Assessing Staff Knowledge, Attitudes and Practices: A Quality Improvement Initiative to Improve HbA1c Monitoring for Diabetes Poor Control at a Rural Health Center

Shelby Jenck, BSN, RN

School of Nursing, Oregon Health Science University

Dr. Jonathan R. Soffer, DNP, ANP

NURS 703B: DNP Project

March 03, 2026

Author Note

This paper is submitted in partial fulfillment of the Doctor of Nursing Practice (DNP) degree.

Abstract

Background: The American Diabetes Association (ADA) established guidelines for HbA1c monitoring to reduce the risk of adverse events in patients with type 2 diabetes mellitus (T2DM). Despite the availability of HbA1c point-of-care tests (POCT) at a federally qualified health center (FQHC) in Oregon (OR), where this quality improvement (QI) project was conducted, nearly one-third of the patients with diabetes poor control had no HbA1C in the year prior.

Aim: To increase staff knowledge and use of evidence-based HbA1C monitoring and to identify the utility of POCT HbA1c at an FQHC in a rural county in Oregon (OR).

Methods: Staff voluntarily participated in and completed an anonymous modified KAP (knowledge, attitudes and practices) survey to assess baseline HbA1c practices at an in-person staff meeting, then attended a one-hour educational training the following month, with repeat KAP assessment at three months. Concurrently, criteria for POCT HbA1c was developed, and a champion provider-medical assistant team volunteered to follow the criteria for a 4-week plan-do-study-act (PDSA). Results were analyzed using comparative statistics.

Results: A total of 10 staff completed the educational intervention including pre- and post-assessment. Though the sample size limits the statistical power, staff demonstrated a 60% improvement in knowledge score with the greatest gains among those with the lowest baseline knowledge. The PDSA revealed the champion team had one of the lowest rates of missing HbA1c and performed 63% better on completing HbA1c compared to the lowest performing provider, though statistical significance is limited by the sample size.

Conclusion: Tailored education to address identified practice gaps and the use of defined criteria for POCT HbA1c shows promising preliminary evidence at improving guideline-based HbA1C monitoring.

Table of Contents

Author Note 2
Abstract 3
Table of Contents 5
Problem Description 7
Available Knowledge 8
Rationale 9
Specific Aim 10
Methods 11
  Context 11
  Interventions/ Study of the Interventions 11
  Identification of Clinical Staff Knowledge and Practice Gaps 12
  Tailored Clinical Staff Education 12
  POCT HbA1C Criteria 13
  PDSA Cycle 1 13
Measures 13
Analysis 14
Ethical Considerations 14
Results 15
  Clinical Staff Survey 15
  POCT PDSA 16
  Challenges in Data Collection 17
  Unintended consequences 17
Discussion 17
  Summary 17
Interpretation 18
  Clinical Staff Survey 18
  POCT PDSA 18
Limitations 19
Conclusion 19
References 21
Appendix A: Root Cause Analysis 25

Appendix B: KAP Survey 26
Appendix C: Staff Education 28
Appendix D: IRB Determination 32
Appendix E: Results 33
Appendix F: Project Timeline 38
Appendix G: Letter of Support from Clinical Agency 39

Assessing Staff Knowledge, Attitudes and Practices: A Quality Improvement Initiative to Improve HbA1c Monitoring for Diabetes Poor Control at a Rural Health Center

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder characterized by insulin resistance and progressive β-cell dysfunction. Its global prevalence continues to rise, currently affecting an estimated 537 million adults worldwide, including over 38 million in the United States (U.S.) and is the ninth leading cause of morbidity and mortality worldwide (Farmaki et al., 2020; Gudlavelleti et al., 2024; Khavjou et al., 2025; Marsh et al., 2022). This trend is also reflected at the state level, where 9.6% of adults in Oregon live with diabetes (Khavjou et al., 2025). T2DM significantly reduces quality of life and imposes a substantial economic cost, with an estimated $327 billion spent in direct and indirect T2DM care in the U.S. in 2017 (Marsh et al., 2022). To mitigate this, ADA recommends for most nonpregnant adults to maintain an HbA1c < 7% to prevent microvascular and macrovascular complications associated with long-term hyperglycemia (Abukhalil et al., 2025; Diabetes Care, 2025; Imai et al., 2021; Pantalone et al., 2020). HbA1c glycemic monitoring is recommended twice a year in patients at treatment goals, and every three or more when not (Diabetes Care, 2025).

Problem Description

At an FQHC in a rural county in OR where this QI project took place, internal electronic health record (EHR) data indicates nearly 30% of the 468 patients aged 18-75 with T2DM meet Centers for Medicare and Medicaid Services (CMS) criteria for diabetes poor control. CMS defines this population as patients aged 18-75 with diabetes whose

most recent glycemic assessment (HbA1c) was missing, not performed during measurement period (12 months) or was greater than 9% (CMS, 2025). Despite evidence-based HbA1C monitoring recommendations from the ADA, consequences of suboptimal HbA1c monitoring are not well known (Imai et al., 2021; Weiss et al., 2021). This creates an impetus for Family Nurse Practitioners to better understand the impact of adherence to evidence-based HbA1c monitoring on clinical outcomes for patients with T2DM.

Available Knowledge

A comprehensive literature review of publications from 2019-2025 using PubMed, MEDLINE, and Ovid was conducted to evaluate rates of adherence and clinical outcomes associated with ADA recommended HbA1c monitoring and to examine if a superior method of HbA1c assessment exists. The Johns Hopkins Evidence-Based Practice (2025) model was used for synthesis and critical appraisal of the evidence. Initial search terms included “A1C monitoring” and “A1C test outcomes.” Four high-quality, level III retrospective cross-sectional studies (two cohort and two multicenter) were reviewed. Much of the literature demonstrated improved glycemic control and fewer microvascular and macrovascular complications with adherence to ADA guidelines, however, adherence was found to range between 7% to 70% (Abukhalil et al., 2025; Imai et al., 2021; Pantalone et al., 2020; Weiss et al., 2021).

To compare methods of HbA1c assessment, additional search terms included “A1C test” “A1C lab” and “A1C POCT.” Several level III, mixed-quality studies (qualitative and cross-sectional observational) identified standard lab processing (SLP) and point-of-care (POCT) as the most used methods for HbA1c assessment. POCT was favored in the

literature reviewed due to low-barrier implementation, ease of use, and availability of instant results for same-day management (Crocker et al., 2020; Hirst et al., 2020; Pi et al., 2023; Rosa et al., 2020; Sacks et al., 2024; Smits et al., 2022). However, the literature diverged on POCT accuracy and cost. One cross-sectional study in China found no significant difference in HbA1c value obtained with PCOT compared to SLP, and found POCT less expensive (Pi et al., 2023); whereas Sacks et al. (2024) identified inaccuracies in HbA1c values measured by unregulated POCT devices and Rosa et al. (2020) found increased costs associated with POCT due to single use cartridges. Only one study found POCT to improve adherence to ADA guidelines and a 0.5% improvement in glycemic status compared to SLP (Crocker et al., 2020). This research underscores the potential of POCT to optimize HbA1c control. While concerns about cost and accuracy remain, these can be minimized with use of FDA-approved POCT devices.

Rationale

During the root-cause analysis and creation of a cause-and-effect diagram (**appendix A**), it was identified that HbA1c monitoring at the project site was not routinely completed for patients who met CMS diabetes poor control criteria despite the availability of SLP and POCT HbA1c. Furthermore, the existing clinic workflow for T2DM A1C monitoring was found to be out of date and not consistently used or followed by clinical staff.

The root-cause analysis demonstrated the crucial need to improve the clinic T2DM A1C Monitorng workflow by updating it with evidence-best practices and provide clarity on the utility of POCT vs. SLP HbA1c. A review of available literature supports evidence that

patients with T2DM with at least two HbA1c assessments performed annually have improved glycemic control, compared to those with one or less (Abukhalil et al., 2025; Imai et al., 2021; Pantalone et al., 2020; Weiss et al., 2021). The literature also supports the use of POCT as time and cost-effective method to increase adherence to evidence-based HbA1c monitoring recommendations and is associated with reductions in glycemic value (Crocker et al., 2020; Hirst et al., 2020; Pi et al., 2023; Rosa et al., 2020; Sacks et al., 2024; Smits et al., 2022). This evidence provides a basis for assessing the utility of POCT HbA1c as the preferred choice for patients with diabetes poor control. The Institute for Healthcare Improvement's (IHI) Model for Improvement (MFI), a framework well suited for measuring change in clinic practice, was used to trial this process. The MFI framework offers a low-barrier implementation, small but scalable sample size, and emphasis on identifying trends via rapid plan-do-study-act (PDSA) test cycles (IHI, 2021). In addition, to address the lack of adherence to best practices in T2DM management, clinical staff barriers, and facilitators to identify practices gaps in HbA1c assessment and current clinical workflow was assessed by through the creation of a KAP survey, which is a survey method commonly used in change work Andrade et al., 2020) and targeted education to address gaps was provided.

Specific Aim

The primary aim of this project was to increase staff knowledge, use, and adherence to evidence-based HbA1C monitoring recommendations. A secondary aim was

to identify the utility of POCT HbA1c in caring for patients with poor diabetes control and through this process, optimize the current clinic T2DM workflow.

Methods

Context

A small rural county health department on the northern coast of Oregon operates a primary care FQHC with integrated medical, behavioral, and dental services. Five 1.0 FTE (full-time equivalent) providers (three medical doctors and two advanced practice providers), six 1.0 FTE medical assistants (MAs), one 1.0 FTE clinical nurse (RN), and a small team of administrative staff, care for approximately 7,500 patients insured through Medicare, Medicaid, commercial payors and those without insurance. The site receives state (CareOregon) and federal (Health Resources and Services Administration, HRSA) funding to provide comprehensive diabetic care for the nearly 500 patients with T2DM they serve.

The site's coordinated care organization (CCO) established 2025 payment incentives for certain CMS metrics. One such incentive was to achieve < 19% of panel patients with diabetes poor control. Prior to the start of this project, an interdisciplinary workgroup formed to address metric performance which was off target by 13.3%. The workgroup, chaired by the Chief Operations Officer (COO) convened clinical, behavioral, dental, and administrative leads to engage in strategic planning for patients with diabetes poor control. This QI project was part of a larger quality improvement initiative at the project site to improve diabetes poor control to < 19% by December 31, 2025.

Interventions/ Study of the Interventions

This project sought to optimize the clinic's T2DM A1C Monitoring workflow through (1) tailored clinical staff education based on preliminary assessment data to address gaps in evidence-based practice and (2) provide a recommendation on the use of POCT HbA1c monitoring in the workflow to through a PDSA process.

Identification of Clinical Staff Knowledge and Practice Gaps

Clinical staff (MAs, RNs, Providers) knowledge and current T2DM glycemic assessment practice was identified through an anonymous mixed-method survey adopted from the evidence-based Knowledge, Attitudes and Practices (KAP) survey (**appendix B**). The survey included four domains: (1) Demographics, (2) Knowledge (T2DM), (3) Attitudes (importance of glycemic measurement), and (4) Practices (use of T2D workflow). Survey response options included multi-choice, Likert scale, and open-ended questions. Since the site had one RN, to protect anonymity, the MA and RN demographic were combined as MA/RN. The survey was administered in-person to clinical staff at their usual weekly clinical team huddle during the last week of October. Staff had one week to complete the survey and return it to the drop box near the printer in the main clinical work area. Participation in the survey was voluntary.

Tailored Clinical Staff Education

Tailored clinical staff education was created to address gaps in knowledge and evidence-based practice. A one-hour in-person training was held during the November monthly clinical staff meeting which included a case-based PowerPoint on evidence-based HbA1c monitoring derived from the ADA (**appendix C**). Staff who participated in the

educational intervention were provided with a repeat of the initial KAP survey at three months post education.

POCT HbA1C Criteria

Specific criteria for the use of POCT HbA1c were identified by the diabetes workgroup. The criteria defined that the following scenarios would start the visit with a POCT HbA1c assessment: (1) established patients aged 18-75 with a current diagnosis of T2DM (ICD-10 E.11x) with current A1C > 9%, (2) established patients aged 18-75 with a current diagnosis of T2DM (ICD-10 E.11x) with no A1C or last done > 12 months, or (3) established patients aged 18-75 with a current diagnosis of T2DM (ICD-10 E.11x) who present with classic hyperglycemia symptoms (polyuria, polydipsia, and/or unexplained weight loss) regardless of last A1C value or date of completion. The POCT device used was the FDA-approved POCT device, Abbott AFINION™ 2.

PDSA Cycle 1

A champion provider-MA (P-MA) team was identified and onboarded to use the new POCT criteria for patients in their panel for 4 weeks (PDSA1). Participation was voluntary. The P-MA team could opt for no or different glycemic assessment based on clinical judgement and patient preference. To aid in identification of eligible patients, the P-MA team added “last HbA1c date” and “last HbA1c value” to their schedule overview in the EHR. The P-MA team was observed in their usual care for two weeks prior to the PDSA to ensure adherence to ADA Standards in Diabetes Care for glycemic assessment and use of internal POCT per manufacture standards.

Measures

A combination of outcome and process measures were used to evaluate the effectiveness of this QI project. The outcome measure for the primary aim of improving clinical staff knowledge and adherence to evidence-based HbA1C assessment was the percent change in knowledge and practice domains of the KAP survey. The process measure for this was the number of clinical staff responses to the survey. The outcome measure for the secondary aim to identify POCT HbA1c utility was the percent change in missing A1C values for the provider's panel of T2DM patients compared to the other site's other providers at the end of the PDSA cycle. The process measure for this aim was the percent of POCT HbA1c completed pre and post PDSA. QI projects aimed at improving clinical processes can inadvertently introduce new burdens, particularly in clinical workflows. Visit duration and staff feedback were monitored to identify inefficiencies and dissatisfaction.

Analysis

Pre and post mixed-method survey data were analyzed using descriptive analysis with manual coding in excel to identify key themes from open-ended questions. Quantitative EHR data was analyzed using comparative statistics. Results from pre and post intervention were compared to identify percent change in knowledge with evidence-based HbA1c assessment and impact on HbA1c completion, respectively.

Ethical Considerations

The study protocol was submitted to the Institutional Review Board (IRB) and received a determination of non-human research and exempt status from the OHSU IRB

(**appendix D**). Written consent for voluntary participation was incorporated into the KAP survey, while verbal consent was obtained from the provider–MA team. Implied consent was established through participants' completion and submission of the survey, as well as through use of POCT HbA1c.

Results

Clinical Staff Survey

The survey was handed out to a total of 12 clinical staff members in attendance at the weekly clinical team huddle. At the end of the collection period, the response rate was 83.3% (n=10). In the *demographic* domain, 40% chose provider (n=4) and 60% chose MA/RN (n=6). Years of experience in clinical roles ranged from 3.5 years to 24 years, with an average of 11.13 years of experience. In the *knowledge* domain, ranked responses for knowledge of clinical T2DM workflow (provider or system) varied widely; 40% reported good knowledge (n=4), 10% reported some knowledge (n=1), 30% reported poor knowledge (n=3) and 20% reported no knowledge (n=2) (**appendix E**). Compared to the ranked response for knowledge of ADA clinical guidelines, responses correlated with years of experience, where all respondents who had less than 5 years of experience selected "none" or "poor" knowledge of ADA guidelines (n=1 and n=3, respectively) and those with 5 or more years selected "good" (n=5), except one outlier who had more than 5 years and selected none (**figure 11**). Open-ended questions in the knowledge section inquired about CCO's goal for the site regarding diabetes poor control, where only 30% (n=3) answered correctly the A1C value for diabetes poor control, 20% answered incorrectly (n=2) and 50% did not write an answer (n=5). Additional responses to this open-ended question included

"check A1C every 3 months" (n=3), varies by age (n=1), and a statement about metric inaccuracies (n=1). In the *attitudes* domain, nearly all ranked POCT HbA1c as a useful test (n=9) and in the open-ended question for perceived patient preference on HbA1c method, majority responded with patients preferring POCT (n=7) listing availability of quick results as the reason why (n=6), whereas 20% wrote no perceived preference (n=2) and 10% wrote patient's did not prefer (n=1). In the *practice* domain, majority reported confidence in selecting HbA1c assessment method (n=6) however, only 50% reported using clinic T2DM workflow (provider or system) some of the time and 40% reported no or low use **(figure 12**).

At three months post-education intervention, the same survey was conducted among staff who completed the initial survey. The completion rate for the post-survey was 100% (n=10). Notable findings from comparative analysis revealed a 60% improvement in clinical staff knowledge of ADA clinical guidelines. Staff members who initially reported low baseline knowledge (poor or none) demonstrated consistent improvement at three months post-education, with most increasing by one knowledge step (i.e. poor to some or some to good), however one individual made significant progress moving from poor to good knowledge. In contrast, those who already had good knowledge at baseline maintained their level of competency **(figure 8**).

POCT PDSA

De-identified aggregate data was extracted from the site's EHR by the site data specialist and provided in a password-protected Excel spreadsheet at the conclusion of the four-week PDSA. The data provided measured the number of diabetic patients on each provider's panel and the total percent without a recent A1C (i.e. none in > 12 months). Of

the five providers, the P-MA team (provider 4) had the second lowest rate of diabetic patients without a recent A1C (n=2 or 3%), provider 1 had a rate of 0%, provider 2 at 9%, provider 3 at 4%, and provider 5 at 6% (**figure 9**). Additional data was provided for the P-MA team only on usage of POCT; the P-MA team had increased their use of POCT A1C by 63% pre (n=10) and post PDSA (n=27) (**figure 10**).

Challenges in Data Collection

HbA1c current procedural terminology (CPT) 83036 is the same regardless of SLP or POCT. The lack of granularity in the CPT code made it difficult to identify the correct procedure in the EHR. A description of the code was required to be entered by the EHR data specialist to discriminate between HbA1c; description of CPT codes is not universal (i.e. POCT can be described as "A1C POCT," "HbA1c POCT," "Afinion POCT") therefore n= test is not equal to n= patients.

Unintended consequences

Increased utilization of POCT compared to prior year resulted in shortage of POCT device cartilages, as budget was based on current utilization rate when purchased.

Discussion

Summary

This QI project aimed to increase staff knowledge, use, and adherence to evidence-based HbA1C monitoring guidelines at an FQHC in a rural county in OR. A secondary aim of this was to identify the utility of POCT HbA1c in caring for patients with poor diabetes control. Conducting this QI project was a crucial step for the site to optimize their T2DM

HbA1c monitoring workflow to ensure evidence-based HbA1c monitoring is being performed.

Interpretation

Clinical Staff Survey

While the sample size was small (n=10), limiting statistical power, there was a clear positive trend on the knowledge domain of the KAP survey following the implementation of the educational intervention. In addition, no decline in knowledge was found, with the majority of the staff demonstrating measurable improvement. The most pronounced improvement in knowledge was found among staff with lower baseline knowledge, indicating that the intervention was particularly beneficial for individuals with greater opportunity for growth.

POCT PDSA

At the end of the four-week PDSA cycle, the proportion of diabetic patients lacking a recent HbA1c across site providers ranged from 0% to 9%. Apart from one provider who had independently adopted a POCT protocol prior to implementation of this PDSA, the P-MA team demonstrated the lowest percentage of diabetic patients without a recent HbA1c among providers who did not have standardized POCT criteria. Furthermore, when compared to the provider with the highest rate of missing HbA1c, the P-MA team achieved a 67% reduction in missed HbA1c testing. Though the small denominator limits statistical power, The P-MA team's performance demonstrated that implementation of defined POCT criteria results in reduced gaps in recommended diabetes monitoring and supports a more structured monitoring workflow with criteria for POCT use.

Limitations

Several limitations should be considered when interpreting the results of this QI project. First, implementation was disrupted due to unforeseen scheduling conflicts (inclement weather and staff illness) which limited opportunities for interdisciplinary collaboration and iterative refinement of the clinical workflow following the first educational intervention. Due to this, the educational component of the intervention was limited to training on The ADA Standards of Care and did not include a component on the internal workflow as planned. While this still allowed for assessment of knowledge acquisition, it did not address gaps from baseline with staff confidence and practices. Next, limitations within the EHR restricted the parameters available to generate reports assessing the impact of glycemic assessment using POCT. Incomplete data fields and reporting constraints limit the ability to perform more granular analyses, including differentiation of testing modality or time-to-completion metrics. These data limitations may underestimate the true impact of POCT implementation and reduce the precision of the outcome measurement. Finally, the short evaluation period allowed for a single PDSA cycle, whereas performing multiple iterative cycles would allow for refinement, reproducibility, and scalability.

Conclusion

With a limited duration of study and small sample sizes, the results from this QI project should be interpreted with caution. Even so, preliminary evidence supported that tailored education to address identified practice gaps, and the pre-defined use of POCT HbA1c in a clinic workflow can improve adherence to evidence-based HbA1c monitoring.

These findings could inform on several areas of improvement that support the site's larger quality improvement initiative to achieve < 19% of panel managed patients with diabetes poor control. Future direction for this project includes optimizing the site's current T2DM A1C Monitoring workflow and continued open, supportive dialogue and partnership with staff to continue to identify and overcome barriers in practice knowledge and gaps.

References

Abukhalil, A. D., Muhanna, S. A., Madi, M. N., Al-Shami, N., Naseef, H. A., & Rabba, A. K. (2024). Adherence to ADA clinical guidelines in type 2 diabetes management in public health clinics in Palestine. *Patient Prefer Adherence*, *18*, 2667-2680. https://doi.org/10.2147/PPA.S494951

Andrade, C., Menon, V., Ameen, S., & Kumar Praharaj, S. (2020). Designing and conducting knowledge, attitude, and practice surveys in psychiatry: Practical guidance. *Indian Journal of Psychological Medicine, 42*(5), 478–481. https://doi.org/10.1177/0253717620946111

Crocker, J. B., Lynch, S. H., Guarino, A. J., & Lewandrowski, K. (2021). The impact of point-of-care hemoglobin a1c testing on population health-based onsite testing adherence: A primary-care quality improvement study. *Journal of Diabetes Science and Technology*, *15*(3), 561-567. https://doi.org/10.1177/1932296820972751

Diabetes Care. (2025). Diagnosis and classification of diabetes: Standards of care in diabetes—2025. *Diabetes Care*, *48*(Supplement_1). https://doi.org/10.2337/dc25-s002

Farmaki, P., Damaskos, C., Garmpis, N., Garmpi, A., Savvanis, S., & Diamantis, E. (2021). Complications of the type 2 diabetes mellitus. *Current Cardiology Reviews*, *16*(4), 249–251. https://doi.org/10.2174/1573403x1604201229115531

FQHC Electronic Health Record System [EHR]. (2025, May). Adult patients with poor

control T2DM and number of HbA1C tests completed in 2025 [Unpublished raw data]. Retrieved from The FQHC's Electronic Health Record System.

Gudlavalleti, A. G., Babu, G. R., Agiwal, V., Murthy, G. V., Schaper, N. C., & van Schayck, O. C. (2024). Undesirable levels of practice behaviours and associated knowledge amongst community health workers in rural South India responsible for type 2 diabetes screening and Management. *International Journal of Environmental Research and Public Health*, *21*(5), 562. https://doi.org/10.3390/ijerph21050562

Hirst, J. A., Farmer, A. J., & Williams, V. (2020). How point-of-care HbA(1c) testing changes the behaviour of people with diabetes and clinicians - a qualitative study. *Diabet Med*, *37*(6), 1008-1015. https://doi.org/10.1111/dme.14219

Imai, C., Li, L., Hardie, R.-A., & Georgiou, A. (2021). Adherence to guideline-recommended HbA1c testing frequency and better outcomes in patients with type 2 diabetes: A 5-year retrospective cohort study in Australian general practice. *BMJ Quality & Safety*, *30*(9), 706-714. https://doi.org/10.1136/bmjqs-2020-012026

Khavjou, O., Tayebali, Z., Cho, P., Myers, K., & Zhang, P. (2025). Rural–urban disparities in state-level diabetes prevalence among US adults, 2021. *Preventing Chronic Disease*, *22*. https://doi.org/10.5888/pcd22.240199

Marsh, Z., Teegala, Y., & Cotter, V. (2022). Improving diabetes care of community-dwelling underserved older adults. *Journal of the American Association of Nurse Practitioners*, *34*(10), 1156–1166. https://doi.org/10.1097/jxx.0000000000000773

Oregon Health Authority (2025). *Diabetes: Hba1c poor control (CMS122v13)*. Oregon Health Authority CCO Metrics 2025. https://www.oregon.gov/oha/HPA/ANALYTICS/CCOMetrics/2025%20Diabetes%20Poor%20Control%202024.12.31.pdf

Pantalone, K. M., Misra-Hebert, A. D., Hobbs, T. M., Kong, S. X., Ji, X., Ganguly, R., Milinovich, A., Weng, W., Bauman, J. M., Petraro, P., Burguera, B., Zimmerman, R. S., & Kattan, M. W. (2020). The probability of a1C goal attainment in patients with uncontrolled type 2 diabetes in a large integrated delivery system: A prediction model. *Diabetes Care*, *43*(8), 1910-1919. https://doi.org/10.2337/dc19-0968

Pi, L., Zheng, Y., Shi, X., Wang, Z., & Zhou, Z. (2023). Using point-of-care HbA1c to facilitate the identification of diabetes and abnormal glucose regulation in primary healthcare settings. *Front Public Health*, *11*, 1078361. https://doi.org/10.3389/fpubh.2023.1078361

Rosa, L. S., Mistro, S., Oliveira, M. G., Kochergin, C. N., Cortes, M. L., de Medeiros, D. S., Soares, D. A., Louzado, J. A., Silva, K. O., Bezerra, V. M., Amorim, W. W., Barone, M., & Passos, L. C. (2020). Cost-effectiveness of point-of-care a1C tests in a primary care setting. *Front Pharmacol*, *11*, 588309. https://doi.org/10.3389/fphar.2020.588309

Sacks, D. B., Kirkman, M. S., & Little, R. R. (2024). Point-of-care hba1c in clinical practice: caveats and considerations for optimal use. *Diabetes Care*, *47*(7), 1104-1110. https://doi.org/10.2337/dci23-0040

Smits, M., Hopstaken, R., Terhaag, L., de Kort, G., & Giesen, P. (2022). Early experiences with quality-assured HbA1c and professional glucose point-of-care testing in general practice: a cross-sectional observational study among patients, nurses and doctors. *BMC Nursing*, *21*(1), 183. https://doi.org/10.1186/s12912-022-00969-0

Weiss, T., Alison, E., Dominik, L., Swapnil, R., & and Snow, K. (2021). Hemoglobin A1C testing frequency among patients with type 2 diabetes within a US payer system: A retrospective observational study. *Current Medical Research and Opinion*, *37*(11), 1859-1866. https://doi.org/10.1080/03007995.2021.1965562

Appendix A: Root Cause Analysis

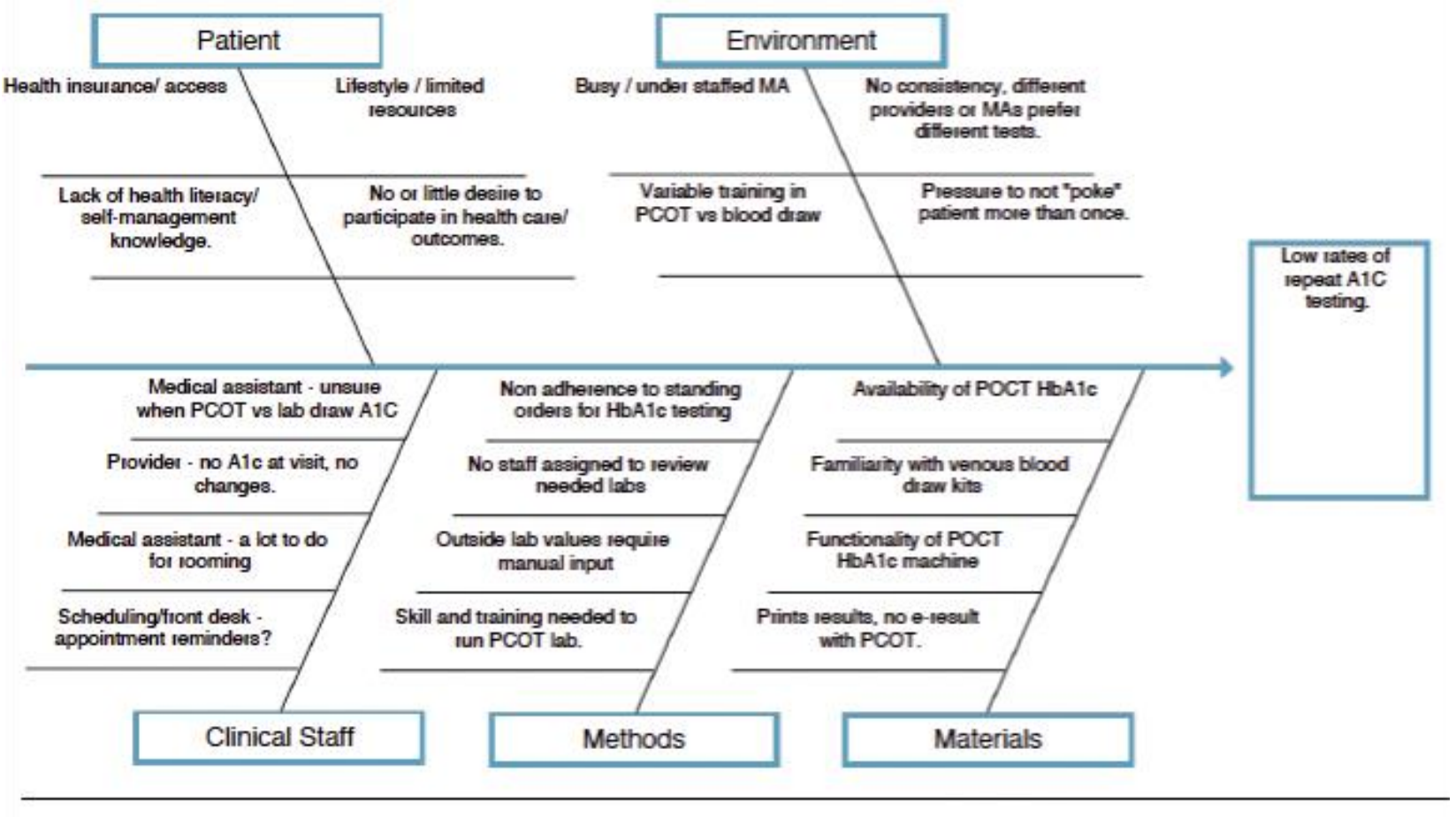


Figure 1: Root Cause Analysis

Appendix B: KAP Survey

Demographics

1. What is your role in the clinic? (select one)
    - Medical Assistant/ Nurse
    - Provider
    - Other (list) _____

2. How many years of experience do you have in your role (total years) (write in) _____

Knowledge

Purpose to learn more about your understanding of poorly controlled T2DM and the workflow for monitoring A1C for these patients.

3. To what extent are you familiar with your provider's workflow for poor control A1C monitoring or the OCHIN EPIC Poorly Controlled T2DM workflow for A1C monitoring?

    Provider own workflow (0 = not at all; very familiar, circle one) 0 1 2 3 4 5

    OCHIN Epic workflow (0 = not at all; very familiar, circle one) 0 1 2 3 4 5

4. In your experience, how would you describe the Columbia Pacific CCO's goal for our patients with poorly controlled T2DM and what is considered to be poorly controlled T2DM (HbA1c value / testing frequency) * (write in)

5. What is your experience (use/knowledge of) with the American Diabetes Association (ADA) guidelines for HbA1c monitoring in patients with T2DM? (select all that apply)

    - I am not aware of the ADA guidelines
    - I am aware of the ADA has guidelines, but not very familiar with it.
    - I am familiar with the ADA guidelines.
    - Other (list) _____

Attitudes

Purpose: to understand your experience with A1C monitoring.

6. To what extent do you find using point-of-care A1C (POCT) compared to venous blood draw A1C (blood draw) to be useful? (0 = not at all; 5 = very, circle one)
   0 1 2 3 4 5

7. How confident are you in determining when point-of-care A1C (POCT) should be used over venous blood draw per clinic policy?

   0 = not at all; 5 = very confident, circle one) 0 1 2 3 4 5

8. In your experience, how do patients respond to having point-of-care A1C (POCT) compared to venous blood draw A1C (blood draw)? (write in)

Practices

Purpose: to know what works and what does not work for A1C monitoring.

9. How often do you talk with the provider about A1C monitoring/use their workflow OR use the OCHIN EPIC Poorly Controlled T2DM workflow for A1C monitoring in your daily practice?

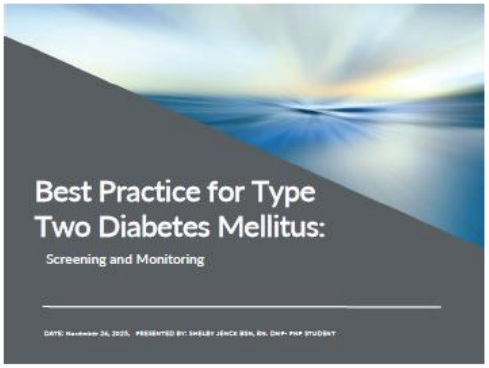
   Provider workflow 0 = not at all; 5 = very, circle one) 0 1 2 3 4 5

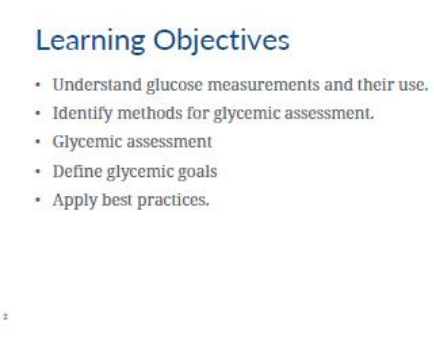
   EPIC workflow 0 = not at all; 5 = very, circle one) 0 1 2 3 4 5

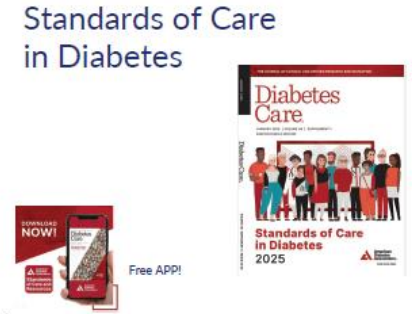
10. Can you describe any challenges or barriers you have encountered when using the OCHIN EPIC Poorly Controlled T2DM workflow for A1C monitoring? (write in)

11. Are there any specific scenarios where you find the OCHIN EPIC Poorly Controlled T2DM workflow for A1C monitoring to be particularly useful? (write in

Appendix C: Staff Education







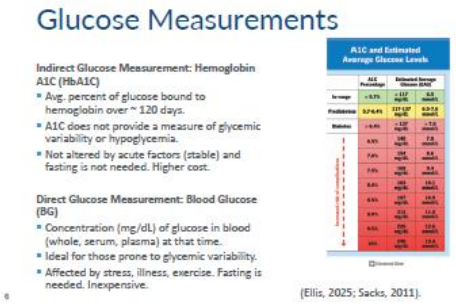


Figure 2: Staff Education Slides screenshot 1.

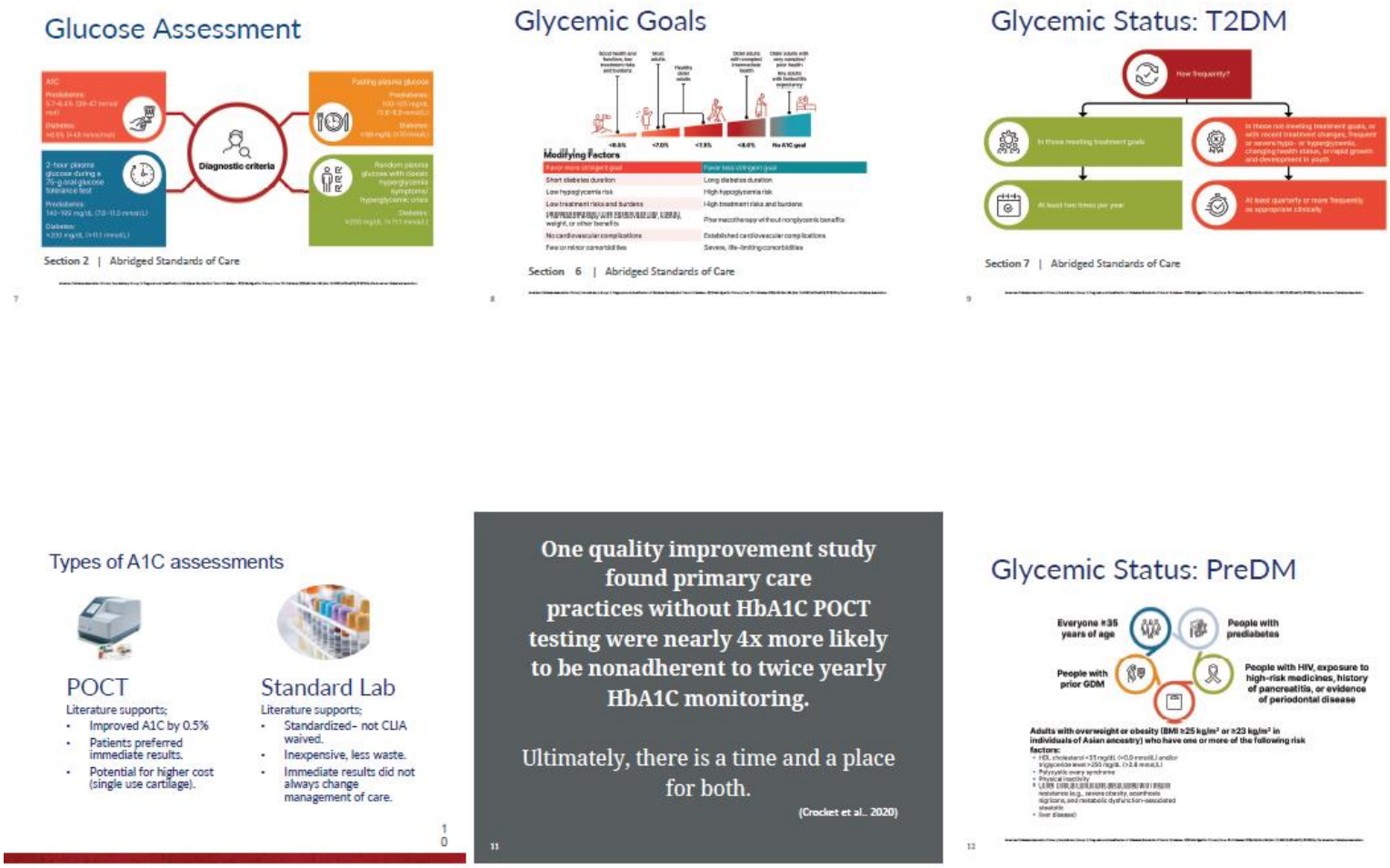


Figure 3: Staff Education Slides screenshot 2

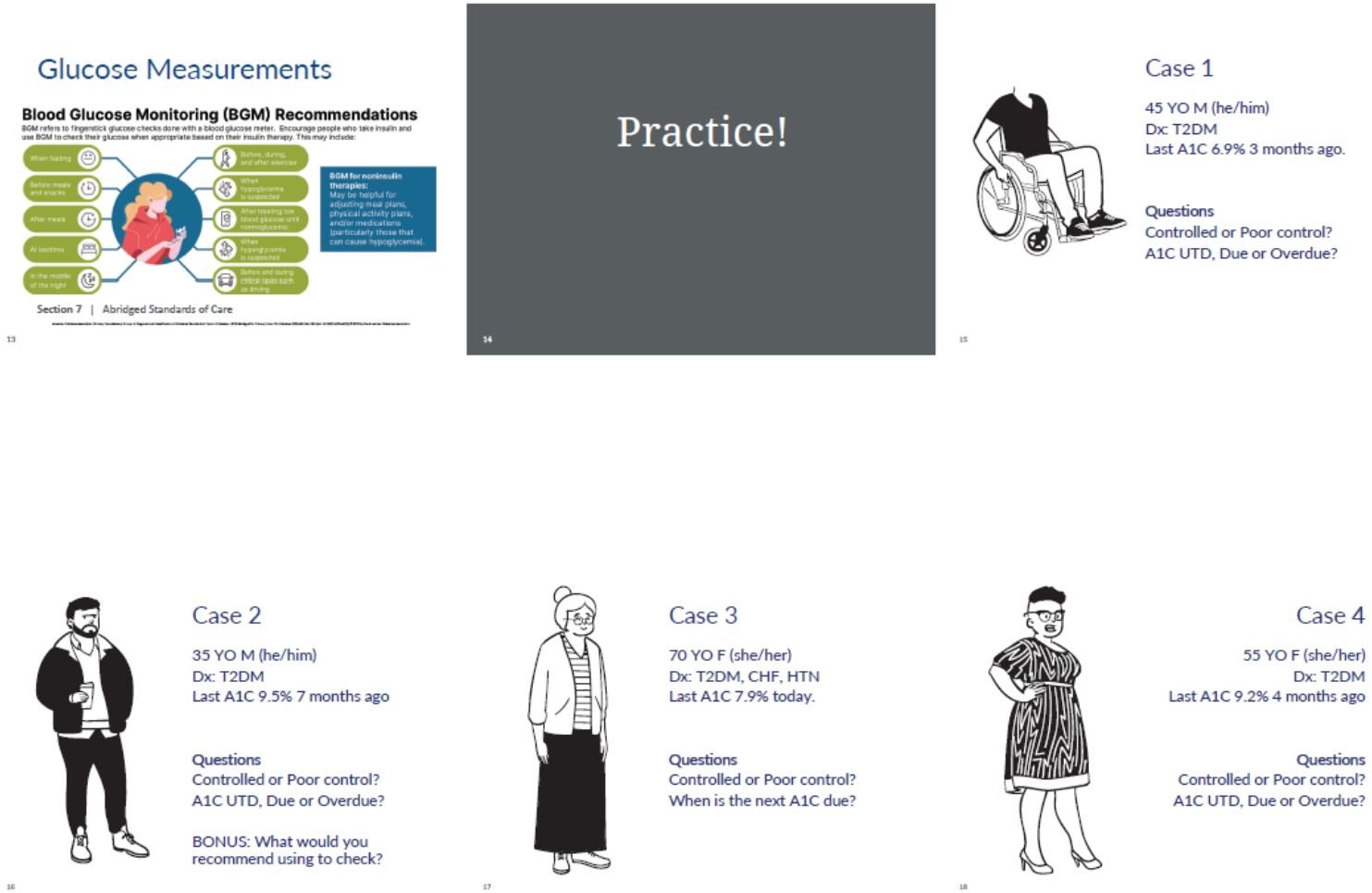


Figure 4: Staff Education Slides screenshot 3

Figure 5: Staff Education Slides screenshot 4.

Appendix D: IRB Determination

OREGON HEALTH & SCIENCE UNIVERSITY

IRB MEMO

Research Integrity Office
3181 SW Sam Jackson Park Road - L106RI
Portland, OR 97239-3098
(503)494-7887 irb@ohsu.edu

NOT HUMAN RESEARCH

June 6, 2025

Dear Investigator:
On 6/6/2025, the IRB reviewed the following submission:

Title of Study:	Optimizing HbA1C Monitoring in Poorly Controlled Type 2 Diabetes: A Quality Improvement Initiative Evaluating Adherence and Point-of-Care Testing
Investigator:	Jonathan Soffer
IRB ID:	STUDY00028748
Funding:	None

The IRB determined that the proposed activity is not research involving human subjects. IRB review and approval is not required.

Certain changes to the research plan may affect this determination. Contact the IRB Office if your project changes and you have questions regarding the need for IRB oversight.

If this project involves the collection, use, or disclosure of Protected Health Information (PHI), you must comply with all applicable requirements under HIPAA. See the HIPAA and Research website and the Information Privacy and Security website for more information.

Sincerely,
The OHSU IRB Office

Appendix E: Results

Figure 6: Clinical Staff Pre-Survey Raw Data

Pre-Survey (12.05.25)

#	Demographics	Years in Practice	Knowledge Provider Workflow (0-5)	Knowledge Epic Workflow (0-5)	Poor Control %	CCO goal	ADA Guidelines (0-3)	Usefulness of POCT (0-5)	Confidence with test selection (0-5)	Perceived Patient Preference	Follow provider test workflow (0-5)		Follow Epic test workflow (0-5)	Challenges with using POCT or Barriers
1	MA/RN	8 years	3	2	A1C above 9%.	Decrease in A1C% for poor control patients, better long-term wellness.	I am familiar with the ADA guidelines (3)	5	2	They like POCT for quick results.	4	2	Have not used	Uknown
2	Provider	15 years	3	0	9		I am familiar with the ADA guidelines (3)	5	5	like POCT better	3	3		
3	MA/RN	20 years	4	1		A1C under 7%	I am aware of the ADA guidelines but not very familiar with it (2)	5		Interested in immediate results to discuss with provider.	4	0		
4	MA/RN	4.5 years	4	2		It's good to have a goal but seems like metrics are gathered in the best way particularly with the implementation of telemed and them not taking it into consideration.	I am not aware of the ADA guidelines (1)	5	4	Some do not like getting their finger poked and will ask for blood draw. Most prefer the immediate test results so they can discuss it with PCP	1	1	Don't use workflow often	Yes, all the time for float coverage
5	MA/RN	4.5 years	5	3		Under A1C 7% and checked every 3 months.	I am not aware of the ADA guidelines (1)	5	0	Normally I don't have preference. Normally use POCT - cheaper for patients and result back faster	3	1	Do not use the workflow	Do not use the workflow
6	MA/RN	4.5 years	3	1	A1C over 10%	Test A1C every 3 months.	I am aware of the ADA guidelines but not very familiar with it (2)	5	5	Most patients are happy to have POCT as it is a finger poke and get results before the visit is over	2	1	Have not used	Have not used
7	MA/RN	3.5 years	5	3	A1C over 8%	A1C ~~over~~ 8% check monthly and A1C under 8% check every 3 months.	I am aware of the ADA guidelines but not very familiar with it (2)	3	3	Most patients do not have a preference or do not care either way.	5	3	None	No
8	Provider	21	0	0	> 9%		?? (0)	5	5	positively	0	0	N/A	N/A
9	Provider	24	4	1		Age dependent. Elderly goal A1c 8-9% depending on fragility. Nonelderly goal under 7%. Test A1C every 3 months if not controlled and every 6 if is.	I am familiar with the ASA guidelines (3)	5	1	Seem to like the immediate feedback			little experience with this	little experience with this
10	Provider	6	5				I am familiar with the ADA guidelines (3)	5	3	Well	5		N/a	N/a

Figure 7: Clinical Staff Post-Survey Raw Data

Postsurvey Results (2.26.26)

#	Demographics	Years in Practice	Knowledge Provider Workflow (0-5)	Knowledge Epic Workflow (0-5)	Poor Control %	CCO goal	ADA Guidelines (0-3)	Usefulness of POCT (0-5)	Confidence with test selection (0-5)	Perceived Patient Preference	Follow provider test workflow (0-5)	Follow Epic test workflow (0-5)	Challenges with using POCT or Barriers
1	MA/RN	8 years	4	4	A1C >9%.		I am familiar with the ADA guidelines (3)						
2	Provider	15 years	4	4	A1C > 9%.		I am familiar with the ADA guidelines (3)						
3	MA/RN	20 years	4	1	A1C > 9%.		I am familiar with the ADA guidelines (3)						
4	MA/RN	4.5 years	4	3	A1C >8%		I am aware of the ADA guidelines but not very familiar with it (2)						
5	MA/RN	4.5 years	4	4	A1C > 9%		I am aware of the ADA guidelines but not very familiar with it (2)						
6	MA/RN	4.5 years	5	3	A1C > 7%		I am familiar with the ADA guidelines (3)						
7	MA/RN	3.5 years	5	3	High a1c		I am familiar with the ADA guidelines (3)						
8	Provider	21	5	4	A1C > 9%		I am familiar with the ADA guidelines (3)						
9	Provider	24	4	1			I am familiar with the ADA guidelines (3)						
10	Provider	6	5	0	A1C > 8%		I am familiar with the ADA guidelines (3)						

Figure 8: Chart of Clinical Staff Knowledge of ADA Guidelines by Years of Experience

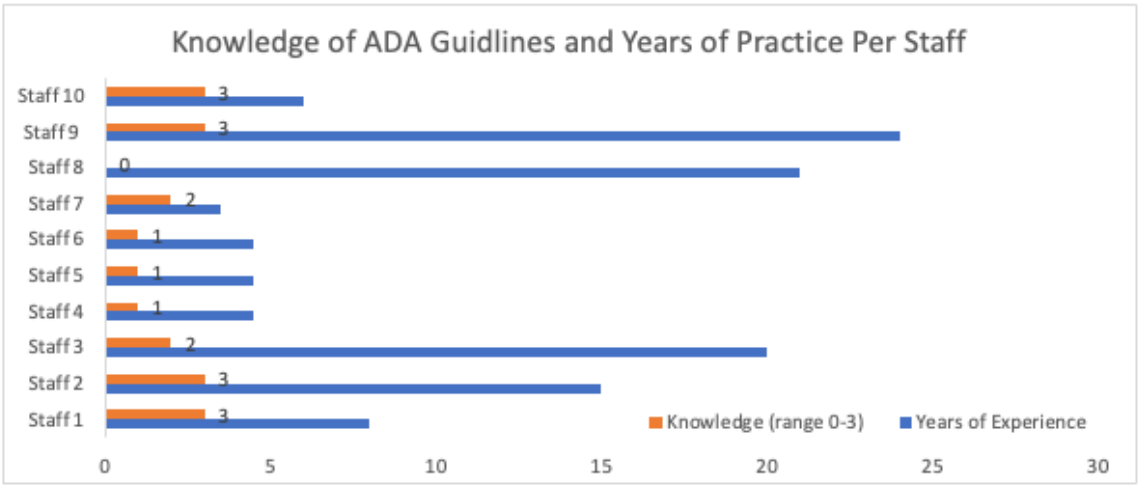
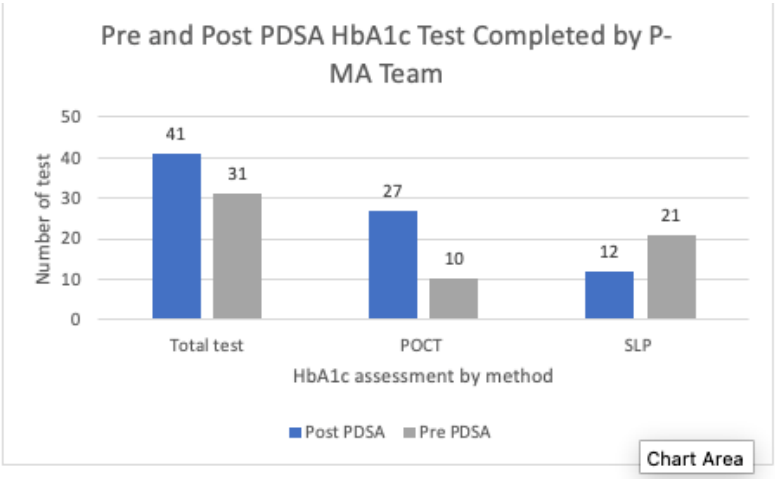


Figure 9: Scatter Plot of Staff Confidence in Selecting HbA1C Test by Years Experienced

Figure 10: Run Chart of Staff Knowledge Pre and Post Education Intervention



*Post PDSA dates 10.01.25 – 12.21.25 and pre PDSA dates 04.01.25 – 06.30.25

Figure 11: Chart of Pre and Post PDSA Number of HbA1cs by P-MA team

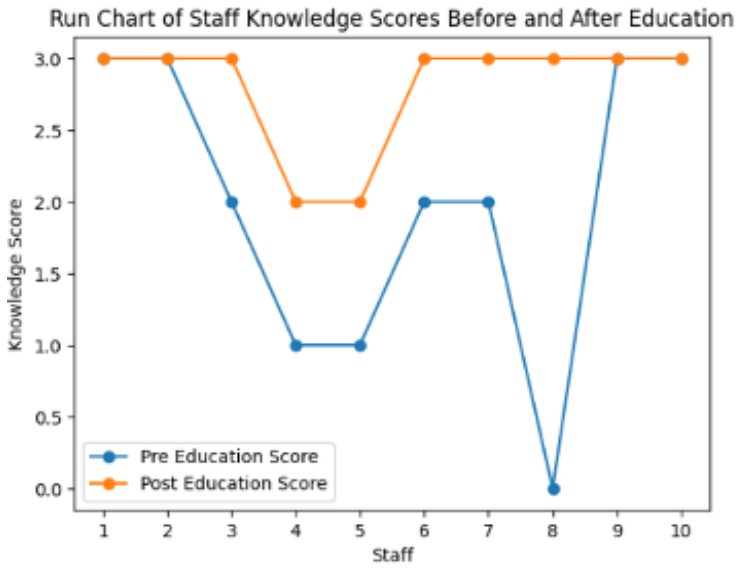
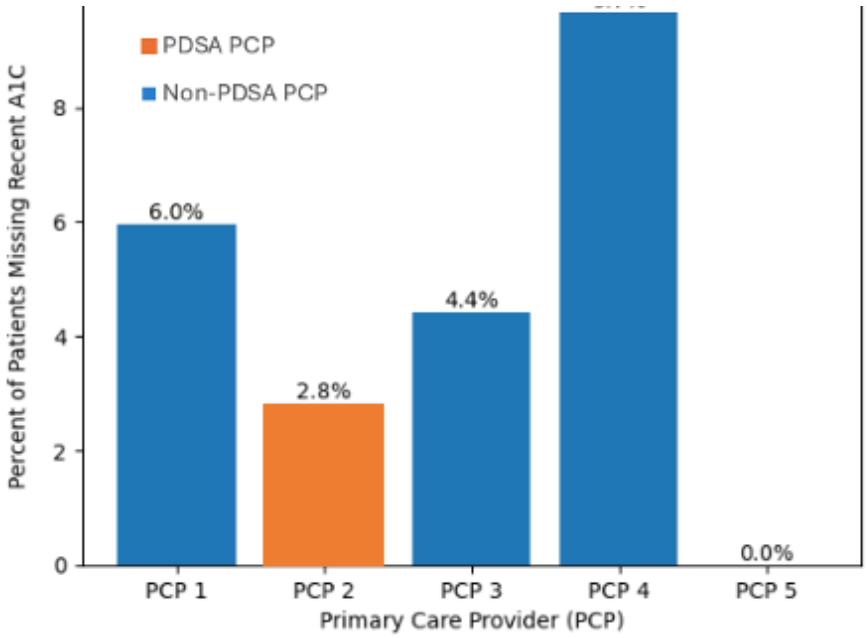


Figure 12: Chart Percent of Missing A1C per PCP at end of 2025

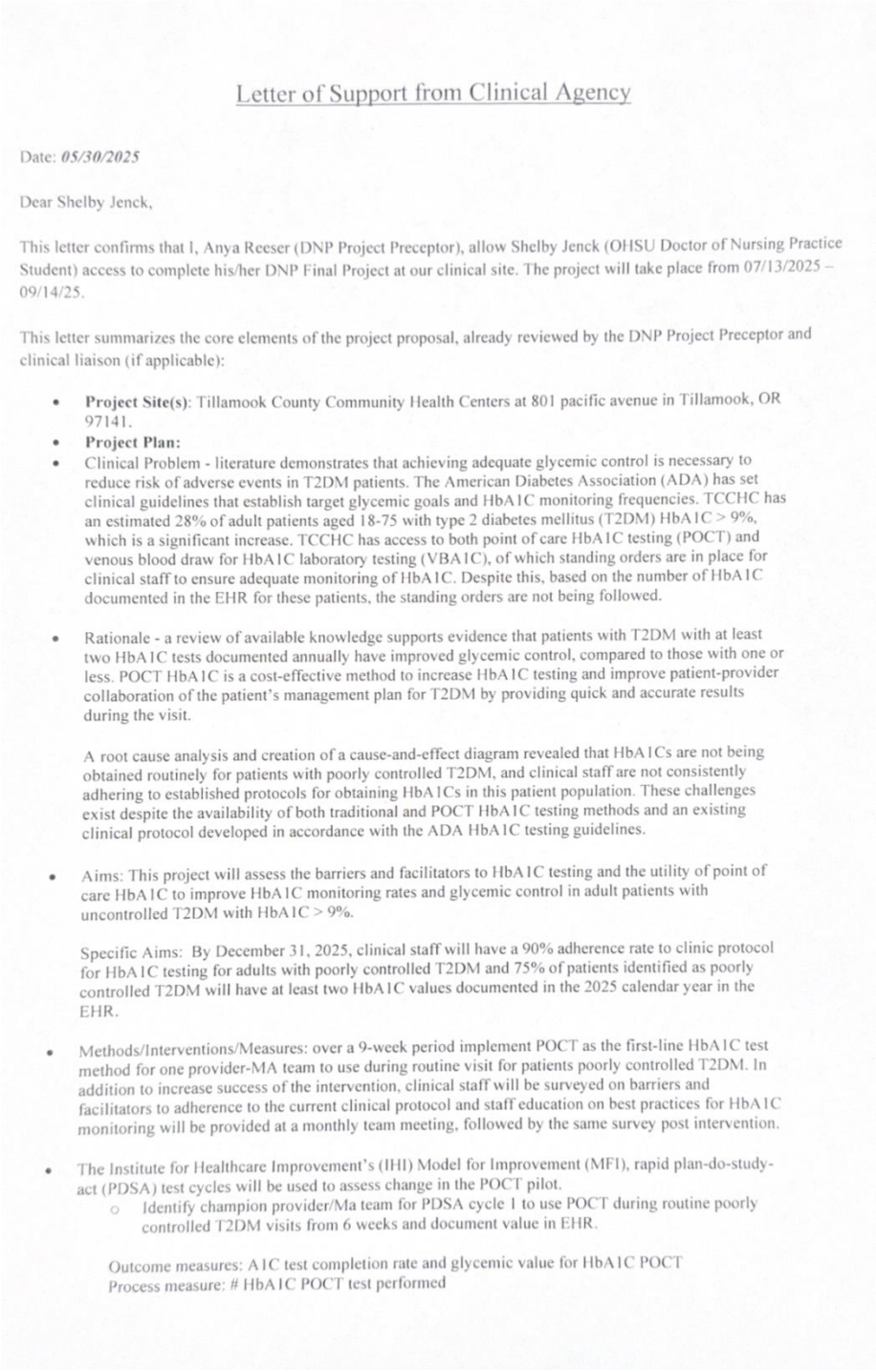


Appendix F: Project Timeline

	May 2025	**Jun 2025**	**Jul 2025**	**Aug 2025**	**Sep 2025**	**Oct 2025**	**Nov 2025**	**Dec 2025**	**Jan 2026**	**Feb 2026**	**March 2026**
Finalize project design and approach (703A)	X										
Complete IRB determination or approval (703A)		X									
Pre-survey				x							
Staff Education							x				
PDSA Cycle 1								x			
Post-Survey (703B)										x	
Final data analysis											x
Write sections 13-17 of final paper											x
Prepare for project dissemination											x

Table 1: Project Timeline

Appendix G: Letter of Support from Clinical Agency



Letter of Support from Clinical Agency

Date: ***05/30/2025***

Dear Shelby Jenck,

This letter confirms that I, Anya Reeser (DNP Project Preceptor), allow Shelby Jenck (OHSU Doctor of Nursing Practice Student) access to complete his/her DNP Final Project at our clinical site. The project will take place from 07/13/2025 – 09/14/25.

This letter summarizes the core elements of the project proposal, already reviewed by the DNP Project Preceptor and clinical liaison (if applicable):

- **Project Site(s)**: Tillamook County Community Health Centers at 801 pacific avenue in Tillamook, OR 97141.
- **Project Plan:**
- Clinical Problem - literature demonstrates that achieving adequate glycemic control is necessary to reduce risk of adverse events in T2DM patients. The American Diabetes Association (ADA) has set clinical guidelines that establish target glycemic goals and HbA1C monitoring frequencies. TCCHC has an estimated 28% of adult patients aged 18-75 with type 2 diabetes mellitus (T2DM) HbA1C > 9%, which is a significant increase. TCCHC has access to both point of care HbA1C testing (POCT) and venous blood draw for HbA1C laboratory testing (VBA1C), of which standing orders are in place for clinical staff to ensure adequate monitoring of HbA1C. Despite this, based on the number of HbA1C documented in the EHR for these patients, the standing orders are not being followed.

- Rationale - a review of available knowledge supports evidence that patients with T2DM with at least two HbA1C tests documented annually have improved glycemic control, compared to those with one or less. POCT HbA1C is a cost-effective method to increase HbA1C testing and improve patient-provider collaboration of the patient's management plan for T2DM by providing quick and accurate results during the visit.

  A root cause analysis and creation of a cause-and-effect diagram revealed that HbA1Cs are not being obtained routinely for patients with poorly controlled T2DM, and clinical staff are not consistently adhering to established protocols for obtaining HbA1Cs in this patient population. These challenges exist despite the availability of both traditional and POCT HbA1C testing methods and an existing clinical protocol developed in accordance with the ADA HbA1C testing guidelines.

- Aims: This project will assess the barriers and facilitators to HbA1C testing and the utility of point of care HbA1C to improve HbA1C monitoring rates and glycemic control in adult patients with uncontrolled T2DM with HbA1C > 9%.

  Specific Aims: By December 31, 2025, clinical staff will have a 90% adherence rate to clinic protocol for HbA1C testing for adults with poorly controlled T2DM and 75% of patients identified as poorly controlled T2DM will have at least two HbA1C values documented in the 2025 calendar year in the EHR.

- Methods/Interventions/Measures: over a 9-week period implement POCT as the first-line HbA1C test method for one provider-MA team to use during routine visit for patients poorly controlled T2DM. In addition to increase success of the intervention, clinical staff will be surveyed on barriers and facilitators to adherence to the current clinical protocol and staff education on best practices for HbA1C monitoring will be provided at a monthly team meeting, followed by the same survey post intervention.

- The Institute for Healthcare Improvement's (IHI) Model for Improvement (MFI), rapid plan-do-study-act (PDSA) test cycles will be used to assess change in the POCT pilot.
  - Identify champion provider/Ma team for PDSA cycle 1 to use POCT during routine poorly controlled T2DM visits from 6 weeks and document value in EHR.

  Outcome measures: A1C test completion rate and glycemic value for HbA1C POCT
  Process measure: # HbA1C POCT test performed

Figure 13: Letter of Support from Clinical Agency page 1 screenshot.

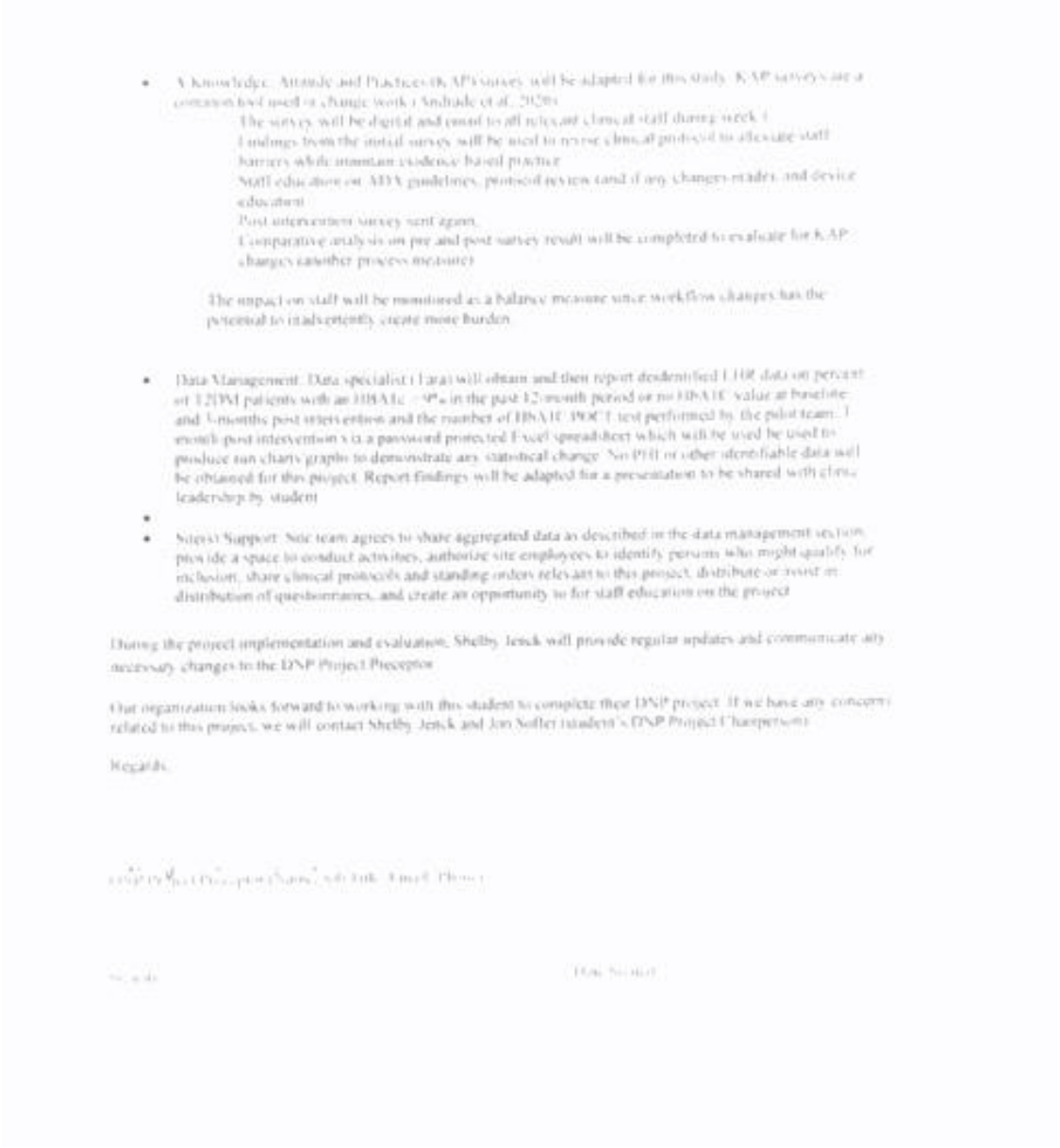


Figure 14: Letter of Support from Clinical Agency page 2 screenshot.