

A THEORY OF SOCIOTECHNICAL JUSTICE IN HEALTHCARE

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ABSTRACT

The social determinants of health make the most impact on our health. There is significant inequality in health due to unfair distribution of the social determinants. Yet, the healthcare system lacks a focus on addressing the social determinants. For this reason, social justice is a necessary part of pursuing equitable healthcare. This goal is complicated by the growing role that technology plays in healthcare and society. Due to the importance of digital information technology, social justice in healthcare must be reoriented to include a focus on its technical aspects. In this paper, I make a case for sociotechnical justice in healthcare, with core concepts and basic principles influenced by Rawlsian Justice. I then present an argument using sociotechnical justice to address a current issue in healthcare before concluding.

This thesis, “Is dedicated to all those who fight
against injustice and corruption every day of their lives” (Kojima, 1994).

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PREFACE

As broad, important topics of human discourse, social justice and healthcare each deserve far more detailed attention than I am able to provide in this paper. They are rightfully the source of discussions and arguments that have lasted for ages and will continue on for generations more. There is no perfect solution to how we should live our lives. Nonetheless, as humans we do seek progress to live better. In that progress, technology has always served an influential role, shaping the way we live and the way we hope to live in the future.

Over recent decades, the role of technology, specifically digital information technology, in our lives has been exponentially expanding, conferring serious ethical implications. As we move further into this era of digital technology and information, those who stand to lose the most are those who already have the least. Humanity has long been keenly aware of the potential problems from technological progress such as the formation of surveillance states. However, invasion of privacy and absolute control by an omniscient authoritarian government are not the only risks that progress in science and technology present to us.

While post-human fantasies remain entirely within the realm of science-fiction, society and technology have progressed to the point that healthcare is at a crossroad. The promises of artificial intelligence and genetic engineering give hope to the bearers of incurable cancers or rare illnesses. At the same, millions suffer from a lack of access to basic healthcare. More importantly, many people experience a social structure unfairly biased against them, resulting in ill effects on their health. Technology can serve to close

this gap in health – or it can create an insurmountable chasm that relegates a segment of the population to a permanent subclass of being and a lower quality of life.

The most prominent connection between technology and health outcomes is not through the field of medicine itself. It is well known that aside from a few magic bullets such as insulin and antibiotics, medical care does not have the most significant impact on health (Stegenga, 2018). Instead, it is the social context in which we live that most determines our health. For that reason social justice is paramount to equitable health care. And it is through that social context, in what we call the social determinants of health, that technology mediates its most potent effect on our health. And because technology is increasingly consequential to society and to our health, justice in healthcare must be seen through a technical frame. Therefore, I will attempt to lay down the groundwork here for a theory of sociotechnical justice in healthcare.

CHAPTER 1: INTRODUCTION

“The fundamental purpose of healthcare is to enhance quality of life by enhancing health” (Berry, 2018, para. 2). However, healthcare as constructed and administered in the United States does not maintain or promote a state of health. Instead, it is focused on financial profit (Berry, 2018). As a result, the United States lags behind most other developed nations in markers of health while consuming money at an escalating rate already higher than any other country (Statista, 2020). This occurs because the money that the United States spends on healthcare does not go towards areas that make the most impact on health.

The largest contributors to health are the social determinants, but the United States fails to act on that knowledge and continues to focus on direct medical care as the solution to most problems in health. In the meantime, millions suffer from an unfair burden of poor health due to the unequal balance of the social determinants in the United States. Despite this ongoing problem, digital technology and information systems have given us a new surge of hope to transform medicine to improve our ability to achieve and maintain better health. However, as with the disappointing results of the human genome project in regard to its effect on medicine and healthcare, the more we know, the more we realize we need to learn. Yet, the next idea is always touted as the one that will help to make the next big leap in healthcare.

Even as the function of the healthcare system has been fundamentally transformed by digital information technology such as with the expansive implementation of electronic health records, its effect on health has not been significant (Brenner et al.,

2016). At the same time, outside of healthcare, society has changed so that everyday tasks require access to digital technology and a working knowledge of how to use that technology.

Where digital technology and information systems can impose their strongest, and potentially unprecedented influence on health, is through a massive change in the social landscape of humanity, altering the effects of the social determinants. Unfortunately, thus far technology has mostly reinforced the existing social structure built on historical injustices, setting the stage for the development of more inequality in health.

The influence of the social determinants on health and their role in health inequality warrant incorporating social justice as a path toward equity within health and healthcare. Because of the growing influence of technology on the social determinants and on healthcare itself, now disproportionate compared to other factors, I argue that we should pursue a form of social and technological justice in healthcare that I hereafter refer to as sociotechnical justice in healthcare.

Sociotechnical justice in healthcare is a critical theory framework adopting Rawlsian principles and challenging the current social, technical, and healthcare infrastructures now dominated by healthcare systems, corporate entities, and policymakers more invested in financial gain than patient care. Healthcare should supplant these infrastructures by promoting a fair, humane, and equitable use of technology in healthcare that will help to close health disparities. In this paper, I will first review the role of society in healthcare and why it is necessary to pursue social justice. Then I will introduce the deep connections between society, technology, and health. This extensive interconnectivity is the foundation on which I will build a theory of

sociotechnical justice in healthcare based on Rawlsian Justice. After establishing core concepts and basic principles, I will provide an example of looking through the lens of sociotechnical justice at a current issue in healthcare.

Although the narrative of science-fiction rightly influences our perspectives on technology, I will not spend time here outlining tech fantasies such as transhumanism, that are unlikely to have any major influence in healthcare soon. The intent here is to build a concise, actionable foundation for sociotechnical justice in healthcare.

CHAPTER 2: SOCIETY AND HEALTHCARE

Defining Health and Healthcare

How health and disease are defined influences perspectives on the role of social justice in healthcare. The definitions may seem straightforward at first thought. Health is when someone is well and disease occurs when someone becomes ill. However, the topic is much more complicated, such that defining health and disease remains an important issue in bioethics (Ereshefsky, 2009). The way conditions are defined as a state of health or disease has changed over time and is imprinted by the values of society at that time. For example, until recently, homosexuality was considered to be a disease condition. Additionally, at one time, the cause of slaves running away was thought by some people to be caused by a disease referred to as drapetomania (Ereshefsky, 2009). Both of these ideas have been eliminated from medical discourse while others have been added.

The intricate nature of understanding health and disease makes exact definitions insufficient. It can lead to unrealistic concepts such as how the World Health Organization defines health as, “A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO, 2020, para. 1). This definition is clearly idealistic and unattainable, and therefore not useful to healthcare or the matter of justice in healthcare.

To grasp the meaning of health, it is more beneficial to think about it from a general perspective which can also guide how we think about healthcare and justice. This can provide a better understanding of the nuances, not restricting health or disease to a binary state of complete wellness or illness. However, there does continue to be debate

surrounding different perspectives of health and disease. That debate can affect how to regard what is healthcare and thoughts on the utility of social justice in healthcare.

There are three primary perspectives: naturalism, normativism, and hybridism. Briefly, those who take the naturalist perspective define health purely based on what is considered to be biologically normal. The normativist perspective defines health based on social values. The last primary perspective, hybridism, combines aspects of both naturalism and normativism so that it accounts for biology as well as social values (Ereshefsky, 2009).

Overall, health is an amalgamation of perspectives and pieces that often do not fit together. Nonetheless, while it is not perfect, I will address justice in healthcare through a lens of hybridism. Although most physicians historically have ascribed to the naturalist perspective (Hamilton, 2010), this view fails to address what people consider to be important to their health. The value of health and which state of being qualifies as being healthy or ill differs from individual to individual, culture to culture, and generation to generation as with the examples of homosexuality and drapetomania. This perspective is also limited in that deciding what is biologically normal is inherently value-laden and not self-determined by biology. On the other hand, the normativist perspective is unable to accurately assign states that we do not desire as disease or not a state of health. Consider the difficulties in classifying mental illness. When is an individual shy or socially aloof versus when someone has social anxiety disorder? Because a hybrid approach leads us to consider both the biological state of health or disease in addition to the values that people place on being well or feeling ill (Ereshefsky, 2009), it makes the most sense for discussing social justice in health, especially considering the role of the social

determinants of health.

The Social Determinants of Health

The social determinants of health (SDoH) are social factors, such as where people live and work, that are reflected in the health of individuals or populations. The idea of SDoH is generally traced back to a study by Thomas McKeown. He noted that the tremendous growth in life expectancy from the 19th century into the 20th century was not mainly due to progress of medical care, but rather primarily from improved living conditions (Braveman & Gottlieb, 2014). Eventually the concept was more formalized and popularized as the SDoH by Michael Marmot (Salerno & Bogard, 2019).

Health is typically equated only with healthcare, so much so that many people assume they are one and the same (Marmot & Allen, 2014). As such, the United States invests much more in medical services than in addressing social determinants (Adler, Glymour, & Fielding, 2016) although it is thought to account for only up to 20% of effect on health outcomes, even when including both quality of care and access to care. The other 80% is attributed to the SDoH (Hood, Gennuso, Swain, & Catlin, 2016).

Across the world, there is a clear gradient of health and disease from top to bottom of society (Marmot & Allen, 2014). A wide breadth of factors contribute to this gradient. These are the social determinants. Some common examples of social determinants include socioeconomic status, race/ethnicity, sex/gender, and education (Singh et al., 2017). The list continues beyond the factors most well-known to be associated with health. Living in rural regions, military veteran status, LGBTQ status, and stigma against mental health disorders are all among numerous other social factors with significant influence on health (Fink-Samnack, 2019). The gradient created by the

effect of all these social factors suggests a direct relationship between the distribution of the social determinants of health and the perpetuation of inequality in health.

Inequality in Health

Inequality in health is usually determined by comparing differences in average health across groups (Asada, 2006). Of the groups most often studied, socioeconomic inequalities have received the most attention (Masseria, Hernandez-Quevedo, & Allin, 2010). There is a difference in life expectancy of about 10-15 years between the most affluent 1% and the poorest 1% (Chokshi, 2018). Another prime example is the comparison of life expectancy between different races or ethnicities. In the United States, overall life expectancy has grown from 69 years to 78 years between 1950 to 2015. When broken down into racial/ethnic groups, there is a large gap between Asian/Pacific Islanders with the longest life expectancy in the United States at 87 years and African-Americans with the shortest life expectancy at 75 years (Singh et al., 2017). These patterns repeat over and over with other social determinants in a way that is clearly unfair and unnatural.

Social Justice in Health

The disparities in health inevitably raise concerns about injustice in health. Undoubtedly, these problems affecting health cannot be solved by traditional medical care alone with its limited naturalist perspective and efforts targeted primarily at biological abnormalities. Yet, despite the obvious connection between unfairly distributed social determinants and poor health outcomes, there exist arguments against addressing the social factors contributing to these disparities.

One of the most alarming arguments is based on faulty assumptions. Ultimately, it

should lead back to addressing social determinants of health, but leaves people a step short of making that connection. This is regarding the connection of individual responsibility for health behaviors with negative health outcomes (Marmot & Allen, 2014). Health behaviors are very important to consider. A change in patient and physician behavior would likely have more effect on improving health than introducing new technology or changing the system to reduce costs (Morrisette, Oberman, Watts, & Beck, 2015), but one should realize that behavior itself is strongly influenced by social factors such as marketing, culture, costs, peer expectations, and even community design (Hood et al., 2016), as well as by technology (Simendinger & Stibe, 2017). Recognizing the community and social influences on health is the first step to realizing the need for social justice in health.

While health, as opposed to healthcare, is often not considered an appropriate focal point for social justice, that perspective can be altered by considering the role of the social determinants outside of access to healthcare. Philosopher Norm Daniels has stated, “A right claim to equal health is best construed as a demand for equality to access or entitlement to health services” (Prah Ruger, 2004, p. 2). This type of approach to health and healthcare justifies that health cannot be considered a human right. For health to be a true human right, it must be able to be distributed purposefully and equally. Clearly, this is not the case as even if we were to address all controllable variables of health, it could not be equal. Therefore, healthcare is proposed as a human right, but this too presents problems as the question arises, to what standard of healthcare do people have a right to have? Resources do not allow for everyone to receive the highest standard of healthcare (Brudney, 2016). However, a right to health or healthcare is not a necessity for

establishing social justice in healthcare. While indeed equal health is not feasible, Daniels falls short of realizing social justice in healthcare does not seek equal health and goes beyond a need for access to health services.

Social justice in healthcare is not simply a practical need to achieve a goal of improving health and decreasing disparities in health. It is a moral need. The idea of social justice in healthcare is that the aforementioned inequalities are unfair, unjust and could be remedied through action such as policy change (Singh et al., 2017). An historical example of remedy through policy is the Metropolitan Health Law that addressed sanitary conditions in New York City, saving countless lives, after cholera outbreaks in 1832 and 1854 which primarily affected the low income population (Chokshi, 2018).

It is worth noting that social justice in healthcare necessitates extending the idea of healthcare into a social sphere in which it has not traditionally existed. Currently, healthcare correlates more with a naturalist perspective of health within the medical field. Social justice requires making social changes with the specific intent of improving the health of those less well off, and this also means respecting the values of different groups of people in regard to their health. The counter to this approach is the threat of medicalizing aspects of life that have not to do with medicine or medical care. However, on two points this does not need to occur. First, healthcare is not the same as medical care. Healthcare is broader and can incorporate social aspects without needing to medicalize those aspects. Second, incorporating the values of people in a hybrid view of health helps guide us to decide what may be warranted as healthcare.

It is now established that social justice is a moral need within healthcare due to the inequality that exists in health, and that the reason for much of that inequality is the unfair distribution of the SDoH. Improving medical care alone is not the path towards social justice. Rather, policy and action targeting the social needs of those less well off is essential. However, to strictly apply social justice in healthcare fails to sufficiently account for how technology has remarkably changed healthcare, society, and how people live overall.

CHAPTER 3: TECHNOLOGY, SOCIETY, AND HEALTHCARE

What is Technology?

To connect society and technology to health, it is essential to understand what I mean here by technology. As with defining health, there is no exact way to define technology, but often we take an external perspective that is too narrow and insufficient in explaining what technology is through a human context (Woodhead, 2012). Briefly, technology can be defined as the application of science that has both a physical component and an information component existing in an embodied relationship with humans designed to achieve a certain outcome (Wahab, Rose, & Osman, 2012). In this way, people and technology co-evolve. Technology can influence what we do and how we think without us realizing (Woodhead, 2012). The way things are is not an inevitability. Change in society would be reflected by change in technology and vice versa (Noble, 2018). Sociologist Manuel Castells noted, “Society cannot be understood or represented without its technological tools” (Benjamin, 2019, p.41). In the current era, this idea is best represented by digital information technology.

Over the last few decades, there has been significant increase in the use of digital information technology (Baum, Newman, & Biedrzycki, 2014). From smartphones to personal computers, and information databases to machine learning algorithms, it is everywhere. Information technology has been defined as “technology of machine (with the use of computer) processing, transferring, and distributing information, and creation computing and software tools of informatics” (Odintsova, Kenesova, & Sarsekeyeva,

2013, p. 107). This is the form of technology that has developed an unprecedented influence on society and with which I am primarily interested in this paper.

Health Information Technology

Health information Technology (HIT) is “the application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of healthcare information, data, and knowledge for communication and decision making” (Yen, Scheck McAlearney, Sieck, Hefner, & Huerta, 2017, p. 1). The rise of HIT use in healthcare has become part of a technological imperative (B. Hoffman, 2002), resulting in significant changes to the healthcare system, but yet to achieve significant changes in outcomes. The development of HIT required new laws to be implemented and ultimately the United States pushed through an initiative to speed the process of adopting a form of HIT, the electronic health record (Ommaya et al., 2018). The electronic health record (EHR) was supposed to be a game changer in medicine. It has a large number of pros and cons, but most distinctly EHRs were initially developed to help with billing so that now regulation compliance and bill coding outweigh patient care in importance (Kuhn, Basch, Barr, Yackel, & Medical Informatics Committee of the American College of Physicians, 2015). This prevents EHRs from being the tool that it was supposed to be for healthcare providers.

Predominantly, HIT addresses medical care, and not the broader healthcare including social aspects that would lead to more significant changes in health. And HIT or other information technology that could be applied socially in a way that improves health is largely hindered by regulation, or in some cases under-regulation that risks more problems. The use of and trust in artificial intelligence increases the risk for many of

those problems. For instance, imaging technology that processes pictures to determine the presence of skin cancer are biased against darker skin. The reason is not that technology is incapable of processing information from darker skin to achieve the outcome of accurately diagnosing skin cancer. It is that the development of technology does not incorporate the necessary information due to a lack of prioritization, in this case represented by insufficient inclusion of darker skin tones in machine learning algorithms (Adamson & Smith, 2018). A lack of regulation can allow negatively biased technology to continue to be a part of healthcare. But this sort of bias in information processing is not only present in health information technology, it also influences other aspects of life, including the social determinants of health.

Technology and Social Determinants

Digital technology is increasingly essential to accessing the social determinants of health including employment, housing, education, and health information. Digital technology itself also acts as an important determinant of health. The two are intricately connected in many ways, such as how people often gain skills in a new technology through their employment. Furthermore, people who have other disadvantages such as economic and social become further excluded from social determinants due to inability to acquire digital capital (Baum, Newman, & Biedrzycki, 2014).

Technology is used in many everyday contexts, often to the detriment of those less well off such as people who are racially marked (Benjamin, 2019). Many of these contexts influence the social determinants of health in some way. For example, machine algorithms are often utilized by employers as a first pass for job applications (Liem et al., 2018). This is sensible if these algorithms are only processing information that is related

to the job or requirements thereof. If the position requires a doctorate level degree, a computer system can quickly eliminate those who do not meet that requirement without a person needing to spend many hours sorting through documentation from candidates who do not meet the qualifications. However, employment processing algorithms now incorporate a large amount of data not relevant to the position. It results in significant biases that are often unfair to certain populations. These algorithms often consider sex, gender, race, zip code, or other various factors that would not actually influence a candidate's ability to fulfill a job. Amazon was previously troubled by a system that was biased against the employment of women (Dastin, 2018). And this is far from the only area of life impacted by information technology. Police tactics, judicial proceedings, education systems, housing decisions, loan opportunities are all often influenced or dictated by a computer, with significant downstream implications for health. In addition, what we see on social media applications, affecting our thoughts and beliefs, is often determined by companies such as Facebook according to their own interests (O'Neil, 2016).

Digital and Technology Justice

“Ethics and technology are connected because technologies invite or afford specific patterns of thought, behavior, and valuing” (Vallor, 2016, p.4). This is exhibited by the long history of technological progress contributing to social justice. From printing technology to sewage systems, technology has been part of significant social change (Dyson, 1997). These well-known connections between progress in technology and progress in society are really just the tip of the iceberg. There are many other examples that really show the intricate relationship between technology and social justice such as

the evolving design of the bicycle representing change in gender expectations. In this instance, a woman in 1898 England was denied service at an inn for wearing pants suitable for riding a bicycle while the innkeeper believed women should only wear long skirts, prompting a legal case. Although the woman lost the case at the time, the bicycle became symbolic of progress in gender rights (Bijker, 1997).

So as noted by Wiebe Bijker in his book on sociotechnical change, “technology and society are both human constructs” (1997, p.1). As such, society shapes technology and in return technology also shapes society (Bijker, 1997). But while progress in technology can seem to be inherently better for everyone, it can present new problems to the disadvantage of some segments of society as explored in the previous section.

The reason why digital technology in particular has the potential to hold sway over modern society is that it allows for access and to and processing of near unlimited information. And information is power. That power can come in a multitude of forms. For example, humans are now using computers to rank or categorize people, places, ideas, and objects in ways that culture previously did (Rosenbaum and Fichman, 2019). The ability to control and process that information is an immense power. Technology gives us information that is “promoted and perceived as more objective or progressive than the discriminatory systems of a previous era” (Benjamin, 2019, p.5-6). But the technology is designed by humans with biases and adopts the social values of its design so that the information it provides is truly no less subjective than information of the past. In that way, any Information is also biased. It isn’t necessarily by intent of the designers or programmers of the technology, but more often the result of implicit bias. Yet, even when that information is wrong, typically at the behest of the least advantaged in society,

it is not disputable (O’Neil, 2016). In her book, “Race and Technology,” Ruha Benjamin describes society having a digital caste system developed on a social and technical apparatus governing all areas of life (2019). This discrimination is becoming further engrained in the sociotechnical infrastructure of daily life (Benjamin, 2019). The development and diffusion of digital technology can alleviate or exacerbate existing inequalities (Baum, Newman, & Biedrzycki, 2014).

In response to this growing problem, there has been movement toward what has been variably referred to as digital justice or technology justice. This movement has especially advocated for algorithm developers to be accountable for outcomes (Rosenbaum and Fichman, 2019). Justice in technology deserves explicit attention no matter the intent of the designers because while computers are efficient they struggle with human concepts such as fairness or trust (O’Neil, 2016). As digital technology shapes much of our everyday lives, and increasingly so, with growing influence on the social determinants, technology justice becomes an essential component of social justice in healthcare.

CHAPTER 4: SOCIOTECHNICAL JUSTICE

Rawlsian Justice

In “A Theory of Justice,” first published in 1971, philosopher John Rawls presented a comprehensive perspective on justice centered on all people having an equal claim on matters of justice (A. Hoffman, 2017). It is often referred to as Justice as fairness. The primary intent was to form a moral foundation for the structure of society (Coogan, 2007). As established in the above sections, healthcare and technology are core parts of society each with its own moral and ethical problems that interplay with one another. There is a history of Rawlsian Justice applied to challenges faced by information technology (A. Hoffman, 2017) as well as healthcare (Coogan, 2007). Rawls himself did not specifically address healthcare in “A Theory of Justice,” opting to assume ideal, fully functioning people (Morrisette et al, 2015). However, Rawls’ ideas have served as the basis for arguing for a broader conception of healthcare incorporating the social aspects necessary for social justice in healthcare (Coogan, 2007). Therefore, Rawlsian Justice is suitable to adapt into a form of sociotechnical justice in healthcare.

There is insufficient space here to outline all of Rawls’ theory, but it should become clear why it is appropriate for sociotechnical justice in health, especially within one aspect of Rawlsian Justice that is particularly conducive to sociotechnical justice in health. Rawls (1999) proposed two principles of justice which he modified over time with the final versions as follows:

First: Each person is to have an equal right to the most extensive total system of equal basic liberties compatible with a similar system of liberty for all.

Second: Social and economic inequalities are to be arranged so that they are both: (a) to the greatest benefit of the least advantaged, consistent with just savings principle, and (b) attached to offices and positions open to all under conditions of fair equality and opportunity. (p.266)

This first clause of the second principle, known as the difference principle, is the key to adapting Rawlsian Justice to sociotechnical justice in healthcare. But first, to make justice as fairness apply to healthcare, it is necessary to extend Rawls' idea of what he calls primary goods. This is essential because Rawls' theory is constructed around the distribution of these primary goods. While different people have different perceptions of what is good, Rawls argues that the primary goods are things necessary for "carrying out any plan" (Coogan, 2007, p. 7). They include both natural and social primary goods. Health is among what Rawls considers to be a natural primary good, but similar to how health is often excluded as a human right as it cannot be directly distributed by society, Rawls has excluded it and other natural goods such as intelligence from his discussion of social justice (Coogan, 2007). However, as discussed previously, healthcare can be composed of social components influencing health and justice in healthcare.

As opposed to the natural primary goods, the distribution of social primary goods is directly influenced by society. Going forward, the term primary goods will refer specifically to the social primary goods. The distribution of the primary goods is formed around two principles that Rawls' arrives at by way of a hypothetical scenario termed the

original position. In this scenario, rational individuals with their best interest in mind are assumed to want more primary goods rather than less. Without any knowledge of their role in society, a condition called the veil of ignorance, Rawls argues that his principles are how these individuals would decide to distribute the primary goods under these ideal, fair conditions. However, healthcare does not appear on his list of primary goods.

Nonetheless, Rawls' initial list of primary goods is flexible and there are arguments that healthcare would qualify as a primary good (Coogan, 2007). Alternatively, it has been argued that healthcare is necessary to fully make use of the primary goods, but extending the list to include healthcare better fits the narrative of Rawlsian Justice. In her thesis on Rawls and healthcare, Coogan (2007) notes:

Rawls writes that one of the objectives of justice as fairness is to nullify “the accidents of natural endowment and the contingencies of social circumstance.”

Reducing inequalities in health through just healthcare policy seems particularly important through this lens: health is both a natural endowment and a contingency of social circumstance. (p. 39)

While Rawls considers health as a natural good that is immutable directly and therefore excluded from social justice in regards to the basic structure of society, that changes if his ideas to social justice in healthcare, so that fairness in health is the goal and not itself a primary good. To arrive at a form of fairness in health then requires a socially-minded distribution of healthcare. This must then incorporate the social determinants of health which are often distributed in ways detrimental to those least advantaged in society.

In contrast to this application of Rawls' theory to healthcare, the applications to information technology have not been broad in nature, but there are several notable examples. Most relatable to the topic at hand, computer scientists have applied Rawls' difference principle to argue for addressing the digital divide and its associated unequal access to information and technology. Also the difference principle has been used to argue that software engineers should take into consideration the least advantaged (A. Hoffman, 2017).

Rawls' theory and its subsequent application to healthcare and information technology exhibit how it is a logical choice on which to build the foundation for sociotechnical justice in health. Justice in healthcare is primarily intended to address inequality in health and the difference principle is clearly adaptable to addressing inequality in different situations including health. Addressing inequality is also important to justice in technology to which Rawlsian Justice has also been previously applied. The difference principle can therefore serve as the foundation for sociotechnical justice in healthcare to build upon with other core concepts from which to establish its own set of basic principles.

Core Concepts Underlying Sociotechnical Justice in Healthcare

To establish principles for sociotechnical justice in healthcare, we must work from a set of underlying assumptions that serve as core concepts. First, as sociotechnical justice is modeled on Rawlsian Justice, and specifically his difference principle, it will treat healthcare as a primary good. While it is not necessary for healthcare to be a human right to establish social justice, there must be a motivation that makes healthcare in some

way special or necessary. The primary goods of Rawls do not act as human rights but rather as necessary means to an end. This absolves healthcare of needing to be set to the highest standard possible, which would be the case if it was considered to be a human right, and as such it can be distributed with other resources or primary goods in mind. As a primary good, it also allows Rawls' principles to be applied to healthcare. The first principle which lays out basic liberties is not directly related to the argument here. However, it is a necessary foundation for the second principle, containing the difference principle which is essential to establishing sociotechnical justice in healthcare.

The difference principle is important to sociotechnical justice in healthcare because it can be used to establish purposeful equity as a tool for justice. Earlier, I established that health inequality is a significant problem for which we are morally obliged to address with social justice. Addressing inequality requires action that is itself unequal. The line between unfair bias and acting to rectify a problem can be a fine line (Howard & Borenstein, 2018), but addressing inequality in health is protected by the difference principle in that it is to the benefit of those least advantaged in society. The current inequality is clearly to the detriment of those least advantaged in society, as exhibited by the gradient in health that correlates with the unfair distribution of the social determinants.

The second core concept underlying sociotechnical justice in healthcare is that information is power (Rowley, 1998). Information used to be predominantly confined to a physical form such as in books or video cassettes (Kundnani, 1999). Now, digitalization provides an opportunity for even the individual internet user to have access to vast

amounts of information (Park, 2017). Additionally, information has become one of the most profitable areas of the world economy with transactions of information services, software, and databases (Kundnani, 1999). However, it is specifically control of information that gives rise to power (Rowley, 1998).

Unequal access to information results in redistribution of power from the powerless to the powerful (Park, 2017). The internet is the most obvious expression of this phenomenon. People newly exposed to the internet recognize its potential for power and will prioritize information needs over other necessities (Kundnani, 1999). But while an individual internet user has the potential for power through vast amounts of information, to use that power the user must be able to navigate information, locate relevant information, and apply that information. Meanwhile, the user is leaving behind digital trails that can be exploited by corporate or government entities with a vested interest in the user's behavior. Even with access to information, an individual's ability to process it is very limited. Thus, in this state of asymmetry of information, there is a hierarchy in the economy and society (Park, 2017), similar to the health gradient created by unequal distribution of the social determinants.

Digital information technology allows for the acquisition and processing of unfathomable amounts of information. It allows for the control and manipulation of that information. And it is also the basis for the global economy that is built on the capability for information to flow across the world with a time approaching zero (Kundnani, 1999). The hierarchy in the economy and society built upon asymmetry of information is not an accident. As noted information power trends from powerless to powerful, but information

itself is biased. When meaning is given to information, it is no longer objective (Park, 2017). The people who design and operate digital technology are also biased. Information is therefore “deeply contextualized and stands within a frame of reference” (Noble, 2018, p.149).

The role of information and information technology in society has significant effects on health outcomes, most often as a result of altering the distribution of social determinants in a way detrimental to the least advantaged in society as information power continues to shift from the powerless to the powerful. This is well described above in the examples of algorithmic injustices incurred by individuals in everyday life. Because the difference principle dictates that we address health inequalities, we must reorient digital information technology to be to the benefit of the least advantaged in society and their health.

The third and final core concept underlying sociotechnical justice in healthcare is more subtle. This concept is that data and narrative are each forms of information. Data can be processed, or manipulated, by information technology to become new information (Odintsova, Kenesova, & Sarsekeyeva, 2013). Data is often considered to be more objective than narrative, but again information is biased and the technology that processes data is biased. While data is essential, narrative carries an understanding for which data cannot do justice. This understanding is representative of humans in a way ,that as mentioned before, computers have difficulty processing. In healthcare, this dynamic is exemplified in that data without narrative lends to thinking of patients from only a medical perspective. However, the use of narrative information can give clinicians

a deeper understanding of the patient's disease with a broader context including the emotional, cultural, familial, and existential circumstances of the encounter (Muneeb et al., 2017). Additionally, it is truly even in the narrative where the diagnosis is most often found (Charon, 2004). It provides meaning, context, and perspective, defining how, why, and in what way the patient is ill (Vannatta, S., & Vannatta, J., 2013). This is the relation between narrative as information and the social values of health that lead to a need for social justice in healthcare. While data and technology are important, they will never alone be a solution for problems ailing healthcare, including health inequality so that technological justice in healthcare would be insufficient.

Basic Principles of Sociotechnical Justice in Healthcare

Based on the utility of Rawlsian Justice in healthcare and information technology practices with the above assumptions intact, I have developed four basic principles of sociotechnical justice in healthcare. Each principle is followed by an explanation to clarify its meaning as well as to tie it back to Rawlsian Justice and the core concepts.

1. Technology in healthcare should be constructed and utilized with fairness between entities of power and the population.

Governments, large corporations, and major academic centers have the ability to hold significant amounts of information, to process that information and distribute it to their own benefit, often unfairly, amongst the population. At times they are also able to access private information without permission and then use that information to manipulate the population. For commercial entities that tends to be for the purpose of financial profit. Historically, this power has also been used for various other purposes.

The government and academic institutions notably have used this power to conduct human research, unfairly using a segment of the population. The Tuskegee Study run by the United States government, intentionally withholding known effective syphilis treatment from black men who were not informed of their diagnosis, was not an isolated case. In the 1990s, Johns Hopkins University intentionally exposed children, typically from urban black families, to lead with the families' knowledge despite knowledge of the negative effects of lead on child development (Washington, 2019). More recently, the Havasupai Tribe was found to be misguided by Arizona State University to allow for biological information from blood to be distributed without consent (Sterling, 2011). This last incident could have been traced back to a similar problem of biological information being taken and distributed without consent, regarding Henrietta Lacks and the production of HeLa Cells. Yet, progress in technology without sufficient regulation allowed for enough difference in the scenarios that the latter incident was initially able to proceed without revocation.

These incidents occurred due to systemic racism but they were also the result of an imbalance of power from unfair distribution of information. The people who suffered were not informed of their role and the investigators of research did not associate with responsibility for the detrimental results of their actions. Now with increased digitization, government, technology companies, healthcare systems all have more information at their disposal without sufficient regulation holding them accountable for the use of that information.

To express fairness between an entity with power and the population requires transparency. Transparency forces the entity with power to be responsible for results, leading to the ability to establish trust with the population. Trust in an unbalanced relationship of power also requires privacy. If the entity holding more power knows too much about individuals with less power, that power imbalance only grows wider. Any exchange of that privacy must come with something in return of more benefit for the individual than what has been given, and this exchange can occur only when there is explicit informed consent.

The final piece to this first principle is that for entities of power to be fair to individuals, those entities must cooperate among themselves for the benefit of individuals. This means being open to sharing information between each other when consent is given and when it is to the benefit of the individuals. It does not allow for sharing without consent for commercial purposes, such as providing data to third parties interested in advertising.

2. The use of technology in healthcare should allow for humaneness toward persons under the domain of healthcare.

Martin Luther King Jr. once stated, “Of all the forms of inequality, injustice in health is the most shocking and the most inhuman because it often results in physical death” (Galarneau, 2018, para. 1). Yet, unfair inequality in health remains a rampant problem, in large part due to unwillingness to direct healthcare to address the social determinants. Our humanity dictates that we should treat health with the utmost of importance, and it is the role of healthcare to fulfill this. In doing so, healthcare should

respect the human values of health not merely the naturalist, biological health. This means being patient-centered and supporting narrative so that data has more meaning, rather than simply collected and acting on data alone. To do so would require technology to be oriented to avoid taking time with patients away from clinicians. This would support improvement in both medical care where narrative remains the primary source for diagnosis and in remedying unfair distribution of the social determinants.

Humaneness also means that technology should be designed to help providers better help patients rather than to maximize income. Artificial intelligence processes should be rigorously developed to be minimally unfair, and in some cases algorithms may need to be constructed specifically to counteract a known bias that has negative impact on those least advantaged in society. Additionally, respecting the autonomy of humanity suggests people should own their own information, including health and biological information. This would reduce the power imbalance between healthcare systems and their patients.

3. The development, distribution, and use of technology in healthcare should be equitable amongst individuals.

This principle recognizes that we do not operate from the original position, creating a new ideal society. Unfair inequality already exists, within health and elsewhere in life. Therefore, purposeful equity is essential so that taking different actions for different people can achieve the goal of decreasing inequality in health. This really emphasizes following Rawls' difference principle so that in any measures addressing

health, any unequal action is to the benefit of those who are least advantaged in society. Equity requires recognizing the social circumstances within which we currently exist.

Strategies such as harm reduction are essential to heeding Rawls' principle. Harm reduction in addressing opioid use disorder puts in mind the circumstances that resulted in the non-prescription use of opioids by those individuals. Technology can be harnessed to supplement this strategy. Additionally, community engagement helps to focus efforts on where inequality is most burdening for members of that community. It also helps to prevent overstepping bounds and presenting as a solution what the community does not want or need. To be of the most benefit possible, sociotechnical strategies need to provide attention to health and technology literacy, representation in research, and considerations of value in care. This attention would help to allow for the development of equity in healthcare.

4. Technology developers, healthcare administrators and healthcare providers should be oriented towards justice.

The current healthcare system as a whole is primarily oriented for business. It is structured for the purpose of making money, and technology both reinforces and is reinforced by that ideology. This results in ignoring the root of health inequality. The goal of healthcare is to maintain or lead to health and doing so requires orientation to justice that can help reduce health inequality. This orientation toward justice must stem from policymakers, healthcare administrators, healthcare providers, and members of the technology community. It demands a large culture shift away from capitalism and free-market as the foundation for all things, and giving special consideration to healthcare as a primary good.

This orientation towards justice necessitates intentional action against unfair bias. While implicit bias is part of human life, society and healthcare can be structured to recognize that bias and act against it. This is important to healthcare as those who are already least advantaged tend to suffer most from unfair bias. Therefore, justice requires purposefully acting to the benefit of those least advantaged. In other words, adoption of the difference principle.

This process should also incorporate justice for healthcare providers to combat burnout. Burnout has been a plague to healthcare providers working too much and under too much stress. It is reflected in patient care, with burned out physicians and nurses providing less than adequate care and exhibiting less empathy (Samra, 2018).

Technology should be incorporated to relieve providers of stress rather than simply increasing efficiency only to enable them to work more, and in a less personable manner.

CHAPTER 5: AN ARGUMENT BASED ON SOCIOTECHNICAL JUSTICE

Health Information Technology Infrastructure

Healthcare in the United States is structured around capitalism and neoliberalism. This is reflected in the approach to health of individual responsibility over collective responsibility despite evidence clearly pointing to the contrary. In the commercial system of the United States developed on the foundation of capitalism, large corporate entities such as Facebook, Google, Apple, Microsoft, or Amazon, “Have vast information on much of humanity – and the means to steer us in any way they choose” (O’Neil, 2016, p.181). As noted, information is power and the sheer amount of information these technology entities have access to gives them immense power. And, as previously noted, that information is biased, often acting unfairly against those least advantaged in society and affecting their health both directly within healthcare as well as through the social determinants.

The boom in Health Information Technology in the United States prompted by the government backing the adoption of EHR and a growing technological imperative within healthcare, has had unclear influence on the healthcare system. There have been many positive changes as a result balanced or in some cases outweighed by other, more negative changes. Shifting towards the use of big data, artificial intelligence, and machine learning to create health related algorithms in a world where information is power and that information is unequally distributed will lead to increased health disparities.

Additionally, even many technology corporations advertised as primarily involved in healthcare technology, such as EHR developers Epic and Cerner, are oriented

primarily for billing purposes and healthcare consumerism rather than patient care. The current HIT infrastructure allows for unethical actions to the detriment of those least advantaged in society. The government, academic institutions, and technology companies repeatedly take advantage of this infrastructure for their own benefit. Sociotechnical justice in healthcare is intended to uproot this power dynamic of unfairly distributed information and social determinants. As an example, I will discuss the role of Google and its healthcare partners in this HIT infrastructure and how do not fulfill the principles of sociotechnical justice in healthcare.

Google and Healthcare

Google, under parent company Alphabet, effectively has a monopoly of information by way of its search engine with more than 4 million searches every minute conducted on its service (Park, 2017). Search engines have a significant role in controlling the vast amounts of information accessible by digital technology. They have the ability to dictate who sees what information and when. Through flawed algorithms that represent societal bias, Google's search engine is described by Safiya Umoja Noble in her book, "Algorithms of Oppression," as reinforcing racism (2018). She also describes how Google has unprecedented access to data without sufficient regulation.

Google treats its search engine as well as its other technology endeavors as a mere tool rather than as representative of human values, brushing off its racialized search engine as a problem of what the users search for when evidence points to it having an algorithm biased by race as well as gender. There are numerous examples, such as how Google associated a map search for the derogatory word "N*gger" with the location of the White House during former President Obama's tenure. Google has also before

associated pictures of black persons tagged by Google as apes. The public, meanwhile, has difficulty holding Google and other technology companies responsible for their work (Noble, 2018). And despite this socially unjust outlook, Google has made significant moves toward increasing its involvement in healthcare wherein social justice (and now also sociotechnical justice) should be paramount.

Before discussing Google's direct involvement in healthcare, first the role of Google's search engine in healthcare must be addressed, as it is a significant purveyor of health information for both patients and clinicians. In line with Google's role in advertising, the first result for a search using Google for "Am I having a heart attack," as depicted in figure 1, is an advertisement. The advertisement is relevant, but its placement at the top of the page for this search prioritizes money over potentially life-saving information. Furthermore, when healthcare reform is discussed and advertised, it is Google that benefits most when people look for more information through its search engine (Shields, 2009). When people need information on matters of health, Google benefits from that, without necessarily providing accurate information.

This company, established as a technology and advertising company, has become involved over time in transactions of medical records and personal health information. Google initially developed this interest in medical records due to plans to develop its own EHR (Cohen & Mello, 2019). In 2008, Google formed Google Health. This was started as an endeavor into health information technology through the creation of an online personal health record. Eventually in 2012, Google Health as a personal health record system would be axed (Spil & Klein, 2014). But that did not stop Google from continuing to increase its participation in healthcare.

In 2015, a subsidiary of Google, DeepMind, formed a partnership with Royal Free, one of the largest healthcare providers in the NHS healthcare system in the United Kingdom. They had been approached by clinicians regarding development of an app despite having no prior experience in healthcare services. They would go on to develop an app called Streams for hospitals in the United Kingdom intended to help manage patients with acute kidney injury. It was revealed that this process involved transfer of identifiable patient records without consent. (Powles & Hodson, 2017). During this same time period, a number of United Kingdom health websites were also noted to be sharing sensitive data with tech companies, including an advertising division of Google, DoubleClick (Dyer, 2019).

Then in 2019, as part of a machine learning endeavor called Project Nightingale, Google in partnership with a healthcare entity, Ascension, acquired millions of patient records including names, results, diagnoses, prescriptions and other personal health information. Google planned to use this information to create a search tool for medical professionals. Patients were not notified of this action and Google has claimed that it did not violate HIPAA privacy laws (Dyer, 2019). Prior to this event, Google was also involved in a lawsuit regarding transfer of patient data from the University of Chicago. A signed form suggested patient medical records would not be disclosed to third parties for commercial purposes. Medical records were given to Google after identifying information was to be removed, but allegedly those records still contained date and times of services allowing the possibility of reidentification (Cohen & Mello, 2019).

Google's healthcare endeavors fail to fulfill any of the four basic principles of sociotechnical justice in healthcare. First to reiterate, Google is primarily an advertising

company (Noble, 2018), obtaining and processing data first for the benefit of making money, not healthcare. Trust is an important component of the first principle. A corporation that blames its users for racism rather than attending to its own racist design cannot be trusted to be fair to a population regarding its health. Additionally, the privacy concerns surrounding Google fail to establish sufficient trust as well. Notably its response in claiming its acquisition of patient records did not circumvent HIPAA guidelines. HIPAA was adopted in 1996 when the internet had about 20 million total users who only spent about a half an hour a month online (Cohen and Mello, 2019). Even if its actions were acceptable by HIPAA standards, HIPAA is outdated for today's healthcare problems and the acquisition of patient information without consent was clearly unjust. There is no evidence that Google can be fair in the use of its information power in healthcare. Lack of consent is a recurrent theme in Google's healthcare ventures which often ignore patient privacy. In this way, both the healthcare systems with the initial data and Google that receives the data violate the first principle of sociotechnical justice in healthcare.

Google, as an advertising and technology company focused on financial profit does not regard individuals with humaneness. For Google, people are sources of income, not humans that need healthcare. Despite the attempt to develop a personal health record, Google has no true vested interest in allowing people to own their information, as information is the basis for Google's power. Many also believed that the purpose of the personal health record system was to drive more health related queries through its search engine (Rochman, 2010). As noted above, any information provided to Google has privacy concerns and a Google-based personal health records would really shift power

from healthcare systems to Google not to individuals. For these reasons, Google's endeavors do not fulfill the second principle of sociotechnical justice in healthcare.

Google's direct involvement in healthcare, at least on the surface, does not fail the third principle. However, due to its control of information and its clear negative bias of that information which then lead to influencing the social determinants, Google as an entity cannot fulfill the third principle. Equity has never been a priority for Google.

Finally, Google does not take responsibility for itself failures even when they are clearly unjust, failing to meet the fourth principle. Google's response to racist search results is not to admit flaws in its algorithm but to lay fault on its users. Similarly, when Google repeatedly obtains patient information without consent, it consistently places blame elsewhere. Google is not oriented towards justice. It is oriented towards financial profit. While some providers may be excited to have Google disrupt the healthcare market (Cohen & Mello, 2019), Google cannot function in a manner necessary to allow for sociotechnical justice in healthcare.

In spite of its history of unjust activity within healthcare, Google could still play a just role in healthcare. That role however should not be as a leader of healthcare, but a contributor to healthcare. The information to which Google has access has been and can be even more enormously beneficial to healthcare as well as to addressing inequality in the social determinants of health, but it must be as a tool. Google should not have access to patient records, it should not advertise emergency health information for money, and it should not partner with healthcare institutions for commercial reward. Google would be best served for the interests of humanity as a tool to address improving health rather than with control of our health.

This ideal role for Google in healthcare reflects back from the heart of sociotechnical justice in healthcare. Both information and the social determinants are unfairly distributed, resulting in ill effects on health, particularly for those who are least advantaged in society. Nonetheless, through its symbiotic relationship with society, and when justly utilized as promoted by sociotechnical justice, technology can direct distribution of information and the social determinants for the benefit of the least advantaged, as well as shape society for justice in healthcare.

CHAPTER 6: CONCLUSION

We have access to great amounts of information as a result of the progress in information technology, and this information is power. In light of this reality, it should not be dismissed that, “With great power comes great responsibility” (Ziskin, Bryce, & Raimi, 2002). Because of the information we have attained and the technology that provides ever-growing amounts of information, we have a responsibility to use information technology in healthcare in a just manner. This means fairly sharing information with those who have a right to access it; it means directly addressing historical inequalities that have resulted in disparate health outcomes; and it means using technology to strengthen the bonds of human relationships among people from all walks of life.

In healthcare, the age of information was presented as a science-fiction developing into real life: “A digital frontier to reshape the human condition” (Bailey, Silver, Lisberger, & Kosinki, 2010). The human genome project followed by the development of genome editing, the rise of artificial intelligence and machine learning algorithms: these great strides in information technology prompted hopes for all sorts of treatments and cures that have not come to fruition in reality. While HIT has failed to live up to its high expectations, technology within society clearly has significant effects that alter distribution of the social determinants and therefore also the distribution of health. The problems plaguing the intersection of society, healthcare, and technology are innumerable, each with the potential to benefit from the application of sociotechnical justice in healthcare. It is intended to be able to address broad problems in meaningful

ways. Health data privacy, EHR optimization, information blocking, medical research ethics, genetic engineering, personalized medicine, and race-based medicine are all topics, among many others, that could be addressed from the viewpoint of sociotechnical justice in healthcare.

Overall, sociotechnical justice in healthcare is about the digital transaction, accumulation, and processing of information as a form of social power. In its current state, this power is unchecked. This has negative effects on society, including on health. The role of Google in healthcare serves as a prime example of how this infrastructure operates without justice. Reallocating this power can help to correct unfair inequalities in health. Sociotechnical justice in healthcare can be applied to other technology companies involved in healthcare as well as healthcare systems that make use of this technology and the policymakers who introduce regulations.

This brings me to a word of caution. Technology is not in and of itself a solution to health inequality. As technology and society are in a symbiotic relationship, the rules we apply to society shape the technology and guide its effect on society in return. Sociotechnical justice in healthcare is not simply a justice of technology and the social aspect must not be undervalued. To achieve significant improvements in reducing health inequalities first and foremost requires social and cultural shifts. Technology can help push those shifts along and it will also be affected by those shifts.

What I have documented here is a foundation for a theory of sociotechnical justice in healthcare. There remain significant gaps that I was not able to cover in this paper. Notably, there is insufficient attention given to the role of technology and healthcare costs. It is known that healthcare innovation can drive prices higher

(Morrisette et al., 2015). Any form of justice in healthcare must account for ways to keep healthcare affordable. However, it should be noted that a large part of the reason healthcare costs are driven up in the United States is due to the focus on ineffective medical care and a broader healthcare perspective as advocated here may help alleviate that problem as well. Matters of privacy and security are also not well enough addressed in this paper. It is briefly attended to in discussion of the first basic principle of sociotechnical justice, but the conflict between privacy of patient data, security of that data, and the ability to share that data as needed must be more thoroughly examined. Further removed from the topic specifically addressed in this paper, both health and technology are intimately connected with climate change in a way that the role of sociotechnical justice in healthcare will invariably be affected.

On how the theory is constructed, I am also unable to directly address criticisms of Rawlsian Justice here. The one criticism that should be mentioned is that while the difference principle requires inequality to be to the benefit of those least advantaged, it does not describe how much benefit. In that way, a minute benefit could qualify as fulfilling the difference principle. However, this is clearly not the purpose of the difference principle. It is intended to make a noticeable impact on the structure of society. The issue is not how little impact is sufficient, but rather how much impact is warranted. The way to optimally distribute inequality to address the already existing inequality is not a matter easily answered and demands full attention of its own. As it stands, Rawlsian Justice can be effectively adopted as a foundation for a functional sociotechnical justice in healthcare. And with that I will end by restating the core concepts and basic principles

that form the foundation for sociotechnical justice in healthcare, acknowledging the potential for further modification in the future.

Core Concepts:

1. Healthcare is a social primary good.
2. Information is power.
3. Data and narrative are forms of information.

Basic Principles:

1. Technology in healthcare should be constructed and utilized with fairness between entities of power and the population.
2. The use of technology in healthcare should allow for humaneness toward persons under the domain of healthcare.
3. The development, distribution, and use of technology in healthcare should be equitable amongst individuals.
4. Technology developers, healthcare administrators and healthcare providers should be oriented towards justice.

BIBLIOGRAPHY

- Adamson, A., & Smith, A. (2018) Machine learning and health care disparities in dermatology. *JAMA*. 154 (11), 1247-1248.
- Adler, N.E., Glymour, M.M., & Fielding, J. (2016). Addressing social determinants of health and health inequalities. *JAMA*. 316 (16), 1641-1642.
- Bailey, S., Silver, J., & Lisberger, S. (Producers), & Kosinski, J. (Director). (2010). *Tron: Legacy* [Motion Picture]. United States. Walt Disney Studios Motion Pictures.
- Baum, F., Newman, L., & Biedrzycki, K. (2014). Vicious cycles: digital technologies and determinants of health in Australia. *Health Promotion International*. 29 (2), 349-360.
- Benjamin, R. (2019). *Race after technology: Abolitionist tools for the new Jim Code*. Cambridge, United Kingdom: Polity Press.
- Berry, L. (2018). Reclaiming health care's fundamental purpose. *Institute for Healthcare Improvement*. <http://www.ihl.org/communities/blogs/reclaiming-health-care-s-fundamental-purpose> accessed July 6, 2020.
- Bijker, W.E. *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change*. The MIT Press. Cambridge, Massachusetts.
- Braveman, P., & Gottlieb, L. (2014). The social determinants of health: it's time to consider the causes of the causes. *Public Health Reports* 129 (S2), 19-31. <https://dx.doi.org/10.1177%2F00333549141291S206>
- Brenner, S.K., Kaushal, R., Grinspan, Z., Joyce, C., Kim, I., Allard, R.J., ...Abramson, E.L. (2016). Effects of health information technology on patient outcomes: a systematic review. *J Am Med Inform Assoc*. 23(5), 1016-1036.
- Brudney, D. (2016). Is health care a human right? *Theor Med Bioeth*. 37, 249-257.
- Charon, R. (2004). Narrative and medicine. *NEJM*. 350 (9), 862-863.
- Chokshi, D.A. (2018) Income, poverty, and health inequality. *JAMA* 319 (13), 1312-1313.
- Cohen, I.G. & Mello, M.M. (2019). Big data, big tech, and protecting patient privacy. *JAMA*. 322(12), 1141-1142.

- Coogan, E. H. (2007). Rawls and health care. Honors Theses. Paper 501. <https://digitalcommons.colby.edu/honorsthesis/501>
- Dastin, J. (2018, October 9). Amazon scraps secret AI recruiting tool that showed bias against women. *Reuters*. <http://www.reuters.com>
- Dyer, O. (2019). US to probe Google deal to manage healthcare data. *BMJ*. 367:l6515 doi: 10.1136/bmj.l6515
- Dyson, F. (1997). Technology and social justice. *Carnegie Council for Ethics in International Affairs*. November 27, 1997.
- Ereshefsky, M. (2009). Defining 'health' and 'disease.' *Studies in History and Philosophy of Biological and Biomedical Sciences*. 40, 221-227. <https://doi.org/10.1016/j.shpsc.2009.06.005>
- Fink-Samnick, E. (2019). Responding to the changing face of the social determinants of health. *Professional Case Management*. 24(4), 173-176.
- Galarneau, C. (2018). Getting Martin Luther King's words right. Physicians for a National Health Program. <https://pnhp.org/news/getting-martin-luther-kings-words-right/> Accessed June 27, 2020.
- Hamilton, R.P. (2010). The concept of health: beyond normativism and naturalism. *Journal of Evaluation in Clinical Practice*. 16, 323-329. <https://doi.org/10.1111/j.1365-2753.2010.01393.x>
- Hoffman, A. (2017). Beyond distributions and primary goods: assessing applications of Rawls in information science and technology literature since 1990. *Journal of the association for information science and technology*. 68(7), 1601-1618.
- Hoffman, B. (2002). Is there a technological imperative in health care? *International Journal of Technology Assessment in Health Care*. 18(3), 675-689.
- Hood, C.M., Gennuso, K.P., Swain, G.R., & Catlin, B.B. (2016). County health rankings: relationships between determinant factors and health outcomes. *American Journal of Preventive Medicine*. 50 (2), 129-135. <https://doi.org/10.1016/j.amepre.2015.08.024>
- Howard, A., & Borenstein, J. (2018). The ugly truth about ourselves and our robot creations: The problem of bias and social inequity. *Sci Eng Ethics*. 24, 1521-1536.
- Kojima, H. (1994). *Snatcher* (Sega CD version) [Video game]. Tokyo, Japan: Konami.

Kuhn, T., Basch, P., Barr, M., Yackel, T., & Medical Informatics Committee of the American College of Physicians. (2015). Clinical documentation in the 21st century: executive summary of a policy position paper from the American College of Physicians. *Annals of Internal Medicine*. 162, 301-303.

Kundnani, A. (1999). Where do you want to go today? The rise of information capital. *Race & Class*. 40 (2-3), 29-71.

Liem, C.C.S., Langer, M., Demetriou, A., Hiemstra A.M.F., Sukma Wicaksana, A., Born, M., & Konig, C.J. (2018). Psychology meets machine learning: interdisciplinary perspectives on algorithmic job candidate screening. In H.J. Escalante, S. Escalera, I. Guyon, X. BAro, Y. Gucluturk, U. Guclu, & M. van Gerven (Eds.), *Explainable and interpretable models in computer vision and machine learning*. Springer.

Marmot, M., & Allen, J.J. (2014). Social determinants of health equity. *American Journal of Public Health*. 104 (S4), S517-S519.

Masseria, C., Hernandez-Quevedo, C., & Allin, S. (2010). Health inequality: what does it mean and how can we measure it? *Expert Rev. Pharmacoeconomics Outcomes Res*. 10(2), 177–186

Morrisette, S., Oberman, W.D., Watts, A.D., & Beck, J.B. (2015). Health Care: a brave new world. *Health Care Anal*. 23, 88-105.

Muneeb, A., et al. (2017). The art of healing through narrative medicine in clinical practice: a reflection. *The Permanete Journal*. 21 (17-013), 105-107.

Noble, S. (2018). *Algorithms of oppression: How search engines reinforce racism*. New York City, NY: New York University Press.

Odintsova, S.A., Kenesova, N.T. & Sarsekeyeva, Z.E. (2013). Information technology: definition, essence and content of the concept. *Education and Science without borders*. 7(4), 107-109.

Ommaya, A.K., et al. (2018). Care-centered clinical documentation in the digital environment: solutions to alleviate burnout. *NAM Perspectives*. Discussion paper, National Academy of Medicine. Accessed at <http://nam.edu/care-centered-clinical-documentation-digital-environment-solutions-alleviate-burnout>

O’Neil, C. (2016). *Weapons of math destruction*. New York City, NY: Broadway Books.

Park, S. (2017). *Digital Capital*. London, United Kingdom: Palgrave Macmillan.

- Powles, J., & Hodson, H. (2017). Google DeepMind and healthcare in an age of algorithms. *Health Technol.* 7, 351–367. DOI 10.1007/s12553-017-0179-1
- Prah Ruger, J. (2004). Health and social justice. *Lancet.* 364(9439), 1075-1080.
- Rawls, J. (1999). A theory of justice (revised edition). Cambridge, MA: The Belknap Press of Harvard Press.
- Rochman, B. (2010). Paging Dr. Google. *TIME Magazine.* 175 (12), 52.
- Rosenbaum, H., & Fichman, P. (2019). Algorithmic accountability and digital justice: a critical assessment of technical and sociotechnical approaches. *82nd annual meeting of the Association for Information Science & Technology. Melbourne, Australia. October 19-23, 2019.*
- Rowley, J. (1998). What is information? *Information Services & Use.* 18, 243-254.
- Salerno, J., & Bogard, K. (2019). What do social determinants of health determine? *Journal of Urban Health.* 96, 793-794.
- Samra, R. (2018). Empathy and burnout in medicine – acknowledging risks and opportunities. *Journal of General Internal Medicine.* 33, 991-993.
- Shields, M. (2009). Awaiting full coverage: Google benefits most from healthcare issue ads. *Mediaweek.* 19 (30), 4.
- Simendinger, T., & Stibe, A. (2017). How increasing technology reliance is influencing behaviors and happiness. *CEUR-WS, March 21, 2017.* <http://ceur-ws.org/vol-1817/paper8.pdf>
- Singh, G. K., Daus, G.P., Allender, M., Ramey, C.T., Martin, E.K., Perry, C., ...Vedamuthu, I.P. (2017). Social determinants of health in the United States: addressing major health inequality trends for the nation, 1935-2016. *International Journal of MCH and AIDS.* 6 (2), 139-164
- Snyder-Mackler, N., et al. (2020). Social determinants of health and survival in humans and other animals. *Science.* 368, eaax9553.
- Spil, T., & Klein, R. (2014). Personal health records success; why Google Health failed and what does that mean for Microsoft HealthVault? Proceedings of the *2014 47th Hawaii International Conference on System Sciences.* Waikoloa, HI, 2014, 2818-2827.

- Statista. (2020). U.S. national health expenditure as percent of GDP from 1960 to 2020. <https://www.statista.com/statistics/184968/us-health-expenditure-as-percent-of-gdp-since-1960/> Accessed July 6, 2020.
- Stegenga, J. (2018). *Medical nihilism*. Oxford, United Kingdom: Oxford University Press.
- Sterling, R.L. (2011). Genetic research among the Havasupai: a cautionary tale. *American Medical Association Journal of Ethics*. 13 (2), 113-117.
- Vallor, S. (2018). *Technology and Virtues: A Philosophical Guide to a Future Worth Wanting*. Oxford, United Kingdom. Oxford University Press.
- Vannatta, S. & Vannatta, J. (2013). Functional realism: a defense of narrative medicine. *Journal of Medicine and Philosophy*. 38, 32-49.
- Wahab, S.A., Rose, R.C., & Osman, S.I.W. (2012). Defining the concepts of technology and technology transfer: a literature analysis. *International Business Research*. 5(1), 61-71.
- Washington, H.A. (2019). *A terrible thing to waste: Environmental racism and its assault on the American mind*. New York, NY: Little Brown Spark.
- Woodhead, R. (2012). What is Technology? *International Journal of Sociotechnology and Knowledge Development*. 4(2), 1-13.
- World Health Organization (2020) Frequently Asked Questions: What is the WHO definition of health? <https://www.who.int/about/who-we-are/frequently-asked-questions>
- Yen, P., Scheck McAlearney, A., Sieck, C.J., Hefner, J.L., & Huerta, T.R. (2017). Health information technology (HIT) adaptation: Refocusing on the journey to successful HIT implementation. *JMIR Med Inform*. 5(3), e28, 1-9.
- Ziskin, L., Bryce, I. (Producers), & Raimi, S. (2002). *Spider-Man* [Motion Picture]. United States. Columbia Pictures.

APPENDIX

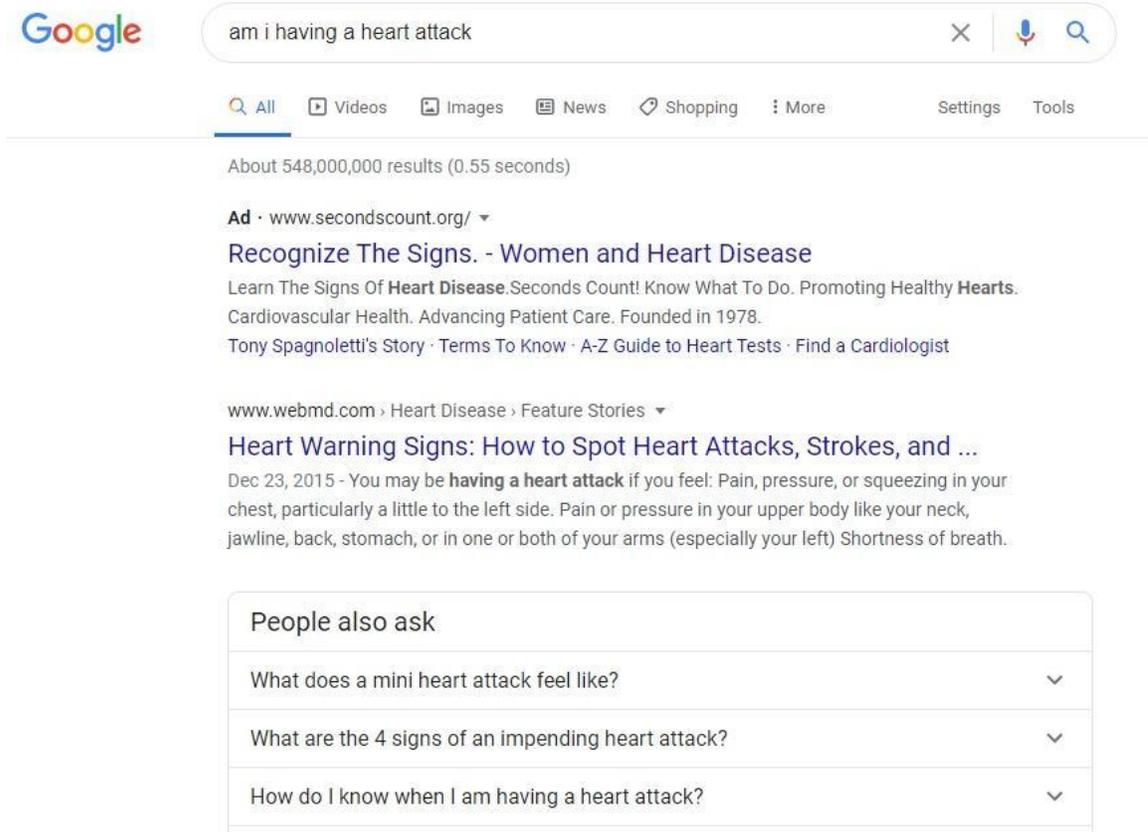


Figure 1. Screenshot of Google search regarding emergency health problem as accessed July, 2020.