

Enhanced Primary Care Electronic Medical Record Education to Improve the Use of Patient
Portals

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Abstract

Background: Health information technology (HIT) refers to the electronic health care systems organizations used to store, share and analyze healthcare information. A central component of the HIT infrastructure is an electronic health record (EMR) and although HIT has been shown to increase enthusiasm for patient care, decrease healthcare costs and improve patient outcomes overall utilization in the United States (US) remains low.

Methods: At an urban primary care pediatric office located in the southwestern US, an educational quality improvement project for healthcare practice providers and front office staff was conducted to increase the utilization of the existing EMR-linked patient portal. The healthcare providers were asked to complete a pre- and post- survey evaluation of their knowledge and usage of the patient portal. Provider and patient portal data usage was collected over a five-month period, September 2019 to January 2020.

Results: Data was analyzed using the Intellectus Statistics software™. Significant results were found at the conclusion of the project in the number of active patient portal users, web-enabled, portal logins, labs published/viewed, messages sent, appointment reminders and Santovia utilization. At the end of the project no significance was found with messages received by the healthcare providers or staff through the patient portal. Survey results found significant differences between pre- and post- portal usage. No significance was found on providers' knowledge on how to web-enable patients. Providers' also demonstrated no significant change in their perceptions of the benefit in utilizing the portal in patient care after the educational intervention. Survey results allowed for additional analysis of commonly utilized portal functionalities, disease or health topics utilized in Santovia, and suggestions on how to make the use of the patient portal easier for providers.

Implications for Health Care Providers: This quality improvement project found that implementation an EMR-linked patient portal requires a comprehensive practice approach with structured education sessions. Including all employees can improve patient portal utilization. This educational project resulted in significant increases in most portal functionalities within 5 months. Further practice change evaluations are needed to evaluate how to improve patient portal utilization with a larger group of participants in a variety of outpatient settings.

Keywords: Electronic health record, patient portal, advanced provider education, quality improvement, primary care, pediatrics

Enhanced Primary Care Electronic Medical Record Education to Improve the Use of Patient Portals

Healthcare organizations face challenges in delivering high quality, effective and safe patient care at an affordable cost. Health information technology (HIT) supports the health information management across computerized systems to promote the secure exchange of information between consumers, providers, payers and quality monitors (Centers for Disease Control and Prevention [CDC], 2020). The use of HIT in healthcare, including smartphone applications have led to an increasing enthusiasm for patient care, decreased healthcare costs and improved patient outcomes (Fiks et al., 2016; Miller, Latulipe, Melius, Quandt & Arcury, 2016). An abundance of evidence-based literature and healthcare initiatives have moved organizations from paper charting to electronic medical records (EMR). An EMR, is a patient-centered digital version of a patient's chart, allowing providers to chart and access patient's medical information digitally, and often includes a linked patient portal. A patient portal is a web-based system in which patients can view some of their information contained within their physicians EMR (Fiks et al., 2016). Although the utilization of EMRs is ubiquitous the utilization of the patient portal in health organizations and practices remains low (National Coordination for Health Information Technology [ONC], 2020). In primary care pediatrics, a patient portal, when implemented correctly can positively influence patient and provider outcomes and improve practices workflow (Bush et al., 2017; Fiks et al., 2016; Hoogenbosch et al., 2018).

Background and Significance

The use of HIT has become a norm worldwide in clinical interactions. With large amounts of patient information healthcare organizations are required to maintain, data analytics have taken a greater role in the day-to-day operations and management of patient information

(ONC, 2019-a). A central component of the HIT infrastructure is the EMR, or digital version of a patient's chart. The digital chart can be shared among multiple different healthcare providers, agencies, specialists and additional added authorized users (Bush et al., 2017). Main components of an EMR includes medical history, diagnosis, medications, treatment plans, immunization schedules, allergies and laboratory and test results. The EMR has evolved even further to often include an accompanying patient portal. Technology and software developments have improved creating a consumer-friendly design that permits patients and their families the ability to access their EMR through an online patient portal (ONC, 2019-a). This portal allows patients to access their EMR as well as additional functionalities if enabled by the healthcare organization.

Functionality of the patient portal can vary between healthcare institutions, but in most portals, patients can access their health information, communicate securely and confidentially with providers, review procedure or bloodwork results, access treatment records and, if applicable, access evidenced-based literature on their diagnosis (Hoogenbosch et al., 2018). Additional portal functionalities allowed by some organizations include paying bills, scheduling appointments and updating individual's personal healthcare information. The ubiquitous nature of smart phones and other digital devices have made patient portals even more accessible, making it easier for patients and their families to access their own digital health information (Dalrymple, Rogers, Zach & Luberti, 2016).

The use of technology has increased significantly due to the financial incentives from the Health Information Technology for Economic and Clinical Care Act in 2009 (Slight et al., 2015). The Clinical Care Act of 2009, with the aim of improving the processes of HIT in the United States (US), offered incentives for the adoption and utilization of technological systems like the EMR. The ONC (2019-a) completed a survey called the Health Information Trends Survey

(HINTS), to access individuals' viewing and use of online medical records and the related smartphone applications in 2017 and 2018. In 2018, the survey found that three out of ten individuals offered access to their EMR, through the patient portal, viewed their record at least once within the last year. Even though the viewing of patient's medical records remains low, 80% of all practices and 95% of all hospitals have adopted certified EMRs in the US (ONC, 2019-a).

Although the use of technology by the US has recently slowly started to increase, adoption of the patient portal in primary care setting has been slow, and the overall rates of portal sustained utilization remain low (Fiks et al, 2016). There are several barriers identified in an organizations adoption of the portal including marketing problems, limited staff commitment and higher increase of portal adoption in adults than in pediatrics (Fiks et al., 2016). Health information technology in pediatrics consists of additional laws and regulations governing who has access to the patients EMR- linked patient portal. As the US continues to accelerate the implementation of HIT into healthcare, more research is needed to ensure positive patient care outcomes with the smallest number of adverse consequences.

Purpose. The purpose of this Doctor of Nursing Practice (DNP) project is to increase the adoption of the patient portal at a privately owned pediatric office in two urban pediatric outpatient clinics in the southwestern US. This pediatric primary care practice, with approximately 20,000 total patients, has less than half of the current patients web-enabled and even fewer families actively using the portal. Currently few advanced practice providers, medical assistants and front office staff at these two clinic sites are utilizing the portals benefits in patient care or know how to integrate key portal's capabilities in the practice's workflow.

PICOT Statement. The following evidence based PICOT statement was developed to help guide a literature search in order to find current evidence related to the improvement of advanced practice providers interaction with the portal: In the pediatric primary care clinic, does offering advanced provider education compared to not providing education sessions improve patient portal utilization and advanced practice providers' perceptions of using the patient portal in patient care?

Critical Appraisal and Evidence Synthesis

The three scholarly databases were searched for the literature review included PubMed, The Cochrane Library and the Cumulative Index of Nursing and Allied Health Literature (CINAHL). Key words included patient portal OR electronic medical record AND education sessions OR implementation. The keywords were specifically included to expand the literature to search to all articles related to the improvement of patient portal utilization with included education curriculums or education sessions to advanced practice providers. There were nine articles directly included in this literature review (Appendix A). Two studies were systematic reviews including an additional 31 articles (Bush et al., 2017; Patelarou et al., 2017). Studies included a mix of high and low levels of evidence. Current literature regarding the implementation of a patient portal includes mostly qualitative studies, a lower level of evidence. All studies included funding sources, adequate sample sizes and included study sample characteristics. No studies appraised were evaluated to include potential bias. The obtained literature from the database searches included studies mostly conducted in the US with additional studies conducted in Iran, the Netherlands and Canada (Fiks et al., 2016; Kooji, Groen, & Harten, 2018; Shahmoradi, Darrudi, Arijji & Nejad, 2016). A synthesis table was created to further critically appraise the included studies in order to inform the development of an education

session (Appendix B). Participants included three studies looking at primary, specialty and resident/fellow advanced practice providers (Alkureishi, Lee, Webb & Arora, 2018, Bush et al., 2017; Patelarou et al., 2017) and three studies included parents or guardians (Bush et al., 2016; Darlymple et al., 2018; Fiks et al., 2016). The remaining two studies included analysis of key stakeholders (Kooji et al., 2018) and one study examined patients' perspectives (Nahm et al., 2017).

Advanced Practice Provider Perceptions

Advanced practice providers play a crucial role in the overall adoption and utilization of the patient portal within the practice but also by the patients (Bush et al., 2017). Critical appraisal of the educational interventions used in the studies was analyzed to develop a patient portal curriculum and improve patient/provider/stakeholder perceptions in order to increase the likelihood of successful integration of the patient portal into this practice. Key findings, in prior research, demonstrated that once education sessions were integrated into the practices, the portal positively influenced providers practice workflow, patient satisfaction, treatment adherence and improvement in patient-provider communication (Alkureis, Lee, Webb, & Arora, 2015; Bush et al., 2017; Miller, Latulipe, Melius, Quandt & Arcyry et al., 2016). One meta-analysis analyzing positive improvements to workflow, found that 80% of the providers noted improvement in communication and 62% found improvement in medical refills when utilizing the patient portal (Bush et al., 2018). Enthusiastic responses were also found related to improved patient care interactions, patient medication and treatment adherence (Alkureis et al., 2015; Kooju et al., 2018). These results emphasize the importance of using the results of evidence-based practice research in the development of education training sessions, including the most commonly used portal capabilities like messaging and medication refills to engage providers and improve their

willingness to utilize the portal in patient care. Providers are more likely to change care and implement key points of the education sessions in their patient care when the implementation is supported by multiple evidence-based practice studies (Patelarou et al., 2017).

Negative considerations for portal implementation found in a few studies, included perceptions of increased advanced practice providers workload. (Bush et al., 2017; Kooij et al., 2018, & Shahmoradi et al., 2017). Three studies found that the integration of a patient portal increased the workload on the advanced practice providers (Bush et al, 2017; Kooij et al., 2018; Shahmoradi et al., 2017). These studies emphasized the importance of education sessions with the providers to include a structured workflow strategy to help decrease the burden on the providers. Additional recommendations included having information technology (IT) personal available to help answer questions and provide additional training if necessary. In addition, training should be provided to front office personal to be able answer family questions and web-enable patients (Bush et al., 2017). The integration and usage of the EMR linked patient portal requires the entire organization to be engaged, willing to learn and united on how the patient portal will be utilized in patient care.

Education Session Curriculum

The second portion of the literature review included key points to include in an education meeting. Two studies critically appraised included the importance of education sessions including current laws and regulations such as enabling a portal proxy and adolescent restrictions (Bush et al, 2016; Kooij et al, 2018). One study found relevance in including mobile device education as most parent's access EMR information from their mobile device (Dalrymple et al., 2018). A majority of the studies included surveys or questionnaires, including 5-point Likert-Scale questions, to analyze providers' perceptions of utilization of the patient portal. These

results helped with the pre- and post- implementation surveys utilized in this project and engagement methods for the advanced practice provider during the education session.

Santovia. One major inclusion of the advanced practice provider curriculum was the education platform called Santovia. Santovia is a physician founded health technology that can be included in an EMR-linked patient portal to allow providers to send education from the EMR, to the patient or family for review, once a diagnosis has been recorded (Santovia, 2020). The portal capability was recently activated by the practice, and no prior structured training was offered to the providers. This available patient education is chosen by the provider from a wide variety of literature developed by ViewMedica™, EBSCOHealth™ and The American Academy of Pediatrics. A vast majority of the studies included the importance of the appropriate digital/health literacy of the patient portal information and display (Bush et al., 2016; Dalrmples et al., 2018; Kooji et al., 2018; Nahm et al., 2017; Patelarou et al., 2017). Education sent through the portal should be appropriate for the audience and also relevant to their clinical interaction and diagnosis. Advanced practice providers should be included in the development of the education structured for patients and have a choice in what information they choose to send to patients/parents (Dalrmples et al., 2018; Kooji et al., 2018; Nahm et al., 2017; Patelarou et al., 2017).

Theoretical & Implementation Framework

The process to successfully implement change has developed across multiple disciplines with numerous implementation frameworks, models and theories to support the diverse array of innovative innovations (Mullin et al., 2015). *The Model for Evidence-Based Practice Change* (Rosswurm and Larrabee, 1999) was selected to guide this evidence-based project implementation process (Appendix C). This model is grounded on research literature related to

evidence-based practice, research utilization, standard language and change theory to guide practitioners through developing and integrating an evidence-based practice change (Rosswurm & Larrabee, 1999). This practice model is widely used in the nursing profession and was the guiding model for this project. The use of this model helped ensure each step of the evidence-based practice change was implemented correctly and smoothly to not only integrate but sustain the change within the practice.

Social and behavioral theories are widely used for development, implementation and evaluation of public health and health promotion interventions. The Social Cognitive Theory, best articulated by Bandura (2007) explains that human behavior has a three-way, dynamic, interaction that evaluates how personal factors, environmental influences and behavior continually interact (Appendix D). Each part of the three-way dynamic interaction was utilized in the development, implementation and evaluation of the educational session and resultant adoption of the patient portal in patient care. During implementation, it is important to include teaching all office staff, medical assistants and billing personal while keeping in mind that previous experiences, and education may influence acceptance outcomes. The staff need to believe in their own abilities to navigate the EMR. The intervention must provide each learner with the opportunity to experience successful portal interactions. The environmental learning conditions must be conducive for behavior change as this is a necessary component of the Social Cognitive Theory.

Applying Evidence to Practice: Methods and Results

Ethics. There were no foreseeable physical, psychological, social, legal or economic risks related to this DNP project. Permission to initiate the program was received by Arizona

State University Institutional Review Board (IRB) in September 2019. Practice owners and lead IT personal were all consulted and ongoing collaboration was conducted.

Setting. The setting consists of two privately owned pediatric primary care offices located in an urban southwestern state. Due to a lack of other pediatric practices in the surrounding areas, each office is busy year around, providing a wide range of services to children from birth to eighteen years of age. The practice delivers a full spectrum of pediatric healthcare visits including well, sick, and urgent care hours. There are 17 advanced practice providers and 30 front and back office staff that were invited to the scheduled education sessions. Of the participants invited, 14 of the advanced practice providers attended the educational session and most of the 30 front and back office staff attended the second education session.

The practice has an established EMR, eClinicalWorks™, with a connected patient portal. The eClinicalWorks patient portal is designed to provide patients access to their medical information over a secure internet portal. This portal when downloaded by family to their desktop or in a smart phone application is called Healow. The practice can track Healow data from eClinicalWorks on all portal functionalities.

Program Intervention. This DNP project's practice change intervention was to provide two different education sessions, one for the front office staff and one for the advanced practice providers. In addition, the DNP project included ongoing data collection on the portal's usage over time. Data collection was conducted over a 5-month period, starting in September 2019 and ending in January 2020. The educational session development utilized the results of the literature review/synthesis after collaboration with the practice owners and the practices lead informational technology (IT) personal. Data collection, analysis and dissemination of the results were the final steps on the timeline.

Following baseline data collection, the first education session conducted included the advanced practice providers. This session was approximately 1-hour education session in length and began with the completion of the pre- survey. During the session providers were actively engaged in a step by step viewing of all capabilities of the practice's patient portal. The second education meeting was developed for front office staff, who include receptionists involved in getting families web-enabled and who answer family's questions regarding the patient portal. An educational pamphlet about the patient portal was created for this project and placed in the front office for staff to distribute to families (Appendix E). A similar education session was provided to the office staff as to the advanced practice providers. No data or surveys were collected from the office staff, as data collected from the patient portal (Healow Analytics) was analyzed to examine the number of patient's web-enabled and the portals' utilization.

Instruments and Data Collection. Data from the advanced practice providers was collected at baseline during the first education session in September, 2019 and again following the 5-month collection period in January, 2020. The measures analyzed include the advanced practice provider perceptions and the patient portal utilization. Advanced practice providers' perceptions will be assessed by a 7-question pre-implementation survey and an 8-question post-implementation survey. Both surveys included a section for providers to leave comments/suggestions for how to improve the utilization of the patient portal at the practice. Both the pre- and post-surveys were evaluated for content validity by the other advanced practice providers not included in the project. Additional data was collected from Healow Analytics including the number of portal active users, the number of patients web-enabled, total number of patient logins, laboratory results published/viewed, messages sent/received, appointment requests and Santovia use.

Budget. A very minimal budget was required for project implementation. The practice encouraged the principal investigator to use the previously scheduled meetings and conference rooms at the practice for the education intervention sessions. The practice printed any required portal education materials. The main lead IT employee was available once a month for meetings and to relay any additional question from the advanced practice providers or office staff (Appendix F).

Results

Data was analyzed using the Intellectus Statistics software™. There was a total of 14 advanced practice providers who completed both pre- and post- surveys. The pre- and post-surveys were analyzed using the Chi-square test of independence and the Man-Whitney U test. Questions on the surveys and project results are available in Appendix G. Ongoing data analysis collected from September 2019 to January 2020 from the Healow Patient Portal was analyzed using the Two Proportions Z-test (Appendix H).

Pre- and Post- Implementation Survey

The surveys were collected by the same number of advanced practice providers for both the pre- and post- analysis. Three questions were the same on both surveys which allowed for statistical analysis. Additional questions were asked to qualitatively analyze the providers' perceptions of utilization of the patient portal.

Quantitative Data

A Chi-square Test of Independence was conducted on two questions; "I know how to web-enable patients to use the patient portal" and "There were benefits to using the patient portal to enhance patient care." The results of the Chi-square test related to how to web-enable patients were not significant ($0.025, \chi^2(1) = 0.85, p = .357$), suggesting that advanced practice providers

did not show improvement in knowing how to web-enable patients. The Chi-square of Independence was also utilized to see if there was an increase in the providers' perception of utilization of the patient portal to enhance patient care which also demonstrated no statistical significance ($0.025, \chi^2(1) = 0.58, p = .445$). This suggests that the advanced practice providers did not see benefit to using the patient portal to enhance patient care after the education session.

A two-tailed Mann-Whitney two-sample rank-sum test was conducted to examine whether there were significant differences in portal usage between the pre- and post- survey. The two-tailed Mann-Whitney two-sample rank-sum test is an alternative to the independent samples *t*-test but does not share the same assumptions (Conover & Iman, 1981). The result of the two-tailed Mann-Whitney *U* test was significant based on an alpha value of 0.05, ($U = 143, z = -2.20, p = .028$). The mean rank for group post intervention was 17.71 and the mean rank for group pre- intervention was 11.29. This suggests that the distribution of portal usage for group post intervention was significantly different from the distribution of portal usage indicated by the pre-survey. The median for post ($Mdn = 3.00$) was significantly larger than the median for pre ($Mdn = 1.50$). There was a significant increase in the portal utilization following the education intervention and 5-month implementation period (Appendix H).

Qualitative Survey Results

Additional questions on the pre- and post- survey were utilized to evaluate aspects of the portal most utilized and allowed the advanced practice providers to make suggestions for increasing portal usage within the practice. Survey questions and results are detailed further in Appendix G.

Diseases/Healthcare Topics. The common disease and health topics survey question was asked to evaluate the education providers were sending, utilization Santoiva, to the patient portal.

Not all providers answered this question and some providers chose multiple options. Common topics on the pre-implementation survey included sore throat and health checkup/well visits, followed by one response each for attention deficit hyperactivity disorder (ADHD), immunizations, cough and the common cold. The results of the post-implementation survey included a wider variety of responses including fever reduction, and health checkup/well visits followed by one response each for asthma, sore throat, urinary tract infection, common cold, dermatitis, constipation, mollescum, ADHD and hordeolum.

Portal Usage Analysis. Providers recorded the current capabilities of the patient portal they utilized. All providers circled at least one answer, some choosing multiple. Percentages were calculated related to the number of times the option was chosen divided by the total number of providers (n=14). On the pre-implementation survey there were a larger number of options chosen. Of the respondents on the pre-implementation survey the following rate was chosen per item: sending lab/testing results (11/14, 78%), patient/provider messaging (9/14, 64%), enhanced parent/patient knowledge (2/14, 14%), growth chart/tracker (1/14, .07%), and refill requests (2/14, 14%). There was an unanticipated decrease in the number of options chosen on the post-implementation survey. On the post- implementation survey, the following is the response rate per item: sending lab and testing results (11/14, 78%), enhancing parent/patient knowledge (5/14, 37%) and patient/provider messaging (6/14, 42%).

Suggestions. Each survey offered a “fill in the blank” option for the advanced practice providers to give suggestions regarding how to increase the overall utilization of the patient portal in the practice. The pre-implementation survey suggestions consisted of increasing the front office employee’s enthusiasm/engagement in utilizing the patient portal. Most providers reported that they would be unable to web-enable patients and answer parent questions regarding

the portal during patient interactions. Another suggestion was to continue ongoing provider education. Additionally, on the pre-implementation survey, the advanced practice providers chose the following options on how to make utilization of the patient portal easier: EMR prompts (8/14, 57%), provide instructions for patients/families (7/14, 50%) and provide education to the medical assistants (4/14, 28%).

The post implementation survey included a larger response on how to improve portal utilization. Three providers made suggestions regarding continuing short education meetings on patient portal utilization to help improve the consistency of the portal in patient interactions. One provider mentioned a step-by-step guide on how to send information through Santovia would be beneficial. Two additional providers mentioned they themselves do not have enough time to web-enable patients and front office/medical assistants helping in this task is necessary. Additional responses included that Santovia was overall a difficult system to navigate, not user friendly and the increased ability to toggle between siblings on the EMR would be beneficial.

Patient Portal Analytics

A Two Proportions Z-test was conducted to examine whether there was a significant difference between the proportions of providers/patient using various portal capabilities before the September 2019 education intervention and following the five-month education intervention in January 2020. An abundance of information was available regarding patient portal utilization available on eClinicalWorks. The chosen EMR-linked patient-portal capabilities (Healow Analytics)/, and month by month data is available in Appendix H. The total number of patients for the practice in September 2019 consisted of 20,120 and 21,671 in January 2020.

Two Proportions Z-Test. The Two Proportions Z-test was conducted on multiple patient portal capabilities to analyze if the advanced practice providers and patients utilizing of the

portal increased from September 2019 to January 2020. Significant results were found related to active users, web-enabled patients, total number of logins, laboratory results published/viewed, messages sent, appointment reminders sent and Santovia utilization. All were significant at ($p < 0.001$). Non-significant result was found related to messages received ($p = 0.296$). (Appendix H).

Sustainability

Ongoing implementation and maintenance of the patient portal in practice requires IT personal to stay up to date on current laws/regulations. Health information technology systems require updating and maintenance. Office personal and advanced practice providers in this organization have a member of the staff available to answer ongoing questions and update the EMR-linked patient portal in the future. It was recommended to create a step-by-step guide, on portal functionalities to reference by practice employees as needed. Patient portal discussion/debriefing should be added to future staff meetings to continue improvement of patient portal utilization within the practice.

Discussion

The purpose of this DNP project was to increase the utilization of an EMR-linked patient portal. Research supports the improvement of patient and provider outcomes when the patient portal is successfully utilized and integrated into patient care. Synthesis of literature in this project demonstrates that education sessions within an organization, including advanced practice providers and front office staff, can positively influence portal utilization. Following the implementation of two separate education sessions, significant increase was found in the utilization of the portal within the practice. Ongoing education and further provider instruction/interaction within practice with the patient portal is necessary. Further studies are

needed to evaluate how to improve patient portal utilization with a larger group of participants and a longer period of data collection.

Project Impact

Results of this DNP project generally correlated with the current evidence synthesis. The pediatric primary care practice showed improvement in many key elements of portal utilization. The advanced practice providers overall expressed a willingness to integrate the EMR-linked patient portal functionalities into their patient care interactions. The EMR has been fully integrated into the practice but ongoing patient portal integration takes consistent utilization in order for the advanced practice providers and staff to become proficient in its use. The results indicated that advanced practice providers did not perceive that the patient portal enhanced patient care. This result could be related to 50% of the providers choosing “agree” and 50% choosing “strongly agree” on the pre-implementation survey on this question. No providers at the start of the project’s implementation disagreed that the patient portal could enhance patient care and, therefore, there was little change in the providers’ perceptions of the use of the patient portal to improve care. This DNP project demonstrated that the integration of the patient portal in this busy pediatric practice is feasible. Further strategies are still necessary to continue to increase the utilization of the portal in this practice.

Barriers and Facilitators

Barriers for this DNP project included the implementation occurring during the practices busiest season (Fall and Winter). Providers expressed that they were unable to utilize/practice sending education through Santovia due to time constraints between patients’ appointments. Additionally, the biggest barrier was the background laws and regulations required in order to utilize some aspects of the patient portal. Adolescent, portal proxy and foster families laws

influenced the education sessions and patients/parents' access to the portal. Understanding and collaboration with lead IT personal within the practice was extensive to make sure the practice was safe from breaches in confidentiality and legal liability.

Facilitators for this project were the practice having education sessions pre-scheduled, IT personal available and an already established EMR within the practice. The practice owners were engaged and supportive of the integration of the patient portal. Additionally, integration of the project consisted of a minimal budget and a feasible ongoing sustainability plan.

Recommendations

Recommendations for future studies include strategic preparations for the education sessions. Splitting the education sessions from the front office staff and the advanced practice providers kept the meetings small and dedicated to the most proficient methods for each audience. Scheduling continuous follow up interaction with the practice during the implementation stage was helpful. These meetings are important to make sure all settings are functional, and practice employees are supported. Ongoing communication was necessary with software representatives from eClinicalworks™ and Santovia™ as well as the practices lead IT personal. The providers recommended step-by-step implementation guides and additional meetings to keep discussion regarding the patient portals integrated in the practice's workflow.

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Appendix A

Table 1

Evaluation Table

Citation 1	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results/Conclusion	Level/Quality of Evidence; Decision for practice/ application to practice
Alkureishi et al, 2018. Integrating Patient-Centered Electronic Health Record Communication Training into Resident Onboarding: Curriculum Development and Post-Implementation Survey Among Housestaff Funding: Grants from University of Chicago Academy of Distinguished	Evidence-Based Implantation Framework	Design: Implementation Study/Qualitative Study Purpose: Develop & Deliver EMR training	Setting- University of Chicago Sample- 158 postgraduate trainees. Inclusion- EHR onboarding for all employees including interns, residents, and fellows. Included Interns 54% Residents/Fellows- 45% PC- 20% Specialty Trainees- 79%	IV- Patient centered EMR curriculum. Interactive lecture embedded all new employee training curriculum. DV1- Knowledge of Barriers, best practices & ability to implement DV2-Effective Training DV3-Training Effectiveness by Primary Care Providers	11-Item Post training Survey- 10 5-Point Likert Scale Questionnaire & 1 Open-Ended Question	Wilcoxon Rank-Sum Tests Kruskal Wallis Tests	Requiring EMR training skills to new employees is effective. Training should include best practices, culture of humanistic approaches and patient centered EMR use. DV1- (3.1 vs 3.9 P<0.001) DV2- Strongly Agreed or Agreed Effectiveness 86.7% DV3- PC most effective (P=0.03), felt training should be required (P=	LOE: VI Strengths: Direct analysis of EMR education session, includes breakdown of type of provider responses, Emphasis on patient-centered care. Weaknesses: not easily identified theory, analysis included new employees. Long curriculum development process

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Medical Educators & Arnold P Gold Foundation Bias: None Country: USA			Attrition- 100%	DV4- Felt the training would change patient care EMR interactions HUMAN LEVEL- Tips mnemonic to enhance patient-centered EMR use			0.10) & would change practice (P=0.03). DV4- 70.9%	Feasibility: Easy implantation, cost effective.
Citation 2	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables /Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Bush et al, 2017. Physicians Perception of the Role of Patient Portal in Pediatric Health Funding: Agency for Healthcare research and Quality. Bias: None Reported Country: USA	Health Belief Mode	Design: Mixed Methods Approach. Quantitative and Qualitative. Purpose: Increase understating of physician perceptions regarding the value of EMR in the pediatric environment.	Setting: Physicians from a 520-bed tertiary pediatric facility. Quantitative Results- n=21 providers including 12 pediatricians & 9 specialists Qualitative Results- n=6 Physicians- 3 specialists, 2 pediatricians, 1 Hospitalist	IV- EMR linked patient portal application MyChart. Quantitative: DV1- Communication of Health Issues DV2- Use of Medical Refills DV3- Easy to Enroll Pts DV4- Perceived Comprehension of Impact of Portal	Surveys- 5 -point Likert Scale Interviews Quantitative Online Survey and a Qualitative Telephone Interview	IBM SPSS Software: Chi-Square Tests, Fisher Exact Tests	Quantitative DV1- 80% positive DV2- 62% positive DV3- 72% were neutral DV4- 60% improved patient care 52% Improved patient adherence DV5- 80% no negative impact on salary	LOE: V Strengths: Shows both qualitative and quantitative Analysis. Easy to follow data analysis. Weaknesses: Low LOE, small sample size. Feasibility/ Conclusion: easy to implement, important to analyze provider perceptions to patient portal to

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			SD: Female 54% Male 48% Pediatrician 57% Specialty 43% Under 50- 54% Over 50-48%	DV5- No Negative Impact on Salary DV6- Increased Workload			DV6- 43% believed it increased workload Qualitative Analysis: Emerging themes-portal use varies by setting, portal recruitment, improve patient communication, enhanced health data access, teenage access needs to be secure.	structure education accordingly.
Citation 3	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Bush et al, 2016. Implementation of the Integrated Electronic Patient Portal in the Pediatric Population: A Systematic Review Funding: Agency for	Cognitive and Behavioral Theoretical Framework	Design: SR Purpose: Review existing research to define a patient portal and examine pediatric patient portal utilization through Qualitative or Quantitative studies that focused on EMR and satisfaction,	Publications Chosen: 11 publications; cross sectional surveys, retrospective analysis, qualitative studies, and usability testing. Sample: Publications from 1992- 2014;	IV- SR Patient Portal Utilization Findings DV1- Portal Utilization DV2- Patient/Parent Satisfaction DV3- Reported Barriers	Data Abstraction- GRADE	PRISMA	Overall indicated positive attitudes toward portal adoption. Emphasis should be placed on health literacy analysis to improve portal adoption. DV1- Low, Most commonly used; IR, SM, SA	LOE: V Strengths: large sample, relevant to pediatric PP utilization Weaknesses: Most studies included large intuitions not primary care, not a variety of MA,

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<p>Healthcare Research and Quality.</p> <p>Bias: None Reported</p> <p>Country: USA</p>		<p>attitudes on use, barriers/facilitators, adherence or clinical or health outcomes.</p>	<p>PubMed, CINAHL Plus, PsychINFO, Academic Search Premier</p> <p>Inclusion: Peer reviewed, published, English language, original research and data analysis, and patient portal in the 0-18 year old age group</p> <p>Exclusion:</p>	<p>DV4- Racial & Socioeconomic Disparities</p> <p>DV5- CD</p>			<p>DV2- Positive Parent Interaction. Doesn't replace telephone calls. Overall enthusiastic outcomes.</p> <p>DV3- Difficulty interpreting data, medical terminology, missing symptom checker, concerns about confidentiality</p> <p>DV4- Individuals of color/Medicaid/Low economic status=Less likely to use portal</p> <p>DV5- Increased use with CD</p>	<p>large amount qualitative designed studies</p> <p>Feasibility: Easy to include in education intervention.</p>
<p>Citation 4</p>	<p>Theory/ Conceptual Framework</p>	<p>Design/ Method</p>	<p>Sample/ Setting</p>	<p>Major Variables & Definitions</p>	<p>Measurement/ Instrumentation</p>	<p>Data Analysis</p>	<p>Findings/ Results</p>	<p>Level/Quality of Evidence; Decision for practice/ application to practice</p>
<p>Dalrymple & Rogers, 2018. Understanding Internet access and use to facilitate patient portal adoption.</p>	<p>Health Belief Model</p>	<p>Design: Cross Sectional Study</p> <p>Purpose: Understand information seeking</p>	<p>Setting: Large Metropolitan area in eastern USA including rural, urban and suburban practices.</p>	<p>IV- Implantation of Patient Portal- 26 Item Survey</p> <p>DV1- Internet Access</p>	<p>26- Item Survey</p>	<p>SPSS</p>	<p>Overall indicated positive attitudes toward portal adoption. Emphasis should be placed on health literacy</p>	<p>LOE: VI</p> <p>Strengths: strong analysis of portal adoption by patients, findings valid,</p>

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<p>Funding: No financial support</p> <p>Bias: None Reported by study</p> <p>Country: USA</p>		<p>preferences and internet access habits of patient portals to ensure successful uptake.</p>	<p>Sample: 270 Useable Surveys where Collected, minimum of 50 from each clinical practice.</p> <p>SD: Age 21-29- 28% Age 30-39- 32% Female- 80% Male- 19.6%</p> <p>Inclusion: All respondents greater than 21 years or older, read/write English- caregivers of children and adolescents. Data collected from August to December 2012.</p> <p>Exclusion: Not Included</p> <p>Attrition: Not Included</p>	<p>DV2- Health Information Seeking</p> <p>DV3- Health Literacy of Participants</p> <p>DV4- Attitudes Towards Portal Adaption</p>			<p>analysis to improve portal adoption.</p> <p>DV1- 95 % reported having internet access. 57% computer or laptop. 36.9% Mobile Device.</p> <p>DV2- 42% reported using the internet to look up health related information. 11.5 % said they look up information daily. 52% the respondents were confident information was accurate. 61% trust information that comes from the HC system</p> <p>DV3- Substantial portion of the population had marginal or inadequate health literacy.</p> <p>DV4- 33% always use EMR, 28% would use EMR/portal, 29.4%</p>	<p>Weaknesses: potential bias found- participations received gift cared, no framework mentioned, study design difficult to assess, no provider analysis</p> <p>Feasibility: Easy to implement into teaching.</p>
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							sometimes would do administrative tasks online	
Citation 5	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
<p>Fiks et al, 2016. Adoption of a portal for the primary care management of pediatric asthma: a mixed methods implementation study</p> <p>Funding: Agency for Healthcare Research and Quality, Eunice Kennedy Shriver National Institute of Child and Health Human Development</p> <p>Bias: Dr. Fiks and Dr.</p>	<p>Evidence-Based Implantation Framework</p>	<p>Design: Mixed-Methods Implementation Study</p> <p>Purpose: use of a patient portal for pediatric primary care impact on management, and barriers for implantation success.</p>	<p>n= 9,133 invited to use the portal IG= 237</p> <p>SD- m-age- 6-12 years (p=0.02) mild or moderate/persistent asthma (p.04) prescription controller medication (p<0.01) private insurance (p=0.002)</p> <p>Setting: 20 practices in 11 difference states.</p> <p>Inclusion: English speaking, children aged 6-12, asthma</p>	<p>IV- MyAsthma Portal</p> <p>DV1- adoption of the portal DV2- Appointments DV3- medication dosage change DV4- Environment change</p>	<p>ACT screening form, questionnaires, interviews</p>	<p>Strata Version 13.1- Chi-Square tests, t-tests, Fisher exact tests, Mann-Whitney U tests</p>	<p>Higher treatment engagement.</p> <p>DV1- adoption of the portal DV2- Appointments; 28% had a asthma-related primary care visit DV3- medication dosage change; 14% increase in medication changes, CI 95%. DV4- 16% reported to make a change</p> <p>Qualitative Results DV1- Well Coordinated Workflows DV2- APP included in education</p>	<p>LOE: III</p> <p>Strengths: Nationally represented in both USA, Canada, comprehensive SD, large sample population, multiple practices</p> <p>Weaknesses: Potential bias, short implementation time period, exclusion criteria not included</p> <p>Conclusion: Higher treatment engagement, portal adaption is better suited for</p>

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<p>Grundmeier helped create software, Dr. Pace invented PEERS</p> <p>Country: USA, Canada</p>			<p>diagnosis, office visit during the last 12 months</p> <p>Exclusion: Not included.</p>				<p>DV3- Ease of Portal Use DV4-Concerned about perceived access to a computer</p>	<p>long-term adaption. Implementation efforts should include redesign and enrollment of symptomatic children.</p> <p>Feasibility: More feasibility to be implemented by individual offices for long-term use.</p>
<p>Citation 6</p>	<p>Theory/ Conceptual Framework</p>	<p>Design/ Method</p>	<p>Sample/ Setting</p>	<p>Major Variables & Definitions</p>	<p>Measurement/ Instrumentation</p>	<p>Data Analysis</p>	<p>Findings/ Results</p>	<p>Level/Quality of Evidence; Decision for practice/ application to practice</p>
<p>Kooij, Groen & Harten, 2018. Barriers and facilitators affecting patient portal implementation from an organizational perspective: qualitative study.</p>	<p>The Consolidation Framework for Implementation Research</p> <p>Crol And Wensing Model</p>	<p>Design: Qualitative Study/ Cross Sectional Study</p> <p>Purpose: Identify barriers and facilitators of various stakeholders within hospital organizations</p>	<p>Setting: Hospitals in the Netherlands 7 Hospitals Included 2 University medical Centers 3 Teaching Hospitals 2 General Hospitals</p> <p>Sample: 21 stakeholders were interviewed.</p>	<p>Medical Centers with a previous implemented patient portal.</p> <p>DV1- Quotes DV2- Barriers DV3- Facilitators</p>	<p>Semi-structured Interviews Questionnaires</p>	<p>Transcribed Interviews- Verbatim</p> <p>Excel</p> <p>Results analyzed using Grol and Wensing Model</p>	<p>Multiple barriers and facilitators discovered. Importance of including multiple stakeholders in portal implantation is essential.</p> <p>Total 376 quotes, 26 Barriers and 28 facilitators</p>	<p>LOE: VI</p> <p>Strengths: strong analysis for including stakeholders in education intervention, good included graphs,</p> <p>Weaknesses: interviews included</p>

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<p>Funding: Dutch Cancer Society</p> <p>Bias: None Reported</p> <p>Country: Netherlands</p>			<p>3 medical professions, 3 managers and 4 IT employees.</p> <p>SD: N=21 Female- 12% Male 9% Age 20-29- 3% 30-39-3% 40-49- 7% 50-59-6% >60%-2%</p> <p>Attrition: 8 hospitals approached, 7 included in study</p>				<p>Analysis of Common Themes:</p> <p>DV2- perceived usefulness, positive attitude, knowledge, motivation to change,</p> <p>DV3- lack of resources, financial difficulties, guaranteeing privacy and security. eHealth Literacy, negative attitude of medical professionals.</p>	<p>prompts, data saturation, potential bias in answers.</p> <p>Feasibility: easy to implement into training, Surveys should include APP current attitudes/beliefs on PPs.</p>
Citation 7	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
<p>Nahm, 2017. Patient-centered person health record and portal implementation toolkit for ambulatory clinics</p>	<p>Robust Implementation and Sustainability Model</p> <p>Social Cognitive Theory</p>	<p>RCT</p> <p>Purpose: To implement a training program to increase portal adoption and support for patients during the implementation process.</p>	<p>Setting: Diabetes and Endocrinology Care Center, part of an inner-city university hospital.</p> <p>Sample: n= 74 patients</p> <p>SD: Age</p>	<p>IV- Patient Centered Portal Implementation Toolkit</p> <p>DV1- Patient-Provider communication</p> <p>DV2- Knowledge</p>	<p>Surveys</p> <p>4-Item Self-Efficacy Tool</p> <p>Adherence to Medication-5 Item Medical Outcomes Study General Adherence Scale</p>	<p>SPSS- t tests, X2 tests, Mann-Whitney U Test, Fisher Exact Test</p> <p>Linear Mixed Models</p>	<p>Online patient friendly step-by-step online training programs can improve PP low adoption rates.</p> <p>Only clinically significant change- DV1- IV improved communication at 4</p>	<p>LOE: I</p> <p>Strengths: strong statistics analysis, high LOE,</p> <p>Weaknesses: potential bias-money given for survey completion, not</p>

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<p>Funding: University of Maryland School of Nursing and University of Maryland Medical Center Collaboration Grant</p> <p>Bias: None Reported.</p> <p>Country: USA</p>			<p>M 21% F 53% Race W 27% B 40% Other 7%</p> <p>Inclusion: 40 years or older, clinic patients, received a diagnosis of at least one chronic disease, could read/write English, use internet independently, email account, agreed to activate the portal.</p> <p>Exclusion: Not Included</p> <p>Attrition: CG- 31.6% at 4 weeks, and 21.1% at 12 weeks. IVG- 11.1% at 4 weeks and 5.6% at 12 weeks</p>	<p>DV3- Self-Efficacy</p> <p>DV4- Adherence to treatment plans</p>	<p>Components of Primary Care Index</p>		<p>weeks (t56= 2.48, P=0.041) and CG decreased communication (t56=, P=0.35)</p>	<p>pediatric, small sample size. Acute care vs. Primary Care analysis.</p> <p>Feasibility: Not all companies will use the toolkit, easy to implement education regarding patient-provider communication</p>
<p>Citation 8</p>	<p>Theory/ Conceptual Framework</p>	<p>Design/ Method</p>	<p>Sample/ Setting</p>	<p>Major Variables & Definitions</p>	<p>Measurement/ Instrumentation</p>	<p>Data Analysis</p>	<p>Findings/ Results</p>	<p>Level/Quality of Evidence; Decision for practice/ application to practice</p>

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<p>Patelarou et al, 2017. Approaches to teach evidence-based practice among health professionals: an overview of the existing evidence.</p> <p>Funding: Not Included</p> <p>Bias: None Reported</p> <p>Country:</p>	<p>Evidence-Based Implantation Framework</p>	<p>SR</p> <p>Purpose: Analyze current research to present approaches for teaching EBP among health care professionals including MD and RNs.</p>	<p>N=20 Studies</p> <p>Database- Medline, EMBASE</p> <p>Inclusion- Published last 10 years, Included education intervention, Pre/Post Intervention Style, Quantitative estimation of the effectiveness of the intervention</p> <p>Sample- 6- 609 Health care professionals, nurses (n=7), physicians (n=6), mixed disciplines (n=5), chiropractors (n=1), Chinese medicine institution (n=5)</p> <p>Setting- Included Europe, USA, Taiwan, Canada, Peru, Iran, Pakistan & Israel</p>	<p>SI Including- Workshop, Lecture, or online learning</p> <p>Interventions Included</p> <p>1- Interactive Lectures/ Group Breakout Sessions</p> <p>2- 2 Hour Session</p> <p>3- 20-hour Course</p> <p>4- Five-hour educational workshop with primary care doctors</p>	<p>Clinical Effectiveness & EBP Questionnaire Fresno Test CAMS Test EBASE Questionnaire Berlin Questionnaire</p>	<p>MOOSE</p>	<p>EBP & associated skills in clinical practice is essential for patient safety, QOC, and careers satisfaction</p> <p>Online programs seem to be effective and comprehensive</p> <p>1- EBP Knowledge Improved P<0.001</p> <p>2- Increased EBP application, attitudes and EBP skill level P<0.01</p> <p>3- Research Attitudes P<0.02, Critical Appraisal Attitudes P<0.04, Self- Appraised Skills P<0.01</p> <p>4- Utilization EBM Resources P=0.001 and EMB knowledge P=0.000</p>	<p>LOE: II</p> <p>Strengths: large analysis of EBP teaching methods to providers,</p> <p>Weaknesses: small sample size, study sometimes difficult to follow.</p> <p>Feasibility: Straightforward curriculum techniques for healthcare providers.</p>
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			Attrition- LS included 973 records, 20 included					
Citation 9	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
<p>Shahmoradi, Darrudi, Arijj & Nejad, 2016. Electronic health record implementation: A SWOT analysis.</p> <p>Funding: Supported by Tehran University of Medical Sciences</p> <p>Bias: None Reported</p> <p>Country: Iran</p>	<p>Social Presence Theory</p>	<p>Design: Descriptive, Analytical Study</p> <p>Purpose: Analysis of strengths, weaknesses, opportunities and threats in EMR implementation</p>	<p>Setting: 90 Member workforce from Hospitals Affiliated to TUMS. Included 15 hospitals</p> <p>Sample: 90 managers health information management staff employees</p> <p>Age- 31-41 f- 67% m- 33% B.S Degree- 75% Employment less than 15 years- 46%</p> <p>Inclusion: 90 mangers and health information management staffs. Census and</p>	<p>IV- Implementation of an EMR</p> <p>DV1- Strengths</p> <p>DV2- Weaknesses</p> <p>DV3- Opportunity</p> <p>DV4- Threat</p>	<p>Self-Structured Questionnaire 5-Point Likert Scale</p>	<p>SPSS Pearson Correlation Coefficient</p>	<p>Some essential parts or EMR implementation include organizations, technical, and resource elements.</p> <p>DV1- Timely and quick access to information. Low volume storage of information. Accurate record of provided services. Prevention of medical errors</p> <p>DV2- lack of hardware and infrastructures. Time-consuming and difficult to link the information.</p>	<p>LOE: VI</p> <p>Strengths: unique insights, clear breakdown of EMR strengths, weaknesses and threats.</p> <p>Weaknesses: Data collection tools lack validity and reliability.</p> <p>Feasibility: Easy to replicate. No cost involved. Legal implications included.</p>

Key: **APP**- advanced practice providers; **CD**- chronic diseases; **CG**- control group; **DS**-databased searched; **DV**-dependent variable; **ED**- emergency department; **EMR**- Electronic medical record; **GRADE**- Grades of recommendation, assessment, development and evaluation; **IG**- intervention group; **IR**- Immunization Records; **IS**- Implementation Study; **IV**- independent variable; **LOE**- Level of evidence; **MM**; mixed methods study- **PRISMA**- preferred reporting items for systematic reviews and meta-analyses; **QOL**- quality of life; **RCT**- randomized control trial; **N**-number of studies; **n**- number of participants; **PP**-patient portal; **PC**- primary care; **PHI**- personal health information; **SA**-scheduling appointments; **SM**- secured messaging; **SD**- sample demographics; **USA**- United States of America.

			<p>convenience sampling.</p> <p>Exclusion: Not Included</p> <p>Attrition: Not Included</p>				<p>Jeopardizing job positions.</p> <p>DV3- Sharing information. Access to health information. Semantic coordination and communication between internal and external parts</p> <p>DV4- Lack of human resources. Lack of Strategic planning. Physician/ Clinical Staff resistance to use EMR.</p>	
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Key: **APP**- advanced practice providers; **CD**- chronic diseases; **CG**- control group; **DS**-databased searched; **DV**-dependent variable; **ED**- emergency department; **EMR**- Electronic medical record; **GRADE**- Grades of recommendation, assessment, development and evaluation; **IG**- intervention group; **IR**- Immunization Records; **IS**- Implementation Study; **IV**- independent variable; **LOE**- Level of evidence; **MM**; mixed methods study- **PRISMA**- preferred reporting items for systematic reviews and meta-analyses; **QOL**- quality of life; **RCT**- randomized control trial; **N**-number of studies; **n**- number of participants; **PP**-patient portal; **PC**- primary care; **PHI**- personal health information; **SA**-scheduling appointments; **SM**- secured messaging; **SD**- sample demographics; **USA**- United States of America.

Appendix B

Table 2

Synthesis Table

Author	Alkureishi	Bush	Bush	Dalrymple	Fiks	Kooij	Nahm	Patelarou	Shahmoradi
Year	2015	2017	2016	2018	2016	2018	2017	2017	2017
Design	IS	MM	SR	CS	MM/IS	QS	RCT	SR	DS
Level of Evidence	VI	V	V	VI	II	VI	I	I	VI
Study Characteristics									
Demographics: Study Population									
Primary Care APP	X	X						X	
Specialty APP	X	X						X	
Interns	X								
Residents/Fellows	X							X	
Parents/Guardians			X	X	X				
Patients							X		
Stakeholders						X			X
Measurement									
Survey/Questionnaires	X	X	X	X	X		X		X
Likert-Scale	X	X	X	X					X
Interviews		X	X		X	X			
Intervention									
Curriculum									
EMR Interaction/Navigation	X							X	
EBP	X							X	

Key: **APP**- advanced practice providers; **CS**- cross-sectional study; **DS**- descriptive study; **EBP**- evidence based practice; **EMR**- electronic medical record; **IS**- implementation study; **MM**- mixed methods study; **RCT**- randomized control trial; **SR**- systematic review

In-Person Education Session	X						X	X	
Online Training							X	X	
Perception Analysis									
Provider		X			X	X		X	
Stakeholder						X			X
Patient Analysis			X	X	X		X		
Dependent Variable									
Patient Portal Analysis									
Effective Training	↑						↑		
Influenced Practice Change	↑	↑				↑			↑
Impact on Patients		↑	↑		↑		↑		↑
Improved Patient Care or Adherence	↑	↑			↑				
Communication		↑	↑				↑		↑
Increased APP Workload		↑				↑			↑
Chronic Care Management			↑		↑				
Attitudes towards Portal Adoption	↑		↑	↑	↑	↑↓			↑↓
Education Structure									
Digital/Health Literacy			X	X		X	X	X	
Structured Workflow					X	X	X		
Education Relevance			X	X	X	X	X	X	
Mobile Device Access				X					
APP Included in Materials Selection				X	X				
Laws & Regulations			X			X			
Portal Functionality							X		

Key: **APP**- advanced practice providers; **CS**- cross-sectional study; **DS**- descriptive study; **EBP**- evidence based practice; **EMR**- electronic medical record; **IS**- implementation study; **MM**- mixed methods study; **RCT**- randomized control trial; **SR**- systematic review

Appendix C

Rosswurm and Larrabee Evidence Based Model Diagrams

Figure 1

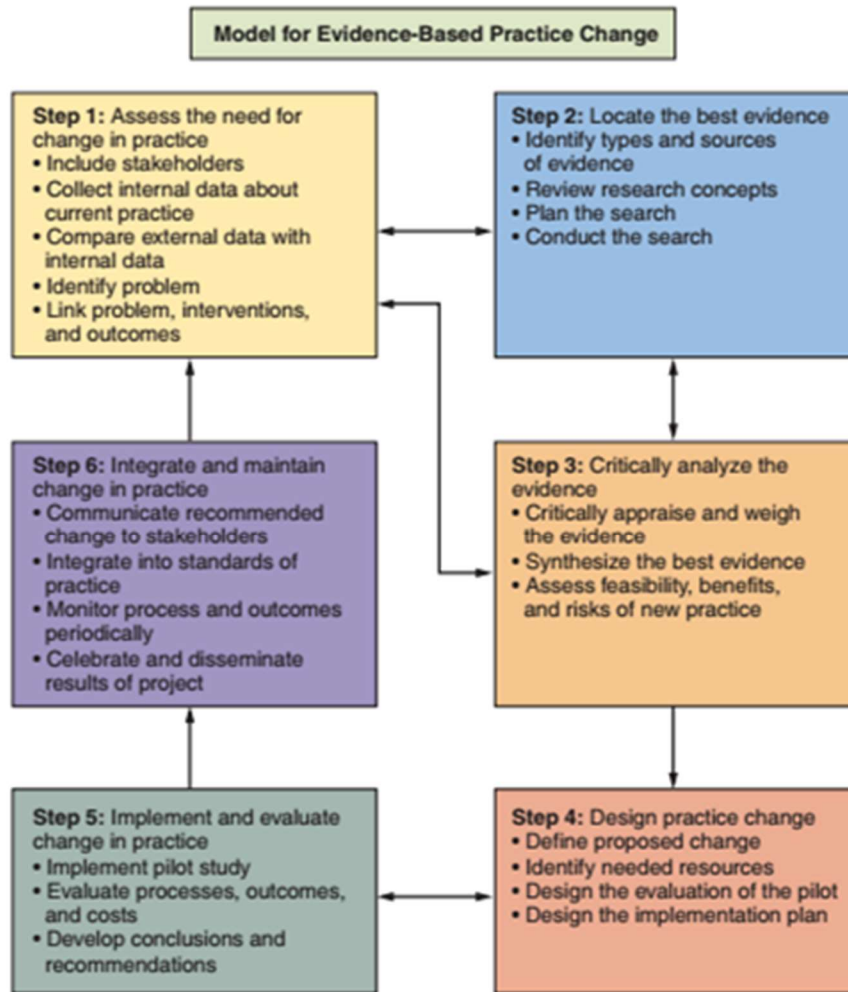


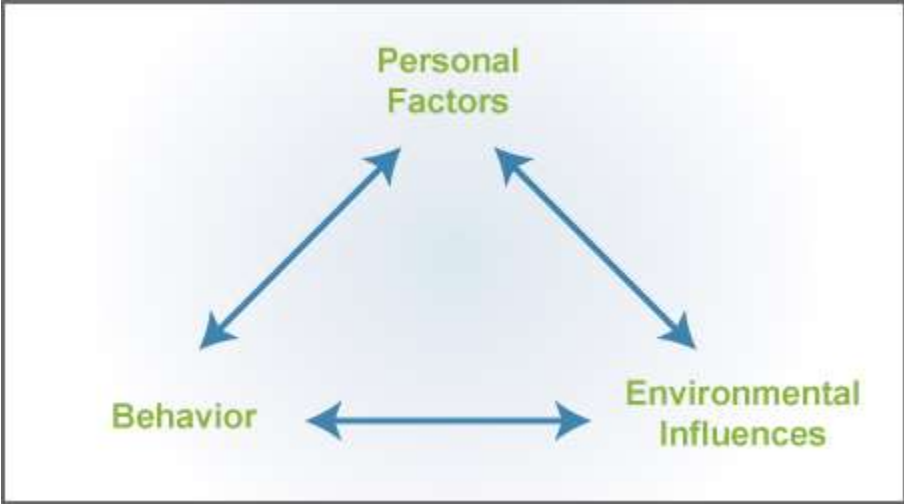
Figure 13.4: A model of evidence-based practice change. (Larrabee, J. H. [2009]. *Nurse to nurse: Practice*. New York: McGraw-Hill. Used with permission.)

(Larabeer, 2009)

Appendix D

Social Cognitive Theory Model

Figure 2

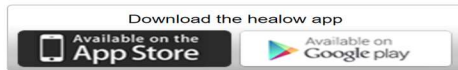


Appendix E

Patient Portal Pamphlet



We offer a smartphone application!



If your child is younger than 13 years of age, download HEALOW KIDS.



If your child is 13 years of age or older, download the HEALOW APP.



Enter the unique practice code:
FDGBAA



Patient Portal

Designed for you to have 24/7 access to your child's health record.



Phone

Office Hours:

Appointment Only- 0800- 0500pm
Limited After Hours- 0500-0700pm
Saturday/ Appointment Only -
0800-1200pm

How to get web enabled?

Simply provide a personal email address and an informational email will be sent with your unique username and password.

Please note that within the first 4 hours of portal activation you may receive notifications of past labs or imaging results, but from that point forward any notifications will be from the present time.

How to access the patient portal:

<https://desertshorespediatrics.com>

Once web-enabled, and you created a username and password. Go to Desert Shores Pediatrics.com and click on **Patient Portal**.

WHAT CAN THE PORTAL DO FOR ME?

On the Desktop & Healow Application:

- Review Current Medications/ Request Medication Refills
- Access Patient Education the provider sent you!
- Review Lab Results
- Review & Schedule Appointments
- Update & Review Demographic Information
- Access Developmental Growth Charts
- Your child's shot record!

Healow KIDS:

- Access to Developmental Milestones
- Immunization Guide
- Growth Tacker
- Helpful Timers- Toothbrush Timer/Screen Time Timer/Sun Timer

FREQUENTLY ASKED QUESTIONS

My child is not web-enabled?

Call us at 480.460.4949. Or at your next appointment, let our front staff know.

What if I have more than one child?

You can use the same email address, but each child will have their own username and password on the desktop version. On the Healow Application, once downloaded you can toggle between children.

Messaging Application not working?

We love that we can offer a messaging service for easy access and open communication with your provider. Please note that the messaging service from the portal may take up to 48 business hours to be answered. The messaging service is for non-urgent matters only. If you waited the 48 business hours, and it's still not working please call our front office to further assist you.



Appendix F

Budget

Phase	Activities	Direct Cost	Indirect Cost	subtotal	Total
Preparation	Design and print EHR materials to give parents and providers on accessing the portal	\$50			
	Design/Implement and lead a provider education meeting		\$0**	\$50	
Delivery	Rent conference room available to all providers at the Pediatric Office.		\$0** Covered by the practice		
	Provider time for presentations. (Cost Variable- Covered by the practice)		\$0**		
	Utility/Office Supply/Other Overhead Costs		\$0** Covered by the practice	\$0	
Analysis	Review and complete analysis of results.		\$0**		
	IT personal time to help collect data for analysis/ Portal Maintenance and Upkeep.		\$0** Provider time covered by the practice		\$50

**Covered by the practice or completed by student.

Appendix G

Pre/Post Implementation Survey Results

Question	Pre-Implementation Survey (n=14) n (%)	Post-Implementation Survey (n=14) n (%)	Results
How many times a week do you use the patient portal?	Never- 0% 1-2 times- 50% 3-4 times- 35.7% 5 or more times-14.3%	Never-0% 1-2 times- 3 (21.4%) 3-4 times- 3 (21.4%) 5 or more times- 8 (57.1%)	Two-Tailed Mann-Whitney U Test- p= .028
Which of the following diseases processes or health topics do you MOST use the patient portal for?	Number of Times Chosen: ADHD- 1 Sore Throat- 4 Immunizations- 1 Health Check-Ups- 3 Cough- 1 Common Cold- 1	Asthma- 1 Health Check-Ups- 2 Customizable Education- 1 Fever Reduction- 2 Sore Throat- 1 UTI- 1 Common Cold- 1 Dermatitis- 1 Constipation- 1 Mollescum- 1 ADHD- 1 Stye- 1	-----
If you do use the patient portal, which aspects of the portal do you current use?	Lab/Testing Results- 12 Patient/Provider Messages- 9 Enhanced Patient/Provider Knowledge- 2 Growth Chart/Tracker- 1	Sending Lab/Testing Results- 11 Enhancing Parent/Patient Knowledge- 5 Patient/Provider Messages- 6	-----

	Refill Requests- 2		
Do you know how to web-enable patients?	No- 12 (85.7%) Yes- 2 (14.3%)	No 10 (71.4%) Yes 4 (28.6%)	Chi- Square of Independence- alpha value of 0.025, $\chi^2(1) = 0.85, p = .357$
Do you know how to use Santoiva to send patient education?	No- 10 Yes- 4	-----	-----
I feel confidence sending Santovia education to patients?	-----	Agree- 7 Disagree- 4 Strongly Agree- 3	-----
I believe there are benefits to using the patient portal to enhanced patient care?	Agree- 7 (50%) Strongly Agree- 7 (50%) Disagree- 0 Strongly Disagree- 0	Agree- 5 (35.7%) Strongly Agree- 9 (64.3%) Disagree-0 Strongly Disagree-0	Chi- Square of Independence- alpha value 0.025, $\chi^2(1) = 0.58, p = .445$

Appendix H

Healow Analytics

Samples	Responses	Proportion	SD	z	Two Proportions Z-test Result
Active Users					
September	5298	0.26	0.44	Z= -7.77	P < .001, CI for α = 0.05 [-0.04, -0.03]
January	6445	0.3	0.46		
Web Enabled					
September	12064	0.6	0.49	Z=-7.68	P <.001, CI for α = 0.05 [-0.05, -0.03]
January	13785	0.64	0.48		
Total Number of Logins					
September	961	0.05	0.21	Z= -11.27	P < 0.001, CI for α = 0.05 [-0.03, -0.02]
January	1604	0.07	0.26		
Labs Published					
September	1132	0.06	0.23	Z= -55.80	P < 0.001, CI for α = 0.05 [-0.19, -0.18]
January	5250	0.24	0.43		
Labs Viewed					
September	67	0	0.06	Z= -12.88	P <0.001, CI for α = 0.05 [-0.01, -0.01]
January	330	0.02	0.12		
Messages Sent					
September	53	0	0.05	Z=-8.74	P <0.001, CI for α = -0.05 [-0.01, -0.01]
January	197	0.01	0.09		
Messages Received					
September	77	0	0.06	Z=1.11	P= .296, CI for α = 0.05 [-0.00, 0.00]
January	69	0	0.06		
Appointment Reminders					
September	967	0.05	0.21	Z=-34.59	P <0.001, CI for α = 0.05 [-0.10, -0.09]
January	3166	0.15	0.35		
Santovia					
September	12	0	0.02	Z=-4.28	P < 0.001, CI for α = 0.05 [-0.00,-0.00]
January	46	0	0.05		