives. Central to this definition is the fact that volunteering must be a choice freely made by each individual.

This can include formal activity undertaken through public, private and voluntary organizations as well as informal community participation and social action. Everyone has the right to volunteer and volunteering can have significant benefits for individuals(NCVO-Volunteering, 2018).

According to the strategy for volunteering in the NHS in Scotland (2008) A volunteer is: “A person who gives freely and willingly of their time to help improve the health and wellbeing of patients, users, (and their families and carers) of the NHS in Scotland”(Group, Wide, & Dykes, 2013).

In July 2015 Volunteering Australia, the national peak body for volunteering announced the new Australian definition of volunteering; "Volunteering is time willingly given for the common good and without financial gain"(Go-Volunteer, 2018).

The law No. (5) 2018 that regulating volunteer work in the Emirate of Dubai define the following(Low(5)2018); Volunteer: Any person who, willingly and under no duress or coercion, dedicates himself to performing Volunteer Work without pay.

Volunteer Work: Any work that is aimed at achieving public benefit and carried out in accordance with the governing framework of a Volunteering Agreement under which a Volunteer contributes, by his own choice and outside of his family circle, his time, effort, or skills with no intent to derive any material gain for himself.

The UAE Red Crescent Authority define volunteering as the voltage provided by man to his community with his own motivations and non-monetary benefits thereby to bear some responsibilities in the areas aimed at achieving the humanitarian assistance (ERC, 2015).

Many actions are considered outside the definition of volunteering, for example, direct family responsibilities are excluded. These direct family relationships vary among people and social groups and so this is open to individual interpretation. Also, caregiver has many similarities with volunteers, but because of the family relationship, these are outside this definition of volunteering. Compulsory educational service learning (where students are required to volunteer as part of a course), mandated court orders including community service and fines, internships, formal work experience / vocational placements mandatory government programs and. limited choice labor market government programs are not included in the definition of volunteering (Volunteering Australia, 2017).

1.2 Scope of volunteering

Volunteers are engaged in a wide range of roles in the healthcare system. Volunteering England list more than 100 roles volunteers carry out in health and social care. Table 1 lists some of the settings in which volunteer’s work(Naylor, Mundle, Weaks, & Buck, 2013).

Table 1. Volunteering in health and social care — settings and roles (Naylor et al., 2013)

Setting	Examples of roles

Community settings	Social support for vulnerable groups; signposting and improving access to services; teaching and training; advocacy and interpreting; providing wellbeing activities in the community; coaching patients through lifestyle changes; fundraising.
Acute hospital care	Assisting with meal times; buddying; delivering supplies to frontline staff; collecting patient feedback; ambulance 'first responders'; plain language volunteers (to edit written materials); clerical support; welcoming and guiding around the hospital
Mental health care	Peer support; friendship schemes; running drop-in centers and sports groups.
Palliative care	Bereavement counseling; providing emotional support to families; running support groups; training other volunteers.
Home care	Visiting and befriending older people outside care homes to reduce isolation; home escorts for vulnerable patients; carer support services.
Care homes	Supporting people to eat properly; providing activities that improve wellbeing; dining companions; providing entertainment

This section reviews international trends in consumer participation in health care as a volunteer, opportunities for consumer participation in health care as a volunteer in the United Arab Emirates and challenges for consumer participation in health care as a volunteer in the United Arab Emirates. Importance shall be placed upon ways in which healthcare volunteerism may improve healthcare management, positively influence society and enhance economic prosperity.

2. International trends in consumer participation in health care as volunteers

2.1 introduction

The Australian Bureau of Statistics, in their most recent report on volunteering, found that 476, 000 people volunteered 47.7 million hours of their time to health organizations. Volunteers make significant contributions to the New South Wales public health sectors economic and service capacity from which the whole community benefits. (NSW Health Framework, 2011). An estimated 1.7 million people volunteer for health or care services across Britain (Gilburt, Buck, & South, 2018).

Volunteers play a crucial and often under-appreciated role in healthcare volunteers help by: improving patient experience in hospitals and elsewhere, building a closer relationship between services and communities, tackling health inequalities and promoting health in

hard-to-reach groups and supporting integrated care for people with multiple needs (Naylor, Mundle, Weaks, & Buck, 2013). The problem of severe shortages in global health workforces is addressed in many places by using community volunteers, particularly in sub-Saharan Africa, has become a major concern for a widening group of researchers and community health practitioners(Maes, 2010). We will mention some examples of the contribution of volunteering in supporting the health sector at the global level.

Volunteering has a major role to play over demand for long-term care services for older people, which is increasing rapidly in low- and middle-income countries. The Governments of Costa Rica and Thailand have implemented broadly comparable interventions to deploy volunteers in long-term home care. Both countries trained older volunteers from local communities to make home visits to impoverished and vulnerable older people and to facilitate access to health services and other social services. Between 2003 and 2013 Thailand's programme trained over 51 000 volunteers, reaching almost 800 000 older people. Between 2010 and 2016 Costa Rica established 50 community care networks, serving around 10 000 people and involving over 5000 volunteers(Peter Lloyd-Sherlock, Anne Margriet Pot, 2017).

UN Volunteers make important contributions to UN action in the pursuit of sustainable development, with a particular focus on people in transition or crisis. UN Volunteers – who are often well qualified individuals at the beginning of their careers – bring much needed skills, experience and energy to public health work around the world, particularly in country offices, by augmenting surge capacity during an emergency, or by doing a lot of the ground work in more stable settings(UN Volunteers, 2018).

Volunteers play an important role when epidemics are widespread, for example, Ebola is not a West African problem Ebola virus epidemic has attacked the global health community disproportionately as caregivers, either health professionals or family members. WHO has helped facilitate partnerships for development and testing of Ebola vaccines, focusing on the vaccines with the greatest likelihood of success and ability for mass production, as well as identifying and supporting the clinical trial sites. Many WHO staff are volunteering to test these new vaccines. Dr. Marie-Paule Kieny, Assistant Director-General - Health Systems and Innovation one of these volunteers "Volunteering for a vaccine trial is just one of those ways we can directly contribute to this common human challenge and stand behind our colleagues and friends in Africa. " (Marie-Paule Kieny, 2014).

Volunteers play an important role in donating blood. In 2012 Haiti launched a strategy to attract more blood donors, to increase the proportion of blood collected from voluntary, unpaid blood donors to 85% (with the aim of reaching 100% volunteer donors) and increase the proportion of regular blood donors to 40%. It tapped into a network of volunteer promoters and sent mobile blood drives around the country to spread the word about the importance of blood donation. Flyers, stickers, t-shirts, books, and pens were handed out, with the aim of attracting younger donors using the concept of Club 25. This international initiative encourages young people aged 16 to 25 to become regular volunteer blood donors. Club 25 also includes educational

activities about safe sex and other health issues linked to remaining a low-risk donor(National Blood Safety Program, 2012).

Volunteers have a very important role to play in educating the community. The presence of volunteers from a particular community or environment contributes to the dissemination of a culture of health close to the understanding of society. Buruli ulcer (BU) is a neglected tropical disease caused by Mycobacterium ulcerans. Usually, the number of patients presenting with ulcers in an advanced stage is high. This complicates treatment and increases the risk of disabilities. The disease is endemic mainly in West Africa. The primary strategy for control is early detection using community village volunteers. In Benin, data were collected to understand the role of the different referral systems on the stage of disease at presentation in the hospital and the diagnostic precision. About a quarter of the patients were referred to the hospital by the community health volunteers. Community health volunteers referred patients more frequently in an earlier stage of the disease. The report found that community health volunteers played an important role in the referral system of BU patients in Benin(PLOS Neglected Tropical Diseases, 2016).

Health associations play an important role in supporting health, at the global level, for example, Doctors without Boarder, which is an independent, global movement providing medical aid where it's needed most, they have medical projects in over 70 countries around the world (Doctors Without Borders, n.d.).

In addition to volunteering to support the health sector at the national and international level, volunteering has an important role to play in supporting the health and psychological state of the volunteer himself. Findings from several studies that have explored the relationship between volunteering and health. While these studies may differ in terms of their specific findings, they consistently demonstrate that there is a significant relationship between volunteering and good health; when individuals volunteer, they not only help their community but also experience better health in later years, whether in terms of greater longevity, higher functional ability, or lower rates of depression (Grimm, Spring, & Dietz, 2007).

In addition to direct service delivery roles, volunteers are also increasingly engaged in strategic roles, including participation in planning, consultation, and community research. In parts of the health system, a cultural change is underway in which volunteers are being more than an 'add-on'. Rather than being on the fringes, volunteers are increasingly becoming an integral part of the care team. For example, in some NHS hospital departments volunteers are now included in team briefings at the beginning of shifts. These developments fit with the suggestion made by several patients and volunteers in our research that volunteers need to be better connected with the paid professionals they work alongside, in order to maximize the value, they add to patient care(Naylor et al., 2013).

2.2 Trends in healthcare volunteering

Several studies have considered the recent trends for volunteers in the healthcare sector, including changing demographics from older to younger volunteers, increasing volunteer preferences for well-defined work commitments that are shorter in duration, and more highly-skilled volunteers with clear personal and professional goals and expectations for assignments that are personally interesting and varied (Rogers, Rogers, & Boyd, 2013).

An aging population

The aging population will likely put a significant strain on the health care system. There are two aspects in this area, the first side is more motivated volunteers to serve the elderly in the society, and the other side is opening the field of volunteerism to the elderly them self. The world is aging fast. By 2045, for the first time in history, people aged 60 and above will outnumber children under 14 globally(Han, 2012). For example, in the UK it expected that by 2033, 25% of the population will be aged 65+, which mean huge resource for the voluntary organization, the Commission on the Voluntary Sector and Ageing was reported that the voluntary sector isn't ready for this opportunity. Organizations need to shift their perceptions of an 'older' volunteer force and remove age-based limits on the opportunities. Enabling and empowering volunteers to use their knowledge and life-long experience (The-Management-Centre, 2018). The United States has a rapidly aging population. People over the age of 65 currently represent 13.7% of the population, and by the year 2050, this is estimated to double(Biphenyls, 2015). How can we engage this group 65+ to volunteer in healthcare for the long-term when they do reach retirement?

Micro-volunteering

Micro-volunteering or crowdsourced volunteering has taken off in the last few years where a task is divided into fragments and accomplished collectively by the crowd. Individuals are only required to work on small chunks of tasks during their bits of short free times during the day(Bernstein et al., 2013). Micro-volunteering allows people to give their time to good causes via technology; quickly, easily and on their own terms. It doesn't require any skills, training or lengthy commitment, and it's completely free. There are 'micro-actions' to suit all interests – from writing a letter to a child receiving treatment for cancer to giving online support to charities involved with conservation, or using a skill you might already have(Ledger, 2015).

Aarogyaseva is a non-profit NGO based in Bangalore, conceptualized in 2010 and founded in 2012, which provides a flexible micro-volunteering platform and participates in extensive collaborations with other organizations for improving healthcare access. Volunteers are the key drivers to achieve the objective of ensuring that every individual has access to quality healthcare. Some recent initiatives of Aarogyaseva are, a doctor at school which serve children in government schools, orphanages, institutional homes and slums, eldercare, doctors in the community providing free medical services to migrant workers who have recently migrated to India's big cities and others(Mohan & Kulkarni, 2016).

The trends that expected to influence and transform volunteerism throughout North America over the next decade are; **Short-Term Workers: Episodic Volunteering**, "Episodic volunteering" is volunteering that takes place in short periods of time, usually defined as not more than 3-4 months in duration, or as even shorter bouts which recur, typically annually. Volunteers do not see volunteering as a life-long commitment. In many cases, the episodic volunteer wants to start with a small job to get a "taste" of volunteering with an organization. Some short-term volunteers, when they have had a good experience in their initial volunteer position, may agree to stay on for an additional term or terms. The point, however, is that it is increasingly rare for a volunteer to commit to many hours in a long-term, ongoing position. Another trend is **new Sources of Volunteers**, while traditional sources of volunteers threaten to shrink, new sources of unpaid or stipend workers are creating a larger pool from which organizations may draw assistance: mandated community service, workfare, compulsory community service as part of school graduation requirements, and so on all stream unpaid resources into the community. **Risk management** is becoming a much more prominent issue in volunteer management because organizations are performing more serious, demanding, complex work/interventions in the voluntary sector and because volunteers are more often directly involved in that work. (Graff, 2001).

Section 2: Opportunities for consumer participation in health care as a volunteer in the United Arab Emirates

Introduction

The culture of volunteering exists in the UAE as part of the Islamic culture, voluntarism is the main part of Muslim culture, that involvement in relief work is a rewarding experience for the Muslim volunteer (Walid & Al-Husayyin , 2007). The government and leadership in the United Arab Emirates support volunteering, that the UAE has earmarked 2017 as the Year of Giving; an initiative based around three main pillars: Corporate Social Responsibility, Volunteering and Serving the nation. Many initiatives and programs launched throughout the year (The Year Of Giving, 2017). The government in the UAE promotes volunteering in ministries through various initiatives and laws, There are many opportunities to volunteer in the health field in the UAE, where there are many associations to support patients and their families, in addition to charities that contribute to the cost of treatment and medical devices, following section will includes more details about volunteer opportunities available in the UAE.

Laws and initiatives related to volunteer in UAE

The UAE Federal National Council (FNC) has passed a new draft law regulating voluntary work across the UAE to invigorate the culture of volunteering. The new bill seeks to promote the culture of volunteering and regulate and develop voluntary work in line with the government's policies and agendas. According to the draft law, volunteer organizations licensed to work in the UAE are obliged to provide volunteers with a healthy and safe

environment, sufficient training and induction, insurance cover against injuries and clear description of assignments(Arabian-Business, 2018).

As well new law No. 5 of 2018 on volunteering was announced in Dubai, the main goal of the law boosts the culture of giving among residents in the UAE and is a one-of-a-kind protection for both volunteers and beneficiaries. The Dubai's Community Development Authority (CDA) has been given a number of specializations and jurisdictions regarding voluntary work to draw up plans and public policies for voluntary work in Dubai and supervise their implementation(Deleon, 2018).

The Federal Authority for Government Human Resources (FAHR), in coordination with the Ministry of Community Development, has launched a guide to volunteering in the work environment of government entities. The new guide is aimed at familiarizing the ministries and federal bodies with the concept of the workplace. The move comes as part of the ongoing efforts to make volunteering one of the fundamental principles of community service by engaging the Federal Government employees in all corporate volunteering initiatives and activities available across the UAE and within the framework of the Federal Government employees' annual volunteering program(Federal Authority for Government Human Resources (FAHR), 2017).

UAE government launches national volunteering platform by His Highness Shaikh Mohammad Bin Rashid Al Maktoum, Vice-President and Prime Minister of the UAE and Ruler of Dubai, and His Highness Shaikh Mohammad Bin Zayed Al Nahyan, Crown Prince of Abu Dhabi and Deputy Supreme Commander of the UAE Armed Forces, who were the first two people to sign on the new volunteer platform. The Ministry of Community Development collaborated with the Emirates Foundation to launch the "UAE Volunteers" website. The website offers a comprehensive database and accurate statistics on volunteerism at the national level for government agencies. The platform bring together volunteering opportunities with government institutions, private sector entities, and charitable organizations. The platform is open to register volunteers, including citizens and residents, the platform is designed in a way that highlights opportunities based on the volunteer's skills and interests. It will develop a personal record for each volunteer, the platform provides volunteering opportunities in a number of humanitarian sectors: education, Humanitarian work, Care for the elderly, Health, Culture and arts, Sports, Environment, Community service, Hope making and International volunteerism(Baldwin, 2017).

After communication with the national volunteering platform, they provide me with following statistics till August 2018 the total number of volunteers registered in the platform was 208.120, 119.452 female and 88.668 male. The total number of health specialization volunteer registered in the platform was 1459 volunteers, table 2 shows this specialization.

Table 2. health specialization register in Volunteer.ae platform

specialization	**No. Registration**
Biology	**100**
Biomedical engineering	**2**
Dental	**93**
Health information management	**2**
Health science	**2**
Medical lab	**2**
Medical laboratory	**2**
Medical Laboratory Sciences	**3**
Medicine	**314**
Microbiology	**44**
Nursing	**292**
Nutrition	**2**
Paramedic	**3**
Paramedics	**2**
Pharmacy	**282**
Psychology	**177**
Public health and nutrition	**2**
Radiology	**25**
Doctors	**110**
Total	**1459**

2.1 Volunteer opportunities in the UAE that support the Healthcare system

The UAE stresses on the culture of volunteering in promoting sustainable development and b uilding a better future for new generations. The UAE
has many organizations that engage in volunteering activities that support healthcare services:

Table 2. Organizations that engage in volunteering activities and community service in the UAE			
No	Organization/ institute / initiatives	Objective	Web
1	National Volunteer Program for Emergencies, Crises and Disasters	The authority aims to form a distinguished base of volunteers and qualify them to assist in the efforts of national response during emergencies, crises, and disasters. Participation in the programme is open for nationals and residents of the UAE.	https://www.ncema.gov.ae/en/home.aspx
2	Takatof	aimed at raising public awareness on social needs and promoting the culture of volunteering as a way of life among the various groups of the community. It provides an opportunity for the youth to volunteer for several humanitarian and social programs and to use their time in a meaningful way that polishes their character and develops their sense of responsibility towards their community.	http://www.takatof.ae/ar/default.aspx
3	Said	Provides citizens and residents of the UAE with the knowledge and skills to become involved in crises and contribute to the safety of their fellow citizens.	http://sanid.ae/ar/
5	We Are All Police initiative	Abu Dhabi Police launched the initiative 'We Are All Police'. Under this initiative, citizens and residents are trained to become community police officers. The programme provides skills through courses that include: Sense of security, first aid, Crises, and disasters, dealing with community diversity, writing reports (of all kinds), organizing events and activities, problem-solving, public speaking skills, innovation in providing ideas that leverage security systems.	https://weareallpolice.adpolice.gov.ae
6	Emirates Voluntary	This initiative aims at implanting voluntary work culture and qualifying local cadres in cooperation with public	

	Academy in Abu Dhabi	institutions, the private sector, and non-profitable organizations.	
7	Dubai Volunteering Center	The Dubai Volunteering Center is an initiative by the Community Development Authority. It is the first formal body of Dubai Government established to manage volunteering services in the UAE, with a special focus on the emirate of Dubai. The center connects deserving community causes with willing volunteers, thereby fostering a spirit of unity and care throughout society.	https://cda.gov.ae/en/volunteering/Pages/
8	Initiatives from Dubai Chamber	Dubai Chamber provides information about volunteering projects that exist in Dubai and how to engage employees in the community. The ENGAGE Dubai programme, managed by the Dubai Chamber's Centre for Responsible Business, connects businesses to community partners to get their support on different community projects.	http://www.dubaichamber.com
9	Dubai Cares	Dubai Cares hosts different activities around the year with the support of the UAE's community. The institution accepts supporters who are over 16 years of age. Young people under 16 years are also eligible when accompanied by a parent or guardian.	http://www.dubaicares.ae/en
10	National Fund	National Fund (Sandooq Al Watan in Arabic) is a fund established to support Emiratis to get education, training and setting up a business. One of its goals is to provide career guidance to 10,000 Emirati school students. In addition, the fund will provide summer and winter courses and opportunities to gain work experience to about 1,000 Emiratis. It will also support research and development in universities to create new products, services, and intellectual property by allocating AED 10 to 25 million dirhams for the years 2017 – 2019.	http://sandooqalwatan.ae/
13	Emirates World Humanitarian Mobile Hospital (Elaaj)	(Elaaj) is a humanitarian initiative launched by Zayed Giving Initiative to deliver specialized medical services free of charge to the needy patients in the UAE and worldwide. The initiative targets the most vulnerable sections of society, especially children and elderly people in remote areas, and provides them with a wide range of curative, surgical, preventive, awareness and training programs.	https://www.abudhabi.ae

14	Zayed Giving Initiative	Zayed Giving Initiative is a unique model for humanitarian work at local and international levels. Since its inception in 2003, the initiative has made valuable contributions to various areas of community services and volunteering including health, education, environment, and culture. The initiative has attracted over 50,000 volunteers to reach out to more than 100 million people in Arab and African countries who benefited from its various voluntary and humanitarian programs. Voluntary Programmers of Zayed Giving	https://arab.org/directory/zayed-giving-initiative/

Volunteer opportunities in hospitals and centers

The healthcare system in the UAE attracts volunteers and provides them with volunteer opportunities in hospitals. For example volunteer program in Sheikh Khalifa Medical, City was established in April 2008, the total number of volunteers are over 4500, the average number of volunteers per month are between 96 -150(SEHA, 2018).

Al Jalila Children's volunteer programme, 'Abtal Al Jalila' (heroes of Al Jalila), was first launched in August 2017 by Ohood Bint Khalfan Al Roumi, UAE Minister of State for Happiness, who was listed as volunteer number one of the programme. Around 400 volunteers have registered in the programme, with 60 active so-called superheroes who regularly visit the hospital. Al Jalila Children's hospital main goal is to eliminate the stress of being in a hospital they want it to be a place where children can come and feel better and feel at home. Volunteers at the programme take turns to interact with children in any of the hospital's five departments; the heart center for excellence, kidney center for excellence, critical care center, neuro sciences department, and the mental health department. The volunteers color with children who are undergoing a dialysis treatment, while others interact with children in the waiting area before seeing a doctor behind other activates(Khamis, 2018).

Dubai Health Authority offers volunteer opportunities to enhance patient satisfaction while producing a well-deserved feeling of personal fulfillment for the volunteer. For example Rashid Hospital volunteer services and Thalassemia Center Volunteers Program; that the volunteer provides immaterial support to patients and their families. volunteers provide entertainment activities, training patients (internet, computer & handcrafts training), help in the awareness campaigns, organizing various events, help patients in their school studies, read stories for small children, providing administrative assistance.

Charities organization in the UAE that has a volunteer program that supports healthcare

Charitable organizations in the United Arab Emirates play an important role in supporting the health sector, providing voluntary opportunities for volunteers to serve the community, for example raising funds for the benefit of low-income patients, as well as collecting donations for the purchase of medical equipment. The table lists some charities in the United Arab Emirates.

No	Table 3. Lists some charities in the United Arab Emirates		
1	Emirates Red Crescent Society	8	Al Maktoum Foundation
2	Khalifa Foundation	9	Dar Al Ber Society
3	The Zayed Bin Sultan Al Nahyan Charitable and Humanitarian Foundation	10	Mohammad Bin Rashid Al Maktoum Foundation
4	Beit Al Kheir Society	11	Dubai Charity Association
5	Zakat Fund	12	Fujairah Welfare Association
6	Al Ihsan Charity Association	13	Al Qasimi Foundation
7	Dubai Cares	14	Noor Dubai

Health association and community organization that supports healthcare

Health associations and community organization play active role in supporting healthcare system, where there are many health associations in the UAE, which works to support the health sector in the country, that these institutions provide financial support for health research, provide customized volunteer opportunities, and increase the awareness in community to support patients and caregiver, for example.

Pink Caravan

The Pink Caravan is UAE breast cancer awareness initiative that highlights the importance of early detection through regular checkups. This popular community initiative by the Sharjah-based cancer charity, Friends of Cancer Patients (FOCP), The most recent accomplishment of the Pink Caravan, a mobile mammography unit, was completed for Dh15 million and is a first in the region. In 2018, the initiative offered 5,160 medical screenings, 4,452 women and 618 men medically screened 1,059 UAE nationals and 4,101 expatriates, 3,509 were given safe health cards, 277 referred for a mammogram, and 1,424 advised to undergo the ultrasound scan, 3,558 of those screened were below 40 years, 230 riders, 200 medical practitioners, Over 100 volunteers(Gulf-News, 2018).

“Make a Wish” Foundation

In 2003, Make-A-Wish UAE was established under the kind patronage of Her Highness Sheikha Sheikha Bint Mohamed Bin Saif Al Nahyan, as a fully licensed establishment from the Ministry of Social Affairs of the United Arab Emirates, only to become one of the most successful organizations to date. Since 2003, the association has granted more than 3000 wishes for children with critical illness. That they granted 359 wishes of children with critical illnesses during the first half of 2018, and they aim to grant 550 or more wishes till the end of 2018.

The Emirates Diabetes Society (EDS)

The Emirates Diabetes Society (EDS) is a non-profit medical society which was established in 1996. The Emirates Diabetes Society is the primary medical society in the United Arab Emirates and its primary objective is to increase public awareness and encourage health improvement, promote the exchange of high-quality information about diabetes, and provide education for people with diabetes and their healthcare providers. The society conducts a number of educational programs, which includes scientific as well as educational programs targeted towards Diabetes Educators(Emirates-Diabetes-Society, n.d.).

3.1 Thinking strategically about volunteering

Several participants argued that organization’s often failing to think strategically about the role of volunteers within their work. The importance of a strategic approach to volunteering is that it encourages service providers to articulate how working with volunteers will help the organization to meet its core objectives, and thereby helps to give volunteering a prominent and useful role within the organization. (Naylor, Mundle, Weaks, & Buck, Volunteering in health and care Securing a sustainable future, 2013).

The UAE has earmarked 2017 as The Year of Giving; an initiative based around three main pillars: Corporate Social Responsibility, Volunteering and Serving the nation. All of the initiatives and programs launched throughout the year reflect the three pillars of giving and engage citizens in an effort to entrench the values of philanthropy and altruism in all communities. The UAE National Strategy for the Year of Giving is a comprehensive plan to institutionalize humanitarianism in the public and private sectors. The National Strategy for Volunteerism 2021: A strategy, based on extensive studies, to be developed and implemented by the government and private agencies, promoting volunteerism and increasing the number of volunteers in the state so that the UAE becomes a philanthropy leader both regionally and globally by 2021(The Year Of Giving, 2017).

The strategic goals of the UAE National Strategy for the Year of Giving:

- Promoting a culture of volunteerism by introducing innovative volunteer opportunities that serve all sectors in the society
- Entrenching the values of serving the nation with the responsibility of the individual and the enrichment of the community

Strategic initiatives:

- The National Platform for Volunteers: A comprehensive online database that contains a list of the entities that recruit volunteers as well as organizations that can benefit from voluntary work. The smart platform, which operates at the state level, is an opportunity for volunteers and institutions to coordinate.
- The National Centre for Volunteering: A center launched by the Federal Government in order to regulate voluntary work and supervise it.
- The National Volunteer Training Programme: A training and educational programme for volunteers in various fields, which will enable them to refine their skills.
- Volunteer Opportunities in the Government: The Federal and Local Governments will provide volunteer opportunities in various sectors, with a focus on skills-based volunteering.
- Volunteerism among Government Employees: The development of plans and mechanisms to encourage Federal and Local Government employees to participate in volunteer work.
- Volunteerism Mandatory Disclosure: Companies will be required to disclose their contributions to volunteering, with regard to how many employees they have and the total number of volunteer hours they accumulated per annum; incentives will be offered in this regard.
- The Annual Volunteer Event: An annual celebration for volunteers and institutions, where volunteers highlight their experience and get to meet others to share their expertise and celebrate their work.
- Volunteering Curriculum: Volunteering will be introduced in schools and a curriculum tailored specifically for this purpose to teach the humanitarian and civilized value of volunteering to students.

3.2 The motivation to volunteer

The motivation to volunteer is a factor in some theoretical models, and it is considered important for understanding participation in volunteer services (Black & Di Nitto, 1994; Clary & Snyder, 1991; Omoto & Snyder, 1990; and Penner & Finkelstein, 1998). Presently, the functional theory of motivation to volunteer is the most important approach to understanding motivation to volunteer (Dávila & Díaz-Morales, 2009). Since the motives that emerge as important for volunteers will determine the type of recruitment, task assignment, training, and so on. The idea underlying this strategy is that the satisfaction of motives is a key factor for retention (Clary, Snyder, & Ridge, 1992; Clary, Snyder, Ridge, Miene, & Haugen, 1994, Chacon & Vecina, 2002; Davila & Chacon 2003; Chacon, Vecina, & Davila, 2007; Vecina,

Chacon, & Sueiro, 2009) (Chacón, Pérez, Flores, & Vecina, 2011). Table 1. Shows various model of motivation.

Table 4. Various Models of Motivation (Widjaja, 2010)

models	Authors	Methodology	Results	Overall model
one-dimensional models	Cnaan and Goldberg-Glen (1991)	Identified 28 different motives.	Volunteers are motivated not by categories of motives but by one category, which consists of a combination of motives.	not been sufficiently replicated
two-dimensional models	Frisch & Gerrard, (1981)	egoistic and altruistic motives	Egoistic motives are related to the attainment of tangible rewards such as career-related benefits.	
	Finkelstien, (2009).	extrinsic and intrinsic motives	Activities that are extrinsically motivated, however, are performed because of the external outcome that it yields.	
three-dimensional models	Monga, (2006).	motivations are divided into altruistic motives, material motives, and social motives	Altruistic motives emphasize the importance of concern for others while material motives are derived from the desire for material rewards, Social motives, on the other hand, appeal to social	

			interactions as motivating factors.	
Multi-dimensional models.	Clary et al. (1998).	Functional motivation theory identifies six distinct motivational factors.	Multiple categories of motives.	become one of the most widely accepted models in the field

Due to the widespread acceptance and salience of Clary et al.'s (1998) model, most of the studies utilizing VFI have been conducted in Western cultures. Since the researcher has not found any study that assessed volunteers' motivation in the specific socio-cultural milieu of UAE. Their model will be further elaborated and used as the basis for the rest of this paper.

Clary and Snyder (1991) designed the following theory to explain the different types of motives that can determine participation in volunteer services. They identified six primary motives (Dávila & Díaz-Morales, 2009):

1. Protective (to reduce negative feelings),
2. Values (to express or act on important values),
3. Social (to strengthen social relationships),
4. Understanding (to learn about the world),
5. Career (to gain career-related experience) and
6. Enhancement (to enhance self-esteem)

The Volunteer Motivation Inventory VMI

The VMI was based on an initial scale developed in 2002 by Mc-win and Jacobsen-D Arcy. Esmond and Dunlop (2004) of Australia then modified the VMI after it was administrated to various samples of volunteers. The authors administrated the VMI to a total of 2444 volunteers from 15 different organizations, making it one of the largest studies of volunteer motivations. The final VMI produced from this research consisted of 44 short statements, to which volunteers respond using a five-point Likert scale. It had six categories identified for the VFI by Clary and Snyder in 1998 and the following four categories that had not been previously investigated(Olberding, 2016):

7. Self-esteem: increasing own feelings of self-worth and self-esteem,
8. Reciprocity: "doing good" benefits others as well as the volunteer,
9. Recognition: recognized for skills and contribution, and

10. Reactivity: addressing their own past or current issues.

Section 3: Challenges for consumer participation in health care as a volunteer in the United Arab Emirates.

The significant potential that volunteering has to add value in health, Volunteering does not, however, always achieve its potential, for a number of reasons. Raymore, Godbey, Crawford, and von Eye (1993) determined that there is a hierarchical relationship between these categories of constraints. It was found that intrapersonal constraints are the first to be encountered and the easiest to overcome whereas structural constraints are the most difficult to negotiate(Gage & Thapa, 2012).

Factors that may challenge people from participating as a volunteer have been captured in the concept of constraints. Much leisure research has been conducted on constraints. Of the constraints models theorized in leisure research, one of the longest standing and most useful has been Crawford and Godbey‟s (1987) conceptualization of three distinct categories of constraints: *intra*personal, *inter*personal, and structural(Osgood, 2011). This section sets out some of the challenges that stand in the way of making the most of volunteering in UAE health sector. By reviewing the literature I found that the barriers are divided into Intrapersonal or individual, Interpersonal, Contextual and Structural.

Several intrapersonal barriers were reported including being time poor, lack of mobility, lack of available transport, health issues, lack of relevant information and knowledge about where to seek volunteer work(Jongenelis et al., 2017). The most frequently cited reason for not volunteering regularly in a formal capacity in England is work commitments. Other reasons include childcare commitments and looking after the home, doing other things, not knowing about volunteering opportunities, study commitments, looking after an elderly family member, disability, age, as well as others (South & South, 2016).

3.1 Individual barriers to volunteer in healthcare.

*Intra*personal constraints consist of psychological states, beliefs, attitudes, internalized norms, and things of that nature, all of which influence leisure preferences (Crawford & Godbey, 1987). Examples of intrapersonal constraints might be a lack of interest, failure to see an activity as fun or worthwhile, or viewing a leisure activity as inappropriate for oneself (Osgood, 2011). So I develop the following eight questions:

1. Illness/disability could prevent people from volunteering in healthcare
2. The age (too old/young) could prevent people from volunteering in healthcare
3. The study commitments could prevent people from volunteering in healthcare opportunities
4. The work commitments could prevent people from volunteering in healthcare opportunities.

5. Family commitments looking after children/ the home/someone elderly or ill
6. Not interested in healthcare volunteer opportunities
7. Afraid of seeing serious injuries, blood, sick people and dying people.
8. Financial difficulties prevent people from volunteering in healthcare opportunities.

3.2 Interpersonal barriers to volunteer in a healthcare

Interpersonal constraints, on the other hand, involve the social interaction of some sort (Crawford & Godbey, 1987), its rise in this way between people, whether it be between friends with differing interests or spouses with conflicting schedules(Osgood, 2011).depend on that I develop the following questions:

1. My friends do not volunteer, I do not know anyone that volunteers in healthcare opportunities.
2. My family does not volunteer or allow me to volunteer in healthcare opportunities.
3. The community has a negative perception regarding volunteers in healthcare.
4. Patients do not deal well with the volunteer
5. The medical and nursing staff look at the volunteer in an unremarkable and inexperienced manner

3.3 Structural barriers to volunteer in a healthcare

The third category, structural constraints, involves constraints from the environment, specifically, that intervene between leisure preferences and participation(Osgood, 2011). Depend on that I develop the following questions in related to the healthcare system:

1. I do not feel comfortable in healthcare sites, hospital, Clinic and other healthcare facilities.
2. I have the perception that healthcare volunteer opportunities are for healthcare professional's doctors and nurses,
3. I don't feel comfortable when volunteering with healthcare staff Doctors, Nurses
4. The voluntary opportunities currently available in the health sector are not commensurate with my goals and aspirations
5. Negatively affected when we saw patients and were afraid of infection

3.4 organizations or system barriers to volunteering in a healthcare

It is important for the healthcare system who strongly depend on the volunteer sector to find ways to alleviate the barriers associated with volunteering. It is paramount for the future of

volunteering that the difficulties associated with volunteerism are minimized, for the benefit of those who require the help and support in society. So I develop the following questions:

1. There are insufficient policies and laws that support healthcare volunteer in the UAE healthcare organization
2. There is insufficient information about volunteers opportunities in UAE healthcare system
3. There are insufficiently organized volunteer training programs in UAE healthcare system
4. There is an insufficient financial support to volunteers in the UAE healthcare system.
5. The information about safety and prevention for volunteers is not available in the healthcare system

Research Materials and Methods

Volunteer play crucial role in supporting healthcare organization, the volunteer motivations is very important to potential volunteers and develop the volunteer opportunities that satisfied their needs as well ensure effective placement of volunteers into activities that meet their needs. This research project aimed to know the main factors that motivate volunteers to participate in the UAE healthcare system, second to know the main barriers that face volunteers in UAE healthcare system.

Research Questions

A review of the literature presented above paves the way for the following research questions.

- What are the main factors that motivate volunteers to participate in the UAE healthcare system?
- What are the main barriers that face volunteers in UAE healthcare system?

Developing a Questionnaire

Questionnaires or surveys are widely used to collect quantitative information from both patients and health- care professionals. Although using an existing questionnaire will save time and resources a questionnaire that measures the construct of interest may not be readily available, or the published questionnaire is not available in the language required for the targeted respondents. As a result, investigators may need to develop a new questionnaire or translate an existing one into the language of the intended respondents(Tsang, Royse, & Terkawi, 2017). That in developing the questionires I follow the following steps:

Motivation to volunteer in UAE healthcare system section

An initial study depend on Volunteer Motivation Inventory (VMI) which was developed in a previous study by McEwin and Jacobsen-D'Arcy (2002). That, the VMI was administered to various samples of volunteers in many organizations in Western Australia. Consisted of three studies and five stages. At each stage, the VMI was revised with the ultimate goal of maximizing its capacity to robustly assess volunteer motivations. The VMI, in its various forms, was administered to a total of 2444 volunteers from 15 different organizations, making it one of the largest studies of volunteer motivations to be conducted worldwide(Esmond & Dunlop, 2004). The Table 1. Shows Items to be included in the adopted Volunteer Motivation Inventory VMI.

Barriers to volunteer in UAE healthcare system

Factors that may challenge people from participating as volunteer have been captured in the concept of constraints. Much leisure research has been conducted on constraints. Of the constraints models theorized in leisure research, one of the longest standing and most useful has been Crawford and Godbey‟s (1987) conceptualization of three distinct categories of constraints: intrapersonal, interpersonal, and structural(Osgood, 2011). By reviewing the literature, I found that the barriers are divided into Intrapersonal or individual, Interpersonal, Contextual and Structural.

Table 2

Summarize the measures used in current study for both sections volunteer's motivation and barriers.

Table 2. Summary of measures will be used in current study					
#	Section	#	Factors	Items	Total items
1	Motivation of volunteer	1	Career development	3	29
		2	Recognition	3	
		4	Reactivity	3	
		6	Self-Esteem	3	
		7	Social	4	
		8	Values	4	
		9	Understanding	5	
		10	Protective	4	
2	Barriers to volunteer	1	Individual barriers	8	23

		2	Interpersonal barriers	5	
		3	Contextual barriers	5	
		4	Organizations or system barriers	5	
	Total				52

On a 5-point Likert scale ranging from 1 being ‘strongly disagree’ through to 5 being ‘strongly agree’. Five statements each represented the ten motivational factors and four barriers that face volunteer mentioned in table 1.

Sampling Techniques

The health system in the UAE attracts volunteers and provides them with volunteer opportunities in hospitals and medical centers. Participants in this study were selected from healthcare facilities that have volunteer program that includes:

- Abu Dhabi Health Authority, SEHA facilities, that a total of 3,776 people has spent their time during 2015 and 2016 engaged in voluntary activities.
- Dubai Health Authority, Rashid Hospital Volunteer services. Thalassemia Center volunteers program; offers volunteer opportunities to enhance patient satisfaction while producing a well-deserved feeling of personal fulfillment for the volunteer.
- The Ministry of Health and Prevention (MOHAP)
- UAE Red Crescent
- UAE volunteer platform "volunteers.ae"

An electronic version of survey was developed. The tool consisted of three major sections. The first section addressed sociodemographic characteristics such as age, gender, education, employment status, and marital status. The second section addressed volunteer motivations factors, and the third section measured constraints to participation in volunteer activities.

Procedure

The modified version of VMI used in this study is a self-reporting scale. Healthcare organization, association and charities were sent a cover letter through the email with a link to the questionnaire, Arabic and English version. The participants were provided the necessary information about the purpose of the survey, and all the instruction. They were also assured that their identity as well as responses will be kept strictly confidential and will be used only for the research purposes.

After getting the approval the email was send to the following:

- The Ministry of Health and Prevention (MOHAP)

- The SKMC
- UAE Red crescent
- UAE volunteer platform volunteers.ae

Reliability

The pilot study analysis used to examine the scales of the motivation factors and barriers factors. This involved computing Cronbach's alpha internal consistency scores for each of the scales. Data collected from sample of 21, Cronbach's Alpha is .817 the value is acceptable, so the instrument is reliable. the alpha coefficients for the various scales will help us to know if the scales share a common theme for further revision, both in terms of definition and in terms of content.

Content validity:

By three experts.

Result

The chapter details the study findings from the analysis of participants who were involved in the volunteer program.

Table XX:

Social Demographic Characteristics

Variable	**Frequency**	**Percent (%)**
Age		
20 years or younger	46	7%
21- 25 years	132	20%
26- 30 years	121	18%
31-35 years	117	18%
36-40 years	114	17%
41-45 years	75	11%
46-50 years	43	6%
Above 51	19	3%
Total	**667**	**100%**
Gender		

Female	422	63%
Male	245	37%
Total	**667**	**100%**
Marital status		
Divorced	44	7%
Married	288	43%
Single	335	50%
Total	**667**	**100%**
Employment status		
Employed full time	290	43%
Employed part time	17	3%
Housewife	20	3%
Retired	19	3%
Self-employed	16	2%
Student	86	13%
Unable to work	1	0%
Unemployed and currently looking for work	213	32%
Unemployed and not currently looking for work	5	1%
Total	**667**	**100%**
Education completed		
Bachelor's degree	269	40%
Diploma or Higher Diploma	87	13%
Doctorate (e.g. PhD, EdD)	16	2%
High school degree or equivalent	220	33%
Less than a high school	4	1%
Master's degree	71	11%

Total	**667**	**100%**
Nationality		
Arab countries	274	41%
Emirati	324	49%
Gulf countries	21	3%
Other	48	7%
Total	**667**	**100%**
Resident Emirates		
Abu Dhabi	305	46%
Ajman	54	8%
Dubai	103	15%
Fujairah	57	9%
Ras Al Khaimah	77	12%
Sharjah	57	9%
Um AlQaween	14	2%
Total	**667**	**100%**

Data was collected from a sampled of 667 participants who were involved in volunteer program in a health facilities in UAE. Majority (53% and 63%) of the participants was between the ages of 20 to 35 years and female respectively which indicated that younger females were involved in the volunteer program while 50% of the participants were single. Previous studies have identified gender as factors related to a higher likelihood of volunteering. According to Cruce and Moore (2007) females were more likely to volunteer than males. The demographic of the study's sample support the prevalence of more female than males.

The participant's employment status showed that 53% were employed on full time, 32% unemployed and currently looking for job while only 13% of the sampled participants were student. Is interestingly to note however, that more full time employed individual were involved in the volunteer program. The finding shows that the participants were well educated as 33% and 40% had bachelor and high school certificate respectively while only 1% has less than high school certificate. The distribution of the volunteer race/nationalities, emirate (49%) and Arab countries (41%) participated in the volunteer program than any other nationalities, and 46% lives in Abu Dubai (Table XX).

Motivations to Volunteer

Using likert scale ranging from "strongly agree" to "strongly disagree" survey participants responded to a series of statement about why they volunteer. Each statement aligned with one of the eight categories of volunteer motivations: career development, recognition, reactivity, self-esteem, social, values, understanding and protective. Table XX present the median of the degree of the scale to each of the statement.

The findings shows that all the categories were main factors for volunteer motivations, however for "social" and "protective" people were not motivated to volunteer because they have close relationship with another volunteer or as a result of loneness respectively. Findings from literature such as Moore et all (2014), found that values and understanding to be the most important motivations to volunteer among college students. From the ranking analysis, self-esteem, understanding and reactivity were the top/main motivation for volunteer (Table XX and figure 1).

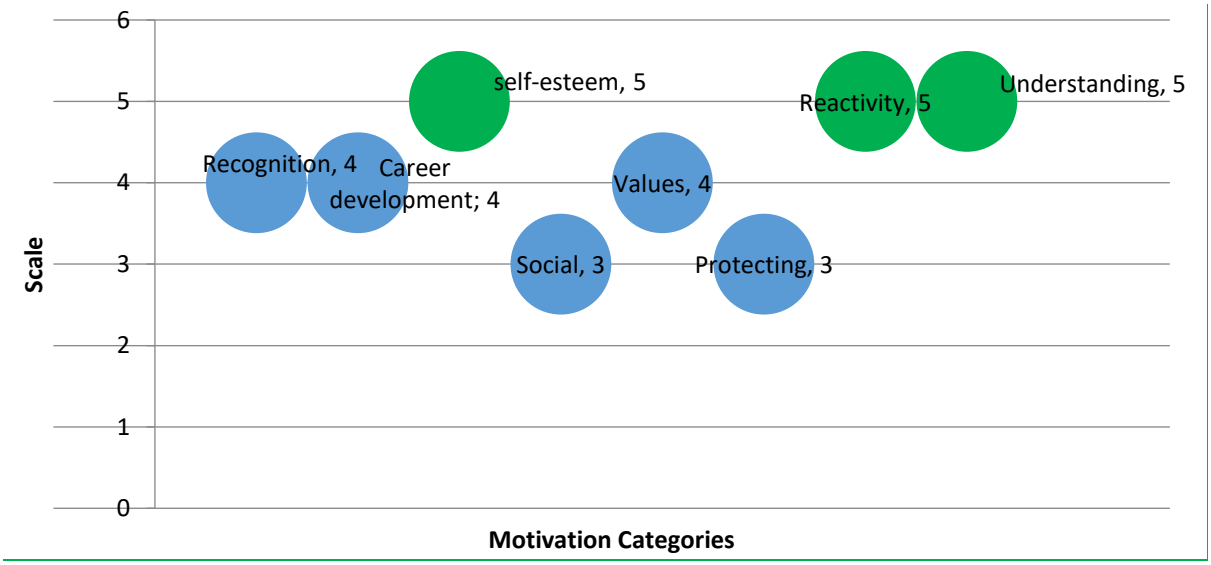

Figure 3: Motivation Bubble Chart

Table XX

Volunteer Motivation

Motivation for Volunteer		
Factors	**Variables**	**Median Response***
[b]Career development	1- I volunteer because volunteering gives me an opportunity to build my work skills.	5
	2- I volunteer because I feel that I make important work connections through volunteering.	5

	3- I volunteer because I feel that volunteering will help me to find out about employment opportunities.	4
[b]Recognition	1- Being appreciated by healthcare organization is important to me.	5
	2- Being respected by doctors, nurses and volunteers at the healthcare organization is important to me.	4
	3- I like to work with a volunteer organization, which treats their volunteers and staff alike.	5
[a]Reactivity	1- I like to help patients, because I have been in difficult positions myself.	5
	2- Many positive and good thing come to my life when I volunteer	5
	3- Volunteering helps me deal with some of my own problems.	5
[a]Self esteem	1- I volunteer because I feel that volunteering is a feel-good experience	5
	2- I volunteer because volunteering makes me feel important.	5
	3- I volunteer because volunteering makes me feel useful.	5
[c]Social	1- I volunteer because people I'm close to volunteer.	3
	2- I volunteer because I look forward to the social events that volunteering affords me.	5
	3- I volunteer because others with whom I am close place a high value on community service.	4
	4- I volunteer because volunteering provides a way for me to make new friends.	4
[b]Values	1- I feel compassion toward patients in need	5

	2- I am genuinely concerned about the group of patients I am serving.	4
	3- I volunteer because volunteering fits in with my religious beliefs.	5
	4- I volunteer because volunteering is national value in UAE government.	5
[a]Understanding	1- Volunteering in healthcare allows me to gain a new perspective on things.	5
	2- Volunteering lets me learn things through direct, hands on experience.	5
	3- I can learn more about the cause for which I am working.	5
	4- I can learn how to deal with a variety of people.	5
	5- I can explore my own strengths	5
[c]Protective	1- No matter how bad I've been feeling, volunteering helps me to forget about it.	5
	2- By volunteering, I feel less lonely	5
	3- Volunteering is a good escape from my own troubles	3
	4- Doing volunteer work relieves me of some of the guilt of being more fortunate than others.	5

[*] Response scale, 5-point Likert scale ranging from 1 being 'strongly disagree' through to 5 being 'strongly agree. [a]High > [b]Mild > [c]Low

Barriers to Volunteer

Results findings shows that none of these barriers to volunteer categories stand as barriers to volunteers, the respondents either responded disagree or strongly disagree to the barrier factors (Table XX)

Table XX

Factors	**Barriers to Volunteer**	**Median Response[a]**

Individual	1- Illness/disability could prevent people from volunteering in healthcare	2
	2- The age (too old/young) could prevent people from volunteering in health	2
	3- The study commitments could prevent people from volunteering in healthcare opportunities	3
	4- The work commitments could prevent people from volunteering in healthcare opportunities.	3
	5- family commitments looking after children/ the home / someone elderly or ill	3
	6- not interested in healthcare volunteer opportunities	1
	7- afraid of seeing serious injuries, blood, sick people and dying people.	2
	8- Financial difficulties prevent people from volunteering in healthcare opportunities.	3
Interpersonal	1- My friends do not volunteer, I do not know anyone that volunteers in healthcare opportunities.	3
	2- My family does not volunteer or allow me to volunteer in healthcare opportunities.	1
	3- The community has a negative perception regarding volunteers in healthcare.	1
	4- Patients do not deal well with the volunteer	2
	5- The medical and nursing staff look at the volunteer in an unremarkable and inexperienced manner	2

Contextual	1- I do not feel comfortable in healthcare sites, hospital, Clinic and other healthcare facilities.	2
	2- I have the perception that healthcare volunteer opportunities are for healthcare professionals doctors and nurses,	2
	3- I don't feel comfortable when volunteering with healthcare staff Doctors, Nurses	1
	4- The voluntary opportunities currently available in the health sector are not commensurate with my goals and aspirations	2
	5- Negatively affected when we saw patients and were afraid of infection	1
Organisational/systems	1- There are insufficient policies and laws that support healthcare volunteer in the UAE healthcare organization	3
	2- There is insufficient information about volunteers opportunities in UAE healthcare system	3
	3- There are insufficiently organized volunteer training programs in UAE healthcare system	3
	4- There is an insufficient financial support to volunteers in the UAE healthcare system.	3
	5- The information about safety and prevention for volunteers is not available in the healthcare system	3

[a] on a 5-point Likert scale ranging from 1 being 'strongly disagree' through to 5 being 'strongly agree

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Digital Health Literacy of Diabetic Patients in the UAE

Dr. Mayada Moussa
Hamdan Bin Mohammed Smart University, UAE

Background

Health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (Schwartzberg, VanGeest, and Wang, 2005).

Digital Health literacy (or e-health literacy) is a relatively new concept that describes the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem (Norman and Skinner, 2006).

Digitization in health care has changed rapidly over the last decades, and online information and (mobile) applications are playing a growing role in health care.

It has become of increasing importance that people can:

- properly seek and make use of reliable health information that is available on the internet
- use interactive technologies to communicate about their health (with peers and with health care professionals; e.g., via forums or e-consults)
- self-monitor their health (e.g., via wearables, mobile apps, or patient portals)
- make appropriate decisions based on information sought through electronic sources

In the UAE, residents have increasingly more access to the internet. Table I shows the use and penetration of internet in the UAE compared to the world in total and to particular regions in it (Internet World Stats, 2018).

Many health service providers (governmental and private) in the UAE have been increasingly providing their services through the internet and mobile applications. The UAE also has incredibly high smartphone penetration, which affects how residents in the UAE consume digital media and apps.

Table I

Use and penetration of internet in the UAE compared to the world and to particular regions

World Regions	Population	Internet Users	Penetration

	(2018 Est.)	31 Dec 2017	Rate (% Pop.)
WORLD TOTAL	7,634,758,428	4,156,932,140	54.4 %
Middle East	254,438,981	164,037,259	64.5 %
Asia	4,207,588,157	2,023,630,194	48.1 %
Europe	827,650,849	704,833,752	85.2 %
North America	363,844,662	345,660,847	95.0 %
UAE	9,541,615	8,515,420	89.2 %

Source: Internet World Stats (2018)

With regard to diabetes in the UAE, the age-adjusted (20-79 years) comparative prevalence of diabetes was 19.3%, as reported in the 7th edition of the International Federation of Diabetes (IDF) Atlas (IDF, 2015). Trends also indicate that the prevalence of diabetes in the UAE is rising at a faster rate than both the MENA region and the rest of the world (IDF, 2017). Diabetes prevalence is the 2nd indicator for health in UAE National Agenda [Vision 2021], and the target of the UAE is to reduce prevalence to 16.3% by 2021 (UAE Vision, 2014).

Such an important goal requires people in the UAE to have a high level of awareness as well as well as the necessary skills to seek information and to make decisions to protect themselves from developing diabetes or to control it. Health literacy, and in particular digital health literacy, can be a very important deciding factor in proper diabetes awareness and management. Self-care, medication management and making healthy life choices are essential skills that diabetic patients (and their care givers) need to master. Low digital health literacy level in diabetic patients can lead them to obtain health information from wrong sources on the web, to misinterpret that information and ultimately make the wrong decisions about their health. It can also prevent them from benefitting from all the information and support provided by the health care providers here in the UAE.

Objective

The objective of this study was to assess the eHealth literacy level of diabetic patients in the UAE, using the eHealth Literacy Scale (eHEALS), and to explore the factors that are associated with it.

Methods

A cross-sectional study design was used, with a convenience sampling strategy, and a targeted sample size of 300 adults (≥18 years). The minimum sample size was calculated to be 150 based on the penetration rate of internet in the UAE: 89%, but to ensure better results the minimum sample size was doubled.

Participants were interviewed from two diabetic clinics in Dubai and Ajman using the eHealth Literacy Scale (eHEALS), which is an eight-item Scale (in English) developed in 2006 by Noman & Skinner. It is the only validated instrument to measure e-health literacy so far, and it measures self-reported skills of health care consumers when searching and using online health information.

Results and Discussion

With regard to the sample characteristics, 32.4% were Emirati diabetic patients, and 58% were women. The age mean and standard deviation for the sample was 44.7 ± 16.2 years. The majority of the diabetic patients in the sample (63.8%) had a high school diploma or more, 95.1% of them had access to reliable home internet, and all of them carried smart phones.

With regard to eHEALS, the lowest score was 8 and the highest was 40, while the median was 24. Diabetic patients who had an eHEALS score below the median were labeled as "low eHEALS" (127 patients amounting to 42.3%), and those with scores equal or above the median were labeled as "high eHEALS" (173 patients or 57.7% of the sample).

Statistical analysis was performed using Mann Whitney U Test (in place of independent samples t-test) and independent Chi-square test to investigate if there is a significant difference between patients with low eHEALS score and those with high eHEALS score with regard to a number of patients' characteristics. Table II shows the results of these analyses.

Table II

Difference between patients with low eHEALS score and those with high eHEALS score with regard to a number of patients' characteristics

Characteristics	**Low eHEALS (n= 127)**	**High eHEALS (n= 173)**	**Test of Significance**
Age (in years) [Mean ± SD]	48.4 ± 18.9	34.3 ± 12.4	**z= 5.04, p=0.043 (a)**
Gender [% Males]	54.9%	60.6%	$\chi 2_{(1)}$= 2.34, p=0.077 (b)
Nationality [% Emirati]	48.1%	20.7%	**$\chi 2_{(1)}$= 14.89, p=0.003** (b)
Education [% College degree or more]	48%	64.6%	**$\chi 2_{(1)}$= 17.36, p=0.001** (b)
Access to reliable home internet (%)	92.2%	97.2%	$\chi 2_{(1)}$= 0.92, p=0.112 (b)

Hours of daily internet [Mean ± SD]	2.0 ± 1.2	2.7 ± 1.8	z=0.68, p= 0.126 (a)

(a) Mann-Whitney U Test

(b) Chi-square Test for Independence

Table II shows that the main factors that were different when comparing diabetic patients with low eHEALS scores with patients with high eHEALS scores in the study were their age, their nationality (being Emirati or not) and their level of education (having a college degree or not). While age and nationality are inherent factors that cannot be modified, education is a very important factor that should receive proper attention when considering how to improve digital health literacy in patients.

Scoring higher with eHEALS tool was also associated with younger age and more education in the study conducted by Xesfingi and Vozikis (2016) in Greece to assess the eHealth literacy level of Greek citizens and to explore the factors that shape it and are associated with it. A similar result was also reported by the study of Paige et al. (2018), where - compared with younger adults - older adults had less confidence in eHealth resource awareness ($P<0.001$), information seeking skills ($P<0.01$), and ability to evaluate and act upon online health information ($P<0.001$).

Conclusion and Recommendations

With the expected increases in life expectancy and proportion of elderly, the UAE will need to provide chronic care for an increasing number of diabetics (using limited healthcare resources), and e-Health resources can play a major part in such initiatives.

The internet and various networked tools provide more information than any other source, and require a new form of literacy to fully engage with it. Digital health literacy is becoming a necessary skill with all the new technologies that are driving the change in the way health-care providers and patients interact.

Globally, the eHealth market is growing, and the UAE is also going digital for better healthcare. When it comes to implementing innovative healthcare technology, the UAE is already at the forefront. Several initiatives are already under way, e.g. Health Authority of Abu Dhabi (HAAD) has introduced the ‘Weqaya’ online tool program to screen the health status of individuals (Department of Health, 2018). The Ministry of Health also launched ‘Wareed’, an electronic healthcare information system, giving doctors and nurses access to patient medical records (UAE Government, 2018). In addition, Dubai Health Authority (DHA) announced that it implement telehealth with remote present robot systems, RoboDocs (DHA, 2018).

Taking all this into consideration, the evaluation and promotion of digital health literacy of patients in the UAE, especially those with chronic diseases, who would benefit the most from electronic resources and application that help them in managing their conditions, should be given considerable attention.

The evaluation of digital health literacy in diabetic patients should extend to cover several aspects that are not covered by currently available tools, like eHEALS. For example, awareness and use of the available resources to gain information, frequency and reasons of use of the different types of resources, and the factors that motivate and empower patients to use digital resources should be explored. Furthermore, the different types of "skills" (operational and navigation skills to use the internet; information and evaluation skills; and additional skills related to interactivity) that improve health literacy should be the focus of further research.

Research Limitations

A few limitations are identified for this study, among them, the English language of the tool used to assess digital health literacy, as it limited the participation in the study to those patients with enough English language skills to understand and respond to the questions in the tool. Another limitation is inherent in the tool itself, which relies on self-reporting, and thus carries the risk of bias, since respondents might over- or underestimate their own Internet skills. Such limitations and others warrant further research to explore other possible tools for the assessment of digital health literacy, or even the development of a more comprehensive and culturally sensitive tool for the region.

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Identification of possible occupational risks associated with some selected archaeological excavation sites in UAE

Jawaher AlAli
Dr. Moetaz Elsergany

Maintaining a high level of health and safety in archaeological excavation sites is an utmost important issue. The unique and sensitive nature of archaeological excavation sites makes the process of maintaining the high levels of safety sometimes difficult to attain. One of the main reasons that may be behind the compromised safety in archaeological sites is the lack of knowledge and awareness of the workers. The aim of this study is to identify the possible health risks that may be associated with working in archaeological excavation sites. The findings can help decision-makers and managers to take proactive steps to protect the workers' safety through revising and amending the existing policies and procedures. In this study, some selected archaeological sites have been selected in one of the Emirates. A questionnaire was distributed among the workers in addition to a walk-through a survey to identify possible health and safety hazards that may be associated with working in the archaeological excavation sites. The questionnaire used to assess the level of awareness of different safety issues within the archaeological excavation sites. Also, participants have been asked about any previous occurrence or exposure to an occupational hazard within different sites that they worked in.

The study revealed that the highest frequency of occupational hazards was sunburns and sunstrokes. With regards to the awareness about protection against different occupational hazards, the results showed that workers are aware of possible hazards and methods of protection. Walk through survey showed that some places are very far from hospitals accordingly these locations need to be supplied with advanced first aid tools, and training of first aid procedures should be given to all workers in these sites. Safety signs were either absent or not clear enough. The study ended up by preparing a risk register and list of recommendations to minimize occupational hazards in the archaeological excavation sites such as rais awareness and training among workers especially new workers about possible occupational hazards, advanced first aid, availability of a permanent paramedic in remote areas, take possible precaution agist blowing dust, and possibility of soil collapse. Safety signs should follow international good practices, should be translated into English, Arabic, and Urdu.

Keywords:

Occupational health, safety, archaeological sites.

Changing Bed Sheets Without Moving Patients

Dr. Sumayyah AL-Faresi

Abstract

Changing bed sheets usually requires the nurse to roll the patient on one side, push the sheet towards the patient, and put the new sheet behind the patient back. After that, the nurse would roll that patient again to the other side, move the old sheet, and spread the rest of the new sheet. Finally the patient will be rolled back to his/her position (see Figure1).

Figure (1)

Moving unconscious patients or those in a great deal of agony, is a painful torturing process for both patients and their family who had to watch their lovers suffers. However, this process is essential. It might be even necessary to do it more than once a day to prevent infections.

This project suggests a theory to change the bed sheets without moving the patient, or increase his/her pain. Although, a number of writers concentrated on the same scope, their ideas were costly and hard to implement. They came up with totally new designs that require replacing the existing beds. In this project, the writer suggests adding a removable device to the existing beds. This device can be attached to the bed when it is needed and moved right after changing the sheet.

If the theory of this device proved to be right, then this project would be the salvation to patients, family, and nurses. In addition, the device would be a great financial saving plan. The hospital can use one device for more than one patient after sterilization.

The theory stands on two main points. First, it has been noticed that if you press an object (a) to a soft surface like a bed for example, then you can slide that object under an existing object (b) that lies over the bed. The thinner object (a) is, the better results one can get. However, object (a) should press small area each time under the object (b). This technique should prevent the object from sliding or touching the underneath moving object. The second point that this theory stands on is speed. For example, if a tablecloth has been moved very quickly, the dishes will stay on the top of the table. So, it is proposed that if the process of changing the bed sheet was very fast, then the patient will not feel it.

Based on that, the suggested device would contain simple components. It starts with a rectangular pole that matches the bed size. This pole consists of two cylinders: one to grab the old sheet, and one to spread the new one simultaneously. The two sides of the pole would be attached to compressor to press the pole down to the bed (see figure 2).

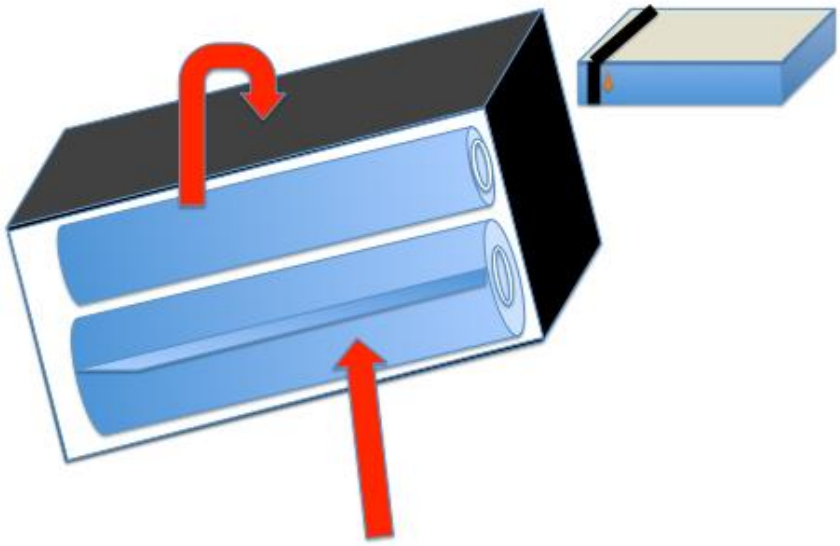

Figure (2)

Timeline

To approve this theory and to start producing this device, I suggest this timeline:

Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
Test the theory on small scale prototype									

	Registering the invention intellectual property rights + locating materials and necessary equipments							
				Recruit specialists + design the first prototype				
						Test the first prototype and made any necessary changes		
							Come up with the final design	
								Look for a suitable manufacturer that can produce this design well in minimum cost.

Funding Opportunity

We can refer to Medical suppliers in UAE to fund this project such as:

Al Mourgan Medical Supplies

Paramount Medical Equipment Trading LLC

A1 Medical Equipment LLC

Saltom Medical Equipment Trading

New Medical Technologies

New AL Farwaniya Surgical & Medical Equipment

IN VIVO: From Labs to Labels

Dr. Rawan AlHarmi
Salmaniya Medical Complex, Bahrain

Description

In vivo, Latin for within the living, describes scientific experiments conducted within living organisms. *In vitro,* in contrast, means literally "in a test tube". And from here comes the name. In vivo is an idea for a network and hub for medical students and physicians to empower innovation in medicine and transfer mere ideas into living technology. The scope and focus area of this project comprises of two aspects: research and invention in medicine. We aim at developing a mobile application that will serve as a network to connect those interested in participating in medical research with laboratories, universities, hospitals, and any institute or individual researcher offering research opportunities. It will also provide a network with engineers, potential investors, and producing companies for those who have innovative ideas for inventions in the field of medicine and biotechnology. In addition to the application, an office and a workplace will be available for guidance and implementation of ideas and projects.

Purpose

Because being a doctor not only means wearing a white coat, it can also be defined as one who is an innovator, inventor, producer, scholar, scientist, entrepreneur, and a pioneer. Or who knows? Someone beyond that. It is time to create the science and the evidence we treat people with and to manufacture the tools we use in our daily clinical practice. Being a doctor and a surgeon specifically, I find in every difficulty I face in my daily practice an opportunity to change and innovate.

Significance

Innovation and research in medicine are pivotal to the development of healthcare services. I was once a medical student that, together with my colleagues, came up with an idea for a medical device and faced many obstacles along the way. Also, I was and still am interested in medical research. However, it was difficult for me and for many of my colleagues to start with a project or get involved in ongoing research. I believe many medical students and physicians are facing the same difficulties as with me and it is our duty to guide and support them.

Impact

This project will facilitate the process of involvement in research and will create opportunities for many healthcare personnel to excel. We will be assisting innovators in transforming their ideas to real products.

Plan and goals

- Development of mobile application

- Organizing regional and international events and exhibitions for invention

- Organizing research methodology courses and workshops

- Organizing summer research schools and awards

Budget

Mobile application development might cost anywhere between $5,000 to $20,000 with basic features. Office and workplace leasing costs approximately $6 per square meter per month. In the future, once the network is widened, further employment might take place and salaries will need to be secured.

Potential funders

In Bahrain, a number of public authorities that support small and medium-sized enterprises (SMEs) exist. Among these are Tamkeen and Bahrain Development Bank (BDB) which offer training and financial support as well.

Proposal timeline

Phase 1	1 week	Business plan development
Phase 2	2-4 weeks	Collaboration with public authorities that provide support for SMEs
Phase 3	4-6 weeks	Opening of the office and workplace
Phase 4*	8-12 weeks	Mobile application development
Phase 5		Launching of the application
Phase 6		Marketing and sustainability

*Phase 4 can be performed simultaneously with the previous phases

Keywords

Innovation, invention, research, biotechnology, medicine