Design and Implementation of an Electronic Tool to Measure Medication Adherence at the Point of Care

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Quality Improvement Success Stories are published by the American Diabetes Association in collaboration with the American College of Physicians and the National Diabetes Education Program. This series is intended to highlight best practices and strategies from programs and clinics that have successfully improved the quality of care for people with diabetes or related conditions. Each article in the series is reviewed and follows a standard format developed by the editors of *Clinical Diabetes*. The following article describes a project to build a point-of-care tool for assessing patients' adherence to their prescribed medications.

Describe your practice setting and location.

Parkland Health & Hospital System (Parkland) is an integrated health care system that provides care for the underserved and uninsured residents of Dallas County, TX. Parkland is considered one of the largest public hospital systems in the United States and is the primary teaching hospital for the University of Texas Southwestern Medical Center. Parkland owns and operates a new, state-of-the-art, 2.8-million-square-foot, 870-bed hospital on its main campus, which in 2018 registered a daily average of 664 emergency department visits, around 198 hospital discharges, and 30 infant deliveries. Parkland also runs 12 community-based clinics, which include primary care, geriatric and women's clinics, and 12 school-based clinics strategically located in underserved communities throughout Dallas County.

In 2018, a total of 1,037,320 outpatient visits were completed at Parkland, of which 352,442 were seen in specialty care and 684,878 in primary care or women's clinics. Parkland also provides care for Dallas' homeless community and for Dallas County Jail (average daily census 6,500), for both adults and juveniles.

The payor mix at Parkland reflects the nature of a large public hospital in a large urban city, with 33% of patients receiving charity care and the rest having Medicaid (31%), Medicare (16%), self-pay (12%), or commercial insurance (8%). In fiscal year 2017, Parkland provided approximately $880 million in uncompensated care.

The goal of the Parkland Global Diabetes Program, which was created in 2014, was to organize, coordinate, and standardize diabetes management, education (patient and professional), and support across the health system, including in the acute inpatient setting, the diabetes specialty clinics, and the network of primary care clinics, by leveraging stakeholders, technology, and creative solutions in a resource-constrained environment.

Describe the specific quality gap addressed through the initiative.

We focused on building a tool that could be used by health care professionals at the point of care to provide objective information about patients' adherence to their prescribed medications. We called the new tool P-SAM (Parkland Score for Adherence to Medication).

How did you identify this quality gap? In other words, where did you get your baseline data?

Providers often lack objective data about their patients' adherence to prescribed medications (1–4) and thus make treatment decisions based on subjective, inaccurate, and limited information (5,6). At the time, the only objective manner in which to gather information on patient adherence short of using predictive questionnaires (7–9) was to contact the patients' pharmacy and manually obtain data on their medication refills. Most clinical practices are too busy or lack the resources to incorporate this important data-gathering effort into their workflows. Even health systems such as ours that have integrated pharmacy records and electronic medical records (EMRs) require extra steps to obtain and aggregate relevant data points in a way that is useful for clinicians at the point of care.

Summarize the initial data for your practice (before the improvement initiative).

Before this project, the act of obtaining a prescription fill history was a cumbersome process involving several steps. Part of the information was found by reviewing an upload of information from outside sources. That information was then reconciled within the EMR. Then a provider could click on each prescription to view the fill history. The fill history for medications that were no longer active in a pharmacy profile were not aggregated or easily found. In addition, for the internal health system's pharmacy fill history, providers needed to log into an external database to review medications that were filled internally.

What was the time frame from initiation of your quality improvement (QI) initiative to its completion?

The gap in care as it relates to medication adherence information was identified and discussed in 2014 with Parkland's leadership and relevant stakeholders through a committee that was formed to fast track high-impact solutions and infrastructure for service lines such as the Global Diabetes Program. A 1.5-year timeline was established to launch the tool, starting with three medication classes: antihyperglycemic agents, antiplatelets (excluding aspirin), and anticoagulants. Additional medication classes were sequentially added to the medication adherence score tool over the next year. Validation of the tool began in February 2017, once the

first classes went live, and revision of the tool continues as additional medication classes are added.

Describe your core QI team. Who served as project leader, and why was this person selected? Who else served on the team?

Our core QI team included a physician champion; the executive director of the Global Diabetes Program, who had identified this project as a priority for the program and the health system; and clinical pharmacists, who contributed their expertise by selecting the methodology for the grouping of the medications the tool used (proportion of days covered) and revising it to account for potential confounders such as patient hospitalizations. The pharmacy group additionally explored opportunities for using the tool for medication reconciliation and management on the inpatient side of the health system. Information technology architects and analysts were instrumental in translating the methodology into digital queries and data-gathering processes from all sources and handled the contracting to obtain fill history data from external sources. Other relevant stakeholders included physician users, administrative support staff, Parkland's chief medical information officer, and EMR analysts.

Describe the *structural* changes you made to your practice through this initiative.

After the initiative was prioritized by our leadership, a workgroup was formed that initially met every 2–4 weeks to determine the approach and methodology that should be employed. The effort was supported through in-kind effort from Parkland stakeholders directly and indirectly through Medicaid 1115 waiver monies that funded the Global Diabetes Program at Parkland. During these meetings, the calculation of the adherence score (based on a Proportion of Days Covered methodology; Supplementary Figure S1), the capabilities of the analytics used (including limitations), marketing to end users, and drug class groupings were discussed. Quality assurance measures were employed during the validation and pilot phases of the initiative, including online submission of any issues identified with scoring, monthly reports showing medications not included in current calculations due to updates to medication databases, dashboards displaying adherence scores and patient demographics, educational user guides, and continuing education provided to the health care teams caring for patients in our ambulatory setting. The validation

process was carried out mostly through provider experience with the tool and took place over the first year of clinical implementation of the tool.

Over the next year, the workgroup meetings were converted into monthly or bimonthly governance meetings to review areas of improvement. In addition, a focus group, including parties interested in the research aspect of this QI project, was formed to explore areas in which there are unanswered questions (e.g., regarding what the goal for medication adherence should be).

Describe the most important changes you made to your *process* of care delivery.

We took the aggregate fill and claims history available for the custom-identified drug classes from internal sources (Parkland's network of outpatient pharmacies) and SureScripts sources and created one unified medication adherence score available within the health care team's workflow. Although we missed data from smaller pharmacies and specialty pharmacies, our data access covered >80% of our patient population. Creating customized groupings of medications and score calculations provides a comprehensive at-a-glance overview of adherence scores. For example, if a patient is changed from an ACE inhibitor to an angiotensin II receptor blocker, and then subsequently to an angiotensin receptor neprilysin inhibitor, the score will calculate this as a cumulative adherence score versus a score for each class individually.

At the individual patient level, the score is displayed for each drug class over a 12-month time frame in several areas of the EMR (Supplementary Figure S2): the patient header link, custom clinic and pharmacy snapshot reports, and medication reports within the medication reconciliation process. In addition, the breakdown of the score is also displayed, including the numerator (number of days filled) and denominator (number of days the drug class is considered active) and the last calculated date.

This supplemental information helps end-users determine how they will use the score. For example, if the score is only 1 month of information for a newly started medication, then it may not be as reflective of persistent adherence when compared with a 6- or 12-month score. End-users most likely to use this information include the intake staff (nurse or medical assistant), providers (physicians or advanced practice providers), diabetes educators, pharmacists, and staff assigned to check patients out after a visit (nurses and medical assistants). Awareness of a patient's adherence to prescription refills

at the point of care started changing the dynamics of medication reconciliation for providers, who started focusing more on reasons for low adherence instead of solely asking patients whether they were taking their medications.

For a global approach, we are able to use the stored adherence scores to identify (via automated reports) patients with low medication adherence and perform follow-up interventions.

Providers and staff were presented the P-SAM tool in various settings to familiarize them with the data it provided, where to visualize the data, and what to do with the data at a clinical practice level. Education and informational sessions were held during quarterly conferences of staff and providers (mandatory for all outpatient clinics), educational webinars delivered to primary care providers by the Global Diabetes Program, and monthly meetings held at the various primary care clinics operated by Parkland.

Summarize your final outcome data (at the end of the improvement initiative) and how they compared with your baseline data.

At baseline, there was no information available to providers that was readily available at the point of care. After 2 years, there are now 21 therapeutic classes and 32,298 drugs (including all diabetes medication classes shown in Supplementary Table S1) that are now mapped and have adherence information readily available. More than 65,000 patients have an adherence score for at least one drug class available within our system. We have also identified 4,718 drug records that we have hidden from view to reduce nuisance information that is not relevant to adherence scoring. In preliminary analysis for one drug—liraglutide—higher adherence rates appear to correlate with lower A1C levels (Supplementary Table S2).

What are your next steps?

We plan to launch a second information and provider awareness campaign along with recommendations for how to interpret and use P-SAM scores. For example, patients with a high P-SAM score and poor disease control might need an adjustment or revision in their treatment prescription, whereas those with poor adherence might benefit from a different approach.

We are also developing survey instruments to identify specific barriers to medication adherence in patients with

a low P-SAM score. We plan to collect survey responses at various patient touch-points such as in-clinic visits (with providers, diabetes educators, nurse-led clinics, social work communications, and so forth), virtual visits, and eventually at the community level through the use of community health workers. Identifying specific barriers will inform our efforts to get patients to the correct types of interventions (e.g., pharmacy counseling, financial or social services, or provider services) to meet their needs.

We plan to also consider social determinants of health and other patient variables (e.g., insurance status) as key enablers of or barriers to medication adherence (Supplementary Figure S3). For example, patients who identify a psychosocial issue as a potential barrier to medication adherence would be referred to a team composed of a community health worker and a licensed clinical social worker, who could address specific issues and link patients to appropriate community resources.

What lessons did you learn through your QI process that you would like to share with others?

Identifying key stakeholders and ensuring leadership buy-in and involvement was essential in successfully completing a complex process meant to address an information gap frequently encountered in clinical practice (i.e., information about whether patients are picking up the medications they are prescribed). Just as important to the success of this adherence tool was involving end-users in how the information can be applied in the workflow, where and how it should be displayed in the EMR, and in what situations it has the greatest value. Support from our

information technology department and a contract with Surescripts to obtain refill data from community pharmacies were also key aspects of this initiative.

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