

**Assessing the United States' Healthcare System through an Actor Network Theory
Framework**

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Christopher Warburton
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On my honor as a University Student, I have neither given nor received
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Signature _____ Date _____
Christopher Warburton

Approved _____ Date _____
Hannah Rogers, Department of Engineering and Society

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Introduction

With a biotechnology market of approximately \$120 billion, the United States (U.S.) is one of the world leaders in health technology development (“Top 4 Countries,” 2020). However, the overall quality and cost of the U.S. healthcare system lags behind many other developed countries, such as Canada and Sweden (Tikkanen and Abrams, 2020). The government and people in the U.S. spend more on healthcare than any other country in the world, spending over \$3 trillion, or 18% of gross domestic product (GDP) in 2018. Healthcare spending has continuously risen throughout the recent decades, as in 1960, the U.S. only spent 5% of its GDP in healthcare costs (“Why are Americans,” 2020). Despite copious healthcare spending, the average life expectancy of a U.S. citizen is relatively low compared to most developed countries, at 78.7 years (Byrnes, 2019). While the U.S. is considered a leader in medical discoveries, this is not reflected in the U.S. population’s health. U.S. citizens do not have significantly better healthcare outcomes compared to other developed countries. In reality, the U.S. has seen recent regressions in common healthcare metrics, such as an increase in premature death rates over the last five years (Kurani, 2020). Additionally, with the current rates of healthcare expenditures, the Centers for Medicare and Medicaid Services project that by 2028, healthcare costs will exceed \$6 trillion or 20% of total GDP (“Why are Americans,” 2020).

This paper will utilize Actor Network Theory (ANT) and network analysis to support an examination of the four main players of the U.S. healthcare system: the financiers, insurers, providers, and suppliers. By learning about the power dynamics between key actors in the U.S. healthcare system through ANT, areas of improvement in the current system will then be

identified. This will be done with a combination of case studies on two of the leading healthcare countries, Canada and Sweden. These studies will first depict the dynamics of these healthcare systems and then identify what successful components of these systems could be feasibly incorporated into the U.S. system to lower costs for both patients and the government and improve population healthcare outcomes. In an effort to suggest improvements for the U.S.' current healthcare system, this paper will focus on the following research question: in comparison to other developed countries, how can the current U.S. healthcare network be improved in order to decrease healthcare costs and improve healthcare outcomes overall?

Actor-Network Theory and Network Analysis

ANT is a social theory that helps map dynamic networks of relationships in the social and natural worlds, developed by Michel Callon and John Law (Cressman, 1970). ANT is traditionally utilized to “open the black box” of science and technology by sketching the relationships between various entities in a social system. Broadly speaking, these entities may include governments, technologies, knowledge, texts, money, and people. In analyzing and understanding the connections between these components, one can more clearly visualize the relationships amongst major actors in a healthcare system (Seabrook, 2020). In respect to the U.S. healthcare system, ANT will be an effective approach in depicting and comprehending the current network in place.

To understand the current network using ANT, one must recognize the central characteristics of ANT. The first important component of ANT is the idea of an actor, which is simply an “entity that does things.” Actors are the tangible components of a network and can include human and non-human constituents (Seabrook). Examples of actors in the U.S. healthcare system are insurance providers and hospitals. According to Callon, a network is, “...

[a] group of unspecified relationships among entities of which the nature itself is undetermined (Callon, 1999).” Networks are dynamic and can change in response to the actions of currently existing actors, the addition of new actors, the desertion of actors, or changes in actor alliances (Tatnall and Gilding, 1999). The network in evaluation is the U.S. healthcare system. Callon explains, “An actor-network is simultaneously an actor whose activity is networking heterogeneous elements and a network that is able to redefine and transform what it is made of.” (Callon, 1987). The actor-network notion cannot be understood fully without knowledge of the black box concept. The term black box is used to represent a complex technology whose contents and behavior may be assumed to be common knowledge (Pinch and Bijker, 2012). This idea is important as it prevents unnecessary analysis of complex actors in the network being studied. Typically, complex actor-networks are black boxed and linked with other networks to create larger actor-networks (Callon 1991). In this thesis, the complex network of insurance programs will be black boxed as two entities, private and public insurance, in order to focus more on the U.S. healthcare system and its actors.

The actors in a network communicate through intermediaries, a broad term to describe how actors are able to convert their intentions onto other actors. Translations involve all the techniques through which an actor recognizes other actors and arranges them in relation to each other. Thus, each actor has their own view (assuming a human actor) of the distribution of their network and how the actor hierarchy (Seabrook, 2020). In the U.S. healthcare system, intermediaries include the way that the actors can interact with each other. For example, insurance companies interact with patients through individual insurance plans or plans provided by the patient’s employee.

The Current U.S. Healthcare System Actors

The United States' healthcare system will be broadly viewed as having four major stakeholders. While underlying healthcare issues can be a result of an entire network of problems, some may stem directly from these four actors.

The Financiers

The financiers supply the funds for healthcare. This group includes individuals consuming healthcare, companies that pay for employee insurance, and the government that subsidizes public programs like Medicare and Medicaid. Medicare is a federal program that provides health insurance, regardless of income, to individuals 65 and over along with select individuals under 65 with disabilities. Medicaid is a state and federal program that provides coverage to people with very low income (“Differences between Medicare and Medicaid”, 2021). Most U.S. citizens are considered financiers because they finance businesses through the purchasing of products, and they support government programs by paying taxes (“An Overview of US Health Care Delivery,” n.d.).

The Insurers

The second key stakeholder is the insurers. At a most basic view, these companies receive money from purchasers and pay providers for care. The traditional roles of insurance providers are to obtain money from purchasers, absorb the medical cost risks of the purchasers, and then pay providers when insured purchasers need medical care. The government can be considered both an insurer and purchaser with its programs; additionally, businesses that self-insure their workers are considered both purchasers and insurers.

The Providers

Providers include but are not limited to, hospitals, clinics, physicians, nurses, nurse practitioners, pharmacists, nursing homes, or any other entity that provides direct care. The

providers category may be further differentiated into healthcare professionals and healthcare locations (“An Overview of US Health Care Delivery,” n.d.).

The Suppliers

The fourth and final key actor in the U.S. healthcare system is the suppliers. This actor includes pharmaceutical companies, medical supply businesses, and computer industries. Together, the suppliers provide equipment, medications, health records, and other supplies necessary for providers to treat patients (“An Overview of US Health Care Delivery,” n.d.).

Current U.S. Healthcare System Network Function

It is essential to understand how the identified actors operate with one another in a network. The U.S. healthcare system “network” is not a smooth, integrated network; instead, it has been described as “a kaleidoscope of financing, insurance, delivery, and payment mechanism that remain loosely coordinated” (“An Overview of US Health Care Delivery,” n.d.). The current U.S. healthcare system will be depicted below.

A Lack of Centralized Healthcare Control

There is currently no central control of the current U.S. healthcare system as there is in most developed countries. The U.S. does not have a governmental department that monitors total expenditures through global budgets or controls availability of resources and services. On the contrary, most developed nations, including Sweden and Canada, have national healthcare programs in place in which the citizens of the country are entitled to a baseline set of healthcare services. These national systems control healthcare costs by utilizing global budgets to determine total national healthcare expenditures along with allocating resources within the budget. A lack of central control of U.S. healthcare could be a key reason for the inefficiencies of the current system.

Private and Public Healthcare Coverage

U.S. citizens have the potential to access healthcare services through one of the following means: employer-issued health insurance, government healthcare programs, private funding, privately-purchased insurance, or through charity or subsidized care. Health insurance is the primary method by which individuals ensure access to care. Uninsured patients have access to certain services at federally supported healthcare centers; however, these centers are located only in certain geographic areas and provide limited specialized care. Additionally, under U.S. law, public hospital emergency departments are legally required to evaluate a patient's condition and provide care for life-threatening ailments regardless of the patient's ability to fund the treatment ("An Overview of US Health Care Delivery," n.d.).

Private insurance companies have a large stake in power compared to the other actors. They are able to set plan rates with the financiers and additionally set rates and negotiate procedures costs with select providers. Financiers are obligated to accept insurance plans to avoid risk of funding a medical catastrophe. Providers are pushed to accept deals with insurance companies so they can have clients to provide their services to. With this power dynamic, these insurance companies are able to maximize personal benefits. This aspect of the U.S. healthcare system has created the high healthcare cost due to the lack of control of healthcare by a free market. In a free market buyers (patients) and sellers (providers) are independent, meaning that buyers can choose to purchase services from any sellers. Sellers neither collude to fix prices nor are the prices fixed by some external agency. In a free market, prices are set by the economic laws of supply and demand. However, since most patients are enrolled in private health plans, these plans act as the intermediary for patients, which means they are the real buyers in the healthcare market. Private health plans typically offer their patients only a limited number of

potential providers among their network, setting health service prices themselves, affecting the forces of a free market.

Insurance and Healthcare Funding Sources

There is a wide variety of insurance options available in the U.S.; however, for this thesis, only the basic details of insurance coverage needs to be understood. Most insurance policies are delivered by private companies in the U.S.. Every person wishing to obtain insurance must pay out of their own pocket, and most people either obtain coverage individually or through their employer. People who choose to obtain insurance individually directly pay the insurance premium for themselves or their family. Advantages of individual insurance plans include the freedom to choose an insurance company and plan, the ability to change plans, the independence between your plan and your job, and the ability to pick a plan that covers doctors and hospitals of your desire (“Employer Health Insurance Versus Individual Plans”, n.d.).

With employer-sponsored health insurance, also known as a group plan, the employer typically splits the cost of insurance premiums with the employee. There are several additional advantages of the group plan. The employer does the work of choosing plan options, which is beneficial to the majority of Americans that are not familiar with insurance plans. The premium contributions made by the employee can be made pre-tax, which lowers the employees taxable income, saving them even more money (“Employer Health Insurance Versus Individual Plans”, n.d.). With the potential savings available with the group plan, a vast majority of privately insured Americans decide to choose this option.

Additionally, there are two major government funded insurance options for qualifying individuals: Medicare and Medicaid. Medicaid eligibility is dependent on the definition of low income, which varies per state and depends on metrics such as cost of living and family size

(“Who is Eligible for Medicaid?” 2017). Medicaid is funded with federal and state general revenues (“International healthcare systems: The US Versus the World,” 2019). Medicare is funded by a combination of payroll taxes, premiums, and general tax revenues. Each insurance company has their own network of providers available for coverage under their plans. Insurance companies create contracts with doctors in their network, in which doctors will accept a reduced payment for services to gain access to the insurance network and its clients. When insurance clients obtain medical service from in-network doctors, the insurance company will usually fully pay or subsidize the medical costs for the client. If care is received from a physician not within the insurance network, then the healthcare costs will fall fully on the patient, which encourages patients to only utilize physicians within their plan (“In-network vs. Out-of-network Providers: Parent FAQs,” 2021). Each insurance company has its own network of physician specialties and hospitals, making the system very confusing for both patients and healthcare facilities.

In a survey conducted in 2015, 90.9% of Americans had health insurance, with 55.7% receiving coverage through their employer, 16.3% through individual coverage, 16.3% through Medicare, 19.6% through Medicaid, and 4.7% through the military. (“International Healthcare Systems: The US Versus the World,” 2019). With the current system, it is clear that most American rely on their employer to supply health insurance. This power dynamic creates further health disparities and unequal access to care in the U.S.. Unemployed citizens are faced with the burden of healthcare costs along with finding ways to monetarily support other aspects of their life. As a result, many uninsured, unemployed individuals will avoid primary care visits and other necessary hospital visits, negatively affecting their quality of life. Some of these people may qualify for Medicaid; however it is common for Medicaid to not fully cover important healthcare visits (“Underinsured Americans Need a Financial Lifeline,” n.d.). With the current

network mainly relying on employers to subsidize expensive insurance plans, the unemployed are not only left to fully fund insurance themselves, but the gap in quality of life and overall health issues continues to increase due to this system.

Summary of the Current U.S Healthcare Network

Each stakeholder in the U.S. healthcare system, including physicians, insurance companies, large employers, and health service institutions, has their own economic interest to protect. Physicians strive to maintain a healthy income while having minimal interference with how they prefer to practice medicine. Health service institutions aim to maximize reimbursements from insurers. Private insurance companies try to maintain their personal share of the insurance market. Big employers try to contain the costs associated with provided health insurance to employees. The government tries to protect the benefits of those covered under public insurance while simultaneously containing the cost of the respective benefits. As a result of these self-interests, cost management has proven to be a major challenge in the current system (“An Overview of US Health Care Delivery,” n.d.) Progress in the cost and quality of individual care in the U.S. is hindered by stakeholders’ self-serving motivations.

The Canadian Healthcare System

In contrast to the current U.S. healthcare system, Canada has a more organized single payer healthcare system, and the monetary benefits are clear. In 2016, healthcare expenditures in Canada accounted for 11.1% of the country’s GDP versus 18% of the GDP for the U.S. respectively. 70% of Canadian healthcare expenditures comes from public funding, 14% comes from out-of-pocket costs for services explained later in the paper, and 12% comes from private insurance (“International healthcare systems: The US Versus the World,” 2019). Canada has a National Health Insurance program (NHI) that is run by the government and provides health

insurance to the entire population. Physician fees are negotiated periodically between the ministry and the provincial medical associations, which is comparable to the American Medical Association in the U.S.. General taxes finance the NHI in a single payer system. Unlike the U.S. insurance system, patients are able to choose any physician they wish for care and do not have to pay any premiums or additional payments. Additionally, Canadians do not have to pay deductibles, or an amount an individual has to pay for health services before the health insurance begins to pay for care. Health plans are administered and monitored by the provinces of Canada, and physicians are paid on a fee-for-service basis. To protect its citizens, Canada has also made it illegal for physicians to utilize a private health insurance plan for any service that is covered by the NHI. In addition to the NHI, most Canadians have a small private insurance plan which covers medical expenses not included in the NHI plan, like dental care, prescription medications, visual care, podiatry, and chiropractics (Feinstein, 2019). Access to these private insurance companies is identical to the U.S., with most Canadians utilizing group plans supported by employers and some Canadians preferring independent insurance.

One of the key ways that Canada effectively manages its healthcare expenditures is through their tight control of resource allocation of high-tech, expensive services. Government regulators control a large range of allocation of resources, including capital investment in hospitals, specialty mix of physicians, location of recent medical graduates, and geographical diffusion of diagnostic and surgical equipment. Not only does the tight control promote more efficient healthcare spending, but it promotes relatively equal access to care among provinces (Ridic et al, 2012). This demonstrates how a developed country like Canada, has implemented superior tactics for managing the complicated healthcare system network.

The Swedish Healthcare System

Similar to Canada, one of the most successful healthcare systems in the world is Sweden. Sweden ranks among the top countries in many healthcare metrics, including life expectancy, cancer survival rates, and infant mortality rates. Sweden utilizes a hybrid healthcare system; the main providers of healthcare are the county councils and municipalities, with about 10% of healthcare delivered by private providers (Marczewska, 2011). It is common in Sweden for healthcare to be provided by private care providers but financed by regional councils (“Healthcare in Sweden,” 2020). Less than three percent of citizens of Sweden had additional private health insurance, and the main purpose of the additional insurance is to expedite the wait time for treatment. Over the last two decades, Sweden healthcare expenditures accounted for about 9.2% of its GDP. Over 70% of the funding for healthcare comes from county council taxes (equivalent to income taxes in the U.S.). 20% of costs are covered by national subsidies. Out-of-pocket costs for physician visits account for about 3% of total healthcare costs. Out-of-pocket fees for different doctor visits are extremely low and are set by the individual county council. Citizens of Sweden also have to pay out-of-pocket for prescription medications. However, there are national ceilings for the amount that each person has to pay for both prescription medications and doctors fees annually (Marczewska, 2011). All hospital fees are covered by the Swedish government along with specialist visits that were referred by a primary care doctor.

Most people in Sweden utilize the national healthcare system. Unlike Canada, where the NHI is a federal program and is standardized throughout the country, public healthcare coverage varies per each municipality; however, plans generally cover costs in categories such as primary care, emergency care, inpatient care, specialist care, outpatient care, and dental care (“Healthcare in Sweden: A Guide to the Swedish Healthcare System,” 2017).

A noteworthy aspect of Sweden's healthcare system is the strong focus on preventative health. Swedish Commissioner Denny Valero explains, "The Swedish public health policy aims to create the social conditions to ensure good health for everyone... health is not produced by the health system alone. Rather, it is produced by other sectors, and thus is the responsibility of all sectors." (Broussard, 2019). Focusing on preventative healthcare measures and making public health a duty of all sectors of the country contributed to the great healthcare outcomes of Sweden in addition to the low total healthcare expenditures.

Sweden has a very organized public health system. At the top of the system is the Public Health Agency of Sweden, which "... develops and supports activities to promote health, prevent illness and improve preparedness for health threats, with most of its activities being focused outside of the health sector." Again, Sweden's focus on health measures beyond the healthcare sector is very unique and is what sets the country apart from others from a health perspective.

The Swedish healthcare system has another government regulatory agency called the National Board of Health and Welfare. This government entity monitors clinics and manages personnel, working to minimize wait times and ensure equal access to care across the entire country. With respect to other countries, this agency is fairly successful in access management, as 88% of patients are able to see a specialist for an issue within 90 days and 82 % receive treatment or surgery within 90 days ("Healthcare in Sweden," 2020). Additionally, this agency is responsible for the licensing of healthcare professionals and developing statistics on medicine efficacy, causes of death, and financial support. Regulation of licensing allows Sweden to maintain the optimal amount of workers to ensure to their best ability that everyone in the country is able to obtain care when needed, while also minimizing healthcare waste and over-licensing of a single specialty that may not have a strong demand. Since 2011, the National

Board of Health and Welfare also established special guidelines on how health services can incorporate preventative health into their daily services. They emphasize the importance of treating each patient as more than just the primary complaint. For example, healthcare professionals are supposed to encourage change in unhealthy habits, such as smoking cessation, increasing physical activity, reducing alcohol intake, and promoting healthier eating habits (Burström, 2018).

There are many other government agencies involved in Sweden's preventative healthcare measures as well. A few important ones will be mentioned here. The National Food Agency takes healthcare measures by guiding consumers towards healthier diets, ensuring food safety, and controlling the quality of water. The Medical Products Agency regulates the safety of new drugs and other medical products. The Swedish Work Environment Authority ensures a safe work environment by carrying out inspections and providing suggestions on how to improve a workspace's ability to prevent risks (Burström, 2018). The idea of making healthcare a priority in every aspect of society has helped Sweden obtain extremely positive outcomes in population health.

Potential Improvements for the U.S. Healthcare System

By understanding and adopting certain strategies and policies of successful healthcare systems, such as Sweden and Canada, the U.S. can feasibly enhance its healthcare system by both decreasing overall expenditures on healthcare and improving on healthcare metrics, such as life expectancy. With each possible healthcare adjustment, it is also necessary to try to understand the consequences, both positive and negative, on each of the major actors of the U.S. healthcare network.

What the U.S. Can Adopt from Canada's Healthcare System

A more radical idea from the Canadian healthcare system that could improve the U.S. system is the idea of a basic universal healthcare system. In Canada, most people have an additional health insurance plan on top of the NHI. The U.S. healthcare system would significantly improve if a small form of the NHI was introduced. For example, a government funded insurance program could be introduced to cover annual primary care visits. This would not only increase access to healthcare, but it would also improve U.S. preventative care measures. Annual primary care visit coverage would allow more people to learn about their health in order to either seek further medical attention or adapt lifestyle habits to improve health. Primary care physicians will be able to assess the current health of their patients while providing personalized advice on life and health habits to more patients under a basic universal healthcare policy. Again, this change would likely improve the U.S. life expectancy, average quality of life, and decrease the rates of chronic illnesses due to preventative primary care measures.

One of the major criticisms of the Canadian healthcare system, and specifically the NHI, is that Canadians have to pay higher taxes overall to fund the public healthcare system. This is a valid point of concern, and a study conducted in 2017 by the Canadian Institute for Health Information (CIHI) found that the average Canadian pays \$6,604 in taxes directly supporting public healthcare coverage. Indeed, this healthcare expenditure is considered high for most developed countries; however, it is still considerably lower than the average American spends annually on healthcare, which is over \$10,000 dollars per person (Feinstein, 2019). Also, as previously stated, the NHI does not have any deductibles, and a visit to almost every specialty of medicine is free to Canadian citizens, as the doctor bills are directly paid by the respective province government through the NHI (Feinstein, 2019). With the potential manner of adoption proposed, the improved health metrics resulting from the basic universal healthcare plan would

far outweigh the small increase in tax rates in the U.S.. Additionally, the plan could potentially even lower the percent GDP healthcare expenditures by reducing the amount of uninsured emergency room visits.

In addition to the NHI, another unique characteristic of Canada's healthcare system is the patient's ability to obtain care covered by the NHI from any physician of choice. This is an idea that the U.S. can potentially adopt to increase access to care. With the current U.S. healthcare system design, patients can only obtain covered care among certain physicians within the insurance provider's network. Thus, patients may be discouraged from obtaining treatment if no local physicians of the necessary specialty are covered in their plan. If this proposed change was implemented, access to care would significantly increase for every patient with health insurance plans. The overall quality of life among individuals and life expectancy would most likely improve as a result.

The U.S. healthcare network would also be affected if this physician selection change was implemented. The patient would have more choice and control over their health with the ability to get insurance coverage for any physician of choice. The insurance companies would have less of an ability to control the cost of their plans. Physicians would not have to negotiate costs insurance plans; they would have one rate for each insurance company, which would most likely increase the physician's income. Overall, adopting this strategy from Canada would bring significant benefits to the U.S. healthcare system with minimal changes in the major network of healthcare actors.

What the U.S. Can Adopt from Sweden's Healthcare System

With an average life expectancy of 82.7 years, Swede's live an average of about 4 years longer than citizens of the United States and spend significantly less on healthcare per year than

the U.S. (Chamberlain, 2020). Much of the success of Sweden's healthcare system is the government's dedication to preventative healthcare measures. These measures are something that the U.S. could feasibly incorporate into the current system and would significantly improve factors such as average life expectancy, chronic disease rates, and overall general population health. The U.S. could specifically adopt the idea that health and public wellness is an issue that needs to be addressed in almost every department of society. For example, a great potential area of focus for public health measures in the U.S. would be in the food industry. In 2020, a whopping 42% of adults in the U.S. were classified as obese (Farberman and Kelley, 2021). Obese individuals are at significantly higher risk than normal adults for a wide variety of health problems, including heart disease and stroke, type 2 diabetes, and cancer (Mayo Clinic Staff, 2020).

It is clear that many underlying health problems stem from obesity; thus, the U.S. should incorporate Sweden's preventative health model into the food industry to improve overall health outcomes. The government could mandate companies to regulate the amount of unhealthy ingredients sold on the market, such as high fructose corn syrup and simple carbohydrates. Additionally, bans on ingredients like toxic, cancer causing preservatives and fat substitutes would improve the overall health of the U.S. population ("10 Banned Foods Americans Should Stop Eating," 2016). By restricting the harmful foods offered to the public for preventative health measures, the U.S. could work to mitigate the obesity pandemic while reducing the amount of healthcare expenditures at the same time. The food sector is only one area where preventative health measures could be improved by government regulation. There are many other fields that could also be regulated from a healthcare perspective, such as workers risk mitigation and mental health education.

To incorporate Sweden's preventative health model, the U.S. government would have to take a bigger role in the healthcare network. In the current U.S. healthcare network, the government was not even considered a major independent actor among the network; instead, it merely made up small portions of the financiers, suppliers, and providers in this paper. In order for preventative care to be successful in the U.S. as they are in Sweden, the government would have to take a stronger role in the healthcare field and become a 5th important actor that plays an independent, significant role in the network. The more individual government funded agencies that can be feasibly established to regulate preventative healthcare in various fields, the more successful the U.S. healthcare system will perform against other countries.

The biggest limiting factor in establishing new government agencies is the source of funding. An increase in funding would mean taxes would have to increase to support new agencies. To determine the effectiveness of increasing taxes, future research could be conducted to identify the optimal amount of government agencies focused towards preventative healthcare. The ideal agency level would most likely be where the tax expenditures and percent decrease in healthcare spending are optimized.

Conclusion

Overall, by characterizing the U.S. healthcare system through ANT and analyzing the relationship of the key actors through network analysis, the function, relationships, and flaws of the present U.S. healthcare system were identified. Some key flaws identified through ANT analysis were the lack of a governmental control of healthcare and the distracting self-interests of stakeholders. The case studies performed on two high-quality healthcare systems, Canada and Sweden, aided in the identification of the strong qualities of these recognized systems. Characteristics evident in the systems evaluated in these case studies include preventative health

efforts and national healthcare programs. Ways these components, as well as others reviewed could practically be incorporated into the U.S. healthcare system were suggested.

There are many opportunities for future research pertaining to healthcare systems. Only two successful healthcare systems were analyzed in this thesis. There are several other countries with higher quality healthcare systems, and further case studies could be performed to determine what methods work well within those systems. Additionally, methods such as interviews and surveys could be conducted in the U.S. to learn about the opinion that citizens and policy makers have on the current U.S. healthcare system along with potential ideas for change. The U.S. healthcare system has a lot of room for improvement, and the system could become more successful by adopting healthcare strategies from more successful healthcare systems. In the near future, it is likely that the U.S. will begin to improve the healthcare system by expanding public health insurance coverage through the Medicaid program. Efforts are being made to both improve the plan's coverage along with increasing the amount of citizen's eligible for the plan (Rudowitz et al, 2021). This is a small, yet important, step in the proper direction to improve overall U.S. healthcare outcomes.

References

- Bijker, W. E., Hughes, T. P., & Pinch, T. (2012). *The social construction of technological systems: New directions in the sociology and history of technology*. Cambridge, MA: MIT Press. doi:10.1177/030631284014003004
- Broussard, B. (2019, January 15). What Can America Learn from Sweden about Healthcare? Retrieved April 06, 2021, from <https://www.weforum.org/agenda/2019/01/what-can-america-learn-from-sweden-about-healthcare/>
- Burström, B., & Sagan, A. (2018). Sweden. Retrieved April 06, 2021, from <https://www.ncbi.nlm.nih.gov/books/NBK507332/>
- Callon, M. (1999). Actor-Network Theory – The Market Test. In Hassard, J & Law, J. (ed.) *Actor-Network Theory and After*. Oxford: Blackwell Publishers
- Callon, M. (1987). Society in the Making: The Study of Technology as a Tool For Sociological Analysis. In Bijker, W., Hughes, T., & Pinch, T. (eds.) *The Social Construction of Technological Systems*. Cambridge: MIT Press.
<http://samples.jbpub.com/9781284047127/Chapter1.pdf>
- Campbell, K. (2020, May 8). Crossing the Border: Doctor Salary US vs. Canada. Retrieved April 06, 2021, from <https://www.dr-bill.ca/blog/practice-management/doctor-salary-us-vs-canada/#:~:text=Although%20doctors%20typically%20do%20earn,salary%20to%20American%20general%20practitioners>
- Chamberlain, L. (2020, November 16). Life Expectancy for Countries. Retrieved April 06, 2021, from <https://www.infoplease.com/world/health-and-social-statistics/life-expectancy-countries>

Chiesi, A. (2002, November 02). Network Analysis. Retrieved April 05, 2021, from <https://www.sciencedirect.com/science/article/pii/B008043076704211X>

Cram, P., Dhalla, I., & Kwan, J. (2016, October 4). Trade-Offs: Pros and cons of being a doctor and patient in Canada. Retrieved April 05, 2021, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5400751/>

Cressman, D. (1970, January 01). A brief overview OF Actor-Network Theory: Punctualization, Heterogeneous Engineering & Translation. Retrieved April 05, 2021, from <https://summit.sfu.ca/item/13593>

Differences between Medicare and Medicaid. (2021). Retrieved April 05, 2021, from <https://www.medicareinteractive.org/get-answers/medicare-basics/medicare-coverage-overview/differences-between-medicare-and-medicaid#:~:text=Medicare%20is%20a%20federal%20program,have%20a%20very%20low%20income>

Employer Health Insurance Versus Individual Plans. (n.d.). Retrieved April 05, 2021, from <https://www.medmutual.com/For-Individuals-and-Families/Health-Insurance-Education/Health-Insurance-Basics/Employer-vs-Individual-Health-Insurance.aspx>

Farberman, R., & Kelley, B. (2021). The State of Obesity 2020: Better Policies for a Healthier America. Retrieved April 06, 2021, from <https://www.tfah.org/report-details/state-of-obesity-2020/>

Feinstein, C. (2019, November 22). What I learned as a Canadian reporting on healthcare in America - and what Americans can learn from Canada. Retrieved April 05, 2021, from <https://www.businessinsider.com/american-misconceptions-about-canadian-healthcare-2019->

<https://www.healthsystemtracker.org/chart-collection/quality-u-s-healthcare-system-compare-countries/>

Lalley, C. (2020, October 29). Health insurance basics: 101 guide to health insurance. Retrieved April 05, 2021, from <https://www.policygenius.com/health-insurance/learn/health-insurance-basics-and-guide/>

Lyu, H., Xu, T., Brotman, D., Mayer-Blackwell, B., Cooper, M., Daniel, M., . . . Makary, M. (2017, September 6). Overtreatment in the United States. Retrieved April 05, 2021, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5587107/>

Mayo Clinic Staff. (2020, November 18). Obesity. Retrieved April 06, 2021, from <https://www.mayoclinic.org/diseases-conditions/obesity/symptoms-causes/syc-20375742>

Marczewska, N. (2011). Swedish healthcare: Overview of the health system. Retrieved April 06, 2021, from <https://healthmanagement.org/c/icu/issuearticle/swedish-healthcare-overview-of-the-health-system>

An Overview of US Health Care Delivery. (n.d.). Retrieved April 05, 2021, from <http://samples.jbpub.com/9781284047127/Chapter1.pdf>

Ridic, G., Gleason, S., & Ridic, O. (2012). Comparisons of health care systems in the United States, Germany and Canada. Retrieved April 05, 2021, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3633404/>

Rudowitz, R., Musumeci, M., & Garfield, R. (2021, January 15). Medicaid: What to watch in 2021. Retrieved April 22, 2021, from <https://www.kff.org/medicaid/issue-brief/medicaid-what-to-watch-in-2021/>

Seabrook, B. (2020). ANT Notes. Retrieved from University of Virginia STS 4500 Collab site.

Tatnall, A., & Gilding, A. (1999). Actor-Network Theory and Information Systems Research.

Retrieved April 05, 2021, from

<http://www.sfu.ca/cmns/research/gmml/archive/zotero%20database/zotero/storage/10891/PaperTatnall-069.pdf>

10 Banned Foods Americans Should Stop Eating. (2016, January 14). Retrieved April 06, 2021,

from <https://www.holisticcenteratbristolsquare.com/wellness-articles/10-banned-foods-americans-should-stop-eating1/>

Tikkanen, R., & Abrams, M. (2020, January 30). U.S. health care from a global perspective,

2019: Higher spending, worse outcomes? Retrieved April 21, 2021, from

<https://www.commonwealthfund.org/publications/issue-briefs/2020/jan/us-health-care-global-perspective-2019>

Underinsured Americans Need a Financial Lifeline. (n.d.). Retrieved April 22, 2021, from

https://www.healthwellfoundation.org/wp-content/uploads/2017/10/Underinsurance_In_America.HWF_.2015.pdf

Who is Eligible for Medicaid? (2017, August 04). Retrieved April 05, 2021, from

<https://www.hhs.gov/answers/medicare-and-medicaid/who-is-eligible-for-medicaid/index.html>

Why Are Americans Paying More for Healthcare? (2020, April 20). Retrieved December 04,

2020, from <https://www.pgpf.org/blog/2020/04/why-are-americans-paying-more-for-healthcare>