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Mission

ATINER is a ***World Non-Profit Association*** of Academics and Researchers based in Athens. ATINER is an independent **Association** with a **Mission** to become a forum where Academics and Researchers from all over the world can meet in Athens, exchange ideas on their research and discuss future developments in their disciplines, **as well as engage with professionals from other fields**. Athens was chosen because of its long history of academic gatherings, which go back thousands of years to *Plato's Academy* and *Aristotle's Lyceum*. Both these historic places are within walking distance from ATINER's downtown offices. Since antiquity, Athens was an open city. In the words of Pericles, **Athens*"...is open to the world, we never expel a foreigner from learning or seeing".*** (*"*Pericles' Funeral Oration", in Thucydides, *The History of the Peloponnesian War).* It is ATINER's **mission** to revive the glory of Ancient Athens by inviting the World Academic Community to the city, to learn from each other in an environment of freedom and respect for other people's opinions and beliefs. After all, the free expression of one's opinion formed the basis for the development of democracy, and Athens was its cradle. As it turned out, the Golden Age of Athens was in fact, the Golden Age of the Western Civilization. *Education* and *(Re)searching* for the 'truth' are the pillars of any free (democratic) society. This is the reason why *Education* and *Research* are the two core words in ATINER's name.

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President's Message

All ATINER"s publications including the e-journals are open access without any costs (submission, processing, publishing, open access paid by authors, open access paid by readers etc) and are independent of the presentations made at any of the many small events (conferences, symposiums, forums, colloquiums, courses, roundtable discussions) organized by ATINER throughout the year. The intellectual property rights of the submitted papers remain with the author.

Before you submit, please make sure your paper meets some basic academic standards, which include proper English. Some articles will be selected from the numerous papers that have been presented at the various annual international academic conferences organized by the different divisions and units of the Athens Institute for Education and Research.

The plethora of papers presented every year will enable the editorial board of each journal to select the best ones, and in so doing, to produce a quality academic journal. In addition to papers presented, ATINER encourages the independent submission of papers to be evaluated for publication.

The current issue of the Athens Journal of Health and Medical Sciences (AJH) is the first issue of the sixth volume (2019). The reader will notice some changes compared with the previous issues, which I hope is an improvement.

Gregory T. Papanikos, President
Athens Institute for Education and Research

Athens Institute for Education and Research

A World Association of Academics and Researchers

18th Annual International Conference on Health Economics, Management & Policy, 24-27 June 2019, Athens, Greece

The Health Economics & Management Unit of ATINER will hold its **18th Annual International Conference on Health Economics, Management & Policy, 24-27 June 2019, Athens, Greece** sponsored by the Athens Journal of Health. The aim of the conference is to bring together academics, researchers and professionals in health economics, management and policy. You may participate as stream leader, presenter of one paper, chair of a session or observer. Please submit a proposal using the form available (https://www.atiner.gr/2019/FORM-HEA.doc).

Academic Members Responsible for the Conference

- **Dr. Paul Contoyannis**, Head, Health Economics & Management Unit, ATINER & Associate Professor, McMaster University, Canada.
- **Dr. Vickie Hughes**, Director, Health & Medical Sciences Division, ATINER & Assistant Professor, School of Nursing, Johns Hopkins University, USA.

Important Dates

- Abstract Submission: **13 May 2019**
- Acceptance of Abstract: 4 Weeks after Submission
- Submission of Paper: **27 May 2019**

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The Social Program Emphasizes the Educational Aspect of the Academic Meetings of Atiner.

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The Medicine Unit of ATINER is organizing its **7th Annual International Conference on Health & Medical Sciences, 6-9 May 2019, Athens, Greece** sponsored by the Athens Journal of Health. The aim of the conference is to bring together academics and researchers from all areas of health sciences, medical sciences and related disciplines. You may participate as stream leader, presenter of one paper, chair a session or observer. Please submit a proposal using the form available (https://www.atiner.gr/2019/FORM-HSC.doc).

Important Dates

- Abstract Submission: **25 March 2019**
- Acceptance of Abstract: 4 Weeks after Submission
- Submission of Paper: **8 April 2019**

Academic Member Responsible for the Conference

- **Dr. Vickie Hughes**, Director, Health & Medical Sciences Research Division, ATINER & Assistant Professor, School of Nursing, Johns Hopkins University, USA.
- **Dr. Carol Anne Chamley**, Head, Nursing Research Unit & Associate Professor, School of Health and Social Care, London South Bank University UK.
- **Dr. Andriana Margariti**, Head, Medicine Research Unit, ATINER & Lecturer, Centre for Experimental Medicine, Queen's University Belfast, U.K.
- **Dr. Ketan Ruparelia,** Head, Pharmaceutical Research Unit, ATINER & Research Fellow and Part-time Lecturer, De Montfort University, U.K.

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Multicultural Health Diplomacy: A Proposed Culturally Competent Diplomacy Model for Health Professionals

By Rachel Boveja[*]

Diplomatic skills are essential for international relations and foreign affairs. However, diplomacy can be valuable for other global initiatives, such as public health. In many countries, healthcare has been affected by migration and has impacted individuals from various cultural backgrounds. As perceptions of health vary among cultural groups, so do the health services needed to accommodate those groups. Some healthcare challenges include limitations in communication and cultural literacy. Therefore, it is imperative to review innovative tools being used to accommodate these global health movements. Multicultural Health Diplomacy is a proposed model for the purpose of training health professionals with a set of skills suitable for engaging in transcultural healthcare. Fundamental to health education and healthcare services, these skills can serve as a model to create a healthcare system which supports the diversity and well-being of all individuals. Multicultural Health Diplomacy is inspired from Global Health Diplomacy, which has its foundation in foreign policy. Therefore, using these skills at the community level can also serve as a conduit for bridging ground level healthcare to foreign policy. The purpose of this paper is to review current trends in multicultural health and diplomacy training models used across several industries. The current status of global migration is highlighted to express the need for cultural competency training for health professionals at institutional, organizational, community, and individual levels. In particular, this paper focuses on the use of diplomacy skills in cultural health competency training to aid in the interaction and ongoing relationships between healthcare professionals and the diversity of individuals receiving healthcare services.

Keywords: *Healthcare diplomacy, Healthcare training, Cultural competency, Multicultural health, Multicultural competency.*

Introduction

Multicultural Health

Global communities, institutions of higher education, and the workforce are increasingly training individuals to be culturally competent because of the growing diversity in our world. Employers from every sector are looking for individuals who know how to work with diverse individuals and have had diverse experiences (Walsh 2017). Furthermore, Walsh suggests that "[Multicultural] competency in today's marketplace is the difference between success and failure" (Walsh 2017). The health industry is also expanding to identify trends in multicultural health. According to the Royal Australian College of General Practitioners, multicultural health can be defined as

> "Multicultural health…reflects how the core principles of multiculturalism operate within the context of general practice, including ensuring that the training of general practitioners has a strong and specific emphasis on

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> building cultural competence and effectiveness, that is, the ability to work competently and effectively in a culturally diverse workplace and in encounters with people from different cultural backgrounds to ensure the delivery of high-quality general practice care".
>
> (The Royal Australian College of General Practitioners 2011)

Understanding multicultural health means unwrapping its complex uses and associated terminology, such as cultural competency. Cultural competency is "…the ability to interact effectively with people of different cultures, and helps to ensure the needs of all community members are addressed".[1] Similar to other definitions associated with "culture", cultural competency is also complex in its purpose (Cross et al. 1989). Meaning, it is a concept *and* a behavior, among other things. The process of cultural competency is an ongoing practice for working in any cultural context (Echeverri et al. 2013). Yet, the function lies in preparing individuals with knowledge and skills as well as *using* cultural competency as a tool for cross-cultural communication. Ultimately, multicultural competency implements equity awareness and evidence-based practices at its core (Echeverri et al. 2013, Cullen and Adams 2012).

Diplomacy

Diplomacy has often been attributed to Foreign Service and international relations. Different cultures make use of the diplomacy concept, but often have their own rules for engaging in diplomatic behaviors. Still, the overall point of diplomacy is to maintain peaceful relationships (McDaniel et al. 2018). For this reason, diplomacy has been defined as both a concept and an actionable behavior trait involving negotiation. Moreover, Gilboa defines diplomacy as "...international negotiation, to a communication system through which representatives of states and international or global actors, including elected officials, express and defend their interests…it is a channel of contact for clarifying positions, probing for information, and convincing states and other actors to support one's position" (Gilboa 2001). Individuals specializing in diplomacy include diplomats, ambassadors, secretaries of state, and other managers of international relations (McDaniel et al. 2018). These individuals are often intermediaries and mediators between different cultural populations. Publicly, diplomacy is often seen on the world stage at the United Nations General Assembly and the Geneva Convention, both overseeing the signing of peace treatises, among other things (McDaniel et al. 2018). Moreover, diplomacy has a history of monumental accomplishments in the forms of the Treaty of Kadesh by Ancient Kemetic Pharaoh Ramesses II and the Treaty of Versailles, which was signed in 1919 (McDaniel et al. 2018).

[1]Center for the Application of Prevention Technologies (CAPT) (2016, November 10). Cultural competence. *Substance Abuse and Mental Health Services Administration.* Available at: https:// www.samhsa.gov/capt/applying-strategic-prevention/cultural-competence.

Diplomacy Characteristics

Traditional diplomacy was known to be "highly formal, institutional, and protected by secrecy" (Gilboa 2001). Common diplomacy characteristics include, but are not limited to, "thorough understanding of issues and an appreciation for the culture of the people you are negotiating with".[2] Some notable skills used to support diplomacy include, "active listening, emotional intelligence, showing empathy, assertiveness, rapport, and politeness".[3] This list demonstrates the need for diplomacy workers to have a repertoire utilizing both knowledge and skills when interacting with individuals from different cultures. Models and frameworks also exist to train individuals conducting diplomatic work (Betlem 2012). Many frameworks have also been developed to replicate diplomacy and implemented in various industries such as business, health, and the media.[4] This reflects the use of diplomacy skills in trans occupational settings as well as larger global contexts.

Diplomacy in Healthcare

Diplomacy can be valuable for other global initiatives, such as healthcare. In many countries, healthcare has been affected by migration and impacted individuals from various cultural backgrounds. As perceptions of health vary among cultural groups, so do the health services needed to accommodate those groups. By nature, any individual or company working with diverse cultures, mindsets, and agendas are taking part in diplomatic work (McDaniel et al. 2018). This is no different for health professionals. Therefore, it is imperative to review innovative tools being used to accommodate these global health movements. In support of this concept, the World Health Organization spearheaded Global Health Diplomacy (GHD).[5] GHD combines the "disciplines of public health, international affairs, management, law and economics and focuses on negotiations that shape and manage the global policy environment for health".

Problem Statement

Previous research has determined that diplomacy skills are essential across many industries. Yet, few studies specifically discuss how to incorporate these skills in training ground-level health professionals. With globalization at our helm, health professionals across the world need to learn how to interact effectively with different cultures (Nyatanga 2001). Moreover, many populations are suffering in health as a result of the lack of cultural understanding or adequate communication skills between health professional and patients. In order for health professionals to

[2]What are the tools of diplomacy? (2018, October). Secretary of State Government. Available at: https://www.state.gov/discoverdiplomacy/diplomacy101/issues/170614.htm.
[3]Tact and diplomacy: Skills You Need (2018, October). Available at: https://www.skillsyouneed.com/ips/tact-diplomacy.html.
[4]Negotiation Strategies for Doctors – Hospitals (2013, October 21). Harvard Business Review. Available at: https://hbr.org/2013/10/negotiation-strategies-for-doctors-and-hospitals.
[5]Global Health Diplomacy (2018, October). World Health Organization. Available at: http://www.who.int/trade/diplomacy/en/.

receive adequate training in this area, diplomacy models must be modified to include the specific needs of health professional/patient interaction, for the purpose of supporting both sides in cultural health negotiation.

Purpose

The purpose of this paper is to review current trends in multicultural health and diplomacy training models used across several industries. Additionally, this paper will identify what is missing in these models in order to use best practices for creating a new health diplomacy model. The new model will be framed to assist in training health professionals interacting with patients from different cultural backgrounds.

Research Questions

The research questions framing this review include: What health diplomacy models currently exist? What trends exist across current models? What is missing in current models? What components are needed to create the new model? Who will this new model ultimately benefit? Where would this new model be most useful? and When would this new model be most useful?

Importance and Scope of the Study

As part of an exploratory review; current diplomacy models will be reviewed which have been used in different industries. These models will be measured against a core diplomacy skills model. After identifying current models, a new health professional model will be developed which will include recommendations from the literature review concerning current issues in multicultural healthcare. Geographically, all current models will be taken from the United States. The United States models will be used as the foundation because of the country's historically diverse demographic and current affairs across the globe. Thus, these models from the US will provide diplomatic insight into working with different cultural populations.

Development of a new model will complement the changing world by offering essential skills for professionals during these evolving times. A new model will identify key actors, issues, and skills regarding multicultural health and diplomacy. Ultimately, it will add to a literature bank which will be drawn upon in the future to help navigate various health beliefs, traditions, disparities, and treatment plans.

Essentially, this paper will highlight the current status of global migration to express the need for cultural competency training for health professionals at institutional, organizational, community, and individual levels. In particular, this paper will focus on the use of diplomacy skills in cultural health competency training to aid in the interaction and ongoing relationships between healthcare professionals and the diversity of individuals receiving healthcare services.

Literature Review

Trends in Multicultural Health

One of the main issues regarding multicultural health is the lack of true cultural literacy among health professionals (Kleinman and Benson 2006). Multicultural health is a universal phenomenon. Moreover, it is transnational because it exists in every part of the world and transcends borders. Multicultural health is also multilevel and involves intrapersonal, interpersonal, family, community, national, and international components (Kleinman and Benson 2006). Multicultural health can be a concept or a treatment plan depending on which part of the process is being undertaken. Additionally, it connects to several other initiatives involving cultural care such as competency, cultural literacy, intercultural competence, cross-cultural perspectives, and transcultural ideas (Cross et al. 1989). Ultimately, multicultural health encompasses various ways of thinking, being, and healing in a diverse world (Kleinman and Benson 2006). However, to understand the nuances of multicultural health, it is important to acknowledge what underlines "culture" (Echeverri et al. 2013). For instance, we must understand the visible and invisible constructs of culture. It is also important to address that culture is more than race or ethnicity (Echeverri et al. 2013). It encompasses deeper aspects of a person or community (Echeverri et al. 2013), such as demonstrated by the cultural iceberg structure (Table 1, Figure 1).

Table 1. *Common Terms Associated with Multicultural Competency*

Term	Definition
Multicultural	"co-existence of diverse cultures…" (Chu 2005)
Cultural Literacy	"…developing new cultural literacies when you enter a new culture, or interact with members of that culture" (Hirsch 1983)
Intercultural Competence	"...behavior and communication that are both effective and appropriate in intercultural interactions" (Deardorff 2006 & 2012)
Cross-cultural	"comparison of different cultures" (Schriefer 2017)
Transcultural	"occurring in more than one culture" (Purnell 2012)

Figure 1. *The Cultural Iceberg*

Source: Hirsch, 1983.

Migration and globalization

Some of the phenomena effecting multicultural health are migration and globalization. Globalization has impacted everything including law, policy, mobility, migration, health, education, and culture (Mok 2000). Globalization has many definitions, one of which is "the constant movements in international trade, economy, technology, and people" (Mok 2000). People often travel across borders either for emergency purposes or in search of new frontiers (Mok 2000). Some take their cultural traditions with them, yet, others completely adapt to new cultural phenomena, including new health practices. On the other hand, some people blend their traditional practices with those in their new life (Mok 2000).

According to culture analysis, globalization has its advantages and drawbacks; it also disrupts the status quo and creates more competition (Mok 2000). Advantages include an increased engagement with a variety of cultures, goods, and services (Hirst and Thompson 1995). A drawback is understanding that globalization may cause negative ripples for certain people and regions because of the lack of engagement with culturally literate professionals (Archibugi and Pietrobelli 2003). Moreover, many populations are experiencing atrocities like famine, poverty, slavery, and poor health with little understanding from their new places of residence (Archibugi and Pietrobelli 2003). The global health idea of "health for all" is truly impacted by globalization and the social determinants of health, which can be defined as a cross-national cultural movement (Huynen et al. 2005).

Barriers between health professionals and patients

One of the ongoing trends when negotiating health is friction. According to Tsing, friction is defined as "producing movement, action, effect…always engaged… resistance…" (Tsing 2005). Health professionals have a job to do, which is to aid in the healing processes of their patients (Tsing 2005). Many patients want to ensure their cultures, traditions, and spiritual beliefs are a part of the healing process (Tsing 2005). This *friction* has caused many misunderstandings between health professionals and the cultural populations they work with. Trust has been lost, if gained at all. And too often, biases on both sides prevail as a result (Tsing 2005). Unfortunately, this can lead to both sides failing to progress in their quest for healing (Tsing 2005).

Another leading issue regarding multicultural health is the lack of adequate cultural training offered to health professionals. For instance, studies show that professionals lack many skills when working with refugees. Of those missing skills, the most reported include: social inclusion, interpersonal skills, cultural competency, intervention design, language acquisition, adequate knowledge about the refugee experience, as well as knowledge about global health and its related initiatives (Hill et al. 2009, Cheng et al. 2015, Lipson 1991, Drain et al. 2007). These trends appear in work with many other cultural populations as well as refugees. In order to train health education professionals with these skills, the Association of Refugee Health Coordinators recommend a holistic approach to

training.[6] Other studies mentioned having a designated platform for engaging health education professionals with these skills, such as universities (Ablah 2014).

Health professional bias has also been reported in recent years; and along with it, studies seeking to understand how bias develops in this field. According to a paper recently published by the Chronicle of Higher Education, bias comes in many forms including the belief in biased information, the entitlement bias, the reciprocity bias, the social-validation bias, and the moral-license bias (Lessig 2018). Pertinent to this literature and the promotion of cultural competency is the notion that health professionals may not realize the severity of their biases. Lessig continues to state how an individual's professional position blinds them of their bias because they truly believe they have done all the work they needed to understand any situation in their field, thus making them experts (Lessig 2018). While still striving to respect a health professionals' years of education and hard work, this belief can undermine work involving cultural competency.

Frameworks supporting diplomacy in healthcare

Research has shown that culture and diplomacy studies share common global goals (McDaniel et al. 2018, Gilboa 2001, Echeverri et al. 2013). Some of the familiar attributes include, communication, cultural literacy, negotiation skills, respect, and reaching a favorable outcome for everyone involved (McDaniel et al. 2018, Gilboa 2001, Echeverri et al. 2013). Since multicultural health is a global issue, diplomacy skills would be beneficial in these healthcare settings. Likewise, proposing new frameworks has long been supported due to the changing nature of our world (Niknejad et al. 2016). The United Nations' 8 Millennium Development Goals (MDGs) in 2000 and the 17 Sustainable Development Goals (SDGs) for 2015 demonstrate the ongoing need to modify goals and frameworks as nations evolve over time. Specifically, the SDGs support global healthcare initiatives involving diplomacy skills with the third objective being "good health and wellbeing" for all.[7]

Frameworks for supporting multicultural healthcare include the Bray, Adamson, and Mason Cube, Arjun Appadurai's concept of "Scapes", and the Purnell Model for Cultural Competency. The Cube is used in comparative education to explain the different levels and dimensions of the educational world (Bray et al. 2014). In regards to multicultural health, the Cube displays Nonlocational Demographic Groups (Bray et al. 2014). Appadurai's "*scapes*" discusses the different, somewhat cultural landscapes, that shape the flows and frictions of globalization (Dimitriadis and Kamerelis 1997). Each of the five "*scapes*" can inform the flows of multicultural health competency, however the most relevant include *Ethnoscape* and *Mediascape* (Dimitriadis and Kamerelis 1997). *Mediascape* has afforded many populations a means to display their culture

[6]The Role of Refugee Health Coordinators (2018, January 18). Available at: https://www.acf.hhs.gov/orr/resource/the-role-of-refugee-health-coordinators.

[7]Sustainable Development Goals kick off with start of new year. United Nations website (2017, March 17). Available at: http://www.un.org/sustainabledevelopment/blog/2015/12/sustainable-development-goals-kick-off-with-start-of-new-year/.

across global technology and connect in real-time during crucial moments using platforms such as social media and the live internet (Dimitriadis and Kamerelis 1997). Whereas, *Ethnoscape* is in the form of the individual, physically moving across borders (Dimitriadis and Kamerelis 1997). Of the three frameworks, the Purnell Model for Cultural Competency includes guidelines for working with specific cultures and what we should know about them prior to providing care or education (Purnell 2012). Although the Purnell Model for Cultural Competency was developed for a healthcare setting, it can be used alongside other fields, such as diplomacy (Purnell 2012).

The Cube, the Purnell Model, and Appadurai's framework share similar characteristics for use in understanding multicultural paradigms. Additionally, components from each of the frameworks can be used to compare cultural health in the US and throughout the world.

Methodology

For the literature review, web searches were conducted between the years 1991 and 2018 in EbscoHost, MEDLINE, ERIC, PubMed, Academic Premiere, Google Scholar, and the Indiana University Libraries database. Keywords used as search terms included: multicultural health, refugee health, cultural health education, cultural health interventions, ministries of health, ministries of education, departments of education, competencies for health professionals, office of refugee resettlement, professional health education curriculum, cultural educational development, Bill and Melinda Gates Foundation, Clinton Foundation, Carter Foundation, UNICEF, WHO, UNESCO, World Bank, Millennium Development Goals, Sustainable Development Goals, Red Cross, and UN Refugee Agency. Specific journal searches include *Journal of Immigrant and Minority Health*; *American Journal of Public Health*; *Health Education Journal*; *Journal of Community Health*; *Journal of Ethnicity and Health*; *International Journal of Public Health*; *International Journal of Health Sciences and Research*; *Journal of Social Work*; *Journal of General Practice*; *Ethnic Health*; *Qualitative Health Research*; and the *Journal of Curriculum Studies*. In addition to journal and web sources, expert reports, books, and white papers were also consulted.

For the diplomacy skills models, web searches were conducted between the years 2001 and 2018 in EbscoHost, ERIC, PubMed, Academic Premiere, Google Scholar, and the Indiana University Libraries database. Keywords used as search terms included: diplomacy models, diplomacy skills, business diplomacy models, media diplomacy models, council on foreign relations, model diplomacy, health diplomacy models, department of state, diplomatic theory, principles of diplomacy, peace treaties, Foreign Service diplomacy models, the United Nations, WHO, UNESCO, World Bank, Millennium Development Goals, and the Sustainable Development Goals. Specific journal searches include *Journal of Immigrant and Minority Health*; *Harvard Business Review*; *Harvard Law School*; and *Diplomacy and Statecraft*. In addition to journal and web sources, expert reports, books, and white papers were also consulted. In addition to journal and

web sources, colleagues who primarily work in international relations research were contacted for help in identifying current diplomatic training documents.

Results of Current Diplomacy Model Search

For the purpose of establishing a clear foundation, the results were organized first by including a prominent diplomacy skills model accompanied by a table of skills/characteristics, then by various industry diplomacy skills models also accompanied by skill/characteristics. Each document, was then compared to the original diplomacy skills training to determine which skills/characteristic were similar and which were added in the industry documents. This was to determine trends across industries and hopefully create a new adequate health professional diplomacy model. Tables and charts accompanied by summaries were developed to exhibit data.

Foreign Service Diplomacy Framework/Model

Title: Three Principles of Diplomacy

Summary: This framework is drawn from the experiences of Colin Powell and George Keenan, both political diplomats in their time. The main takeaway from this reading is that each component alone is sufficient, but only when they are combined, can they be a diplomatic force[8] (Table 2).

Table 2. *Diplomacy Components (Wilson Center 2018)*

	Component	Description
1	Patience	Is indispensable to long-term success in foreign policy…Indeed, patience in a great power goes to the core principle of diplomacy itself, one of three principles that I would like to talk about this evening.
2	Power	Is necessary because it is not possible to reason with every adversary that threatens a vital interest.
3	Staying the Course	Means that, "After the fighting stops, other hard work begins, including political and diplomatic work, rebuilding, transforming a defeated country".
4	Working with Rather than Against	A wise diplomacy magnifies power's attractive quality by using power to benefit others as well as oneself.
5	Provide Honorable Paths to Escape	Adversary needs an honorable path of escape if we are to achieve our main policy goals without using force.
6	Persuasion	Evokes the first principle of diplomacy (Power).

[8]The Principles of Diplomacy (2018, October). Wilson Center. Available at: https://www.wilson center.org/publication/three-principles-diplomacy.

Industry Specific Diplomacy Skills Models

A. Business Diplomacy Model #1

Title: Business Diplomacy in International Firms

Summary: This model was developed to examine the influence of firm characteristics on business diplomacy policies with employees. Although the findings were quantitative, the insight proved fruitful. The main takeaway from this study is that employees in the firm believed business diplomacy initiatives should be shared throughout the entire company, not just with top stakeholders. As a business model, the components represent the factors associated with preparing employees with robust knowledge of their business diplomacy department (Betlem 2012, Figure 2, Table 3).

Figure 2. *Business Diplomacy Framework*

Source: Betlem, 2012.

Table 3. *Business Diplomacy Components (Betlem 2012)*

	Component	Description
1	Intensity	Reflects the extent to which a company actively establishes and sustains positive relationships with FGreps and NONg stakeholders.
2	Policy Clarity	Reflects the extent to which a MNC has a clear and organization-wide policy on how to establish and sustain these relationships.
3	Breadth	Reflects the extent to which establishing and sustaining these relationships is done by every company representative.
4	Means Deployment	Reflects the extent to which the company deploys a diversity of means for establishing and sustaining positive relationships with FGreps and NONg stakeholders.
5	Resource Availability	Reflects the extent to which the company uses multiple firm resources (e.g. financial, time, knowledge) to establish and sustain these relationships.
6	Responsibility	Reflects the extent to which the company's responsibility for establishing and sustaining positive relationships with FGreps and NONg stakeholders lies on the headquarters level or within the foreign subsidiaries, or whether they are both partly responsible.

B. Business Diplomacy Model #2

Title: Lessons from Business Negotiators: Negotiation Techniques from International Diplomacy

Summary: This list of essential diplomacy skills discusses what it means to succeed in negotiations and to retain relationships as well. This framework is used to teach Americans how to sustain relationships with other cultures while doing business. Ultimately, this tool is useful for ongoing positive cultural relationships in business[9] (Table 4).

Table 4. *Business Diplomacy Components (HLR 2018)*

	Component	Description
1	Negotiate Continuously	Who must apply their agreement to unforeseen circumstances and adjust their relationship to a constantly changing environment.
2	Seek to Harmonize	Diplomats know that the key to building relationships lies in understanding other countries' concerns and priorities.
3	Patience of a Clockmaker	Time is indeed money, but scrimping on time during a negotiation may result in an undercapitalized deal. Whether time, money, or both are in short supply, undercapitalization can be the kiss of death for any contract.
4	Saturate Your Mind	Explore virtually every dimension of the organizations, countries, and people with whom they were to come into contact.
5	Apt Listeners	Successful negotiation requires vigilance about your own words and behavior as well as a keen observation of the other party.
6	Show Respect	Diplomacy's rituals and formalities, which acknowledge another country's sovereign status, can be effective in signaling respect and deference in corporate negotiations.

C. Media Diplomacy Model

Title: Diplomacy in the Media Age

Summary: This framework is taken from a study examining three conceptual media diplomacy models. Media is highlighted as a central component to delivering foreign policy information to the world and influence public opinion, yet, each aims to promote conflict resolution. This model did not reveal actual definitions for the components. Instead, the components represented a list the actors and conditions fostered in media diplomacy (Gilboa 2001). However, including this framework was essential to understanding how diplomacy fits into other sectors besides Foreign Service or industries somewhat affiliated with Foreign Service (Figure 3, Table 5).

[9]Lessons for Business Negotiators: Negotiation Techniques from International Diplomacy (2018, July 16). Harvard Law Review. Available at: https://www.pon.harvard.edu/daily/dealmaking-daily/the-art-of-deal-diplomacy/.

Figure 3. *Media Diplomacy Comparison Chart*

Attribute	Public Diplomacy	Media Diplomacy	Media-Broker Diplomacy
Context	Confrontation	Conflict resolution	Negotiations
Initiators	Officials	Officials	Journalists
Time frame	Long range	Short range	Immediate
Goals	General	Specific	Very specific
Method	Promote favourable image	Appeal for conflict resolution	Mediation
Sides	One sided	Joint	All sides
Target	Foreign societies	Domestic/foreign societies	Officials/public opinion
Medium	Multiple channels	Mass Media	Mass Media

Source: Gilboa, 2001.

Table 5. *Media Diplomacy Components (Gilboa 2001)*

	Component
1	Conflict Resolution
2	Officials
3	Short Range
4	Specific
5	Appeal or Conflict Resolution
6	Joint
7	Domestic Foreign/societies
8	Mass Media

D. Health Diplomacy Model #1

Title: Diplomacy Needs Action

Summary: This framework is a part of an international health diplomacy training program. This program trains students, executives, and intermediates for a fee of approximately $800 US dollars. It is a 3 to 5 day intensive training program on global health and diplomatic practice. As this is a closed course, no descriptions for their suggested framework components were available during the research period.[10] However, including these components proved useful in understanding how global heath and diplomacy are being taught internationally (Table 6).

Table 6. *Health Diplomacy Components (GHD ID 2018)*

	Component
1	Negotiation Manner and Strategy
2	Social Influencing
3	Building Professional Image
4	Influencing People
5	Collaboration
6	Decision Making

[10]Diplomacy Needs Action (2018, October). Global Health Diplomacy. Available at: http://global healthdiplomacy.id/index.php#contentExecutive.

E. Health Diplomacy Model #2

Title: Negotiating for Doctors/Hospitals

Summary: This framework set in the setting of doctor/patient relationships deals with attempting health negotiations in order for both parties to come to a favorable agreement. This framework highlights the understanding of additional perspectives not present at the negotiation table and aims to keep the discussion focused on the outcome. This is different than the other frameworks because it stresses external stakeholders and perspectives versus zoning in on only what the person in "front of you" wants in the negotiation[11] (Table 7).

Table 7. *Health Diplomacy Components (HBR 2013)*

	Component	Description
1	Focus on Interests, Not Positions	Too often, health professionals fall into the trap of thinking that there is one correct answer (solution, diagnosis, prescription), and that it will win the day; but human interactions are more complicated than that.
2	Framing Matters	It's not just what you say, it's how you say it.
3	Negotiation Space	Keep an eye on *all* of the parties that are relevant to this negotiation, not just those who are at the table.

Discussion

The models presented in this paper demonstrated a breadth of diplomacy initiatives across sectors. They were clear in revealing the objectives of the frameworks and how it should be used in the associated fields. In comparison with the Foreign Service framework (Model A), the subsequent models focused less on power moves and more on people, space, and ongoing relationships.

In line with the original diplomacy skills model, each model emphasized the need for both parties in the negotiation to have a favorable outcome. The idea of patience was a theme throughout the models as well. Persuasion, although mentioned under different terminology, was a key component for the models. In fact, persuasion and patience came hand in hand when demonstrating the ongoing relationship aspect of diplomacy.

The models displayed differences as well as similarities. Some provided matching diagrams for visual learners, while others told stories to frame their components. Other models became difficult to pin down definitions for their components, if there were definitions at all. However, all models were theoretical in nature. As a result, there were no assessments connected to the models. Therefore, readers were unable to see the long-term benefits of implementing diplomacy training in specific fields. Additionally, the use of simulation training

[11]Negotiation Strategies for Doctors – Hospitals (2013, October 21). Harvard Business Review. Available at: https://hbr.org/2013/10/negotiation-strategies-for-doctors-and-hospitals.

was mentioned in order to provide learners with diplomacy practice before entering the field.

Whether it was the business idea of a bottom line, diplomats upholding nations, media representing political life, or health care professionals healing a life; the models represented an overall respect for negotiating on an even playing field of understanding and care. Moving forward, each model has reliable contributions to the development of new frameworks. In regards to multicultural health, the current components can be built upon by adding specific health and culture aspects as well as a simulation assessment piece. The next step will be to develop a new multicultural health diplomacy model by combining the most pertinent components found from existing diplomacy models, global culture frameworks, and specific health negotiation needs.

Health Diplomacy Model Proposal

After analyzing the results from current diplomacy models. A new model was developed to help prepare health professionals for interacting effectively with different cultural populations. This model comes with a diagram, a chart of skills/characteristics with descriptions, and a summary of intended use.

Multicultural Health Diplomacy: A Model for Training Health Professionals Interacting with Different Cultures

Multicultural Health Diplomacy (*MHD*) is a proposed model for the purpose of training health professionals with a set of skills suitable for engaging in transcultural healthcare. Fundamental to health education and healthcare services, these skills can serve as a model to create a healthcare system which supports the diversity and well-being of all individuals. *Multicultural Health Diplomacy* is inspired from *Global Health Diplomacy*, which has its foundation in foreign policy. Therefore, using these skills at the community level can also serve as a conduit for bridging ground level healthcare to foreign policy. This model endorses actors such as health professionals, health educators, and patients. This new model is unique for its promotion of combining knowledge, skills, *and* assessments for global health practices. The skills in this model can be used across cultures and contexts. The knowledge provides a foundation that can be built upon for each specific, cultural setting. Finally, the assessments allow professionals to reflect on their practices. As a diplomatic foundation, MHD promotes the benefit of all individuals involved in the health negotiation process. Meaning, this training promotes the idea of a collaborative space in which all parties come out with a favorable outcome (Figure 4, Table 8).

Figure 4. *MHD Components Diagram*

1. Effective Communication	2. Health Negotiation	3. Precision
4. Health Literacy & Competency	**Multicultural Health Diplomacy Model**	5. Cultural Literacy & Competency
6. Ongoing Collaboration	7. Patience and Respect	8. Health Professional Responsibility

Source: Original Diagram.

Table 8. *MHD Components and Descriptions*

	Component	Description	Assessment
1	Effective Communication	Communication between two or more persons wherein the intended message is successfully delivered, received and understood (Business Jargons 2018).	Simulation Scenarios
2	Health Negotiation	Health discussions for the purpose of reaching an agreement on health services, needs, prevention, and treatment.	Simulation Scenarios
3	Precision	The ability to solve core health problems specific to certain individuals or cultural populations.	Evident by patient reporting satisfaction after interacting with health professional. Evident by reports of increased positive health outcomes after interacting with patients. Possibly a survey.
4	Health Literacy & Competency	Developing new health literacies upon entering a new culture. Then, demonstrating this knowledge during interactions with those cultures.	Developing thorough briefs or reports on cultures prior to interaction. Then, evidence of competency in the field.
5	Cultural Literacy & Competency	Developing new cultural literacies upon entering a new culture. Then, demonstrating this knowledge during interactions with those cultures.	Developing thorough briefs or reports on cultures prior to interaction. Then, evidence of competency in the field.
6	Ongoing Collaboration	Establishing rapport and sustaining health professional/patient relationships for further support in positive and long-term health outcomes.	A record of an ongoing communication between health professional and patient. An established system allowing patients opportunities to contribute on knowledge regarding their cultures health beliefs and traditions.
7	Patience and Respect	Demonstrating unbiased empathy, compassion, and civility during interactions with other cultures.	Evident by patient reporting satisfaction after interacting with health professional. Possibly a survey.
8	Health Professional Responsibility	Constant self-reflection and bias monitoring regarding job purpose, goals, and continued education throughout the healthcare process.	Ongoing completion of continued education and professional development.

Component Summary and Rationale

The list of components was chosen after careful research regarding the needs of health professionals working with cultural populations. Specifically, components were adapted from or added to information found in the literature review as well as current models and frameworks. For instance, MHD incorporates suggestions from other ideas adopted from the Purnell Model. In this case, cultural literacy and health literacy are identified. As in many industries, this model is on trend with diplomacy and healthcare. This model also bodes well for positive future implications such as increased health outcomes and behaviors around the world for both professionals and patients. The model can easily be modified for specific cultures and can also be adapted for use in interactive learning. For instance, professionals will be able to click on each component in the diagram to reveal the definitions and simulation scenarios. This serves as another attribute for holistic application of the components.

Conclusion

The benefits of establishing a specific model for health professionals include preparing field ready professionals, adapting to evolving global healthcare, and supporting specific cultural needs in various communities. As a basic starting point, a health professional model will be useful for current trends in healthcare involving migrating populations, such as immigrants and refugees. As a growing population comprised of many cultures, professionals need resources they can be quickly trained on and referenced to address refugee health issues. An implicit understanding across each of the previous diplomacy models is that individuals need to become literate about the cultures they constantly interact with and demonstrate ongoing competence. Therefore, the new health professional model explicitly states this need. Ultimately, laying the groundwork for a new model demonstrates support of our health professionals and the populations we hope to serve. Incorporating diplomacy in multicultural health demonstrates care for authentic learning and collaboration for optimal global health outcomes.

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Bringing Health Care Home: A Pilot Project to Improve Access to Primary Health Care Using Mobile Nurse Practitioner Services

By Donna Clare[*]

In the last decade in Canada, goods and services delivered to one's doorstep has become commonplace. In most major Canadian cities, anyone can easily arrange for food and drug delivery, massage and physical therapy, dental care and even dog grooming in one's home. At the same time, primary health care provision in the community remains almost exclusively delivered in the clinic or facility setting, and within those services, health promotion and self-care education is notably sparse. One innovative organization in Calgary, Canada, has piloted a program to provide health care in clients' homes. Services include comprehensive physicals and screening, prescribing, phlebotomy and specimen collection, wound care, referrals, counselling, and health promotion and self-care education for clients of all ages. Nurse Practitioners were chosen to provide these services based on their ability to provide the full spectrum of these health services. In addition to home visits, the Nurse Practitioners provide phone, video and email consultations depending on the situation, and access is 24/7. Pilot analytics include: Costs of the service, Cost savings to the public health care system, Client satisfaction, Nurse Practitioner satisfaction, Integration of health promotion and self-care, Comfort and use of multimedia (video, phone, email) by both clients and NPs, Challenges, Success stories.

Keywords: *Health Promotion, Innovation, Mobile Health Care, Nurse Practitioner, Primary Care Delivery*

Introduction

Private healthcare organizations are responsive to trends in the global marketplace and are often early adopters of technology and other innovations to meet the needs of their clients (Lister et al. 2017, Omachonu and Einspruch 2010). The Canadian public's growing demand for convenience and personalized care means that a myriad of services, traditionally available in storefronts, offices and clinics, are now provided right to the door or in one's own home. Physical therapists, dental hygienists, hair stylists, dog groomers and veterinarians, and a plethora of others, have risen to the challenge and now provide mobile services.

Busy, technologically-savvy Canadians have come to expect services that make their lives easier (Musser 2019, Government of Canada 2012). Boomers (those born between 1944 and 1964) are advocating for home-based services that support aging-in-place for their elderly parents (CHSRF 2011), and Millennials (those born between 1980 and 1994) want easy access to health care providers using text messaging and video conferencing, as well as information that is technology-based and yet, personal (Sandomirsky 2018, Walker 2018). Primary care, defined as the initial interface between patient and health care provider, usually a physician's clinic in the community (Canadian Nurses Association

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2013), has not kept pace with public demand for convenience, greater accessibility and patient-centre care (Health Canada 2005). This paper describes a pilot project that addresses these demands by re-imagining the medical house call.

Background

There are economic benefits to home-based health care. The growing population of seniors in Canada is necessitating a call for innovation in primary care delivery if only to reduce expensive hospital and emergency room use downstream (Herritt 2015, Leff et al. 2015). There are an estimated 100,000 homebound individuals in Canada, for whom access to primary care is a challenge (Stall et al. 2013); and a recent study, by Heale et al. (2018), showed that chronic disease management often suffers when patients with limited resources are obliged to travel to a clinic for care and there are no alternatives. Homebound individuals and those with chronic diseases are more likely be hospitalized and use the emergency room (Densai et al. 2008, Norman et al. 2018, Woolf et al. 2015); whereas, research demonstrates that house calls result in reduce use of both the emergency rooms and hospitals (Chapman et al. 2018, Schuchman et al. 2018).

Providing primary care in the home used to be commonplace in Canada, but by the 1940's, family physician house calls began to wane, and by the late 1960's very few physicians were going to see patients in their homes (Herritt 2015). Today, physicians are still reluctant to provide house calls (Smith and Dhalla 2011, Meyers 2015) however, recent advances in telecommunications technology, especially secure video and chat services, together with the addition of nurse practitioners to the mix of available primary health care providers, makes innovation in the sector possible. In fact, in the USA, more nurse practitioners are providing medical house calls than any other provider including physicians (Yao et al. 2016). Nurses have a long tradition of providing care to people wherever they are, be it the battlefield, the home or school. The Canadian Nurses Association (2013) predicts that nurse practitioners and registered nurses will instrumental in providing comprehensive home-based health care in the coming years.

In response to these trends, one Calgary-based organization that provides private health care, fitness and medical-esthetic services to its clients, began a pilot project to offer medical house calls. The clients of the organization expressed a desire for improved access to primary care, preferable in the home or office setting, more health promotion counseling, and greater integration of illness prevention care beyond screening. The 8 in-house physicians, who at the time offered comprehensive health care services in the organization's clinic setting, preferred not to expand their role in this way, and so the decision was made to pilot a program using Nurse Practitioners (NPs) to provide mobile, 24/7, primary care services.

Aims of the Pilot Project

The project aims to:

- Evaluate the feasibility of providing house calls and telehealth services using NPs.
- Inform a business decision to proceed (or not) with upscaling the service within the organization and expanding it nation-wide.

Taking a bigger view, the company hopes that this pilot, and any future service innovations proceeding from its outcomes, may contribute innovations transferable to primary care within Canada's publicly-funded healthcare system. The company also believes that by providing high-quality primary care in the home, there will be a reduction in the use of hospitals and emergency rooms, thereby saving the healthcare system money.

What follows is a report on the structure of the pilot program, methods of evaluation, key findings, and lessons learned.

Framework

A 6-month pilot (July to December) was proposed, enrolling up to 250 people of all ages. The pilot project was funded by the organization's holding company, and supported by pre-existing resources within the organization, e.g., finance, information technology, operations, graphic design, and communications.

Service Model

Nurse Practitioners were chosen to provide these services based on their ability to provide the full spectrum of primary care services including assessments, diagnosis, ordering diagnostics and making referrals, as well as prescribing and phlebotomy.

Services offered in this pilot included evidence-based comprehensive physicals and screening for disease, treatment of acute and chronic conditions, phlebotomy and specimen collection, prescribing, referrals to specialist, as well as health promotion counseling, integration of illness prevention strategies, and self-care education for clients of all ages, in the home or office environment as desired by the client.

Each client's first visit was conducted in the home and included a full health history interview. Afterwards, clients were free to use the telehealth services (video, email or phone) as appropriate. The NPs were available for house calls on weekdays from 10 am to 7 pm and rotated on-call duty on the off hours (for phone or video contact) so that access was 24/7.

The NPs shared the care of the entire client roster of pilot enrollees. Each NP was enrolled into the electronic medical record which was also used by the physician group within the organization. A designated phone number for the

mobile service was forwarded to the NP's personal cellular phones. NPs were provided with a small laptop and a portable printer-fax machine as well as two carrying cases of equipment including a portable weigh scale, and a centrifuge that would work in their car. NPs delivered lab the specimens directly to the appropriate labs. NPs were hired as independent contractors and were paid an hourly wage, plus mileage. They provided their own vehicle and professional liability insurance.

NP Qualifications

Initially, two NPs were hired: One NP with 10 years' experience working in primary care, and a new graduate who had experience in home care nursing. The former served as the NP-Lead and had strong skills in patient-centered care and NP integration processes; the new NP was able to advise on issues regarding safety strategies for going into patient's homes. A third NP was added to the team two months into the pilot when the demand for services increased. This last NP was also an experienced community NP with 7 years' experience. All NPs graduated from the same University so were aware of each other's strengths and knowledge base.

Client Recruitment

The company chose to invite three types of participants, all of which were identified by the company as potential users of such a service:

1. Current clients who subscribe to the company's current concierge health care and aesthetic services;
2. Clients identified by the company physicians who might benefit or want house calls because of chronic disease or mobility issues. This accounted for only 20 of the total number recruited, and,
3. Persons in the community who might be interested in such a service but who are not clients of this company's nor any other company's concierge health care services. Participants in this last group were recruited via snowball sampling initiated through the friends and families of the company's executive team, thereby limiting communication of this pilot project to the company's competitors.

The services were offered free of charge to the enrollees for the duration of the pilot. None of the services, including the telehealth services, continued once the pilot was completed.

NP Integration Process

Nurse practitioners are still relatively new in Canada and most organizations require advice on how to integrate NPs into an existing practice milieu or new service (Bryant-Lukosius and Dicenso 2004). Consequently, a NP leader was

hired initially to advise both management and in-house physicians on NP scope of practice, develop an orientation program, draft policies and procedures, and to organize equipment relevant to NP practice. Contractual details, being somewhat unique from physician practice, were developed in consultation with the Canadian Nurses Protective Society.

The NPs met with the physicians, the operations team and the organization's executive team several times before start-up. In keeping with Bryant-Lukosius and DiCenso's (2004) PEPPA framework for successful NP integration, expectations were aligned, knowledge of the NP scope of practice and role in health care provision was shared, and how NPs would communicate and interact with other parts of the organization was discussed. The main concerns expressed by the physicians were in regard to communication, and legal liability in the case of shared care.

In response to physician concerns, the NP lead prepared a document offering a literature review and discussion on collaborative care. Then, together with the physicians and to mutual satisfaction, a policy was drafted outlining lines of communication and delineating mutual responsibilities according to the professional obligations of each party.

Method

At the end of the six months, enrollment ceased, and data collection commenced, however, the pilot ran for a total of 9 months (July to March), giving those who enrolled in the fourth and fifth months, the opportunity to continue to use the service and form an opinion for evaluation purposes. Clients were interviewed and surveyed after they had been enrolled in the service for a least 5 months. Contact with clients and all services ceased once the pilot evaluation was complete; for some, this meant that they continued to have access to the services after providing feedback. The NPs were unaware of who had participated in the evaluation process and who had not.

A practical paradigm using both qualitative and quantitative methodologies was employed. Anonymized client profiles were compiled as congregate data, including what services were provided and the medium used for the encounter (e.g., phone, video, email or home visit). Enrollees were surveyed using multiple choice, Likert scales and short answer. Focus groups were held, and many clients were interviewed by phone by an employee of the organization not involved in operations or service provision. The NPs were surveyed using the Misener Nurse Practitioner Job Satisfaction Scale (Martin-Misener 2000) and short interview. A workflow audit was conducted by the lead NP.

Unfortunately, the company chose not to submit a formal ethics application citing time constraints, however, no breaches of ethical research standards were noted by this author. Specifically, confidentiality and privacy of patient information was maintained and the privacy officer within the company provided oversight.

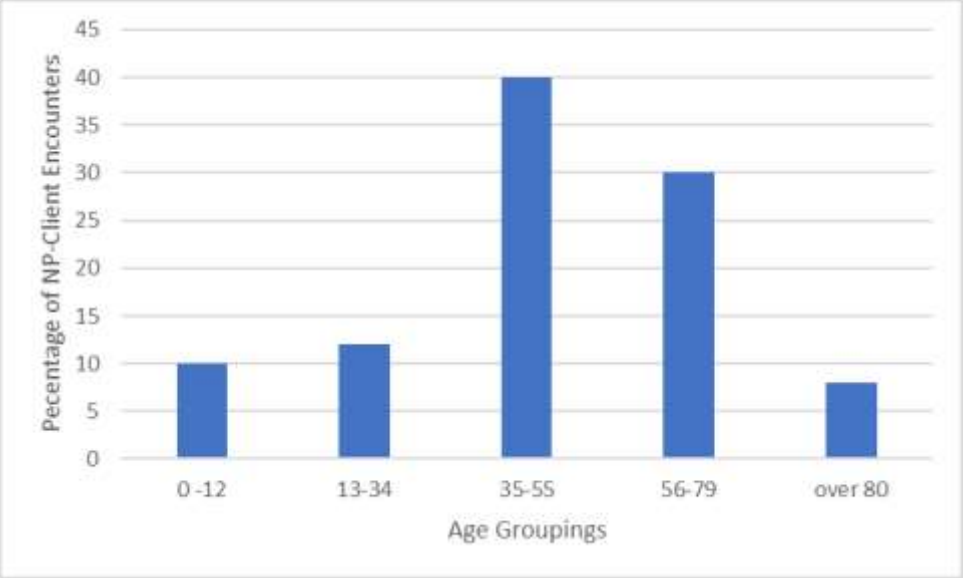
Results

Client Demographics

A total of 254 people enrolled in the pilot (Table 1). It was anticipated that the elderly, because of limitation in mobility, weather conditions and higher rates of chronic disease would be the heaviest users of the service, but the results showed that dual-income couples with children utilized the service most often.

Patient quote (paraphrased) *"I was so grateful that they could come to my home. Our family was going through a lot at the time and it was so much easier than having to get to doctor's appointments, too."*

Table 1. *Encounters by Age Group (Not Including the Initial Intake Visit)*



By gender: 51% males/49% female (includes children).

Health Conditions

The most common conditions seen by the NPs match those common acute and chronic diseases seen in traditional primary care clinic settings. The most common procedures performed by the NPs were ear lavage, PAP tests, and phlebotomy.

The most frequent reason for a client encounter (any medium):

- Periodic Health Examination.
- Stress-related disorders.
- Skin problems.
- Urinary tract infections.
- Upper respiratory tract infections.

- Prescription refills.
- Lab collection.
- Follow-up care or health counseling.

Most Common Health Promotion and Illness Prevention Interventions

Health promotion and illness prevention strategies were offered at almost all client encounters (any media). A workflow record compiled by the NPs, revealed that both medical (e.g., diagnosis, labs, prescriptions) and nursing strategies (e.g., self-care, immunizations, health promotion) were offered depending on the situation. Health education was integral to each encounter and most often included information about a particular health condition, self-care or medication information, or dispelling myths and misconceptions.

Health Promotion and illness prevention strategies most often included in client visits:

- Vitamin D supplementation.
- Vaccinations, including influenza and travel immunizations.
- Screening procedures.
- Self-care advice.
- Parenting advice.
- Nutrition and special diets.
- Smoking Cessation counseling.
- Probiotic recommendations when antibiotics are prescribed.

Media Evaluation

All initial client encounters occurred in the client's home. Both the NPs and the clients enjoyed the home visit setting. Clients reported feeling more relaxed and the NPs reported appreciating the first-hand living-context of the client which they said directly affected their assessments and health care recommendations. Children were examined with a parent present.

One NP stated, *"Watching (the client's) constant movement during the visit: going from kitchen to dining table, to the backdoor, to the pile on the floor and so on, told me so much about her underlying condition. My diagnosis and treatment plan was greatly informed by watching (the client) in her natural setting."*

A workflow audit showed that the majority of NP-client encounters after the initial home visit, were conducted by phone (43%), and secure email (23%); very few were video visits (4%) presumably due to implementation of this medium late in the pilot. Secure video visits were useful for counseling, looking at rashes, and other situations where a hands-on examination was not required, or when preferred by clients. Clients preferred emails for quick questions.

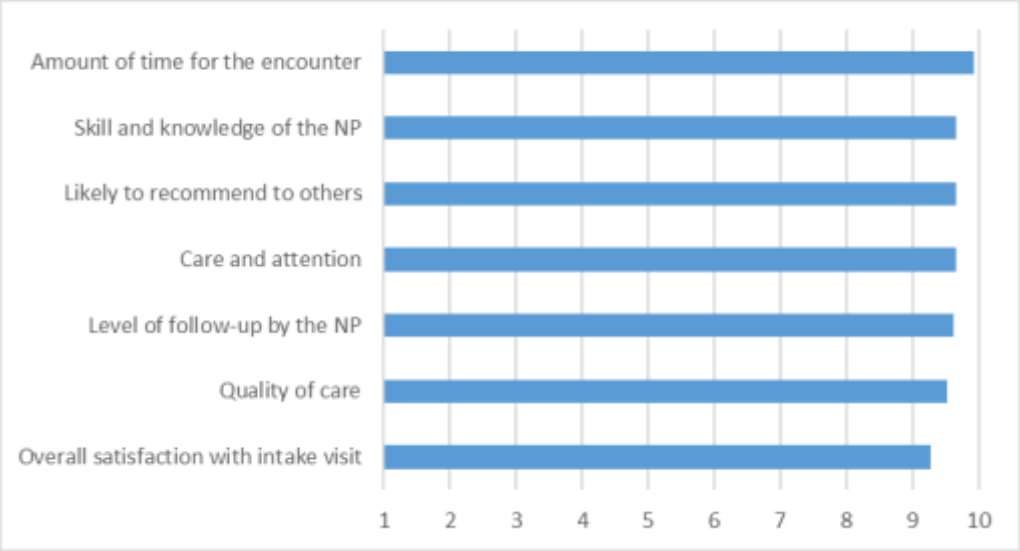
Some of the NPs found the video visits more cumbersome to set up for each encounter. One NP said, *"By the time I got the video set up and running, I was frazzled because I was thinking about how much emphasis the company put on great service. There was also a big push by the company to use this new secure*

video. It didn't feel very efficient to me and it was especially hard to do if I was in a car. I didn't like using the video and avoided it if I could."

Client Satisfaction

The organization's key goal for the NPs was to provide exceptional service. Client surveys revealed an overall 96% satisfaction rating for the NP service. All interviewed enrollees expressed continued interest in continuing with the services provided by NPs and 73% found that it filled a need (Table 2).

Table 2. *Aggregate Satisfaction Measures Rated Out of 10*



Physician Satisfaction

On reflection, the biggest challenge for both NPs and physicians was to foster the physician-NP relationships when the NPs worked off site. To this end, it was determined that more in-clinic contact would help and so the NPs were placed in the clinic to cover MD absence at the three-month mark of the pilot.

By the 6-month mark, all physicians had settled into the collaborative model and were satisfied with the care provided by the NPs and communication patterns. By the end of the pilot, an NP was hired for the on-site clinic to cover MD absences.

NP Job Satisfaction

The NPs reported that they enjoyed their role:

- The NPs enjoyed the autonomy of their role and utilizing their full scope of practice.
- The NPs were very satisfied with the patient care component of their role. They felt that had enough time to provide complete patient-centred care,

because times allotted for each appointment was generous (1/2 to 1 hour) compared to typical primary care clinic settings (10-15 minutes).
- The NPs also enjoyed their working relationships with the physicians.

Downsides included:

- The hours of mobile work from 10 am to 7 pm were unpopular with all of the NPs.
- Some differences of opinion amongst the NPs arose over policy e.g., whether injectables like vaccines or blood draws for children should be done in their home, or if should the home be kept a "safe place" with those painful procedures best done elsewhere (like a pharmacy, lab, public health unit).
- The mobile technology was often frustrating, meaning that charting, faxing and scanning often had to be completed after patient visits and sometimes in vehicles.
- The NPs mentioned that working in isolation with little opportunity for interaction with colleagues was less satisfying than working, say, in a clinic setting.

Other Findings

The role of the NPs evolved over the pilot. The NPs, initially, felt overwhelmed managing emails, phone calls and client visits as well as tending to faxing of referrals and prescriptions, and delivering lab specimens to lab outlets throughout the city. Administrative support was added very late in the pilot but was a great relief to the NPs.

Managing video appointments and incoming calls while mobile was a challenge. The NPs sometimes felt that the obligations to provide efficient, timely care was difficult to achieve in the context of professional obligations, especially ensuring privacy and confidentiality when conducting a video consultation in the car between scheduled home visits or talking with a client on the phone. As well, driving while using a cell phone is unlawful in Canada.

The NPs all reported that they thought the initial home visit provided an opportunity for health- history-taking and patient assessment that increased their level of comfort taking phone calls from the clients later. They felt that this was an essential component to providing safe care for their clients.

Costs and Savings

A financial review determined that the cost of the service to the organization was estimated to be $120/hour CAD ($90 USD; €80 Eur). And start-up costs ran to about $5000 CAD ($3750 USD; €3300 Eur) per NP. Analytic parameters included NP wages, supplies, transportation, cost of support staff, storage space and office for NPs, graphic design (handouts, forms), information technology support; electronic medical record and telephone and video service, hardware

(computers, mobile fax/printer), business insurance, and average time of each patient encounter.

Savings to the healthcare system were hard to determine. Only one NP-client encounter, out of more than 600 care episodes, could be said to have avoided an emergency room visit for acute symptom management. None of the enrollees were admitted to hospital during the pilot, but neither was there any evidence that care provided by the NPs was instrumental in preventing admissions during this period. Long-term prevention of hospitalization cannot be determined.

Unanticipated Results

Some interesting and unanticipated patterns were observed over the course of the pilot that are worth some mention.

Some clients were late returning to their homes for a scheduled appointment, leaving the NP waiting in the winter weather outside. On the other hand, there were no missed appointments.

Approximately half of the women requesting a periodic health assessment (annual physical), were uncomfortable with having a PAP smear done in their homes. The organization did not want to accommodate those women within their physician-clinic facility, therefore, women were sometimes referred to a community women's health clinic for this procedure. NPs admitted being somewhat uncomfortable performing this procedure in homes as well. One NP stated, *"It just didn't feel clinical enough for such an intimate procedure."*

NPs noted that extra time was needed for in home visits because of having little control over the environment. One NP exclaimed, *"Sometimes dinner preparations were in progress during the history-taking, or once a small child insisted on climbing over the parent who was being examined, or the dog put its head in the way of the phlebotomy…It can be difficult to stay on track!"*

Working within a business model rather than a health care model was new to the NPs. Priorities of the business were not always the priorities of the NPs, for example, using the video equipment was strongly encouraged by the organization because they were using it on trial from a major telecommunications provider in the country; however, the NPs and their clients were less enthusiastic.

Limitations

This pilot project has obvious limitations primarily as a result of business goals conflicting with conventional research processes. Internal bias and problems with generalizability are evident. For example, participant recruitment processes were based on assumptions about each group of invitees and their likelihood of enrolling in this service as a paying client which limits generalizability. Convenience sampling relying on current clients and those close to the business leaders also limits its generalizability to bigger systems like the public health care system where population demographics are more diverse. Furthermore,

comparisons based on the age, income, or general health status of participants is biased because equal representation for each cohort was not obtained.

Participant responses in the evaluation process may be influenced by current connections and contact with the organization. A recruitment strategy that targets those who influence consumerism within Calgary's affluent community, may also create bias in their responses to evaluation. Participants recruited via snowball sampling, specifically those initial contacts originate amongst company staff, may also have created bias in client feedback.

The company chose not to separate member and non-member data in the evaluation, which was unfortunate as not all enrollees were members of this private care organization and some clearly would have never been able to afford this service beyond the pilot. On the other hand, the non-member input would have provided relevant data in terms of generalizability to the greater public. In the end, and despite the internal biases, the company knows who its clients tend to be, and the priority was to produce outcome analytics to inform future business planning. Limitations in the study are coherent from the company's goal: to expand services using NPs as mobile health care providers.

Discussion

This pilot met the evaluative nature of its goals: to gauge client satisfaction of a mobile NP primary care service and to assess the financial viability of providing such a service.

House Calls

This pilot confirms the trend in the United States that suggests that medical house calls can be successfully provided by NPs, and that clients were comfortable and satisfied with medical home visits provided by nurse practitioners. House calls are not a new intervention; in this case, the house call has been reimagined using NPs as the provider along with the addition of a few services, like full physicals at home, collection of laboratory specimens, and continued contact via multiple media.

Telehealth

Both the clients and the NPs in this pilot were comfortable using technology to enhance access to care. Ensuring privacy and confidentiality through the use of secure email, videoconferencing and phone services was an essential requirement from both professional and legal perspectives. Text-messaging and phone-based video calls (like Facetime™ and Snapchat™) are not secure, nor can they be easily copied into a chart for documentation of a patient encounter, and so can not be incorporated into the options for communication at this time. Some studies have demonstrated that patients tend to be most comfortable with email for communicating with health care personnel: the youngest, those who have more

health literacy and more education, tend to prefer secure email (Huan et al. 2015, Jenssen et al. 2016). Technology continues to evolve to meet the needs of consumers, and secure methods available for patient-provider communication will likely expand to provide more options over time.

Convenience versus Actual Need

Most NP-client encounters occurred in regard to common health concerns often seen in regular physician offices thereby reinforcing the concept of convenience as the driver of service acceptability rather than exceptional health care requirements like immobility or frailty.

The affluent, dual-income couples in mid-life who have children at home, and who value convenience were the most willing to pay for this service. It is acknowledged that a lack of diversity amongst study participants in terms of age, income and health status skewed the results in a way that might have shown a greater need for the services based on health status if more of the participants had been elderly or unwell. However, the internal bias is consistent with the company's target cohort: the young, affluent and technologically savvy. The results confirm that their target customers are interested in this service and are willing to pay a fee for it.

Bigger Picture Contributions

It has been shown that accessible care in one's community reduces emergency department use for problems that could be taken care of in a regular primary care setting (Health Council of Canada 2014), this study could not conclude that accessible care provided by the NPs 24/7 prevented use of the public health care system for routine or emergent care. In addition, the affluent typically have better health than the non-affluent, and the former are not known to frequent emergency facilities for routine care and are less likely to need emergent care due to deteriorating health (Woolf et al. 2015). The lack of hospitals and emergency room use for acute conditions was not surprising given the short duration of the pilot and the general good health of the study participants. No control group in the general public was provided for in this study for comparison in regard to hospitalization rates or emergency room use.

Generalizability to the Public Health Care System

Publicly-funded health care systems innovate to make improvements in population health while balancing the need to provide high-quality healthcare with cost-containment and maximum efficiency (Omachonuand and Einspruch 2010). In Canada, public healthcare services typically target the largest users of expensive resources: mainly the aged and people at the lower end of the socioeconomic ladder (CIHI 2014). So, while the busy, affluent client is sometimes willing to pay for concierge health care services like house calls, there may not be much advantage to targeting this demographic if the aim is reducing illnesses that result

in hospital admission or emergency room care. Private health care organizations may continue to offer these enhanced primary care services to their clients, however, the not-for-profit public sector may find better value in offering house calls to specific populations like the housebound, the infirm, frail or elderly. More research is needed.

Feasibility

The service is practically and logistically feasible and is an effective means of providing high-quality health care services that is pleasing to clients. However, the service may not be economically feasible in the current model: i.e., an intake house call, that includes history-taking and a physical assessment, followed by health care services provided on demand either in-home or using various media. The cost of the delivering the current model of service, $120 per hour, plus an added profit for the company, likely requires adjustment of the service model and options for pricing to make the business viable. The company can consider options such as an annual membership fee, or a fee-for-service model offering various "price packages" or a combination thereof, e.g., unlimited media contacts for a base price, with a separate fee for house calls.

Conclusion

Despite the flaws, this pilot suggests that medical house calls can be successfully provided by NPs in Canada and may be financially feasible within a user-pay system. There are limits on its generalizability of the findings, but this pilot may provide information useful to the public health care system if it chooses to utilize house calls as an adjunct to existing home care programs, or to augment care provided in physician clinics in both urban, rural and remote settings, and to expand the services available at Nurse Practitioner–Led Clinics in Ontario. It seems prudent to study this option further within the public sector embracing NPs and various secure media.

Addendum

The services described in this paper have since been reconfigured in a way that reduced costs, and focuses on video and phone consultations, with optional home or office visits for an additional fee. The service continues to utilize nurse practitioners and is currently being expanded across the country as a private health care service.

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Noise Exposure Assessment for University Police Officers during Rifle and Shotgun Qualifications

By Emmanuel Iyiegbuniwe[*], Alexander Ufelle[†] & Anita Britt[‡]

Police and other law enforcement officers are routinely exposed to hazardous noise levels during normal working conditions. Occupational noise exposure is a known risk factor for noise-induced hearing loss and other documented non-auditory health effects of significant public health importance. The purpose of this study was to assess noise exposures among a convenient and representative sample of police officers and instructors at a University in Kentucky during routine rifle and shotgun qualifications at an outdoor firing range. The assessment was conducted among 17 police officers and 2 instructors over a period of 3 days in accordance with the requirements of national noise standards (29 CFR 1910.95) stipulated by the United States Occupational Safety and Health Administration (OSHA). We measured both personal and area sound pressure levels using calibrated noise dosimeters and sound level meters. Average personal noise levels during shotgun and rifle qualifications ranged from 74 to 101 dBA and 90 to 101 dBA, respectively. The results of area noise measurements for shotgun and rifle ranged from 107 to 121 dBA and 106 to 114 dBA, respectively. Without consideration of hearing protection, personal exposures exceeded OSHA's noise standards (i.e., Permissible Exposure Limit of 90 dBA and Action Level of 85 dBA, averaged over 8 hours work-shift). The results indicate potential health risks from continuous noise exposures among these police officers and instructors. Recommendations are made for continued adherence to and reinforcement of all elements of OSHA's hearing conservation program.

Keywords: *University police officers, Rifle and shotgun qualifications, outdoor firing range, Occupational noise exposure assessment, Hearing conservation program*

Introduction

In the United States, approximately 22 million workers are exposed to potentially damaging noise annually (OSHA 2018). The Occupational Safety and Health Administration (OSHA) estimates that in 2017, American businesses paid over $1.5 million in penalties for not protecting their employees from noise. Annually, compensation for worker-related hearing loss disabilities accounted for a huge economic burden of approximately $242 million (OSHA 2018). A previously published report by the National Institute for Occupational Safety and Health (NIOSH 1998) estimated that 30 million American workers were exposed to hazardous noise each year. The NIOSH report further noted that occupational noise remains one of the most common and significant health hazards among industrial workers. Available research supports the increasing prevalence of higher noise levels in many industrial workplaces (Patel and Ingle 2008). In addition, occupational noise continues to be a critical health and safety issue in the 21st century workplace (NIOSH 1996).Worldwide, it is estimated that 16% of all hearing losses in adults is attributed to occupational noise and has resulted in an

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estimated cost of 0.2% to 2.0% of the gross domestic products in developed countries (Nandi and Dhatrak 2008). Although there has been some significant improvements towards reducing noise exposure, it still remains a global challenge (Concha-Barrientos et al. 2004).

Noise or unwanted sound, is a very common occupational hazard in the workplace. Sound is "a rapid variation of atmospheric pressure caused by some disturbance of the air" (Royster et al. 2003). Routine exposure to hazardous noise and the prevailing non-adherence to hearing protection remains one of the most common occupational hazards among workers (Bhatt et al. 2017). Individuals of all ages, including children, adolescents, young adults, and older people, can develop noise-induced hearing loss during exposure to intense noise in the workplace, at recreational settings, or at home (Jansen et al. 2009). Excessive and repeated exposures to hazardous noise over an extended period of time, loud impulse sounds, or a combination of both, can lead to noise-induced hearing loss (NIHL) or sensorineural hearing loss (Jansen et al. 2009). NIHL is an irreversible, sensorineural condition that progresses with continued exposure to hazardous noise (Harney et al. 2005). Exposure to excessive noise constitutes a major avoidable cause of permanent hearing impairment and produces hearing loss that far exceed those resulting from the natural aging process or a term referred to as presbycusis (Nandi and Dhatrak 2008). A study by Patel and Ingle (2008) reported that in addition to hearing impairment, occupational exposure to excessive noise also caused non-auditory health effects. Health effects that result from noise generally depend on the exposure level and duration.

NIHL results from repeated exposure to hazardous noise of long durations that cause damage to the hair cells of the cochlea in the inner ear. Tak and Calvert (2008) reported that over 11% of the United States population was affected by hearing loss and is considered the third-most prevalent condition among older adults (Bogardus et al. 2003). Additionally, NIOSH has stated that NIHL is one of the top ten priority areas for the most critical diseases and injuries requiring research and development activities under the National Occupational Research Agenda. In order to protect American workers from developing permanent heating loss, NIOSH has included NIHL in the list of 21 priority areas of targeted research in the next century. In general, the effects of noise depend on three physical characteristics of sound: amplitude, frequency, and duration.

Sound pressure level is generally expressed in decibels (dB) or as a unit that measures the amplitude of pressure change that produces sound (perceived as loudness). In the United States, occupational noise exposure limits are typically reported in decibels using the A-weighted scale (dBA). As described in 29 CFR 1910.95, the OSHA standard for occupational exposure to noise stipulates a permissible exposure limit (PEL) of 90 dBA with an exchange rate of 5 dBA as an 8-hour time weighted average (TWA) (OSHA 2003). The OSHA noise standards stipulate that workers exposed to noise levels in excess of the PEL, feasible engineering and administrative controls must be implemented to reduce workers' exposure levels. Furthermore, OSHA standards stipulate that the selection of noise exposure limits must consider two parameters including the maximum acceptable occupational hearing loss (i.e., the fence) and the percentage of the occupational

noise-exposed population for which the maximum acceptable occupational hearing loss will be (OSHA 2003). In addition, OSHA believes that the 5-dB exchange rate will account for any interruptions in noise exposures that commonly occur during the workday.

OSHA's regulation has an additional requirement for an action level (AL) of 85 dBA. In addition, during any 24-hour period, a worker can be exposed up to 100% of the daily noise dose (equivalent to 90 dBA as an 8-hour TWA) and doses greater than 100% are considered to exceed the PEL (Harney et al. 2005). Commonly used noise exchange rates incorporate either a 3 dB or a 5 dB per doubling or halving of exposure duration. OSHA requires that every employer must administer a continuing and effective hearing conservation program (HCP) for all employees exposed to noise above to 85 dBA during an 8-hour workday. According to OSHA, all workers exposed to noise at or above 85 dBA as an 8-hour TWA must be informed about the potential consequences of noise exposure and the methods of preventing NIHL. The elements of the HCP must include noise exposure monitoring or assessment, employee notification, observation, audiometric testing, hearing protection training and routine record keeping.

NIOSH has recommended exposure levels require that audiometric monitoring be conducted on noise-exposed workers either at the end or late in their daily work shifts with a view to discovering and taking action to prevent permanent hearing loss. NIOSH's recommended standards or guidelines stipulate for a recommended exposure limit (REL) of 85 dBA as an 8-hour TWA with 3 dBA exchange rate that is more firmly supported by scientific evidence when compared to the 5 dBA required by OSHA (Harney et al. 2005). Additionally, NIOSH requires the use of engineering and administrative controls to reduce hazardous noise to acceptable levels and communicates the RELs to regulatory agencies such as OSHA and the entire occupational safety and health community. NIOSH defines engineering control as modifications or replacements of equipment, or related physical change at the noise source or along the transmission path (with the exception of hearing protectors) that reduced noise levels at the employee's ears (NIOSH 1996). In a 2016 report, the National Academies of Sciences called on government agencies to strengthen research efforts on population-based data on hearing loss in American adults (NAS 2016). Noise exposure assessments are conducted to: determine if noise levels in the workplace could potentially cause NIHL; establish compliance with noise regulations, standards or recommended guidelines; enhance an existing hearing conservation program; for legal purposes (worker's compensation claims); identify possible safety hazards (communication and detection of emergency alarms); and (6) complete special requests (Royster et al. 2003).

Firearms are a common source of noise and hazardous noise levels associated with NIHL commonly occurs in the military and the police force during activities that involve firearm and pulse-induced explosions (Sulkowski et al. 2017). A number of studies have reported abnormal levels of noise exposures in various occupations, including construction workers, farmers, railway workers, civil aviation workers, military personnel, firefighters, shipyard workers, offshore workers, healthcare workers, musicians, and police officers (Guida et al. 2014,

Win et al. 2015). Previously published studies of hazardous noise exposures have focused on conventional occupations such as airport grounds staff and military personnel, while only a few studies have targeted less obvious professions such as police officers (Lesage et al. 2009). The discharge of firearms constitutes a major source of routine noise among police officers during the course of their work shift. In a recent study of police officers in Brazil, Guida et al. (2014) reported noise levels that exceeded the national occupational health standards.

The weapons used routinely by police officers such as small caliber weapons, typically emit hazardous noise levels that ranged from 140 to 160 dBA (Murphy and Tubbs 2007). Such high noise levels have the potential to cause hearing loss, which is a significant hazard in a number of populations, including military personnel, police officers, and recreational shooters (Pawlaczyk-Luszczynska et al. 2004, Wu and Young 2009). Police officers, when compared to the military, use the same or similar weapons which produce hazardous noise levels (Lindblad et al. 2011, Muhr and Rosenhall 2011), and also have similar requirements to maintain proficiency with various weapons (Murphy and Tubbs 2007). Considering that the risk of NIHL is often higher in the military than other occupational sectors, the incidence of service-related NIHL for police officers is reported to be similar to those of the military (Murphy and Tubbs 2007). This is in part due to the similarity in routine noise exposures from gunfire during normal work conditions or practice rounds at a shooting range.

In this study, we measured both personal and area noise levels associated with shotgun and rifle qualifications at an outdoor shooting range and compared them to the occupational exposure standards and guidelines designed to protect against noise-induced hearing loss. The main purpose of the study was to conduct a noise exposure assessment among police officers at a university in South-central Kentucky with a view to developing an intervention program to prevent or control the development of noise-induced hearing loss. Specifically, the objective was to determine personal and area noise levels, to compare recorded noise levels to OSHA noise standards, and to provide recommendations for the establishment of an effective hearing conservation program for police officers who may potentially be at risk of developing NIHL.

Methodology

Study Design

A noise exposure assessment was conducted among 19 law enforcement officers at a university, including 17 police officers and 2 instructors. Personal and area noise measurements were made during shotgun and rifle qualification rounds at an outdoor firing range. Personal noise measurement involved the officers having dosimeters equipped with microphones attached to their waistbands throughout the entire process. On the other hand, area noise measurements involved the use of handheld Sound Level Meters (SLM) by the investigators to measure sound levels at various distances from the police officers during the

process. Qualification is an annual process through which police officers are tested and certified to carry and use firearms in accordance with standard proficiency levels. In this study, the police officers were subjected to qualifications that involved the use of both shotguns and rifles.

Personal and area noise monitoring was conducted over a period of three days during the summer of 2009. During the shotgun qualifications, 17 police officers and their 2 instructors were included in the study to determine their personal noise exposure measurements. For the rifle qualification, 8 police officers and 2 instructors selected from the same pool of the original 19 officers were included in personal noise measurements. Area or environmental noise measurements were also taken during both shotgun and rifle qualifications.

Equipment Description and Noise Measurement Procedure

Personal noise measurements were made using Quest™ 400 noise dosimeters (Figure 1) (Quest Technologies 2010). The Quest™ 400 noise dosimeters have data logging capabilities and were programmed to measure time weighted average (TWA), average noise level (Lavg), maximum and peak noise levels, and dose. Area noise measurements were made using Quest™ 2400 Sound Level Meters (SLM). The noise dosimeters and SLM were calibrated before and after each measurement period. All sampling was conducted in accordance with the noise monitoring requirements stipulated in the OSHA Noise Standard as 29 CFR 1910.95 (OSHA 2003). All the police officers and instructors included in this noise survey were informed of the purpose and procedures for this assessment. The participants wore two types of hearing protection devices (HPDs): David Clark 10A Green Hearing Protector (Part #: 12451G-01) and Silentio Hearing Protection. All noise dosimeters were attached to the waistband of the participants and the microphones were clipped to their shirt collars within the hearing zones.

Personal noise assessment was conducted with calibrated noise dosimeters during shotgun qualifications on Day 1 while 10 personal noise samples were collected during rifle qualifications on Day 2. Noise samples were collected during the morning and afternoon sessions. The dosimeters were turned on shortly before the qualification rounds started and paused in between rounds. The dosimeters worn by the instructors remained on throughout the sampling period. For area (environmental) measurements, samples were collected at various distances and positions from the target, including 25 yards from prone position; 15 yards from kneeling position; 7 yards, 5 yards, and 2 yards, from standing positions for shotgun. Individual data from the dosimeters were recorded manually and subsequently downloaded onto a computer as using excel spreadsheet in Quest Suite Professional Application Software™. The following parameters were recorded: time in minutes, average noise level (Lavg, (dBA), Maximum noise (dBA), and the Dose (%).

The same protocols for personal noise measurement applied during shotgun qualifications were repeated during rifle qualifications. The police officers shot from the following distances and positions: 50 yards from prone position; 35 yards from prone, kneeling and standing positions; 25 yards from kneeling and standing

positions; 15 yards from standing position; and 7 yards from standing position. The same parameters recorded for shotgun qualifications were also recorded during rifle qualifications. Area noise measurements were made using the SLM, which was used to measure instantaneous noise levels. The measurements were made at a height of approximately 3.0 feet from the ground, with a 1.5 feet distance from the shooters (i.e., using the same five distances and positions as described above for both shotgun and rifle qualifications). A total of 20 area noise samples (10 samples during shotgun and 10 samples during rifle) were recorded as average noise levels (dBA).

Data Analysis

All data collected with personal noise dosimeters and SLMs were downloaded onto a personal laptop computer using the Quest Suite Professional software™ and saved for further analysis. Statistical analysis was conducted using GraphPad Prism version 7.02 and IBM Statistical Package for Social Sciences (SPSS) version 19. The noise exposure results for all participants were analyzed and both the mean and standard deviations were calculated. Unpaired t-test was used to compare means for different parameters for shotgun and rifle qualifications.

Results

Personal Noise Exposure Using Shotgun

The results of personal noise exposures during shotgun qualifications are shown in Table 1 and summarized in Figures 1 and 3. The Lavg was 94 dBA (range=74 to 101 dBA, SD=5.4). The Maximum SPL was 121 dBA (range=102 to 127 dBA, SD=4.9). The results showed that all police officers had Lavg that were above the of 90 dBA averaged over an 8-hour period. The Maximum SPL reported for all participants was greater than 100 dBA, but less than of 140 dBA (the impact noise standard). The reported Dose for all police officers were below 50%, except for one instructor with a Dose of 54.4%. In addition, there was a strong correlation (R=.838) between Lavg and Maximum SPL. However, as shown in Figure 1, there was a weak correlation between Lavg and Dose (R=.277) as well as between Maximum SPL and Dose (R=.546).

Personal Noise Exposure Using Rifle

The results of personal noise exposures during rifle qualifications are shown in Table 2 and summarized in Figures 2 and 3. The average SPL was 94 dBA (range=90 to 101 dBA, SD=2.9). All the recordings for Lavg were above 90 dBA. The Maximum SPL was 120 dBA (range=117 to 123 dBA, SD=2.2). The overall Dose recordings for both shotgun and rifle were below 50% (Table 4). In addition, all the participants were exposed to average noise levels (Lavg) greater than 90

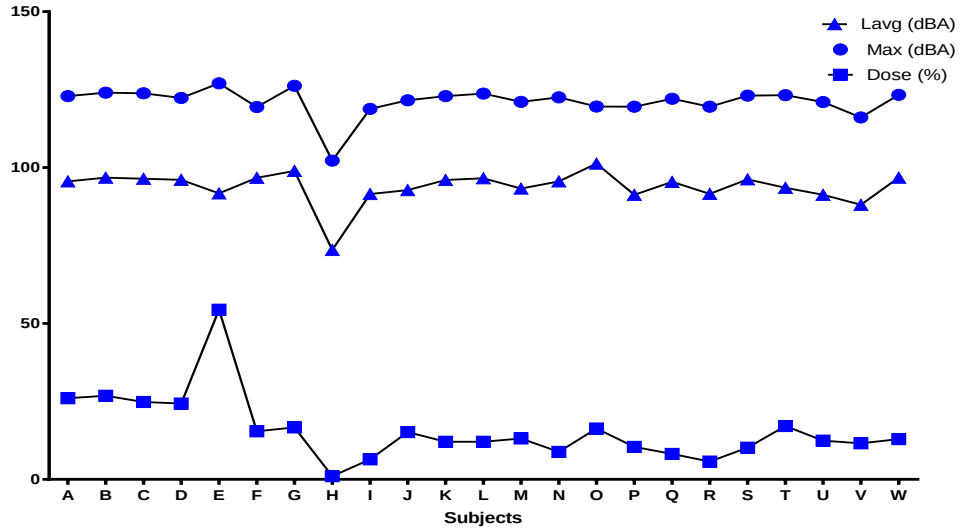
dBA. The results showed that with the exception of one instructor who had a Dose of 95.6%, the Dose reported for all the police officers were below 50%. The maximum noise exposure for all participants was greater than 100 dBA, but below OSHA's impact noise standard of 140 dBA. The unpaired t-test analysis showed a significant difference in Dose for shotgun when compared with riffle (Figure 3). However, both the Lavg and Maximum SPL were identical for both shotgun and rifle qualifications.

Table 1. *Personal Noise Exposures of Police Officers during Shotgun Qualifications*

Sample Number	**Time (minutes)**	**Lavg (dBA)**	**Maximum (dBA)**	**Dose (%)**
01	28:36	95.6	122.9	26.0
02	26:56	96.8	124.0	26.8
03	24:33	96.4	123.8	24.8
04	24:59	96.1	122.3	24.3
05	103:37	91.7	127.0	54.4
06	12.36	96.7	119.4	15.4
07	23:27	98.9	126.2	16.7
08	24:11	73.6	102.2	1.0
09	25:05	91.5	118.8	6.4
10	24:33	92.8	121.6	15.2
11	25:21	96.0	122.9	12.1
12	23:27	96.6	123.7	12.1
13	19:53	93.3	121.1	13.1
14	19.27	95.6	122.5	8.8
15	16:24	101.3	119.6	16.3
16	41:32	91.3	119.5	10.4
17	18.44	95.4	122.1	8.2
18	21:50	91.6	119.5	5.7
19	20.39	96.2	123.1	10.2
20	50:31	93.5	123.2	17.1
21	49:51	91.3	121.0	12.4
22	72:36	88.1	116.1	11.6
OSHA Standard[i]	**480**	**PEL=90 AL=85**	**140**	**100 (PEL @ 90 dBA) 50 (AL @ 85 dBA)**

Note: [i] Instructor; OSHA Noise Standards: PEL=90 dBA, AL=85 dBA, Impact Noise=140 dBA, Dose=50%.

Figure 1. *Noise Exposure Assessment for Police Officers during Shotgun Qualifications*



Note: The noise parameters measured included average sound pressure level (Lavg, dBA), maximum sound pressure level (Max SPL, dBA), and Dose (D, %). "R" represents the Pearson correlation coefficient between two variables (Lavg vs. Max SPL, Lavg vs. Dose, and Max SPL vs. Dose).

Figure 2. *Noise Exposure Assessment for Police Officers during Rifle Qualifications*

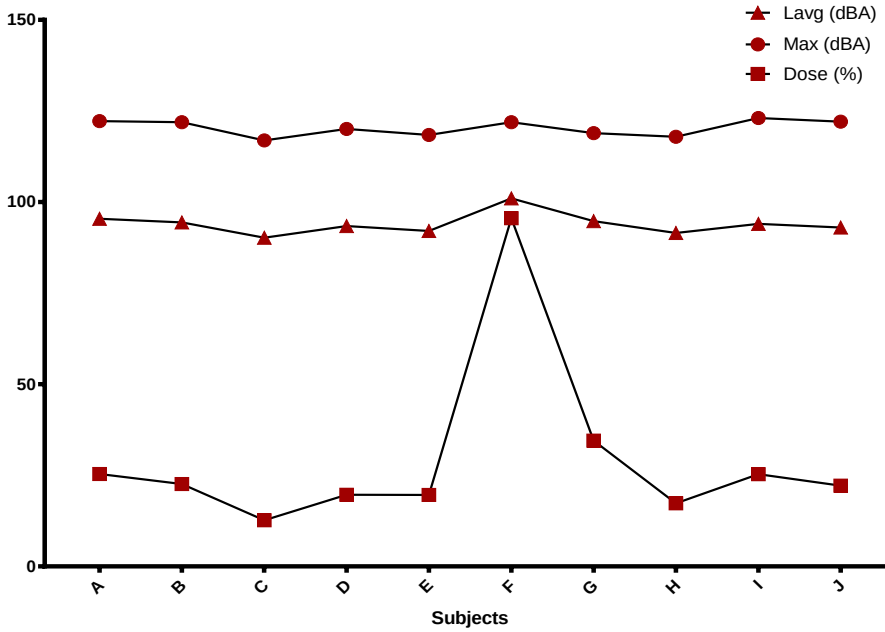
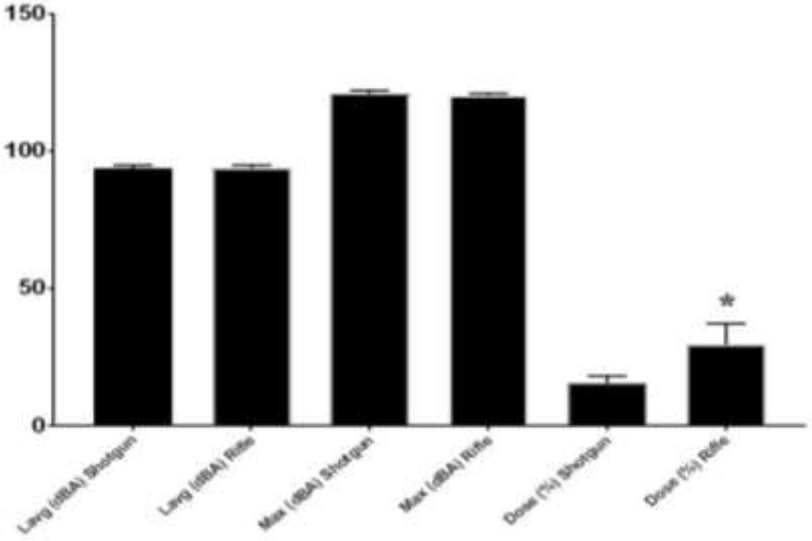


Table 2. *Personal Noise Exposure Levels for Police Officers during Rifle Qualification*

Sample Number	Time (minutes)	Lavg (dBA)	Maximum (dBA)	Dose (%)
01	57:54	95.4	122.2	25.4
02	59:14	94.4	121.9	22.6
03	59:29	90.2	116.9	12.7
04	59:05	93.4	120.1	19.7
05	70:10	92.1	118.4	19.6
06[i]	100:18	101	121.9	95.6
07[i]	85:16	94.8	118.9	34.5
08	67:29	91.5	117.9	17.3
09	69:59	94.0	123.1	25.3
10	70:43	93.0	121.1	22.2
OSHA Standard[i]	**480**	**PEL=90 AL=85**	**140**	**100 (PEL @ 90 dBA) 50 (AL @ 85 dBA)**

Note: [i] Instructor; OSHA Noise Standards: PEL=90 dBA, AL=85 dBA, Impact Noise=140 dBA, Dose=100% (PEL=90 dBA) and 50% (AL=85 dBA).

Figure 3. Summary Personal *Noise Exposure Levels during Shotgun and Rifle Qualifications*



Note: N≥10; * indicates p<0.05 vs. rifle by unpaired T-test.

Area (Environmental) Noise Levels for Shotgun and Rifle Qualifications

Tables 3, 4, and 5 provide the detailed and summary results of area or environmental noise levels for both shotgun and rifle qualifications. The reported parameters were shooting distance from the target, range, and the average SLM for both morning (am) and afternoon (pm) qualifications. The overall average noise levels from various distances to the target during the qualification rounds for shotgun ranged from 84.6 dBA to 118.3 dBA (morning) and 101.2 dBA to 120.3 dBA (afternoon). The overall average noise levels from various distances to the

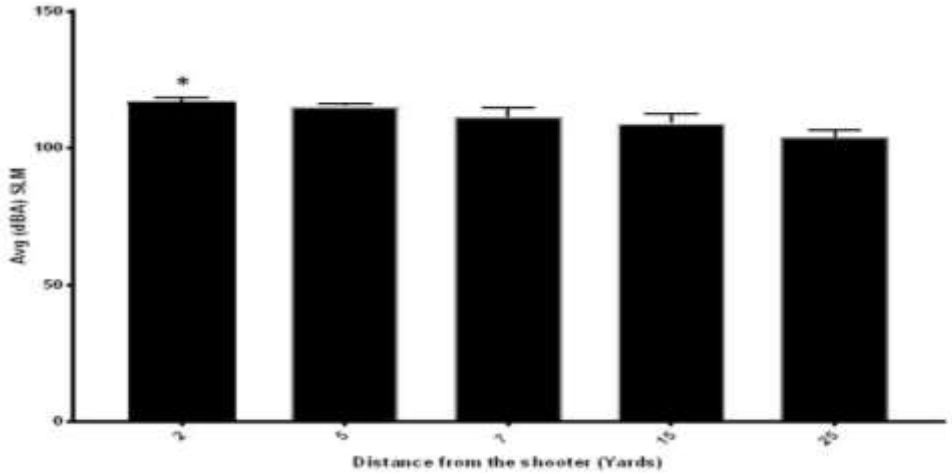
target during the qualification rounds for rifle ranged from 97.3 dBA to 116.6 dBA (morning) and 101.7 dBA to 116.6 dBA (afternoon). The data showed that there was an inverse relationship between distances and area noise levels for both shotgun and rifle. As illustrated in Figures 4, 5, and 6, the area noise levels increased as the distances between the shooters and their targets decreased.

Figure 4 showed that there was a significant difference in the area noise levels for shotgun between 2 yards and 25 yards. Furthermore, using unpaired t-tests for the data collected during rifle qualifications, there was a significant difference in reported noise levels between 7 yards and 50 yards as well as between 15 yards and 50 yards (Figure 5). However, as shown in Figure 6, no statistically significant difference existed between shotgun and rifle at 7, 15, and 25 yards.

Table 3. *Area Noise Levels for Police Officers during Shotgun and Rifle Qualifications*

Description	Sample	Distance (Yard Line)	Range (dBA)	Avg. SLM (dBA)
Shotgun: Morning				
Shooter 1	01	25	93.5- 98.1	96.1
	02	15	96.9-100.4	99.5
	03	7	84.6-110.5	102.0
	04	5	111.1-114.5	113.1
	05	2	110.4-114.0	112.7
Shooter 2	06	25	101.0-110.6	106.8
	07	15	110.1-114.5	112.4
	08	7	108.9-116.3	114.2
	09	5	116.5-117.0	116.7
	10	2	117.2-118.3	118.0
Shotgun: Afternoon				
Shooter 1	01	25	101.2-108.5	105.7
	02	15	109.0-113.2	111.4
	03	7	110.7-116.1	113.8
	04	5	113.8-117.8	116.2
	05	2	115.9-119.4	117.4
Shooter 2	06	25	105.9-109.7	107.6
	07	15	110.5-114.4	113.5
	08	7	115.2-116.9	116.2
	09	5	111.0-117.1	115.3
	10	2	119.4-120.3	119.8
Rifle: Morning	01	50	103.2-107.4	105.6
	02	35	105.4-110.9	108.9
	03	25	105.0-110.6	108.1
	04	15	110.8-113.9	113.0
	05	7	109.3-116.6	114.3
Rifle: Afternoon	01	50	101.7-111.1	106.4
	02	35	109.7-111.0	110.6
	03	25	105.7-116.5	111.4
	04	15	110.4-114.8	112.3
	05	7	112.1-115.4	113.9

Figure 4. *Area Noise Levels for Shotgun at Various Distances from the Shooter*

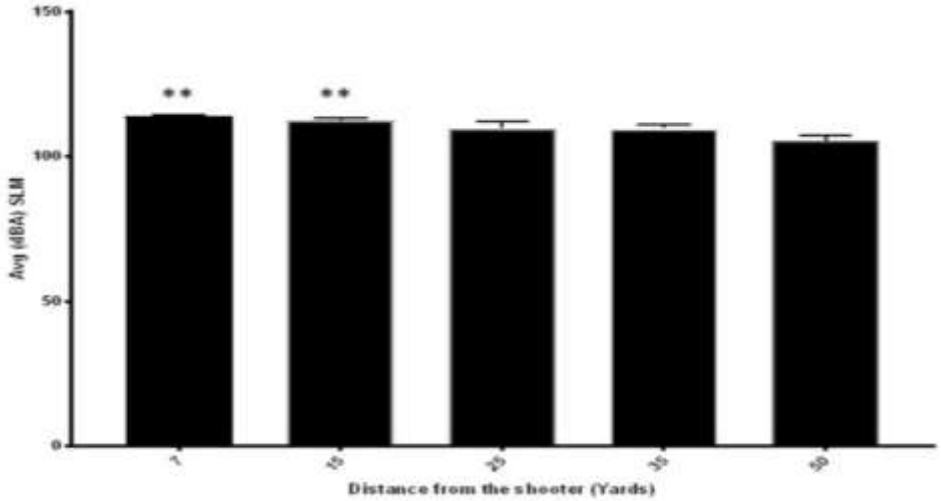


Note: N=4; * indicates p<0.05 vs. 25 yards using One-way ANOVA followed by Bonferroni correction for multiple comparisons.

Table 4. *Personal Noise Exposure Levels during Shotgun and Rifle Qualifications*

Description	N	Mean (dBA)	Range (dBA)	SD
Shotgun				
Lavg	22	94	74-101	5.38
Max SPL	22	124	102-127	4.88
Rifle				
Lavg	10	94	90-101	2.93
Max SPL	10	120	117-123	2.18
OSHA Standards (8-hour TWA)		**PEL=90 AL=85**	**Impact=140**	

Figure 5. *Area Noise Levels for Rifle at Various Distances from the Shooter*

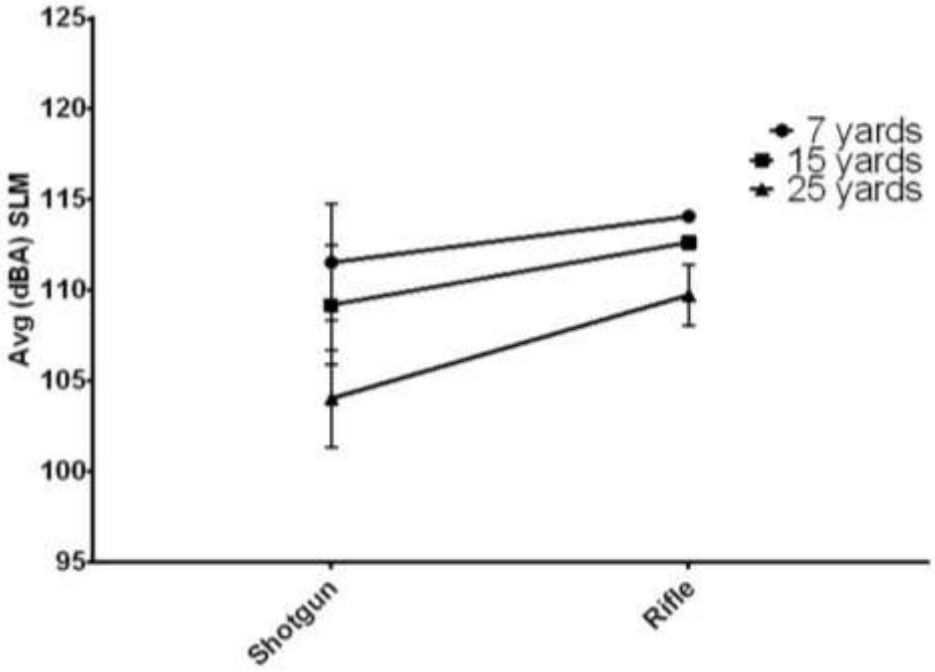


Note: N≥2. * indicates p<0.05 vs. 50 yards by one-way ANOVA followed by Bonferroni correction for multiple comparisons.

Table 5. Summary *Area Noise Levels during Shotgun and Rifle Qualifications*

Description	N	Mean (dBA)	Range (dBA)	SD
Shotgun	10	116	107-121	4.53
Rifle	10	111	106-114	2.61
Shotgun and Rifle	20	112	106-121	3.34

Figure 6. *Noise Levels for Shotgun and Rifle Compared at 7, 15 and 25 Yards from the Target*



Discussion

Firearm-Associated Sound Pressure Levels and Noise Standards

The overall objective of the study was to determine personal noise exposure levels during shotgun and rifle qualifications for a representative sample of 17 police officers and 2 instructors at a university in South-central Kentucky. The OSHA standard for occupational noise exposure (29 CFR 1910.95) specifies a PEL of 90 dBA averaged over an 8-hour time period using an exchange rate of 5 dBA (time/intensity relationship). The OSHA standard also specifies that exposure to impulse or impact noise should not exceed 140 dBA (OSHA 2003). The results of personal noise exposure levels for shotgun showed the mean Lavg was 94 dBA (range=74 to 101 dBA, SD=5.4). With the exception of one police officer and one instructor, all the Lavg were above OSHA's PEL of 90 dBA (Table 1). The results for rifle qualifications showed Lavg of 94 dBA (range=90 to 101 dBA, SD=2.9) and all exceeded OSHA's PEL of 90 dBA.

The mean Maximum SPL for shotgun was 121 dBA (range=102 to 127 dBA, SD=4.9) and all the readings were above 100 dBA, but none below OSHA's

impact noise standard of 140 dBA. The mean Maximum SPL was 120 dBA (range=117 to 123 dBA, SD=2.2). The Maximum SPLs measured during shotgun and rifle qualifications were below 140 dBA. In addition, the Maximum SPL from this study were below those previously reported in the literature for similar small caliber weapons used during training and leisure time activities by Murphy and Tubbs (2007) and Pawlaczyk-Luszczynska et al. (2004) with noise levels that ranged from 156 to 170 dBA and 132 to 165 dBA, respectively. These previous studies reported maximum SPLs that generally exceeded the OSHA's impulse noise standard of 140 dBA. This may be due in part to the fact that this study was conducted in an isolated outdoor shooting range in a remote location surrounded by dense vegetation where sound levels often had adequate space to dissipate or be absorbed. Several of the studies reviewed for comparison were conducted in indoor settings or shooting ranges (Wu and Young 2009, Murphy and Tubbs 2007, Pawlaczyk-Luszczynska et al. 2004) and this may provide some explanation for the higher noise levels previously reported.

It is important to note that the results presented in this study cannot be generalized to suggest that the 17 police officers and 2 instructors were at minimum risks of developing NIHL or other related adverse health effects of hazardous noise exposure. In addition, no audiometric testing or assessment was conducted for all the police officers included in this study. The prevalence of NIHL among police officers is high, remains a significant health impact of occupational firearm use, and often associated with physiological and pathological factors as well as the duration of service and rank of the affected police officer (Win et al. 2015, Moon et al. 2011). Virkkunen et al. (2005) reported that continuous and impulse noise exposures greater than 80 dBA was associated with increased risks of coronary heart disease. In addition, several studies have documented that over-exposures to hazardous noise was associated with significant hearing losses, tinnitus, irritability, sleep disturbance, and exacerbation of hypertension and cardiovascular diseases (Chang et al. 2003, Passchier-Vermeer and Passchier 2000, Stansfeld et al. 2000, Virkkunen et al. 2005). Additionally, loss of hearing has been associated with adverse psychological effects with decreased job performance and productivity (Vaillancourt et al. 2011).

Area or environmental noise levels for both shotgun and rifle (Table 5) showed that the average SLM were 112 dBA (range=106 to 21 dBA, SD=3.4) and 116 dBA (range=107 to 121 dBA, SD=4.5) for shotgun and 111 dBA (range=106 to 14 dBA, SD=2.6) for rifle, respectively. All area or environmental sound levels were above 100 dBA but below 140 dBA, the OSHA noise standard for impulse noise. Although previous studies have shown that rifles generally emit slightly higher noise levels than shotguns (Murphy and Tubbs 2007, Pawlaczyk-Luszczynska et al. 2004), however, in this survey we reported that shotguns had slightly higher noise levels than rifles. The short duration of the sampling time for this study makes it difficult to make a broad statement on why this anomaly was observed, It must be noted that police officers often use several small caliber weapons such as rifles and shotguns, during their practice rounds (Pawlaczyk-Luszczynska et al. 2004). Small caliber weapons were reported by previous studies to produce peak noise levels that exceeded both the OSHA's PEL and

NIOSH's recommended exposure level of 140 dB for impulse noise (Murphy and Tubbs 2007, Pawlaczyk-Luszczynska et al. 2004).

Noise-Induced Hearing Loss Associated with Firearms

The numbers presented in these results were below those reported by NIOSH during a health hazard evaluation conducted on a Special Weapons Assault Team during indoor and outdoor weapons training with peak noise levels that ranged from 156 to 170 dBA (Murphy and Tubbs 2007). Furthermore, guns, miniature rifles, and assault rifles used during training and even during leisure time can produce SPL with a range of 132 to 165 dBA (Pawlaczyk-Luszczynska et al. 2004). Most previous studies on noise exposure assessments among law enforcement officers have focused on military personnel and their risks of developing NIHL as a result of their use of weapons (Collee et al. 2011, Lindblad et al. 2011, Mrena et al. 2009, Muhr and Rosenhall 2011). These studies are still relevant and comparable to police officers due to their use of similar weapons (Lindblad et al. 2011, Muhr and Rosenhall 2011) and their requirements of similar proficiency tests with various weapons (Murphy and Tubbs 2007, Pawlaczyk-Luszczynska et al. 2004). Even though the military could be at greater risk of NIHL than other occupations, police officers have a similar incidence of service-related hearing loss when compared to other occupations (Murphy and Tubbs 2007). In general, there was not enough data on police officers' hearing thresholds and the risks of NIHL from exposure to hazardous occupational noise, in part because most previous studies focused on occupations with more obvious and documented cases of hazardous noise exposures (Lesage et al. 2009).

Preventing Firearm-Associated Noise-Induced Hearing Loss

Hearing protective devices (HPDs), such as earplugs or earmuffs, have been found to be effective in reducing noise levels to prevent NIHL and can effectively attenuate the peak SPL typically by as much as 25-35 dBA (Collee et al. 2011, Mrena et al. 2009, Muhr and Rosenhall 2011, Pawlaczyk-Luszczynska et al. 2004). In addition, doubling the HPDs by using both earplugs and earmuffs can further reduce the peak levels by an additional 15-20 dBA, resulting in over a 40 dBA reduction (Murphy and Tubbs 2007, Wu and Young 2009). Communication issues among officers, which further increases with double protection, may be solved by the use of electronic HPDs, such as electronic level limiting earmuffs (Murphy and Tubbs 2007). Some studies have emphasized the importance of proper and efficient training on earplug fit and insertion (Collee et al. 2011, Mrena et al. 2009, Muhr and Rosenhall 2011), and suggested the use of non-linear earplugs, and active noise reduction headsets (Collee et al. 2011). Hearing impairment would significantly decrease a police officer's ability to perform duties properly. Functional hearing is essential for successful task completion within occupations such as military, pilots, firefighters, and law enforcement (Vaillancourt et al. 2011).

Comparing Hearing Impairment Associated with Shotgun and Rifle

Using unpaired t-tests to compare Lavg, Maximum noise levels, and Dose between the shotgun and rifle, our data showed that there was a significant difference in the Dose between the two types of firearms. Based on these results, the police officer may be in greater danger of noise-induced hearing loss using the rifle compared to the shotgun. However, there was not a significant difference between the Lavg for shotgun and the Lavg for rifle. Similarly, there was not a significant difference between the mean shotgun maximum SPL and the mean rifle Maximum SPL. This result may suggest that the rifle, being a larger caliber weapon, would have produced more sound as confirmed by other previous studies (Murphy and Tubbs 2007, Pawlaczyk-Luszczynska et al. 2004). However, another study suggested that small caliber guns often disrupted middle ear function, despite the use of ear plugs (Job et al. 2016), indicating that hearing protection should involve a more comprehensive process.

A comprehensive approach is especially vital because in addition to noise exposure, age, male gender, high blood pressure, diabetes and duration of service, are all significantly associated with noise-induced hearing loss among police officers (Win et al. 2015). Due to the number of recorded SPLs that were above 90 dBA, and potential chronic exposure to such exposure levels, the results as a whole suggest that both police officers and instructors may be at risk of NIHL, regardless of whether they are using a rifle or a shotgun during their qualification rounds. Use of double hearing protection devices (HPDs) at all times during qualification rounds should be continued. NIHL is permanent, but preventable; hence, it is recommended that the University police officers and instructors continue to adhere to standard 29CFR 1910.95 (OSHA 2003). University police officers should have their noise exposure levels assessed for an entire 8-hour work shift that would incorporate their qualification rounds, and other daily work-related activities. This will provide a better idea and more realistic data for their typical noise exposure levels and hence enable to make adequate and informed statistical comparisons with the OSHA noise standards.

Limitations of the Study

This study has a number of limitations including that the data utilized had a small sample size that was not a random sample of police officers. Rather, data collection was from a convenient and representative sample of police officers and instructors who volunteered to participate in the study. This may provide some limitation to the statistical analysis and interpretation of the results of the study. In addition, the sampling times were of very short durations when compared to a typical 8-hour workday. It must be recognized that OSHA's noise standards (PEL and AL) are based on an 8 hour TWA. For an accurate comparison of the results of this study to OSHA's noise standards, one would have to collect noise dosimeter readings for a typical 8-hour work shift. However, extrapolation of the results of the study would be difficult. If we assume that the exposures had continued for an entire 8-hour work shift without hearing protection, the results

obtained would have exceeded the OSHA's PEL and AL. This would suggest that the police officers and instructors included in the study were over-exposed to hazardous noise levels during both shotgun and rifle qualifications. There may be a presumption that the police officers and instructors were at increased risks for NIHL. However, based on the short duration of exposures and the results of this study, no such generalization can be made.

Conclusion

In this study, we assessed noise exposure among police officers at a University in South central Kentucky during routine rifle and shotgun qualifications at an outdoor firing range. In general, the personal exposure assessment revealed that the Lavg for both shotgun and rifle were similar (94 dBA). Without consideration of the duration of exposures, the data showed that 20 of the 22 personal noise levels (Lavg) exceeded OSHA's PEL of 90 dBA, but the maximum noise levels were below the impact noise standard of 140 dBA. The all but one of the 22 results of personal exposures exceeded 85 dBA, which is OSHA's Action Level that would trigger the mandatory implementation of a hearing conservation program for the police officers. In this regard, the use of adequate and effective hearing protection devices (i.e., a combination of ear plugs and muffs) is advised at all times during shotgun and rifle qualification for all police officers including those within close proximity from the shooters such as their instructors.

Occupational noise exposure remains an important, but often overlooked, risk factor for sensorineural hearing loss and other significant health outcomes. Hearing loss affects people psychologically and often leads to reduced job performance and productivity. A comprehensive strategy to prevent hearing loss should include efforts to reduce exposure to hazardous noise directly from the source, implementation of administrative controls, and the use of personal protective equipment. Noise-induced hearing loss can be minimized among law enforcement officers who routinely use firearms by instituting comprehensive and effective HCP. According to OSHA (2018), HCP "strive to prevent initial occupational hearing loss, preserve and protect remaining hearing, and equip workers with the knowledge and hearing protection devices necessary to safeguard themselves". The HCP includes the use of adequate hearing protection devices and other key elements that are critical for understanding and protecting the hearing of American workers in industries with hazardous noise.

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Pharmacological and Non-Pharmacological Treatment of Headaches in Early Modern Cretan Healing Manuals

By Steven M. Oberhelman[*]

The treatment of headaches and migraines have been a major concern in Greece since Hippocrates. Ancient and Hellenistic Greek physicians gave many discussions of the symptoms of cephalalgia and their treatment, while Byzantine medical writers added to those descriptions and offered new therapeutic methods. On the island of Crete, during the Venetian occupation (1205–1669), medical students, after their studies at the great European universities, brought back classical and Byzantine knowledge of healing diseases, including headaches. But after the Ottoman Turks seized the island, practical doctors handled medical prophylaxis. These folk healers preserved their knowledge in treatises called iatrosophia for use by their neighbors and friends. In this paper, I analyze passages from two Cretan iatrosophia for their description and treatment of headaches and migraines. Some recipes are drawn from classical and Byzantine formal medical texts, but others are traditional medical cures preserved over the centuries by villagers and practical doctors and consist of natural pharmacological ingredients (plants, herbs, animal substances, minerals). But because these treatments were sometimes ineffective, the iatrosophia also offer headache remedies containing magical spells, phylacteries, exorcisms, and prayers. Such multiple approaches to healing (natural, supernatural, supranatural) reflected a cultural mindset that welcomed any and all forms of healing.

Keywords: *History of medicine, Magic, Pharmacology, Traditional medicine*

The ancient Greeks approached the treatment of headaches from three main methods: medico-pharmacological (cures offered by physicians, root-cutters, and druggists), religious (for example, the healing cult of the god Asclepius), and magical (for example, the incantations and exorcisms in the *Greek Magical Papyri*). People did not hiercharize such treatments but freely used one or the other; any method that could bring relief from the pain or result in a cure was viable.[1]

The medical writings ascribed to Hippocrates refer to both headaches and migraines (Rose 1995: 1, Rapaport and Edmeads 2000: 1222, Magiorkinis et al. 2009, Koehler and Boes 2010: 2491–2492, Eadie 2012: 39–50). Hippocrates was the first person to recognize and describe aura that migraine sufferers experience. He wrote that patients see a bright light, usually in the right eye, followed by extreme pain in the temples and eventually the entire head; vomiting often helps.[2] Hippocrates observed that headaches may have many causes. Some headaches are symptomatic of the onset and course of a disease. Others come from imbalances of

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[1]This multiple approach to the healing of headaches may be seen in Assyrian and Babylonian tablets and in Egyptian medical papyri from the second and first millennia BCE; see, e.g., Dijk and Geller (2003), Eadie (2012: 35–39), Karenberg and Leitz (2001), and Zayas (2007).

[2]Monette (2012) points out that emetics are used for headaches in Islamic medicine.

humors that circulate in the body from the liver to the head. Still others are caused by exercise and sexual relations or even by stress. External factors like climate and weather or food and drinks can also result in a headache. In the Hippocratic corpus, bleeding a patient was recommended so as to drain the excess humors. Humors could be drawn out also by applying to the head plant like hellebore or poultices made of iris mixed with vinegar and rose perfume. For chronic headaches, the juice of a squirting cucumber was used. Interestingly, Hippocrates recommended the powder made from the willow tree's bark and leaves to treat headaches. The substance in willow plants, called salicin, gives us modern aspirin (Norn et al. 2009).

Subsequent Greek physicians refined Hippocratic ideas about headache. The first-century CE physician Aretaeus of Cappadocia described three types of headache: (1) *cephalalgia*, which is sporadic, mild, and lasted for one or two days; (2) *cephalaia*, which is a severe form of head pain and often hard to be treated; and (3) *heterocrania*, which occurs on one side of the head and is equivalent to our modern migraine (Rose 1995: 1–2, Rapaport and Edmeads 2000: 1222, Koehler and Boes 2010: 2490–2492). Galen, a doctor of the second century CE, distinguished between the chronic headache and the *hemicrania* (Rose 1995: 2, Trompoukis and Vadikolias 2007: 1063–1064). Galen attributed both the migraine and the headache to harmful humors, especially yellow bile, which reach the brain from the other parts of the body. Other causes include drinking wine, stomach ills brought on by food, wounds, and cold. Galen used many substances, such as opium, and even electricity by applying electric sea rays to the patient's cranium and allowing the electricity to pass until the patient was healed.

Some patients went to the sanctuaries of healing gods, in particular Asclepius.[3] In this cult's ritual, one slept at night in the sacred precincts of the temple or in the sleeping-chamber and received healing directly at the hand of the god, or indirectly through a dream that the god sent him. On awakening, the patient was cured, or he followed the instructions in the dream to achieve a cure. Five votive tablets, which survive from the Asclepian healing sanctuary at Epidauros, tell of the miraculous healings that took place there.[4] For example, in stele B cure number 9, we read:

> *Agestratos suffered from insomnia on account of headaches. As soon as he came to the abaton,*[5] *he fell asleep and had a dream. He thought that the god cured him of his headaches and, making him stand up, taught him wrestling. When day came, he departed cured, and after a short time, he competed at the Nemean games, and was victor in wrestling.*

[3]Good starting points on this cult is Edelstein and Edelstein (1945), Roebuck 1951 (headaches at Corinth sanctuary), Pfohl (1977), LiDonnici (1995), Wickkiser (2009), and Steger (2017).

[4]The texts may be found in Herzog (1931), LiDonnici (1992, 1995) for analyses of the texts; Renberg (2017: vol. I: 171–178). Ploeg (2018) divides the stories on the stelai into medical and divinatory (see the discussion in her chapter 2).

[5]The *abaton* was the building structure at an Asclepian sanctuary where a suppliant slept at night; the god would then heal him of his ailment or would communicate a cure through a dream.

Suppliants, after they were healed, dedicated replicas, usually in terracotta, of the body parts that were healed. At Corinth and Athens we have remains of heads that symbolize the curing of headaches (Oberhelman 2014, also LiDonnici 1992: 137–140, and 1995: 41–43).

Plants and herbs were recommended by ancient druggists and root-cutters. The first-century CE pharmacologist and botanist Dioscorides wrote a lengthy work (in five books) on the properties and uses of plants in medical treatments.[6] I offer below just a few of the many treatments for headaches that Dioscorides offers:

Dried roses boiled in oil and drunk
Seed of the vitex agnus-castus applied as a poultice
Root of bitter almond tree bruised and boiled and then applied with vinegar and rose oil to temples and forehead
Wool with vinegar and rose oil applied to head
Sesame with rose oil for heat-induced headache
Leaves of mint laid on temples and forehead
Thyme with vinegar and rose oil dripped onto head
Aloe with vinegar and rose oil applied to forehead
Peppermint applied to forehead
Rue pounded fine and applied with rose oil and vinegar
Anise inhaled through the nostrils
Common hogweed with oil dripped onto head
Squirting cucumber with milk poured into the nostrils
Leaves and tendrils of the grape vine
Leaves and berries of the myrtle tree
Butcher's broom
Rush plant
Roseroot
Betony
Fleabane
Melanthion
Seawater inhaled as steam
Fruit of the wild vine mixed with vinegar and rose oil and inhaled

Many of these are proven herbal remedies as modern folk pharmacological encyclopedias and ethnopharmacology tell us. For example, rose vinegar is commonly used for headaches, and the leaves of peppermint and of rue are often placed on the aching area of the head.[7]

[6]Of all the many studies of Dioscorides, I mention here only Riddle (1985), since Riddle analyzes the pharmacological properties of Dioscorides' *materia medica* and in modern medical research. The best text for Dioscorides remains the three-volume text by Wellmann (1906-1914).

[7]For a parallel, Zarshenas et al. (2013) review the headache as it appears in pharmacopeias and other medical manuscripts of traditional Persian medicine. These texts deal with over 20 various types of headache and more than 160 different medicinal plants administered for oral, topical, and nasal application. Nearly 60% of the medicinal herbs referenced have related anti-inflammatory or analgesic effects as determined by science.

If religion, Hippocratic medicine, and folk remedies were not effective, magical methods like amulets and phylacteries were used. Many of the Greek magical papyri contain incantations and spells for the relief of headache pain.[8] One amulet, dated to the early second century CE and meant to relieve a migraine or cluster headaches, reads:

> *Turn away, O Jesus, the Grim-Faced One, and on behalf of your maidservant, her headache, to (the) glory of your name, Iaô Adônai Sabaôth…Ouriēl… Ouriēl…Gabriēl.*[9]

Another reads: "Lord Sabaôth, repel the pain from me, the headache, I pray, take [from me]," while another spell for migraine headache goes: "Take oil in your hands and utter the spell: 'Zeus sowed a grape seed: it parts the soil; he does not sow it; it does not sprout'."[10] The latter spell is *similia similibus*: just as the seed does not sprout, so the headache will not grow.

This same pattern of a multiple approach to curing headaches or removing their pain—formal and informal medicine and pharmacology, religion, and magic—occurs in the Byzantine period of Greece. Byzantine physicians continued ancient Greek medical discussions of the headache (Rose 1995: 2–3, Trompoukis and Vadikolias 2007). Oribasius (fourth century) distinguished between acute and chronic headaches, and described the effects of migraine. He recommended the importance of good diet, lots of liquids, and sleep as a way to prevent headaches. Herbal ointments and poultices, especially with rose oil, eliminate pain. Alexander of Tralles (sixth century) offered a whole typology of headaches based on causation, such as heat, cold, fever, wine drinking, and wounds. He also gave for each type of headache various herbal and vegetable compounds for dressing the forehead. Paul of Aegina (seventh century) built upon the theories of Alexander and described the migraine in greater detail. He warned that severe headaches can come from undue stress levels in one's life or from excess humors; if humors are responsible, then the physician should bleed the patient by opening the veins in the nose.

Religious texts of the Byzantine era show that saints healed headache through incubation methods or through invocation in prayer.[11] Saint John the Baptist, in Greek Orthodox theology, was given the grace of healing headaches (in the western Catholic Church, Saint Teresa of Avila has this grace). Biographers of saints' lives record dreams sent by the saints to sufferers. In the *Miracles of Saint Cyrus and Saint John* (cap. 18), for example, we read that a

[8]I refer the reader to only a few discussions, as the bibliography on magic and medicine is immense. In the context of ancient and Hellenistic magic and medicine see Kotansky (1991) (an excellent introduction to the subject with extensive bibliography); for headaches specifically, see Barb (1966), Bradshear (1979), Kotansky (1980).

[9]Taken from Kotansky (2002), who offers a full discussion and commentary.

[10]*Papyri Magicae Graecae* XVIIIa.1–4 and VI.199–201; taken from Betz (1992: 255 and 121, respectively); see also the spell with commentary and bibliography in Betz (1992: 317).

[11]Again, the bibliography is immense; see, for an introduction and survey, Talbot (2002); also the articles in Oberhelman (2013), Csepregi (2007), Csepregi and Burnett (2012), Graf (2014), Renberg (2017: vol. II: 743–807), for a comprehensive bibliographical survey.

man suffering from headaches was told to go to a certain door of the church and strike the first person whom he met. The order was given three times before he obeyed. A soldier met him and returned the blow with a heavy stroke of his stick on the man's head, thus curing him.[12] Another biographer records how Saint Gregory Palamas cured a priest-monk who had suffered from migraines for seven years (Talbot 2010). Religious materials also can cure. People afflicted with severe headaches, it is recorded, could relieve their pain by taking the hemp of the cord holding the lamp before the icon of Saint Stephen in Hagia Sophia, and then wrapping it around their heads (Carr 2003: 84 note 58).

Just as in antiquity, Byzantine people resorted to magical incantations and amulets to ward off or cure headaches. Two charms, which are to be written down, placed into foil or an amulet, and then worn on the head or around the neck, call upon divine help or contain exorcism prayers:

> *Holy John, prophet and baptizer of our Lord Jesus Christ, you who have as your father the holy Zacharias and as your mother the holy Elizabeth, you baptized our Lord Jesus Christ in the Jordan River [fol. 74r], which you traversed, you who took into your hand the holy head and lived in the desert: heal the pain of the migraine of the slave of God, and [if so,] he will sing your praises for the days of his life and will glorify your holy memory, just as we sign the praises and glorify the all-honorable and magnificent name of you, the Father and Son and Holy Spirit. σ. μ. κ. λ. σ. μ. μ. τ. φ. β. θεου.*[13] *Amen. Erothonios, Ablatha, Nathanaēl, Onios, Thathaēl, Ieliô, Athenaphron, Iathenophronēs, Ôrē, Thenaphrôn, Euphrone, Phriophronēs, Ôrē. σ. μ. κ. λ. σ. μ. μ. τ. φ. β. θεου. Amen. In the name of the Father and son and Holy Spirit. Liakops Lilaps, cure the pain of this migraine and the whole head [fol. 74v] for the slave of God. σ. μ. κ. λ. σ. μ. μ. τ. φ. β. θεου. Amen.*
>
> *[fol. 74v] A phylactery for the head: O Lord God of our fathers Abraham, Isaac, and Jacob, set free the pain in the head of NN, the slave of God, [set free] the migraine. I adjure you, every unclean thing always sitting on the head of the slave of God: withdraw from the one who has the pain in his head and keep closely [to yourself] the migraine. Trophon Skoudaos, come out of NN, the slave of God. Mikhaēl, Gabriēl, Ourouēl, and Raphaēl. In the name of the Father and the Son and the Holy Spirit, now and always and for ever and ever. Amen.*[14]

After the collapse of the Byzantine Empire, scholars fled Greece for the West. On Crete and the mainland, the practice of medicine was mostly relegated to monasteries where there were collectives of healing practitioners.[15] Most cures, though, were carried out by local practical doctors (*praktikoi iatroi*), priests and monks, and village old women who knew the properties of local herbs and

[12]Story described in Hamilton (1906: 155).

[13]The Greek letters are abbreviations for the prayer spoken by the Eastern Orthodox priest in the Divine Liturgy: "Let us stand well, let us stand with the fear of God."

[14]Both texts are in Bibliothèque de la Société Historique Codex 210. All translations in this article are mine unless otherwise noted.

[15]See the discussion in Clark (2011: chapters 1–2), with recent bibliography.

plants and who were acquainted with centuries-old folk remedies (Hionidou 2016). Proprietors of pharmacy shops and marketplace booths could, as they even do today, also recommend a treatment of aromatics, plants, and vegetables when consulted by a sufferer (Hanlidou et al. 2004).

Priests, practical doctors, and other medical healers were assisted in their cures by relying on manuscripts called *iatrosophia*.[16] An *iatrosophion* is a collection of medical recipes taken from classical and Byzantine medical treatises (for example, the writings of Hippocrates and Galen, or the writings of Paul of Aegina and Alexander of Tralles) and from pharmacological works like Dioscorides' massive work on plants, and supplemented by new medical knowledge and new medical substances from the New World, the Middle East, and the Far East. Thus, *iatrosophia* gradually incorporated discussions of the "French disease" (that is, syphilis) and new substances like coffee, quinine, and tobacco alongside ancient home garden herbs like rosemary and oregano.

There were two basic types of *iatrosophia*. One type, which was linked either to monasteries and was penned by monks or to hospitals and was written by doctors, contains only medical recipes and therapeutics (Lardos 2006, 2012, Lardos and Heinrich 2013). Most recipes in the texts consist of herbal concoctions, with others containing minerals or animal substances. The majority of recipes derive from ancient and Byzantine formal medicine, but we have as well the pharmacopoeia of folk healing.

An example is the *iatrosophion* ascribed to the monk-physician named Meletios and dated to the late twelfth or early thirteenth century. The book is typical of the text that physicians working at hospitals of the middle Byzantine period used. Entries are brief: a header that describes the ailment and then one to four or five therapeutic recipes, mostly drawn from classical and early Byzantine sources. Most commonly used are Dioscorides' *On Medical Substances* and Galen's treatises *On Readily Available Medicines* and the *Mixtures and Properties of Simple Drugs*. A number of early to middle Byzantine physicians, who wrote recipe books themselves, are quoted: the fourth-century author Oribasius (*Collections* and *Synopsis for Eustathius*), the sixth-century Aëtius of Amida and Alexander of Tralles, and Paul of Aegina (seventh century). For example, for curing a headache, Meletios writes:

> ***For headache***. *Take cress, vinegar, and rose oil. Parch the cress and make it like flour. Mix everything together. Rub onto the patient's head.*

This recipe is very similar to what we read in three famous texts and shows how the iatrosophist gleans classical and Byzantine texts for his recipe book:

> Galen, *De remediis*, II (Kühn 14.400.9–12): *Roast cress in vinegar and rose oil and make a thick salve. Put this on from one temple to the next. This instantly stops the pain.*

[16]Basic studies on the *iatrosophion* are Tselikas (1995), Alexopoulou (1998), Bennett (2000), Papadogiannakēs (2001), Touwaide (2007), Papadopoulos (2009), Clark (2011), Demetriades-Hadj (2015), Valentino (2017).

> Aëtius of Amida, 6.50 (Oliveri 2.193.2–3): *Roast cress with vinegar and rose oil and make a thick salve. Place it on and he will be healed immediately.*
> Paul of Aegina, *Epitome medica* 3.4 (Heiberg 1.138.10–11): *A patient benefits from cress roasted and triturated in vinegar and rose oil.*

The second type of *iatrosophia* also contains remedies drawn from folk medicine and classical Greek medicine; but besides the medical recipes and treatments, there are sections on a variety of topics like agricultural and veterinarian matters, astrology, exorcisms and spells, magic, and religion.

The remainder of this paper concerns two *iatrosophia* that belong to this second category and that come from the island of Crete. My purpose here is to discuss the many different treatments for headache which appear in the *iatrosophia*. One text dates to around 1800. The author is called *Anagnōstēs*, that is, "The Reader," according to a note dated 23 February 1978. The text was passed down in his family, the Kharalampos family from the village of Nippos outside of Khania.[17] The other *iatrosophion* was the personal notebook of Nikolaos Konstantinos Theodorakis (1891–1979). The notebook was autographed on 10 August 1930. Theodorakis, an herbalist and expert in local flora, dispensed remedies in his home and at his tobacconist shop to patients. Some recipes came from his own experimentation on local flora, while others were based on folk and medical traditions that reached back centuries, even millennia, earlier.[18]

Anagnōstēs followed Hippocratic theory on the causation of headaches. Humors come from the body and settle in the head; these must be purged to restore proper humoral balance. Methods are as follows:

> *Crush leaves of the pine tree and place the juice in the person's nose. Grind black cumin finely; stir in woman's breast milk and place this [mixture] in the patient's nose. Pestle cyclamen and place the juice in the nostrils. Crush black cumin finely and then mix it with anointing oil; let it sit and then smear it in your nose.* (Papadogiannakēs 2001: 61–62)[19]

An accumulation of phlegm can also cause headaches and must be purged too:

> *Take a jar of vinegar and boil it along with hyssop, pennyroyal, oregano, and marjoram. Let these juices ferment. [Place and] keep in the mouth to draw out many fluids. Mix crushed ginger and stavesacre; one should then chew this. Crush very finely stavesacre and pepper and then add mastic gum. Chew this in order to expel many fluids. Take stavesacre, vinegar, pennyroyal, thyme, and oregano. Seethe these and then keep in the mouth so as to produce much sputum and spittle.* (Papadogiannakēs 2001: 60–61)

[17]There is a long passage on this in the *iatrosophion*; see Papadogiannakēs (2001: 132–133); for an excellent introduction to the work see Papadogiannakēs (1990).
[18]Clark (2011: 31–45); in greater detail, Clark (2002).
[19]All translations from Papadogiannakēs' (2001) text are my own; I quote from the page of this edition. For Theodorakis' *iatrosophion* I have used the translation in Clark (2011).

Many of these ingredients not only go back to classical and Byzantine pharmacological works but are still used in folk herbal remedies. For example, in pharmacopoeias hyssop is recommended as an expectorant, powdered stavesacre seeds are given for dropsy, and pennyroyal and thyme are prescribed for easing headache pain (Gruenwald 2007).

The author devotes a considerable amount of space to cephalalgia. He gives 744 recipes in the *iatrosophion*; of these, 106 or 14.2% deal with headaches, migraines, and general pains. Almost forty plant substances are used for headaches:

almonds, bitter
almonds, oil of
asphodel, leaves and root of
beans, broad
bramble, leaves of
caper, fresh root of
cherry tree, sap of
chrysanthemum
frankincense
ginger
hyssop
ivy, leaves and buds of
labdanum
laurel, leaves and berries of
lentil
marjoram
mastic gum
monk's pepper, seeds of
myrtle berry
myrtle tree, shoots of
nosesmart
oleander, dried leaves of
oregano
peach tree, sap of
peach, pit of
pennyroyal
peppercorn
pine tree, root of
pondweed
reed, bark of
rue, fruit and plant and seeds of
saffron
sloe tree, sap of
stavesacre
thyme
walnut
wormwood

Animal substances include:

bird's egg, white of
bird's egg, yolk of
earthworms
hedgehog, skin of
pigeon, dried feces of
sheep tallow
snail
wild pigeon, feces of

Minerals are iron rust, lead monoxide, quicklime, and salt, while other substances used are:

anointing oil
ashes
bread crumbs
coals, burning
honey
oakum
pine resin
pitch
rose water
vinegar, regular
vinegar, weak
water not drunk by mules or horses
wax
wine
yeast

All these ingredients—plants, animals, and minerals—are combined in various recipes as a means to treat headaches; for example,

> *If one has a headache because of a cold, take laurel berries and seeds of rue. Remove the covers. Take a root of the pine tree and vinegar. Boil these. Add a little wax and then apply to the head. Crack open a peach pit and grind it along with frankincense and vinegar. Soften and then place on the forehead with a cloth.[Take] finely ground seed of nosesmart and the burnt feces of a pigeon. Soften with vinegar and place upon the forehead. If one has a headache because of the sun beating down on him, take snails and crack them open. Mix the meat with ground frankincense and vinegar. Place this mixture on his forehead with a cloth. [Make sure that you] pestle the meat well first and then mix it with the other ingredients*. (Papadogiannakēs 2001: 55)

For migraines, herbal and non-herbal compounds are smeared onto the side of the head affected with pain. For example, this series of recipes:

> *Take "the guts of the earth," that is, worms. Simmer them in a fire along with 15 crushed peppercorns. Mix these with vinegar and apply to the head. Grind the dung of wild pigeon dung and mix with vinegar; smear on. Boil seeds of monk's pepper in anointing oil. Beat and then apply to the forehead and temples. Soften quicklime with honey and apply. Take the fruit of the rue and place in the ears and on the head; press it firmly [onto the skin] and then cover [with cloth]. Pestle bitter almonds and kneaded mastic gum; mix with vinegar and smear on the forehead. Pestle the tender buds of ivy. Mix the juice with rose oil and vinegar and apply. Put dry oleander leaves into burning coals and have the patient breathe the fumes through his nose. Ground a fresh root of the caper plant and smear on. Pestle rue and mix with vinegar. Place on the area where the head aches. Boil oakum in vinegar; extract the pitch and sprinkle it with salt. Cover the head with this. Turn a hedgehog's skin into ash; mix with oil and apply. Take the leaves and root of an asphodel and turn into ash. Mix with oil and apply.* (Papadogiannakēs 2001: 57-59)

While not a few ingredients, like vinegar, rue, almonds, and asphodel, may seem strange, they are excellent folk pharmacological remedies.

Any individual recipe may be effective (after all it would not have been recorded if it did achieve results), but it may not always work: patients vary, and species of plants may be different in various locales or not available. If so, then the Greek of the early modern period did what his classical and Byzantine ancestors had done: resort to religion and/or magic. Supernatural and supranatural methods were not rejected in medicine of the Tourkokratia as they are in today's modern medicine; any remedy was tried if it could promise hope for a cure. Thus, in his chapters on headache, *Anagnōstēs* offers religious prayers for headaches and migraines. For example,

> *Just as Solomon the wonderful annihilated the evil spirits of deceit, so too I give over you by the name of our Lord Jesus Christ; I give over you, O skull, cranium, mesocranium, the rheum, spasm, cold chills, inflammation, erysipelas, feverish shakes, and demons lurking on the outside. Our Lord Jesus Christ enjoins you, O*

> *evil spirits, to retreat into the wild mountains where no sound of birds is heard, where neither sun nor moon enters. You are also to depart from NN, the slave of God. On [the place of] the skull the Lord was crucified, on the wood of the cypress and pine and cedar trees, so that He might abrogate every activity of the devil. Let us stand well, let us stand with the fear of God. Amen.* (Papadogiannakēs 2001: 59-60)

Sometimes magical letters or magical words (most of which are gibberish on the surface but supposedly contained the power to exorcise demons or illnesses) are joined with biblical verses and invocations of members of the Trinity:

> *Write on a sheet of paper the following [characters] and give it to the patient: Mikhaēl. Ekklēsourariz. Barsaphaēl. Eklēson. Rhix. [Write also the verse] "In the beginning was the Word." Akranou. Aphra. Aphikodamros. Phisazaēl. φ ν κ δ α ν κ τ τ τ φ λ τ σ υ ρ χ τ ✶.*[20] (Papadogiannakēs 2001: 60)

Or, this combination of magical characters and gospel readings:

> *Write these and have [the sufferer] wear them [on the head]: Abra. Aphikodak. Aphizaēl. Phiktha. ι π ι τ φ π ρ †. Also read into his ear 11 gospel readings from the Matins cycle.*[21]

Some cures are magical in nature and consist of binding/unbinding spells or cures using the principle of *similia similibus*, where what one does to an object will have the same effect on the patient. The following is a cure for internal and external hemorrhoids:

> *Take a newly made knife—one that has never been used to cut anything before—and on the fifth day of the moon's waning draw binding circles with it around three roots of ribwort plantain. [While doing this,] say: "In the name of the Father, the Son, and the Holy Spirit." Then cut out the roots with the knife and recite this prayer: "O God of heaven and earth and everything in them, holy trinity rulers of life, have mercy on us. Holy Lady Theotokos, Saint Lucian, Paul, the healing saints Cosmas and Damian, intercede with Holy God so that He may cause the internal and external hemorrhoids, as well as any other ailment, to shrivel up and vanish for NN, the son of NN [masculine] and NN [feminine]. And just as this knife has made shavings on this plant, so may God shave away the internal and external hemorrhoids and perforations of the intestines and all diseases afflicting NN, the slave of God; for the intercession of the Blessed Theotokos and all the saints we glorify and give thanks to the Father, Son, and Holy Spirit, now and always, forever and ever. Amen." Immediately hang the plant roots over smoke and cause them to wither; if God wills it, the patient will be healed.* (Papadogiannakēs 2001: 128)

[20]There are six-pointed stars painted in the text after this star.
[21]An example of magical words existing alongside religious words.

Here, just as the roots are shaved by the knife, so God is asked to shave away the swollen hemorrhoids; and just as the plantain roots wither over a fire and its smoke, so too God will cause the hemorrhoids to wither. Notice, though, that even within this magical context, religion pervades and is critical for the effectiveness of the treatment. This is a clear example of how faith in Christianity can exist alongside with magic (cutting herbs on moonlit nights while chanting exorcisms) and with good pharmacology, as plantain is used in herbal medicine to treat intestinal problems.

One cure in *Anagnōstēs*' text for a headache incorporates all three methods of healing: religious (cruciform knots), folk medicine (binding cloth or similar materials pulled tightly across the skull to constrict the vessels and ease the pain), and magic (the cracking open of an egg for the yolk symbolizes that the cracking open of the skull so that the migraine will escaped from the patient):

> *One should place a batch of cotton on the sufferer's head and then tie this with cruciform knots from the forehead to the nape of the neck, and from one side of the head to the other. Take four bobbins. Twist a knot around each bobbin and tighten well. Pull the knots tight. Next crack a newly laid egg and place the yoke on the crown of his head. The pain will pass in but a short time.* (Papadogiannakēs 2001, 54)

I would point out, incidentally, that modern studies have shown that cystine, the amino acid found in eggs, breaks down toxin acetaldehyde in the liver. This toxin is brought on by hangovers, and so eggs can help with headaches brought on by a hangover.

In the Theodorakis *iatrosophion*, headaches are not treated as extensively; rather, skin diseases are his main concern. It is not uncommon, however, for individual *iatrosophia* to emphasize particular diseases. Although each *iatrosophion* claims to treat all physical disorders, the fact is that each writer chose to highlight specific areas of the body, whether from his own interests or because certain ailments were more common in the locale where he lived.

Theodorakis records headache cures that range from good folk medicine to binding spells and sympathetic magic. In one section he offers three recipes:

> *For headache: Take vinegar and boil it, and add oakum and fine salt; put them on the head as a poultice/plaster. Similarly: Also raki, really hot, you should put it on the head. It is the perfect cure. (Another): The shell of the tortoise, you should burn it and make a powder, and you should mix it with pork fat, and pound Arum lily, and you should mix all together and anoint this person and he gets well.* (Clark 2011: 113)

All these ingredients are found in ancient and Byzantine folk medicine. Vinegar has been a popular cure for head pain from Hippocrates down to the present day, while turtle shells and especially Arum lily are still used for such pain. On the island of Crete, raki is commonly considered a great way to treat headaches, as well as other ailments like colds, flu, diarrhea, and fever.

Another recipe combines raki with vegetables and fruits:

> *For headache: Take one white onion, pound it, and Wallachian salt, and two paras worth of cinchona bark and 51 black raisins and very fine quality raki and beat them up well and put this on top; open out a blistering plaster on top of the neck.* (Clark 2011: 101)

Both onions and black raisins are found in herbal books as a treatment for headaches, but the cinchona bark is interesting. This bark contains alkaloid compounds including quinine, and would be effective for headache pain.

Another recipe calls for an unusual application: placing a freshly chicken on the patient's head:

> *For headache: Take oil and hot butter to anoint his head, and you should take a live chicken, and you split it to its belly just as it is, with the intestines; you should put them behind onto the very top of his head on top of the pain, similarly you should put another one underneath on the chin of the neck.* (Clark 2011: 125)

The magical method here is transference. By placing a chicken on the patient's head, the disease (or the pain) will be transferred from the head to the chicken.

A final section on headaches in this *iatrosophion* contains magical characters and exorcism prayers for expelling the headache or migraine:

> *For headache: Write the letters below at the waning of the moon: Ξ. E. Ψ. Θ. E. H. X. Λ. A. E. X. K. Ξ. B. B. M. Ψ. Swear by the 24 priests who officiate before the throne of God, depart from the servant of the Lord, You endured the nails, Christ, and bowed [your] immaculate head and you saved your faithful people and your faithful robber. Dismiss the head(ache) and the migraine head from the servant of the Lord. Holy Angels of the Lord who keep the four rivers of paradise: Psouson, Geon, Tigris and Euphrates, keep also the head of the servant of the Lord. Write these at the waning of the moon and have him keep them on top of his head.* (Clark 2011: 111)

This spell combines astrology (the waning of the moon), religious texts (the story of the penitent thief on the cross and passages from the book of Revelation), exorcism of the headache, and the use of a phylactery that the patient must wear on his skull. What we have is a marvelous syncretism of various belief systems working side by side to achieve healing.

In conclusion, the various recipes (medical, pharmacological, religious, and magical) in our two *iatrosophia* demonstrate how all methods of healing in post-Byzantine Crete were considered legitimate. Throughout the early modern era of Greece, medical practitioners came in many forms: herbalists, folk healers, priests, wise village men and women, magicians, old women in the family, as well as trained doctors.[22] All these people were viewed in society as legitimate medical healers, for the medical practitioner was not necessarily one who possessed specialized, formal training, but anyone whose primary concern

[22]See more fully Jütte (2013); Oberhelman (2013: 1–31); and the special issue of *Anthropology & Medicine* 23.2 (2016); for Europe generally, Gentilcore (1998) and Walker (2005); for Greece, Hionidou (2016).

was the treatment of a sick person. People who were suffering from illness and were in pain did not care who cured them or even how they were cured. They were willing to consult anyone and to undergo any method of treatment, as long as health was restored.

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