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Grant Proposal

Eliminating disparities and implicit bias in health care delivery by utilizing a hub-and-spoke model

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Abstract

The state of health disparities in the United States has remained relatively stable over a number of years. Although overall outcomes for all patients have improved, a difference persists in how different racial, ethnic, and gender groups have fared in our health care system. Many programs that have sought to combat this problem have been predicated on the belief that only a small number of providers in the medical community are aware of their own biases. Accordingly, it was believed that bias awareness is the direct conduit for this particular change in the health system. However, the results of such programs have been unsatisfactory. The reason for such ineffectiveness is that many programs have not taken into account the presence of implicit bias within the patient-provider relationship. This complex form of bias operates in specific ways, and must be dealt with appropriately. The use of digital checklists to aid in clinical decision making has proved to be both a way that patients can receive equitable care, and a way to improve overall patient outcomes. Secondly, in order to reach the most at-risk populations, health care must expand beyond the hospital walls, and out into the community. Nurse navigator programs have been shown to accomplish this with great success. Together, checklists and nurse navigators are the necessary next-step in the battle against health care disparities. What's more, this two-pronged approach is relatively simple to implement. By making use of current electronic medical records, digital checklists can be quickly installed. Likewise, nurse navigator programs, a comparatively inexpensive option, can be rolled out quickly because of their

simple design. A focus on the patient-provider relationship and community outreach is critical for progress in eliminating health care disparities.

Keywords

health disparities, implicit bias, clinical checklist, quality of care, health IT, nurse navigator, community health

Introduction

The Problem of Health Care Disparities

Health care providers within the U.S. have sworn allegiance to the principles of justice and egalitarianism from the beginning of their training. Yet, an overwhelming amount of research has indicated that there remains a disparity in today's health care system among the care different population groups receive. These disparities are most pronounced among different racial and ethnic groups. In a groundbreaking report published by the Institute of Medicine (IOM), black Americans, who are only about 3-6% more likely to deny treatment than other populations, received significantly less needed care than white Americans, even when controlling for factors such as insurance coverage and patient income (Smedley et al. 2002). As a result, African Americans are 40% more likely to die from breast cancer, 20% less likely to receive treatment for depression, and 2 times more likely to receive a less desirable treatment for diabetes, such as limb-amputation, than their white compeers (Families USA 2014). To account for this great disparity in received medical care, the authors of the IOM report suggest that the disparities must arise during the individual clinical encounter, which features the most room for variation. Sadly, this disparity has seen only minimal improvement through recent years. Though the moral imperative is strong, it is not the only factor that should drive initiatives to eliminate health disparities. The economic consequence of this issue has a debilitating effect on the U.S. economy as a whole. A group of researchers from Johns Hopkins University studied three parameters in health inequality: direct medical costs, indirect medical costs, and the cost of premature death. Using economic models of prediction, they found that excess direct medical care due to inequalities for African Americans, through the years 2003-2006, totaled to over $135 billion (LaVeist et al. 2011). After adding in the excess direct care costs for Asians and Hispanics, the total amounted to about $230 billion (LaVeist et al. 2011). However, they had only scratched the surface of the true cost of health inequalities. After factoring in both indirect medical costs and the cost of premature death, the total cost rose to a staggering $1.24 trillion (LaVeist et al. 2011). This means that over $300 billion is lost annually in the U.S. economy due to health disparities alone. Therefore, it is imperative that this issue be resolved.

The Failure of Traditional Methods

After the IOM discovered the presence of health care disparities, they offered one solution to this complex problem: raise awareness (Smedley et al. 2002). Shortly thereafter, many new programs emerged in order to spread the news of the presence of health disparities. In theory, raising awareness among physicians and other health care providers of health disparities, was thought to reduce such differences in care by making clinicians more observant in how they treat their patients. This, in turn, would help them reach their goals of providing equitable care. However, research has shown that this method is counterproductive. A study published in the Harvard Business Review found that diversity-training programs at over 800 companies over the course of 30 years did not have a significant effect on prejudice levels, and did not increase diversity in the workplace Dobbin et al. 2007. For example, after mandatory diversity training, African American women and Asian women decreased in representation for managerial positions by 9.2% and 5.4%, respectively Dobbin and Kalev 2016 Table 1.

Table 1.

Effects of Traditional Diversity Training in the Workplace: % Change Over Five Years in Representation Among Managers.

Note: n/a indicates no statistical certainty of program's effect.

Type of Program	White Men	White Women	Black Men	Black Women	Hispanic Men	Hispanic Women	Asian Men	Asian Women
Mandatory Diversity Training	n/a	n/a	n/a	-9.2	n/a	n/a	-4.5	-5.4
Job Tests	n/a	-3.8	-10.2	-9.1	-6.7	-8.8	n/a	-9.3
Grievance Systems	n/a	-2.7	-7.3	-4.8	n/a	-4.7	-11.3	-4.1

Research in psychology has provided a basis for the failure of these traditional programs. One group of researchers took overt measures to minimize bias in one group and compared the facilitatory effect, an indicator of stereotype activation, with that of a control group's. The results showed that the group exposed to an overt suppression of bias showed an increased, or "rebound," facilitatory strength (Macrae et al. 1994). Therefore, the use of traditional diversity awareness training may exacerbate the issue at hand by causing individuals to think more on their own biases without putting in place safeguards against biased behaviors.

The Presence of Implicit Bias

One potential reason diversity training programs fail in many different workplace environments is because biases may often be unconsciously held. One study answered the question of why implicit, or unconscious, bias may have a role in the clinical encounter by pointing to the fact that there are not enough black men working within the medical field. In 2012, only about 2% of the graduating medical class in the United States were black men (Ansell and McDonald 2015). Consequently, many health care providers may be unable to relate to this patient population as well as they relate to other populations who are well represented within the medical field. In a study utilizing the Implicit Association Test (IAT), researchers found that 4 out of 5 sample clinician groups exhibited evidence of implicit bias (Blair et al. 2011). Interestingly, the one sample physician group that did not give evidence of unconscious bias was a primarily minority population. If these results are due to minority physicians being acquainted with a larger number of other minorities than white physicians are, then this is consistent with the findings of Nobel Laureate Daniel Kahneman, who identified a significant bias in people who were making judgements based off of small numbers (Tversky and Kahneman 1974). Therefore, physicians with very minimal contact with minorities are likely to make judgements that are inadvertently biased against this group of people. Yet, if psychologists are correct in identifying implicit bias as the product of an "automatic cue-response association," taking advantage of cues that counter implicit bias may prove effective in bringing equity to the patient-provider relationship (Blair et al. 2011). So, to effectively inhibit these unconscious mental processes that create barriers between different racial, ethnic, and gender groups, interventions must be put in place that only tacitly act on these biases, in order to avoid the rebound effect observed from methods that rely on an overt suppression of bias.

Literature Review

Using Digital Checklists for Standardization

One form of bias observed in 2006 at Johns Hopkins Hospital prompted researchers to begin studying ways to reduce treatment disparities. Gender bias was evident from the fact that women were less likely than men to receive intensive treatment for heart attacks, less likely to be sent for knee replacements, and had longer wait times for EKGs (Nordell 2017). However, in a recent publication, members of the Johns Hopkins Hospital Trauma Department outlined the results of their implementation of a "smart order set" checklist that was designed to ensure that all of their patients receive appropriate care. This clinical decision support (CDS) digital checklist was put in place for about 3 years, and was tuned specifically for patients with venous thromboembolism (VTE). When faced with such a pathology, physicians have to be wary because the pharmacologic medication these patients require may lead to major uncontrolled bleeding. Yet, if they are not given VTE prophylaxis, patients may suffer preventable harm from having an untreated blood clot. So, many factors are involved in deciding whether a patient should receive any form of VTE prophylaxis. The management goal here is that all patients who are at an appropriate risk level for VTE treatment would receive such treatment, and only patients who are likely to

experience major bleeding would have VTE prophylaxis withheld. If this level of accurate prognostication can be achieved, this would equate to the best possible patient outcomes under the given circumstances. Unfortunately, due to the variance of each patient-provider interaction, there was a great disparity in care. Johns Hopkins researchers observed that 45% of women, as oppose to only 31% of men, were not getting blood clot prevention treatment under conditions in which they would need it (Nordell 2017). To minimize variation, these physician researchers decided upon the checklist in order to increase the standardization of care across all patient demographics. After implementing the CDS checklist in the Johns Hopkins Trauma Department, a retrospective study of patient data revealed the significant effect the checklist had on VTE treatment Table 2. "The prescription of risk-appropriate VTE prophylaxis increased from 65.6% to 90.1%" while simultaneously eliminating preventable harm entirely (Zeiden et al. 2013). Preventable harm reduced from 1.1% to 0% during this time with no difference in major bleeding or mortality (Zeiden et al. 2013). The stark improvement in the physician's decision-making is demonstrated by his or her ability to now prescribe more intensive treatments for patients who require it without resulting in harm from overtreatment.
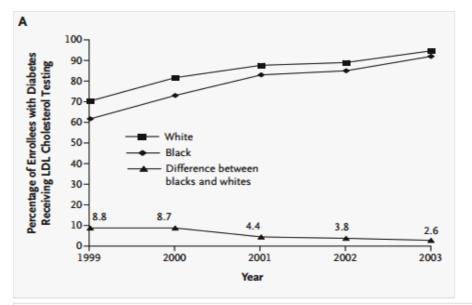
Table 2.

CDS Checklist Results on VTE Treatment

	Preimplementation (N=1,000)	Postimplementation (N=942)	P-value
Total receiving risk-appropriate VTE prophylaxis	656 (65.6%)	849 (90.1%)	<0.0001
Not receiving any form of VTE prophylaxis	236 (23.6%)	41 (4.4%)	<0.0001
Total VTE episodes	25 (2.5%)	7 (0.7%)	0.0022
Preventable harm from VTE	11 (1.1%)	0 (0)	0.001
Total 30-day post-discharge VTE	9 (1.1%)	2 (0.3%)	0.0300
Total 90-day post-discharge VTE	20 (2.7%)	2 (0.3%)	0.0003

This shows that thousands of patients who arrive at Johns Hopkins Hospital each year at risk for blood clots can receive truly equitable care that does not discriminate based on gender, race, or any other factor (Nordell 2017). The Johns Hopkins Hospital CDS checklist shows that mandating physicians to participate in considering standardized methods of care has a significant effect on their mental processing. Although they are given the ability to override the recommended treatment given by the electronic system, they are not exempt from interacting with it entirely to assess their patient. Therefore, the cues from the digital checklist that are consistently provided to the physician regardless of the patient's gender or race, can be said to likely have an effect in mitigating implicit biases. In this way, the data shows that the use of a digital checklist can enhance the quality of care while simultaneously eliminating any disparities in preventable harm between populations. However, because the sample size of preventable harm from VTE, as displayed in Table 1,

is not very large, it is worthwhile to examine the relationship between quality of care and health disparity magnitude on a larger scale.

The Impact of Quality of Care on Health Disparities

In order to measure whether there is a correlation between the improvement in care and the magnitude of health disparities, researchers from Harvard Medical School analyzed quality-of-care data made available from all Medicare managed plans. In 1997, the Centers for Medicare and Medicaid Services (CMS) mandated that all associated managed-care plans publish data relating to the quality of care its patients received. This information is stored in the Health Plan Employer Data and Information Set (HEDIS). The nine clinical parameters chosen as common measures of health care were captured under three headings: breast-cancer screening, diabetes care, and cardiovascular care. For example, under breast-cancer screening, a woman between the ages of 65 and 69 who had not received a mammogram within the past two years would be flagged in the system (Trivedi et al. 2005). As a reminder system for providers, it was believed to contribute to the improvement in the quality of care. However, the question remained as to whether racial disparities in care would also improve (Fig. 1). The results showed that as health outcomes improved overall, racial disparities in care also improved in 7 out of the 9 clinical performance measures (Trivedi et al. 2005). For example, through the years 1999 to 2003, the difference between black individuals and white individuals receiving LDL cholesterol testing under the heading of diabetes care decreased from 8.8 percentage points to 2.6 percentage points (Trivedi et al. 2005).
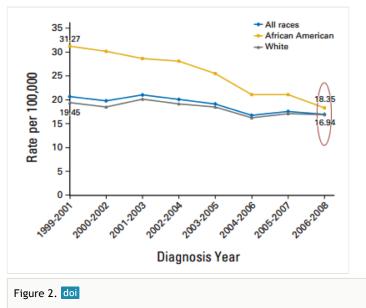

Figure 1. doi

Disparity in LDL cholesterol testing between black and white populations.

For the two clinical measures in which racial disparities did not improve, control of glycosylated hemoglobin levels and control of LDL cholesterol levels, both under the cardiovascular care heading, there was found to be no statistically significant change. This means that the improvement in care quality has no harmful effects on health disparities. Nevertheless, it is important to recognize that improving the quality of care alone does not accomplish the ultimate goal of eliminating disparities in health care entirely. One point of concern in this study is the lower number of black individuals receiving care. For example, out of those needing care for diabetes, there was a 19.6% reduction in the number of white patients throughout the study, compared with a 31.7% reduction in the number of black patients (Trivedi et al. 2005). This may be the basis for the existing minor disparity of 2.6% observed in Fig. 1. This points to what may be one underlying cause for many of the persistent disparities we see today: there are too few initiatives to reach out to priority populations and ensure that they receive the care that they need.

The Nurse Navigator Program

Sending health care workers out into the community as a means to improve a target population's health is indeed unconventional. However, this is exactly what the state of Delaware accomplished recently by making use of a nurse navigator program. Initially, government officials in Delaware recognized the growing disparity in cancer incidence between its white and black populations. To combat this trend, nurse navigators were hired at each acute care hospital, and were commissioned with specifically reaching African Americans to be screened for colorectal cancer. To that end, they would work with community organizations throughout the state and lead marketing campaigns to reach as many black Americans as possible. Once they agreed to be screened for cancer, the nurse navigators would serve as their primary point of contact. Each patient was assigned a nurse navigator for guidance through the health care system (Fig. 2). After an implementation period of 8 years, screening rates for colorectal cancer among black Americans rose from 48% to 74%, the same rate as white Americans (Grubbs et al. 2013). In addition, these two populations now experienced a cancer incidence per 100,000 of 45 each; this is a reduction from the initial values of 67 for blacks and 58 for whites (Grubbs et al. 2013). Finally, the number of black patients diagnosed with colorectal cancer at advanced stages fell from 79% to 40% (Grubbs et al. 2013).

Although a small disparity still exists in colorectal cancer mortality rates, as can be seen in Fig. 2, a significant improvement has been made since the inception of the nurse navigator program. Fig. 2 also highlights the importance of this program by showing how it is able to target very specific populations. At the initial measurement, the average of all races had a very similar mortality rate to that of white individuals in particular. Thus, the high mortality rate of African Americans would be hidden if one were to only observe the average mortality rate for all of the races combined. The health care system in the state of Delaware had produced this disparity because of its insufficient ability to serve all aspects of the community equitably. To counteract this, care coordinators serve to reach the outlying African American population and help them attain a health status close to that of the rest of the community.

Figure 2. doi

Colorectal cancer mortality rates during implementation of the nurse navigator system.

Strategy and Plan

Overview

To achieve a meaningful reduction in health care disparities across the United States, I am seeking first to establish a two-year program at two target hospitals. This two-year program will require a 6-month preparation period and will be conducted at the Robert Wood Johnson University Hospital in New Brunswick, NJ, and the University Hospital in Newark, NJ, the two principal teaching hospitals in the Rutgers Health network. Although the two-year time frame poses a limitation for the nurse navigator program, which may require a longer period of time to provide conclusive data, the rate of change over two years can be extrapolated for an eight-year time frame in order to estimate whether this program would produce significantly improved results when compared to the Delaware nurse navigator program. Based on the success of this initiative, steps can be taken to apply similar changes at hospitals nationwide in order to eliminate health disparities. The main features of this program will be the establishment of a hospital-wide CDS checklist, and a nurse navigator program operating out of each hospital. The checklist employed at Johns Hopkins Hospital was developed solely for the Trauma Department in their dealings with patients at risk for blood clots, one common hospital acquired complication. Now, for our target hospitals, checklists for two other hospital acquired complications will be created: hospital acquired infections and pressure ulcers. This way, the efficacy of such checklists for morbidities other than blood clots can be measured. For similar reasons, the nurse navigator program will be expanded to help African American patients receive screenings for breast cancer and cervical cancer, as oppose to colorectal cancer.

Specific Details

The Principal Investigator of this project will be commissioned to oversee the project by managing and coordinating activity between the different organizations that will have to work together in order for the program to be successful. Under these obligations, he or she will be required to hire all of the nurse navigators necessary for the two communities to be reached, and for gathering medical professionals to create the clinical checklist for physicians who deal with patients with the two aforementioned hospital acquired complications. These medical professionals will have each hospital's institutional review board approves the clinical checklist. The only organization outside of the Rutgers Health network involved in this project will be CTG Health, a health information technology consulting firm, who will be responsible for implementing the digital checklist into the existing electronic health record framework. CTG is a reliable organization because it has accomplished a similar task for the St. Luke's Health System in Idaho. CTG was able to redesign St. Luke's online system for patient data and implement new applications, without causing disruptions in workflow (Ctg 2016). Within 3 months, physicians were at, or exceeded, their previous patient volume (Ctg 2016). This means that after implementing a digital checklist application into the two Rutgers Health hospitals, it can be expected that after a brief period there will be no hindrance to physicians seeing their patients efficiently. Thus, a 6-month preparation period before the new data collection begins will be enough time to ensure that the hospital staff is well-acquainted with the new health care delivery design. The new application to be built by CTG will also track each patient's data in order to measure improvement in the population over time. The four clinical parameters of improvement will focus on rates for hospital acquired infections, pressure ulcers, breast cancer screening, and cervical cancer screening. This way, the effect of both the digital checklist and the nurse navigator program can be understood in one easy-to-use online system. Lastly, the baseline measurements for the health status of the New Brunswick and Newark populations will be retrieved from the HEDIS that is made available by the CMS. Success will be measured as an aggregate of the four clinical parameters, with a disparity elimination in any one parameter registering as 25% success. This health care delivery model will be determined successful only if all four parameters see an elimination in disparities.

Budget

Overview

The plans of this proposal is modelled heavily on the success of other programs that have made their associated costs available. Therefore, the budget can be broken down into three simple categories that cover many smaller, and related, expenses Table 3. It is important to note that though the total expense of this program will be almost $2.5 million, the economic burden of the issue it addresses is far costlier. As discussed earlier, if this initiative successfully addresses the problem of health disparities in the U.S. health care system, it is undeniably cost-effective because billions of dollars are wasted annually due to this issue.

Table 3.		
Budget Distribution		
Principal Investigator:	$162,220 * 2.5	$405,550.00
Digital Checklist:	$618,000 * 2	$1,236,000.00
Nurse Navigator Program:	(2 * ($1.15 * 55,181)) + (2 * ($1.15 * 277,140))	$764,338.30
Total:		$2,405,888.30

Justification

- Principal Investigator: The Principal Investigator will be paid a salary equal to the national average for clinical research directors, $162,220. This salary is multiplied by 2.5 because the project will be in place for 2 years with a 6-month preparation process.

- Digital Checklist: The checklist implemented at Johns Hopkins Hospital costed a total of $618,000 (Haut 2014). This includes the cost of gathering physicians to develop such checklists, and the implementation of it into the health system as an application by a third-party consulting firm. However, since this project encompasses two different hospitals, $618,000 must be multiplied by 2.

- Nurse Navigator Program: The colorectal cancer screening program in the state of Delaware resulted in an annual cost of $1.15 per resident (Grubbs et al. 2013). This includes the salary for each nurse navigator and the resources they would need to effectively reach their target population. Since this project only involves two communities, we multiply $1.15 by 55,181 and 277,140, the number of residents in New Brunswick and Newark, respectively. Also, because this is a two-year program, we must multiply each value by 2 and add up the costs for New Brunswick and Newark in order to estimate how much a nurse navigator system will cost overall.

Discussion

At this time in American history, a tipping point has been reached where the health disparities between different populations must be accounted for. Methods that have primarily focused on making clinicians more aware of their own biases have backfired. From previous research, it is clear that redesigning how physicians interact with patients by introducing a clinical checklist greatly increases the quality of care. Furthermore, this standardized quality of care has been shown to lead to significant reductions in health care disparities. However, changes within the walls of the hospital are not enough to completely eliminate inequalities. There must be an outreach into the community by care coordinators to ensure that at-risk populations are receiving an appropriate level of care. The hub-and-

spoke design of this proposal seeks to accomplish this task. When the final data from this project is obtained, the Principal Investigator will analyze it and make a public report for leaders in the field to determine the program's merit as a new health care delivery paradigm. This hub-and-spoke model shows great promise for achieving a health care delivery system that is free of disparities.

References

- Ansell DA, McDonald EK (2015) Bias, black lives, and academic medicine. The New England Journal of Medicine 372: 1087-1089. https://doi.org/10.1056/NEJMp1500832
- Blair IV, Steiner JF, Havranek EP (2011) Unconscious (implicit) bias and health disparities: Where do we go from here? The Permanente Journal 15: 71-78.
- Ctg (2016) St. Luke's Health System Relies on CTG for Implementation Leadership. https://www.ctg.com/fr/case-study-st-lukes-health-system-relies-ctg-implementation-leadership. Accessed on: 2017-4-12.
- Dobbin F, Kalev A, Kelly E (2007) Diversity management in corporate America. Harvard Business Review 6 (4): 21-27. https://doi.org/10.1525/ctx.2007.6.4.21
- Dobbin F, Kalev A (2016) Why Diversity Programs Fail. https://hbr.org/2016/07/why-diversity-programs-fail. Accessed on: 2017-4-22.
- Families USA (2014) African American health disparities compared to non-hispanic whites. http://familiesusa.org/product/african-american-health-disparities-compared-to-non-hispanic-whites. Accessed on: 2017-4-17.
- Grubbs SS, Polite BN, Carney J, Bowser W, Rogers J, Katurakes N, Paskett ED (2013) Eliminating racial disparities in colorectal cancer in the real World: It took a village. Journal of Clinical Oncology 31: 1928-1930. https://doi.org/10.1200/JCO.2012.47.8412
- Haut E (2014) Summaries of Independent Scientist (K) Awards. Agency for Healthcare Research and Quality. https://www.ahrq.gov/funding/training-grants/grants/active/kawards/Kawdsumhaut.html. Accessed on: 2017-4-04.
- LaVeist TA, Gaskin D, Richard P (2011) Estimating the economic burden of racial health inequalities in the United States. International Journal of Health Services 41: 231-238. https://doi.org/10.2190/HS.41.2.c
- Macrae CN, Bodenhausen GV, Milne AB, Jetten J (1994) Out of mind but back in sight: Stereotypes on the rebound. Journal of Personality and Social Psychology 67: 808-817. https://doi.org/10.1037/0022-3514.67.5.808
- Nordell J (2017) A fix for gender bias in health care? Check. https://www.nytimes.com/2017/01/11/opinion/a-fix-for-gender-bias-in-health-care-check.html?_r=0. Accessed on: 2017-3-03.
- Smedley BD, Stith AY, Nelson AR (2002) Unequal treatment: Confronting racial and ethnic disparities in health care. National Academies Press.
- Trivedi AN, Zaslavsky AM, Schneider EC, Ayanian JZ (2005) Trends in the quality of care and racial disparities in medicare managed care. The New England Journal of Medicine 353: 692-700. https://doi.org/10.1056/NEJMsa051207
- Tversky A, Kahneman D (1974) Judgment under uncertainty: Heuristics and biases. Science 185: 1124-1131. https://doi.org/10.1126/science.185.4157.1124
- Zeiden AM, Streiff MB, Lau BD, Ahmed SR, Kraus PS, Hobson DB, Haut ER (2013) Impact of venous thromboembolism prophylaxis "smart order set": Improved

compliance, fewer events. American Journal of Hematology 88: 545-549. https://doi.org/10.1002/ajh.23450