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Descriptive Report

Employing a Quality Improvement Database to Observe the Gaps in Care at a Student-Run Free Clinic

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Abstract

The Student Health Alliance Reaching Indigent Needy Groups (SHARING) clinics are student run free clinics (SRFCs) at the University of Nebraska Medical Center that serve low income, uninsured adults in Omaha, Nebraska. Like many other SRFCs, they face multiple barriers to providing high quality care. To address this, the SHARING Quality Improvement (QI) Database was created. QI has many definitions, but, overall, it is a method of analyzing clinic performance and the changes made to improve the clinic. Before this database, there was no way of continuously tracking clinic metrics over time, so previous QI projects required timely data abstraction that often only evaluated retrospective outcomes with limited real-time data to track clinical outcomes as changes were implemented thereby limiting our ability to implement further changes to improve patient health. A review of SRFC literature reveals a lack of a model or guide on how to assess quality of care in SRFCs and track patient data over time. This study seeks to fill this gap. Our database consists of a patient list of electronic medical records that were compiled in the charting system Epic. The patient data is exported into a Microsoft Excel document each month and clinic metrics are analyzed, thus providing a real-time dashboard of quality metrics for the clinic. This database will be utilized to inform decisions regarding the reform of clinic processes. This database model can be used at other SRFCs to monitor quality of care provided at their clinics and implement QI measures accordingly.

Introduction

Student run free clinics (SRFCs) provide free healthcare services to many people across America who have limited access to medical care and funds to afford treatment. SRFCs help to reduce healthcare inequities and improve patient outcomes.[1,6] Without these clinics, many patients would not be able to afford healthcare services.[1] SRFCs provide long-term care for underserved populations like patients who are uninsured, underinsured, low income, or experiencing homelessness.[1-2] SRFCs provide a wide variety of services, including primary care, mental health care, pharmacy, dental care, and occupational and physical therapy.[1] Through these clinics, patients have reported improvements in their health.[1] In 2014, SRFCs were operating at 75% of American medical schools.[1] SRFCs are an expanding part of medical student education, especially for first and second year students since most of their training is in the classroom.[1,11] Volunteering at SRFCs gives students the opportunity to develop their history taking and clinical skills, while interacting with diverse patients from different socioeconomic, racial, and ethnic backgrounds.[1,6,11] To ensure high quality care is provided to SRFC patients by students, a large level of supervision from preceptors and clinic administrators is required.[11] Medical students are not qualified to determine the necessary changes needed to improve a SRFC on their own.[11]

To continuously improve the care provided at SRFCs, the clinic processes in place need to be

evaluated often.[6] It is crucial for medical establishments to assess the condition of their SRFCs and determine how well these clinics provide quality patient care and education to medical students.[11] Quality improvement (QI) projects are one way that the challenges of SRFCs have been confronted. QI is an organized method of analyzing clinic performance and the changes made to the clinic to boost its performance.[10] QI modulates the way healthcare systems work to improve how care is delivered to patients, with the goals of lowering costs and bettering the patient population's health.[8] The use of QI is one important method of assisting these clinics in providing quality care to patients and education to medical students. Analyzing QI in the evaluation of SRFCs is critical in establishing a method for students, faculty, and clinic administrators to utilize to ensure adequate care is provided at their SRFC. Furthermore, gaining experience in conducting QI initiatives is key for students' further development as clinicians.

There are multiple studies that detail utilizing QI through numerous methods to address the various challenges of SRFCs. One study by Hemba et al. discussed a QI project to improve their SRFC, JeffHOPE clinic, through innovating a centralized way to collect data to evaluate patient demographics, visits, outcomes, and adherence to care.[5] Another study by Nott et al. reported instituting QI measures, such as a new cloud-based volunteer certification protocol and comprehensive volunteer roster, to address common problems that SRFCs have like long patient wait times, limited healthcare services, and high turnover of volunteer medical students and attending physicians.[3] A study conducted by Butala et al. at the HAVEN Free Clinic in Connecticut implemented a program where medical students developed and executed their own QI measures to increase adherence to preventative medicine screening guidelines, reviewing charts pre- and post-intervention to examine adherence[7]. Lastly, a study by Lee et al. in 2017 after evaluating their clinic performance with a needs assessment, the Keeping Neighbors in Good Health Through Service (KNIGHTS) SRFC through the University of Central Florida College of Medicine implemented 17 interventions over a 2-month period, including collecting patient data and creating a research committee to design studies that would continue to gauge their clinic's progress and institute new changes[6]. However, none of the implemented strategies from these studies highlighted a model or guide of continuously monitoring multiple metrics within their clinic.

The University of Nebraska Medical Center (UNMC) has its own SRFCs that have been in practice since 1997. The Student Health Alliance Reaching Indigent Needy Groups (SHARING) clinics are interprofessional SRFCs that seek to provide general and specialized patient care for low-income, uninsured adults in Omaha, Nebraska and give healthcare professional students the opportunity to provide care to underserved populations. SHARING hosts several interdisciplinary clinics, including SHARING, Greater Omaha Outreach for Diabetes Lifestyles Impacting Fitness and Education (GOODLIFE), Responsible Early Sexually Transmitted Disease Prevention Education and Community Testing, and VISION, that provide primary care, specialized diabetes mellitus care, sexually transmitted infections testing and treatment, and ophthalmology services and diabetic eye screenings, respectively. Students from the UNMC's Colleges of Medicine, Pharmacy, Allied Health Professions, and Nursing volunteer as student providers under the supervision of a preceptor. Social work students from a local university provide services as well[4].

The SHARING clinics have cared for Omaha's uninsured, low-income population for 23 years. However, longevity does not ensure that the quality of care being provided is where it should be. To expand upon QI studies performed at SRFCs across the country and assess the quality of care at the SHARING clinics, a QI database was generated to gather updated patient lab and healthcare maintenance data monthly that clinic leaders can use to assess how well controlled patients' health conditions are and adjust clinic processes. Before this database was created, there was no real-time quality metric data available, so previous QI projects dedicated a large amount of time to data abstraction. This database was constructed to assess what adjustments needed to be executed at the SHARING clinics and provide a centralized method of recording data over time to monitor the needs of patients. To determine areas of improvement within the clinics, objectives

from Healthy People 2020 were selected based on the parameters listed in the SHARING Quality Improvement Database to compare our SRFCs to clinics across the country. Healthy People is an organization that identifies 10-year national goals for bettering the health of American citizens. They endeavor to discover health improvement priorities, lay out measurable goals for healthcare institutes at the national, state, and local levels, and evaluate the care given to patients across the country.[9]

To our knowledge, there is limited data on how SRFCs could continuously track updated patient data, with many articles failing to provide a way to determine and describe patient outcomes[1,11]. Many studies have utilized QI to address other challenges of SRFCs, such as high levels of student and preceptor turnover, long patient wait times, and limited services available[3]. However, the studies that have used QI only tracked one patient metric retrospectively, whereas this project tracks multiple metrics providing both retrospective and prospective data points. None of the implemented strategies from these studies highlighted a model or guide of continuously monitoring multiple metrics within their clinic. Our study seeks to establish a way for other SRFCs to continuously monitor a dashboard of patient metrics at once. This database provided SHARING with actionable data to augment quality of care and outcomes, as well as help to fill the void of knowledge regarding the generation of QI databases at SRFCs.

Based on existing scheduling data, a list of patients who used the SHARING clinics was compiled in Microsoft Excel (2022, Microsoft, Redmond, WA) to be included in the database. These patients were then identified in the electronic medical record (EMR), Epic (2022, Epic, Verona, WI). The database was generated in Epic using the Patient List function. Patient names were removed from the Excel document after the Patient List was created in Epic. The monthly data reports do not include patient names and are accessed on secure devices. The information was encrypted and password protected. Different parameters were selected to be displayed in the columns in the database to pull data from the patients' charts, illustrated in Figure 1. This reduced the need to manually search through charts to find needed information. These data points were exported to an Excel document by running a patient report in Epic each month. The process of creating this database can be seen in Figure 2 and each of the parameters can be seen in Figure 1. To indicate if a patient was overdue on a parameter, the cell was colored red. If something was due to be completed, the cell was colored yellow. Blue cells indicated that the test was ordered in the patient's chart and the patient has not yet gone in to have it completed. Lastly, light purple cells indicate an order that was postponed to a later date. Cells were colored by a database reviewer after the report was pulled from Epic each month.

Clinic Metrics

The first set of clinic metrics was calculated in July 2020. Out of the 48 patients that used the services of SHARING over the last 2 years, 67% of patients were female and 33% were male, ranging from 20 to 71 years old. Of the 48 patients, 23% were African American/Black, 54% were Caucasian/White, 6% were multiracial, and 17% identified their race as "Other". The SHARING patient population was 30% Hispanic or Latino and 70% not Hispanic or Latino.

After the clinic demographics were calculated, objectives from Healthy People 2020 were selected (Table 1). The real time data about the SHARING clinics collected by its QI database was used to evaluate whether the clinics were meeting the goals set by Healthy People and compare the clinics to others across the nation. This allowed the quality-of-care SHARING provides and how well controlled patients' health conditions are to be evaluated. The SHARING and GOODLIFE clinics met 8 out of 24 goals selected, indicating where the focus of reshaping the clinics should be set. This provides SHARING with real time data to act upon and a starting point for making improvements to meet these goals. In comparison, according to Healthy People 2020, clinics across the nation met 6 out of 24 goals on average. SHARING is therefore performing at a level similar to or slightly above the national average; however, the SHARING clinics strive to provide an even high quality of care to patients.

SHARING can improve in five main categories. The first area is improving blood pressure control

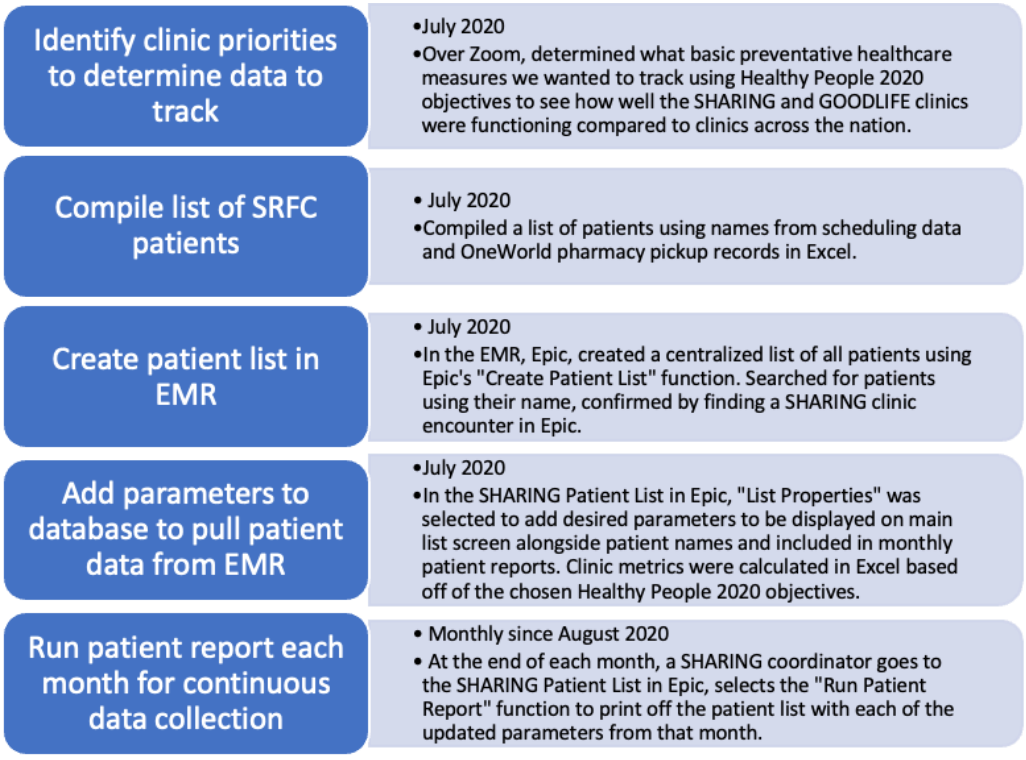
for all patients, with a goal systolic blood pressure of 140 or lower based on International Society of Hypertension guidelines.[12] Another domain is increasing the number of patients who have had their cholesterol checked within the past five years. Improving blood sugar control and lowering diabetic patients' A1c levels to 7% or lower is another scope of focus. Additionally, SHARING needs to work to increase the number of patients with healthy weights. Lastly, helping patients attain important preventative services needs to be refined. These preventative procedures include regular diabetic eye exams, colonoscopies, mammograms, pap smears, hepatitis C screening, and vaccinations.

Figure 1. SHARING Quality Improvement Database in Microsoft Excel.

Legend:	Overdue	Ordered	Due Soon	Postponed																	
Patient Last Name	Patient First Name	Age	Gender	Race	Ethnicity	Preferred language	Blood Pressure	LDL	BMI (kg/m2)	Last A1C	Urine Albumin/Creatinine ratio	Diabetic eye exam	Last colonoscopy	Last mammogram	Last pap smear	Influenza vaccine	Tdap vaccine	Pneumococcal polysaccharide vaccine	Pneumococcal conjugate vaccine	Herpes Zoster vaccine	Hepatitis C Screening
Doe	Jane	30	Female	Caucasian or White	Not Hispanic or Latino	English	120/10	59	42	6	7.88	1/1/18	1/2/18	1/3/18	1/12/18	9/2/18	9/2/18	9/2/18	9/2/18	No hx	1/1/18
Smith	John	45	Male	African American or Black	Not Hispanic or Latino	English	130/10	72	39	7	6.2	1/1/01	1/1/01	1/1/01	1/1/01	1/1/01	1/1/01	1/1/01	1/1/01	No hx	1/1/01

LDL: low-density lipoprotein; BMI: body mass index; A1C: glycated hemoglobin; Tdap: tetanus, diphtheria, pertussis; Hx: history

Figure 2. SHARING Quality Improvement Database.



Steps and timeline to generate a quality improvement database for student run free clinics.
SRFC: student run free clinic; EMR: electronic medical record SHARING: Student Health Alliance Reaching Indigent Needy Groups; GOODLIFE: Greater Omaha Outreach for Diabetes Lifestyles Impacting Fitness and Education

Table 1. Assessment of clinic metrics at the SHARING clinics in comparison to goals set by Healthy People 2020.

Healthy People 2020 Objectives	Target (%)	SHARING (%)	National (%)
Increase the proportion of adults who have had their blood pressure measured within the preceding two years and were aware of an elevated blood pressure reading or a diagnosis of hypertension	92.6	100.0	92.8
Increase the proportion of adults with hypertension whose blood pressure is under control	61.2	35.0	47.8
Increase the proportion of persons with diagnosed diabetes whose blood pressure is under control	57.0	55.6	51.8
Increase the proportion of adults who have had their blood cholesterol checked within the preceding five years	82.1	75.0	88.0
Increase the proportion of adults with coronary heart disease who have their LDL cholesterol at or below recommended levels	67.5	100.0	48.1
Increase the proportion of adults who have had a stroke who have their LDL cholesterol at or below recommended levels	56.1	100.0	29.1
Improve lipid control among persons with diagnosed diabetes (LDL cholesterol <100 mg/dl)	58.3	77.8	53.0
Reduce the proportion of persons with diabetes with an A1c value greater than 9%	16.2	44.4	18.0
Persons with diagnosed diabetes whose A1c value is less than 7%	53.1	0.0	Increase desired
Increase the proportion of adults with diabetes who have an A1C measurement twice a year	72.9	94.4	70.7
Increase the proportion of adults who are at a healthy weight	33.9	33.3	27.7
Reduce the proportion of adults who are obese	30.5	50.0	38.6
Increase the proportion of persons with diagnosed diabetes who obtain an annual urinary microalbumin	37.0	100.0	48.7
Increase the proportion of adults with diabetes who have an annual dilated eye examination	58.7	50.0	62.3
Increase the proportion of adults who receive a colorectal cancer screening based on the most recent USPSTF guidelines	70.5	30.8	65.2
Increase the proportion of women who receive a breast cancer screening based on the most recent USPSTF guidelines	81.1	19.0	72.8
Increase the proportion of women who receive a cervical cancer screening based on the most recent guidelines	93.0	35.7	80.5
Increase the percentage of noninstitutionalized adults aged 18+ who are vaccinated annually against seasonal influenza	70.0	47.9	45.2
Increase the percentage of noninstitutionalized adults aged 65+ who are vaccinated annually against seasonal influenza	90.0	50.0	66.6
Increase the vaccination coverage level of Tdap vaccine	80.0	85.4	88.2
Increase the percentage of noninstitutionalized adults aged 65+ who are vaccinated against pneumococcal disease	90.0	100.0	69.0

Increase the percentage of noninstitutionalized high-risk adults aged 18 to 64 years who are vaccinated against pneumococcal disease	60.0	54.3	24.3
Increase the proportion of persons aware they have a hepatitis C infection	60.0	39.6	54.0

The percentages indicate the number of patients that meet that goal across the country or within SHARING and GOODLIFE only.
SHARING: Student Health Alliance Reaching Indigent Needy Groups; GOODLIFE: Greater Omaha Outreach for Diabetes Lifestyles Impacting Fitness and Education; LDL: low-density lipoprotein; A1C: glycosylated hemoglobin; USPSTF: United States Preventative Services Task Force; Tdap: tetanus diphtheria acellular pertussis

Discussion

We designed a QI database using Epic and Excel for the SHARING clinics to provide real-time quality metric data and identify changes that need to be made to enhance the quality of care delivered to patients. After implementing the database and collecting data on our patients, SHARING metrics were compared to the national targets set and national averages reported by Healthy People 2020. Five major health improvement priorities were identified, and changes to address these priorities can begin to be made through the QI process. The clinic operations committee and quality improvement team are currently identifying priority areas and best practices. They are implementing plan-do-study-act cycles to improve outcomes with a specific focus on diabetes and hypertension to start. The database will make it easier for medical students, attending physicians, and other healthcare team members to assess what labs, procedures, and vaccines patients might need at their clinic visits.

This database is meant to be the foundation for future QI research projects, clinic assessments, and measures put in place to reform how care is given to patients at SHARING. It provides a centralized method of recording real-time patient data for continued monitoring of SHARING patient needs, identifying gaps in their care, and closing those gaps to improve patient care. Creating this database and evaluating the clinics, is just the first step towards improving our SRFCs. Each month, an updated patient report will be run from the database to examine what lab testing, healthcare screening procedures, and vaccinations are missing for each patient. This will be a valuable resource to student providers and attending physicians when determining what should be discussed with a patient. It also helps to identify potential areas for improvement regarding clinic processes which can be modified by the clinic board. The SHARING clinics will use this database in future quality improvement assessments of clinic procedures and research studies. One research project the database will be utilized in is evaluating initiatives to improve diabetes and blood pressure control.

In the future, the SHARING clinics will be reevaluated each year using the Healthy People 2020 objectives and the SHARING QI Database to assess whether clinic changes were effective in improving the clinics and meeting more of these objectives. We will identify and focus on areas where we can make the most impact in an efficient and timely manner. With the current metrics we have collected, it will take many years for the SHARING clinic to meet the Healthy People 2020 goals that were selected. Adding new Healthy People objectives in 2030 could be considered in the future to collect additional patient data in the database upon meeting previously set objectives listed in Table 1. If new metrics are added for further evaluation and improvement of the clinics, these parameters will be added to the database in Epic and will become a part of the monthly report that is collected, becoming a part of the continuous data collection. The additional clinic metrics will be calculated in Excel and compared to the updated Healthy People 2030 objectives. The effectiveness of the SHARING QI database will be evaluated as well, by monitoring improvement in clinic metrics the database is tracking over time after changes are made.

The authors acknowledge limitations to this study. The most notable limitation comes from the fact that not all health systems and SRFCs use Epic. One way that other SRFCs that use a different EMR can create their own QI database is by using any function in their charting system that allows them to group patients into lists and run

reports. SRFCs that do not use an EMR could create an Excel document with the list of SRFC patients and manually type in results each month using their method of tracking patient data. The Excel document can include all the parameters that were included in the SHARING QI Database, as seen in Figure 1. To track patient data over time and to notice trends in variables, different pages can be opened for each month recorded and then plotted in a figure in Excel.

We believe that this quality improvement database can serve as a framework for other SRFCs to follow to have a way to collect real-time data on their patients and to observe where changes within their clinics can be implemented to assess if they are adequately addressing the health needs and barriers to care of their underserved populations. Other SRFCs could use our quality improvement database as the foundation in their own clinics to start implementing new measures to improve quality of care.

Disclosures

The authors have no conflicts of interest to disclose.

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