HEALTH IT AND HEALTH DISPARITIES

Howard University Hospital Diabetes Treatment Center – using multi-modal health IT tools to improve quality and delivery of care in an urban setting

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Case Study Report: Howard University Hospital Diabetes Treatment Center – using multi-modal health IT tools to improve quality and delivery of care in an urban setting

"Our focus is definitely to advance care and quality to the populations we serve. We do things with disparities specific to our population. Our mission is focused on providing the best care possible in those areas—cardiology, sickle cell, HIV, behavioral health, etc." – Chief Information Officer of the Howard University Hospital

Report Summary

Intervention and Setting	The Howard University Hospital (HUH) Diabetes Treatment Center (DTC), located in Washington, DC, uses an electronic health record (EHR), personal health record (PHR), patient portal, and two innovative health information technology (health IT) pilot projects with the goal of improving quality of care and access for high-risk urban patients with diabetes.
Target Population	Urban Black adults and children with diabetes, many of whom are enrolled in Medicaid or are uninsured/underinsured.
Technology Description	Core Health IT Technologies • EHR • PHR and patient portal Innovative Pilot Project • Telehealth self-management intervention • Smartphone pilot
Funding and Start-up	DC Department of Health Grant National Institutes of Health's (NIH) National Institute on Minority Health and Health Disparities (NIMHD) Research to Reduce Ethnic Disparities in End Stage Renal Disease (ESRD) Export Grant – $1,474,087 (2005)
Data and Analysis	Content analysis using NVivo for a series of in-person discussions with program administrators, providers, and participants including: • Director of the DTC • DTC Data Coordinator • Chief Information Officer of Howard University Hospital • Four members of Howard University Hospital's IT Staff • Multiple DTC providers including physicians, endocrinologists, diabetes educators, and a medical assistant • Individuals who seek services from DTC • Representatives from NuMedics, DTC's EHR vendor • Representatives from NoMoreClipboard, DTC's PHR vendor
Key Take-Aways	• Introduction of health IT tools through a trusted source is fundamental to successful implementation. • Intensive technical assistance is important when working with underserved populations. • Providing access to health IT tools through multiple technology platforms can increase uptake. • Patient-facing technologies can dramatically increase patient engagement and result in improved outcomes in chronic disease self-management.

Introduction

Howard University Hospital (HUH) in Washington, District of Columbia created its Diabetes Treatment Center (DTC) in 2007. Gail Nunlee-Bland, M.D., F.A.C.E., F.A.A.P., Director of the Center and Interim Chief of Endocrinology at Howard University School of Medicine, led the establishment of the DTC after observing a need for a setting where diabetic patients could receive cohesive care from specialists. According to DTC data, approximately 20% of patients at the center are Type 1 Diabetics with the remaining 80% diagnosed with Type 2 Diabetes.

The DTC provides a vital service in DC, where the prevalence of diabetes is particularly high among Blacks – in 2000, prevalence among Blacks was 10.4% compared to 2.7% among Whites and 2.9% among Hispanics.[i] Further, those earning less than $10,000 per year and $10,000 – $14,999 experience prevalence rates of approximately 12% and 15%, respectively, much higher than groups at higher incomes.[ii] The DTC's patients reflect these trends. DTC staff indicated 90% of the center's patients are Black and 40% are enrolled in the Medicaid program. While prevalence of Type 1 and Type 2 Diabetes in DC is higher than national averages,[iii] most of the population affected by diabetes has Type 2 Diabetes and treatment of this group is the primary focus of the DTC and this case study. Nearby Federally Qualified Health Centers (FQHCs) referred a majority of DTC patients to the center.

Potential benefits of using an EHR, PHR and other innovative health IT tools. Effective use of an electronic health record (EHR) can result in benefits such as improved productivity (for example due to more efficient handling of specific patient needs), financial improvements (such as more efficient billing), and improvements in quality of care (for example through better chronic disease management).[iv] Personal health records (PHRs) can add additional benefit by giving patients greater control to their health information. Other health IT tools, such as telehealth technology, can be leveraged as a tool for improving patient engagement and fostering self-management to increase adherence to treatment plans.[v] Further, projects using smartphone technology to monitor and record personal health metrics demonstrate potential benefits for patient engagement and understanding of health issues.[vi]

Core health IT functionality and uses. From its inception, the DTC has used health IT innovation as a strategy for improving care to the underserved. In order to facilitate better decision-making at the point of care, conduct active outreach to patients, and encourage greater patient engagement in self-management of this chronic disease, the DTC has implemented a number of core health IT technologies and pilot projects, detailed in Table 1 below.

Sources of Funding

- DC Department of Health Grant
- NIMHD Research to Reduce Ethnic Disparities in ESRD Export Grant – $1,474,087 (2005)

Table 1: Overview of Health IT at the DTC

	Type of Health IT	Description of Functionality
Core Health IT Technologies	EHR	• NuMedics CliniPro EHR implemented in 2007 with chronic disease management functionality
	PHR and Patient Portal	• NoMoreClipboard PHR implemented in 2009 with select information populated from the EHR (problem list, progress notes, medication list, and labs) • Patient Portal with educational materials, secure messaging functionality, and SMS appointment reminders
Pilot Health IT Projects	Telehealth Remote Monitoring Technology	• Funded by the NIH's NIMHD, 26 patients were provided with hardware, software, and technical support for a telehealth pilot to facilitate self-management of diabetes • Implemented in 2007, the intervention utilized the patient's PHR and patient portal as well as bi-weekly 30-minute video conferences with a telehealth nurse
	Smartphone Technology	• Using funds from the DC Department of Health, smartphones with data plans were distributed to DTC patients free of charge to facilitate use of the PHR

Encouraging Adoption & Implementation

Implementation of health IT technology among underserved populations warrants special considerations related to adoption and implementation. In the section below, we detail findings related to implementation and adoption of core health IT technologies and pilot projects at the DTC.

"We have the most perfect… EHR for the diabetic patients – it is just time consuming. Nothing is missing. When I send my notes to the doctors a lot of them say you have the best notes ever. It's all because of the EHR. You don't miss anything." *DTC Provider*

Selecting solutions that fit the needs of the provider/patient population can accelerate adoption. Staff at the DTC purposely selected EHR and PHR products to directly meet user needs. For their EHR, the center selected NuMedics, a vendor that developed a health IT product customized for diabetic patients. Although providers noted the tool increased the time needed for recording documentation, most praised its unique functionalities tailored to their patient population (e.g., the EHR contains a feature allowing clinicians to record detailed notes during a foot exam.)

The DTC's PHR vendor, NoMoreClipboard, received similarly favorable reviews among patients and DTC staff. Initially, the center selected NoMoreClipboard because it offers patients the option to incorporate data from health records of multiple providers and gives patients specific, easy-to-use tools for accessing and tracking information related to their care, behaviors, and clinical outcomes. Specifically, NoMoreClipboard portrays itself as a "portable patient-controlled online PHR" and functions as a health record bank, allowing patients to upload information from multiple providers in a standard format such as the clinical care document (CCD). To avoid requiring manual entry of data, a drawback of many health record banks, the DTC interfaced their EHR with NoMoreClipboard to automatically populate medical information from the center for each patient in their PHR.

NoMoreClipboard conveys clinical information in a user-friendly format and effectively uses visual cues supporting patient learning. As one DTC staff member explained, *"A lot of our patients are visual learners so it is really easy – if you want your medications, click on the medicine bottle. It is a lot of pictures."* NoMoreClipboard offers a range of functionalities, some of which patients use more often than others. Functionalities available include access to labs, problem lists, medications from the EHR, and manual entry of allergies as well as family and social history. Patients can also track pedometer steps,

monitor glucose, and record carbohydrate and calorie intake. Staff reported younger patients tend to use more advanced functionality, while older patients are less likely to use NoMoreClipboard at all.

Patients and providers adopt technology more readily when a trusted source introduces and encourages its use. Adoption of any new technology can be a difficult process, and lessons learned from the DTC demonstrate the critical importance of having an effective human component as part of the adoption process. In the case of EHR adoption among providers, Dr. Bland's role as a clinical champion, including her vision for providing cohesive care to diabetic patients, helped ease concerns during implementation.

> **"What I would say is different in the safety-net setting is that you need more human glue. You have to have someone like Dr. Bland and team who will take the time to educate the patient."** *Vendor*

In introducing a PHR to patients, the trusted source's role is even more critical. At the DTC, Dr. Bland and her team of providers consistently emphasized the PHR's role with patients to facilitate its effective use. As one provider explained, *"If the physician doesn't see it as important, then the patient tends not to. If the physician isn't going to look at it, why bother?"* Younger providers were particularly supportive; some providers even told patients they would no longer provide test results over the phone – the patient needed to go to the PHR to learn the results. This commitment to the technology adoption among providers reinforced the importance to patients, increasing technology uptake.

Some underserved populations benefit tremendously from intensive technical assistance in using health IT. When staff at the DTC implemented the NoMoreClipboard PHR, it became apparent some patients already understood the concept and wanted to enroll to access their lab results and share information with their providers. Many others required more intensive assistance. Special considerations were made for NoMoreClipboard to meet the needs of those underserved and uninsured patients who were being signed up for the PHR as part of DTC's outreach efforts in the community. As one project member familiar with the implementation process recalled, *"A lot of patients did not have e-mail accounts, which were a requirement for NoMoreClipboard. It took 10 minutes to set up an email account and you lost people."* Even after addressing the email requirement there were other obstacles. In setting up a username and password, staff indicated some people lacked familiarity with computers and were uncomfortable using a keyboard. To address this problem, project staff consulted the appropriate compliance officials and developed a protocol allowing a staff member to choose a username and password for a patient. According to one respondent, this experience differed from implementation in non-safety-net settings, where project staff can show patients a video on how the tool worked with little additional contact and still facilitate successful adoption. Project staff also provided technical assistance by identifying sources of access such as the local library for those patients without a home computer with an internet connection (approximately 30%).

> **"One thought is that in underserved communities, there would be…a computer literacy barrier, an adoption barrier to technology. We found that amongst our target populations they were receptive to technology. You needed to provide support, depending on the age groups – there were some differences there."** *HUH Staff*

Using a grant from the DC Department of Health, the DTC was able to assign a single dedicated staff member on-site to introduce the PHR to patients and sign them up for the tool. Staff members administered a pre-survey to patients prior to the sign-up process and used the information collected to inform individual outreach efforts. If the patient expressed interest, a DTC staff member thoroughly introduced the PHR to him or her on-site. Those patients with lower computer literacy received more thorough

training, including instructions on how to access the Internet and proceed to the appropriate websites, sign-in to the PHR and patient portal, use the functionalities included in the tools, and access their lab results. After the initial session, help with resetting passwords was cited as the most common technical assistance need. Patients generally found the site easy to use, although some complained about the PHR prompting to reset their password every six months.

Pilot projects that focus on providing access to technology through multiple platforms can increase uptake. Patients who signed up for a PHR through the DTC could access the application via computer or using smartphone with an internet browser. A grant-funded pilot project increased access to the PHR via smartphone, allowing the DTC to provide patients with a smartphone and accompanying data plan free of charge for a limited period. Notably, those who accessed the PHR through their smartphone were more likely to use it, with staff estimating about 90% of those using the PHR on their smartphone routinely entered data.

Diabetics found the PHR's smartphone functionality particularly useful because it allowed them to enter their blood glucose into their PHR when they were on the go or when a computer with Internet access was unavailable. Once patients entered a value from the glucometer, they received immediate feedback on whether their blood sugar was too high, too low, or just right, with accompanying trend lines and colors (e.g., over the red line is too high). When a patient's reading was outside a defined clinical range, the PHR alerted the provider. Patients participating in the smartphone pilot praised the convenience and instant feedback they received with this feature: *"I wasn't really familiar with the level of numbers that it is supposed to stay in between – I could never get that right. [The PHR on the smartphone] would let me know if it was high or low."* One patient described how this feedback was a motivating factor, stating, *"I hate it when I get a red bar. I went almost a full three months without red – I felt pretty good about that."*

Importantly, after grant funding providing access to their smartphone was discontinued, patients who accessed the tool via smartphone were not always able to effectively transition to the online version. This illustrates the value of mobile technologies for underserved patients and highlights the difficulties for patients needing to change the process they use to access PHRs because of changes in grant funding.

Impact of Adoption and Consequences

Careful considerations in the adoption and implementation process at the DTC resulted in significant findings related to information access, patient engagement, and health outcomes, as detailed below.

Technologies can result in increased provider access to information. From the provider's perspective, a key benefit from adopting NuMedics CliniPro EHR is increased access to reporting functionality. Providers can easily create groups of patients (e.g., those attending education classes) and pull reports on quality measures by group without the assistance of any IT staff. In comparison, other EHRs have more complicated reporting functionality. Providers interviewed as part of this case study indicated reports on patient outcomes were helpful in thinking of ways they could improve care delivery.

> **"One of the things that I like about this EHR is… I can get data; I don't have to depend on an IT person to get it for me… It is really easy for reporting."**
> *DTC Staff Member*

Providers at the DTC and elsewhere also benefit from using NoMoreClipboard PHR. In facilitating data collection at home, the PHR not only encourages patient engagement through increased monitoring of

their own health status – it also serves as a repository of patient information that can benefit providers. Providers recounted instances where they were able to use information in the PHR to provide higher quality care. For example, for a patient with difficulty controlling his hypertension, the DTC provider was able to look at the patient's self-entered readings (e.g., from his cardiologist) and use the information to adjust his medication. Others reported using the PHR to monitor patients' blood glucose readings and eliminate previously necessary office visits.

Patients utilizing the PHR also reported sharing the information with their primary care providers and others, effectively facilitating information exchange. Some patients print out their information, such as progress notes, medications, and labs, and take the information to their primary care provider. Others give access to their PHR directly by sharing their username and password. This access can be critical, especially for patients with chronic diseases who take a number of medications, as one patient recalled, *"I was out of town one time in Augusta, GA and I got sick and I couldn't take all my medications and I told them about NoMoreClipboard.com. They went on the website and pulled my name up and everything so they could see my medications."* We did not find any examples of patients who worked with other providers to enable electronic transfer of data from those providers into the NoMoreClipboard PHR, suggesting this type of use requires additional technical assistance for many underserved patients.

"It is very empowering for the patient. The patient becomes a partner in the care because they have access to the information. So it helps from an educational point of view and to know what is going on. It makes them stay abreast of what is going on with them and it makes them get involved in the care." *DTC Provider*

Patient-facing technologies, when implemented carefully, can dramatically increase patient engagement. Stakeholders agreed implementation of patient-facing technologies at the DTC, including the PHR and patient portal, has dramatically improved patient engagement. Appointment reminders sent to patients signed up for the portal has decreased no-show rates. DTC staff found 98% of patients had mobile phones; text message reminders therefore proved extremely effective. There was also anecdotal evidence suggesting PHR and patient portal use in combination helped decrease the clinic's no-show rate due to improved education about the importance of physicals and check-ups.

In addition, the PHR motivates patients to take an active role in improving their health. Patients reported that, once they started tracking their glucose readings, the PHR helped them remain disciplined. One patient discussed the notifications she received when she did not take her readings, describing how much she disliked them and strived to avoid them by entering her information every day.

Patient engagement can result in improved outcomes in chronic disease self-management. In order to investigate the impact of PHR use on health outcomes, DTC staff tracked patients who used the PHR through May 31, 2011. One staff member reported PHR patients as a whole reduced their hemoglobin A1c (HbA1c) from an average 9.2 to 8.2. The NoMoreClipboard PHR also affected patient engagement beyond measures exclusively related to diabetes. For example, one patient described using the PHR to track and manage her cholesterol and, through diet and exercise, successfully lowered it to a normal range.

Importantly, PHR use appears closely linked to patient engagement through disease self-management. One patient no longer able to use the application after the smartphone pilot program's completion described how lacking the PHR as a motivation to keep her blood glucose on track has negatively impacted her health: *"Yeah, now I don't really go see [the doctor] anymore, because I know things are*

bad. I haven't been keeping up with it. I don't know how many appointments I missed… my last reading was terrible. You need to come and keep the program started again... I was really into it. Now I am just not interested."

Technology can improve access to providers and trusted educational materials. The patient portal implemented by the DTC (separate from the NoMoreClipboard PHR) includes vetted educational materials sorted by category (e.g., diabetes overview, hypoglycemia, chronic complications, physical activity, nutrition/eating, etc.) to facilitate patient access to information. In addition, patients have access to secure messaging functionality through the portal, although staff and providers noted responsiveness to messages varied. When a provider sends a message through the portal, patients receive a text message directing them to access the portal to retrieve it. However, this functionality does not allow for a similar text alert when patients send messages to providers; some noted having this capability would help encourage use and benefits associated with the tool.

Barriers to Use of Health IT Tools

While this case study illustrates the potential for using health IT technologies among underserved populations, we observed a number of barriers associated with use of these tools.

Computer literacy and cultural issues can be a barrier to successful implementation. At the time of our visit, 30% of the patient population at the DTC (approximately 1,000 patients) had signed up for the PHR, with about 20% using it on a regular basis. The PHR and portal were only available in English, limiting access for those who primarily spoke other languages (e.g., Spanish, African languages or Chinese dialects). Data security was a concern for many individuals. Although DTC staff attempted to ameliorate these fears by assuring patients of the data's security, privacy concerns still prevented some patients from signing up for the PHR and patient portal.

> **"At the beginning of the [telehealth] study when we were talking about the mouse – people looked down on the floor to see if there was a [live] mouse, or they would use it on the screen."** *HUH Staff*

For others, computer literacy was an issue, including limited familiarity with a keyboard and mouse. DTC staff frequently mentioned computer literacy as a barrier for the elderly in particular. As one project staff member explained, *"Elderly [patients] were a little challenging because they are kind of set in their ways – [they say] 'I don't have a computer' or 'I don't know how to use a computer,' etc."* For the project's mobile phone component where the patient received text message reminders, the intervention was not as effective for elderly patients either because *"they don't leave their cell phone on, [or] they only use it to call."* The consensus was older individuals would rather *"let their kids do it"* than engage with the technology themselves.

Even with a clinical champion, achieving buy-in among providers can be challenging. As described above, DTC providers played a crucial role in encouraging PHR adoption among their patients. DTC staff noted some providers were less enthusiastic than others about the PHR and this impacted adoption. As one staff member explained, *"Some of them feel as though their patient doesn't need [the PHR] and don't even offer it to the patient. We had one patient who was a little upset because he wasn't offered it; he didn't know about it, but [DTC staff] can't catch every patient. That's why we are really reliant on providers."*

Findings from a limited telehealth pilot show this technology can dramatically improve outcomes for some patients. In a limited pilot program, DTC obtained funding to test a telehealth application allowing patients to automatically transfer blood sugar readings and other clinical indicators to the DTC without having to manually enter the data. Recognizing limitations in access to technology among the population targeted for this intervention, the DTC undertook more intensive efforts to overcome technological barriers. In this case, DTC investigators worked to install computers with specialized telehealth software and provide connectivity to underserved patients from their homes, using trusted community members to introduce the computer and software, and help with its installation and use. As part of this pilot project, a nurse conducted virtual visits with diabetic patients in their homes via webcam. This pilot proved very useful for many patients, especially those who had limited transportation access or difficulty traveling for appointments due to physical limitations or handicaps.

Although the study size was small, findings indicated *"patients were 4.58 times more likely to reach the desired HbA1c target if they were enrolled in the intervention."*[vii] The intervention also helped participants reach a healthy body mass index (BMI). Once again, patient empowerment was a key component of this intervention, as one HUH staff member described, *"The empowerment that came as a consequence was something that actually surprised me. When the patients were asking for this and were asking for that and were moving the obstructions themselves in order to improve their health care, they were taking such a delight in seeing their HbA1c come down, I realized that this was the way to go."* While the investigators who ran this pilot did not measure impact on hospitalizations and re-hospitalizations, they concluded based on anecdotal evidence the application would likely reduce unnecessary hospitalizations and may help control health care costs.

Policy and Organizational Factors for Replicability

Finally, we present key findings related to organizational factors that played an important role in the implementation of health IT tools at the DTC, particularly as they relate to replicability.

Leadership and vision can play a key role in implementation. In speaking to staff at the DTC and HUH, it is clear that Dr. Bland's vision for the use of health IT, her connections to the community, and her ability to secure resources from HUH's IT department played a key role in implementing core health IT technologies and pilot projects. Specifically, she successfully articulated a vision for establishing *"two-way communications between the clinic and the patient,"* bringing technology to the community in a way that persuaded executives at HUH to support her goals and initiatives.

Costs can be a barrier to sustainability and replicability. The DTC was able to use grants from the DC Department of Health and the NIMHD to implement health IT tools and pilot projects, including the EHR and PHR. However, without additional funding, the DTC discontinued the smartphone pilot program and diabetes telehealth self-management pilot, even though patients expressed significant interest in continuing to utilize these services. In one case, we found a patient's motivation, engagement. and health outcomes worsened after the smartphone pilot was discontinued. For the core health IT technologies, although the DTC purposefully selected relatively low cost technology solutions, reliance on grants to fund these projects highlights the problem of replicability in similar environments. In addition, the lack of reimbursement for the provider component of these technologies, including secure messaging, could be problematic for sustainability.

Innovation and standardization can be competing forces in health IT adoption. The DTC has a unique history of innovation in their adoption of core health IT technologies and their use of pilot projects to engage patients and the community. In the movement to EHRs throughout the rest of HUH, the DTC has been challenged to move away from a niche vendor to a standardized model of one vendor; however, one DTC staff member explained, that because they receive specialized functionality and benefits from NuMedics and NoMoreClipboard, they would rather not make a change.

While an HUH official indicated the hospital would strive to make comparable and necessary functionality available through HUH-wide initiatives, there is some risk that the hospital's push to meet Meaningful Use requirements will affect applications and functionality targeted to specific populations. In DTC's case, it is unclear how this transition may affect the outcomes the DTC achieved with its current tools and the culture of innovation that made the DTC a leader in its field.

Summary of Findings

The DTC case study illustrates how health IT tools designed for treatment of patients with diabetes that automatically facilitate reporting can aid in the delivery of quality care for an urban, underserved and predominantly Black population. Stakeholders emphasized the importance of introduction to the technology through a trusted source and the provision of intensive technical assistance to address unique needs of the population served. They also emphasized the use of the "right" tool for specific populations. For example, an EHR that facilitates creation of patient panels and outcomes reporting without use of an additional registry or data warehouse. Further, using technologies fitting within the provider's workflow or a patient's "daily routine" and using active, enthusiastic clinical champions positively affected buy-in.

Project Background and Data Sources

The Office of the National Coordinator for Health Information Technology (ONC) and the Health Resources and Services Administration (HRSA) awarded NORC at the University of Chicago a project to conduct case studies examining lessons learned from community organizations using health IT to serve the needs of underserved groups or to address health disparities. The final report from this project will inform the Secretary of the Department of Health and Human Services' (HHS) work under these topics per Section 3001 of the Health Information Technology for Economic and Clinical Health (HITECH) Act passed as part of the American Recovery and Reinvestment Act of 2009 (ARRA). Findings are based on analysis of notes taken during a series of discussions with administrators, IT staff, vendor representatives, multiple DTC providers, and patients who receive services from the DTC.

In addition to increasing provider access to information, the implementation of patient-facing health technologies at the DTC increased patient engagement and resulted in improvements in chronic disease self-management. Innovative pilot projects also illustrate benefits of providing access to health IT tools through multiple technology platforms, such as smartphones, as well as the utility of telehealth monitoring for those who experience barriers to mobility. Finally, the DTC case study highlights that barriers to sustainability and replicability, especially in relation to costs, may compromise the clear benefits of adopting innovative solutions.

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