Summer 2019

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Implementation of a Smart Tool in the Electronic Health Record to Improve Interdisciplinary Discharge Communication and Hospital Readmission Rates

Katelin Umland

A project submitted for fulfillment of Nursing 595

College of Nursing and Professional Disciplines

University of North Dakota

Summer 2019
Abstract

In the department of Inpatient Psychiatry at a large mid-western academic medical center, interdisciplinary discharge communication between registered nurses, social workers, advanced practice providers, and physicians has presented as a problem. Patients are frequently discharged from the hospital without being seen by all necessary disciplines and concomitantly discharged without needed supplies, medications, resources, or follow-up appointments in place. This current discharge method negatively affects patient care, causes workflow disruption for all disciplines, and is known to be a contributing factor in increased hospital readmission rates. The purpose of this Doctor of Nursing Practice (DNP) project was to improve interdisciplinary communication during patient discharge from the hospital, which included the creation, implementation, and education of a smart tool in the electronic health record to provide a central area for communication. The project was modeled and conducted as a pretest-posttest design. Although the results of this project were not statistically significant in some areas of data analysis, significant improvements were via increases in the key discharge metrics of a patient discharged by 12:00 PM and a patient discharged within 2 hours of order release. Of particular note-worthiness is the 1% decrease in hospital readmission rates where such improvement at any level had a positive mental health impact on patients because they were not being readmitted and on the economic impact to the institution as a result of cost-savings.
PERMISSION

Title
Department College of Nursing
Degree Doctor of Nursing Practice

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Name
Date 7-21-19
This DNP Project paper, submitted by Katelin Umland in partial fulfillment of the requirements for the Degree of Doctor of Nursing Practice from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

Mary Jane Rivard, DNP, RN-BC
Clinical Instructor, Chairperson

This DNP Project paper is being submitted by the appointed advisory committee as having met all of the requirements of the University of North Dakota and is hereby approved.

Diana Kostrzewski, PhD, RN
Dean, College of Nursing and Professional Disciplines
Implementation of a Smart Tool in the Electronic Health Record to Improve Interdisciplinary Discharge Communication and Hospital Readmission Rates

Background and Significance

Problem Identification

In the department of Inpatient Psychiatry at a large mid-western academic medical center, interdisciplinary discharge communication between registered nurses, social workers, advanced practice providers, and physicians has presented as a problem. Patients are frequently discharged from the hospital without being seen by all necessary disciplines and concomitantly discharged without needed supplies, medications, resources, or follow-up appointments in place. This current discharge method negatively affects patient care, causes workflow disruption for all disciplines, and is a contributing factor in increased readmission rates.

Background

A review of relevant literature revealed that a lack of interdisciplinary communication with respect to hospital discharges is a problem of national proportions. The fast pace of both routine and non-routine hospital activities coupled with the absence of an effective, formalized, easily accessible mechanism for sharing a patient’s discharge information with members of the health care team creates ambiguity regarding a patient’s discharge status (Driscoll & Gurka, 2015). This lack of communication substantially contributes to disruption to staff workflows, adverse patient outcomes, and hospital readmissions.

The Department of Inpatient Psychiatry works in treatment teams that are comprised of physicians, advanced practice providers, social workers, and a clinical care coordinator nurse. There are six different units in the hospital with each treatment team’s patients dispersed throughout all units. The members of the treatment team are frequently not able to be together
when seeing patients, thus creating confusion in discharge communication for registered nurses who are working on the unit. As a result, some specific elements relevant to a patient’s discharge plan are often unclear to nursing staff what the discharge plan is, if a patient has been seen by each needed discipline, and if a patient has all needed discharge supplies and medications.

**Scope/Impact Statement**

Hospital staff, patients, families, communities, outpatient providers, and health care systems are all affected by the lack of interdisciplinary discharge communication. Often, patients suffer from being discharged from the hospital without needed supplies, medications, resources, and follow-up appointments in place. This leads to poor patient health outcomes and can affect others in the community. Not having these needed discharge components in place can create stress and confusion for families who may be involved in the care for these vulnerable patients. This can also affect outpatient providers’ and case managers’ ability to provide quality care in the community and to help prevent patients from hospital readmission.

This issue of poor interdisciplinary discharge communication has led to poor patient outcomes and increasing hospital readmission rates affecting the organization financially and the healthcare system as a whole. For example, approximately one-in-eight patients who are discharged from a hospital experience an adverse event (Gao et al., 2018). A systematic review of 34 studies found the median percentage of preventable readmissions was 27%, and ranged from 5 to 79% (Alper, O’Malley & Greeenwald, 2018). With respect to psychiatric units the hospitalization rate for mental disorders increased more rapidly than for any other type of hospitalization between 2003 and 2011. In 2011, mood disorders and schizophrenia had the highest number of all-cause 30-day hospital readmissions among adult Medicaid patients (Heslin & Weiss, 2012).
Consequences

Failing to recognize and to address the issue of poor interdisciplinary discharge communication can have multiple consequences. A patient’s health and safety are at risk when they are not sent home with needed supplies, medications, resources, and follow-up appointments in place. Because readmission within 30 days of discharge is not reimbursable from insurance companies, poor patient outcomes that lead to increased hospital readmission rates contribute to loss of revenue from the organization.

In the United States, hospital readmissions contribute to the overall already high cost of healthcare. Recent studies have estimated that the incidence of adverse events range from 19% to 23% within 2 to 5 weeks post-discharge, which constitutes a costly and unnecessary use of resources (Sevick et al., 2017). National data show that the annual cost of unplanned readmissions to be $15 to $20 billion (Alper et al., 2018).

Proposed Solution

A proposed solution for the lack of interdisciplinary discharge communication is the implementation of a smart-tool in the electronic health record (EHR). A smart-tool is an electronic interface within a patient’s medical records, the purpose of which is to communicate information between all disciplines. The smart-tool allows each discipline to enter information about key discharge elements—including but not limited to—the patient having been seen by a physician or advanced practice provider, social worker has completed safety plan, follow-up appointments have been scheduled, and medications have arrived and have been checked by the registered nurse. This procedural method creates a central area for communication between physicians, advanced practice providers, social workers, clinical care coordinator nurses, and
registered nurses, thus providing reasonable assurance that all needed discharge elements are completed before nursing staff allows the patient to be discharged from the unit.

Having all key discharge elements in place before the patient is discharged leads to improved patient health and safety outcomes, ultimately reducing morbidity and mortality; moreover, it improves patient satisfaction and reduces hospital readmission rates, thus providing a financial benefit to the organization and health care system overall. Improved communication will not only improve workflow of treatment teams, but also save nursing staff time and stress in trying to contact multiple members of the treatment team, thus improving staff work satisfaction for all interdisciplinary members.

**Theoretical Foundation**

The theoretical foundation for this project was Lewin’s Change Theory. Lewin’s theory consists of concepts of the force field, motivators, stages, and change agent. The sub-concepts of stages that include unfreezing, moving, and refreezing were utilized in the project. Unfreezing is the process that involves finding a method to make it possible for people to let go of an old pattern that was counterproductive in some way. This stage is necessary to overcome the strains of individual resistance and group conformity. Unfreezing can be achieved by increasing the driving forces that direct behavior away from the existing solution or status quo, decreasing the restraining forces that negatively affect the movement from the existing equilibrium, and finding a combination of the two methods. The moving stage involves a process of change in thoughts, feelings, behavior, or all three, that is more productive. The refreezing stage establishes the change as a new habit, so that it results in becoming the standard operating procedure. Without this last phase firmly in place, digressing to old thought patterns and procedural habits is likely to occur (Current Nursing Theories, 2011). During the refreezing phase, a stabilization of process
occurs, and if stabilization is successful, then the change is assimilated into the system. Organizational change disrupts the comfort of the status quo, and such change often leads to disequilibrium; consequently, resistance to change should always be anticipated and expected (McEwen & Wills, 2014).

The implementation of a smart-tool in the electronic health record followed the concept of the stages and sub-concepts of unfreezing, moving, and refreezing. The unfreezing stage involved empowering staff members to relinquish old patterns of procedures and behaviors that have not been effective in discharge communication and educate them on the importance and need for change in this process. Of paramount importance is that both the driving and restraining forces must be clearly identified and analyzed before implementation of new organizational procedures (Current Nursing Theories, 2011; McEwen & Wills, 2014). Patients are frequently discharged from a hospital without being seen by needed disciplines and are discharged without needed supplies, medications, resources, or follow-up appointments in place, placing patient health and safety at risk as well as creating stress and disruption in workflow for all disciplines. Educational materials were provided to staff members to explain why change was needed, as well as training on smart tool use during this stage.

The next stage was that of moving, or the change, which involved the process of changing people’s thoughts, feelings, and behaviors. This involved the implementation of the smart tool in the electronic health record for an allotted three-month time-period. Staff needed to be informed and empowered to understand how this would benefit them, such as reducing staff confusion, paging time and improving workflow.

The final stage was that of refreezing, which is establishing the change as a new habit, such that it became the new norm in the department; if this stage isn’t completed, then hospital
staff members will digress to their old habits. During this phase, stabilization occurs and if successful, then the change is assimilated into the system (McEwen & Wills, 2014). This stage was completed by reinforcing use of the smart-tool and communicating staff feedback and results of discharge metric data and hospital readmission rates.

**Definition of Terminology**

An electronic health record, also known as an electronic medical record, is a digital collection of patient health information. A smart-tool is defined as an interdisciplinary smart phrase that is editable by all disciplines located within the electronic medical record. Interdisciplinary discharge communication is defined as communication about patient discharge information between physicians, advanced practice providers, social workers, care coordinators, and registered nurses.

**Clinical Question**

For physicians, advanced practice providers, social workers, care coordinators, and registered nurses, does the implementation of a smart-tool within the electronic health record in comparison to the absence of a smart-tool improve interdisciplinary communication, hospital discharge metric data, and hospital readmission rates within the allotted three-month time-period?

**Literature Review**

**Description of Search Strategies**

A CINAHL, PubMed, and PsycInfo database search was performed through the University of North Dakota Harley French Library using search terms that included various combinations of hospital discharge, discharge tool, discharge checklist, care coordination, electronic health record, interdisciplinary discharge communication, mental health, psychiatry,
SMART TOOL TO IMPROVE DISCHARGE COMMUNICATION

and psychiatric unit. Articles for inclusion were limited to peer reviewed literature ranging from 2008-2018.

The initial searches yielded hundreds of articles, so additional, more specific search terms were added and combined which reduced the number of articles that were specific to discharge communication in electronic health records. By refining search terms, the number of relevant articles was reduced to less than 100. Additional resources from Online Journal of Nursing Informatics and Up to Date were reviewed. Ultimately, ten pertinent articles were chosen for full review because they contained information about improving interdisciplinary discharge communication, various discharge communication tools, and utilization of electronic health records.

**Interdisciplinary Discharge Communication**

Evident in the literature is a lack of interdisciplinary communication with respect to hospital discharges that contribute problems in workflow, adverse patient outcomes, and hospital readmissions. It has been estimated that of the 35 million inpatient hospital discharges that occur annually in the United States, about one-in-eight patients experience a preventable adverse event (Gao et al., 2018). Numerous factors contribute to this statistic, some of which are the complexity of the patient population, dynamic team structures, and high rates of discharge that create challenges as clinicians try to ensure safe discharge and transition to the community (Drake, McBride, Bergin, Vandeweerd & Higgins, 2017). The fast-paced environment of hospitals contributes to communication failures between health care providers while impacting patient care and patient flow. The absence of an effective, formalized, easily accessible mechanism for sharing patients’ discharge information with members of the health care team creates ambiguity regarding a patient’s discharge status (Driscoll & Gurka, 2015).
Hospital Readmission Rates

Decreasing the rate of hospital readmissions has been targeted as a high priority for United States health care reform (Alper et al., 2018). Hospital readmission rates are a routinely used measure of patient and service outcomes, most of which could be improved by enhanced discharge planning. Within psychiatry, readmission rates are often a key outcome measure and have been shown to be affected by discharge planning. Readmission within 30 days of discharge has been demonstrated to be a valid quality of care measure and is inversely associated with standardized discharge processes (Khanbhai, Nance & Smith, 2018). Due to fragmentation and discontinuity of care services, poor discharge planning hinders stable recovery where patients commonly lack support structures, have reduced insight, and co-morbid physical and social issues (Khanbhai et al., 2018). One-half of potentially preventable readmissions were suggested to be linked to interventions that could have been provided during the initial hospitalization (Alper et al., 2018).

The Economic Impact

Economic analyses of electronic discharge communications are not only scarcely reported, but also have inconsistent methodology and outcomes. Recent studies have estimated that the incidence of post-discharge adverse events range from 19% to 23% within 2 to 5 weeks; of these events, 21% of patients required additional physician visits, 17% required hospital readmission, and 12% presented to the emergency department. These events constitute a costly and potentially avoidable resource use (Sevick et al., 2017). Alper et al. (2018) stated that the cost of unplanned readmissions is $15 to $20 billion dollars annually and that preventing avoidable readmissions has the potential to improve both the quality of life for patients and the financial wellbeing of the health care systems.
Use of Discharge Communication Tool

Multiple articles in the literature discussed the importance of a discharge checklist, tool, or pause to help improve interdisciplinary communication (Drake et al., 2017; Gao et al., 2018; Khanbhai et al., 2018). Discharge from the hospital is a critical point-of-care that requires clear communication and a coordinated effort from the entire team (Drake et al., 2017). Standardizing discharge processes with discharge tools remains in keeping with recommended guidelines, functioning to augment existing practices by minimizing human fallibility in clinical practice (Khanbhai et al., 2018).

Effective and efficient patient-centered discharge planning processes can facilitate the transition from hospital to home and begin to address the adverse events experienced by some patients in the immediate post discharge period. Nosbusch, Weis & Bobay (2011) state that one strategy to improve communication between nurses and other direct-care providers and patients is the use of a discharge checklist. Clinical nurses, other health care providers, and hospital leaders are being encouraged to transform their discharge processes by conducting patient evaluations using standardized instruments, employing automated decision support systems, and improving communication and coordination among care providers (Nosbusch et al., 2011).

Use of Electronic Health Record

In 2009 President Obama signed the American Recovery and Reinvestment Act which directed the Department of Health and Human Services, its partner agencies, and the individual states to encourage adoption of health information technology by promoting the use of the electronic health record (EHR). According to survey participants, EHRs have numerous advantages over traditional paper records - including a more complete and organized record, efficiency in navigating the record, ease of communication between providers, and strong
modules for scheduling and medical billing (Reitz, Common, Fifield & Stiasny, 2012). The EHR can share relevant patient information among care providers to coordinate care, aid in decision-making, and achieve improvements in quality (Burnett, 2016).

Multiple articles in the literature discuss the use of a discharge communication tool in the EHR (Garg, Lee, Evans, Chen & Shieh, 2015; Driscoll & Gurka, 2015; Reitz et al., 2015; Sevick et al., 2017). The adoption and increasing use of the EHR provides an opportunity to explore EHR technology as a novel and more efficient vehicle for checklist delivery. Unlike a paper checklist, an EHR checklist is secure, can seamlessly fit into clinicians’ workflow, and can be instantly shared with other team members and collaboratively updated, resulting in enhanced, team-based, coordinated care. The EHR checklist can prompt clinicians to complete discharge tasks, improve confidence in having done so, and increase process efficiency. Results from a study by Garg et al. (2015) found evidence supporting the hypothesis that an EHR checklist might be better integrated with a clinicians’ workflow and thus be more strongly supported than a traditional, paper checklist. Driscoll & Gurka (2015) state that patients’ EHR has gained acceptance as the primary - if not the sole - means of conveying patients’ specific information, such as discharge status, to the health care team. Moreover, an EHR checklist can be used as a tool to minimize communication breakdowns, improve the delivery of patient care, and increase the efficiency for the related processes (Driscoll & Gurka, 2015). Sevick et al. (2017) reported that a previously published systematic review on the efficacy of electronic discharge tools identified that there is evidence for the implementation of computer-based discharge tools. Burnett (2016) stated the necessity to establish an evidence-based paradigm to incorporate the use of technology with behavioral strategies to enhance multidisciplinary clinical communication and care coordination for effective discharge planning.
National Data

Evident in the literature is that a lack of interdisciplinary communication in hospital discharges contributes to a problem in workflow, adverse patient outcomes, and hospital readmissions. Of the 35 million inpatient hospital discharges that occur annually in the United States, estimates are that approximately one-in-eight patients experience a preventable adverse event (Gao et al., 2018). Recent studies estimate incidence of adverse events range from 19% to 23% within 2 to 5 weeks of post-discharge, which constitutes a costly and unnecessary use of resources (Sevick et al., 2017). National data reports the annual cost of unplanned hospital readmissions to be $15 to $20 billion dollars (Alper et al., 2018).

Much concern for decreasing hospital readmission rates has been expressed in the literature and has been targeted as a high priority for the United States’ health care reform. The United States government passed legislation under the Affordable Care Act’s Hospital Readmission and Reduction Program applying financial penalties for excess readmissions of Medicare patients (Alper et al., 2018). Many hospitalizations are unavoidable, but some readmissions are likely preventable, although the proportion of this is unknown. Alper et al. (2018) report results from a systematic review of 34 studies that found the median proportion of preventable readmissions was 27% and ranged from 5 to 79%.

In 2012, Heslin & Weiss reported that with respect to national level psychiatric unit discharges, hospitalization for mental health disorders increased at a faster rate than for any other type of hospitalization between 2003 and 2011. In 2011, mood disorders and schizophrenia had the highest number of all-cause 30-day hospital readmissions among adult Medicaid patients (Heslin & Weiss, 2012).
Local Data

A large mid-western academic medical center’s hospital-wide, unplanned 30-day readmission rate is 16.6% which is slightly greater than that of the national rate of 15.2% (Hospital Care Data, 2018). Currently, the department of Inpatient Psychiatry has a current readmission rate of 10.79% (Hennepin County Medical Center, 2018). The department of inpatient psychiatry maintains weekly discharge workflow metrics to meet organizational goals - including anticipated discharge order before day of discharge, discharge order signed by 10:00 AM on the day of discharge, discharge by 12:00 PM, discharged within 2 hours of order release, and discharge count. Other than anticipated discharge order before day of discharge, all other metrics are currently not meeting department key performance indicator targeted goals.

Project Purpose

The purpose of this Doctor of Nursing Practice (DNP) Project was to improve interdisciplinary discharge communication between registered nurses, care coordinators, social workers, advanced practice providers, and physicians in the department of inpatient psychiatry at a large mid-western academic medical center. The creation of a smart-tool in the electronic health record for all disciplines to edit was utilized to communicate pertinent patient discharge information prior to patient discharge.

Project Goals

The goal of implementing a smart-tool in the electronic health record was to improve interdisciplinary workflow for registered nurses, clinical care coordinators, social workers, advanced practice providers, and physicians. A secondary goal of implementation of a smart-tool in the electronic health record for interdisciplinary communication was to decrease hospital readmission rates.
Project Objectives

The associated outcome objectives for improving interdisciplinary workflow was not only achieving at least a 5% increase of departmental discharge metrics, but also capturing useful, positive data from post-survey measurement supporting the use of a smart-tool. The outcome objective for decreasing hospital readmission rates was at least a 5% reduction in the total number of hospital readmissions for the department of inpatient psychiatry during the three-month time-period.

Design and Methods

Study Population

The study population included registered nurses, care coordinators, social workers, advanced practice providers, and physicians working in the department of Inpatient Psychiatry at a large mid-western academic medical center. All staff members in these designated roles were included; accordingly, all other departments in the hospital and any staff members not in these designated roles were excluded from the study population.

This population was chosen because identified disciplines are an integral part of the hospital’s discharge process. Discharge from the hospital is a point-of-care that requires clear communication and a coordinated effort from the entire team (Drake et al., 2017). Given that the members of the treatment team are frequently unable to be together when seeing patients, discharge communication confusion for all disciplines can result. All too often a patient’s discharge plan is unclear to nursing staff who are working the unit. There is no clear way to know if a patient has been seen by each needed discipline or if a patient has all needed discharge supplies and medication. Therefore, all involved disciplines need efficient communication to ensure safe patient discharges.
Project Design

The project design followed that of a pretest-posttest design conducted via computer. This method was chosen because it is a practical method of descriptively assessing for improvement in discharge communication by staff feedback (Polit & Beck, 2017; Terry, 2018). Implementation of the project began in January 2019 with an electronic pre-survey and interdisciplinary education and training on use of the new smart-tool in the electronic health record. Education on the use of the smart-tool was sent to interdisciplinary staff electronically and was also available on the department intranet. The education included why the change was needed, the intended goals, and the workflow process to utilize the tool.

The implementation of the smart-tool began February 2019 and lasted through April 2019. After three months of implementation in May 2019, a post-implementation survey was electronically conducted to assess for improvement in discharge communication. In addition to the pre- and post-surveys, three-months of implementation-period of discharge data and hospital readmission rates were collected for analysis for comparison to three-month data prior to implementation to determine statistical significance.

Data Collection and Analysis

During the three-month period of November 2018 through January 2019, discharge metric data were collected that included (1) anticipated discharge orders before a patient’s day of discharge, (2) a patient discharge order signed by 10:00 AM on the day of discharge, (3) a patient discharged by 12:00 PM, and (4) a patient discharged within 2 hours of order release. These data were collected prior to the project’s implementation and then compared to metrics three months after project implementation in May 2019, assessing for improvement in workflow and meeting organizational goals. In addition to this, 3 months of retrospective hospital
readmission rates from November 2018 through January 2019 for inpatient psychiatry were collected and compared to 3 months of hospital discharge readmission rate data after project implementation.

The study population included all registered nurses, care coordinators, social workers, advanced practice providers, and physicians working in the department of inpatient psychiatry. All staff members in these designated roles were included. All other departments in the hospital and any staff members not in these designated roles were excluded from the study population.

Several variables were measured via an electronic pre and post survey to all interdisciplinary staff assessing for improvement of communication after implementation of the smart-tool. The survey was administered and scored by Survey Monkey®. Where applicable, data were analyzed by use of independent-samples t-test. Discharge metric data including anticipated discharge orders before day of discharge, discharged order signed by 10:00 AM day of discharge, discharged by 1200 PM, and discharged within 2 hours of order release were created by nursing quality improvement manager and measured in a spreadsheet. Hospital readmission rates were measured by accessing retrospective data from Mediware software and measured in a spreadsheet.

**Anticipated Findings/Outcomes**

An anticipated finding was reported improvement in discharge communication via post-survey results. A second anticipated outcome was improvement in workflow showing evidence from statistical improvement of department discharge metrics. A third anticipated finding was a decrease in hospital readmission rates during allotted 3-month implementation period.
Ethics and Protection of Human Subjects

The Institutional Review Board (IRB) was contacted and deemed this to be a quality improvement project the purpose of which is to improve a care process and as such did not require review (Appendix A and Appendix B). The project did not gather personal or identifiable patient health information and there was no use of an existing or new medication or device. Participation in the project was voluntary and would not have any impact on employment.

Strengths and Limitations

Strengths of the project included the inclusion of all interdisciplinary staff involved in the discharge process as well as inclusion of all patients, regardless of diagnosis or reason for hospitalization. Another strength was the ability for the DNP candidate to discuss the project in person with staff. Limitations of the project included the lack of a control group and lack of reliability and validity data due to use of a custom survey used for the pretest-posttest design. Another limitation was the potential for project confirmation bias, given that the DNP candidate was working with colleagues who were using the smart tool.

Results

The purpose of this DNP project was to improve interdisciplinary communication during patient discharge from the hospital. The goal of implementing a smart tool in the electronic health record was to improve interdisciplinary workflow for registered nurses, clinical care coordinators, social workers, advanced practice providers, and physicians. A second goal was to decrease hospital readmission rates.
Pre and Post Survey

The pre-survey included 29 respondents: 2 physicians (6.9%), 5 advanced practice providers (17.24%), 2 clinical care coordinators (6.9%), 15 registered nurses (51.72%), and 5 social workers (17.24%). Years in service included 0 respondents for less than 1 year (0%), 2 respondents for 1-2 years (6.9%), 7 respondents for 3-5 years (24.14%), 9 respondents for 6-10 years (31.03%), and 11 respondents for more than 10 years (37.93%).

The post-survey included 16 respondents: 1 physician (6.25%), 3 advanced practice providers (18.75%), 1 clinical care coordinator (6.25%), 8 registered nurses (50%), and 3 social workers (18.75%). Years in service included 1 respondent for less than 1 year (6.25%), 1 respondent for 1-2 years (6.25%), 3 respondents for 3-5 years (18.75%), 7 respondents for 6-10 years (43.75%), and 4 respondents for more than 10 years (25%).

Independent-samples t-tests were used to compare the pre- and post-survey results for the six statements given to respondents; the hypothesized difference between the pre-survey and post-survey population means was assumed to be zero.

For the statement, “Adequate communication exists between Physicians, Advanced Practice Providers, Care Coordinators (Registered Nurses), Registered Nurses, and Social Workers in the Department of Inpatient Psychiatry,” the pre-survey mean was 3.17 (n = 29) and the post-survey mean was 3.19 (n = 16); this increase was not statistically significant $t = -0.45, p = 0.964$).

For the statement, “A patient’s discharge needs are clearly communicated between all team members,” the pre-survey mean was 2.86 (n = 29) and the post-survey mean was 3.19 (n = 16); this increase was not statistically significant $t = -1.072, p = 0.290$.)
For the statement, “Prior to discharge, it is clearly documented when a patient’s needed discharge elements are completed,” the pre-survey mean was 2.52 (n = 29) and the post-survey mean was 3.06 (n = 16); this increase was not statistically significant t = -1.758, p = 0.087).

For the statement, “It is clear when the patient has been seen by all needed interdisciplinary team members,” the pre-survey mean was 2.43 (n = 28) and the post-survey mean was 2.44 (n = 16); this was not statistically significant t = -0.031, p = 0.975).

For the statement, “The current discharge process is disruptive to my current workflow,” the pre-survey mean was 3.41 (n = 29) and the post-survey mean was 2.88 (n = 16); this decrease was not statistically significant t = 1.692, p = 0.101).

For the statement, “The electronic health record is useful for communicating patient discharge information,” the pre-survey mean was 3.72 (n = 29) and the post-survey mean was 3.88 (n = 16); this increase was not statistically significant t = -0.491, p = 0.626).

Two questions that were not included on the pre-survey were included in the post-survey. One question, “I believe that the use of discharge communication tool has improved interdisciplinary discharge communication” resulted in 2 respondents strongly agree (12.5%), 7 respondents agree (43.75%), 6 participants were neutral (37.5%), 1 respondent disagree (6.25%), and 0 respondents strongly disagree (0%). The second question, “I believe that the use of discharge communication tool improved my daily workflow” resulted in 0 respondents strongly agree (0%), 8 respondents agree (50%), 7 respondents were neutral (43.75%), 1 respondent disagree (6.25%), and 0 respondents strongly disagree (0%).
Hospital Discharge Metric Data

The comparison of hospital discharge metric data thirteen weeks pre-implementation from November 2018 through January 2019 to thirteen weeks post-implementation February 2019 through April 2019 are contained in the following table and graph:

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Ant-DC</th>
<th>By 10:00</th>
<th>By Noon</th>
<th>≤ 2 Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 Weeks Pre</td>
<td>695</td>
<td>556</td>
<td>320</td>
<td>495</td>
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<tr>
<td>13 Weeks Post</td>
<td>673</td>
<td>562</td>
<td>402</td>
<td>666</td>
</tr>
<tr>
<td>Change</td>
<td>-22</td>
<td>6</td>
<td>82</td>
<td>171</td>
</tr>
<tr>
<td>Percentage Change</td>
<td>-3.17%</td>
<td>1.08%</td>
<td>25.63%</td>
<td>34.55%</td>
</tr>
</tbody>
</table>

*Table 1: Table of the pre and post intervention discharge metric data*

*Figure 1: Graph of the pre and post intervention discharge metric data*
Comparing the mean counts for anticipated discharge between the pre-intervention thirteen weeks ($M = 4.26$) and the post-intervention thirteen weeks ($M = 3.98$) using an independent-samples $t$-test, the difference was not significant ($t = 0.8769$, $df = 330$, $p = 0.3812$); between the pre-intervention and post-intervention, the number of anticipated-time discharge orders decreased by 3.17%.

Comparing the mean counts for discharge by 10:00 AM between the pre-intervention thirteen weeks ($M = 3.41$) and the post-intervention thirteen weeks ($M = 3.32$), using an independent-samples $t$-test, the difference was not significant ($t = 0.2861$, $df = 330$, $p = 0.7750$); between the pre-intervention and post intervention, the number of discharges by 10:00 AM increased by 1.08%.

Comparing the mean counts for discharge by noon between the pre-intervention thirteen weeks ($M = 1.96$) and the post-intervention thirteen weeks ($M = 2.38$), using an independent-samples $t$-test, the difference was significant ($t = -2.0830$, $df = 330$, $p = 0.0380$); between the pre-intervention and post intervention, the number of discharges by noon increased by 25.63%.

Comparing the mean counts for discharge by at most two hours between the pre-intervention thirteen weeks ($M = 3.04$) and the post-intervention thirteen weeks ($M = 3.94$), using an independent-samples $t$-test, the difference was significant ($t = -2.9651$, $df = 330$, $p = 0.0032$); between the pre-intervention and post intervention, the number of discharges by at most two hours increased by 34.55%.

**Hospital Readmission Rates**

The comparison of hospital readmission rate data three months pre-implementation and three months post-implementation are as follows:
Table 2: Table of the pre and post intervention hospital readmission rates

<p>| | | | |</p>
<table>
<thead>
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<tbody>
<tr>
<td>Pre-Intervention</td>
<td>Nov</td>
<td>12.5%</td>
<td>Mean = 11.80%</td>
</tr>
<tr>
<td></td>
<td>Dec</td>
<td>11.5%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jan</td>
<td>11.2%</td>
<td></td>
</tr>
<tr>
<td>Post-Intervention</td>
<td>Feb</td>
<td>13.1%</td>
<td>Mean = 11.68%</td>
</tr>
<tr>
<td></td>
<td>Mar</td>
<td>9.85%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apr</td>
<td>12.0%</td>
<td></td>
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</table>

An independent-samples t-test comparing the respective means for the two time-periods was not statistically significant $t = 0.1172, p = 0.9123$. There was a 1% decrease in the total number of hospital readmission rates.

**Validity of Results**

A weakness encountered during implementation of the project that may have biased the results is the DNP candidate participating in the project. This may have influenced others to use the tool when they otherwise wouldn’t have. There was also potential for bias from the study population identifying it as useful to support their colleague.

Another weakness encountered implementing the project that could have biased the results is the lack of consistency in using the tool. Given that this was a pilot project and not a mandatory change of workflow for staff, not all staff were required to participate, so nursing staff may not have been able to fully benefit if staff were not utilizing the tool.

**Discussion and Conclusion**

Although the results of this project were not statistically significant in some areas of data analysis, significant improvements were via increases in the key discharge metrics of a patient discharged by 12:00 PM and a patient discharged within 2 hours of order release. This likely
shows an improvement of workflow as well as an increase in meeting organizational goals. Of particular note-worthiness is the 1% decrease in hospital readmission rates where such improvement at any level had a positive mental health impact on patients because they were not being readmitted and on the economic impact to the institution as a result of cost-savings.

An unexpected finding during the project implementation was the positive feedback from staff regarding the DNP candidate talking about the project with in person on a one-on-one basis. The information on the project was electronic and the DNP candidate spent time talking with others in person when able to discuss the tool and its goals. The DNP candidate received positive emails about the project from staff who had been spoken to one-on-one about project. This finding may have occurred as one-on-one communication about change processes may have a higher success rate than group and/or electronic disbursement of information.

The results supported the use of the theoretical model of Lewin’s Change Theory. The initial stage of unfreezing was necessary for people to let go of old patterns that were counterproductive to the discharge process and overcome resistance to change. It was necessary to communicate why the change was needed in staffs’ discharge workflow. The moving, or change phase changed thoughts and behaviors of staff to be more productive in discharge communication. The refreezing stage was necessary to encourage others to continue to use the smart-tool in their daily workflow to avoid digressing to old patterns.

**Future Implications**

Based on the results, it is recommended that the smart-tool in the electronic health record continue to be utilized. As shown by improved discharge metric data and decrease in hospital readmission rates, there is potential for this to have a positive impact on improving
interdisciplinary discharge communication, improving interdisciplinary staff workflow, and decreasing hospital readmissions.

Due to the limitation of the project not including a control group, it is recommended that future studies include a control group. One way this could be achieved is by comparison of the non-control unit to the implementation of the project on the control unit. It is also recommended to include in-person and/or one-on-one education in the future while working on a project affecting a workflow change process due to the positive feedback received from educating and discussing the smart-tool in person on a one-on-one basis.
References


Sevick, L. K., Esmail, R., Tang, K., Lorenzetti, D. L., Ronksley, P., James, M., Santana, M., …

Appendix A

**Institutional Review Board**
Tech Accelerator, Suite 2050
4201 James Ray Drive Stop 7134
Grand Forks, ND 58202-7134
Phone: 701.777.4279
Fax: 701.777.2193
UND.irb@UND.edu

December 18, 2018

<table>
<thead>
<tr>
<th>Principal Investigator(s):</th>
<th>Katelin Umland</th>
</tr>
</thead>
<tbody>
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<td><strong>Project Title:</strong></td>
<td>Implementation of a Smart Tool in the Electronic Health Record to Improve Interdisciplinary Discharge Communication and Hospital Readmission Rates</td>
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<td><strong>IRB Project Number:</strong></td>
<td>IRB-201812-130</td>
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<td><strong>Project Review Level:</strong></td>
<td>Exempt 1, 2</td>
</tr>
<tr>
<td><strong>Date of IRB Approval:</strong></td>
<td>12/18/2018</td>
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<tr>
<td><strong>Expiration Date of This Approval:</strong></td>
<td>12/17/2021</td>
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</tbody>
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The application form and all included documentation for the above-referenced project have been reviewed and approved via the procedures of the University of North Dakota Institutional Review Board.

If you need to make changes to your research, you must submit a Protocol Change Request Form to the IRB for approval. No changes to approved research may take place without prior IRB approval.

This project has been approved for 3 years, as permitted by UND IRB policies for exempt research. You have approval for this project through the above-listed expiration date. When this research is completed, please submit a Termination Form to the IRB.

The forms to assist you in filing your project termination, adverse event/unanticipated problem, protocol change, etc. may be accessed on the IRB website: [http://und.edu/research/resources/human-subjects/](http://und.edu/research/resources/human-subjects/)

Sincerely,

Michelle L. Bowles, M.P.A., CIP
IRB Manager

Cc: Mary Rivard, DNP
Appendix B

HUMAN SUBJECTS RESEARCH COMMITTEE

Hennepin Healthcare

Craig J. Peine, M.D.
Chair
Karen Heim-Duthoy, PharmD
Vice Chair

Date: November 15, 2018

To: Katelin Umland, MSN
   Inpatient Psychiatry
   Hennepin Healthcare

From: Karen Heim-Duthoy, PharmD
       Vice Chair
       Human Subjects Research Committee

Re: “Implementation of a Smart Tool in the Electronic Health Record to Improve
   Interdisciplinary Discharge Communication and Hospital Readmission Rates”

Your project was reviewed and has been determined to fall outside of the IRB jurisdiction,
and does not require IRB approval.

Thank you for bringing this matter to my attention.