Southern California CSU DNP Consortium

California State University, Fullerton
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DEVELOPMENT OF A DASHBOARD FOR NURSING-SENSITIVE INDICATORS

A DOCTORAL PROJECT

Submitted in Partial Fulfillment of the Requirements

For the degree of

DOCTOR OF NURSING PRACTICE

By

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ABSTRACT

In an era where healthcare organizations are increasingly scrutinized by external oversight agencies, individualized and cost-effective quality care must be provided to meet community demand. Accordingly, measuring clinical quality and evaluating healthcare throughputs has become increasingly important. Nurses play a key role in the delivery of patient care, and evaluation of the quality of care provided by nurses has been enhanced through the development and utilization of nursing-sensitive indicators (NSIs). NSIs are structured to identify key patient care delivery issues that are particularly influenced by nurses. They are used by nurse executives and others to quantify, monitor, and report the quality of nursing care in three domains of structure, process, and patient outcomes.

NSIs have been shown to be effective outcome measures for assessing the quality of nursing care and identifying care deficiencies for performance improvement. Inconsistency in their reporting at hospitals within the Los Angeles County Department of Health Services (LACDHS) was identified as problematic as it prevented system-wide assessment of quality and the opportunity for facilities to share best practices. This quality improvement project was designed to standardize the reporting and use of NSI data throughout the LACDHS system. It involved the development of a dashboard to enable tracking of performance at all system hospitals. It was posited that having a system-wide dashboard would allow intra-facility comparisons and promote system-wide care improvements.

The project involved an evidence-based practice quality improvement design to develop a system-based NSI Dashboard that provides a visual portrayal of NSI performance at each County hospital facility and the ability to benchmark facility and County performance with other facilities nationwide.

The evaluation demonstrated general satisfaction with the design of the NSI Dashboard, its ease of use, and readability of data. Participants noted it provided opportunities to observe individual facility and system-wide performance, benchmark against other hospitals within the system and collectively implement strategies for improvement.

Because the NSI dashboard enables LACDHS to benchmark performance of its facilities and identify care delivery trends, this tool will be used to assist in designing improvement strategies to resolve care deficiencies. This project also resulted in improved data collection efforts, standardization of data collection and greater consistency in data definitions.

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ACKNOWLEDGMENTS

Education is a blessing. I would not have been able to successfully complete my DNP academic journey without the support of many individuals who believed in me. Most grateful to the divine God for guiding my path to success.

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I am dedicating this project to my parents who taught me the importance of hard work and dedication to serve those in need of help.

BACKGROUND

Issues such as financial hardship, advances in technology, nursing shortages, and changes in reimbursement models have influenced the already complex provision of care and increasing competition for the patient population (Barros, Brouwer, Thomson, & Varkevisser, 2016). Consequently, capturing the quality of patient care quantitively has become a critical component of strategies to ensure clinical effectiveness, patient safety, and a value-based patient experience. An executive dashboard of quality indicators allows healthcare leaders to monitor organizational performance, establish priorities, and implement well-designed interventions for change. Similar to other healthcare organizations, nursing represents the largest discipline within the Los Angeles County Department of Health Services (LACDHS), with more than 8,000 nurses. A dashboard of Nursing-Sensitive Indicators (NSIs) supports communication of the significance and quality of nursing's contributions by measuring its direct effect on patient care and outcomes (Ju et al., 2018). NSIs, also known as nursing quality indicators, have been demonstrated to provide reliable metrics for tracking nursing performance, identifying areas in need of improvement, and evaluating patient and staff safety initiatives (Li, Cheng, Lv, She, & Liu, 2014). According to Burston, Chaboyer, and Gillespie (2014), NSIs are used extensively to quantify, monitor, and report the quality of nursing care and measure three domains of nursing care: the structure, processes for providing care, and patient outcomes (Heslop & Lu, 2014).

NSIs have been used as quantifiable measures to assess the impact of nursing care delivery on patient safety and to track adverse patient outcomes (Beck et al., 2013). Untoward patient outcomes, such as patient falls and pressure injuries, concentrate on the

adverse effect related to nursing care whereas measures such as total hours of nursing care per patient day and staffing mix support nursing care quality and measure structural elements to justify programs, funding, and staffing (Doran, Mildon, & Clarke, 2011). The use of NSIs as targets for quality improvement has proven effective in enhancing nursing care performance. However, the practice of using such data on a day-to-day basis to monitor and improve patient care has been slow (Heslop & Lu, 2014). The accuracy and completeness of patient care documentation in electronic health records have been evaluated through indicators such as patient falls and medication management. In this regard, NSIs have been demonstrated to be effective in the identification of system deficiencies and directing performance improvement strategies to promote quality, reduce cost, and minimize patient-related risks.

To display information obtained through NSIs in a meaningful and understandable way, a dashboard is frequently used to provide visual monitoring of performance data and track trends. This monitoring is afforded through graphical demonstration of NSIs as performance metrics to reflect trends and aid in understanding current practices (Dowding et al., 2015). The reporting of metrics through dashboards also allows for benchmarking of data against other organizations, identifying best practices for deficient areas, and implementing cost-effective strategies to optimize nursing care (Karami, Langarizadeh, & Fatehi, 2017).

Capturing the quality of patient care quantitatively has become a necessity for healthcare leaders, as the focus for healthcare delivery reimbursement has shifted to value-based processes based on quantifiable performance metrics (Kelly, McHugh, & Aiken, 2012). The resulting increase in scrutiny of service quality and efficiency requires

continuous performance monitoring. According to Grigoroudis, Orfanoudaki, and Zopounidis (2012), strategically designed and focused dashboards provide executive leaders with valuable insight into organizational issues and areas in need of improvement. However, there is considerable heterogeneity in the selection, implementation, and evaluation of NSIs. Even when a dashboard of NSIs exists, the interpretation of NSIs varies among organizational leaders. This variation in the use of NSIs, together with design limitations, impedes the use of dashboards for monitoring trends and improving the quality of nursing services (Sim, Joyce-McCoach, Gordon, & Kobel, 2019).

The challenging task in creating a dashboard of NSIs is the development of a system that facilitates data analysis and provides timely clinical performance feedback so that targets for quality improvement can be identified. The importance of having strong systems support has increased in recent years, as the Centers for Medicare and Medicaid Services (CMS) requires measuring and reporting of performance indicators to improve patient outcomes and contain costs (Myers, Pugh, & Twigg, 2018).

Problem Statement

Within the LACDHS, the process of assessing and prioritizing NSIs currently occurs only at the facility level. Each facility is responsible for its own case-based methodology, data collection and aggregation, analysis, and reporting process. This heterogeneity in facility practices has resulted in fragmented quality improvement processes within the LACDHS and has inhibited opportunities to monitor system-wide performance.

Purpose Statement

The purpose of this Doctor of Nursing Practice (DNP) project was to develop,

evaluate, and implement an NSI Dashboard for the LACDHS, including a standardized data collection process, specifically for the Office of Nursing Affairs (ONA). To guide the development and evaluation of the project, a Nurse Executive Leadership Team (NELT) was formed consisting of the Director of Nursing Affairs, the ONA nursing leadership team, and six facility-based Chief Nursing Officers from four County hospitals, the Ambulatory Care Network, and Correctional Health Services. It was believed that the development of a visual management tool in the form of an NSI Dashboard would assist the NELT in identifying variances in quality so that targeted, evidence-based practices could be implemented to improve patient outcomes. Additionally, it was thought that continuous evaluation of nursing care quality would support the identification of system-wide targets for quality improvement.

Supporting Framework

A framework is a supporting structure that can guide and facilitate a quality improvement project such as the one identified for this project. It identifies steps, prevents confusion, and ensures the involvement of key stakeholders to achieve deliverable outcomes (Bonnel & Smith, 2013). The framework also serves to guide implementation of activities in a sequential manner to smoothly progress through the change process and accomplish the goals and objectives of a project (Bonnel & Smith, 2013).

The Model for Improvement

The framework chosen for this project was The Model of Improvement, which was developed by Associates in Progress Improvement (API) and endorsed by the Institute for Healthcare Improvement (IHI). It was developed to provide structure for

implementing and evaluating change processes (Figure 1; Health Catalyst, 2018). The model consists of two sections. The first section focuses on answering three fundamental questions to identify the aim, measures, and evaluation process for a project (Langley et al., 2009). The Plan-Do-Study-Act (PDSA) cycle, also known as the Deming circle or Shewhart cycle is the second component of the model (Langley et al., 2009). This cycle is a four-stage process that is repeatedly implemented to test a change and evaluate the quality and effectiveness of changes which have been made in the areas selected for improvement (Provost, 2018). Figure 1 provides a graphic display of the model.

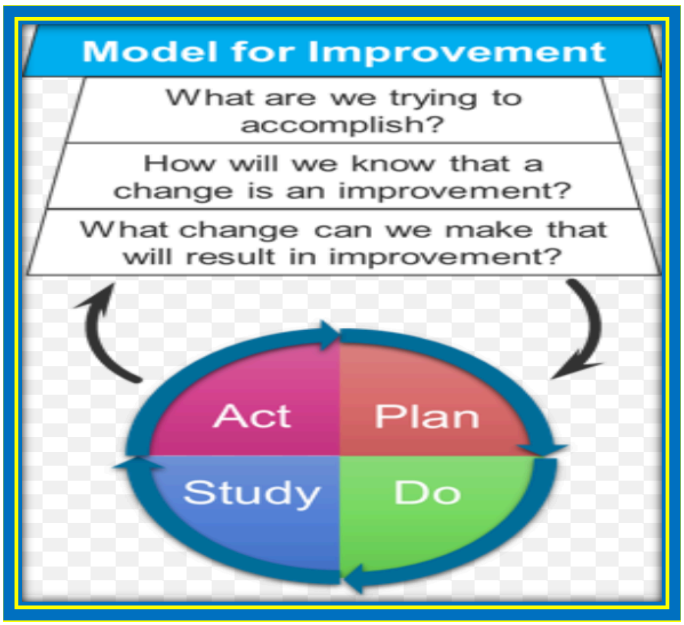

Figure 1. The API Model for Improvement (Health Catalyst, 2018).

Integration of the Framework into the Project

The API Model's Three Questions

The response to the first question regarding what changes need to be accomplished is outlined in the aim of this quality improvement project: creating a method to allow the LACDHS to monitor system-wide performance of nursing care being delivered throughout its facilities. The second question regarding how the change would

be evaluated to see if there was an actual improvement was addressed by interviewing and surveying end-users to determine their perceptions of the usefulness of a dashboard in evaluating NSI performance at all facilities and system-wide and whether they believed that such a mechanism would be of assistance in positively changing performance. The third question regarding what changes could be performed that would result in improvement was addressed through in-depth discussions of the metrics displayed on the dashboards with facility-based Chief Nursing Officers (CNOs), and brainstorming identified quality improvement activities to enhance patient outcomes.

Plan-Do-Study-Act Cycle

The PDSA cycle started with the *plan* stage. This stage included development of specific goals and a project timeline. Individual stakeholders for different deliverables and required resources were identified, the literature review was shared and discussed, and meetings were scheduled to review and facilitate the projected timeline for this project improvement. The *do* phase included development and implementation of the dashboard and decisions on how to measure the effectiveness of the tool. The *study* phase included a review of stakeholder satisfaction with the NSI Dashboard and their recommendations for change. The last phase, *act,* focused on acting and implementing changes to the dashboard as suggested. This stage also included testing of the dashboard with data to evaluate its effectiveness in visualization of performance and identification of deficient areas for improvement (Figure 2).

Steps That Were Undertaken During the Plan-Do-Study-Act Cycle

The steps in the *plan* phase included

- Sharing results of literature review with the team for suggestions
- Identifying stakeholders and teams

- Scheduling a meeting with Press Ganey representatives and discussing/identifying database available data to be used for this dashboard
- Scheduling a meeting with the Information Technology Department and exploring possible formats to construct the dashboard electronically
- Identifying a list of NSIs for measurement and monitoring of nursing performance
- Exploring the reporting process at each of the facilities within LACDHS to identify those indicators being continuously reported to assist with countywide as well as national benchmarking
- Sharing the definitions and protocols established by Press Ganey for the selected NSIs
- Designing the communication methodology
- Identifying resources needed for data collection
- Developing a timeline for the project

The steps in the *do* phase included

- Designing and developing a discussion draft for the proposed dashboard
- Presenting the proposed dashboard to the CNOs for initial feedback
- Identifying all data sources and means of uploading data
- Implementing the project and the dashboard
- Training stakeholders
- Maintaining scheduled meetings with Nursing Informatics and Information Technology
- Organizing meetings with Quality Management Department for data collection if data were not submitted to the Press Ganey

The steps in the *study* phase included

- Surveying the NELT
- Interviewing the ONA nursing affairs team about their satisfaction with the dashboard and the degree to which they found this tool practical to observe current performance, identify trends, and benchmark against other practices.
- Presenting drafts of the proposed design to the ONA NELT for review and revision and incorporating their feedback into improving the design of the revised draft to meet the needs of stakeholders.
- Assessing the overall functionality and acceptability of the dashboard.

The steps in the *act* phase included

- Revising the dashboard based on feedback from the NELT and concentrating on incorporating all feedback to keep participants engaged.
- Receiving consensus on a design for the table of indicators supported by a detailed analysis of each indicator on the table.
- Incorporating data into the design and presenting it for review and to assess functionality in demonstrating data trends and comparisons.

- Reviewing results of the metrics displayed on the proposed dashboard to identify trends for improvements.
- Identifying issues with validity of submitted data, training individuals responsible for entering data into data portals.
- Designing the next cycle of PDSA when was needed based on feedback received.
- Creating a report to communicate results of the dashboard implementation.

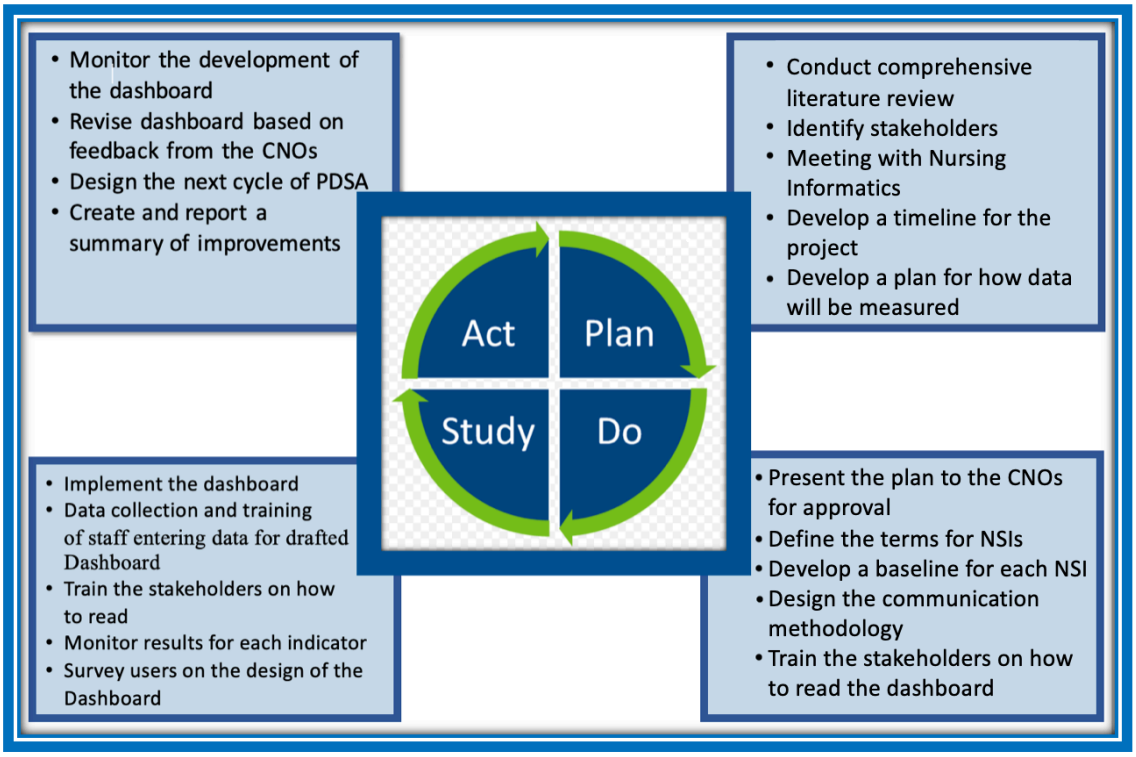

Figure 2. Steps undertaken during the Plan-Do-Study-Act cycle.

REVIEW OF LITERATURE

Overview

A review of literature focused on the effectiveness of data dashboards in monitoring NSIs as well as the overall quality of nursing services. The review included the history of quality nursing care, the importance of NSIs and dashboards, the definition of NSIs, nursing-sensitive value-based purchasing, nursing-sensitive databases, and key factors to consider when developing NSI dashboards.

The databases searched included Wiley Online Library, PubMed, ProQuest, CINAHL, EBSCO, Google Scholar, Ovid Medline, the IHI, Cochrane Library, The Joint Commission, and LACDHS. The search terms, which were used in multiple variations, included NSIs, dashboards, quality indicators, quality measures, quality improvement, quality reporting, report cards, outcome measures, staff communication, patient safety, and performance improvement. The search included publications dated from 1999 to 2019. Other inclusion criteria included articles that were published in English and available in full paper format. Additionally, the references cited in studies and articles which were selected for this project were reviewed for relevance to the project.

Healthcare Quality Improvement and Total Quality Management

To improve care and contain costs, healthcare organizations have increasingly prioritized improving the quality of nursing care to strengthen their approaches to care delivery (Gabutti, Mascia, & Cicchetti, 2017). Integration of new structures and processes that promote performance data transparency has assisted in providing meaningful quality of care data for nurses delivering direct patient care so they can engage in improvement efforts to achieve clinical excellence (Aiken et al., 2013). One of

the structural approaches to accomplish this is Total Quality Management (TQM), which is an effective strategy to use in providing a structure for quality improvement initiatives. The process of TQM involves continuous improvement in the quality of services to meet client needs, promote health, and lower the costs associated with care delivery (Yousef & Yousef, 2017). In order for TQM to be effective, an emphasis must be placed on three dimensions: culture, attitude, and organizational resources (Hashmi, 2017). A main principle of TQM is customer satisfaction, which can be achieved by strengthening organizational performance through improved work processes.

Baird, Hu, and Reeve (2011) examined the relationship between the organizational culture and the practice of TQM. They suggest that staff who are involved in the type of continuous data-driven improvements inherent within the TQM structure achieve common goals of high-quality service faster than those with less exposure to data interpretation and monitoring. Geraedts, Montenarie, and Van Rijk (2001) concluded that TQM must include a process to collect, monitor, and report quality data results by promoting a culture emphasizing practice outcomes and innovation for performance improvement initiatives. Data on performance measures and effective communication with stakeholders are pivotal parts of TQM processes (Gabutti et al., 2017). This continuous monitoring and communication of results promote staff involvement in quality improvement to enhance services. A NSI Dashboard allows for a centralized quality center to collect, analyze, and report data from different resources to support standardized improvement activities.

In most healthcare organizations, nursing comprises the largest segment of the workforce, and its contribution has a significant effect on the quality and cost of

healthcare delivery. Recent efforts to manage costs and promote optimal patient outcomes focus on improving the quality of nursing care (Gabutti et al., 2017). To improve care quality, healthcare leaders have developed systems to measure and monitor data so they can identify targeted areas to focus on quality improvement (Baird et al., 2011). Because the patient outcomes associated with care delivery are highly correlated with patient satisfaction (predominantly satisfaction with nursing care) and the efficiency of services, monitoring the quality of nursing care is considered fundamental to the TQM process when used in the healthcare environment (Karaca & Durna, 2019).

Quality of Nursing Care

Assessing nursing care quality is a complex process which involves measuring the effectiveness of patient care related to desired health outcomes (Institute of Medicine, 1999). According to The Joint Commission (2017), quality of care is defined as the degree to which patient care services influence the probability of desired outcomes. Similarly, quality is defined as the process of evaluating the timeliness, consistency, and effectiveness of essential patient care practices (Langley et al., 2009). This evaluation of quality is accomplished by examining and measuring the degree to which nursing care supports patients in recovering from illnesses, preventing complications, and restoring health. The quality of nursing care is dependent on the level of nursing competency and nurses' satisfaction with their work, the work environment, and the overall quality of care they provide.

Lorini, Porchia, Pieralli, and Bonaccorsi (2018) concluded that reaching a consensus among healthcare providers on the selection of appropriate NSIs is a critical step in improving the quality of care. This process must also include the development of

clear definitions for each of the identified structure, process, and outcome indicators (Burston et al., 2014). Therefore, selection of appropriate NSIs provides insight on deficiencies in need of improvement and implementation of evidence-based practices to enhance nursing services and sustainment of quality care (Kueny, Shever, Mackin, & Titler, 2015).

Several of the studies reviewed for this project focused on the relationship among the nursing workforce, the quality of nursing services, and how nurses influence patient outcomes (Aiken et al., 2017; Karaca & Durna, 2019; Rahn, 2016; Stalpers, de Brouwer, Kaljouw, & Schuurmans, 2015). Farup (2015) found that monitoring the structure and processes involved in nursing care delivery through analysis of NSIs demonstrated an inverse correlation between the level of nurse staffing, nursing skill mix, and nurse-patient ratio and the creation of a safe culture and a lower rate of patient harm events. Montgomery, Panagopoulou, Kehoe, and Valkanos (2011) identified job satisfaction, trust, and perceived quality of care among nurses as factors influencing the level of nursing care provided. The authors recommended the use of data to determine training requirements necessary to ensure that nurses possess the knowledge and skills necessary to provide quality and cost-effective care.

Traditionally, most studies on the structure and processes of nursing care have primarily focused on examining the training and competencies of nurses and the environments where nurses provide patient care. However, increasingly, there has been an effort to focus beyond simply examining structure and process elements of care and to incorporate study of the actual outcomes of care delivery. Karaca and Durna (2019) evaluated the relationship between nursing care quality and patient satisfaction. The

authors examined the associated risk factors and concluded that satisfied patients attributed high-quality care to communication, respect, training, and expertise of nursing personnel.

Van Bogaert et al. (2014) found that organizational attributes, such as leadership style, shared governance culture, and teamwork, are positively correlated with nurse satisfaction and the quality of their services. In other studies, surveys of nursing staff and leaders revealed the importance of the leadership role. Leadership styles play an integral role in enhancing quality measures in health care and nursing (Choi, Goh, Adam, & Tan, 2016). These studies suggested that a supportive change culture and data monitoring by leaders increase stakeholder's engagement in quality improvement activities (Sfantou et al., 2017). Houser (2003), using a mixed-methods study, evaluated the impact of organization, leadership, resources, and work environment on nurses and the quality of their performance. The study identified a direct correlation among nursing expertise, stability of the nursing staff, and nursing productivity on the quality of care delivery.

Houser (2003) identified that nurses who are supervised by transformational, as opposed to transactional, nurse leaders exhibit lower rates of preventable events such as medication errors, patient falls, unnecessary use of patient restraints, infection, and patient mortality (Houser, 2003). Transformational leaders inspire a shared vision and create a prominent culture of continuous improvement which empowers staff to challenge their current processes to improve patient outcomes. In this environment, leaders and followers raise each other to a higher level of integrity and motivation. In a similar cross-sectional quantitative study, Lin, MacLennan, Hunt, and Cox (2015) explored the relationship between transformational leadership style, mental health of nurses,

organizational commitment, satisfaction with job, and caring for patients. It was reported that supportive supervisors who create shared governance environments stimulate subordinates and ensure their psychological well-being. This satisfaction, in turn, motivates these nurses to perform at the top of their skill and invest in quality improvement projects aimed at efficient service delivery such as medication error reduction, infection prevention, and preventable medical errors. In contrast, transactional leaders look to maintain the status quo, carefully monitor their subordinates, and ensure that expectations are met. Wong, Cummings, and Ducharme (2013) reported a positive relationship between relational leadership and patient outcomes.

In an observational study, Fischer and Nichols (2019) examined the association between scores on the Leadership Practices Inventory and nurse-sensitive patient outcomes such as falls, medication errors, and HAPIs. They reported significant differences in the nurse-sensitive patient outcomes in Magnet hospitals due to the emphasis placed on planning and development of nurse leaders.

Whether the setting is a hospital, primary care clinic, specialty ambulatory center, or another setting, the effectiveness of nursing care is directly associated with the care delivery process, patient experience, and patient outcomes. Multiple studies have examined the link between nursing satisfaction and the quality of patient care (Berwick, James, & Coye, 2003; Dubois, D'Amour, Pomey, Girard, & Brault, 2013; Naylor et al., 2013). Most studies identified a positive association between nurse-administered interventions and improved quality. These studies suggest that developing well-defined indicators is necessary for evaluating the quality of nursing care (Berwick et al., 2003; Dubois et al., 2013; Naylor et al., 2013). Traditionally, quality of care assessment data

was closely held at the managerial level within the nursing department. However, Dubois et al. (2017) concluded that sharing the results of quality improvement studies and the resulting data, including data related to NSIs, is critical in promoting communication with staff and involving appropriate stakeholders in improvement processes. From these studies, it is apparent that both managers and frontline nursing staff must be engaged in analysis and participation in the design and implementation of quality improvement processes.

Definition of Nursing-Sensitive Indicators

Assessing and measuring the quality of nursing care is a critical step in improving healthcare services and patient outcomes (Burston et al., 2014). This assessment should include the development of a set of well-defined NSIs to identify areas in need of improvement related to the quality of nursing care. The NSIs provide quantifiable metrics for measuring quality of nursing care, identifying trends and deficiencies, driving improvement strategies, and preventing care inequalities (Kieft, Stalpers, Jansen, Francke, & Delnoij, 2018). Monitoring patient care processes by using NSIs, such as patient falls, medication errors, and restraint usage, can provide information on performance gaps to address quality care disparities. Therefore, it is critical for the NSI selection process to include clear definitions, methodologies, and strategies for data collection and reporting.

Quality improvement initiatives are frequently guided through the identification of NSIs to evaluate the structure, processes, and outcomes of nursing care (American Nurses Association, 1996; Donabedian, 2005; National Database of Nursing Quality Indicators [NDNQI], 2012). Structure measures assess the attributes of the services or the

providers involved in delivering patient care (Burston et al., 2014). These attributes include the skill level, education, certification, and experience of the nursing staff that may influence the care provided to patients. For example, in evaluating the adequacy of nurse staffing, structure measures such as nurse turnover, nurse staffing, and nursing hours per patient days allow for analysis of their effect on patient care and guide the implementation of strategies to ensure the right number of nursing workforce with the right skills to provide required patient care safely and effectively.

Process measures, on the other hand, assess whether processes and procedures are followed in delivering quality care to meet health promotion or disease prevention needs of the patient population (Burston et al., 2014). In today's environment of external oversight, it is incumbent upon us to provide individualized quality care to meet the needs of the members of the community served. Assessing whether staff members wash their hands before and after patient care or follow an existing protocol to assess patients at risk for falls process measures can then be selected that will demonstrate assessment trends translated into numbers that can be analyzed. Findings can then help to identify focused improvement strategies that can correct non-compliance areas.

Lastly, outcome measurement focuses on the way care delivery actually impacts patients. Examples of NSIs related to outcome measurement include patient falls, medication administration errors, use of restraints, and HAPIs. Through measuring these outcomes, nurses are able to identify and implement interventions for care improvement.

Importance of Nursing-Sensitive Indicators and Dashboard

The concept of measuring the quality of nursing care through selection of NSIs that identify untoward patient outcomes has evolved over the years. To improve the

quality of nursing care, actual patient outcomes need to be measured continuously and feedback provided to frontline nursing staff related to the outcomes of care they provide. This outcomes-based approach to assessing care has proven to be more effective in ensuring care quality than more traditional approaches to structuring care delivery though imposing a set of expected standards. Providing feedback on patient outcomes greatly enhances the design of meaningful interventions to enhance and improve care (Bombard et al., 2018; Wang, Hyun, Harrison, Shortell, & Fraser, 2017).

The need to evaluate the quality of nursing care is believed to have started with Florence Nightingale's measuring patient outcomes by collecting and using clinical data (Burston et al., 2014). Utilizing these data, Nightingale decreased the mortality rate among British soldiers by teaching nurses' principles of maintaining cleanliness to prevent the spread of disease. For example, practicing simple hand washing before wound care greatly decreased the spread of disease-causing bacteria (Chun & Bafford, 2014).

NSIs were created to provide a means for monitoring, comparing, and reporting the quality of nursing care (Dubois et al., 2013). NSIs provide a mechanism for nurses to employ necessary principles, procedures, and assessment methodologies to measure the effectiveness of patient care. They are now also used as an essential component for performance improvement activities (Wu et al., 2017). Nursing is a complex and multidimensional profession. The practice of nursing combines biology and psychology with the art of caring to support individuals through disease prevention and health promotion activities (Jasmine, 2009). Consequently, nursing performance should be the center of quality improvement initiatives, monitoring, and reporting processes.

The evaluation of data on NSIs also assists with determining the cost effectiveness of patient care services through monitoring adverse events and patient outcomes. Among other benefits related to the use of NSIs are the ability to benchmark the quality of health care against other organizations and make judgements on continuation and strengthening of services proven to be cost-effective and patient centered (Rahn, 2016). Stalpers et al. (2015) examined the association between the nursing work environment and five nurse-sensitive patient outcome indicators. This systematic review of quantitative studies covering eight years of data included patient falls, pressure injuries, delirium, medication errors, and pain (Stalpers et al., 2015). The authors concluded that positive work environments enhance the quality of nursing care which, in turn, contributes to improved patient outcomes (Stalpers et al., 2015).

Nursing-Sensitive Value-Based Purchasing

Recent changes in the healthcare industry, including rising costs associated with patient care, have forced healthcare leaders to explore alternatives to decrease their operational expenditures (Kavanagh, Cimiotti, Abusalem, & Coty, 2012). Because nursing care directly influences patient care outcomes, a major focus for cost-benefit analysis relates to the financial benefit that could be achieved by decreasing adverse events (Shang, Needleman, Liu, Larson, & Stone, 2019). As a result, many healthcare organizations have implemented nursing-sensitive value-based purchasing (NSVBP), an initiative to enhance the quality of care provided by the nurses while containing costs. The process of NSVBP allows for assessment and measurement of NSIs, which, in turn, provides transparency of results to be used in improving staffing performance, the practice environment, and patient services (Kavanagh et al., 2012).

The value-based purchasing (VBP) program, also known as pay-per-performance, is an initiative implemented by the Centers for Medicare and Medicaid Services (CMS; Aroh, Colella, Douglas, & Eddings, 2015). This program is predominantly aimed at improving the quality of patient care for Medicare and Medicaid beneficiaries (CMS, 2017). VBP rewards hospitals with payments based on the scores they achieve for the quality of patient care services and the outcomes achieved by patients who have undergone care. CMS (2018) estimates that approximately "1.9 billion dollars will be available for VBP in 2019" (p. 1). The basis for this reimbursement under VBP relies on a set of approved measures which are categorized into five domains: safety, clinical care, efficiency, cost reduction, and patient care coordination. All of these measures are highly influenced by the structures established to organize nursing care as well as the skills and knowledge possessed by nurses. To illustrate, included in the patient safety domain are indicators such as pressure injury rates and hospital falls, both of which are highly nursing dependent.

Shang et al. (2019) conducted a study to examine the relationship between HAPI (one of the nationally recognized NSIs) and nurse staffing. Through a cross-sectional data review between 2007 and 2012 involving a large urban hospital system, the authors analyzed unit-based staffing level data. The study determined there was a 15% increase in patient days when a unit was staffed below 80% of the nursing staff required to provide patient care. On units with understaffing on both morning and afternoon shifts, significant increases in the development of HAPIs were also observed. In other words, the fewer the number of required nurses on a unit, the higher the rate of HAPIs. In another study, Patrician et al. (2011) reported that a 10% decrease in nursing skill mix was associated

with a 30% increase in the rate of patient falls. The use of NSI dashboards would be of assistance to nursing leaders in measuring and monitoring the quality of nursing services, which may lead to lower rates of adverse events and increased patient satisfaction.

Nursing-Sensitive Databases

An NSI database is a data repository for NSIs, which can be accessed by healthcare organizations that submit their data to the repository (Patrician, Loan, McCarthy, Brosch, & Davey, 2010). Those organizations subscribing to the repository have access to NSI reports, which allow them to benchmark with other hospitals locally, regionally, and nationally. Among the more recognized NSI data repositories are those operated by the California Nursing Outcome Coalition (CALNOC), the Agency for Healthcare Research and Quality, the NDNQI, and the National Quality Forum. The two databases most pertinent to this project are CALNOC and NDNQI.

California Nursing Outcome Coalition

In response to the need to enhance the quality of healthcare services provided by the nursing workforce, the CALNOC was launched in 1996. The development of this non-profit organization was the result of a collaboration between the American Nurses Association (ANA) and the Association of California Nurses Leaders. CALNOC is recognized as a premier nursing-sensitive benchmarking registry and the largest statewide nursing quality database in the nation (Donaldson, Brown, Aydin, Bolton, & Rutledge, 2015). CALNOC's mission is to provide an NSI data repository and to engage in research activities that enhance evidence-based practices to improve the quality of nursing care. This data repository has been used to assist nursing leaders with decision-making processes related to clinical practices, resolution of clinical issues that are affected by

nurse staffing, quality of service delivery, and public policy decisions. Healthcare organizations in California and other western states use CALNOC to demonstrate compliance with standards promulgated by the CMS, The Joint Commission (TJC), and the American Nurses Credentialing Center (ANCC) Magnet Recognition Program (Collaborative Alliance for Nursing Outcomes, 2019).

This database collects NSI data submitted by hospitals that reflect service quality, human resources, clinical processes and outcomes, and patient safety. The data can be sorted and individualized in reports specific to hospitals as a whole as well as subdivisions within the hospital. CALNOC currently collects data and provides access to reports relating to patient falls, pressure injuries, restraint prevalence, patient satisfaction, pain management, nurse staffing, nurse skill mix, workload intensity (admissions, transfers, and discharges), nurse work satisfaction, and medication administration accuracy (Hemsley et al., 2019). In 2010, 225 hospitals from six states actively participated and provided data to CALNOC (Brown, Aydin, Donaldson, Fridman, & Sandhu, 2010). The participating hospitals transmit data on a monthly basis. In return, they have access to the data in the form of descriptive comparisons, trends, and benchmarking comparison, which can be used to identify processes in need of performance improvement. The end-users also have the ability to create customized drill-down reports that include colored grafts and charts which aide in visualizing trends and insufficiencies in need of improvement.

National Database of Nursing Quality Indicators

The NDNQI was the first national outcomes database in the United States (Staggs, Davidson, Dunton, & Crosser, 2015). This repository of NSIs was developed by

ANA in 1998 with the goal of promoting and facilitating the standardization of data submitted by hospitals on nursing quality and patient outcomes (Alexander, 2007). The NDNQI provides quarterly and annual reporting of structure, process, and outcome indicators to evaluate nursing care at all organizational levels. The CALNOC and NDNQI databases were recently integrated and are now operated by Press Ganey, a nationally recognized firm that has been the primary source for patient satisfaction data for the healthcare industry. Press Ganey has a mission of supporting and empowering nurses and their leaders to improve patient outcomes through use of performance data. The benchmarking of results allows for identification of deficiencies and implementation of focused initiatives to improve the quality of patient care services.

Key Factors to Consider When Developing NSI Dashboard

Importance of NSI Dashboard Design

To improve patient outcomes, provide cost-effective care, and maintain quality of care, healthcare leaders have increasingly emphasized monitoring nursing performance (Aiken et al., 2013; Aiken et al., 2017). The development of an NSI Dashboard allows an organization to select quality of care indicators, measure care quality in relationship to the indicators, report data results and, in general, assess and improve the quality of care provided by nurses (Kieft et al., 2018; Myers et al., 2018; Patrician et al., 2010). Ideally, this should incorporate a systematic evaluative approach which includes an interactive NSI Dashboard that provides measuring and monitoring of nursing performance (Ghazisaeidi et al., 2015; Wang et al., 2017).

NSI dashboards can be utilized as a framework for creating reports to present and disseminate NSI results and identify trends. This availability of performance results, in

turn, promotes frontline staff involvement in hospital-wide quality improvement processes (Weggelaar-Jansen, Broekharst, & De Bruijne, 2018).

Recent advancements in IT have been instrumental in the collection of quality data related to patient care structures, processes, and outcomes. Research studies suggest that the development of an effective NSI Dashboard should include the selection of relevant indicators to allow for an easy understanding of results and data interpretation by all internal and external stakeholders (Alexander, 2007; Myers et al., 2018). This development of well-defined content and inclusion of an evidence-based framework supports an unrestricted use of data on a daily basis. Furthermore, design layout should include an uncomplicated graphical presentation for an efficient visualization and understanding of the content by a variety of users within a healthcare organization (Dowding et al., 2015). Lastly, the data presentation should include integration of the evaluation of results into the organization's continuous quality improvement processes. This is a best practice, which ensures all clinical staff have access to relevant information in a timely manner to allow for daily decisions to improve patient outcomes (Pace, Buttigieg, & Malta, 2017; Weggelaar-Jansen et al., 2018). Fortunately, advancements in IT have enabled automated creation of such data dashboards.

Other studies provided support for evidence-based practices regarding the type of dashboards, visual presentation, and selection of relevant structure, process, and outcome indicators (Alexander, 2007; Myers et al., 2018; Pace et al., 2017). Dashboards that clearly present quality and clinical information displayed on computer screens increase access to the data. However, lack of a standardized dashboard can cause information overload or participant disengagement with the quality indicators (Dowding et al., 2015).

The continuous use of an NSI Dashboard allows for performance data tracking and identification of deficiencies for improvement before they become ethical or safety issues (Jeffs et al., 2014). A process that uses an NSI Dashboard as a tool to monitor and report quality indicators is more effective in identification of trends for improvement initiatives compared to an occasional reporting processes that occur for the purpose of reporting on expected standards (Wells et al., 2018).

Reliability

The process of data collection to assess quality of care for identified NSI is highly dependent on the reliability of the assessments and collected data (Donabedian, 2005). Reliability relates to the need for consistency in measuring to assure that results are consistent. In general, the person who is responsible for collecting and monitoring the data is highly involved in the decision process and reporting of results (Kieft, de Brouwer, Francke, & Delnoij, 2014). Therefore, the process of data collection must include careful orientation and clear expectations to eliminate bias. Also, to ensure total agreement among those responsible for making judgments on adequate versus insufficient data, there needs to be detailed specification of criteria. When developing a dashboard, a critical component to include is a description of standards, procedures, and methods for each of the selected indicators.

Validity

In measuring the quality or efficiency of care being provided, standards of practice must be defined when selecting NSIs and prior to data collection (Kieft, de Brouwer et al., 2014). This increases the validity of the evaluation before the evaluation process is implemented. The selection of NSIs must include reaching a consensus among

stakeholders on the set of indicators and a clear definition of each indicator (Lorini et al., 2018). Dubois et al. (2017) concluded that the selection of nursing indicators must include those that allow for evaluation of nursing contributions to high-quality care, scientific evidence supporting their importance, feasibility of data collection within the organization, and ease for benchmarking with other organizations. Selection of appropriate NSIs also influences the evaluation process to achieve the desired outcome measures. The evaluation process must include training of staff to prevent bias in interpretation of data. For example, in scenarios where an NSI related to patient falls is selected, there can be staff bias and different determinations of the definition of a fall. This training of staff in reviewing and understanding results in uniformity results in a reliable evaluation of processes and identification of deficiencies for improvement to ensure efficient and customer sensitive patient care services.

Benefits of Continuous Monitoring

NSIs dashboards have been instrumental for nursing leaders to examine the impact of nursing care on patient outcomes by analyzing structure, process, and outcome data (Wang et al., 2017). The recent changes in healthcare delivery and scarce resources demand special attention to patient safety, fiscal pressure, patient expectations, and customer satisfaction (Burston et al., 2014). This project endeavor of developing a dashboard was effective in affording the nursing leaders a tool to also communicate information through customized reports at the organizational or unit-based levels to show the best performers as well as those in need of improvements.

Despite the numerous advantages in monitoring NSIs through dashboards, there remain considerable inconsistencies and variabilities that warrant consideration in this

section (Burston et al., 2014; Heslop & Lu, 2014). The first step is the attention to the development of an effective and sustainable information system and the integration of databases that allow for effortless data collection to support clinical quality and safety governance, both of which are costly implementation processes. In general, dashboard implementation in a healthcare organization requires significant resources to ensure the quality of data. Both financial and human resources are needed to ensure a successful dashboard implementation and data monitoring process. Also, the main aim of a dashboard is to provide real data that can be used to make decisions for improvement. The purpose is not achievable if data are not accurate. Once a dashboard is implemented, the validity of its data is highly dependent on the source of data. Therefore, attention must be given to support processes that feed and update data into the dashboard. In turn, these processes, as well as analysis of data on dashboard and communication of result, require more financial resources to sustain the productivity of measuring services through data monitoring. Therefore, since healthcare resources are scarce, it is pivotal to use resources to design a dashboard that uncover causes for poor performance for the greatest return on investments.

Although much progress has been made by this author in the development of NSI Dashboard, there remain many other activities to complete the implementation of a virtual dashboard and standardization of data collection in an understandable and timely manner. Nursing executives must deal with an increasing number of reports on a daily basis and face the challenge of digesting data to evaluate the performance of different services (VanFosson, Jones, & Yoder, 2016). They receive data from different sources. Therefore, in the creation of the NSI Dashboard for this project, this author concentrated

attention on the design that would allow for an uncomplicated display of information that supports decision-making processes and alleviates information overload. Aimed at designing an effective dashboard, several key criteria were considered to ensure selected metrics were relevant and evidence-based, allowing internal and external benchmarking.

Among recent reforms forcing an already complex healthcare systems to transform their patient care delivery is the implementation of the Patient Protection and Affordable Care Act in 2010 (Aroh et al., 2015). Additionally, the launch of Medicare Value Purchasing has influenced healthcare organizations to stimulate higher efficiency and sustain quality outcomes. Consequently, more than ever, these organizations must operationalize service access, employ high reliable providers, and demonstrate high-quality, cost-effective, and optimal patient health care.

Continuous monitoring and reporting of quality improvement initiative data for selected critical key performance indicators identifies opportunities improvement and fosters processes to achieve high-quality, coordinated, and patient centered care. As patient care continues to shift from inpatient setting into the ambulatory and primary care environment, healthcare organizations such as LACDHS must continue to focus on providing cost-effective and efficient care in the clinics. To meet this patient's demand and provide a high level of excellent care, it is imperative to direct resources to value nursing practice that produces desirable outcomes. This mission is sustainable through the utilization of a reliable dashboard to monitor and evaluate internal and external results and benchmark the current services to identify areas of strength and improvement. Continuous monitoring of measures such as Body Mass Index, depression, nursing care hours, and total patient visits will assure the availability of data to measure the impact of

nursing clinical practice. Based on the data, nursing leaders can then implement strategies that will lead to effective care coordination, health promotion, and optimum patient outcomes.

Summary

In summary, healthcare organizations have developed structures and processes to improve the quality of patient care services and the outcomes of care delivery. Organizational leaders now concentrate on continuous quality improvement, and a major component of a well-designed quality improvement process is the identification of appropriate indicators (Alexander, 2007; Myers et al., 2018; Pace et al., 2017). Such identification allows a continuous monitoring of processes that are vital to positive achievement of patient outcomes. Because the outcomes of patient care are highly dependent on the quality of nursing services, NSIs should be carefully selected to identify areas in need of improvement. NSIs can provide reliable and valid tools for evaluating the quality of care. They enable trend monitoring and assessing the impact of staffing ratios. They also enable benchmarking service performance internally and externally to assist in improving patient safety and satisfaction (Buttigieg, Pace, & Rathert, 2017). Creation of an NSI Dashboard allows LACDHS CNOs to monitor nursing performance indicators against those of other County hospitals within the system and other types of hospitals locally, regionally, and nationally. The overall project aim, however, was to provide an important tool for nurse leaders as they develop targeted interventions to continually improve the quality of care and optimal patient outcomes.

METHODS

The overall goal of this DNP project was to develop and implement a dashboard of NSIs to allow the NELT the ability to compare and benchmark their performance with the performance of other LACDHS facilities as well as with hospitals outside of the County system. An evidence-based practice quality improvement (QI) design was utilized to develop and test the NSI Dashboard. A timeline for the project, which included major implementation milestones, is presented in Appendix A.

Setting

The setting for this project was the LACDHS. This integrated health system includes four hospitals, two multi-disciplinary ambulatory care centers, and six comprehensive health centers. For purposes of the project, only the four hospitals operated by LACDHS were used. The four hospitals were Harbor Medical Center (Harbor-UCLA), Los Angeles County + University of Southern California Medical Center (LAC+USC), Olive View Medical Center (OVMC-UCLA), and Rancho Los Amigos National Rehabilitation Center (RLANRC). Harbor-UCLA is one of only five Level I Trauma Centers serving Los Angeles County. The LAC+USC Medical Center is one of the largest public hospitals in the country. This 600-bed hospital operates specialized units including a burn center, a Level III Neonatal Intensive Care Unit, and a Level I Trauma Center. The OVMC is a 377-bed teaching hospital serving the North San Fernando Valley. The RLANRC is one of the nation's leading rehabilitation hospitals, specializing in the care of patients with life-changing illnesses, injuries, or disabilities.

Ethical Considerations

This project did not require patient contact. The data for the NSI Dashboard were pulled from the CALNOC data repository, which is now maintained by Press Ganey. A team of workforce members from each facility within LACDHS is responsible for uploading data into the CALNOC repository on a monthly basis. The encrypted data are transmitted to CALNOC from facilities throughout LACDHS. The data did not include patient identifiable information.

Permission to conduct the project was first granted by the LACDHS Chief Nursing Officer. The project was then submitted to two Institutional Review Boards (IRB) for approval, the California State University, Long Beach IRB, and the Los Angeles County Department of Public Health IRB, which is responsible for project approval for the LACDHS headquarters. Because this was a QI project, it was determined by both IRBs to be exempt from comprehensive IRB review. The design and use of the NSI Dashboard were evaluated through the use of surveys and interviews. The project participation was voluntary, and responses were kept anonymous to protect confidentiality.

Study Population

Eleven-members of the LACDHS NELT previously described participated in this project. The Chief Nursing Officers (CNOs) of the four identified LACDHS hospitals and Ambulatory Care Network (ACN) supervise approximately 8,000 nursing workforce members consisting of nursing directors, nurse supervisors/managers, advanced practice registered nurses, registered nurses (RNs), licensed vocational nurses, and certified nursing attendants.

Planning the Intervention Process for the Dashboard Development

The planning stage included identification of the current situation and the barriers that might influence the development of the NSI Dashboard. A Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis was conducted, which, among other elements, recognized available resources and potential areas in need for improvement (Figure 3). This analysis identified a number of strengths, including commitment to nursing professional development by nurse executives, quality patient care, transformational leadership, and excellent critical thinking. All of these were deemed to be factors that would positively influence development of the NSI Dashboard. A timeline for this project was identified (see Appendix A).

The weaknesses and opportunities assessment identified a number of areas in need of improvement that could be addressed through the development and implementation of a cohesive systemwide dashboard. Specifically, this assessment revealed that monitoring of data collection and reporting of results were not standardized. Each facility was using separate scorecards to present NSI data and no facility-based data were shared at the ONA nursing executive level. These findings led to the identification of an *opportunity* for standardizing data collection and analysis throughout the LACDHS hospital facilities.

Following the SWOT analysis, a prototype NSI Dashboard, which included data from all hospitals, was presented allowing the NELT to compare their data to that of other facilities. Throughout the project, a number of potential dashboards were developed and presented to the team, offering the opportunity for critique and iterative refinement. These drafts included presentation of data in graphic, table, and other visual display

formats (See Appendix B for a sample).

The next step in the planning process was to conduct a careful review of existing data collection protocols for reporting of NSI data to CALNOC and assess how it would be possible to collect data for the countywide dashboard. To ensure the availability of timely data, a flow process was identified for transferring data into the NSI Dashboard. An automated data collection process was discussed with the Information Technology (IT), IT Security, Nursing Performance Improvement, and Education Departments. This discussion revealed that the restrictions embedded in the design of the LACDHS information system as well as the limitations of the current Electronic Health Record made electronic collection of data unfeasible. Therefore, an alternative temporary data collection route was explored and approved for uploading data to the proposed dashboard. This temporary flow process satisfied the need for data collection while procurement of new software as a permanent, automated data transfer route was explored.

Figure 3. SWOT analysis for implementation of NSI Dashboard.

Implementation of the Dashboard

The development and implementation of an NSI Dashboard included four iterations. Each draft was presented to the NELT and feedback provided was used to revise the next iteration.

Phase One

During the first phase of the project, specific NSIs that would best meet the needs of stakeholders and be most reasonable for testing the dashboard were identified. The NELT members were surveyed and after numerous discussions, review of LACDHS strategic goals, and examination of related literature, a list of potential indicators was ultimately identified. This list was presented and discussed in depth, and the NELT reached a consensus to focus on two NSIs for testing the dashboard, HAPIs and patient falls.

This phase also involved an assessment of the data submission processes to the CALNOC data repository from each of the facilities as well as current monitoring processes and the perceived validity of the data being submitted. Because dashboards are typically structured to provide data in layers, this developmental phase also included the identification of various layers in which data would be displayed. Ultimately, an initial dashboard prototype was created, presented, and discussed with the NELT. The team's feedback was incorporated into the design of a second dashboard prototype.

Phase Two

The Phase Two dashboard prototype was populated with data selected for two NSIs and displayed using a table format. Data displayed in the table represented performance of the four hospitals by quarter period of the year. The NELT was asked to

review the dashboard and the data contained therein and to offer suggestions for improvement. These suggestions were incorporated into the design of a third prototype.

Phase Three

As a result of feedback from the NELT that the table format was not conducive to ease of analysis, a graphic format was used for the third prototype and a data table was included for drill-down purposes. The third prototype provided a further breakdown of the two selected indicators. For example, data displayed for patient falls were expanded to include a breakdown of the overall fall rates and the rate of patient falls with injuries. For HAPI-related data, the dashboard was supplemented to include data for the number of patients with HAPIs. The third prototype included data for four consecutive quarters for all the County hospitals and the graphic portion of the NSI Dashboard presented data in two different formats, a line graph and a bar graph. To enhance visualization, the color and more appealing formatting and font size were used.

Phase Four

During the fourth project phase, all feedback from the NELT and the analysis of current practices were consolidated. Agreement on the format for the NSI Dashboard was reached and the final project dashboard constructed. The format again included a data display table accompanied by a graphic representation of data. At the request of nurse leaders interested in applying for Magnet recognition through the ANCC Magnet Recognition Program, the data horizon was extended from four weeks to eight consecutive weeks, as required by ANCC. The final production dashboard is presented in Appendix C. During this project phase, a data collection and upload process flow was created in collaboration with CNOs and the IT and Nursing Informatics departments.

Data Definitions and Measures

To ensure validity of data being submitted to CALNOC, the organization developed and published clear definitions for calculating numerator and denominators for each of the NSIs being submitted. Since all facilities had been using these definitions, it was decided that the CALNOC definitions and codebook would be used for the project.

The Evaluation Process

Both qualitative and quantitative methods were used to evaluate the project. The quantitative evaluation consisted of administering a survey to each of the NELT members (see Appendix D). The survey was designed to assess team member satisfaction with the NSI Dashboard. Six questions were posed related to the overall design, presentation of data, ability to identify trends and the practically, originality, and perceived value of the dashboard. Questions were rated using a Likert-type scale with a response of 1 through 5, with 1 being “extremely dissatisfied” and 5 being “extremely satisfied.”

The qualitative component of the evaluation involved interviews with NELT members using five structured questions (see Appendix E) to measure their satisfaction with the dashboard in meeting their needs. The survey also included space to provide comments on other priorities that each member wanted to be addressed in future iterations of the NSI Dashboard.

RESULTS

Overall, the project was considered to have been successful in achieving its purpose. As a result of the project, a useful NSI Dashboard was created and placed in service within the LACDHS for corporate use and the use of each County hospital facility.

The quantitative component of the evaluation revealed that all 11 members of the NELT completed the survey (100% response rate). Eighty-two percent of the respondents rated satisfaction with design of the dashboard as either "Extremely Satisfied" or "Somewhat Satisfied." Actual results of the survey for each category are shown in Figure 4.

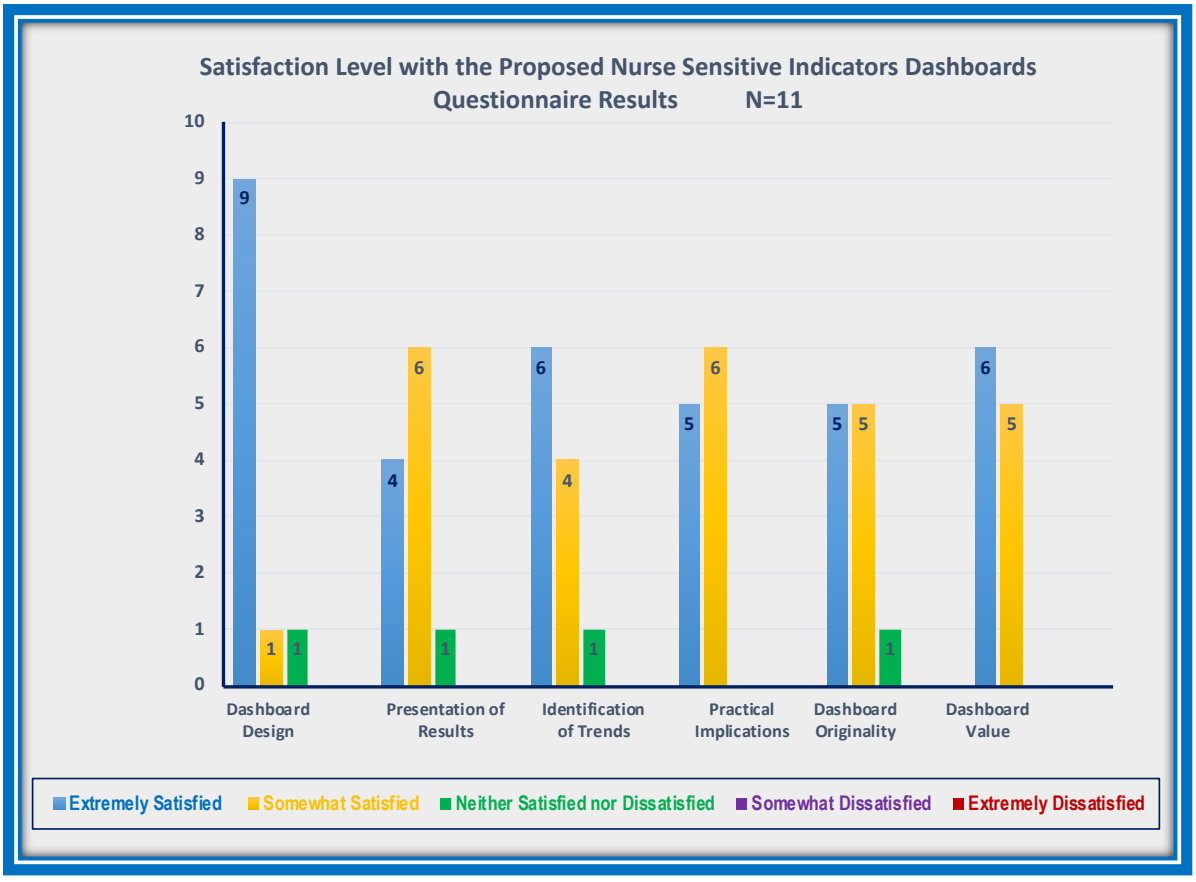

Figure 4. Satisfaction level with the proposed Nursing-Sensitive Indicators Dashboards questionnaire results.

The qualitative component of the evaluation included a content analysis of comments made during the NELT interviews. Due to availability, it was only possible to interview nine participants. The key responses are characterized in the following statements made by those interviewed:

Satisfaction with Design of the NSI Dashboard

Most participants reported that the design should display crucial indicators to detect areas in need of improvement at a glance. It was reported that the design satisfied the needs for monitoring of data for external and internal benchmarking as well as improvement and learning. Color-coding of the table portion of the dashboard provided an instant identification of trends and comparison of data against those of other hospitals within the system. Participants stated, "liking the readability of the overall design and would like to see more trend graphs," that it was "easy to understand," that it was a "work in progress, and [I] would like to see more graphs in the format required by Magnet," and that the "design [was] practical for CNOs…very practical."

Utilization for Observation of Performance

Respondents verbalized that the layout was important in allowing for structural reviews and identification of trends and performance improvements. One CNO shared that she used the NSI Dashboard in her staff meeting to increase an awareness on the importance of NSI. The NELT acknowledged that it was important to have a layout that supports all users regardless of environment, cognitive abilities, or analytical skills. One participant stated,

> In reviewing the most recent dashboard data, I found it is very helpful. Initially I had some areas that I needed clarified; however, I feel that the most recent changes made it clearer to understand which included the overall numbers. I will review with my team to ensure the falls data aligns with our hospital data being pulled.

Another "would like to see data for other indicators such as CAUTI and CLABSI," and one was "always satisfied with data that has comparative data."

Importance of Benchmarking with Other Hospitals

The NELT members verbalized that the NSI Dashboard was as an effective tool that allowed for comparison of results to identify practice variations. Having the ability to have a drill-down function to identify the data source was also perceived as a positive dashboard attribute. One participant stated,

> It is important to benchmark within the DHS system as well as externally. Benchmarking is critical in identifying sites that have best practices. The dashboard will also open up rich discussions around practice variations and the impact on patient outcomes and staff satisfaction.

A second participant added, "it is vital to have this ability to benchmark performance." Another mentioned it is "very important and would like to compare against those outside of the County even for indicators not being submitted to the CALNOC." A fourth stated, "it helps to track performance and make us motivated to do better." Lastly, a fifth mentioned it is "very important to see as a system and opportunities for improvement."

Extent to Which Working with Other Hospitals is Important

Respondents considered the NSI Dashboard as a practical tool for initiating conversations and sharing of best practices. Monitoring nursing performance indicators against other County hospitals as well as other hospitals locally, regionally, and nationally allows for better utilization of resources and implementing focused strategies that have proven effective in other healthcare organizations. One participant said,

> Spreading best practices within DHS and ensuring high level standardized practice is esstential to improving patient outcomes and staff satisfaction. The dashboad is a tool that can also address questions about variability in practice which is often a concern of our Service Employees International Union (SEIU) labor partners.

Another stated the "dashboard is a great tool to connect and address quality improvement issues and review data interpretation for Magnet readiness." A third found "plenty of value as there are quality issues that are the same and we can learn from each other's successes and failures."

Importance of Seeing How Other County Hospital Hospitals are Performing

The NELT agreed that, since indicators were common, the review of data on the NSI Dashboard allowed for performance comparisons internally and against others across the system. This sharing of best practices promotes standardization of programs and services which supports LACDHS strategic goals. One participant said it was "useful to look at alike hospitals for benchmarking as well as other major academic medical centers and hospitals that serve the same patient population." Another participant said it "could identify trends in practice and opportunities for improvement."

DISCUSSION

The NSI Dashboard was constructed to facilitate understanding of data through visual display so that comparisons could be easily made. In developing the dashboard, attention was given to the fundamental elements of design, presentation of data, and use of color to ensure its ease of use and understandability. Since its implementation, a number of clinical leaders have utilized the dashboard to undertake care improvements at their facilities.

Through participation in the project, communication opportunities among nurse executives at the Los Angeles County's healthcare facilities has been enhanced. A number of multidisciplinary initiatives for overall quality and productivity improvement have been initiated. There has also been a renewed effort to improve the quality of the data being submitted to the data repository. To support this effort the CALNOC/NSI Review Committee was reestablished and recharged with engaging in continuous review of all NSI data and reports. The LACDHS facilities are all fully accredited by a number of accrediting bodies. They are continually required to submit data to the accrediting organizations that provide oversight. Likewise, some facilities are seeking recognition as Centers of Excellence and, through ANCC, official recognition as Magnet facilities. All of these external organizations require evidence that facilities are continually monitoring and improving their performance, particularly in the area of care quality. The dashboard offers new opportunities to demonstrate to these external entities the robustness of ongoing care oversight and to provide them with the support data they require.

Future Iterations

From the outset, it was envisioned that the dashboard be a "living instrument" that would be continually evaluated and improved. Although the NSI Dashboard was originally tested utilizing data from the CALNOC data repository, it is anticipated that future iterations will include data from other sources. Expansion will most probably include data specific to systems intelligence, internal audits, electronic health records, and patient and nurse satisfaction. Much of this data is routinely available from the Press Ganey data repository. Additionally, future iterations of the dashboard will incorporate data specific to the County's Ambulatory Care and Correctional Health Systems.

Other Important Project Accomplishments

While this project had the primary aim of developing an NSI Dashboard to assist nurse leaders in their quality of care oversight responsibilities, the project has also resulted in a number of other important benefits for the LACDHS related to overall data validity, system and organizational performance, and quality of care improvement. The project has also generated the desire to create system-wide tasks forces to address a number of quality of care issues throughout LACDHS. For example, during the assessment of data for HAPIs, it was found that pressure injury prevention strategies were not uniformly practiced at all county facilities. This led to the development of a taskforce charged with developing a standardized pressure injury protocol.

Conclusion

The NSI Dashboard has been effective in supporting data review of key quality of care indicators that have already led to overall improvement in patient care delivery. Implementation of the NSI Dashboard has also been instrumental in identifying systems,

organizational, and operational opportunities for system-wide improvement. The overall aim of the project was achieved and a new awareness of the need for expanding the NSI Dashboard to incorporate other data to facilitate other system-wide improvements has been realized. The infrastructure for accomplishing this expansion is currently being created, and it is anticipated that collaborative analysis and creative programs for overall healthcare system improvement will follow.

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APPENDIX A

Project Timeline

July 2019	August 2019	September 2019	October 2019	November 2019	December 2019	Jan 2020	Feb 2020	March 2020
-Preparing Proposal	Defending Proposal- Provide presentation for approval - Submit IRB for approval as an exempt project	- Work on obtaining IRB -Present samples of EBP NSIs & dashboards (different designs, layouts, contents, and other NSIs from the list of NSIs) to LACDHS CNOs for feedback - Work with IT on the design of the dashboard	- Receive IRB approval - Present a draft of NSIs dashboard to LACDHS CNOs during CNO Council meeting for feedback on the design and reporting - Obtain an approval from CNOs of one design for NSIs dashboard - Work with IT on how information will reach this author	- Present dashboard with results for Sept. -Take input from CNOs after this presentation for combined refinement (Appendix C) - Working on the format of the NSI Dashboard with IT	-Incorporate feedbacks to refine the NSI Dashboard format - Present dashboard with results for October - Receive feedback from CNOs	-Incorporate feedbacks to refine the NSI Dashboard format -Present dashboard with results for November -Obtain approval of the dashboard format from all CNOs -Aggregate / report the results of interviews with CNOs during CNO Council	-Present dashboard with results for December -Conduct interviews of all members of the CNO Council on their perception of the usefulness of the NSIs dashboard - Review of goals for this dashboard with CNOs to be utilized as a communication tool to discuss results with respective facility	-Present dashboard with results for January -Review of Facility- based minutes of meetings led by CNOs sharing NSI Dashboard

CNO=Chief Nursing Officer; EBP=Evidence-Based Practice; IRB= Institutional Review Board; IT=Information Technology; LACDHS=Los Angeles County Department of Health Services; NSI= Nurse-Sensitive Indicator

APPENDIX B

Sample of NSI Dashboard

Performance Tracking for CMS Inpatient Quality Measures with Financial Risk												
	Measure Name	Hospital A	Hospital B	Hospital C	Hospital D	Hospital E	Breakeven Threshold	70% Threshold[2]	Max Downside Risk	Max Upside Risk (70%)	Estimated Dollars Earned	Opportunity Dollars[3]
Value-Based Purchasing Program	Communication with nurses	0.56	0.78	0.97	0.60	0.80	0.57	0.80	$ (104,576)	$ 185,673	$ 35,821	$ 149,852
	Communication with doctors	0.80	0.75	0.57	0.65	0.41	0.65	0.83	$ (104,576)	$ 185,673	$ 80,291	$ 105,382
	Responsiveness of hospital staff	0.94	0.69	0.77	0.96	0.86	0.90	0.74	$ (104,576)	$ 185,673	$ (121,458)	$ 307,131
	Communication about meds	0.44	0.40	0.58	0.66	0.94	0.65	0.83	$ (104,576)	$ 185,673	$ 79,218	$ 106,455
	Cleanliness and quietness	0.69	0.84	0.95	0.52	0.54	0.62	0.65	$ (104,576)	$ 185,673	$ (119,823)	$ 305,496
	Discharge information	0.89	0.50	0.72	1.00	0.60	0.58	0.93	$ (104,576)	$ 185,673	$ 65,822	$ 119,851
	3-Item Care Transitions Measure	0.82	0.77	0.40	0.91	0.66	0.64	0.70	$ (104,576)	$ 185,673	$ 70,293	$ 115,380
	Overall rating of hospital	0.89	0.47	0.84	0.54	0.80	0.68	0.83	$ (104,576)	$ 185,673	$ (59,212)	$ 244,885
	30-Day AMI Mortality	0.81	N/A	N/A	N/A	0.33	0.67	0.87	$ (398,437)	$ 435,762	$ (299,125)	$ 734,887
	30-Day HF Mortality	0.75	0.86	0.74	0.50	0.72	0.75	0.90	$ (537,693)	$ 435,762	$ 532,152	$ (96,390)
	30-Day PN Mortality	0.60	0.40	0.54	0.23	0.78	0.73	0.90	$ (537,693)	$ 435,762	$ 299,125	$ 136,637
	THA/TKA Complication Rate	0.44	0.37	0.16	0.31	0.75	0.10	0.03	$ (537,693)	$ 435,762	$ 454,586	$ (18,824)
	Medicare Spending per Beneficiary	0.96	0.14	0.77	0.92	0.07	0.94	0.88	$ (876,523)	$ 1,023,482	$ 982,151	$ 41,331
	PC-01 Elective Delivery	0.98	0.62	0.25	0.60	0.65	0.01	0.00	$ (375,689)	$ 409,285	$ 235,925	$ 173,360
Value-Based Purchasing & HAC Reduction Program	CAUTI	0.74	1.11	1.07	N/A	1.62	0.57	0.23	$ (823,498)	$ 422,902	$ 335,728	$ 87,174
	CLABSI	1.52	N/A	N/A	N/A	0.90	0.60	0.24	$ (795,836)	$ 398,201	$ 182,402	$ 215,799
	CDI	0.04	0.43	0.66	0.99	0.48	0.68	0.34	$ (1,298,634)	$ 355,829	$ (212,452)	$ 568,281
	MRSA	0.91	N/A	N/A	N/A	0.71	0.59	0.24	$ (823,964)	$ 378,922	$ 203,985	$ 174,937
	SSI Hyst	0.52	N/A	N/A	N/A	0.46	0.53	0.21	$ (254,692)	$ 55,920	$ (20,392)	$ 76,312
	SSI Colo	0.30	N/A	N/A	N/A	0.57	0.54	0.22	$ (498,725)	$ 202,938	$ 23,452	$ 179,486
	PSI 90 Composite	0.24	0.77	1.24	0.01	0.46	0.97	N/A	$ (623,985)	$ -	$ (12,994)	$ 12,994
Readmissions Reduction Program	30-Day AMI Readmissions	0.80	N/A	N/A	N/A	1.80	N/A	N/A	$ (7,234,924)	$ -	$ (25,918)	$ 25,918
	30-Day CABG Readmissions	0.11	N/A	N/A	N/A	0.28	N/A	N/A			$ -	$ -
	30-Day COPD Readmissions	1.42	0.07	0.55	0.65	0.29	N/A	N/A			$ (328,108)	$ 328,108
	30-Day HF Readmissions	0.15	1.08	1.75	0.65	0.09	N/A	N/A			$ (16,829)	$ 16,829
	30-Day PN Readmissions	1.15	0.75	0.97	0.86	1.64	N/A	N/A			$ (17,659)	$ 17,659
	30-Day THA/TKA Readmissions	1.14	0.20	0.99	0.34	1.67	N/A	N/A			$ (572,819)	$ 572,819
	Grand Total								**$ (16,807,565)**	**$ 6,503,176**	**$ 1,943,890**	**$ 4,559,286**

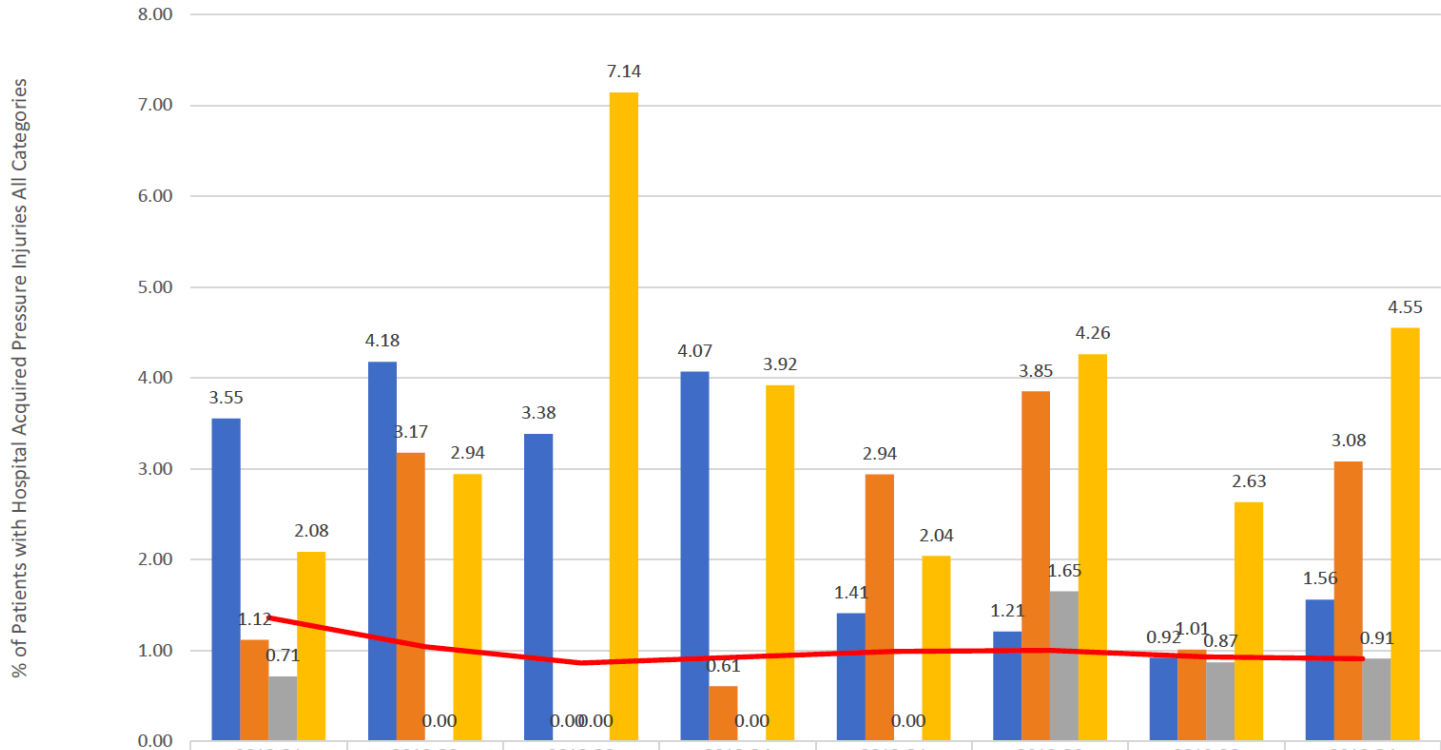
APPENDIX C

Final Production Dashboard

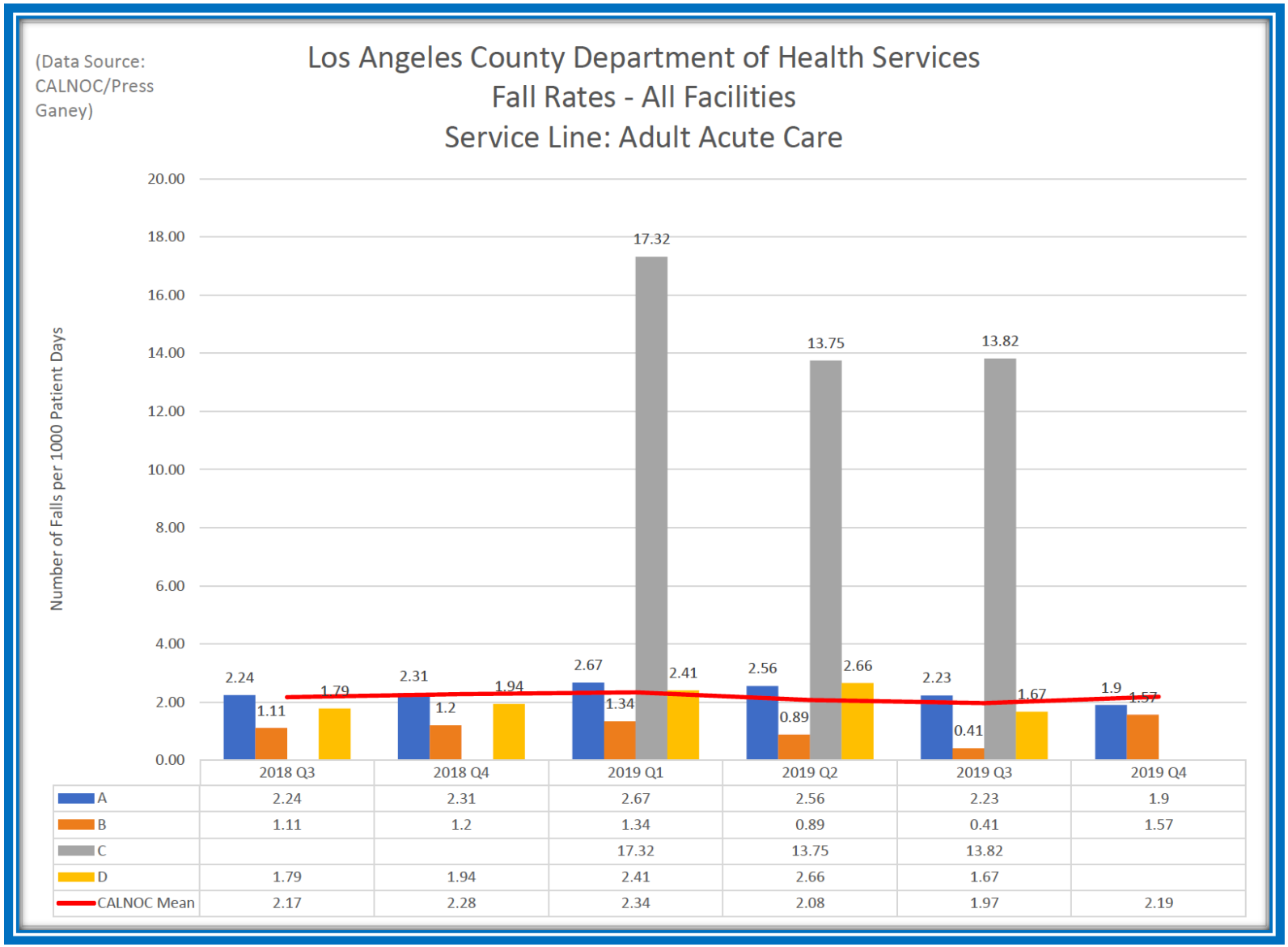
Los Angeles County Department of Health Services									
Office of Nursing Affairs									
			2017	4th Quarter 2018	1st Quarter 2019	2nd Quarter 2019	3rd Quarter 2019	4th Quarter 2019	1st Quarter 2020
HAPI	% of Pt. with Hospital Acq. Press. Injuries All Categories	Hospital A		4.07	1.41	1.21	0.92		
		Hospital B		0.61	2.94	3.85	1.01		
		Hospital C		0.00	0.00	1.65	0.87		
		Hospital D		3.92	2.04	4.26	2.63		
Falls	Falls per 1000 Pt Days	Hospital A		2.31	107	102	87		
		Hospital B		1.20	2.6	1.7	3.2		
		Hospital C		1.20	2.2	3.1	1.9		
		Hospital D		1.94	13	14	7		
Falls	All Injury Falls per 1000 Patient Days	Hospital A		0.25	24	13	11		
		Hospital B		0.16	1	3	0		
		Hospital C							
		Hospital D		0.00	0	1	2		

(Data Source: CALNOC/Press Ganey)

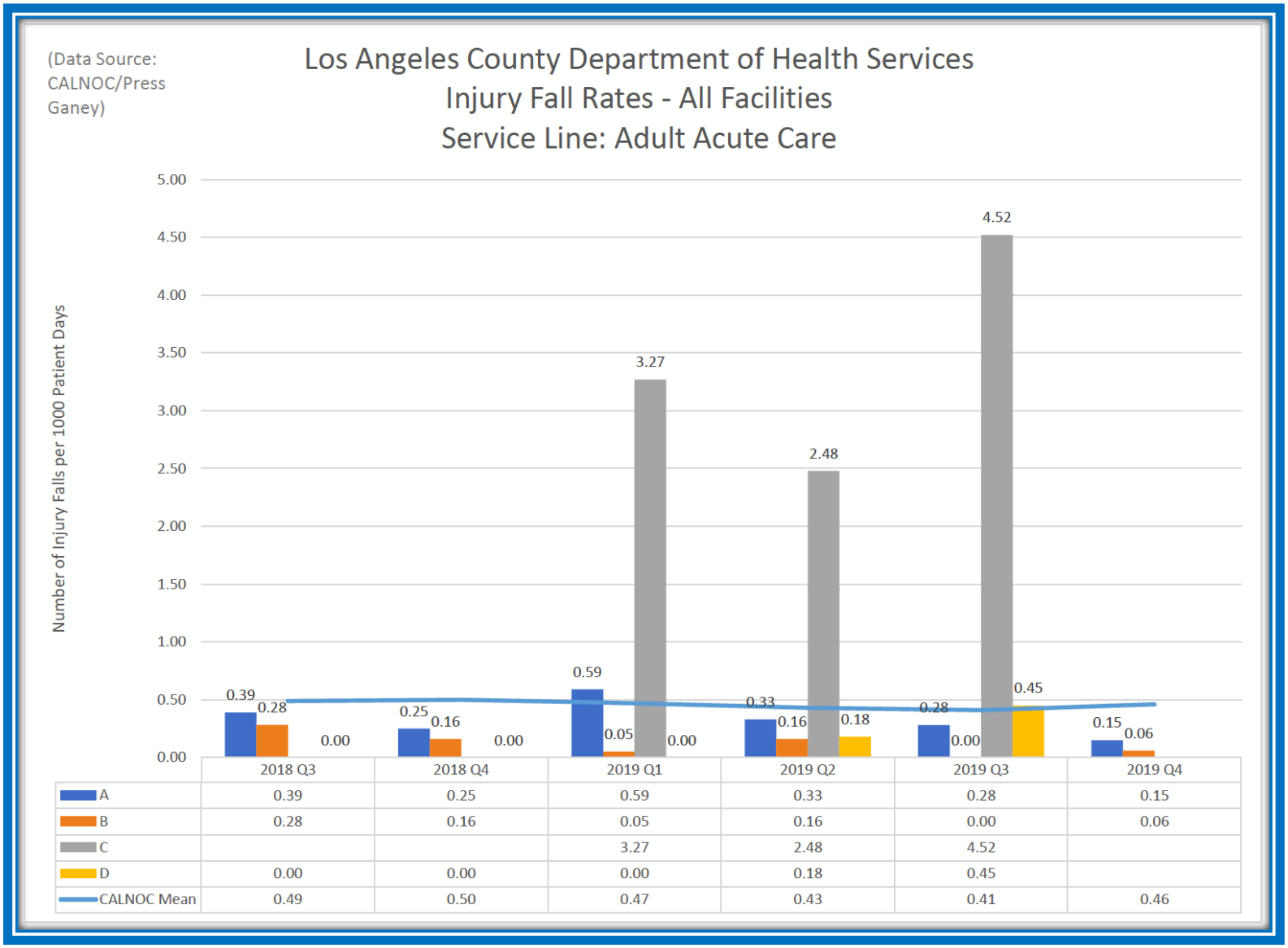
Los Angeles County Department of Health Services
Hospital Acquired Pressure Injuries All Categories - All Facilities
Service Line: Adult Acute Care



	2018 Q1	2018 Q2	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
A	3.55	4.18	3.38	4.07	1.41	1.21	0.92	1.56
B	1.12	3.17	0.00	0.61	2.94	3.85	1.01	3.08
C	0.71	0.00	0.00	0.00	0.00	1.65	0.87	0.91
D	2.08	2.94	7.14	3.92	2.04	4.26	2.63	4.55
CALNOC Mean	1.36	1.04	0.86	0.93	0.99	1.00	0.93	0.91



	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
A	2.24	2.31	2.67	2.56	2.23	1.9
B	1.11	1.2	1.34	0.89	0.41	1.57
C			17.32	13.75	13.82	
D	1.79	1.94	2.41	2.66	1.67	
CALNOC Mean	2.17	2.28	2.34	2.08	1.97	2.19



	2018 Q3	2018 Q4	2019 Q1	2019 Q2	2019 Q3	2019 Q4
A	0.39	0.25	0.59	0.33	0.28	0.15
B	0.28	0.16	0.05	0.16	0.00	0.06
C			3.27	2.48	4.52	
D	0.00	0.00	0.00	0.18	0.45	
CALNOC Mean	0.49	0.50	0.47	0.43	0.41	0.46

APPENDIX D

Chief Nursing Officers Questionnaire

SATISFACTION LEVEL WITH THE PROPOSED DASHBOARD

Please respond to the following questions by placing a check mark (√) in the answer box that corresponds to your response. Thank you for your support.

	Extremely Dissatisfied	Somewhat Dissatisfied	Neither Satisfied nor Dissatisfied	Somewhat Satisfied	Extremely Satisfied
How satisfied are you with:					
1. Design					
2. Presentation of results					
3. Identification of trends					
4. Practical implications					
5. Originality					
6. Value					

APPENDIX E

Chief Nursing Officers Interview Questions

POST-NSI DASHBOARD PROJECT IMPLEMENTATION

1. How satisfied are you with the design of the current dashboard? If not, why?
2. How satisfied are you with the utilization of NSI Dashboard allowing for the observation of current nursing performance for selected indicators?
3. How important is it to you to have the ability to benchmark your performance with other hospitals in the County?
4. To what extent do you see value in working with other County hospitals CNOs to identify countywide opportunities for addressing quality issues?
5. How important would it be to you to be able to see how other County facilities are performing on selected NSIs?
6. Comments