Improving Linkage to Care in the Human Immunodeficiency Virus Clinic Setting

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A DNP Project Manuscript
Submitted in Partial Fulfillment of the Requirements for the
Doctor of Nursing Practice Degree

University of Maryland School of Nursing
May 2019

Abstract

Background

At the end of 2015, an estimated 1.1 million individuals in the United States aged 13 and older were living with human immunodeficiency virus (HIV), including 162,500 (15%) of persons who are undiagnosed. The state of Maryland is currently ranked seventh among 50 states in HIV diagnoses. Linkage-to-care of people living with HIV is a major problem for health care providers. Linkage-to-care can be summarized as a completion of a visit with a primary care or HIV medical provider within 30 days of diagnosis. Linkage-to-care is currently below average at an estimated 66% in the United States with a national goal of 80%.

Local Problem

A linkage-to-care template inside the clinic patients' electronic medical records ensures there is a standard of care when linking patients to a primary care provider after diagnosis. However, site staff may not be completing the template at discharge and closing the charts within three days according to protocol. The purpose of this DNP project is to raise linkage-to-care protocol adherence by implementing a pop-up point-of-care reminder in Outlook Calendar.

Interventions

A Quality improvement Project with pre-post intervention measurements was implemented at a Suburban HIV clinic in the United States. The project used a convenience sample consisting of five clinic case managers. Retrospective pre-intervention EMR audits (n = 20) were used to assess baseline rate of linkage-to-care closure within three days of opening. Records were randomly selected from all records discharged in April through August 2018. Pre-intervention surveys were given to clinic case managers to assess barriers to completing linkage-to-care templates within three days of opening and completing patient discharges. The intervention consisted of point-of-care electronic calendar reminders. Post-intervention surveys were given to assess satisfaction with the intervention and to seek recommendations on other ways the intervention can be utilized. Post-intervention records audits (n = 16) were used to assess whether linkage-to-care templates were closed within three days of opening at a higher rate than during pre-intervention.

Results

The pre-implementation survey revealed barriers in completing the discharge template, including complexity of the discharge, difficulty navigating through the record, template too wordy, too time consuming, and lack of patient cooperation. Pre-intervention audits indicated that 40% were not closed within three days. Five of 16 new records audited post-intervention were not closed within three days. A nine-percentage point increase in discharges completed within three days post-intervention was observed but was not statistically significant ($p > 0.05$). In the post-implementation survey, all subjects reported that reminders were important and helped with remembering to complete the discharge templates and other patient-related tasks.

Conclusions

This project suggests that there is a correlation between setting reminders in the outlook calendar and closing of linkage- to-care templates within 3 days. Closing of linkage-to-care templates within 3 days improved from 60% to 69% after the implementation of Outlook Calendar reminders. The results of this project further reinforce the notion that reminders at the point of care help staff complete patient-related tasks.

DNP Project Proposal

At the end of 2015, an estimated 1.1 million individuals in the United States aged 13 and older were living with human immunodeficiency virus (HIV); this included 162,500 (15%) of persons who are undiagnosed (Centers for Disease Control and Prevention [CDC], 2017]). The state of Maryland is currently ranked seventh among the 50 states in the number of HIV diagnoses (CDC, 2015). In Maryland there are 32,002 people living with HIV (PLWH); 65% of the diagnosed are male and 35% are female (AIDSVu, 2017). Montgomery County has 42.7 per 100,000 PLWH (Maryland.gov, 2017). HIV disproportionately affects African American men who engage in male on male sexual encounters at a higher rate. According to AIDSVu (2017), Black males living with an HIV diagnosis in America are 8.5 times that of White males. Linkage-to-care of PLWH has proven to be a major problem for health care providers. Linkage-to-care can be summarized as a completion of a visit with a primary care or HIV medical provider within one month (30 days) of HIV diagnosis (National HIV Curriculum, 2018). At the HIV clinic, there is currently a linkage-to-care template inside patients' electronic medical record (EMR) to ensure there is a standard of care when referring patients to a primary care provider after diagnosis. It is not clear that site staff are properly and completely utilizing the template at discharge and closing the charts within three days, per clinic policy.

Linkage-to-care is currently below average at an estimated 66% in the United States with a national goal of 80%. The linked-to-care element is a key element of patients' HIV continuum, and a necessary step towards improving the health of PLWH and their communities (Bendetson, et al., 2017). Studies have shown that patients living with HIV, who are linked-to-care, are more likely to have a better outcome than patients who are not linked-to-care (Bendetson, et al., 2017). By linking to care, patients have access to antiretroviral medications that can suppress the virus

and receive laboratory tests to measure if the treatment is effective or not. The purpose of this DNP project was to raise linkage-to-care protocol adherence through assessing the utilization of the linkage-to-care template, including determination of who populated the template and whether the template was completed, implementation of a pop-up point of care reminder in outlook calendar, and reporting the findings to site staff.

The implementation of this DNP project was structured with short- and long-term goals. The short-term goals for this DNP project were to 1) increase rates of completion to the linkage to care templates per the facility's protocol, and 2) implement an improved workflow by setting reminders to remind staff to complete the linkage-to-care template within three days. The long-term goals of this project were to 1) increase linkage-to-care rates to match and/or exceed the national goal of 80%, 2) Improve overall health outcomes for PLWH, and 3) sustain rates of successful linkage-to-care for PLWH.

Description of Theoretical Framework

The Six Sigma is a theoretical framework used to implement quality improvement projects. Six Sigma is defined as a methodological approach to improving efficiencies in a business structure by removing the causes of errors (Graves, 2012). Six Sigma was originally introduced in 1988, by Motorola University to enhance the manufacturing training program (Tjahjono, 2010). The model later progressed into a process improvement framework used in many other diverse sectors for a quality improvement solution (Tjahjono, 2010). There are five major concepts for this model: define, measure, analyze, improve, and control (DMAIC). This model is an improvement system for existing processes falling below specification and looking for incremental improvement. The first phase is define, which is achieved by defining the problem and creating a problem statement. The second phase is measure; one must create a plan

to collect data. The third phase is analyze; closely examine the process and graphically display the data. Improve is the fourth phase; the team will brainstorm solutions, pilot process changes, implement solutions, and collect data to confirm there is measurable improvement. The fifth phase is control; teammates must ensure the process is properly managed, monitored, and documented (DMAIC Infographic, 2018).

Six Sigma is a detailed framework that can be utilized in evidence-based research and primary care settings to implement a quality improvement project (DMAIC Infographic, 2018). Using this framework can help guide an individual in evaluating whether or not a patient was successfully linked-to-care. The theory of Six Sigma explicitly explains how transitioning through phases and implementing interventions can evaluate and improve a patient's outcome.

Explanation of Theoretical Framework

Selecting the appropriate theory is important in managing evidence-based research and implementation. Theories can guide practice that can bring progressive change and improve patient outcomes, such as improved healthcare access and education. A Six Sigma framework was used in this DNP project to implement change. First, the problem was defined: did the completion of the linkage-to-care template facilitate a patient to be effectively linked to a primary care provider? Next, in the pre-implementation phase an audit of all of the charts from April to August 2018 was conducted to measure the number of charts that were completed in the linkage-to-care template appropriately and if they were closed within three days. After auditing the charts, during the analysis phase, the number of patients' charts in the EMR that had the linkage-to-care template completed were checked. Each template was checked to see if it was filled out in its entirety. The fourth phase involved brainstorming and implementing various solutions to sustain the intervention of creating a pop-up reminder in Outlook Calendar, such as

quarterly meetings to discuss progress and any questions from staff. Lastly to ensure sustainability, team members were encouraged to continue to monitor if linkage-to-care templates were being completed in the EMR and if so, whether or not they were done correctly.

In summary, the ongoing problem with linkage-to-care requires that healthcare providers find an intervention or process that will help improve linkage-to-care for patients living with HIV (PLWH). Measuring the outcome of interventions using a quality improvement process is highly recommended to ensure that the best evidence-based practice is being used to provide efficiency in patient care.

Literature Review

This literature review was based on the practice problem regarding the effectiveness of a method designed to increase linkage to a primary care provider or HIV clinic in patients living with HIV. The literature review began with a search for evidence supporting the importance of thorough completion of linkage-to-care procedures at the HIV clinic to patient engagement with primary care providers. Then, an overall synthesis of all literature was conducted to compare and contrast interventions that can be utilized in effectively linking PLWH at the time of discharge. Furthermore, literature was reviewed on how computerized reminders can help improve staff behavior and compliance to tasks that are critical to patients' outcome.

Analysis

A literature review of four studies was conducted on interventions that can be implemented in effectively linking PLWH at the time of discharge. Kiene et al. (2017) explored a Duster-randomized controlled trial study, which included 600 adult participants who tested HIV positive. This study was conducted to evaluate if an individual receives multiple counseling sessions does it increase linkage-to-care and improve viral suppression among newly diagnosed

patients living with HIV. The participants were selected from 40 villages in Central Uganda. It was conducted over a 46-month timeframe. Furthermore, this study measured outcome of CD4 count and RNA viral load at baseline and at 12-month follow-up. The researchers concluded that timely linkage-to-care improved patient treatment outcomes and reduced mortality rates.

Bendetson et al. (2017) conducted a cohort study, which included 118 participants newly diagnosed with HIV. The purpose of this study was to evaluate the effectiveness of a linkage-to-care specialist (LTC-S) intervention to see if it improved linkage-to-care and improved patient outcome. The participants were selected from a single clinic and the study did not disclose ethnicity, which introduced a threat to external validity. The study had a sufficient time frame, ranging from March 2014-September 2015. Outcomes were measured by whether or not participants attended an appointment with a primary care provider within 3 months of the diagnosis, and RNA viral load and CD4 count were completed and documented. The researchers suggested that LTC-S improved linkage-to-care by following up with the patient and improved patients retained in care.

In a retrospective cohort study, Loeliger et al. (2017) analyzed data concerning a total of 1,350 inmates who were discharged from prison and living with HIV. This study aimed to evaluate whether or not patients, who were incarcerated and linked with a case manager prior to discharge from the prison, increased the inmate's linkage-to-care with a primary care provider, and improved patient outcome. The participants were selected from 16 facilities in Connecticut. The study was conducted over a seven-year timeframe. The researchers were clear on their inclusion and exclusion criteria outcome measured by RNA viral load drawn within the first year of being released from prison. This study summarized that there was an increase to linkage-to-care but did not show if the patient was retained in care.

Using a prospective observational study, Turan et al. (2014) examined a total of 135 antenatal women living with HIV over the course of two years. The purpose of this study was to evaluate the effectiveness of antenatal patients with HIV who were linked to a primary care provider by there counselor in comparison to patients who were not linked to a primary care provider to decrease postpartum depression. Measurement for postpartum depression was measured using the Edinburgh Postpartum Depression Scale (EPDS) at six weeks postpartum. The researchers indicated that women who were not linked-to-care were more likely to exhibit postpartum depression compared to women who were linked-to-care. The participants were selected from eight antenatal clinics in rural Nyanza Province of Kenya. These four studies concluded that linking patients to a primary care provider assists in improving patient outcome in PLWH.

Two studies were examined on the benefits of using computerized reminders to both improve staff behavior and compliance to tasks that are critical to patients' outcome. In a randomized control trial, Lear and Walters (2015) analyzed data concerning a total of 32 registered nurses who worked in a neurological step-down unit over a six weeks period. The purpose of this study was to implement a computerized point of care reminder on a neurological step-down unit to evaluate if the reminder would improve the nurse's documentation of neurological assessments. Compliance was measured by chart audit to assess if the neurological assessment was documented on newly diagnosed stroke patients. The participants were selected from one unit in the hospital. The authors implied that electronic nurse reminders improved timely documentation of neurological checks on patients with a new diagnosis of stroke.

Cheung et al. (2012) conducted a systematic review of effectiveness of computerized reminders in improving healthcare professional behavior in clinical settings. The purpose of this

study was to evaluate the effectiveness of reminders in changing professional behavior in clinical settings. Outcomes were measured through certain performances that were unique to that clinical setting. This systematic review was comprised of seven high level evidence studies. The results of the study supported the conclusion that reminder systems are effective in changing healthcare behavior and improving processes of care. Both studies demonstrated that computerized reminders can improve care coordination through staff cooperation in task completion.

DNP Project Implementation Plan

The DNP project was a quality improvement project to increase the number of completed linkage-to-care templates and closing of the EMR within three days via reminder tools. The pre-implementation data collected in this project came from two different sources. One data sample for this phase consisted of EMR audits to assess completion of the linkage-to-care template in each patient EMR created from April 1, 2018, through August 2018. Additionally, a questionnaire was administered to clinic case managers staff for assessing staff attitudes, thoughts, and feelings related to completing the EMR linkage-to-care templates before the start of the intervention. The implementation phase from September to November 2018, consisted of reminder post-it notes placed at staff computers, EMR audits bi-weekly for patient's discharged, one-on-one meetings with case managers to assess barriers, post-surveys were distributed to staff to assess satisfaction of the intervention, and use of a pop- up reminder in Outlook calendars of the case managers at the HIV health clinic. The text that appeared in the Outlook reminders was designed at the beginning of the project so that the subjects could copy and paste the text as they created their Outlook reminders. These small blocks of text are referred to henceforth as reminder scripts. Inclusion criteria consisted of individuals 18 years and older, confirmed

diagnosis of HIV, EMR closed out, and the EMR locked. Exclusion criteria included charts outside of the appropriate timeframe, individuals younger than 18 years of age, EMR not closed out and unlocked, and an unconfirmed diagnosis of HIV.

Procedures and Timeline Plan

During week 1, a prototype for the reminder post-it notes was created and reviewed by the Project Manager. Also, by the end of week 1, the pre-intervention questionnaire was administered to the clinic staff (Appendix C). By the end of week two, an audit of twenty charts was completed. Also, by the end of week 2, a meeting was conducted with 100% of the case management staff to discuss the findings of the initial audits. During this meeting an assessment was done to discuss the progression of the implementation plan. By the end of week four, all reminder post-it notes were placed on at staff computers, which coincided with training of all case management staff on the Outlook reminder tool (Appendix E & G) and appropriate scripting to use in the outlook reminder calendar (Appendix F). During weeks 5 through 10, the staff operated under the intervention plan, setting reminders in the outlook calendar and there were weekly visits by the DNP student to field staff inquiries and to monitor template completion by EMR audits. The auditing of EMRs and implementation components were ongoing until the end of the data collection period. A post-intervention questionnaire was administered to the clinic staff at the end of week 14.

Data Collection

The project involved retrospective EMR audits, initiated in week 1, to assess the level of template completion and to gather other EMR data from April 2018 to August 2018. The chart audit instrument (Appendix B) consisted of items such as the encounter date, the date the Case Manager signed off, the date the Program Manager signed off, the question of whether or not the

chart was closed out by the Case Manager within three days, the date of diagnosis, gender, age, name of discharge agent, level of completion, and reasons chart was not closed out within three days. The audits continued prospectively from week 2 onward until the data collection period ended in November of 2018. Questionnaires (Appendix C & D) were administered to the staff before and after implementation of the intervention components. The pre-questionnaire consisted of questions that were designed to help identify barriers to completing the templates. The post design of the questionnaire administration assessed whether or not the intervention had a positive impact on reducing barriers to completing the templates.

Data Analysis

The overall evaluation of the success of the project was in the form of whether or not there was a statistically significant increase in the proportion of EMRs at discharge that had completed linkage-to-care templates and were properly closed out within three days after the intervention implementation. EMR audit data were tested for pre- and post-implementation differences in completion rates by the chi-square test for homogeneity. Questionnaire data were examined qualitatively.

Measures to Protect Human Subjects

A project description was submitted to the University of Maryland Baltimore (UMB) Institutional Review Board (IRB) for a Non-Human Subjects Research (NHSR) determination. Data were collected from EMRs stripped of individual identifiers, and this project was exempt from IRB oversight.

Results

A staff questionnaire was administered to assess barriers to completing the discharge templates. There was an 80% (4 out of 5) questionnaire response rate. Some of the barriers in

completing the discharge included complexity of the discharge, difficulty navigating through the EMR, template too wordy, too time consuming, and lack of patient cooperation. One question in particular, which read, "What would you add or change to make the discharge process more successful?" generated informative responses, such as, "Incorporate a reminder to help me remember to discharge a patient." A pre-intervention chart audit was conducted via chart audit tool on 20 random EMRs dated April 2018 to September 2018. The chart audit indicated that 40% of the charts were not closed out within the three-day timeframe before the intervention was implemented. During audits, some trends were noticed as to why discharge templates were not being completed within three days. One trend that was brought to this author's attention during the audit was the fact that patients who were lost to care were not referred to the outside company that makes house calls. Also, EMRs were missing documentation of patients attending their first appointment with their primary care provider.

After the intervention consisting of discharge template completion reminders was implemented, 16 new charts were audited dated October 1, 2018, through December 10, 2018. Five of the 16 charts were not closed out within three days. There are several reasons why charts were not closed out within the three-day timeframe, as discovered during the chart audit process. These reasons include that patients who were lost to care were not referred to a Disease Intervention Specialist (DIS), no date was listed or no reference was made to the patient's first appointment with a PCP, the chart was closed within three days and had to be reopened (reason unknown), and the chart was opened without all required documents. There was an increase of nine points in percent discharges completed within three days. A chi-square test of homogeneity in the proportions pre- and post-intervention projection did not provide evidence of a statistically significant increase ($p > 0.5$). The chart audit results are summarized in Table 1.

Pre-staff survey responses revealed a number of barriers to discharge template completion within three days. Although all respondents said the task of template completion was not too time-consuming, the majority (75%) said it took longer than 30 minutes. All respondents believed that the templates were important and that closing them within three days was important. Most (75%) were comfortable with navigating the EMR system, and believed that remembering to complete the templates and close the cases was not difficult. All staff reported post-intervention that the reminders were important and helped them with remembering to complete the discharge templates and other patient-related tasks, and 80% (4 of 5) were comfortable with creating their own reminders. Sixty percent (3 of 5) indicated that they would like to see reassessment reminders added. Post-questionnaire responses provided evidence that the reminder intervention helped staff improve the template completion rate, although not significantly so. The staff survey responses are summarized in Table 2.

Facilitators and Barriers

For a project to be successful, team collaboration is essential. Facilitators of this implementation were as follows: The Lead Case Manager and Champion, the Project Manager, who managed the site and arranged meetings between the other Case Managers; the Nurse Manager, the nursing staff, and this author. However, every project has challenges. One unforeseen obstacle that was encountered during this implementation was that the computer reminder application was no longer approved, despite an earlier approval. A meeting with key personnel was then held and focused on alternative interventions. It was determined that setting a reminder in the Outlook calendar would be more appropriate than adding an application to the computer. Also, another obstacle was that the Project Manager was unclear on the appropriate language to use for the scripts. To rectify this concern, trends were assessed on possible reasons

why the discharge template was not closed in three days. After the EMRs were audited and trends assessed, six different scripts were created to utilize in the reminder. Another barrier that was discovered during the implementation process was staff resistance. One Case Manager was already using a Next Gen reminder; subsequently she was apprehensive about using the reminder in Outlook. To address her concerns, a one-on-one meeting was held where the pros and cons of using the reminder in Outlook calendar was discussed. It was emphasized that she could share her calendar with other counterparts, and they would be able to see what was on her schedule. She was given guidance on how to set reminders on the Outlook calendar and how to copy and paste the different scripts into the reminder Outlook calendar.

Unintended Consequences

An unintended benefit was that staff members were able to use reminders in the Outlook calendar for other tasks, not just for the discharge process. Staff members can also utilize reminders in the Outlook calendar to remind them to call patients for future appointments, staff meetings, and to follow up with the Disease Intervention Specialist. One of the problems encountered was decreased patient intake. Initially the final audit was due to be completed during week 14; however, because of a decreased patient load which affected data collection, the last audit was rescheduled to be completed by the end of week 15 to have at least 20 charts reviewed. Only 16 post-intervention chart audits were completed in the allowed timeframe. There were no costs associated with this intervention.

Discussion

Audits were used to determine whether charts were closed within three days after linkage-to-care templates were opened prior to and after a reminder intervention was implemented. A modest (non-significant) increase was observed in the proportion of charts

closed within three days after the reminder program was implemented. In addition, clinic staff, for whom the intervention was designed, reported post-intervention that the reminder system helped them complete the templates and other patient-related tasks. The results support the use of a point-of-care reminder system in an effort to improve HIV patient linkage-to-care by improving the successful completion of templates within three days.

In this project, only a small number (n = 5) of clinic case managers were available as subjects for implementation of the reminder intervention. The case managers were trained to create their own reminders in their work calendars and found this to be helpful. By both creating and responding to the reminders, case managers reported that they were more likely to complete the tasks for which they were reminded. This is arguably a more effective implementation of reminders than if, say, an administrator set the reminders remotely. In fact, the case managers reported a desire to implement the reminder system for completing other patient-related tasks. The reminder system costs nothing in terms of infrastructure in this particular implementation because Outlook was already used. Outlook is a popular and widely used messaging and scheduling application. If considering the paid time involved in creating reminders, it can be argued that a system that leads to better linkage-to-care and patient outcomes is worth the small-time investment and will easily offset the labor costs. By having more tasks completed in a timely manner, the overall clinic costs likely decrease.

The percent of all patient linkage-to-care templates (n = 20) that were closed within three days of their opening before the reminder intervention implementation was found by chart audits to be approximately 60%. The three-day window for completing the templates is a clinic guideline based on best practices. Chart audits revealed that, after the reminder intervention was implemented, the percent of templates closed within three days of opening increased to 69%.

The increase, however, was not statistically significant but demonstrated a positive trend. One possible explanation for this only modest increase is that simply not enough templates were closed within three days and the intervention produced only marginal improvement. This would suggest that a more aggressive reminder system is needed to move the template completion closer to 100%. However, the follow-up period duration may be a confounding factor in this interpretation. This intervention required behavioral changes in the subjects. Therefore, it is reasonable to expect an appreciable time-to-maximal engagement as subjects become accustomed to performing the new tasks and making them daily routine. Moreover, the numbers of pre- and post-intervention charts audited were not equal, with more pre-intervention charts audited than post. It is believed that a longer post-intervention chart audit period would reveal a higher percentage of templates closed within three days. Larger numbers of chart audits overall would also possibly reveal a larger post-intervention proportion of templates closed.

Other investigators have reported benefits to patient outcomes after reminder systems were implemented. Were et al. (2011) demonstrated that computer-generated reminders targeted to clinicians working in HIV clinics in Western Kenya resulted in greater adherence to CD4 testing guidelines. These authors implemented a reminder system in one of two high-volume (approximately 1,000 patients per month) clinics and compared CD4 test order rates to the other clinic, which served as a control. While the order rate remained constant at the control clinic, the order rate significantly increased from 42% to 53% at the clinic in which reminders were implemented. Also, in this project, reminders improved order rate, but not to 100%. This suggests that it is reasonable to expect a significant increase, but perhaps not perfect or near-perfect adherence in response to reminders alone.

Reminder systems have not only been implemented successfully in the HIV clinic setting, but in acute care hospital settings as well. Piscotty and Kalisch, (2014) reported a significant association between the use of nursing care reminders and greater fulfillment of nursing care responsibilities. Using a convenience sample of 165 hospital care-givers, the investigators implemented a reminder system that produced a significant negative association between missed nursing care and use of reminders, as compared with missed care prevalence pre-reminder intervention. The present project also took advantage of a convenience sample of HIV clinic case managers and implemented a reminder-based intervention in a pre-post context. The scale of this project in terms of assessment sample, project subjects, and duration was smaller than the works by others cited. Scaling of the project along these parameters will likely produce a significant increase in template completions. The results of the present project and of the work by Were et al. and Piscotty, and Kalisch, suggest that reminders may be best viewed as an important component of a wider effort to improve guideline adherence.

Strengths and Limitations

One of the strengths of the project was staff participation. Only one pre-intervention questionnaire was not returned. All case managers were able to attend education sessions and were open to resolutions to barriers to the implementation process that were found during the implementation phase of the project. Limitations of the project included threats to internal and external validity, such as small sample size, relatively short timeframe, selection bias inherent to convenience sampling, and method of setting reminders in Outlook. Convenience sampling was used in recruiting participants from a single HIV clinic, a sampling method that introduces a threat to external validity because a convenience sample is not representative of the population of HIV clinic staff. The project had an insufficient time frame, ranging from September through

early December 2018, a 13-week period that greatly limited post-intervention follow-up. Also, participants were responsible for setting their own reminders in the Outlook calendar instead of it being an automated generated reminder. This may be viewed as a limitation because one could argue that the burden of remembering is only shifted from completing templates to creating reminders to complete templates. An automatic, software-generated reminder system would address this limitation, but was not feasible in the present project. The pre and post surveys used to assess barriers and effectiveness of the intervention were useful in assisting the investigator in identifying issues of concern for the case managers. They offered the case managers an opportunity to provide their input on the process improvement project. To minimize the above-mentioned limitations, the author visited the clinic bi-weekly and spoke with each case manager one-on-one to assess whether each was following through with the intervention and identify any possible barriers. Also, a reminder postcard was placed at their computer desks to help remind case managers to set reminders in the Outlook calendar.

Conclusion

This project suggests that there is a correlation between setting reminders in the Outlook calendar and closing of linkage- to-care templates within 3 days. Closing of linkage-to-care templates within 3 days improved from 60% to 69% after the implementation of Outlook Calendar reminders. The increase in the closing rate observed was not, however, statistically significant. Also, clinic case managers reported that the reminders were important, easy to create, helpful for remembering to complete linkage-to-care templates, and helpful for remembering to complete other patient-related tasks. In addition, the clinic case managers reported that setting reminders may be beneficial in completing patient reassessments and follow-ups and collecting patient eligibility documents.

Plan for Sustainability and Spread

The clinic will maintain weekly staff huddles lasting two to five minutes on Monday mornings to ensure Outlook Calendar reminders are being created for completing templates and closing out EMRs at discharge for the week. These weekly huddles are organized and maintained by the project manager. In addition, quarterly staff meetings lasting 30 minutes to one hour are scheduled and supervised by the project manager and serve as an ongoing monitoring and evaluation mechanism. Any templates that were not completed or EMRs that were not properly closed out within three days are discussed, and reasons why protocol was not followed are identified and addressed. The lead investigator visited twice after the project ended to make sure the sustainability measures were in place.

Dissemination of the project findings was accomplished by presenting the author's poster at different conferences. The lead investigator arranged to present posters at two research conferences: The Nurse Practitioner Association of Maryland meeting, Spring 2019, in Towson, Maryland; and The University of Maryland Graduate Research Conference, Spring 2019, in Baltimore, Maryland. The goals of the presentations were to convey how important linkage-to-care is to HIV patient outcomes and to instruct on how this author's intervention can be successfully implemented at a low cost elsewhere.

Implications and Next Steps

The results of this project further reinforce the notion that reminders at the point of care help staff complete patient-related tasks. Better completion of patient-related tasks will lead to better patient outcomes. The reminder intervention is simple to implement at a low cost in a wide variety of settings and is expected to help staff better adhere to guidelines and protocols. Future QI projects on this topic could expand to include multiple clinics and nurses at each

clinic, in addition to case managers. Future projects should cover more patient charts and a longer period, both pre- and post-intervention. Finally, future projects may test whether other types of electronic reminders, including independent apps and messaging on both workstations and handheld devices, are effective in improving task completion according to guidelines. The additional education of clinic staff should include a description of and emphasis on evidence-based importance of improving patient outcomes by following guidelines on ensuring linkage-to-care as well as specific training on any other reminder systems added in the future.

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Tables

Table 1. Patient demographics and percent charts closed within 3 days.

	n	%	Mean Age	Standard Deviation	Range	% Closed w/in 3 Days
Pre						60
Age	20	100	44.6	12	26-64	
Male	12	60	40.8	13	26-63	
Female	8	40	50.3	7.98	39-64	
Post						69*
Age	16	100	43.4	13.1	24-65	
Male	11	68.75	45.8	13.8	24-65	
Female	5	31.25	38.6	11.6	27-53	

*Not statistically significantly greater ($p = 0.587$) than for pre-intervention, as determined by the chi-square test for homogeneity.

Table 2. Discharge template questionnaire responses, pre- and post-intervention.

Pre-Intervention (n = 4)	**Responses**	
1. Time to complete templates?	1 (25%) 20-30 min	3 (75%) >30 min
2. Comfortable navigating EMR system?	3 (75%) Completely	1 (25%) Somewhat
3. Templates important?	4 (100%) Important	
4. Remembering to complete template difficult?	1 (25%) Yes	3 (75%) No
5. Closing template in EMR important?	4 (100%) Important	
6. Remembering to close case difficult?	1 (25%) Yes	3 (75%) No
7. Templates too wordy or complex?	1 (25%) Yes	3 (75%) No
8. Templates too time-consuming?		4 (100%) No
Post-Intervention Items (n = 5)		
1. Comfortable creating reminders?	4 (80%) Completely	1 (20%) Somewhat
2. Importance of setting reminders?	5 (100%) Important	
3. Setting reminders make remembering easier?	5 (100%) Yes	
4. Reminders helpful for completing templates?	5 (100%) Yes	
5. Setting reminders helpful for other tasks?	5 (100%) Yes	

Figures

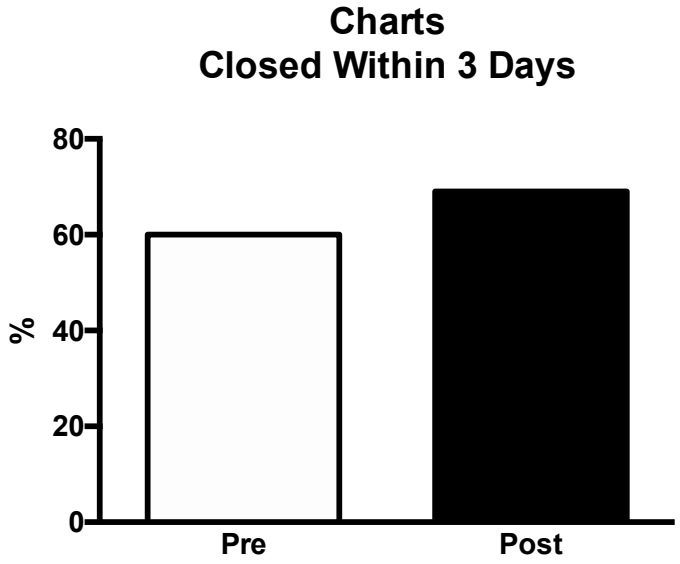


Figure Legends

Figure 1. Percentage charts were closed within three days of opening before and after intervention. 60% of charts were closed within three days prior to the intervention. Following the implementation of the reminder intervention, 69% of charts were closed within three days ($p > 0.05$).

Appendix A

Evidence-Based Practice Question: Does the use of a follow-up method designed to link patients living with HIV to a primary care provider/HIV clinic improve outcomes over those of standard referral practice?							
Authors, Year	Study Objective/Intervention or Exposures Compared	Design	Sample (n)	Intervention	Outcomes Studied (How Measured)	Results	Level of Evidence (1-7) & Quality Rating
Cheung et al., 2012	The purpose of this study was to evaluate the effectiveness of reminders in changing professional behavior in clinical settings.	Systematic Review	A total of 7 reviews (n=7)	-Different types of computer reminder systems in various clinical settings.	-Measured certain performances that were unique to that clinical setting.	The study summarized that reminder systems are effective in changing healthcare behavior and improving processes of care.	1 A
Lear & Walters, 2015	The purpose of this study was to implement a computerized point of care reminder on a neurological step-down unit to evaluate if the reminder would improve the nurse's documentation of neurological assessments.	Randomized Control Trial	A total of 32 registered nurses, who worked on neurological step-down unit (n=32)	-Computerized point of care reminder (electronic nurse reminder tool)	-A chart audit was conducted to assess if the neurological assessment was documented on newly diagnosed stroke patients.	The authors concluded that electronic nurse reminders improved timely documentation of neurological checks on patients with a new diagnosis of stroke.	2 A

Authors, Year	Study Objective/Intervention or Exposures Compared	Design	Sample (n)	Intervention	Outcomes Studied (How Measured)	Results	Level of Evidence (1-7) & Quality Rating
Kiene et al., 2017	The purpose of this study is to evaluate an intervention used to enhance linkage-to-care and improve viral suppression among newly diagnosed patients living with HIV.	Duster-Randomized Controlled Trial	A total of 600 adult participants living with HIV (n=600)	-The counselor provides patients with a paper based referral (standard of care). -PATH/Ekkubo intervention: Patient receives HIV counseling at baseline, up to three follow-up counseling sessions at home, and a booster session at the HIV clinic if they are receiving care	-Interview at baseline, 6, and 12-month follow-up. -A CD4 count and a RNA viral load testing at baseline and 12 month follow-up.	This study concluded that timely linkage-to-care improves patient treatment outcomes and reduces mortality rates	2A

Authors, Year	Study Objective/Intervention or Exposures Compared	Design	Sample (n)	Intervention	Outcomes Studied (How Measured)	Results	Level of Evidence (1-7) & Quality Rating
Turan et al., 2014	The purpose of this study is to evaluate the effectiveness of antenatal patients with HIV who are linked to a primary care provider in comparison to patients who are not to decrease postpartum depression.	Prospective Observational Study	A total of 135 antenatal women living with HIV (n=135)	-Enrolling into HIV care and treatment program (which is considered linkage-to-care) -The counselor provided health education, adherence counseling service, and supportive groups.	Measurement for postpartum depression was measured using the Edinburgh Postpartum Depression Scale (EPDS) at 6 weeks postpartum.	The study concluded that women who were not linkage-to-care were most likely to exhibit postpartum depression compared to women who were linked-to-care.	4A

Authors, Year	Study Objective/Intervention or Exposures Compared	Design	Sample (n)	Intervention	Outcomes Studied (How Measured)	Results	Level of Evidence (1-7) & Quality Rating
Bendetson et al., 2017	The purpose of this study is to evaluate the effectiveness of a linkage-to-care specialist (LTC-S) intervention to see if it improved linkage-to-care and improved patient outcome.	Cohort Study	A total of newly HIV-diagnosed patients (n=118)	-Refer patient to a primary care provider and ensure there is an appointment scheduled for the patient to be seen by the provider. -The LTC-S aids the patient to cope with new diagnosis and helps the patient to develop or reinforce concrete skills that are required for successful reengagement (planning ahead and rescheduling appointments).	Patients were considered linked-to-care if they attended an appointment with a primary care provider within 3 months of the diagnosis. The timeframe for which the study took place was from March 2014-September 2015. RNA viral load and CD4 count was	Primary outcome: 94% of participants attended their first HIV medical visit within 3 months of the diagnosis. Secondary outcome: 91.9% were successfully retained in care following linkage. Overall, this study showed that LTC-S improved linkage-to-care by following up with patients and improved	4 A

					completed and documented.	patients retained in care	
Authors, Year	Study Objective/Intervention or Exposures Compared	Design	Sample (n)	Intervention	Outcomes Studied (How Measured)	Results	Level of Evidence (1-7) & Quality Rating
Loeliger et al., 2017	To evaluate if patients who are incarcerated and are linked with a case manager prior to discharge from the prison, will increase inmates linked-to-care with a primary care provider and improve patient outcome.	Retrospective Cohort Study	A total of 1,350 inmates who are being discharged from prison living with HIV (n=1,350)	Linking inmates with case managers prior to discharge from prison.	RNA viral load drawn within the first year of being released from prison. The timeframe for this study was from January 1, 2007-Decemeber 31, 2014.	21% of inmates released had a RNA viral load drawn within 14 days of being released. 34% of inmates released had a RNA viral load drawn within 34 days of being released. .By 6 months 76% of inmates released had a RNA viral load drawn. Overall, this study concluded that there was an increase to linkage-to-care but does not	4A

						show if the patient was retained in care.	

Appendix B

EMR Audit Tool

Case Number	**Date Created**	**Date Closed** (0 if not closed)	**Closed out within 3 days of discharge** (0 = No, 1 = Yes)	**Dx Date**	**Gender** (0 = M, 1 = F)	**Age** (years)	**Discharged by** (Name)	**Level of Completion** (0 = 0%, 1 = up to 25%, 2 = 26 to 50%, 3 = 51-100%)

Appendix C

Pre-Implementation Staff Questionnaire

Directions: Please circle the best answer and return this survey to Melvin Cauthen (Program Manager)

1. On an average, how long do you spend completing an EMR linkage-to-care template? (less than 10 minutes/ 11-20 minutes/ 20-30 minutes/ greater than 30 minutes)

2. How comfortable are you with navigating the EMR system? (not at all/somewhat/completely)

3. How important do you think the linkage-to-care template is? (important/not important)

4. Do you find it difficult to remember to complete the linkage-to-care template at discharge? (yes/no)

5. How important do you think the closing out of the EMR is? (important/not important)

6. Do you find it difficult to remember to close out the EHR after discharge? (yes/no)

7. Is the linkage-to-care template too wordy or complex to complete? (yes/no)

8. Is the linkage-to-care template too time-consuming to complete? (yes/no)

9. Which of the following would you identify as the most important barrier to template completion? (1=complexity, 2=time investment, 3=patient comprehension, 4=patient cooperation, 5= other)

10. If you answer “other” in question 9, please specify. _____

*Number 10 for informative purposes, will not be included in the analysis.

Appendix D

Post-Implementation Staff Questionnaire

Directions: Please circle the best answer and return this survey to Melvin Cauthen (Program Manager)

1. How comfortable are you with creating your own reminders in the Outlook system? (not at all/somewhat/completely)

2. How important to completing the discharge process do you think setting reminders in the Outlook calendar is? (Important/Not Important)

3. Do you find it easier to remember to complete the discharge process if you set reminders in the Outlook calendar? (yes/no)

4. Does setting reminders in the Outlook calendar help you complete the discharges within three days? (yes/no)

5. Do you find setting up reminders in Outlook proves to be helpful in completing other patient-related tasks? (yes/no)

6. If you answered yes to number 5, what is one other task for which you set up a reminder?

_____

7. What would you add or change to make the reminder system more successful?

_____
_____
_____

Appendix E

Reminder Card

Appendix F

Scripts

Case Management

(Patient's initial) needs to be discharged from case management.

Follow up on (Patient's initial) future provider appointment.

Lost to Care

Send (patient's initials) lost to care letter

(Patient's initial) needs DIS worker referral

Project Manager

Review (Patient's initial) discharge template.

Unable to discharge (Patient's initials), missing XXXXXXXXXX documentation. Sent back to (MCM's name) on XX/XX/XXXX. – then reminder would be set for the next review date.

Appendix G

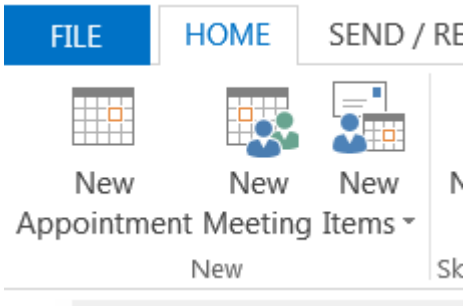
Work flow

Steps to setting a reminder in outlook:

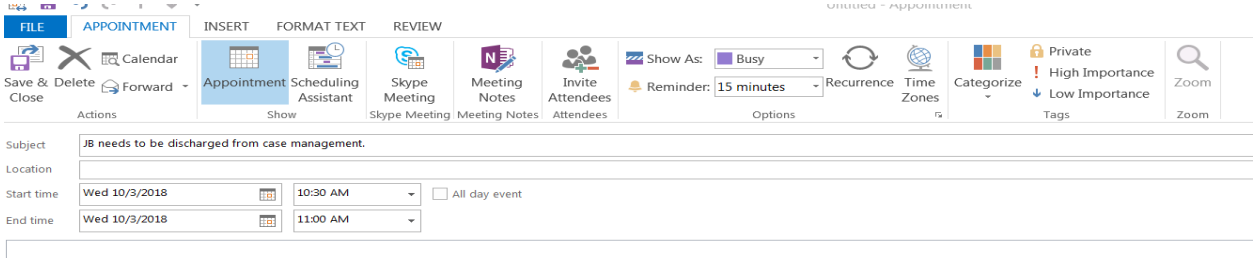
First: Save discharge scripts to a sticky note on the desktop. This will make it readily available to copy and paste

When you receive a discharge:

- Go into your Outlook calendar
- Select a date on the calendar. This date should be the date that you are targeting to have the discharge completed.
- Once the date is selected, select “New Appointment” in the top left hand corner of the screen:



- Fill in the subject line with one of the “Script” options. Set your reminder time to the desired time.



- If needed- you can set up a “recurrence” time frame. Select “Recurrence”. Please complete the fields as indicated: