

Monitoring Diabetes Care in Three Clinics:

A Retrospective Diabetes Registry Review

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Introduction

Diabetes is the seventh leading cause of death in the United States (US) (Baus, Wood, Pollard, Summerfield, & White, 2013), and those living with diabetes have a poorer prognosis than non-diabetics after suffering from major illnesses including angina, myocardial infarction and stroke (Kelly, et al., 2014; Mankovsky & Ziegler, 2004). Diabetes is one of the most prevalent chronic illnesses in the United States and contributes greatly to increased rates of heart disease, stroke, kidney failure, amputations and blindness (Baus, et al., 2013). However, diabetic patients receive only about 45% of the recommended care suggested by 13 national diabetes guidelines (McGlynn, et al., 2003). As the US healthcare system transitions to a focus on prevention and chronic illness management, evidence-based practice is being used to inform new strategies of diabetes management.

With the advent of electronic health records (EHRs), charting has become not only a method for documentation but also a method of data collection for evidence-based practice. Data from outpatient clinic EHRs are being collected and used to support management of many chronic illnesses through the use of disease registries. Electronic health records now often contain a function to generate a chronic illness registry, a spreadsheet-style set of information including patients affected by a particular disease, their demographics, laboratory data, and outcome data. Storing this information in one place provides a way in which providers can identify patients of greatest need to arrange follow-up or referral and also observe outcomes and indicators in their patient populations over time (Chamany, et al., 2009).

Illness registries have been shown to be successful in reporting and observing epidemics in the past (Chamany, et al., 2009), leading to the eradication of small pox, cholera and yellow fever (Littenberg & MacLean, 2008). Through the use of a disease registry, public health officials are able to appropriately observe geographic and population patterns in a disease, in order to guide planning of programs, set priorities and allocate resources (Littenberg & MacLean, 2008). Within the last ten years, however, public health officials have begun to use registries to manage the care of diabetes. In 2005, the New York City Board of Health mandated laboratory reporting of hemoglobin A1c (Hgb A1c) results, establishing the United States' first registry to track the level of blood sugar control in diabetic patients (Chamany, et al., 2009).

Description of Clinical Problem

The use of diabetes registries has become a trend across the United States and has become a function of many office EHRs. However, the clinical care context often creates difficulties for data generation. Tolar and Balka (2012), in an ethnographic case study, identified problems and preconditions which need to be addressed for successful use of a diabetes registry. For example, they cite the need for human tailoring as a problem in the use of registries. Once an electronic registry is set up by an information technology department, a staff member must ensure all diabetic patients have diabetes reflected on their problem lists. Also, data needs to be entered in a searchable form, rather than in a narrative text. Additionally, the EHR needs to be in an accessible and useable format. Tolar and Balka (2012) write that if the initial data in a health registry is not manually edited for errors and completion, it becomes very difficult to meaningfully use secondary data from the EHR. Often, these issues preclude healthcare staff from being able to use EHRs to their full effect (Tolar & Balka, 2012).

The issue of using diabetes registries as background monitoring tools rather than a data generation tool is faced by the Yakima Valley Farm Workers Clinic (YVFWC) branch, Salud Medical Center (SMC) in Woodburn, Oregon. Since 2011, SMC has used a diabetes registry to inform their chronic disease management committee. The committee is able to use this information to make decisions affecting development of clinic protocols and prioritization and resource allocation in their clinic. However, this clinic does not currently use registry data as a means of identifying areas of clinical practice which need to be addressed. This represents a missed opportunity for the implementation of evidence-based care. Additionally, there is no staff person assigned to maintain the diabetes registry. At this point, the registry has not been reviewed and updated in nearly one year. The quality of the data contained in the Yakima Valley Farm Workers Clinic diabetes registry is unknown. It is unknown how this clinic's diabetes measures are changing over time and how they compare with other clinics in the Yakima Valley system.

Policy and Equity Considerations

This missed opportunity for using registry data to drive evidence-based practice is a timely problem, considering the changes to Oregon healthcare policy and the adoption of the coordinated care model. SMC is a patient-centered primary care home which receives reimbursement from the Oregon Health Authority (OHA) based on quality metrics. For example, one measure currently being monitored in Oregon is the percentage of diabetic patients who have had a Hgb A1c drawn within the past year (Oregon Health Authority, 2014). Without the ability to accurately demonstrate improvement in the outcomes of the diabetic patients at SMC, the clinic may not be able to obtain payment for services rendered.

Equity considerations in this clinic are great, as the population served by SMC is primarily minority, low income and rural. About 90% of the patients at SME are of Hispanic descent, many of whom are first generation immigrants from Mexico. This clinic is located in the fertile Willamette Valley and serves migrant farm workers and their families. Because of the nature of the employment which draws this community to the area, many patients seen at SMC are unable to pay for healthcare services. As a result, SMC has become a federally-qualified health clinic (FQHC) and received federal reimbursement to care for those unable pay for services. Despite being located in a town of about 10,000 people, SMC is still considered rural because many of the patients and families drive in from the rural farming areas in order to seek care.

Description of the Population SMC

The population served at SMC is a primarily Hispanic, immigrant worker population of first and second generation immigrant families. According to the SMC diabetes registry, the age range of the diabetic population at SMC is 14-94 years old.

Hispanic families are affected by diabetes in rates that are disproportionately higher. The prevalence of diabetes in Hispanic individuals living in the US is 16.9%, as opposed to 10.2% for non-Hispanic whites (American Diabetes Association, 2014). Additionally, poverty rates for Hispanic individuals are much higher than average. In 2010, 26.6% of Hispanic individuals were poor, compared to 9.9% of non-Hispanic white individuals (National Poverty Center, 2014). Living in poverty has been associated with increased rates of diabetes (OR 2.2, $p < 0.001$) (Hsu, et al., 2012). Additionally, diabetes registry use is of particular importance for this population, because other data sources such as surveys, medical records tend to miss underserved and uninsured populations while gathering statistics (Littenberg & MacLean, 2008).

Purpose of the Project

The aim of this project is to use the SMC diabetes registry to track Hgb A1c levels and percentages of patients on statins, ACE-I/ARB and insulin since the inception of the registry in 2011. The use of the registry at SMC represents a major step towards addressing the epidemic of diabetes using a traditional public health tool (Chamany, et al., 2009). However, the staff at SMC lacks a staff member who is employed to intentionally sort through registry data, maintain its quality and accuracy, and apply findings to clinical problems. At this point, the registry is generated by an electronic search function of IC-Chart, the charting software at Salud. However, a previous review of the IC-Chart registry review revealed that inappropriate data was included in the registry, including patients with pre-diabetes who had corrected their Hgb A1c through diet and weight loss. There has been no prior inquiry in this registry to assess whether or not diabetes core measures, such as Hgb A1c and rates of ACE-I and statin use, have improved since the implementation of the SMC diabetes registry in 2011. Also, it is unknown how the diabetes core measures at SMC compare with those of other clinics in the Yakima Valley system and with national and state averages.

Literature Review

In October and November 2014, a review of literature was completed to gather information relevant to the use of diabetes registries. The terms “Diabetes Mellitus, Type 2” and “Registries, Disease” were searched in CINAHL using the search limits of date (2005-2014) and language (English). Four of the twelve resulting articles were identified as relevant to this topic. The terms “Diabetes Mellitus, Type 2” and “Registries” were searched in OVID Medline® without Revisions (1996 to November Week 1, 2014) and limited by date (2004-Current),

language (English) and publication type (journal article) for a total of 468 results. Six of the resulting articles were chosen.

A total of twelve articles were selected for inclusion in this review, and their topics centered around three themes: the association between registry use and improved clinical outcomes, examples of applied registry use, and discussion of logistical and ethical factors associated with registry implementation. In general, the literature supports the use of diabetes registries as a population-based implementation to improve health outcomes in diabetic patients. This review supplied several specific ways of using the registry beyond tracking outcomes. Finally, the articles reviewed provide a balanced discussion of the logistics and ethics associated with implementing a diabetes registry.

Diabetes Registry Use and Associated Outcomes

Three articles in this review discussed the outcomes seen after a diabetes registry is implemented in a clinic or city setting. Hallgren, Elfgren, Grodzinsky and Tornvall, in a 2013 quality improvement project, investigated whether or not the Swedish National Diabetes Register improved the average Hgb A1c level in the registered population between 2005 and 2009. The authors were charged with increasing the level of participation in the diabetes registry in their county in Sweden.

Hallgren and colleagues compared the percentage of patients at goal Hgb A1c (<6.0%) between Ostergotland county and Sweden as a whole. Hallgren and colleagues obtained mixed results but found that with one exception (2009) the Hgb A1c results in the county studied were slightly better than Sweden as a whole in each year studied. The authors note that they have seen “better and sustained medical outcomes associated with registration in the Swedish National

Diabetes Register” (p. 256) and that health professionals have an improved method for evaluation and follow-up of their patients.

Morrow, et al., in a 2013 prospective cohort analysis, used a similar structure of gathering data while improving and implementing a diabetes registry. In 2006 and 2007, seven small or mid-sized primary care practices were recruited by the New York Diabetes Coalition to implement a diabetes registry and receive education and coaching on using a diabetes registry in their practice and to engage patients. Morrow and colleagues hypothesized that use of a registry would achieve meaningful improvement in the number of patients meeting Hgb A1c, LDL and blood pressure goals in these primary care practices. After diabetes registries were implemented at all sites, Morrow and colleagues measured health status quarterly for Hgb A1c, LDL and blood pressure. Then, the authors calculated the proportions of the 1,212 patients who were at, above and below goal.

In observing the health metrics over time, Morrow and colleagues noted that with each subsequent quarter, patients were 1.4 times as likely to have Hgb A1c levels <9.0%, almost twice as likely to have LDL levels <100 and 1.3 times as likely to have BP <140/90. The average Hgb A1c for the studied population improved slightly, but not at a statistically significant level.

This literature review also revealed that improved outcomes following diabetes registry use occur in rural areas, as well. Pollard, et al. (2009) examined the effects of basic registry use on diabetes care processes and clinical outcomes in rural West Virginia. The registry consisted of 661 diabetic patients from six Federally Qualified Health Centers. After implementing a diabetes registry, 12 of 13 clinical processes, such as food, eye and dental exams, improved and three of six clinical outcomes (Hgb A1c, LDL and cholesterol levels) improved. These improvements were not seen in the control population. This study represents a critical addition

to the available medical literature about diabetes registries. It was the first to demonstrate that diabetes registries are associated with improved outcomes in urban, rural and single-payer settings.

Examples of Applied Registry Use

Four studies demonstrate ways in which registries can be used as tools beyond monitoring test results. Two of these used diabetes registries to identify populations at risk. Of these two studies, one outlined a subpopulation already in a registry and the other used the registry to predict a population at greatest risk for developing diabetes. A third study outlined applied registry use by documenting how the authors used a registry to create a method for estimating prognosis after a diabetes complication occurs. Finally, the fourth study discussed using the registry as a clinical tool in the form of a searchable database. These studies add to the previously discussed literature theme, improving outcomes associated with diabetes registry use, by demonstrating other ways registries can be used as clinical tools for population management.

In a 2013 non-experimental retrospective analysis, Baus, et al. examined the ability to use an EHR to identify at-risk patients in a Chronic Disease Electronic Management System (CDEMS). This study analyzed established patients without a diabetes diagnosis in 14 West Virginia care organizations at 23 sites. The 130,021 patients in the population without a diabetes or pre-diabetes diagnosis were the focus of this study. Baus and colleagues imported their EHR data into the CDEMS, a type of registry, and analyzed it to identify 11.3% of patients who were at risk for diabetes based on previous lab results and biophysical data.

These patients represented a subpopulation in need of targeted follow-up and screening. This study demonstrates that patients can be identified retrospectively by importing data into a registry rather than conducting prospective community-level screenings or patient-by-patient

reviews of laboratory results. Using chronic illness registries to capture a subpopulation in need of follow up uses fewer resources and much less time to capture a greater number of potentially affected individuals than more traditional screening methods. By using a registry to identify a target population, the registry “becomes a tool for prevention by automating and standardizing the search for patients meeting specific risk factor criteria” (p. 4). (Baus, et al., 2013) Baus and colleagues additionally note that using a registry in such a way advances it from its role in secondary and tertiary prevention and gives the registry a role in primary prevention.

Another way in which a registry was used to identify a subpopulation at risk was documented in a cross-sectional study by Cheong, et al. in 2013. This study compared the glycemic control in a population of 30,427 Malaysian women of reproductive age (ages 15-49) with those of non-reproductive age. The authors were able to collect their data through the use of a web-based diabetes registry which originated in 2008. According to the American Diabetes Association (Inzucchi, et al., 2012), women of reproductive age require more strict diabetes control than other age groups. However, using the diabetes registry, the authors demonstrated that the women of reproductive age had poorer glycemic control than their counterparts of non-reproductive age. This occurred in spite of the fact that the majority of women of reproductive age had diabetes for fewer than five years. This subpopulation may have gone unnoticed had the registry not been used to identify those at highest risk.

Tolar and Balka (2012) used an alternate approach to document the use of an EHR to prevent and manage diabetes. In their ethnographic case study, the authors completed action research, which brings together theory, research and practice to generate research about a situation without influencing the situation. Tolar and Balka identified difficulties of registry implementation based on observing and interviewing staff members using an EHR in a clinic in

Vancouver, British Columbia. The staff used the registry function of the EHR to run practice searches, which allow staff members to search their patient panels for subgroups based on their desired criteria. They identified the following components necessary to improving patient outcomes: an effective EHR, the use of registries, a means to measure and evaluate the success of the technology components and cooperation from staff and patients (Tolar & Balka, 2012).

Another way in which a diabetes registry has been applied to a clinical problem is in using the information to make predictions about the future health of individuals in a population. Diabetics have higher mortality rates than non-diabetics, much of which is attributed to a twofold increase in risk of coronary artery disease (Emerging Risk Factors Collaboration, 2010). Although diabetic patients have these known risks and complications, it can be difficult to judge their prognoses. In 2014, a descriptive study published by Kelly, et al. discussed another use of diabetes registries. Kelly and colleagues examined the degree to which life expectancy is changed by clinical risk factors.

Kelly and colleagues tracked risk factors using the Swedish National Diabetes Register. Risk factors included blood pressure, BMI, macro- and microalbuminuria, GFR, a cholesterol panel, Hgb A1c, duration of diabetes, gender, and smoking status. Then, the authors combined this information with type of complication and data from the National Causes of Death Statistics. The authors used information gathered in the National Diabetes Register to derive an equation which can be used to estimate survival and prognosis after any of five complications related to diabetes. The authors do acknowledge the limitation of a non-random sample, however, as participation in the National Diabetes Register is voluntary. This example of applying a diabetes registry to the clinical problems of improving the accuracy of patient prognoses is useful to

providers serving individual patients but can also be applied in public health to develop protocols, guidelines and policy.

Logistics and Ethics Diabetes Registry Implementation

Five studies discuss the implementation, advantages or disadvantages of diabetes registries. Two of these outline the process and challenges of implementing a diabetes registry. Three studies focus on positive and negative aspects of registry use with a particular emphasis on ethics and privacy. Together, these five studies provide a context for the two themes already discussed, health metrics associated with registry use and application of registry use to other clinical problems.

Ortiz (2006), in a discussion of implementing a diabetes registry, explains the value of registry use in a practice without EHRs. Many practices are set up to encounter high risk patients only when patients present to the clinic for another reason, such as an acute problem. The provider then addresses the acute problem and makes an appointment for another date to address the chronic illness. One of the key points Ortiz makes regarding diabetes registry use is that the registry allows a provider to take an active role in monitoring a whole panel of diabetic patients at one time. In the registry he discusses, the patient is flagged if his or her last Hgb A1c was more than 90 days ago, prompting clinic personnel to bring the patient in for an appointment. Ortiz also notes that initial data entry of the registry should be spread over 10-15 days so as not to overwhelm staff.

Similarly, Elfgrén, Grodzinsky, and Tornvall (2012) followed an implementation process and noted that registry use should become routine for staff members and embedded into everyday practice. Elfgrén and colleagues observed implementation of the National Diabetes Register at 42 primary care facilities in Sweden. This program was put into place following a

change in healthcare policy in Sweden which required that all healthcare units have an established method of quality improvement. The diabetes registry was implemented by a pay for performance process, in which providers received a payment for adding patients to the registry every year until the program was discontinued. Fifty percent of diabetic patients per clinic were needed to receive payment.

A 2009 article by Chamany, et al. was the first of three journal articles to discuss the pros and cons of the use of diabetes registries. Chamany and colleagues discuss the public health rationale for the creation of a diabetes registry by the New York City Board of Health. In this registry, Hgb A1c values are considered reportable data and are automatically sent by laboratories to the New York City Board of Health. Providers receive a roster of their patients every quarter, ordered by Hgb A1c level. Patients with Hgb A1c levels over 9% are contacted by the Board of Health via letter. Patients may opt out of being contacted by the Board of Health, but they are not able to opt out of the registry entirely.

Privacy is an issue raised by critics of diabetes registries. Chamany, et al. (2009) note that many who are opposed to diabetes registries believe diabetes registries violate individuals' rights to privacy without a clear benefit in diabetes outcomes. Traditionally, registries such as the New York City Board of Health Hgb A1c registry are used to manage acute illnesses. Many privacy advocates opine that the Health Department has exceeded their authority in taking the step to use registries in the management of chronic diseases.

Similarly, Trief and Ellison (2008) write that a passive opt-out in diabetes registries will be ineffective and undermine the physician-patient relationship as well as the expectation of privacy. Trief and Ellison call this use of patient data "ethically compromised" (p. 799) and state that this uses patient data in a way which offers little respect to the individual patients.

Specifically, they express concern about the first contact between a registry and patients with high Hgb A1cs. The authors state that a “serious breach of trust could occur when patients get their first notification of having a high Hgb A1c” (Trief & Ellison, 2008, p. 800).

Littenberg and MacLean (2008), however, rebut this hesitation by addressing the many uses of a diabetes registry: epidemiology, program planning, budgeting, assessing and monitoring disparities and improving quality of care. Littenberg and Maclean also focus on the ways in which a diabetes registry can help providers offer individualized care. An additional positive aspect of diabetes registry use noted by Littenberg and MacLean is that registries allow providers to identify and contact patients who are lost to follow up.

To summarize the available literature on diabetes registry use, these system of diabetes data organization are associated with improved diabetes measures over time, though they have not been in use long enough to demonstrate improved clinical outcomes. In addition to using diabetes registries to monitor a clinic’s progress in monitoring diabetes care, there have been multiple applications of registry use to other clinical problems. While some opponents of registry use cite concerns about patient privacy, many individuals in healthcare are supportive of the practice and see many possible uses for diabetes registries.

Gaps in Literature

Because diabetes registries are a new clinical tool within the past 15 years, much of the relevant available data does not address patient outcomes. Registries have been associated with improved diabetes health metrics (Hallgren, et al., 2013; Morrow, et al., 2013; Pollard, et al., 2009), but they have not yet been shown to improve clinic outcomes such as decreased amputation rate and mortality. Also, registries help in identifying patients who are complex or lost to follow up. When included in diabetes registry analysis, these inactive patients can skew

registry statistics. At this point in time, it is unknown how patients lost to follow up should be addressed in registries. If patients are lost to follow up and disincluded in a registry, they could miss opportunities to be contacted by a healthcare organization for further care. However, if patients who are out of contact are allowed to continue in the registry, the data could be skewed and may not be ideal for informing decision making. There is no established pattern for how long patients should be included if they have not presented for care for a prolonged period of time.

As Trief and Ellison (2008) identified, the optimal way to address privacy in a diabetes registry has not been established. There are not yet any data to reflect the usefulness of an opt-in registry or a coding system to ensure patient privacy. Similarly, there are no studies to address the utility of obtaining patient consent prior to using patient data in a registry.

Additional Relevant Data Sources

This registry literature review was updated in April 2015 to include two additional articles. A 2014 article by Kelly, et al. describes use of the Swedish National Diabetes Registry to calculate rates of mortality after patients' first major diabetes complication. This article supports the theme of using applied diabetes registry data to solve clinical questions. A 2014 article by Barkhuysen, et al. described a study which compared diabetes registry data entered manually into an online chronic disease registry with registry data automatically retrieved from an EMR. Barkhuysen and colleagues found that the online chronic disease registry produced more reliable data and made the recommendation that EMRs and providers' charting patterns be adapted if their charting is expected to be analyzed as a registry in the future. This study aligns with the literature theme of describing the logistics of using a registry.

Other data sources relevant to this project are the 2014 Standards of Medical Care in Diabetes, published by the American Diabetes Association. This document outlines the principles of diabetes care and establishes guidelines by which providers direct their care. The Standards of Medical Care in Diabetes is used to determine which data points are collected in diabetes registries. Additionally, the Oregon Health Authority sets the performance standards by which many patient-centered primary care homes receive reimbursement for the care they deliver. Both the Oregon Health Authority and the coordinated care organizations in Oregon are useful sources for determining the degree to which quality improvement must be demonstrated in order to receive payment. As diabetes registries are a way to demonstrate quality improvement, both these sources represent important resources to the use of diabetes registries.

Clinical Problem in the Context of Literature Review

In the setting of a transformed healthcare system in which many reimbursements are being made via pay-for-performance, it is increasingly important to demonstrate quality improvement. In the setting of diabetes management, diabetes registries offer a new method for tracking outcomes on a population scale. Additionally, registries can be used beyond monitoring as tools for primary prevention.

The Yakima Valley Farm Workers Clinics in Washington and Oregon implemented a diabetes registry into their EHR in 2011. The Salud branch of YVFWC in Woodburn, Oregon currently uses their registry for background monitoring of diabetes care, but they do not apply this data to clinical processes. As discussed in the literature review, there are many potential ways in which the registry could be applied to diabetes care in the clinic. SMC has not applied their diabetes registry to clinical problems, nor do they use their registry to compare diabetes measures across clinics in the Yakima Valley system. Right now, healthcare is moving beyond

individual patient care “to an awareness of patterns of practice across larger patient populations” (p. 470) in which providers receive feedback about and manage their clinics’ entire patient populations (Tolar & Balka, 2012). However, SMC has not yet achieved this level of population awareness, not has it used registry data to change their practice patterns.

Project Approach

Setting

Data gathering occurred at Salud Medical Center in Woodburn, Oregon. Data were collected electronically from the diabetes registries of Salud Medical Center, Lancaster Medical Center in Salem, Oregon and Rosewood Medical Center in Portland, Oregon. Barriers to this project related to the setting included initial difficulty in obtaining access to the diabetes registries and the fact that there is no single staff member assigned to managing the diabetes registry.

Participants

Data were collected via the online registry from all diabetic patients contained within the registry at each of the three clinic locations. All patients who were listed within the diabetes registry were included in this project. In 2014, there were 756 patients in the SMC registry, 188 patients in the Lancaster registry and 158 patients in the Rosewood registry.

Protection of Human Subjects

Patients were not required to consent for inclusion into the registry other than initially signing consent to be treated at their respective clinics. This project was determined to be exempt from approval by the Oregon Health & Science University Institutional Review Board. The data was de-identified by removing names and medical record numbers prior to storing the registry information on a flash. Data was deleted upon completion of the project.

Data Collection

Data were collected by using the diabetes registry function of IC-Chart, the YVFWC charting software. In IC-Chart, diabetes registry data can be limited by clinic, by provider and by date. Registry data for Salud Medical Center were exported to Microsoft Excel in six month intervals from 2011, when the registry was implemented, to 2014, the most current date available. Additionally, 2014 registry data from each of the three clinics for the entire year were exported to Excel.

Intervention Procedures

For the Salud registry from 2011 through 2014, Excel was used to find maximum, minimum, mean and median Hgb A1c in six month intervals. Additionally, the percentage of diabetic patients using insulin, ACE-I/ARB and statin drugs was calculated. The percentage of patients with Hgb A1c less than 9% was also calculated. Nine percent was used as a marker because the SMC chronic illness committee, which reviews care policies at SMC, determined that this value will be used to determine whether or not their diabetic patients are in control of their diabetes.

Excel was also used to compare registry data among Salud, Lancaster and Rosewood clinics. First, the 2014 mean and median Hgb A1c of each of these three clinics was calculated. Maximum, minimum, and percentiles were also calculated. The percentage of patients who used insulin in 2014 was calculated in addition to the percentage of patients who had a Hgb A1c checked within the past year.

Project Outcomes

The mean Hgb A1c at Salud Medical Center fell from 7.85 in 2011 to 7.67 at the end of 2014. This measure was supported by the median Hgb A1c, which also fell from 7.3 to 7.1. However, the percentage of patients with Hgb A1c less than nine increased from 76.2% to 77.4% over the same time period.

The percentage of patients on insulin was documented as less than 8% from 2011-2013, but this number increased to 19.1% in 2014. This trend was also seen in the percentage of Salud diabetics on ACE-I/ARBs, which increased from less than 6% before 2014 to 53.6% in 2014, and statin drugs, which increased from less than 6% to 54.4% over the same time period.

When comparing Salud, Lancaster and Rosewood clinics, it was found that the average Hgb A1c was 7.7, 7.76 and 7.82 respectively. The registries contained 756, 188 and 158 patients respectively. The percentage of patients on insulin varied, with 24.3% of patients on insulin at Salud, 18.6% at Lancaster and 25.3% at Rosewood. Similarly, the percentage of patients who had a Hgb A1c checked within the previous year varied. At Salud, this value was 89.4%, compared with 72.9% at Lancaster and 84.8% at Rosewood.

Limitations

Limitations to this project included the fact that registry data was not evaluated for completion or accuracy prior to analysis. It is not known how much of the data represents active patients in the clinics. Additionally, demographic information included in the registries was limited and did not include race, sex, citizenship status or address, which meant that these variables were not evaluated.

Outcomes in Relation to Literature

The mean and median Hgb A1c at Salud, Lancaster and Rosewood clinics were found to be higher than the US National Average (Centers for Disease Control and Prevention, 2014). Also, national Hgb A1c averages were taken from National Health and Nutrition Examination Surveys (NHANES) which represent the US noninstitutionalized population. The population served by the YVFWC is not entirely made up of US citizens and includes a large number of patients from Central America who frequently travel to and from their native countries, resulting in gaps in their medical care at these three clinics. These interruptions in care could easily result in suboptimal diabetes control and resultant discrepancies between the Hgb A1c clinic averages and those noted in NHANES studies.

	<u>SMC</u>	<u>Lancaster</u>	<u>Rosewood</u>	<u>US National Average (Centers for Disease Control and Prevention, 2014)</u>
25 th Percentile	6.1	6.1	6.2	6.0
Mean	7.7	7.8	7.8	7.2
Median	7.0	7.2	7.0	6.7
75 th Percentile	8.7	8.8	8.75	7.8

Another way to compare YVFWC diabetes data to published statistics is in looking at the percentage of patients who have received an on-time Hgb A1c, defined as having this lab value drawn and evaluated with the past year. In 2011, the OHA began tracking this statistic and found that 78.5% of Oregon diabetics had their Hgb A1c reviewed on time. In an effort to improve diabetes care and decrease healthcare costs, the OHA developed a pay for performance measure involving on-time Hgb A1c. The OHA distributed funds to coordinated care

organizations which were able to meet benchmarks on each of four different measures, one of which was on-time Hgb A1c. By increasing on-time Hgb A1c to 86%, along with improving alcohol and depression screening and increasing primary care home enrollments, Oregon coordinated care organizations were able to qualify for additional funding beyond that provided by meeting basic incentive measures.

FamilyCare, a coordinated care organization which includes SMC, was able to qualify for this additional “challenge pool” funding, and part of the reason they were able to do this was because SMC achieved 89.4% on-time Hgb A1c screening in their clinic in 2014. However, Rosewood and Lancaster clinics both fell below the 86% benchmark at 84.8% and 72.9% respectively. While both of Rosewood and Lancaster’s representative CCOs did receive challenge pool funding, it was not because these two clinics met the 86% benchmark. Having identified these low values, one way the YVFWC diabetes registry could be utilized to improve diabetes care on a systems level is through the patient recall process used by SMC to achieve greater than 86% on-time Hgb A1cs being identified and instituted at Rosewood and Lancaster clinics.

Practice-Related Recommendations

This review has generated two recommendations for practice. First, it should be determined why such low rates of insulin, ACE-I/ARB and statin use were documented in the registry from 2011 until 2013. It is unknown why these figures improved so dramatically in 2014. This may be due to a change in the data entry at the user level. In future work, this question should be answered, as the answer could be applied to other similar situations in the future and used to more accurately reflect practice measures.

Second, the process of bringing in patients to have the Hgb A1c checked at SMC should be mapped. Key personnel in this process should be identified, along with the timing of the process and the steps taken to ensure SMC patients are contacted and come to the clinic promptly. This process should be compared to the processes at Rosewood and Lancaster clinics and possibly adapted for implementation at these two clinics with the goal of meeting the OHA 86% on-time Hgb A1c benchmark.

Summary

Diabetes registries are a systematic way of representing key diabetes monitoring data from an affected subset of a population. The YVFWC uses a diabetes registry to monitor their diabetes care, but there has not been a designated person in charge of reviewing the registry in over a year. The aim of this project was to use the registry to identify trends in diabetes care at three branches of the YVFWC and to compare these trends to available literature and statistics. This aim was supported by a literature review which identified three themes, including examples of diabetes registry applications, discussion of logistics and ethics of using a diabetes registry and the association between registry use and improved outcomes.

In April 2015, a retrospective observational diabetes registry review was completed at SMC and analyzed using descriptive statistics. A key finding of this review was the demonstration of improved Hgb A1c from 2011 to 2014 at Salud Medical Center. Two recommendations were generated, that low levels of documented ACE-I/ARB, insulin and statin use from 2011 be correlated with practice or data entry patterns and that the process for achieving high rates of on-time Hgb A1cs used at SMC be identified and implemented at two

clinics with lower rates. This diabetes registry review met the aim of this project and will contribute to improved diabetes care at each of these three clinics.

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