



## **A PLAN TO ADDRESS DOCUMENTED HEALTH DISPARITIES WHILE ENHANCING UTMB CAPACITY FOR COORDINATED ACTION**

*THE 3<sup>RD</sup> IMPROVEMENT PLAN*

*FULFILLING DSRIP PERFORMANCE MEASURE I-11.1*

---

Center to Eliminate Health Disparities (CEHD)  
University of Texas Medical Branch (UTMB)  
301 University Blvd, Galveston, TX 77555-0920  
[cehd@utmb.edu](mailto:cehd@utmb.edu)

September, 2016

## Contributing Authors

**Hani Serag, MD, [haserag@utmb.edu](mailto:haserag@utmb.edu)**

**Kenneth D. Smith, Ph.D., [kennsmit@utmb.edu](mailto:kennsmit@utmb.edu)**

**Wei-Chen Lee, Ph.D., [weilee@utmb.edu](mailto:weilee@utmb.edu)**

## Acknowledgements

We are very grateful to the support from UTMB Office of the President-Waiver Operations, Office of Health Policy and Legislative Affairs (HPLA), Clinical Data Management, Oliver Center for Patient Quality and Safety, Admitting & Registration Services, and Ambulatory Training & Development.

This report is free to download. Copyright is reserved for Center to Eliminate Health Disparities (CEHD) and proper citation of this report is needed if being used in any document. Suggested citation:

- Center to Eliminate Health Disparities. (2016). A Plan to Address Documented Health Disparities while Enhancing UTMB Capacity for Coordinated Action: The 3<sup>rd</sup> Improvement Plan. Galveston, TX: University of Texas Medical Branch. Available at: <http://www.utmb.edu/hpla/health-disparities/publications>.

The project that is the subject of this report was approved by Texas Health and Human Services Commission (HHSC) and conducted by members of Center to Eliminate Health Disparities with the assistance of Dr. Karl Eschbach from Department of Internal Medicine-Geriatric Medicine. The views presented in this report are those of CEHD and are not necessarily those of the funding agencies.

## Table of contents

<b>EXECUTIVE SUMMARY</b>	<b>IV</b>
<b>INTRODUCTION</b>	<b>1</b>
<b>HEALTH DISPARITIES IN UTMB PATIENTS WITH TYPE II DIABETES MELLITUS</b>	<b>1</b>
<b>IMPROVE THE DISEASE MANAGEMENT AND ASSOCIATED HEALTH DISPARITIES IN UTMB PATIENTS WITH TYPE II DIABETES</b>	<b>3</b>
A CONCEPTUAL FRAMEWORK OF MULTI-LEVEL INTERVENTIONS	3
SPECIFIC STRATEGIES TO ADDRESS DISPARITIES IN DIABETES MANAGEMENT AND OUTCOMES AMONG AFRICAN AMERICAN PATIENTS	5
<b>THE 'SECOND IMPROVEMENT PLAN': ACHIEVEMENTS SO FAR</b>	<b>8</b>
DISSEMINATION AND DIALOGUE	8
DESIGNING NEW PROGRAMS FUNDRAISING	8
<b>REFERENCES</b>	<b>10</b>

## **EXECUTIVE SUMMARY**

This is the **Third Improvement Plan** to address disparities in UTMB patient health outcomes as a required deliverable for “Strengthening the UTMB Health Information System to Reduce Health Disparities,” also known as the REAL (Race, Ethnicity and Language) Data Project.

This improvement plan aims to address three racial disparities observed among UTMB patients diagnosed with Type 2 Diabetes Mellitus (T2D) during the period from January 1<sup>st</sup>, 2012 to March 31<sup>st</sup>, 2016). Analyzing the electronic health records of UTMB patients with T2D during this period showed significant racial disparities. Compared with White and Hispanic patients, African American patients had: **(1) Higher rates of macrovascular and other associated morbidities (hypertension, ischemic heart diseases, stroke and obesity stage II); (2) Higher rates of microvascular complications (renal, ophthalmic and neurological complications); and (3) Higher rates of use of insulin.**

T2D is a “*self-care management disease.*” However, self-management needs empowerment through improving knowledge, skills and enabling condition. Self-care agency (an individual's capability to perform self-care actions) and self-efficacy (an individual's beliefs in his or her capability to perform self-care actions) are important pre-requisites for effective engagement in T2D self-care management. Both vary by demographic characteristics, socioeconomic status, and access to health care and supportive community resources.

Accordingly, the current ‘Improvement Plan’ provides a conceptual framework of multi-level interventions to address the question of T2D. It seeks an integrated response that addresses patient, interpersonal, institutional, community and policy factors. It also provides specific strategies that utilize tested interventions to improve diabetes control and management of associated morbidities and complications among African American patients. The disparity reduction strategies incorporate interventions at: **(1) Patient level** (diabetes education, self-management skills and positive peer influence and support), **(2) Provider level** (adoption and use of clinical and practice guidelines); and **(3) Health system level** (adoption and use of case management approach and related practices).

## INTRODUCTION

The Center to Eliminate Health Disparities (CEHD) presents this **Third Improvement Plan** to address disparities in UTMB patient health outcomes. The report is a required deliverable for “Strengthening the UTMB Health Information System to Reduce Health Disparities”, a [Region 2 Texas Medicaid 1115 Waiver](#) project supported by the Delivery System Reform Incentive Payment ([DSRIP](#)) program. We refer to the project as the “REAL (Race, Ethnicity and Language) data project”.

This Third Improvement Plan incorporates a conceptual framework to address the question of type II diabetes mellitus (T2D) through multi-level interventions focusing on preventive and promotive measures. In addition, it provides specific strategies and interventions to address three groups of racial disparities among UTMB patients diagnosed with T2D. The three groups of disparities that are related to associated morbidities, complications and treatment line<sup>i</sup> were uncovered by analyzing UTMB electronic medical records (EMR) from January 1<sup>st</sup>, 2012 to March 31<sup>st</sup>, 2016. The suggested strategies and interventions are based on published studies and reviews as well as best practices utilized and documented by professional organizations and health systems that are nationally recognized leaders in the area of heart failure and addressing related disparities.

Although confident in the results, the project team recognizes the need for further research that incorporates, population-level and qualitative data to provide supplementary empirical evidence to strengthen the commitment of relevant stakeholders.<sup>ii</sup>

In addition, this report provides updates on the progress achieved since the submission of the **Second Improvement Plan** (March, 2016).

## HEALTH DISPARITIES IN UTMB PATIENTS WITH TYPE II DIABETES MELLITUS

The UTMB REAL data project is an example of the meaningful use of electronic health records (EHRs). It supports decision making processes at the institutional level by 1) improving the UTMB health information system’s ability to report patient outcomes stratified by demographic characteristic and billing/insurance status; 2) identifying priority disparities; and 3) developing and disseminating improvement plans to address disparities that focus on strengthening coordination among UTMB mission groups and building partnerships with relevant stakeholders.

In the third cycle of data analysis, the REAL data project team followed the same logic of the second cycle and chose to focus on one health condition for which in-depth analysis of EHRs would help UTMB meet the “triple aim”: improving the patient experience of care (including quality and satisfaction); improving the health of populations; and reducing the per capita cost of health care. T2DM was selected as it meets the three criteria.

T2D is a chronic disease of a global public health concern affecting 9.3% of the US population (29.1 million), with an economic burden of \$245 billion in 2012. The alarming increase in T2D prevalence by

---

<sup>i</sup> These disparities are described briefly in the next section and in detail in the companion report, “Documenting Health and Healthcare Disparities in the UTMB Patient and Community Population: Third Report”.

<sup>ii</sup> The framework adopted for this research does not incorporate all elements of T2D, including its etiology, prevention, treatment, and management. We recognize the need for stronger theoretical considerations to identify new approaches to addressing T2D, which we save for future work.

382% from 1988 to 2014 suggests that by 2050, about 1/3 of the US population will be diabetic.<sup>[1]</sup> Risk factors for T2D development include older age, family history of T2D, physical inactivity, and race/ethnicity. In Texas, 11.0% of adults have T2D and 12.1 per 10,000 adults are hospitalized for T2D every year. Compared to whites, African Americans have the highest prevalence of T2D and are more than twice as likely to die from T2D <sup>[2]</sup>. Overall, Medicaid spent more than \$280 million on beneficiaries with T2D and spent \$1,000 per beneficiary with T2D on average. In order to achieve the goal of Healthy People 2020, <sup>[3]</sup> eliminating disparities in T2D health outcomes, it is important to assess T2D disparities in UTMB patients and identify effective improvement plans to address disparities.

The companion report “Documenting Health and Healthcare Disparities in the UTMB Patient and Community Population: Third Report” identifies three groups of racial disparities in UTMB patients with T2D. These disparities are identified through an analysis of four years and three months of data from UTMB electronic medical records (EMR) from January 1st, 2012 to March 31st, 2016. The identified disparities are:

- **Higher rates of selected macrovascular and other morbidities among African American T2D patients.** Non-Hispanic black patients are more likely to have hypertension, ischemic heart diseases, and stroke compared to non-Hispanic white and Hispanic patients. The rate of hypertension was 45.3% in African American patients in comparison with 35.9% in Whites and 32.5% in Hispanics ( $p < 0.001$ ). The rate of ischemic heart disease was 20.2% in African American patients in comparison with 20.1% in Whites and 14.6% in Hispanics ( $p < 0.001$ ). The rate of stroke was 4.2% in African American patients in comparison with 3.2% in Whites and 2.0% in Hispanics ( $p < 0.001$ ). The rate of stage II obesity was 37.0% in African American patients in comparison with 32.7% in Whites and 31.0% in Hispanics ( $p < 0.001$ ).
- **Higher rates of microvascular complications among African American T2D patients.** Non-Hispanic black patients are more likely to acquire renal, ophthalmic and neurological complications in comparison with White and Hispanic diabetic patients. The rate of kidney complications was 10.3% in African American patients in comparison with 6.7% in Whites and 7.9% in Hispanics ( $p < 0.001$ ). The rate of ophthalmic complications was 11.1% in African American patients in comparison with 5.8% in Whites and 10.0% in Hispanics ( $p < 0.001$ ). The rate of neurologic complications was 11.8% in African American patients in comparison with 11.3% in Whites and 7.4% in Hispanics ( $p < 0.001$ ).
- **Higher rates of use of insulin among African American T2D patients.** The percentage of patients who use insulin rather than hypoglycemic oral therapy was 53.6% in African American patients in comparison with 48.3% in Whites and 44.5% in Hispanics ( $p < 0.001$ ).

Unmanaged diabetes and racial disparities increase the economic burden of T2D. The ‘Economic Costs of Diabetes in the U.S. in 2012’ study of the American Diabetes Association estimated reported a significant (41%) rise in the cost of diabetes in five years. The cost increased from \$174 billion in 2007 to \$245 billion in 2012. More 40% of this cost goes only to the hospital inpatient care for complications management. The study findings also showed that the per-capita health expenditures are higher among non-Hispanic blacks (\$9,540) in comparison with Hispanics (\$5,930) and non-Hispanic whites (\$8,101). The per capita hospital inpatient costs were also higher among non-Hispanic blacks by 41.3% in comparison with non-Hispanic whites <sup>[4]</sup>.

## IMPROVE THE DISEASE MANAGEMENT AND ASSOCIATED HEALTH DISPARITIES IN UTMB PATIENTS WITH TYPE II DIABETES

T2D is a “self-care management disease.” However, self-management needs empowerment through improving knowledge, skills and enabling condition. Self-care agency (an individual's capability to perform self-care actions) and self-efficacy (an individual's beliefs in his or her capability to perform self-care actions) are important pre-requisites for effective engagement in T2D self-care management. Both vary by demographic characteristics, socioeconomic status, and access to health care and supportive community resources. [5]. However, knowledge, self-care agency and self-efficacy are not merely behavioral issues but rather shaped by wide range of demographic characteristics, socioeconomic status, and access to health care and supportive community resources.

### A CONCEPTUAL FRAMEWORK OF MULTI-LEVEL INTERVENTIONS

Table (1) illustrate a conceptual framework of multi-level interventions to address the question of T2D. It seeks an integrated response that addresses patient, interpersonal, institutional, community and policy factors. It also provides specific strategies that use tested best practices in the areas of prevention, control and management of complications.

**Table (1): A Conceptual Framework of Multi-Level Interventions<sup>iii</sup>**

Level	Pillars, People & Settings	Strategy	Action/Activity
Patient	Knowledge	Work with patient to envelop and/or acquire relevant, accessible & updated evidence based knowledge	Develop interactive diabetes focused health education programs that depend mainly on face-to-face educational sessions but also benefit from advancements of information technology and social media programs,*
	Self-management skills & health lifestyle	Work with patient to acquire knowledge and skills for self-management & to adopt healthy lifestyle	Design hands-on training programs to improve self-management skills (e.g. monitoring glucose level, blood pressure and weight). Incorporate culturally tailored methods to promote healthy lifestyle changes (e.g. healthier diet, more exercise, less alcohol consumption, no tobacco use). Programs could include personalized and group activities.
Interpersonal	Provider	Enhance the professional response	Engage professional health personnel (primary care physicians, specialist and nurses) in health education programs and as coaches for health lifestyle changes.**
			Educate physicians and other clinical staff about practice / clinical protocols and guidelines emphasizing eye exam, foot

<sup>iii</sup> The presented framework is missing interventions to address influential biological factors and environmental exposures which are outside of the scope if this plan.

Level	Pillars, People & Settings	Strategy	Action/Activity
			inspection, etc.
	Family	Work with family members to enhance the at-home support	Design the educational and healthy lifestyle change programs to engage family members in the plan and its implementation – aim to promote the healthy lifestyle change across the family.
	Peers	Facilitate positive peer influence and support	Organize regular and frequent group activities that facilitate an exchange of success stories and experiences. These group activities can be organized in clinical and community settings (outpatient clinical and outreach community activities).
Structural	Institutions	Promote a culture of multi-disciplinary, cross sectoral coordinated and data-driven response	Establish A multi-disciplinary center for addressing diabetes.
			Create and institutionalize channels for engagement of different stakeholder groups including patients and their families in planning, implementing and evaluating response to diabetes question
			Develop and institutionalize mechanisms to monitor disparities (e.g. health disparity/inequity dash board) and develop a research plan to inform best practices to address these disparities in certain localities.
	Community & Society	Benefit from all available community resources	Map the available community resources that would be used to enhance primary, secondary and tertiary preventive measures and tailor patient-centered outcomes.***
		Coordinate efforts of different actors	Establish a coordinating body at community/district level to coordinate efforts of public health agencies, hospitals, and population based programs, research institutes and faith-based and non-governmental organizations. Such a body will also facilitate collaboration with non-health actors and promote health in all policies.
	Policy	Promote the concept of evidence-driven policies	Engage policy makers and legislatures in action-oriented research projects that inform concrete policy alternatives. These alternatives would also promote policies and programs to improve access to healthy, affordable food and opportunities for physical activity and play.
Reimbursement restructure		Incentivize preventative and promotive measures among health systems and public health agencies for diabetes by increasing funding and reimbursement levels for those measures.	

\* Face-to-face interactive education showed better results in comparison with computer-based and remote education - Peek, et al, 2008 (A systematic literature review) <sup>[6]</sup>.

\*\* Engaging physician in educational and lifestyle change programs increase patients trust in them – Clancy, et al, 2003 (A randomized control trial) <sup>[7]</sup>.

\*\*\* Primary prevention includes avoidance of obesity, increasing physical activities, dietary modification and optimizing the intrauterine environment. Secondary prevention includes: Glycemic control, managing associated risk factors for complications (hypertension, microalbuminuria, hyperlipidemia, cessation of smoking. Tertiary prevention includes: management of associated morbidities and complications (retinopathy, nephropathy, peripheral artery diseases) – adapted from Dornhorst and Merrin, 1994 <sup>[8]</sup>.

### **SPECIFIC STRATEGIES TO ADDRESS DISPARITIES IN DIABETES MANAGEMENT AND OUTCOMES AMONG AFRICAN AMERICAN PATIENTS**

Table (2) demonstrate selected best practices to improve diabetes control and complications managements. All described strategies/activities are proven successful through studies with predominant African American study population.

**Table (2): Specific Strategies to Address Disparities in Diabetes Management and Outcomes among African American Patients**

Intervention	Description	Documented process and patient outcomes	Discussion
<b>Patient Level interventions</b>			
One-on-one interactive education including self-management skills, counselling and lifestyle coaching	<ul style="list-style-type: none"> <li>- Preferably through follow up visit at clinical or community settings,</li> <li>- Multi-disciplinary team of registered nurse for medical counselling including self-management skills, diabetes educator for interactive education and lifestyle change coaching (using validated curricula).</li> </ul>	<ul style="list-style-type: none"> <li>- Improvement in outcome measures (HbA1C, Lipid panel, weight) - Clancy et al. 2003, Ziemer <i>et al</i>, 2003 (Randomized Control Trial with predominant African American study population) <sup>[7]</sup>.</li> <li>- Improvement in managing complications (e.g. eye exam, foot inspection, etc.) - Basch <i>et al</i>, 1999 (Study with predominant African American study population) <sup>[9]</sup>.</li> </ul>	<ul style="list-style-type: none"> <li>- Face-to-face interactive education showed better results in comparison with computer-based and remote education - Peek, et al, 2008 (A systematic literature review) <sup>[6]</sup>.</li> </ul>
Group activities (facilitated peer support, culturally tailored nutrition education and group exercise)	<p>Through periodical (monthly) gatherings during which:</p> <ul style="list-style-type: none"> <li>- diabetes educator or community health worker facilitates peer support through exchange success stories;</li> <li>- a diabetes educator or dietitian provide culturally tailored nutrition education and life-style coaching.</li> </ul>	<ul style="list-style-type: none"> <li>- Improvement of dietary knowledge, behaviors (reduction in sugar and fat intake) and physical activity - Two Feathers <i>et al</i>, 2005 - Study with predominant African American study populations <sup>[10]</sup>.</li> <li>- Weight loss - Ziemer et al. 2003 (Randomized Control Trial with predominant African American study population) <sup>[7]</sup>.</li> </ul>	<ul style="list-style-type: none"> <li>- Culturally tailored education showed consistent positive impact on knowledge and behavior but less consistent in relation to outcomes - Peek, et al, 2008 (A systematic literature review) <sup>[6]</sup>.</li> </ul>
<b>Provider level interventions</b>			
Use of practice guidelines	<ul style="list-style-type: none"> <li>- Adoption of health system to certain clinical protocols and guidelines</li> <li>- Training of physician on using them,</li> <li>- Enforcement of the use of guidelines through audit, feedback and reminders.</li> </ul>	<ul style="list-style-type: none"> <li>- Improvement in process indicators (e.g. HbA1C testing, eye exam, foot inspection, pneumococcal vaccination)</li> <li>- Improvement in diet, physical activities and compliance,</li> <li>- Improvement in patient outcomes (e.g. HbA1c</li> </ul>	Clinical and practice guidelines need continuous update, refinement to reflect new evidence. They also need coordination among

Intervention	Description	Documented process and patient outcomes	Discussion
		level Phillips <i>et al</i> , 2002 <sup>[11]</sup> ; Phillips <i>et al</i> , 2005 <sup>[12]</sup> and Ziemer <i>et al</i> , 2006 (Randomized Control Trial with predominant AA population)	profession associations for unification.
<b>Health system level interventions</b>			
Case management	Culturally tailored 12-month follow up through phone calls RN, community health workers visits + CHW	<ul style="list-style-type: none"> <li>- Improvement in process indicators (e.g. HbA1C testing, eye exam, foot inspection, pneumococcal vaccination)</li> <li>- Improvement in utilization of training and counselling services</li> <li>- Improvement in patient compliance,</li> <li>- Improvement in patient outcomes (e.g. HbA1c level)</li> </ul> Gary <i>et a</i> , 2004 (Randomized Control Trial with predominant AA population) <sup>[13]</sup> and Shea <i>et al</i> , 2006 (Randomized Control Trial with predominant AA population) <sup>[14]</sup> .	Implementing a task shift strategy by using nurses and community health workers in follow up rather than physician save costs.
Research	Further research using mixed methods (qualitative and quantitative)is required to systematically investigate the underlying causes of these racial disparities in UTMB population.		A participatory research that engage different stakeholder groups (including patients) would better inform more effective and feasible policy alternatives and interventions.

## THE 'SECOND IMPROVEMENT PLAN': ACHIEVEMENTS SO FAR

This section provides a brief update on the progress achieved since the last reports issued in March 2016. The following list includes key achievements for addressing health disparities as suggested by the first 'improvement plan'.

### DISSEMINATION AND DIALOGUE

By the end of March 2016, CEHD formally submitted the second package of reports, 'Documenting health disparities in the UTMB patient population' and 'Improvement Plan', to UTMB leadership represented by Ms. Katrina Lambrecht, the UTMB Vice President for Institutional Strategic Initiatives. The reports focused on documenting existing disparities in UTMB patient population with heart failure and motivating selected best practices to address these disparities. The reports were later shared and discussed with leadership of relevant departments and units at UTMB: the Cardiology Division of Internal Medicine.

In February 2016, CEHD developed and published an issue brief on 'Key disparities in UTMB inpatients admitted with heart failure'. The brief was widely disseminated electronically and distributed in hard copies in relevant events.

Based on the analysis of electronic health records made for the second disparity documentation report, CEHD developed and submitted FOUR abstracts to leading national conferences. All were accepted for poster presentations.

1. Lee, W.-C., Khalife, W., Morsy, M., Serag, H., Eschbach, K., Goodman, M., Guillot-Wright, S., Lancaster, D., Smith, K. D., Walcher, C., Raimer, B. G. (Oct, 2016). *Racial/Ethnic Disparities in Hospitalization Outcomes of Heart Failure Patients*. Poster section presented at 144<sup>th</sup> American Public Health Association Annual Meeting & Exposition, Denver, CO.
2. Lee, W.-C., Serag, H., Eschbach, K., Smith, K. D. (Jun, 2016). *Racial/Ethnic Disparities in Hospitalization Outcomes of Heart Failure Patients*. Poster section presented at Disparities Interest Group (IG) Meeting of AcademyHealth's 2016 Annual Research Meeting, Boston, MA.
3. Lee, W.-C., Eschbach, K., Miller, C., Lancaster, D., Serag, H., Guillot-Wright, G., & Smith, K. D. (Nov, 2015). *Addressing Racial/Ethnic Disparities in Heart Failure Hospitalization through Electronic Health Records*. Poster section presented at 143<sup>rd</sup> American Public Health Association Annual Meeting & Exposition, Chicago, IL.
4. Lee, W.-C., Eschbach, K., Miller, C., Lancaster, D., Serag, H., Guillot-Wright, G., & Smith, K. D. (Jun, 2015). *Addressing Racial/Ethnic Disparities in Heart Failure Hospitalization through Electronic Health Records*. Poster section presented at Disparities Interest Group (IG) Meeting of AcademyHealth's 2015 Annual Research Meeting, Minneapolis, MN.

### DESIGNING NEW PROGRAMS FUNDRAISING

During the last six months, the REAL data project team cultivated relationships and developed new partnerships with several UTMB clinical and academic departments to collaborate on health disparity research.

In May 2016, jointly with the Department of Cardiology, CEHD will design and implement large-scale research to investigate associations between heart failure (severity of illness, length and frequency of hospitalization, etc.) and social parameters (e.g. race and ethnicity, socio-economic conditions, place of residence, etc.). The research will utilize UTMB EHRs in addition to population-based qualitative and quantitative studies. The research project was submitted for NIH funding.

In September 2016, jointly with the division of endocrinology of internal medicine department, CEHD developed and submitted a letter of intent for Patient-Centered Outcome Research Institute (PCORI) call for applications on health disparities.

In late August 2016, CEHD, in collaboration with faculty from the Department of Internal Medicine, directed a minimester elective course in the School of Medicine titled 'Beyond Medicine: Social Health and Human Rights'. The course focused on upstream determinants of health, illness, and health disparities. Some of the course materials were inspired by the findings from the REAL data project.

## REFERENCES

1. American Diabetes Association (2016). Overall numbers, diabetes, and prediabetes. <http://www.diabetes.org/diabetesbasics/statistics>. Cited Sept. 13, 2016., 2016.
2. Texas Department of State Health Services (2016). Diabetes Fact Sheet-Texas. <https://www.dshs.texas.gov/diabetes/tdcdata.shtm>. Cited Sept. 13, 2016.
3. Office of Disease Prevention and Health Promotion (2016). 2020 Topics & Objectives: Diabetes. <https://www.healthypeople.gov/2020/topics-objectives/topic/diabetes>. Cited Sept. 13, 2016., 2016.
4. The American Diabetes Association (2013). Economic Costs of Diabetes in the U.S. in 2012. Available: <http://www.diabetes.org/advocacy/news-events/cost-of-diabetes.html>. Cited Sept. 13, 2016.
5. Shrivastava S, Shrivastava P, Ramasamy J (2013). Role of self-care in management of diabetes mellitus. *J Diabetes Metab Disord* 2013;12:14.
6. Peek M, Cargill A and Huang E (2007). Diabetes Health Disparities: A Systematic Review of Health Care Interventions. *Med Care Res Rev*. 2007 October ; 64(5 Suppl): 101S–156S.
7. Clancy D, Brown S, Magruder K and Huang P (2003). Group visits in medically and economically disadvantaged patients with type 2 diabetes and their relationships to clinical outcomes. *Topics in Health Information Management* 2003;24(1):8–14.
8. Dornhorst A and Merrin P (1994). Primary, secondary and tertiary prevention of non-insulin-dependent diabetes. *Postgrad Med J* (1994) 70, 529-535.
9. Basch C, Walker E, Howard C, Shamoan H and Zybert P (1999). The effect of health education on the rate of ophthalmic examinations among African Americans with diabetes mellitus. *American Journal of Public Health* 1999;89(12):1878–82.
10. Two Feathers J, Kieffer E, Palmisano G, Anderson M, Sinco B, Janz N, Heisler M, Spencer M, Guzman R, Thompson J, Wisdom K and James S. Racial and Ethnic Approaches to Community Health (REACH) Detroit partnership: Improving diabetes-related outcomes among African American and Latino adults. *American Journal of Public Health* 2005;95(9):1552–60.
11. Phillips L, Hertzberg V, Cook C, El-Kebbi I, Gallina D, Ziemer D, Miller C, Doyle J, Barnes C, Slocus W, Lyles R, Hayes R, Thompson D, Ballard D, McClellan W and Branch W (2002). The Improving Primary Care of African Americans with Diabetes (IPCAAD) project: Rationale and design. *Controlled Clinical Trials* 2002;23(5):554–69.
12. Phillips L, Ziemer D, Doyle J, Barnes C, Kolm P, Branch W, Cook C, Dunbar V, El-Kebbi I, Gallina D, Miller C, Rhee M, Thompson D and Watkins C (2005). An endocrinologist-supported intervention aimed at providers improves diabetes management in a primary care site. *Diabetes Care* 2005;28(10):2352–60.
13. Gary T, Bone L, Hill M, Levine D, McGuire M, Saudek C and Brancati F (2004). Randomized controlled trial of the effects of nurse case manager and community health worker interventions on risk factors for diabetes related complications in urban African Americans. *Preventive Medicine* 2004;37(1):23–32.

14. Shea S, Weinstock R, Starren J, Teresi J, Palmas W, Field L, Morin P, Golan R, Izquierdo R, Wolff L, Ashraf M, Hilliman C, Silver S, Meyer S, Holmes D, Petkova E, Capps L and Lantigua R (2006). A randomized trial comparing telemedicine case management with usual care in older, ethnically diverse, medically underserved patients with diabetes mellitus. *Journal of the American Medical Informatics Association* 2006;13(1):40–51.