The University of San Francisco

USF Scholarship: a digital repository @ Gleeson Library | Geschke Center

Doctor of Nursing Practice (DNP) Projects   Theses, Dissertations, Capstones and Projects

Fall 12-11-2020

Creating a Thriving Informatics Culture

Nicholas Webb
nicolasowebb@aol.com

Follow this and additional works at: https://repository.usfca.edu/dnp

Part of the Nursing Administration Commons, Other Nursing Commons, and the Public Health and Community Nursing Commons

Creating a Thriving Informatics Culture

Nicholas R. Webb, RN, MSN, JD

University of San Francisco

Dr. Juli Maxworthy, DNP, PhD (c), MSN, MBA, RN, CNL, CPHQ, CPPS, CHSE, FNAP, FSSH

Committee Chair

Dr. Elena Capella, EdD, MSN/MPA, RN, CNL, CPHQ, LNCC, Committee Member

October 12, 2020

Acknowledgments

Growing up, my mother used to have a magnet on our refrigerator that said, "You cannot choose your circumstances, but you can choose to overcome them." Suddenly finding herself a single mother of three young children, she went back to college to earn her associate's, bachelor's, master's, and a teaching credential to give her family a better life. Her example made a lasting impression on me, and I hope to pass that on to my children, Nico and Emily. Thank you for your example. I was watching.

I would like to thank some of the wonderful mentors and colleagues who have been graduates of the USF DNP program and who have helped guide me to the top of the mountain. First and foremost, thank you to Dr. Juli Maxworthy for being my 'sherpa' during my ELDNP journey and to my second reader, Dr. Elena Capella, for being an inspirational nursing instructor and second reader. I would like to thank Dr. Ro Lofton, Dr. Philomena Whelan, Dr. Beth Eichenberger, Dr. Debra Morton, and Dr. Jim D'Alfonso for their guidance and mentorship. I would like to thank my two right hands, Directors Liss Leal and Syndra Jones, for covering for me when I was in my class intensives, and to my supervisors Kevin Hart, Desiree Gandrup-Dupre, and Dr. Lisa Massarweh for affording me the opportunity to be there. I also want to recognize some of the larger-than-life bosses from early in my career that set a good example for me to follow on my executive leadership journey: Wayne Brant, Liz Ngassa, Sharon Redman, and Dr. Carolota Cinco.

Last and certainly not least, I would like to thank the love of my life, my wife, my rock, my calm in the storm. Meji, I seriously could not have done this without you. I appreciate your patience, support, and understanding as I have completed this rite of passage. I would like to say that this is my last university rodeo, but we both know that is not likely…thanks in advance :) Te amo mucho!

Table of Contents

SECTION I: Creating a Thriving Nursing Informatics Culture

Abstract

Nurses thrive best when they are empowered to make decisions that can positively impact healthcare delivery. Knowledge and application of nursing informatics principles can influence clinical, quality, operational, and financial outcomes in ways that were not available in previous professional nursing generations.

If nursing informatics is the solution, what is the problem? A survey regarding use and attitudes about nursing informatics was taken of chief nurse executives (CNEs) at an integrated, not for profit healthcare system in the Northern California region, where the author oversees the electronic health record (EHR). The results were surprising. Half said they did not know where to locate certain informatics information in the EHR, and 100% wanted training for their leaders in nursing informatics. This need was further magnified when nurse leaders had a multitude of questions about the COVID-19 dashboard that lived within the EHR.

A theoretical framework developed by Locsin (2017) provided a framework for an evidence-based intervention in the form of education on a COVID-19 dashboard, which was deployed to nursing leaders to increase the knowledge and application of nursing informatics. Using informatics competencies developed for nurse leaders by the American Association of Colleges of Nursing (AACN) to guide the curriculum, nurse leaders received virtual instruction and guidance to move the informatics dial forward. Pre and post-assessments on learning, using a Likert Scale, measured the effectiveness of the intervention. Results showed significant improvements in nurse leader knowledge and comfort with informatics as it relates to COVID-19 due to the training.

Keywords: Informatics, Competencies, Assessment, Nursing, Nurse Leaders, COVID-19

SECTION II: INTRODUCTION

Problem Description

Bacon (1597) remarked that "knowledge is power." Nurses and nurse leaders must be equipped with the power to improve patient safety and quality outcomes. To be empowered by knowledge and data, nurse leaders must have informatics available to them and know how to put them into practice. The way to do this is through mastery of nursing informatics competencies. In today's modern age, frontline nurses and nursing leaders must master technical resources such as the electronic health record (EHR) to improve quality, safety, and efficiency (Kaur, 2015)

It is crucial to ensure that nurse leaders have the competencies to facilitate and support nursing informatics. Kaur (2015) defined nursing informatics as the intersection of computer science, information science, and nursing, where data can be used to facilitate nursing care. As healthcare becomes more digital, informatics and other big data analysis are being discussed in healthcare, and nurse leaders should be at the table leading these discussions (Kwon et al., 2019).

If nurses are not at the table when informatics discussions are taking place among healthcare and industry leaders, they risk losing control over their practice (Booth 2016). Nurses must also become experts in new health technologies and weave nursing informatics knowledge into systems and workflows. There exists a perceived lack of informatics knowledge among nurse leaders and clinical executives. A survey sent out on August 6, 2019, regarding use and attitudes about nursing informatics was taken of chief nurse executives (CNEs) in the Northern California region, where the author oversees the electronic health record (EHR). The results were surprising. Sixteen out of twenty-one CNEs responded, for a response rate of seventy-six percent. Fifty-three percent of CNEs stated they did not know how to locate informatics data for their facility. For those respondents who stated that they did know where the

informatics data was located, a mere fifty-four percent reported they knew how to make use of the data. Ninety-three percent would like to receive training on nursing informatics for CNEs, and 100% were interested in having their leadership teams trained on nursing informatics. With over half not knowing where the information is or how to use it, a tremendous opportunity existed to change practice.

The opportunity for change was magnified as a result of the COVID-19 pandemic. Effectively beginning in the Winter of 2020 in Northern California, the pandemic consumed nearly every hour and minute of the day in terms of preparation and execution. Projects and initiatives that were once top of mind were paused or slowed to make way for the gargantuan effort that it would take to ensure our hospitals were ready for a COVID-19 surge. This required several revisions of the Work Breakdown Structure (WBS) contained in Appendix I. Anything that was not related to COVID-19 prep was not on leadership's radar. Information relating to COVID-19 was at the forefront of everyone's minds. How many patients had been diagnosed? How many persons under investigation (PUIs)? How do we measure whether someone has COVID-19 or not? Is it lab results, or is it a physician assessment? A dashboard was developed by the regional analytics team to provide forward-facing information to hospital stakeholders in Northern California. Once it was rolled out, however, there were quick questions about how to read it, what particular aspects of the dashboard meant, and how they could be applied in clinical practice. Crisis breeds innovation; hence the author developed and launched an evidence-based intervention aimed at increasing nurse leader knowledge and application of the COVID-19 dashboard in the EHR based around AACN informatics competencies for nurse leaders.
Given the heightened focus of COVID-19, there was a lot of support across the region for the initiative. Nurse leaders from CNEs down to house supervisors all asked for and welcomed the

training. As a result of this focus and time being of the essence, a not-human research

determination was submitted to the Research Determination Committee and fast-tracked. A

decision that the project was not research-based was obtained within about seventy-two hours,

far more rapid than usual.

Available Knowledge

PICOT Question. Root and colleagues (2018) examined the rigor of several DNP

projects for practice excellence. Part of their analysis looked at the PICOT process. The PICOT

process can provide structure and focus when identifying gaps in the literature and further

whether it was "rigorous" (p. 262). For that reason, the author wanted to ensure that a rigorous

PICOT question was crafted. The selected PICOT question was: In nurse leaders (house

supervisors, assistant nurse managers, unit managers, service line directors) and facility nurse

executives at a non-profit community hospital system, will the creation and deployment of

informatics training on the COVID-19 EHR dashboard, as opposed to the current state (hinted at

by the CNE survey at the beginning of this paper), improve nursing informatics competencies

among nursing leaders, particularly regarding the COVID-19 pandemic?

The evidence shows us that technology is beginning to play a more significant role in the

healthcare space, particularly when it comes to making or augmenting decisions for clinicians.

From utilizing electronic devices that drive care decisions, improve patient safety, and leverage

the power of the EHR, it is clear there is evidence that exists which can answer the PICO(T)

question. There are limitations and strengths in the evidence as it relates to this project. In terms

of limitations, it must be noted that though decision-making in nursing has been around even

before Florence Nightingale's time, technological decision-making to help nurse leaders make

care decisions is a relatively new phenomenon. There is a lot of evidence (much of which is

displayed in this work), yet nursing informatics nursing lags behind medical informatics in terms of research and practice.

Literature Review

Sengstack (2015) wrote that "The word informatics was introduced around 1957 and was believed to be Russian (from *informatika*) in origin" and that "Other sources have postulated that it was coined in the 1960s and was influenced by the combination of the words *information* and *automatic*" (p. 1). Automatic information, either pushed from a centralized source or available at the nurse leader's fingertips, could be used to make clinical nursing decisions and leadership practice decisions. Nurse leaders who can use empirical data through nursing informatics can make decisions that positively impact care delivery at the bedside. Forty-two articles were reviewed. The University of San Francisco Library's online search engine (Fusion) was used. Search terms included "nursing leadership competencies," "teaching nursing competencies," and "validating nursing competencies." Inclusion criteria included articles published in the last five years and articles from scholarly peer-reviewed journals. Articles from international journals were considered. Exclusion criteria included articles older than five years and articles which did not have a defined methodology. Many of the articles which were initially reviewed were excluded as they did not include transparent methodology or data analysis sections (there were over forty such articles). Ten were ultimately selected and included in the review due to their relevance. The evidence was evaluated using the Johns Hopkins Evidence Evaluation Model (Dearholt & Dang, 2018, and detailed in Appendix C).

Though there are many aspects of information technology used by nurses in healthcare, nursing leaders do not always have the access and knowledge to lead through informatics and data, nor do they possess the tactical or strategic competencies (Kassam, Nagle and Strudwick,

2017). Fore, Islim and Shever (2019) conducted an observational study on acute care inpatient

nursing units at a large academic medical center where sixty-three nurses from twenty-five units

were observed. They examined average times to complete everyday nursing tasks charted in the

EHR and those not documented. They found that over half of the activities performed by nurses

did not fit into categories abstracted from the EHR. For this reason, they feel that utilizing the

EHR for cost accounting is an exciting approach, and further recommended that additional

sources of data should be utilized to capture relevant data appropriately. This is significant as

nurse leaders need to know where and how to find data that can be used to better patient

outcomes. Fortunately, the literature was rich with research examining and advocating the use of

nurse leader informatics competencies.

Informatics competencies.

Informatics competencies are often taught at the nursing graduate school (MSN, Ph.D.,

and DNP) level. As more and more nurse leaders become educated at the graduate level, they

must understand nursing informatics competencies to be valuable participants and contributors to

the profession. Shea and colleagues (2019) advocated that nurses who learn how to use data will

be able to transform health care delivery. Shea believes that nurses can use data for decision-

making and to inform care, but they must have skills to manage data at the point of care. There

remains a shortage of clinicians to support these changes, and graduate education does not

necessarily instill relevant nursing informatics competencies in students. The importance of

ensuring that nurse leaders embody informatics competencies cannot be understated.

Competencies influence outcomes.

In order for nurse leaders to positively impact healthcare, they must exhibit evidence-

based behaviors, in the form of competencies. The Outcome-Based Education Model (OB-CE),

described by Graebe (2019), provides a framework to assess nurse competence. Achieving learner outcomes is the focus, and time is the variable. The OB-CE model focuses less on time, as many traditional educational curriculums do (such as credit hours or continuing education hours), but rather on the validation of learner knowledge and performance (p. 102). The OB-CE, developed by the American Nurses Credentialing Center (ANCC), writes Graebe (2019), points out that learning occurs in environmental factors such as culture, institutional structure, resources, and systems issues. This can undoubtedly be true of nursing informatics, where long-existing cultures and practices are beginning to meld with new technological advances and discoveries. Competency frameworks have also been found to help set clear goals and targets and improve how the practice is organized (Stanford, 2016).

Closing the competency gap

It is crucial to assess the baseline competency of nurse leaders as it relates to nursing informatics. Pordeli (2018) conducted an evidence-based study at a 304-bed, non-profit Magnet recognized hospital in Florida. There, twenty-one informatics nurses were provided a pre-assessment to examine gaps in nursing informatics competencies. The researcher's primary objective was to construct a professional development program to meet the organization's informatics competency needs. After the education was delivered, the post-assessments determined an increase in computer skills competency by 25.41%, privacy/security competencies increased by 26.21%, and data mining competencies by 51.64% (Pordeli, 2018).

It is imperative that to become an integrated profession, leaders at the forefront of nursing must adopt and embrace informatics. Remus (2016) believes that inadequate development of informatics competencies by chief nurse executives may lead to the inability of a health system to reap the benefits of EHRs. Remus further argued that despite this, CNEs who are informatics

savvy will be the ones to lead the way and effectively advocate for nurses and patients. This can

be done, Remus believes, through transformational CNEs who will empower nurses to become

knowledge workers who can deliver evidence-based practices.

Nurse leaders can play an important role at the table through the implementation and use

of EHR data (Sturdwick et al., 2019) Sturdwick and colleagues conducted a study that used a

modified Delphi technique with a panel of nurse leaders in Canada, with a Likert Scale used to

rate the relative priority of twenty-six potential competency statements obtained from a review of

the literature. The study reached a consensus on twenty-four of those competency statements and

used a Likert scale to determine priorities. The study found that greater than 70% of the

respondents fell within two points on the seven-point Likert scale. When looked at together, the

results showed that all statements had a mean of five or greater on a seven-point Likert scale

(with one being a low priority and seven being a high priority). The competencies are being

presented to informatics organizations and national nurse leaders for adoption in the future.

Regional Nursing Informatics in the Form of a COVID-19 Dashboard

Informatics at the regional level, in the form of a COVID-19 dashboard, has provided

relevant and actionable data and improved relevant competencies. As stated previously, 53% of

CNEs did not know where to locate informatics data for their facilities. Having a regional

dashboard allowed for centralized resources that could be used by multiple facilities. The

concept of a centralized hub for informatics has been explored in several disciplines in

healthcare. Namulanda and colleagues (2018) reported that EHRs could advance environmental

public health tracking through multiple data sites, which in their case was health departments in

four different states. One particular example circled the use of a regional hospital system's

diabetes registry and monitoring of hemoglobin A1C (HgbA1c) levels for type two diabetes

monitoring (disclosure: this case study was done at the student's hospital system and region of

employment). The study demonstrated the practicality of using HgbA1C levels for public health

surveillance efforts in type two diabetes patients. Hazlehurst and their team (2015) looked at

comparative effectiveness research (CER) across six different healthcare systems utilizing an

informatics hub. EHR data was examined to look at the effectiveness of medications to control

asthma and the effectiveness of smoking cessation interventions in primary care environments

for over 2.5 million patients. Hazlehurst believes that use of CER can provide for accelerated

knowledge development as it relates to nurses using EHRs This concept was utilized as an

intervention to support the author's PICOT question.

The literature found that many nurse leader tasks are administrative. Nurse leaders need

to spend more time with their staff and at the bedside instead of spending time on administrative

tasks, such as gathering or analyzing data (Fore, Islim & Shever, 2019). Nursing leaders,

particularly CNEs, who utilize nursing informatics, can be transformational leaders in healthcare

(Remus, 2016). Further, the literature showed that informatics competencies could be taught via

continuing professional education in a non-profit hospital setting (Georgsson, 2019).

Conceptual Framework

Through Locsin (2017), there is an evidence-based theoretical model where technology

can peacefully coexist and thrive with the caring aspects of nursing. Concepts such as

technology, which may not historically be looked at as being of a caring nature, have a place in

the realm of nursing. The survey provided to the CNEs described earlier indicated that nurse

leaders may not be comfortable using and deploying informatics, highly dependent on

technology. Locsin asserts a series of five assumptions that allow technology to coexist and

thrive with nursing peacefully. These include that people fundamentally care by virtue of their

humanness; that the ideal of wholeness is a perspective of the unit; that knowing people occurs

through a multidimensional process; incorporation of both health and technology are components

of caring, and that nursing is fundamentally a discipline and a professional practice. Locsin's

theoretical model and assumptions will guide the project. A full list of these assumptions is

contained in Appendix N. It is Locsin's fourth assumption, that incorporation of both health and

technology are components of caring, that is most integral for this project. To use informatics, a

technology to help patients can be looked at as a *higher form of caring*. Informatics can allow

nurse leaders to lead and support initiatives that reduce harm, keep patients safe, improve quality

outcomes, and decrease the amount of time patients spend in a hospital. This is caring.

Nurses, often associated with caring, may not be the first profession one thinks of when

speaking about technology. However, if nurse leaders are going to be successful in helping

nursing become a truly integrated profession that is distinct from medicine, they must learn how

to navigate toward the intersection of caring and technology. Nurse leaders must speak in terms

that interdisciplinary teams like medicine, pharmacy, and finance can understand and respect.

Nurses are already known for their exemplary ability to care. Locsin's framework ensures that

there is a place at the table of competent nursing informatics nurses.

Locsin (2017) provided five prongs for his theory of caring and technology in nursing.

The fourth prong, technologies of health and nursing, are elements for caring by providing a

bridge between traditional aspects of nursing caring and the technology that can support them.

Nursing has traditionally been associated with holding a patient's hand, inserting an intravenous

catheter, or providing medication. Informatics, as viewed through Locsin's theory, allows us to

look at other forms of caring, such as informatics. In fact, the study and application of

informatics can, itself, be a form of caring. Is monitoring patients to prevent the spread of a

deadly viral disease a form of caring? Is ensuring that an inpatient bed and ventilator is available

quickly for a COVID-19 patient a form of caring for patients? Though it doesn't take away from

the nurses on the frontlines, preventing the spread of infection and bed control through EHR

dashboards is a form of caring that is compatible with nursing practice. Informatics, as an

extension of technology, is thus also an extension of nursing care.

Specific Aims

The PICOT question for this project focused on determining whether or not the providing

education on the EHR's COVID-19 dashboard would improve informatics competencies among

nursing leaders. The evidence reviewed indicated that it was possible to provide interventions

that can improve nurse leader informatics competencies that are compatible with caring (as

demonstrated by Locsin's theory).

This project aimed to improve informatics competencies for nurse leaders so that they

can lead using data to help them make decisions that more positively impact care at the bedside.

Nurse leaders must know where to locate informatics data and also must be proficient in using it

to influence outcomes. An aim statement was developed for the author's project: By September

1, 2020, develop, implement and evaluate an educational program for COVID-19 dashboards

located within the EHR for twenty-one non-profit hospitals at an integrated health system in

Northern California.

SECTION III: METHODS

Context

The setting for this project was twenty-one hospitals in an integrated, non-profit healthcare system in Northern California. Nearly 100% of patients in the system have insurance coverage by virtue of the organizational structure. Education for satisfying the competencies was deployed among inpatient nurse leaders and executives to move the dial. The hospital's registered nurses were represented by a labor union, while nurse leaders and executives were not unionized. Nurse leaders and (relevant) executives all had access to the EHR yet did not have access or knowledge of all of the related reports available from the system that they use. At that time, we did not intend to provide frontline registered nurses with the data from these reports, though there is technically nothing secret about them. There have been instances where nurse leaders and executives wanted to share information, and they have reviewed the reports with their nurses to change their practice positively. A phase two effort, to be possibly deployed later, may provide frontline nurses with the opportunity to access the data themselves. This would be optimal.

All nurse leaders and facility executives have access to computers, and most have a rudimentary understanding and familiarity with the EHR. Though the EHR is the primary source of information, it can be one of many. Currently, communication about EHR reports and changes/updates to the system come through a regional email from the EHR communications department. There is also an online alert available to all leaders and frontline nurses on facility intranet pages, which advertises changes and updates to the EHR system. Though all facilities have a Director of Clinical Education, Practice, and Informatics (DCEPI), the information cascaded down to frontline nurse leaders and executives varied depending on the engagement of the particular DCEPI for their facility. Some DCEPIs cover multiple facilities, making it challenging

to cascade information up and down the chain of command due to geography and distance. Most of the DCEPI role is educational, and very little has to do with informatics (this also varies by facility).

It is also important to note that in terms of setting, the current state of informatics in the facility should be contrasted with the current state for physicians in the same hospitals. Physicians have an embedded informatics structure with associate physicians in charge (APICs) who oversee technology and the department technology leads (DTL) who cover all aspects of KPHC for their facility. An important piece to note is that the nursing side of the house lives within the organization's non-profit wing, while the physician side of the house primarily lives in the for-profit arm (medical group). This is significant because the medical group is primarily run by physicians, while the non-profit wing is run primarily by nurse leaders (and often, non-clinician administrators). The medical group conducts many informatics initiatives, including, but not limited to, studying the number of clicks each physician must perform to access certain aspects of the EHR. When compared with nursing informatics, physician informatics appears more robust in the organization. Though there are certainly fewer opportunities for funds on the non-profit nursing side, it does not mean that informatics should not exist for nurses.

Intervention

This project's objectives included three selected informatics competencies that are recommended for nurse leaders by the American Association of Colleges of Nursing (2011). These competencies are contained below and also located in Appendix D.

- Use of technology, information management systems, and standardized terminology
- Retrieval information systems, including access, evaluation of data, and application of relevant data to patient care

- Use of technology to analyze data sets and their use to evaluate patient care outcomes

CNEs have reported that they did not have access to or know how to use informatics data in their facilities. They indicated that they would like training for themselves and their nursing leadership teams. The AACN nursing leadership informatics competencies provide a framework from which the education was designed and carried out. The use of these competencies may allow nurses to provide transformational care using technology in a caring way.

The author's Executive Leader, Doctor of Nursing Practice (ELDNP) project, focused on the creation and implementation of regional informatics reporting training on the COVID-19 dashboard. Education was planned around access and use of the dashboard. Before the COVID-19 dashboard was created, several reports were available to nurse leaders in the EHR. However, these reports were generally limited and forward-facing. The author's organization (the author themselves did not create the dashboard) created a one-stop-shop for nurse leaders to be able to do this at the click of a button, which it accomplished. Training and education were provided to teach nurse leaders how to read, interpret, and apply the COVID-19 dashboard to hospital operations and clinical practice.

As organizations seek to become more efficient, they often rely on distance education. The education for this project was not an exception. The education planned for this project was developed and delivered through distance learning via a video course recorded to Microsoft Stream, using a questionnaire created by Microsoft Forms, and hosted on a Microsoft Teams site. Georgsson (2019) discussed the uses and advantages of eLearning and distance pedagogy in nursing informatics education. The ability of nurses to utilize distance learning, particularly as it relates to nursing informatics, can be empowering due to its adaptability to the learner, and the flexibility it provides the nurse while balancing other professional responsibilities (Georgsson,

2019). With our nursing leaders having multiple and changing priorities throughout their day, it

will be imperative to give them flexibility regarding the mode and timing of education. Kwon et

al. (2019) stated that nurses can employ 'Wisdom-in-Action' (WIA) to utilize the information

generated by machine learning to make clinical decisions to benefit patients. WIA can help

nurses understand the complexity of applying knowledge…to make appropriate clinical

decisions" (p. 210) and consists of person and environment-factors, as well as knowledge.

Kwon's WIA provides a starting point and stops short of providing a theoretical basis in which to

merge data and nursing.

Study of the Interventions

The desired outcome measure was to increase nursing informatics nurse leader

knowledge so that they could better access and utilize data to make clinical, operational quality

and financial decisions to improve healthcare delivery. Nurse leader knowledge was measured

via a Likert scale, which measured the proficiency of informatics competencies (See Appendix

P).

The question then became: 'so, what?' So, what if nurse leaders were well versed in

nursing informatics? What benefit did that bestow upon the hospital system where this

intervention took take place and the communities that it served? Not only were the Likert scales

employed to measure satisfaction with the learning process, but the opportunity also existed for

nurse leaders who were educated to provide their opinions and feedback on the value of the tools

employed, as well as what tools and strategies they might like to see in the future. Other trends,

such as clinical and quality outcomes and use of reporting tools, were monitored to look for any

noticeably significant trends. However, there was no discernable difference as it was challenging

to measure during the COVID-19 surge prep as patient demographics/population changed

significantly.

Measurable goal.

Each of the AANC competency was addressed through the training. Nurse leaders were educated on these in a web-based training developed by the author's team. The goal was for knowledge of the dashboard to increase at least ten percent on the Likert scale (when comparing pre and post-assessment results).

Gap analysis.

At the outset of this project, a gap analysis was conducted. A survey regarding use and attitudes about nursing informatics was taken of chief nurse executives (CNEs) in the Northern California region. The CNE survey's results were displayed earlier in this work and affirmed the need for evidence-based intervention. The intervention of providing accompanying education will increase nurse leader informatics competencies and close the perceived gap. Please see Appendix G for the gap analysis.

GANTT chart.

In order to strategize and navigate, a GANTT chart (Appendix H) was developed in order to reverse-engineer the steps of the project in a way that would allow project timelines to be monitored, adjusted, and implemented. Milestones were evaluated weekly to ensure that the project was on track. Deviations and extraneous variables necessitated revisions of the GANTT chart in order to satisfy successful project intervention and completion.

At least two different iterations of the GANTT chart transpired during the course of this project. The GANTT chart was revised during the California Wildfires during the Summer/Fall of 2019 due to employment demands. The second revision of the chart was perhaps the most significant, though, due to the scope and focus of the author's project being changed as a result of

the COVID-19 virus pandemic in Northern California. The project scope focused more on informatics as it related to COVID-19, as opposed to educating nursing leaders in nursing informatics in a general way. Thought originally to be a hindrance, the narrowing of the scope and focus of the project was actually fortuitous, as there was a lot of attention on patient data and interpretation during the pandemic, particularly as it related to the virus. It is thought that this may have actually led to higher participation of nurse leaders in the intervention.

Though it went through multiple updates, the GANTT chart's structure was fundamentally the same. Items ranging from the intervention pre-work (such as a gap analysis, SWOT analysis, literature review for evidence-based solutions) still transpired and paved the way for a successful intervention deployment. Following the prep work and intervention, intervention results were analyzed and studied, and results reviewed with relevant stakeholders.

SWOT analysis.

Prior to providing an intervention, it was necessary to assess the landscape in terms of what the organization was and was not prepared for. A SWOT (strengths, weaknesses, opportunities, and threats) analysis was conducted (Appendix K).

Strengths were found to include highly skilled technical teams at the *regional* nursing informatics level (this did not tend to be true in the *local* medical centers). These teams were tenured and well-versed in the technological skills and processes required to make applications function. Additionally, high-level strategic roadmaps were in place regionally, which mapped out project deployments. Weaknesses included that 67% of CNEs reported that they didn't know where to find informatics data for their facilities (Appendix K). This was particularly concerning and provided much of the impetus for this project, sparking the idea for the delivered intervention. Opportunities included close coordination with other regions at the regional level (though it was

later found there is poor coordination between local facilities within the region). There was also a willingness to explore the utilization of best practices from external organizations and from the scholarly literature, which was an advantage. Threats included competition from other healthcare organizations, as well as a reluctance to share EHR information among organizations (this has recently shifted in a favorable way). Another threat was that the EHR is built by a third-party vendor.

The intervention was able to leverage some of the organization's assessed strengths (such as highly-skilled regional technical teams) and weaknesses (such as knowledge deficits for nurse leaders in informatics) while shoring up opportunities (utilizing evidence-based practice in the scholarly literature) and reducing threats (such as contributing and sharing information from the intervention with wider nursing leadership and informatics audience).

Work breakdown structure.

The SWOT analysis determined that 67% of CNEs did not know where to access informatics data at their local medical centers. Combined with the literature review that identified Locsin's theory of technology and caring in nursing, which showed that the fundamental aspect of caring in nursing could peacefully coexist, even thrive, with technology, the framework for an evidence-based intervention was formulated. A work breakdown structure model (Appendix I) was developed for this project utilizing three overarching phases of the project: development, implementation, and evaluation. Fundamental stages included:

- Assessing organizational readiness

- Searching through and selecting relevant evidence-based practices in the scholarly literature

- Creating pre- and post-intervention assessments

- Coordinating and executing the project intervention at twenty-one hospitals

- Analyzing and interpreting results

The work breakdown structure allowed for the project to be broken into separate parts which could, at the project's conclusion, be aggregated to provide a clear and concise overall picture that will positively contribute to nursing informatics knowledge and allow the intervention to spread across the author's organization and to other healthcare delivery systems across the world.

Responsibility and communication plan.

Providing role clarity and responsibilities for those individuals or groups who worked on the project was of utmost importance. As such, a responsibility and communications plan was developed. This plan, contained in Appendix J, details the deliverable or task, as well as the responsible stakeholder. This is further broken down as to whether the responsible individuals' work scope involved being a driver, responsibility, accountability, support, consultation, and being informed. The author was the primary driver for most of the project components, though select others also drove certain aspects and supported project goals. The COVID-19 dashboard within the EHR was not developed by the author (the director of analytics developed it). The training was recorded/narrated/produced by a nursing clinical informatics consultant and EHR senior learning consultant. Specifically, the plan was divided into four phases. Phase one included the author becoming more knowledgeable by learning more about nursing informatics and passing the nursing informatics certification exam from the American Nurses Credentialing Center (ANCC). The second phase consisted of developing a curriculum for facility nurse leaders, developing communication for facility nurse leaders, receiving the green light and buy-in from facility CNEs, and ensuring that all components are in place. The third phase included nurse leaders taking the Likert-scale pre-assessment and delivering the curriculum. The final and

fourth phase included having nurse leaders taking a post-assessment, providing the findings back

to leadership, and discussing the next steps and possible spread across the region.

Proposed budget.

Though all participants for this project were salaried employees, they displaced some of

their other responsibilities (albeit, even if only briefly). The average hourly wage for nursing

leaders in the author's organization is $94.23. The pre-assessment development took about five

hours for a total cost of $471.15. The post-assessment development took about four hours, for a

total cost of $376.92. The curriculum development took about eighty hours, for a total cost of

$7,538.40. Education class attendance for one-hundred-eighty attendees will cause 45 hours to

be expended (fifteen minutes of training each), resulting in a task total of $4240.35. When

coupled with the 250 hours the author expended on research, coordination, and the intervention

delivery, when combined and totaled together, 384 hours were expended for a total of

$36.184.32

Analysis

The evaluation of this project intervention occurred through a pre and post-assessment (see

Appendix E). The long-term strength of the effects of an intervention can be collected from several

points in time, similar to a pretest/posttest design (Alessandri, 2017). The researchers also noted,

however, that several factors could hinder the capacity to collect data further, including financial

constraints, poor compliance, and relocation of participants to other areas. Lack of funds, level of

monitoring compliance, and participants relocation in different areas were not an issue.

Standardized measurements of data that are consistent were an essential component of this

project. As the EHR data is stable and longstanding, it did not impact this project. Kwon et al.

(2019) talked about the importance of the International Classification of Nursing Practice (ICNP),

which is a worldwide system for represent nursing practice using standardized terminology. There was a consistency of documentation structure during the pre and post-assessment periods.

A standard Likert scale with a rating of one through five was developed to gauge nurse leader understanding/knowledge before and following the project intervention. The pre and post-assessments were deployed electronically via the hospital's intranet, and a link was sent by email to nurse leaders in Microsoft Teams.

Harpe (2015) analyzed the challenges of measuring certain types of data. They stated that while some data is more straightforward to measure, such as blood pressure or hospital length of stay, cognitive phenomena are more difficult to measure than discrete data. A design such as a Likert scale was crafted as a way to measure some of the more abstract concepts in research. The positive movement on the Likert scale assessment was considered successful. The survey elements are included in Appendix P.

Ethical Considerations

Ethical considerations for this project focused more on the potential missed opportunity of not empowering nurse leaders with informatics knowledge. The American Nurses Association (ANA) Code of Ethics (2015) provides ethical standards for nurses to espouse for professional practice. Provision 5.5 of the Code of Ethics regards competence as a "self-regarding duty" that impacts not just a nurse's self-esteem and self-respect, but also the quality of care provided to patients (p. 22). In general, organizations need to assess their risk when it comes to their informatics competencies. Many large organizations assess their risk to the point where they will set aside money for either legal or compliance costs throughout their fiscal/calendar year. As lawsuits and regulatory fines can be in the millions and billions of dollars, healthcare organizations need to prepare for such risks. However, it is not only litigation and regulatory fines which can

damage an organization's pocketbook. Haslem and colleagues (2017) discussed that the cost of the litigation itself is not the only point of impact on a corporate defendant. An example cited by the researchers was damage to an organization's reputation. The organization where this project intervention was deployed needs to preserve and propel its reputation for delivering state of the art outcomes for every patient, every time. To provide this service in the future, the organization will need to stay relevant and at the forefront of nursing practice by embracing nursing informatics from infancy to maturity, which can be achieved by mastering nurse leader informatics competencies.

       Reflection of Jesuit values and ANA ethics standards.

       Two lenses with which to look at this project are through the Jesuit Values and the American Nurses Association (ANA) Ethics Standards. Jesuit institutions such as The University of San Francisco (USF) often have philosophies that espouse values and principles such as "Unity of Heart and Mind" (Streetman, 2015). The nursing aspect of caring is often associated with the human heart, while informatics is often associated with the human mind. By combining these two powerful forces, institutions such as USF can prepare nurse leaders to lead with both their hearts and their minds. The ANA provides ethics standards for nurses in general but also has developed scope and standards of practice for nursing informatics, which was published in 2015. Two of the six standards will be discussed here, 5B and 5C. 5B, Health Teaching and Health Promotion, states, "The informatics nurse employs informatics solutions and strategies for education and teaching to promote health and a safe environment" (p. 75). This project sought to introduce not only informatics solutions for nurse leaders but seeks to teach nurse leaders about these goals. Similarly, standard 5C of the ANA Code provides that informatics nurses will provide "consultation to influence the identified plan, enhance the abilities of others, and effect change"

(p. 76). The provided intervention enhanced the abilities of nurse leaders and effectuated change by increasing their professional competence. Since the focus of this project was on quality improvement, the project was evaluated and approved as a quality improvement project through the University of San Francisco School of Nursing and Health Professionals (Appendix A).

SECTION IV: RESULTS

Results

Over the course of a month, the training was viewed by nurse leaders across the 21-

hospital region. One hundred eighty-two leaders took the training and filled out the pre- and

post-assessments to gauge their understanding as it related to the AANC competencies. Of those,

eight were CNEs, thirty-three were directors, thirty-four were managers, eighty-three were

assistant nurse managers, and fourteen were house supervisors. Six non-clinical leaders (non-

nurses) and two respiratory leaders (also non-nurses) took the survey. The non-clinical leaders

and respiratory leaders, though relevant, were not included in the final results as this project

focused on moving the dial on AANC informatics competencies, which are nursing specific.

This resulted in 182 responses, eliminating the six, resulting in an *n* of 174 valid responses.

Table 1

Survey participants who completed pre- and post-assessments
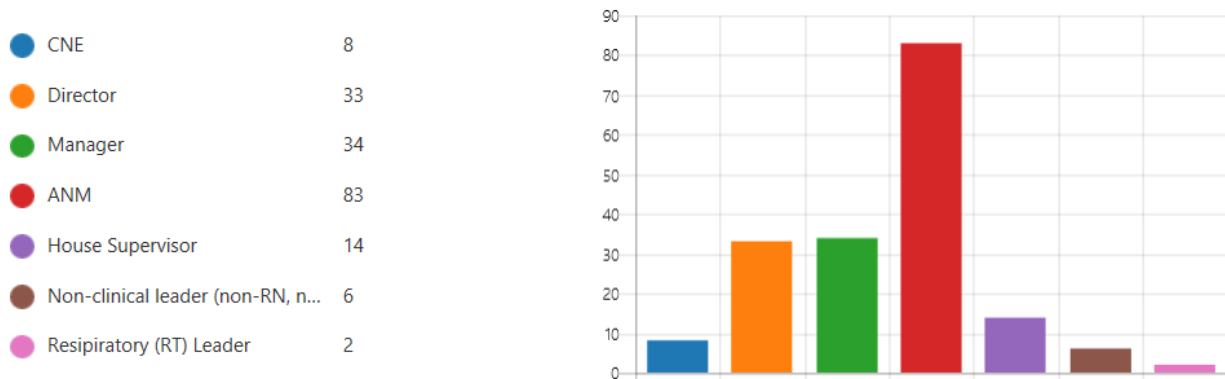
The pre-assessment gauged nurse leader knowledge and level of comfort with the

COVID-19 dashboard before the training intervention. This was used as a baseline to see where

nurse leader knowledge and beliefs were before the training. As discussed previously, a Likert

scale was used for measurement. The results follow below.

Table 2

Pre-Assessment Results

Pre-Assessment: Prior to proceeding with this training, please rate your level of knowledge and comfort with the following statements:

More Details

■ Very Low   ■ Low   ■ Average   ■ High   ■ Very High

My level of comfort/knowledge with the Coronavirus-Hospitalized Patients Dashboard (RO) prior to compl...

100%   0%   100%

Similar to the pre-assessment, the post-assessment utilized a Likert scale to gauge

comfort and knowledge with the COVID-19 dashboard after the training intervention. Those

results follow below.

Table 3

Post-Assessment Results

Post-Assessment: After completing this training, please rate your level of knowledge and comfort with the following statements:

More Details

■ Very Low   ■ Low   ■ Average   ■ High   ■ Very High

My level of comfort/knowledge with the Coronavirus-Hospitalized Patients Dashboard (RO) after completi...

100%   0%   100%

The table below details the pre- and post-assessment Likert scales (also included as Appendix F).

Table 4

Summary of Pre- and Post-Assessment Results

	Knowledge level pre-training %	Knowledge level post-training %	Difference (Improvement)
Very low	13.6	0	13.6
Low	21.5	2.9	18.6
Average	37.9	25.3	12.6
High	18.6	46	27.4
Very high	8.5	25.9	17.4

Qualitative responses.

In addition to the quantitative responses captured in the pre- and post-assessments, forty-eight nurse leaders provided free-text qualitative feedback at the end of the training. Responses were relatively consistent in that the training intervention helped nurse leaders understand the COVID-19 dashboard. A sampling of the qualitative responses are included in Appendix O. There were no critical issues with content, though there were some concerns about the size of the font (which was increased), technical connectivity problems, and several requests to add clinical nurse educators and clinical nurse specialists to this training and provide additional training. Technical issues were looked at and will be resolved for any future pieces of training.

Knowledge check.

To ensure that participants were gaining an understanding of the subject matter and not merely clicking through the training to get through it without absorbing the material, a knowledge-check was placed in the training response form, which gauged substantive understanding and ensured that they watched the video. A full eighty-four percent of respondents

selected the correct answer, suggesting that they watched the video and took the time to provide

meaningful feedback via the Likert scales. This was demonstrated by the data below.

Table 5

Learning Verification to Ensure Learners Were Not Just Clicking Through the Training,

Correct Answers

🔵 Hospitalized in this instance -...	144	✓
🟠 Hospitalized in this instance -...	20	
🟢 Hospitalized in this instance -...	7	
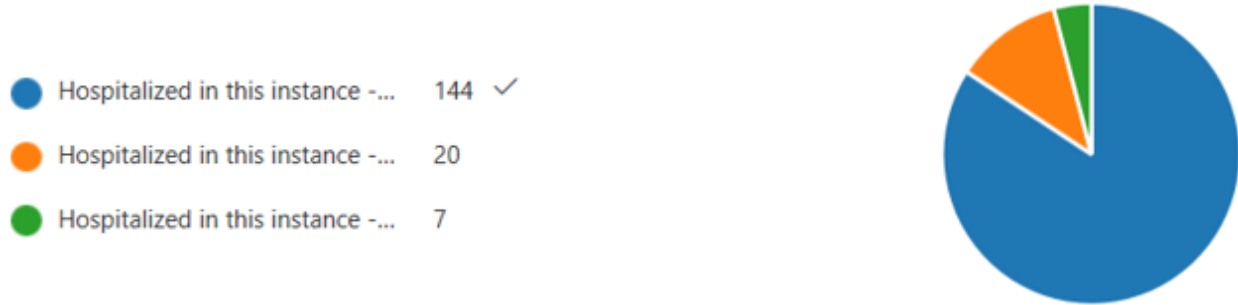
SECTION V: DISCUSSION

Summary

A survey sent to CNEs in the Northern California region determined that informatics competencies were lacking among nurse leaders and that they desired more training for them and their nurse leader teams on nursing informatics. A review of the literature showed the importance of nurse leaders being competent in nursing informatics, and that educational intervention is an evidence-based solution which can yield results.

Achievement of project aims.

The project aims were achieved as there was significant movement in terms of competence as measured on the Likert scale. Most impressive was that there was a 17.4 point increase (or a 204.7% increase) in nurse leaders who rated themselves as having very high knowledge after completing the training (the number of nurse leaders rating themselves as having very high knowledge after completing the training nearly tripled as opposed to before the training). This surpassed the ten percent goal that was initially set at the project's outset.

Key findings.

There were several key findings from this project. First and foremost, it showed that nurse leaders were hungry for education on informatics and that their competency soared after receiving this training. Nurse leaders who rated themselves 'very low' in the pre-assessment at 13.6% and were reduced to 0% in the post-assessment. The leaders who rated themselves as low at the beginning stood at 21.5% and decreased to 2.9%. Those rating themselves as average in the pre-assessment were 37.9% and was reduced to 25.3% in the post-assessment. Leaders rating themselves high in the pre-assessment stood at 18.6%, which increased to 46% in the post-

assessment. Finally, the nurse leaders who rated themselves having 'very high' competence in the pre-assessment stood at 8.5%, which then increased to 25.9%.

At the outset of planning for this project, delivering the training in person was contemplated, yet COVID-19 necessitated social distancing, which required the training to be delivered remotely. This had the benefit of saving budgetary dollars by not requiring live, in-person instructors, and reimbursing them for travel expenses, as well as being able to reach nurse leaders at twenty-one hospitals, which were several hours' drive time apart from each other.

The response rate from nurse leaders during the COVID-19 surge and prep was a surprise, as there were so many different changing priorities during the pandemic. As shown in Table 1, over a third of the surveyed CNEs responded, which was a good result considering all of the work that was being done with the COVID-19 surge at the time. This shows that a critical and needed gap was filled that was found to be meaningful by nurse leaders and executives across the region. Responses and participation will continue to be monitored on future training interventions. The transition to remote training has emerged as a new possibility that can be duplicated in several other avenues, including new hire training and continuing education on the EHR.

Results were disseminated to nurse leaders across the region. As the project was successful, it will likely have positive implications for advanced nursing practice. This will likely take the form of more informatics projects that can empower nurse leaders to improve patient safety, quality, and outcomes. Nurse leaders will be able to demonstrate competency at reading the COVID-19 dashboard (and likely other dashboard reports), which can improve patient outcomes, as evidenced by the literature.

Interpretations

The results from this project are consistent with findings from other publications existing within the literature. This project utilized an educational intervention with a Likert scale, which was in line with available evidence-based practice within the current body of knowledge. This project will undoubtedly impact people and systems within the organization, from showing that remote training was indeed possible and even quite useful to improving nurse leader competencies in nursing informatics, which may have a positive impact on care outcomes.

The costs of delivering this training were relatively low due to its remote nature and that it could be done at any time of the day, which did not require nurse leaders to interrupt their busy schedules to make room for the important training. An inverse relationship exists between the cost (low) and the potential for leadership change. The literature showed that nurse leaders who are well-versed in nursing informatics competencies are better and propel the profession forward as they are able to understand and wield data that can improve patient outcomes.

Perhaps the most significant takeaway from the project was that it is possible for technology and caring to coexist in nursing peacefully. Locsin's framework provides that technology and caring can exist together, and this project is a case study of how this can happen effectively. Nursing informaticists and nurse leaders, depending on their position and practice area, may sometimes feel that they are a few steps removed from the point of care. Bedside nurses who provide clinical interventions directly to patients see the fruits of the labor and the connections that are made between their skills and outcomes daily. The COVID-19 pandemic offered nurse leaders the opportunity to care for patients in different ways. One of those ways was through the collection and interpretation of COVID-19 data and directing nursing care based on those data sets. The collection and use of data allowed nurse leaders to care for patients at a

level that perhaps has not been seen before. Interpreting a COVID-19 dashboard which shows

which patients were persons under investigation (PUI) or patients who tested positive helped

nurse leaders make life or death decisions that informed staffing, allocation of resources, patient

placement, and throughput decisions, and infection control/prevention strategies. There was a

direct correlation established between the COVID-19 data in the EHR and what was happening

on the front lines of care. The deliberate use of data during the COVID-19 pandemic no doubt

saved lives, reduced hospital length of stay, and kept more patients from being admitted to the

hospital in the first place. This allowed nurse leaders to 'care' in ways that they may not have

delivered care before. This was caring at its best, perhaps even a higher form of caring, as it

allowed nurse leaders to properly care for those nurses who were doing care on the front lines.

Limitations

It is important to cite some of the pitfalls which exist with big data. In her 2016 book

Weapons of Math Destruction, data scientist Dr. Cathy O'Neil examined some of the potential

pitfalls of utilizing big data. O'Neil believes that big data looks backward, and not forward. The

ability for data to truly look forward would require 'moral imagination' which she argues is

something that only human beings are capable of providing. O'Neil argues that in order to have

ethical data models, we must embed better values into our algorithms, which could entail

prioritizing fairness over profits.

Failure to adopt and embrace informatics at the nurse leader level can result in turnover

among leaders and possibly even staff. Technological resources can both improve and detract

from employee work experiences (Carlson, 2017). This is perhaps most true in the millennial

population, who stereotypically have been quicker to adopt technology than previous

generations. Nurse leaders want to be part of secure, stable, and forward-thinking organizations

that align with their interests and values. Those organizations which do not lead in informatics may be placing themselves at a disadvantage.

The generalizability of results should also be examined as it relates to nursing leader informatics competencies. Using evidence-based research, this project produced a favorable outcome by increasing nurse leader competencies in informatics so that they can more positively contribute to better clinical, operational, quality, and financial decisions. Though healthcare organizations differ in size, budget, location, and scope (among other variables), the intersection of caring and data is inevitable. Nurses are often cited as the world's most trusted profession, will need to become more familiar with how to access and use informatics data no matter where they are employed or volunteer. With the federal government promoting interoperability (formerly 'meaningful use') requirements, all hospitals, clinics, and other healthcare organizations will likely adopt and continue to utilize EHRs, which will allow us to mine data better patient outcomes.

Despite the potential drawbacks of the increasing informatics use and knowledge, the benefits far outweigh the risks. Nursing informatics empowers leaders to know their patient data to make better decisions about how patient care is delivered. This can have clinical, operational, quality, and even financial ramifications.

Conclusions

The evidence in the literature demonstrates that nursing informatics is essential, as is knowledge in the form of competencies. Despite the widespread acknowledgment that the competencies in question are essential, there was a realization that these competencies are not being understood, practiced, or embraced by nurse leaders, even those at the executive level. Though there are potential drawbacks of reducing certain aspects of care to a form of usable

data, a happy medium can be developed using a theoretical framework that acknowledges that

data and caring can peacefully exist, even thrive together. Using these evidence-based practices,

the author provided a very successful educational intervention at their place of employment to

move the dial on nurse leader informatics competencies with favorable results, which can be

duplicated across the continuum.

SECTION V: REFERENCES

Alessandri, G., Zuffiano, A. & Perinelli, E. (2017). Evaluating Intervention Programs with a

Pretest-Posttest Design: A Structural Equation Modeling Approach. *Frontiers in*

Psychology, *8*(223), 1-12. https://doi.org/10.3389/fpsyg.2017.00223

American Association of Colleges of Nursing. (2011). *The Essentials of Master's Education in*

Nursing. Retrieved from

https://www.aacnnursing.org/Education-Resources/AACN Essentials

American Nurses Association. (2015). *The Code of Ethics for Nurses with Interpretive*

Statements. Silver Spring, MD: Nursebooks.org. Retrieved from:

https://www.nursingworld.org/practice-policy/nursing-excellence/ethics/code-of-ethics-

for-nurses/coe-view-only/

American Nurses Association. (2015). *Nursing Informatics: Scope and Standards of Practice.*

Silver Spring, MD: Nursebooks.org. Retrieved from

http://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=nlebk&AN=102

1761&site=ehost-live&scope=site

Bacon, F. (1597). *Meditationes Sacrae and Human Philosophy*. (n.p.).

Retrieved from

https://books.google.com/books/about/Meditationes_Sacrae_and_Human_Philosophy.ht

ml?id=ieO2NjBGmewC

Booth, R. (2016). Informatics and Nursing in a Post-Nursing Informatics World: Future

Directions for Nurses in an Automated, Artificially-Intelligent, Social-Networked

Healthcare Environment. *Canadian Journal of Nursing Leadership*, *28*(4), 61–69. doi:

10.12927/cjnl.2016.24563

Carlson, R., Carlson, D., Zivnuska, S., Harris, R., & Harris, K. (2017). Applying the job

    demands resources model to understand technology as a predictor of turnover intentions.

    Computers in Human Behavior, *77*, 317-325.

    doi: 10.1016/j.chb.2017.09.009

Fore, A., Islim, F., & Shever, L. (2019). Data collected by the electronic health record is

    insufficient for estimating nursing costs: An observational study on acute care inpatient

    units. *International Journal of Nursing Studies*, *91*, 101-107. doi:

    10.1016/j.ijnurstu.2018.11.004

Georgsson, M. (2019). Uses and advantages of eLearning and distance pedagogy in nursing

    Informatics education. *Online Journal of Nursing Informatics* (OJNI), *23*(2),7.

Graebe, J. (2019). Continuing Professional Development: Utilizing Competency-Based

    Education and the American Nurses Credentialing Center Outcome-Based Continuing

    Education Model. Journal of *Continuing Education in Nursing, 50*(3), 100-102.

    doi: 10.3928/00220124-20190218-02

Harpe, S. (2015). How to analyze Likert and other rating scale data. *Currents in Pharmacy*

    Teaching and Learning, 7, 836-850. doi: 10.1016/j.cptl.2015.08.001

Haslem, B., Hutton, I., & Smith, A. H. (2017). How Much Do Corporate Defendants Really

    Lose? A New Verdict on the Reputation Loss Induced by Corporate Litigation. *Financial*

    Management, *46*(2), 323–358. doi: 10.1111/fima.12171

Hazlehurst, B. L., Kurtz, S. E., Masica, A., Stevens, V. J., Mcburnie, M. A., Puro, J. E., … Sittig,

    D. F. (2015). CER Hub: An informatics platform for conducting comparative

    effectiveness research using multi-institutional, heterogeneous, electronic clinical

    data. *International Journal of Medical Informatics*, *84*(10), 763–773. doi:

10.1016/j.ijmedinf.2015.06.002

Kassam, I. et al. (2019). Informatics Competencies for Nurse Leaders: A Scoping Review.

Journal of Nursing Administration, 49(6), 323-330.

doi: 10.1097/NNA.0000000000000760

Kaur, S. (2015). Importance of Nursing Informatics in Nursing Curriculum for utilization of

Information Technology in Nursing Profession. *Baba Farid University Nursing Journal*,

9(2). Retrieved from http://eds.a.ebscohost.com/eds/detail/detail?vid=2&sid=e41071a8-

9806-4f7b-84b6-

d27070c5fbdc%40sessionmgr4006&bdata=JkF1dGhUeXBlPXNzbyZzaXRlPWVkcy1sa

XZlJnNjb3BlPXNpdGU%3d#AN=125594197&db=a9h

Kwon, J., Karim, M., Topaz, M., Currie, L. (2019). Nurses "Seeing Forest for the Trees" in the

Age of Machine Learning: Using Nursing Knowledge to Improve Relevance and

Performance. *Computers, Informatics, Nursing*, 37(4), 203-212. doi:

10.1097/CIN.0000000000000508

Locsin, R. (2017). The Co-Existence of Technology and Caring in the Theory of

Technological Competency as Caring in Nursing. *The Journal of Medical Investigation*,

January 1, 2017, 64(1.2), 160-16. doi: 10.2152/jmi.64.160

Namulanda, G., Qualters, J., Vaidyanathan, A., Roberts, E., Richardson, M., Fraser, A.,

McVeigh, K., Patterson, S. (2018). Electronic health record case studies to advance

environmental public health tracking. *Journal of Biomedical Informatics, 79*, 98-104.

doi: 10.1016/j.jbi.2018.02.012

Nelson, K. (2017). Nurse Manager Perceptions of Work Overload and Strategies to Address It.

Nurse Leader, 15(6), 406-408. doi: 10.1016/j.mnl.2017.09.009

O'Neil, C. (2016). *Weapons of Math Destruction*. New York City, NY: Crown Publishing.

Pordeli, L. (2018). Informatics competency-based assessment: Evaluations and determinations of

nursing informatics competency gaps among practicing nurse informaticists. *Online*

Journal of Nursing Informatics, 22(3). Retrieved from

http://eds.a.ebscohost.com/eds/detail/detail?vid=9&sid=a99bed4b-bf8f-471f-a1f1-

f5f6da17df5f%40sessionmgr4007&bdata=JkF1dGhUeXBlPXNzbyZzaXRlPWVkcy1saX

ZlJnNjb3BlPXNpdGU%3d#AN=edselc.2-52.0-85056654047&db=edselc

Remus, S. (2016). The Big Data Revolution: Opportunities for Chief Nurse Executives. *Nursing*

Leadership, 28(4), 18-28. doi:10.12927/cjnl.2016.24557

Root, L., et al. (2018). Advancing the Rigor of DNP Projects for Practice Excellence. *Nurse*

Leader, *4*(16), 261-265. doi: 10.1016/j.mnl.2018.05.013

Sengstack, Patricia (2015). *Mastering Informatics: A Healthcare Handbook for Success*.

Indianapolis, IN. Sigma Theta Tau International. Retrieved from

http://eds.b.ebscohost.com/eds/detail/detail?vid=2&sid=179bc0a9-8336-4288-8992-

a6117ea96d7f%40sessionmgr103&bdata=JkF1dGhUeXBlPXNzbyZzaXRlPWVkcy1saX

ZlJnNjb3BlPXNpdGU%3d#AN=iusf.b2774766&db=cat00548a

Shea, K. et al. (2019). A model to evaluate data science in nursing doctoral curricula. *Nursing*

Outlook, 67(1), 39-48. doi: 10.1016/j.outlook.2018.10.007

Stanford, P. (2016). How can a competency framework for advanced practice support care?

British Journal of Nursing, *25*(20), 1117-1122. doi:10.12968/bjon.2016.25.20.1117

Streetman, H. (2015). Jesuit Values, Ignatian Pedagogy, and Service Learning: Catalysts for

Transcendence and Transformation via Action Research. *Jesuit Higher Education: A*

Journal, 4(1), 36-50. Retrieved from

http://eds.a.ebscohost.com/eds/detail/detail?vid=2&sid=e311084d-41e3-4d4d-8a42-

7dcd4cd1c5b9%40sessionmgr4006&bdata=JkF1dGhUeXBlPXNzbyZzaXRlPWVkcy1sa

XZlJnNjb3BlPXNpdGU%3d#AN=103584722&db=eue

Sturdwick, G. et al. (2019). Adapting and validating informatics competencies for senior nurse

leaders in the Canadian context: Results of a Delphi study. *International Journal of

Medical Informatics*, 129(9), 211-218. doi: 10.1016/j.ijmedinf.2019.06.012

SECTION VI: APPENDICES

Appendix A

Signed Statement of Non-Research Determination Form

Student Name: **Nicholas Webb**

Title of Project: Creating a Thriving Nursing Informatics Culture

Brief Description of Project:

In June 2019, the student/author began a new position as Regional Managing Director of Kaiser Permanente's (KP) HealthConnect (HC) program overseeing twenty-one non-profit Kaiser Foundation Hospitals (KFH). As KP's version of the widely used Epic electronic medical record (EHR) system, KPHC is a data powerhouse that contains EHR records for over twelve million current insurance plan members. The physicians have a regional and facility-by-facility structure to cascade KPHC updates and initiatives up and down the chain (referred to herein as the 'Department Technology Lead' or 'DTL' structure), while nursing does not. This structure allows physicians to use informatics from the EHR data to make decisions that impact patient safety and quality.

Bacon (1597) remarked that "knowledge is power." Nurses and nurse leaders must be equipped with the power to influence patient safety and quality outcomes. This is so because patient safety and quality outcomes are essential to patients/members and organizational survival in terms of financial, regulatory, legal, and performance requirements. In order to be empowered by knowledge and data, nurses and nurse leaders

must have it available to them and know how to use it. The way to do this is through the use of nursing informatics.

Kassam, Nagle & Strudwick (2017) wrote that "Globally, health information technologies are now being used by nurses in a variety of settings. However, nurse leaders often do not have the necessary strategic and tactical informatics competencies to adequately ensure their effective adoption and use." Fortunately, the literature is ripe with research examining and advocating the use of nurse leader informatics competencies. Several researchers have done studies on both the existence and efficacy of nursing informatics competencies for nurse leaders, including but not limited to Westra and Delaney (2008); Remus and Kennedy (2012); and Collins et al., (2017).

A) Aim Statement: By September 1, 2020, develop, implement, and evaluate a centralized nursing informatics hub and intraregional nursing informatics meeting structure for Kaiser Foundation Hospital's twenty-one Northern California hospitals.

B) Description of Intervention: The author's Executive Leader Doctor of Nursing Practice (ELDNP) project will focus on the implementation of a centralized informatics hub and data repository, as well as the creation of a facility-by-facility and regional informatics reporting and distribution structure. Education will be planned around access and use of the informatics hub. The critical criterion on which to evaluate the importance of informatics-based on the EHR for nurses and nurse leaders is whether it is accessible and whether they know how to use it. In the current state, there are several reports which are available to nurse leaders in KPHC. However, these reports and generally limited and forward-facing. There is no opportunity or avenue for a frontline nurse leader or facility executive to say, "Hey, I would like to see variable "X" for all of my patients in a report

to be run tomorrow." The author would like to create a one-stop-shop for nurse leaders to

do this at the click of a button. If timing and budget permit, we are also considering using

an electronic app that will interface with the system, which will allow nurse leaders to get

up-to-date data even when they are not physically at work. The hub (or app) may also be

used to submit suggestions or opportunities for improvement to regional KPHC leaders

for implementation.

C) How will this intervention change practice?

A centralized nursing informatics hub will allow nurse leaders in Kaiser's twenty-

one Northern California medical centers to have access to actionable data that they can

use to make practice decisions that relate to clinical, quality, staffing, regulatory,

financial, and legal requirements.

A structure to get information to and from KP HealthConnect (KPHC) to our

facilities will aid in the facilitation of projects, initiatives, and other information that

otherwise is not being accomplished. Will lead to greater cohesion between KPHC and

the KFH Patient Care Services team. Education will happen in this model, with

effectiveness measured by an assessment after the intervention is provided.

D) Outcome measurements: Measurable Project Objectives:

The objectives of this project will include the following informatics competencies

that are recommended for nurse leaders prepared at the master's degree level by the

American Association of Colleges of Nursing (2011):

1. Use of technology, information management systems, and standardized

    terminology

2. Use of standardized terminologies to document and analyze nursing care outcomes

3. Retrieval information systems, including access, evaluation of data, and application of relevant data to patient care

4. Electronic health record, including policies related to the implementation of and use to impact care outcomes

5. Use of technology to analyze data sets and their use to evaluate patient care outcomes

Goal: For each of the above five competencies, to increase the knowledge of the learner in each competency on an assessment by greater than or equal to 20% by providing the project intervention.

The project will be done at hospitals in the Northern California region and may eventually be spread nationally.

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used:

(http://answers.hhs.gov/ohrp/categories/1569)

✓ This project meets the guidelines for an Evidence-based Change in Practice Project, as outlined in the Project Checklist (attached). Student may proceed with implementation.

Appendix B

Letter of Support from the Organization

Mon 9/9/2019 8:49 AM

Desiree J Gandrup-Dupre

RE: DNP Project

To   Nicholas R Webb

Sounds like a great project Nick. I support and approve this to move forward.

Regards,

Desiree Gandrup-Dupre
Vice President and Information Officer
Care Delivery Technology Services NCAL & Technology Innovation
Kaiser Permanente
1950 Franklin, 10th Floor
Oakland, CA 94612
(O): 510-625-5676
(M): 510-301-2001

Assistant:
Beverly Salguero
Beverly.k.salguero@kp.org

Appendix C

Evaluation Table

Citation: author(s), date of publication, title	Purpose of study	Conceputal Framework	Design/Method	Sample/Setting	Evidence /QualityLevel
Hazlehurst, B. et al. (2015). CER Hub: An informatics platform for conducting comparative effectiveness research using multi-institutional, heterogeneous, electronic clinical data. International Journal of Medical Informatics, 84: 763-773.	CER data was examined across six different healthcare regions, including hospitals in Hawaii, California and Texas.	Looked at the capability of connecting data across organizations and analyzing the data for the greater good.	Non-experimental study, descriptive.	Over 2.5 million members across six different healthcare regions and organizations.	3/A
Kassam, I. et al. (2019). Informatics Competencies for Nurse Leaders: A Scoping Review. Journal of Nursing Administration, 49(6), 323-330.	The authors sought to consolidate informatics competencies for nursing leadership.	Looked at the competencies for nurse leaders in informatics.	Meta-synthesis.	Looked at 15 articles. Themes related to competency were examined.	3/A
Locsin, R. (2017). The Co-Existence of Technology and Caring in the Theory of Technological Competency as Caring in Nursing. *The Journal of Medical Investigation*, January 1, 2017, 64(1.2): 160-164.	Locsin provides a theoretical framework for the coexistence of technology and caring.	Here, he introduces a theoretical framework. Locsin asserts there are a series of five assumptions which allow technology to have a place in nursing. These include that	Nursing theory.	Nursing theory.	4/A

		people fundamentally care by virtue of their humanness; that the ideal of wholeness is a perspective of the unit; that knowing people occurs through a multidimensional process; incorporation of both health and technology are components of caring, and that nursing is fundamentally a discipline and a professional practice			
Namulanda, et al. (2018). Electronic health record case studies to advance environmental public health tracking. Journal of Biomedical Informatics, 79: 98-104.	This article looks at case studies that focus on the sharing and centralizing of electronic health record (HER) documentation.	One case study looked at the relationship between HgbA1c monitoring and general type two diabetes monitoring in a Northern California regional	Meta-analysis of different case studies where randomized controlled trials were used.	Over 400,000 EHRs in Contra Costa and Solano (CA) counties.	1/A

		healthcare system. The study looked at 412,400 members who lived in Contra Costa and Solano counties.			
Pordeli, L. (2018). Informatics competency-based assessment: Evaluations and determinations of nursing informatics competency gaps among practicing nurse informaticists. Online Journal of Nursing Informatics, 22(3).	Gap analysis conducted. Pre and post assessment (pre and post-test) completed.	Increase in competencies ranging from 26 to 51% increase, depending on the competency.	Evidence-based experimental research.	21 informatics nurses at a 304-bed non-profit hospital in Florida	2/A
Remus, S. (2016). The Big Data Revolution: Opportunities for Chief Nurse Executives. Nursing Leadership, 28(4): 18-28.	The researcher examined the role of chief nursing executives in using big data/nursing informatics to change nursing practice.	The researcher looked at servant-based competencies and transformation-based competencies and contrasted each with both the AONE and the Academy of Canadian Nurse Executives competencies.	Meta-synthesis through expert opinion.	Various.	5/A
Sengstack, Patricia (2015). Mastering Informatics: A	Handbook teaching about history and	Looks at history, practice and	Non-research.	N/A	5/A

Healthcare Handbook for Success. Indianapolis, IN. Sigma Theta Tau International. Shea, K. et al. (2019). A model to evaluate data science in nursing doctoral curricula. *Nursing Outlook*, 67(1): 39-48.	practice of healthcare informatics.	applications for nursing informatics.			
Stanford, P. (2016). How can a competency framework for advanced practice support care? British Journal of Nursing, 25(20): 1117-1122.	Examined the perceptions of nurse practitioners in relation to a competency framework.	Looks at competency framework for nurse practitioners.	Qualitative cross-sectional design	8 advance practice nurses (nurse practitioners)	3/A
Shea, K. et al. (2019). A model to evaluate data science in nursing doctoral curricula. *Nursing Outlook*, 67(1): 39-48.	Focused on the importance of data science (informatics) as it relates to nursing doctoral curriculum.	Doctoral curricula were examined using DSCOM criteria. One-hundred twenty-three (123) different matches were found by examining the syllabi for courses at the university.	Quasi-experimental research	123 different matches were found using machine learning technology. Matches were looked at to determine whether there were gaps in data science in the doctoral curricula.	2/A
Sturdwick, G. et al. (2019). Adapting and validating informatics competencies for senior nurse leaders in the Canadian context: Results of a Delphi study. *International*	Sturdick and colleagues conducted a study which used a modified Delphi technique with a panel of nurse leaders in Canada, with a Likert Scale used	Modified Delphi technique/Likert scales.	Expert agreement on 24 competencies for Canadian	24 nursing informatics competencies were agreed to by the subject matter experts.	4/A

Journal of Medical Informatics, 129, September: 211-218.	to rate relative priority of twenty-six potential competency statements obtained from a review of the literature. The study reached a consensus on twenty-four of those competency statements and used a Likert scale to determine priorities. The competencies are being presented to informatics organizations and national nurse leaders for adoption in the future.		informatics nurse leaders.		

Appendix D

Selected ACNN Nursing Informatics Competencies for Master's Prepared Nurses

- Use of technology, information management systems, and standardized terminology

- Retrieval information systems, including access, evaluation of data, and application of

  relevant data to patient care

- Use of technology to analyze data sets and their use to evaluate patient care outcomes

Appendix E

Likert Scale Surveys

Pre-Assessment: Prior to proceeding with this training, please rate your level of knowledge and comfort with the following statements:

More Details

■ Very Low   ■ Low   ■ Average   ■ High   ■ Very High

My level of comfort/knowledge with the Coronavirus-Hospitalized Patients Dashboard (RO) prior to compl...

100%   0%   100%

Post-Assessment: After completing this training, please rate your level of knowledge and comfort with the following statements:

More Details

■ Very Low   ■ Low   ■ Average   ■ High   ■ Very High

My level of comfort/knowledge with the Coronavirus-Hospitalized Patients Dashboard (RO) after completi...

100%   0%   100%

Appendix F

Pre- and Post-Intervention Assessments and Deltas

	Knowledge level pre-training %	Knowledge level post-training %	Difference (Improvement)
Very low	13.6	0	13.6
Low	21.5	2.9	18.6
Average	37.9	25.3	12.6
High	18.6	46	27.4
Very high	8.5	25.9	17.4

Appendix G

Gap Analysis

Gap Analysis		
Area under consideration:	Creating a thriving nursing informatics culture at Northern California non-profit hospitals.	
Desired State	**Current State**	**Action Steps**
100% of nurse leaders will have access to and know how to use nursing informatics concerning AANC Nurse Leader Competencies.	A survey regarding use and attitudes about nursing informatics was taken of chief nurse executives (CNEs) in the Northern California region, where the author oversees the electronic medical record (EHR). The results were surprising. 53% of CNEs stated they did not know how to locate informatics data for their facility. For those respondents who stated that they did know where the informatics data was located, a mere 54% stated they knew how to make use of the data. 93% would like to receive training on nursing informatics for CNEs, and 100% were interested in having their leadership teams trained on nursing informatics.	Nursing informatics training and education will be provided for nurse leaders through distance education.

Appendix H

GANTT Chart

Task	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20
GAP Analysis	■																
SWOT Analysis	■																
Literature Review	■	■															
Completion of Online Module "Protecting Human Subject Research"			■														
Submit Manuscript				■													
Submit Prospectus					■												
Prospectus to be approved by first and second reader prior to beginning the evidence-based intervention process.					■												
Manuscript to be approved by first and second reader and then submitted to the Online Journal of Nursing Informatics.						■	■	■									
A curriclum will be designed (reconfigured due to COVID-19). *Note: this is a deviation which occurred due to the COVID-19 Pandemic. Originally, this was going to be more general. Pivoted to focus on COVID-19 Intervention.*						■	■	■									
Pre assessment designed.						■	■	■									
Post assessment designed.								■									
Schedule intervention.								■									
Communicate invitation to participate in intervention education.								■									
Send out intervention link.									■	■							
Send out reminders to leaders to take the training										■							
Review intervention assessment results.										■							
Interpret assessment results										■							
Communicate intervention result with reginoal leaders											■						
Draw conclusions from assessment results											■						
Integrate into final project paper.											■	■	■	■	■	■	
Revisions, edits, discussions with faculty chair and second reader.																	■
Final project presented to faculty.																	■
Graduation																	■
Submit project to become part of the scholarly body of evidence-based literature																	■
Discuss spreading project to other areas within the region and nationally																	■

Appendix I

Work Breakdown Structure
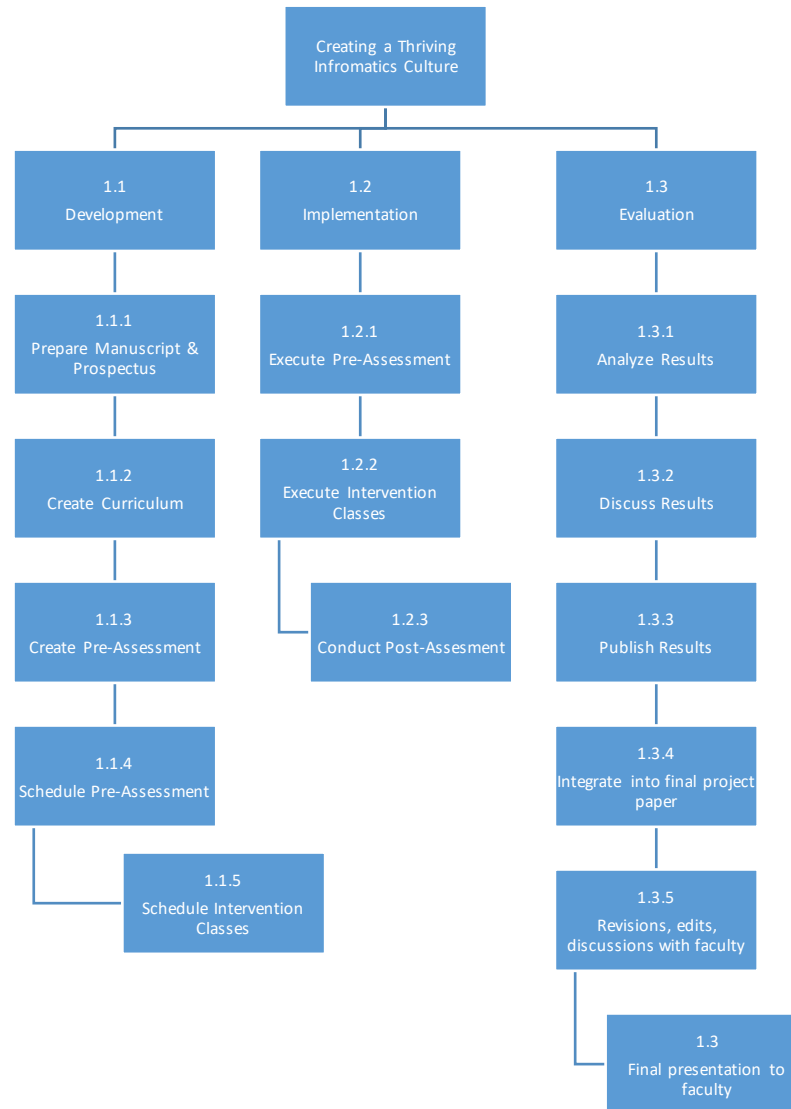
Appendix J

Responsibility/Communication Matrix

RACI Matrix

Creating a Thriving Informatics Culture

Deliverable or Task	DNP Student Author	Nursing Consultants	Analytics	Chief Nurse Executives (CNEs)	Nurse Leaders (learners)
			Sponsor / Leadership		
Phase 1					
Become Educated on Nursing Informatics	D				S
Pass Nursing Informatics Certification Exam	D				
Build COVID-19 Dashboard In EHR	R		D		
Phase 2					
Develop Curriculum for Facility Nurse Leaders	D	C			
Develop Pre- and Post-Assessment	D				
Film and Produce Training for Nurse Leaders	R	D			
Phase 3					
Communicate to Nurse Leaders	D			S	
Deliver intervention (curriculum) to nurse leaders	D				R
Phase 4					
Analyze intervention findings	D				I
Report findings and incorporate into final project	D				I
Insert new rows above this one					

D	Driver
R	**Responsible**
A	**Accountable**
S	**Support**
C	**Consulted**
I	**Informed**

RACI Matrix

Creating a Thriving Informatics Culture

Deliverable or Task	DNP Student	Nursing Consultants	Analytics	Chief Nurse Executive (CNE)	Nurse Leaders
				Sponsor / Leadership	
Phase 1					
Become Educated on Nursing Informatics	D				S
Pass Nursing Informatics Certification Exam	D				
Build COVID-19 Dashboard In EHR	R		D		
Phase 2					
Develop Curriculum for Facility Nurse Leaders	D	C			
Develop Pre- and Post-Assessment	D				
Film and Produce Training for Nurse Leaders	R	D			
Phase 3					
Communicate to Nurse Leaders	D			S	
Deliver intervention (curriculum) to nurse leaders	D				R
Phase 4					
Analyze intervention findings	D				I
Report findings and incorporate into final project	D				I
Insert new rows above this one					

D	Driver
R	Responsible
A	Accountable
S	Support
C	Consulted
I	Informed

Appendix K

SWOT Analysis

STRENGTHS (+)

- Highly skilled *technical* teams
- Tenured teams that are well-versed in history and processes
- Roadmaps are in place, 3 more services being added this year

WEAKNESSES (–)

- Every employee doesn't have a backup/isn't cross-trained (especially the training team)
- 67% of CNEs report they don't know where to find informatics data for their facilities
- 2% of training is done remotely

OPPORTUNITIES (+)

- To coordinate with other regions, agencies and organizations outside of our own
- Utilization of best practices from external organizations and from scholarly literature
- Ability to increase our ability to care for more members in our community by staying affordable

THREATS (–)

- Competition from other healthcare organizations
- Reluctance to share EHR information among organizations
- The EHR is built by a third party vendor

Appendix L

Project Budget

Project Task	Labor Hours	Labor Cost/Hr	Travel Cost	Other Cost	Total Per Task
Pre-Assessment Development	5	$94.23	n/a	n/a	$471.15
Post-Assessment Development	4	$94.23	n/a	n/a	$376.92
Curriculum Development	80	$94.23	n/a	n/a	$7,538.40
Education Class Attendance	45	$94.23	n/a	n/a	$4,240.35
Total	134	$94.23	n/a	n/a	$12,626.82

Appendix N

Locsin's Five Assumptions Structure of the Theory of

Technological Competency as Caring in Nursing

1. Persons are caring by virtue of their humanness.

2. The idea of wholeness is a perspective of unity.

3. Knowing persons is a multidimensional process.

4. Technologies of health and nursing are elements for caring.

5. Nursing as a discipline and a professional practice

Appendix O

Sampling of Qualitative Statements from Training Survey

Director: "Excellent Video! Really helped me understand this important dashboard."

Regional Executive: "This is very helpful. Thank you.

Assistant Nurse Manager: "Good place for information update. Thank you."

Director: "I don't need any additional training, just to practice with the dashboard."

Manager: "I would like to arrange additional training for Med-Surg ANMS. Thanks!"

Chief Nurse Executive: "Thank you for this excellent presentation."

Director: "This was great thank you!"

Manager: "Since my area of expertise is in the perioperative area, this was helpful in navigation

of the various options related to COVID."

Manager: "Very helpful to reinforce what I already knew."

Manager: 'Great learning module."

Appendix P

Survey Questions

Questions	Responses 187

Nurse Leader COVID-19 KPHC Dashboard Training

This training is being offered to KP NCAL inpatient nurse leaders. Being able to access and interpret dashboard data can help nurse leaders improve patient safety, quality, throughput and positively impact other outcomes.

This training consists of a pre-video Likert scale and a post-video Likert scale, both to measure understanding, as well as one multiple choice question to gauge retention. Total anticipated time to complete training is under 10 minutes.

The COVID-19 KPHC dashboard training includes a basic question regarding your current role, a pre-training knowledge question, and two post training knowledge questions. The total anticipated time of the training is no more than 10 minutes. Your participation is voluntary and data will be reviewed and de-identified aggregate format only.

Disclosure: Information obtained from this training/survey will be used to improve the learner experience and may also be used for academic/quality improvement purposes (evidence-based practice DNP project, non-research). Any identifying information such as name/contact information will not be used or distributed to third parties.

Thank you to Wendy Windle and Diana Habra-Rotheneder for developing and narrating this training.

1

What is your current role at KP?

○ CNE

○ Director

○ Manager

○ ANM

○ House Supervisor

○ Non-clinical leader (non-RN, non-MD, non-RT, etc.)

○ Respiratory (RT) Leader

2

Pre-Assessment: Prior to proceeding with this training, please rate your level of knowledge and comfort with the following statements:
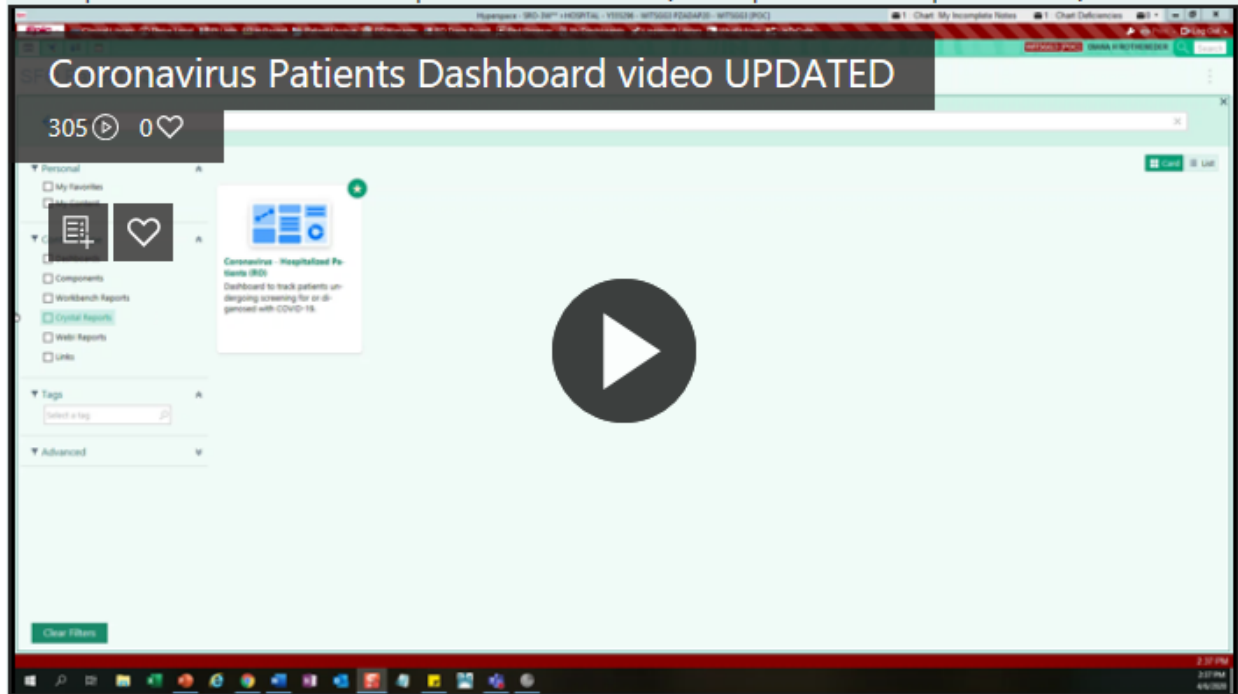
	Very Low	Low	Average	High	Very High
My level of comfort/knowledge with the Coronavirus-Hospitalized Patients Dashboard (RO) prior to completing the following training.	○	○	○	○	○

3

After watching the video below, please answer question #3:

What is the name of the blue hyperlink on the dashboard that shows the number of patients hospitalized that have been exposed to COVID-19 (which pulls from the problem list)?

Coronavirus Patients Dashboard video UPDATED

○ Hospitalized in this instance - Exposure ✓

○ Hospitalized in this instance - Ruled Out

○ Hospitalized in this instance - Resolved COVID

4

Post-Assessment: After completing this training, please rate your level of knowledge and comfort with the following statements:

	Very Low	Low	Average	High	Very High
My level of comfort/knowledge with the Coronavirus-Hospitalized Patients Dashboard (RO) after completing the above training.	○	○	○	○	○

5

Please provide any additional feedback on how we can make this course better in the space below. If you would like to receive additional training on KPHC dashboards, please indicate you would like to be contacted and include your KP email address. This survey is anonymous - your email will only be used to respond back to you if you want us to follow up with you. This text field is voluntary.

Enter your answer