Conducting a Medical Chart Audit to Identify Gaps in Follow-Up Care of Pediatric Patients with Celiac Disease: A Quality Improvement Initiative

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Submitted to: Dr. Rana Najjar - Chair

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Abstract

Background: A pediatric gastroenterology clinic found patients with celiac disease (CD) reporting exacerbations of CD related symptoms. There is no cure and treatment for CD is a gluten free diet with routine follow-up care per national guidelines. The goal of this project was to identify adherence to national guidelines for CD follow-up care by conducting a medical chart audit.

Methods: As recommended by the literature, 10% of patient charts with CD from 2018, 2019, and 2020 were assessed for compliance. Literature review was conducted to determine thresholds for chart audit samples and CD follow-up guidelines. Six variables consisting of biopsy, dietician referral, and obtainment of tTg-IgA levels were analyzed as "met" or "unmet".

Intervention: The completed chart audit demonstrated the occurrence of each variable measured both in percentile and numerical aspects. A guideline presentation was presented to providers with a follow-up retrospective pre/post survey to determine confidence levels.

Results: The chart audit was conducted over a six-week period and included 123 patient encounters with a diagnosis of CD for the years 2018-2020. Downtrends in five of the six CD metrics were observed, most notably "Biopsy Confirmation" decreasing by 43% and "tTg-IgA Annually" decreasing by 73%. Notably, "RD Referral" was most consistent at 100%, 93%, and 90% compliance for 2018, 2019, and 2020, respectively.

Conclusion: Variables such as "RD Referral" followed national guidelines while others, including "Biopsy Confirmation" did not. This project highlighted strengths and areas for improvement, while generating data for future PDSA cycles.

Keywords: celiac disease, compliance, screening, follow-up, NASPGHAN

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Problem Description

Celiac disease is an autoimmune disease where the ingestion of gluten attacks an individual's small intestine, causing damage to the intestinal lining, contributing to problems such as malabsorption, slowed growth, and iron deficiency anemia. In the pediatric population, celiac disease is prevalent in 1 out of 80 children between the ages of 2.5 and 15 years old (Hill et al., 2005). Initial diagnosis is confirmed with serological testing, the most common measurement looking at IgA antibodies to human recombinant tissue transglutaminase (tTg). Duodenal biopsy taken while performing an upper endoscopy is recommended to further confirm a celiac disease diagnosis. The only treatment for celiac disease, and thus resolution of symptoms and healing of the duodenum, is to undergo strict adherence to a gluten-free diet (Hill et al., 2005; Gallegos & Merkel, 2019).

A pediatric gastroenterology clinic located in a metropolitan area recently noticed their patients with celiac disease (CD) presenting with exacerbations in CD related symptoms such as abdominal pain or discomfort, diarrhea, constipation, gas, and bloating. Leadership was interested in assessing providers' screening practices with patients during intial and follow-up visits. It is unknown if patients are experiencing worsening symptoms because of poor compliance to their treatment plan or if providers are inadvertently straying from the clinic's current standard of care for providing follow-up care and screening of children with previously diagnosed celiac disease. The purpose of this quality improvement initiative is to assess current practices involving adherence to the NASPGHAN guidelines within a pediatric gastroenterology clinic by conducting a medical chart audit of patients with CD and analyzing the potential gaps

in care. The results of the chart audit will help to determine an appropriate intervention to improve patient outcomes within the clinic.

Available Knowledge

There are a number of reasons for the potential lack of adherence to the clinic's current standard and the NASPGHAN guidelines. Many providers may have been educated and trained using the 2005 NASPGHAN guidelines, which are still relevant but over a decade old and written when there was less evidence-based data available (Snyder et al., 2016). One possible factor could be that providers are inadequately incorporating newly updated evidence-based practices when providing follow-up care.

A clinical report conducted by Hill et al. (2016) on the 2005 NASPGHAN guidelines, recommends screening tTG-IgA 3 to 6 months post initiation of a GFD and then every 6 months until symptom resolution and tTG-IgA levels have normalized. Additionally, the NASPGHAN guidelines do not recommend routine biopsies in children with confirmed celiac disease, unless symptoms do not subside or tTG-IgA levels do not decline after initiation of a GFD (Hill et al., 2016). Although there are national guidelines for the diagnosis of CD, there is a lack of universal guidelines for follow-up care in children with celiac disease.

Experts agree on the recommendations that follow-up screening post of tTG-IgA levels and symptom resolution be conducted every 3-6 months initially, then every subsequent 6 months until levels normalize, and then annually (Hill et al., 2016; Moya et al., 2020; Valitutti et al., 2017). The NASPGHAN 2016 clinical report states that annual follow-up not only include symptom screening and tTG-IgA levels, but also include monitoring for other autoimmune diseases. Obtaining a complete blood count, thyroid testing, vitamin D levels, or other diagnostics, although recommended, relies on provider discretion (Hill et al., 2016).

Routine monitoring of compliance to a gluten-free diet (GFD) is crucial with a wide range of 42-91% of children reporting proper adherence (Gallegos & Merkel, 2019). Not following a strict gluten-free diet can increase risks of mortality and decrease quality of life and noncompliance to a GFD can have mild to severe consequences (Snyder et al., 2016). These can include nutritional deficiencies, dentition defects, and impaired bone growth; as well as an increased risk of osteoporosis, non-Hodgkin lymphoma, and bowel adenocarcinoma (Gallegos & Merkel, 2019). Additionally, those with one autoimmune disease, such as celiac disease, in general are at a greater risk of developing other autoimmune diseases; including type 1 diabetes and autoimmune thyroiditis (Hill et al., 2005; Snyder et al., 2016). The development of cooccurring autoimmune diseases is not entirely understood but hypothesized to be related to genetics and the human leukocyte antigen (HLA) function of the immune system. These potentially serious but avoidable complications can be identified and managed with appropriate screening and follow-up care of celiac symptoms (Snyder et al., 2016).

In a systematic review of celiac disease literature from the years 1900-2016, Valitutti et al. (2017) provide evidence of the importance of monitoring for other possible autoimmune diseases. Additionally, Moya et al. (2020) supports annual screening for vitamin D and discuss the importance of screening folate in pediatric patients of childbearing age, since many gluten-free containing products do not have added folic acid, compared to their gluten containing counterparts. In conjunction with annual serologic and symptom screening, there are recommendations for screening growth velocity (weight and height percentiles) as children with celiac disease typically consume diets higher in calories, sugar, and fat, which could lead to excessive weight gain (Moya et al., 2020). In contrast, Valitutti et al. (2017) recommends observing “catch-up growth” in children who presented with inadequate growth prior to

diagnosis. Many children present with less-than-ideal height and weight percentiles due to malabsorption from damaged intestinal villi (Valitutti et al. 2017).

There are several potential gaps in care, including patients with comorbidities such as type 1 diabetes followed by other specialists, who may not receive annual screening for CD in the gastroenterology clinic. Patients who become lost to follow-up care due to inadequate reminders or feeling as if their needs are not met. Lastly, fragmentated or a lack of coordinated care between specialist and primary care providers may lead to missed screening opportunities. For example, Valitutti et al. (2017) found that patients followed by a specialist had better adherence to a GFD, than those who only follow-up with their primary care providers. Establishing a trusting relationship and providing guidance is important in making children and families feel like they have found a celiac home (Gallegos & Merkel, 2019; Moya et al., 2020; Valitutti et al., 2017). The need for providers to comply with appropriate follow-up screening is important for keeping children with celiac disease symptom free, decreasing further intestinal damage, and preventing long term comorbidities (Gallegos & Merkel, 2019; Hill et al., 2005).

Rationale

Clinic leadership noticed an increase in exacerbations of celiac patient symptomatology which had them wondering if routine screening is being provided. The clinic is also aware that patients with additional comorbidities such as type 1 diabetes, are not receiving routine follow up care for their CD. Lastly, during a recent division meeting, it became apparent that providers were using different clinical practice standards. The aim of the chart audit was to evaluate provider adherence to current clinical standards regarding follow-up care practices. The chart audit was completed using EPIC and include information from the charts of newly diagnosed

celiac patients in the years 2018, 2019, and 2020. Identifying potential gaps in care will help guide efforts in implementing an appropriate intervention.

Chart audits can be beneficial in addressing the cause for the problem identified in clinical practice. They can help stakeholders determine potential gaps in patient care in a timely and cost-efficient manner. The framework to conducting a formal chart audit starts with selecting a topic area, identifying what criteria will be measured, isolating the patient population to review, establishing an appropriate sample size, creating data collections tools, collecting the data, summarizing the data in a meaningful way, and lastly, interpreting the summarized data and apply the results to improving patient outcomes (Barick et al., 2018; Gregory et al., 2008; Limb et al., 2017). Conducting a chart audit to evaluate provider performance as it pertains to adhering to clinic standards and national guidelines for follow-up care in patients with CD, allowed the clinic to identify potential areas of care that need improvement.

Specific Aims

By October 2021, 10% of charts were assessed for compliance in follow-up screening of newly diagnosed celiac patients. Follow-up screening auditing included diagnostic biopsy, nutritional referral, and tTg-IgA levels. Based on the chart audit findings, a information session was provided using national guidelines and evidence-based recommendations, in an effort to improve the care and management of celiac patients.

Methods

Context

The pediatric gastroenterology clinic is part of a large children's hospital in a metropolitan area and provides comprehensive care to children experiencing a wide variety of digestive system conditions. Children with CD are seen in the clinic, with approximately 100-

150 new patients diagnosed annually. The clinic includes nine physicians and three nurse practitioners, all of whom can see this population of patients. The clinic also has its own registered dietician who is a mainstay in providing follow-up care related to diet for patients with CD since strict adherence to a gluten-free diet is the only known method of abating related symptoms and promoting intestinal healing (Hill et al., 2005; Hill et al., 2016).

Leadership was supportive of this project and requested chart audits be conducted before an intervention is developed. The clinic's medical director gave permission to access patient charts within their EPIC system for the chart audit. This information was accessed using an institution login through a secure server portal. The lead CD provider assisted in selecting the CD patient charts to be audited and provided oversight when needed. The number of patient charts to be reviewed was completed by one individual collecting pertinent data. Anticipated barriers included time restrictions of the providers, inability to sort out CD patients within the clinics EHR, stress of one individual conducting the chart audit, and gaps in communication among auditor and clinic staff.

Interventions

A retrospective chart audit of 45 total patients over a 3-year was conducted. The chart audit, in the clinic's EPIC charting system, was completed by looking at a sample of 10% of patient's charts, or 15 charts from the years 2018, 2019, and 2020 each (Appendix B), to identify if appropriate guidelines have been followed. Assessing 10% of eligible charts is an appropriate standard when conducting chart audits (Gregory et al., 2008). These 45 patient charts were randomly selected and their charts reviewed. A set of clinical data variables were then identified within each patient chart. The variables include confirmed biopsy diagnosis, registered dietician (RD) referral, and tTg-IgA levels drawn at intervals stated in the NASPGHAN 2005 guidelines

and clinic standard. This includes tTg-IgA levels being screened 3-6 months after initial diagnosis, then every 6 months until levels normalize, where screening can then be done annually (Hill et al., 2016).

If any of the above variables were not included in the patient's chart, Care Everywhere within EPIC was reviewed to see if follow-up care has been provided at an outside facility. If no follow-up documentation was noted in EPIC or Care Everywhere, loss to follow-up was assumed. The clinical data variables will be marked as either "Met" or "Unmet" within an Excel spreadsheet.

Study of the Interventions

The audit reviewed specific variables that are to be met at each follow-up visit post CD diagnosis, as outlined by the clinic standard and NASPGHAN guidelines. It was hypothesized that certain variables would not be available in all cases, which can lead to poor delivery of care and negative patient outcomes. Possible themes were identified in the summarization and analysis of the chart audit data, adding internal validity.

Additionally, processes that were most efficient to conducting the chart audit and assessing for variables were noted. This included discussing how providers documented follow-up screening in a way that clearly demonstrated adherence to clinic guidelines; such as where and how referrals and recommendations were documented in the patient chart. Noting whether or not providers are collecting tTg-IgA levels by seeing this data in the results section of the EHR, but no mention of a plan to collect this data in the chart note, was one example of an inconsistency worth documenting in field notes for future interventions.

Measures

Study of the process measures includes evaluating 5 clinical data variables. These include documentation of a biopsy confirmed diagnosis, RD referral within 4 weeks of diagnosis, tTg-IgA screening 3-6 months post diagnosis, tTg-IgA screening every subsequent 6 months, and annual tTg-IgA screening once levels have normalized and symptoms regressed (Appendix B). These measures align with the most recent NASPGHAN guidelines and expert opinions regarding the follow-up care for children with CD. The outcome measures included assessing whether or not each variable was met for a single patient and at the right time, whether in the clinic or at an outside facility; as well as assessing the percentage of charts that met clinic standards and NASPGHAN guidelines.

Analysis

This retrospective chart audit reviewed a total of 45 patient charts from the years 2018, 2019, and 2020, over a two-month period from August to October, of 2021. During the audit, the clinical data variables outlined previously were obtained as qualitative data and marked as either met or unmet within a data collection tool (Gregory et al., 2008). Post chart audit, the data collected was compiled in a bar chart that demonstrates the occurrence of each variable measured both in percentile and numerical aspects.

Ethical Considerations

All providers within the outpatient pediatric GI clinic were aware of the purpose of the project and that it will include a retrospective chart audit. Beneficence and non-maleficence underpinned this work in the basic belief that providers are practicing with the intention of doing good, helping others, and preventing harm. Moreover, information on each specific provider was not collected as the aim of this project is not to single out specific provider actions. The

department chair supplied a written and signed letter of support to conduct the chart audit within the clinic, along with assurance of staff compliance and support where needed. No identifiable patient data will be collected since the chart review is cross sectional. The proposal was submitted to the Oregon Health and Science University Institutional Review Board for determination and deemed quality improvement and not human subject's research.

Results

The chart audit was conducted over a six-week period and included 123 patient encounters with a diagnosis of "Celiac Disease" for the years 2018-2020. The goal of 15 charts per year was met for 2018 and 2019, with only 10 charts in 2020.

Initial steps involved diagnosis determination. To meet criteria, patients had to be diagnosed in the years 2018, 2019, and 2020. Additionally, a total of seven charts with a corresponding celiac disease diagnosis code, were initially diagnosed the year prior. For example, a patient with a follow-up visit in 2020 and a celiac disease diagnosis code, was initially seen in 2019. This patient would have then been officially diagnosed in the previous year, when the sample size for that year was already met, and as a result was not included in the audit. Lastly, seven virtual visits conducted in 2020 were included in the list of patient encounters but were patients of satellite clinics, thus out of context for the chart audit. Excluded charts were those with patients diagnosed outside of the defined years and those previously diagnosed at an outside facility, equaling a combined total of 66 charts.

An evolution of this project required de-identifying charts by assigning a number for each audit year. This processes of collecting and assessing the clinical data variables for differences in met and unmet variables for each year were compiled into a line graph to provide a visualization of changes over time. Results from the audit revealed downtrends for "Biopsy Confirmation" at -

43% and “tTg-IgA Annually” at -73%. Of note, for the year 2020, if a diagnosis was less than a year at the time of the chart audit completion in September 2021, annual tTg-IgA follow-up was inconclusive. The variable with the most compliance was “RD Referral”, which was met at 100%, 93%, and 90% for 2018, 2019, and 2020, respectively (Figure 1).

The findings of the chart audit, including process and outcome measures and field notes were shared with clinic leadership. After sharing the results, a request was made to present a summary of the current NASPGAN guidelines at the upcoming provider meeting. The presentation led to an unexpected benefit of educating providers on follow-up care practices.

An infographic consisting of the most updated NASPGHAN guidelines for follow-up care of pediatric patients with CD was constructed and presented during the provider meeting in the allotted 5-minute timeframe. Providers and nurses were present and were asked to complete a retrospective pre/post survey using Qualtrics. The questions assessed confidence levels and intent to change current practice pre & post presentation. An additional question asked providers if they wanted more information regarding results of the chart audit. The results of the Qualtrics survey included one response in which the individual felt “extremely confident” before the presentation and would “probably not” change their current practice, post-presentation. Contextual factors that interacted with the interventions included the need for the clinic to supply pertinent patient health records; as well as provider turnover, transfer of patient care, and patients who received care from other specialties.

Discussion

Summary

This project utilized a collaborative approach to determine CD metrics for a retrospective chart audit and identify gaps in practice. Three key findings from this project include: downtrends in five of the six variables, RD referral as the benchmark most consistently met, and

biopsy confirmation, despite being supported as best practice in the literature, as one of the least met variables. Another key finding that was not part of the aims of this project included field note data regarding follow-up care differences among the providers. Field notes revealed that providers are tailoring their care based on individual circumstances, such as age at which tTg-IgA levels were found to be elevated, significantly elevated tTg-IgA levels, first-degree relative with CD, and parental hesitation to the risks associated with obtaining a confirmatory biopsy. The strength of this project was identifying gaps in meeting NASPGHAN guidelines and elucidating areas for continued focus to standardize care.

Interpretation

The chart audit revealed downtrends in over 80% of variables and provided insight on which variables need more attention in the clinic's current practices. It was anticipated that there were to be downtrends in met variables due to an overlap of the COVID 19 pandemic. The pandemic could have been an added impact, however in examining the metrics over the three years, the data revealed a downward trend before pandemic onset. Field notes revealed that providers are focused on individualized care rather than a one size fits all approach. Barth et al. (2015) solidified the importance of following practice guidelines to improve patient outcomes but shares that when patients' personal needs do not align with the guidelines, providers may be less compliant. This could explain the challenges with guideline adherence.

The chart audit also highlighted the clinic's strengths with current practices. RD referral showed noticeably consistent adherence and was met 90% of the time or more over the 3-year audit window which was similar to findings from another study (Lundin et al., 2021). Similar to other research, the data indicates the support for starting a GFD is the only known treatment for CD and aids in symptom cessation and gut healing (Hill et al., 2005; Lundin et al., 2021). The

clinic's high adherence rate to RD referral is a great foundation for follow-up care of those with newly diagnosed CD; however, without proper follow-up visits to evaluate for symptom resolution and adherence to a GFD, patients may still experience an exacerbation of symptoms. This signifies the importance of monitoring the recommended variables at appropriate times, per the NASPGHAN guidelines.

Although the 2005 NASPGHAN guidelines and clinical report conducted by Hill et al. (2016) state that a confirmatory biopsy is needed in all cases, the clinic was unable to meet this benchmark in all three years. In the more recently updated guidelines from the European Society for Peadiatric Gastroenterology, Hepatology and Nutrition (ESPGHAN), a no biopsy approach to diagnosing CD in pediatric patients was supported in 2012 and updated in 2019 (Husby et al., 2020). Authors of the ESPGHAN 2019 guidelines continue to support a no biopsy approach in children with suspected CD based on clinical presentation and clinical decision making between provider, the pediatric patient, and their caregivers, as positive outcomes are still achievable (Husby et al., 2020). These findings demonstrate that an individualized approach is possible and aligns with what clinic providers are currently practicing.

In regards to the Qualtrics survey, 11 of the 12 providers did not respond to the pre/post questions. It is unclear why there was little response to the survey, but possible contributing factors could have been due to lack of time to provide a response, that the presenter is not a member of the clinic, and unclear expectations for survey completion. Due to inadequate data collection, it cannot be inferred that they would not apply the summary of follow-up care to their current practice.

Limitations

This project had several imitations. The auditor is not an employee of the clinic, nor do they have adequate knowledge of the current practices required within the setting. Clinic providers do not follow a standardization for charting notes, which made finding certain variables more difficult and may limit reproducibility of similar audits. Other limitations include the potential lack of documentation in the clinic EHR with testing conducted at an outside site and only included charts from one location of a multi-clinic site. Lastly, this chart audit only assessed provider adherence to national guidelines and the implications on patient outcomes. As mentioned above, other contributing factors such as poor patient compliance and follow-up with providers can lead to exacerbations in symptoms in patients with CD. This theory is supported by a study conducted by Lundin et al. (2021) which found decreases in patient compliance are multifactorial and include patients believing they can manage their CD on their own or not following up with a gastroenterologist. Data from patients on barriers to compliance may be helpful to collect during the next PDSA cycle.

To minimize potential limitations, audit practices were discussed with the lead CD provider. Specific variables were outlined with a general consensus of where to find them by the lead CD provider. Field notes were collected to help provide context for variables at the provider level, although it was decided that this data would not be analyzed in the final results.

Conclusion

This was the first chart audit to have examined adherence to practice guidelines within the gastroenterology clinic. We found variabilities among providers and the follow-up care they provide for their patients with CD, evident of a deviation from the current NASPGHAN guidelines. When guidelines are not followed as intended, patient outcomes may be less

favorable (Barth et al., 2015). However, we cannot definitively conclude that the sole cause of exacerbation in symptoms of patients with CD within the clinic was the result of nonadherence to practice guidelines. Follow-up care for those with CD resulting in symptom resolution is reliant not only on provider adherence to practice guidelines in addition to patient compliance. Future chart audits assessing patient compliance through self-report of symptoms and stable tTg-IgA levels would be beneficial to supply a more definite answer for symptom exacerbation.

Literature supports that practice guidelines are only valuable when implemented correctly and audited frequently (Barth et al., 2015). This audit proved useful in helping understand the strengths and weaknesses of current practices within the clinic, as they pertain to a specific population and has validity, reproducibility, and generalizability to other contexts, including the department's satellite clinics. It is evident that the NASPGHAN guidelines for providing follow-up care to the population of interest need to be updated and better align with the needs of patients. Further recommendations include updating the clinic's standard of care, utilizing more recent guidelines such as the EASPGHAN guidelines, and incorporating reputable literature showing positive outcomes from individualizing follow up care for patients with CD, while advocating for updates to the current NASPGHAN guidelines. Future work will need to evaluate how standards/guidelines could be met while meeting the individual needs of patients and repeat audits assessing adherence to those guidelines.

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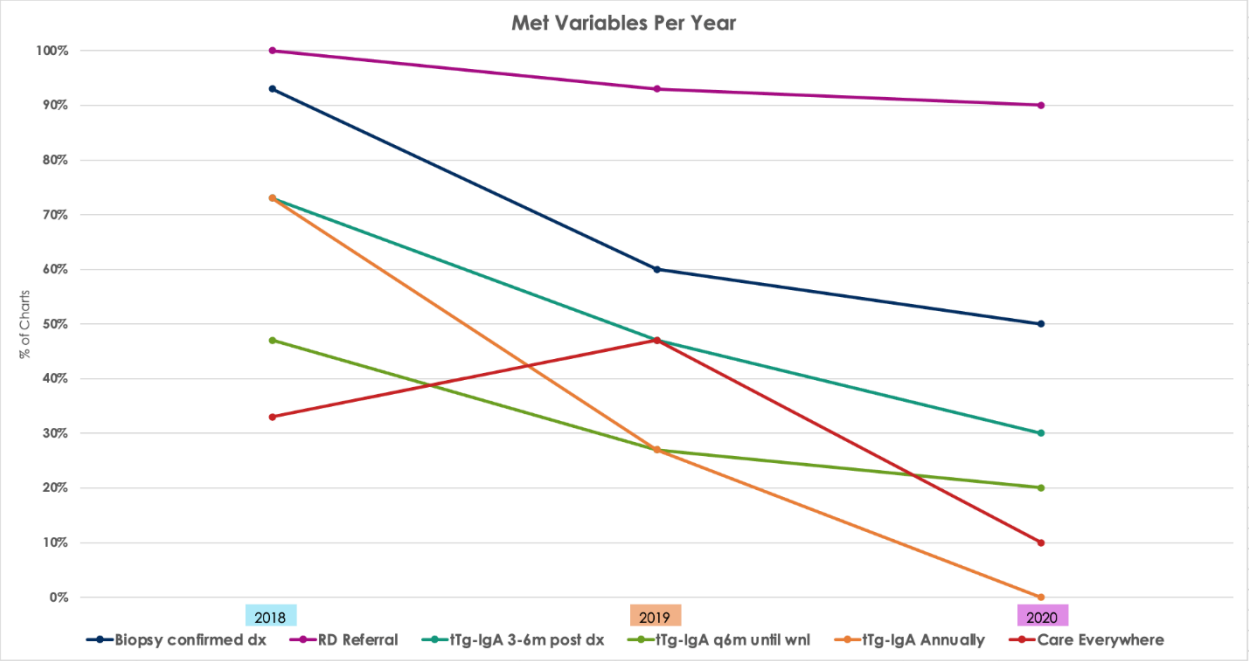
Figure 1

Met Variables Per Year



Appendix A

Table 1

Data collection spreadsheet 2018

Patient Charts 2018	Clinical Data Variables							
	Biopsy confirmed diagnosis	RD referral	tTg-IgA within 3-6m post diagnosis	tTg-IgA every 6m until wnl	tTg-IgA annually	Care Everywhere	Lost to F/U	Notes
1								
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Table 2

Data collection spreadsheet 2019

Patient Charts 2019	Clinical Data Variables							
	Biopsy confirmed diagnosis	RD referral	tTg-IgA within 3-6m post diagnosis	tTg-IgA every 6m until wnl	tTg-IgA annually	Care Everywhere	Lost to F/U	Notes
1								
2								
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Table 3

Data collection spreadsheet 2020

Patient Charts 2020	Clinical Data Variables							
	Biopsy confirmed diagnosis	RD referral	tTg-IgA within 3-6m post diagnosis	tTg-IgA every 6m until wnl	tTg-IgA annually	Care Everywhere	Lost to F/U	Notes
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Appendix B

Clinical Site Letter of Support

Letter of Support from Clinical Agency

Date: ***6/05/2021***

Dear *Janesa Porter*,

This letter confirms that I, *Dr. Henry Lin* , allow *Janesa Porter* (OHSU Doctor of Nursing Practice Student) access to complete his/her DNP Final Project at our clinical site. The project will take place from approximately *July 2021* to *April 2022*.

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)**: *Doernbecher Children's Hospital Gastroenterology Clinic.*
  700 SW Campus Drive. Portland, Oregon 97239

- **Project Plan:**
  - Identified Clinical Problem: *The pediatric gastroenterology clinic at OHSU's Doernbecher Children's Hospital (DCH) has recently noticed worsening symptoms in their celiac patient population. They have also become aware that providers have different clinical practices when it comes to screening these patients at their follow up visits.*

  - Rationale: *A root cause analysis will be conducted with the hopes of identifying wherein lies the problem correlating with worsening celiac symptoms. Current assumptions of possible contributors include lack of patient compliance to treatment plan and/or lack of provider adherence to current clinic standards regarding follow up care practices. This will be done by completing a retrospective chart review in EPIC of newly diagnosed celiac patients in the years 2018, 2019, and 2020. Narrowing down the most likely cause to the problem in question will help to guide efforts in implementing an appropriate intervention.*

  - Specific Aims: *Conduct a retrospect chart review from the years 2018, 2019, and 2020, of 20 newly diagnosed celiac patients each year, from July 2021-September 2021.*

  - Methods/Interventions/Measures: *To complete the root cause analysis, a retrospective chart review of 60 total patients over a 3-year period will be conducted. The measures include evaluating clinical data variables and determining patients have a biopsy confirmed diagnosis with a subsequent nutrition referral within 4 weeks of diagnosis. The next measure will include documentation of follow up tTg-IgA levels within 3-6 months post diagnosis and every 6 months thereafter, until normalization of levels and cessation of symptoms; at which time, annual tTg-IgA levels will be evaluated. Lastly, if no follow up tTg-IgA levels are documented, then Care Everywhere will be reviewed to see if tTg-IgA levels have been followed up at an outside facility. If no follow up documentation is noted in EPIC or Care Everywhere, loss to follow up will be assumed.*

  - Data Management: *Clinical data variables, such as the ones mentioned in the above measures section, will be marked as either "Met" or "Un Met", within an Excel spreadsheet. For the purposes of this root cause analysis, patients may remain de-identified. If the clinic would like the data in a patient identifiable format, one may be provided to them, solely.*

  - Site(s) Support: *We will provide space and support to conduct the study, access to required patient data, and faculty oversight.*

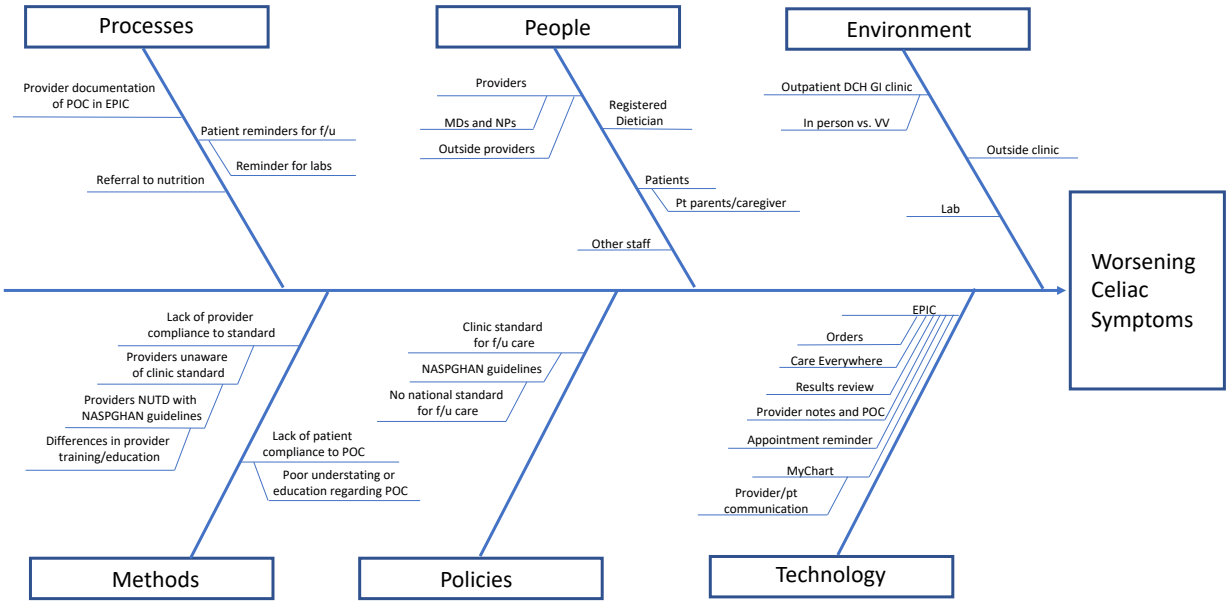
  - Other: *Not applicable*

During the project implementation and evaluation, *Janesa Porter* will provide regular updates and communicate any necessary changes to the DNP Project Preceptor.

Our organization looks forward to working with this student to complete their DNP project. If we have any concerns related to this project, we will contact *Janesa Porter* and *Dr. Rana Najjar* (student's DNP Project Chairperson).

Appendix C

Cause and Effect Diagram



Appendix D

Project Timeline

Janesa Porter Project Timeline	Jun	Jul	Aug	Sep	Oct	Nov	Dec-Mar
Finalize project design and approach	X	X					
Complete IRB determination or approval		X					
Start retrospective chart review			X	X			
Finish retrospective chart review					X		
Review data and complete Pareto Chart					X		
Identify an intervention					X	X	
Write sections 13-17 of final paper						X	X
Prepare for project dissemination							X