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Educating Nurses on Workflow Changes from Electronic Health Record Adoption

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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Abstract

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MSN, Western Governors University, 2011

BSN, Manila Doctors College, 1995

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

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Abstract

Workflow issues related to adoption of the electronic health record (EHR) has led to unsafe workarounds, decreased productivity, inefficient clinical documentation and slow rates of EHR adoption. The problem addressed in this quality improvement project was nurses' lack of knowledge about workflow changes due to EHR adoption. The purpose of this project was to identify changes in workflow and to develop an educational module to communicate the changes. This project was guided by both the ADDIE model (analysis, design, development, implementation, and evaluation) and the diffusion of innovations theory. Five stages were involved: process mapping, cognitive walkthrough, eLearning module development, pilot study, and evaluation. The process maps and cognitive walkthrough revealed significant workflow changes particularly in clinical practice guidelines, emergency department treatment plan, and the interdisciplinary care plan. The eLearning module was developed to describe workflow changes using gamification, scenario-based learning, and EHR simulation. The 14-item course evaluation included a 6-point Likert scale and closed- and open-ended questions. A purposive sample of nurses (N = 30) from the emergency department and inpatient care areas were invited to complete the eLearning module and course evaluation. Data were collected until saturation was achieved (n = 15). Descriptive statistics revealed the participants' positive learning experience. This quality improvement project is expected to contribute to positive social change by facilitating the effective use of the new EHR which can improve the quality of patient care, promote patient safety, reduce healthcare costs, and improve patient outcomes.

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Dedication

This project is dedicated to my parents who have instilled in me the value of education, perseverance, and the pursuit of excellence. This project is also dedicated to my loving husband, Rafael, who inspires me each day to continue to achieve my dreams and become a better nurse and person. There is no doubt that without his continued love, motivation, and support I could not have conquered one of the biggest milestones of my life.

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I would like to thank Dr. Joan Moon, my project chair, for her tireless mentorship efforts, patience and continued guidance. Likewise, I would like to thank my friends and colleagues who have inspired me to pursue my professional endeavors.

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Section 1: Nature of the Project

Introduction

The Doctor of Nursing Practice (DNP) is a practice-focused degree with an emphasis on innovative and evidence-based practice that reflects the use of credible research findings to improve practice (American Association of Colleges of Nursing [AACN], 2006). This DNP project focused on the role of the DNP-prepared nurse in informatics, a specialty that aligns with the DNP Essentials of Doctoral Education for Advanced Nursing Practice IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care (AACN, 2006).

Successful adoption of the electronic health record (EHR) necessitates an understanding of workflows and how EHR impact the daily tasks of clinicians. Workflow refers to the sequence and interaction of physical and mental tasks performed by staff within and between work environments (Agency for Healthcare Research and Quality [AHRQ], n.d.). In this project I addressed the nurses' lack of knowledge about workflow changes that result from adoption of the EHR. This project is expected to contribute to positive social change by enhancing nurses' knowledge of on workflow changes and thus facilitating the effective use of the new EHR. The effective use and continued adoption of EHR can improve the quality of patient care, promote patient safety, reduce healthcare costs, and improve patient outcomes.

The enactment of the Health Information Technology for Economic and Clinical Health (HITECH) Act in 2009 mandates that the U.S. Department of Health and Human Services (HHS) promote the adoption and meaningful use of health information

technology (IT, Office of the National Coordinator for Health Information Technology [ONC], 2015). This law prompted the widespread adoption of health IT, including the use of certified electronic health records (EHRs) in ambulatory and hospital settings (ONC, 2015).

The hospital system that was involved in this DNP quality improvement (QI) project transitioned from paper and electronic-based medical records (EMR) to a comprehensive EHR that fully integrates inpatient and ambulatory EHRs, utilization management, and clinical information systems on inpatient care management. An EMR is a paper chart in a digital format that contains notes and information gathered by clinicians within a single practice or hospital setting. Whereas, an EHR is a database that contains a comprehensive view of patient information collected by and shared with all authorized clinicians involved in a patient's care within and across different care settings (ONC, 2015). This hospital health system, located in an East Coast metropolitan area , is an integrated delivery network comprised of 11 hospitals, an extended care facility, multiple primary and specialty care practices, school health, home health, care management, and managed care programs. I work as a manager of training and development in the care management/managed care division.

The hospital’s clinical leadership identified a lack of knowledge among nurses regarding clinical workflow changes that result from EHR adoption. The director of nursing presented this issue and discussed the need to develop and implement an educational module that would describe the workflow changes and enhance the use of the new EHR. This project has implications for positive social change.by enhancing the

knowledge of nurses on workflow changes and thus facilitating the effective use of the new EHR that can improve the quality of patient care, promote patient safety, reduce healthcare costs, and improve patient outcomes.

Background

Research articles suggest that EHR adoption is challenging across health care organizations (Desroches, Painter, & Jha, 2013; McAlearney, Robbins, Kowalczyk, Chisolm, & Song, 2012; Yan et al., 2014). According to an Institute of Medicine (IOM, 2012) report on health IT and patient safety, a more in-depth understanding of how health IT can cause harm and affect workflows is required to fully achieve its potential benefits to IT. Some of the factors critical to the success of EHR adoption include end-user attitude toward EHR, end-user participation, interoperability, technical support, training, and workflow impact (Gray, 2014; McAlearney et al., 2012; Najaftorkaman & Ghapanchi, 2014). According to the California Network of EHR Adoption, the impact of EHR on workflows is the most significant factor in the success of EHR adoption (California Healthcare Foundation [CHF], 2011). Workflow issues associated with EHR implementation have contributed to provider dissatisfaction, slow rates of EHR adoption, decreased productivity, and inefficient clinical documentation which can decrease patient safety and outcomes (Lowry et al., 2015). Workflows associated with clinical and practice management processes change when implementing EHRs. Recognizing the changes on clinical workflows through process mapping is vital to successful EHR implementation (AHRQ, n.d.; ONC, 2012). Process maps provide a visual representation of tasks within processes; the maps can be used as a blueprint for implementation

training, for establishing best practices and organizational standards, and for subsequent optimization and redesign (CHF, 2011; ONC, 2012). Changes to workflows need to be communicated appropriately to nurses through education (Topaz, Rao, Creber, & Bowles, 2013). Nurses' lack of knowledge about workflow changes can lead to inefficient and unsafe workarounds (Lowry et al., 2015).

Problem Statement

As the target hospital system transitioned from hybrid clinical documentation (paper and electronic-based medical record) to a fully integrated EHR, changes to the clinical and administrative workflows were anticipated. Unexpected changes can cause significant disruption in patient care, billing, and communication among patients and providers. Issues on workflow changes associated with EHR adoption can lead to poor clinical documentation, fragmented patient care, and increased risks to patient safety. Moreover, changes to the clinical workflow—when steps are added or eliminated in work processes—can impact the way nurses perform tasks and complete them. For example, to complete clinical tasks in response to workflow challenges, clinicians tend to develop workarounds or temporary fixes (Lowry et al., 2015). These workarounds may reduce the quality and efficiency of patient care (Zheng, Ciemins, Lanham, & Lindberg, 2015). By identifying how workflows will change and anticipating them, informed decisions can be made (AHRQ, n.d.).

Nurses lack knowledge about workflow changes caused by EHR adoption. The clinical leadership identified this problem during EHR design meetings with application analysts, instructional designers, and subject matter experts (SMEs). To address this gap,

the director of nursing for the EHR project sought for ways to communicate the changes through training.

Purpose

The purpose of this QI project was to identify the changes in workflow caused by adopting the EHR and to develop an educational module to address them in the emergency department (ED) and inpatient care areas. The review of literature confirmed that EHR training programs that discussed the benefits of EHR as well as the workflow changes led to improved learning outcomes and the effective use of EHRs (Bredfeldt, Awad, Joseph, & Snyder, 2013; McAlearney et al., 2012).

EHR training is focused on the technical aspects of the EHR, such as navigational functions, and does not include information about the impact to workflows (Harrington, 2015). This QI project involved the development of an educational module to describe the significant workflow changes and address the gap between evidence and current practice.

Project Goals and Outcomes

Goals

The goal of this QI project was to facilitate end-user knowledge of workflow changes caused by EHR adoption.

Outcomes

The project has three outcomes: (a) process maps (see Appendix A), (b) a cognitive walkthrough and comparative analysis of old and new workflows and (c) an eLearning module (see Appendix B).

Framework for the Project

The main framework for this QI project was a model of instructional design called ADDIE: **A**nalysis, **D**esign, **D**evelopment, **I**mplementation, **E**valuation (Hodell, 2011). ADDIE provided a structure for analyzing the learning gaps, identifying the workflow changes, defining the learning objectives, selecting delivery strategies, developing the course content, deploying the module, and gathering feedback from pilot program participants. The secondary framework for this project was the diffusion of innovations () theory (Rogers, 2003). DOI informed the project about the EHR adoption process and how the perceptions of end users affected the rate of adoption.

Nature of the Project

The team approach for this project—of which I was the leader—included several members: the nursing senior leadership for the EHR project, the director of professional practice and nursing quality officer, the director of clinical education, two EHR training managers, two clinical faculty members, the eLearning expert, and two EHR instructional designers. The process maps were developed to identify the clinical functions and tasks performed by registered nurses (RNs) in the ED and inpatient care areas. A series of meetings with the clinical faculty and instructional designers were conducted for the cognitive walkthroughs and comparative analysis of the ED and inpatient care workflows. An eLearning module was developed using innovative strategies such as gamification, scenario-based learning, and simulation. RN participants completed a pilot

of the eLearning module and then evaluated the course. Descriptive statistics were used to describe the course evaluation results and then summarize them.

Definition of Terms

The following terms were used in this QI project.

Cognitive walkthrough. A cognitive walkthrough is a task-oriented method for evaluating the usability of health information systems (Khajouei, Esfahani, & Jahani, 2016).

Electronic health record (EHR). An EHR is a computerized version of a patient's paper chart that includes the patient's medical history, diagnoses, medications, treatment plans, medications, immunization records, allergies, images, and laboratory results. EHRs facilitate sharing of information across more than one organization or group of providers who are involved in a patient's care. In addition, EHRs allows access to evidence-based tools, use of clinical decision support, and streamline workflows (ONC, 2013).

Electronic medical record (EMR). An EMR is a computerized version of a patient's paper chart that contains medical and treatment records that can be accessed within a provider's office (ONC, 2013).

Gamification. Gamification is defined as the "use of game-based mechanics, aesthetics, and game thinking to engage people, motivate action, promote learning, and solve problems" (Kapp, 2012, p. 10).

Process mapping. Process mapping, also known as flowcharting, involves the illustration of all tasks necessary to carry out a process and identification of points at which one process interconnects with another (CHF, 2011).

Usability. Usability is the "effectiveness, efficiency, and satisfaction with which specific users can achieve a specific set of tasks in a particular environment" (Schoeffel, 2003, p. 6)

Workarounds. Workarounds are behaviors end users use to overcome perceived limitations in a health IT system as responses to workflow issues (Friedman et al., 2014).

Workflow. Workflow refers to the sequence and interaction of physical and mental tasks performed by staff within and between work environments (AHRQ, n.d.).

Assumptions

Assumptions are statements that are considered to be true but have not been scientifically proven (Grove, Burns, & Gray, 2013). This project involved an educational module about the workflow changes that resulted from adoption of the EHR. Knowledge of the current workflow and the learners' readiness to learn are significant to the project's success. The assumptions for this QI project were:

1. Nurses had the basic knowledge of the current workflow.
2. Nurses were willing and were ready to learn about the workflow changes.

Scope and Delimitations

The scope of this QI project was limited to RNs in both the ED and inpatient care. The process maps, cognitive walkthroughs, comparative analysis, and eLearning content were focused on clinical workflows that have significant changes in the ED and inpatient care areas.

Significance

The effective use of EHRs can improve patient care; can (a) facilitate better care coordination, (b) increase practice efficiencies and cost savings, (c) foster patient-provider communication, (d) reduce errors, (e) improve patient safety, and (f) facilitate better patient outcomes (ONC, 2013). EHR adoption is a complex process that can significantly impact clinical workflows. This QI project sought to enhance end-user training and improve the communication of workflow changes among nurses across the hospital system. Teaching nurses about workflow changes in the EHR adoption process will help them use and adopt the EHR. This project could facilitate opportunities for process improvement after the EHR adoption and it could be useful for training new staff.

Summary

In Section 1, I presented an overview of the problem about the nurses' lack of knowledge on clinical workflow changes resulting from EHR adoption. This overview emphasized the significance of workflow development in the EHR adoption process, and in particular, the inclusion of workflow changes in end-user training. The purpose of this QI project was to identify the changes in the workflows and to develop an educational module to communicate the changes. This project aimed to facilitate end-user knowledge of workflow changes caused by EHR adoption. The outcomes of the project include process maps, a cognitive walkthrough, and an eLearning module. Moreover, the ADDIE and DOI theory guided this project.

In Section 2, the literature is reviewed on the following topics: EHR adoption, workflow changes, and the theoretical underpinnings of the project.

Section 2: Review of Literature

Introduction

The problem identified in this QI project was nurses' lack of knowledge about the clinical workflow changes caused by the adoption of EHR. The purpose of this project was to identify the workflows changes caused by EHR adoption and to develop an educational module for nurses on workflow changes in the ED and inpatient care areas. Health IT, such as EHRs, plays a vital role in making health care safe, effective, patient-centered, timely, efficient, and equitable (IOM, 2012). The Health Information Technology for Economic and Clinical Health (HITECH) Act has prompted the widespread adoption of EHR across health care organizations (ONC, 2015). EHR adoption is a complex process that can significantly impact clinical workflows. Changes to the clinical workflows have been identified as one of the critical barriers to successful EHR adoption. These changes need to be appropriately communicated to clinicians through training (Topaz et al., 2013). The literature review provides a description of what has been published on the following topics: health IT, EHR adoption, EHR adoption impact on workflows, EHR training, instructional strategies, and the ADDIE and DOI frameworks used in the project.

The following databases were used in the literature search: Cumulative Index to Nursing and Allied Health Literature (CINAHL), MEDLINE, Computers & Applied Sciences Complete, , and Google Scholar. The following search terms were used: *health information technology, meaningful use, EHR, implementation, workflow, clinicians, nurses, physicians, training, EHR adoption, diffusion of innovation, instructional design,*

gamification, scenario-based learning, simulation, and *ADDIE model*. Approximately 85 foundational, seminal, and peer-reviewed articles were reviewed, of which 51 peer-reviewed journal articles, research studies, systematic reviews, reports, and textbooks (published between 2000 and 2016) were included in the review.

Health IT

IOM (2012) describes health IT as a broad range of products, including EHRs, personal health records, and health information exchanges. They store a broad range of health data, provide clinical decision support, facilitate communication among patients and providers, promote patient engagement, and reduce medical errors. Health IT consists of computers (), software, and devices integrated into processes and workflows used by people in an organization. Based on the IOM report (2012) on health IT and patient safety, health IT, when developed and implemented effectively, can transform health care into one that is "safe, effective, patient-centered, timely, efficient, and equitable" (IOM, 2001, p. 7). Conversely, IOM reported that evidence about the impact of health IT on patient safety is limited to medication safety; IOM cited case reports that, due to variations and inconsistencies in health IT products, health IT can risk patient safety. Because health IT has been adopted widely in the U.S. health care systems, numerous studies have been conducted to determine whether health IT improves the quality and safety of health care. According to the report of Banger and Graber (2015), based on systematic reviews of 826 articles published from 2006 to 2014, health IT improves patient safety. Nonetheless, the authors concluded that the evidence calls for more work and research on the indirect factors that support or prevent successful implementation and

use of health IT. The HITECH Act and meaningful use regulations have pointed up the need for more research to determine the environments or situations in which some health IT adoptions are successful and others are not (Jones, Rudin, Perry, & Shekelle, 2014).

HITECH Act and Meaningful Use

The enactment of the HITECH Act in 2009 mandated the HHS to promote the adoption and meaningful use of health IT (ONC, 2015). This law has accelerated the widespread adoption of health IT to comply with the meaningful use regulations, including the use of certified EHRs in the ambulatory and hospital settings. Meaningful use involves the use of certified EHRs to

- Improve quality, safety, efficiency, and reduce health disparities
- Engage patients and family
- Improve coordination, and population, and public health
- Maintain privacy and security of patient health information (ONC, 2015)

The Centers for Medicare and Medicaid Services (CMS, 2015) have incentive programs that provide incentive payments to eligible professionals, eligible hospitals, and critical access hospitals that implement, upgrade, and achieve specific objectives of meaningful use stages. The objectives include: to create a baseline for electronic data capture and sharing (Stage 1); to begin using EHR for continuous quality improvement at the point of care, promote patient engagement, and demonstrate ability to share data with patients and providers across the care continuum (Stage 2); and to promote improvements in quality, safety, and efficiency to improve health outcomes (Stage 3) (Ahmad & Tsang, 2013; ONC, 2015). The passage of the HITECH Act and meaningful use bring changes to

the workflows and impacts how clinicians perform and complete tasks to achieve a desired goal.

EHR Adoption and Workflows

EHR adoption has been reported to be challenging across health care organizations (Desroches et al., 2013; McAlearney et al., 2012; Yan et al., 2014). Some of the factors that are critical to the success of EHR adoption include end-user participation and attitude toward EHRs, interoperability, technical support, workflow impact, and training (Gray, 2014; McAlearney et al., 2012; Najaftorkaman & Ghapanchi, 2014). The California Network of EHR Adoption considers the impact of EHR to workflows as the most significant factor in the adoption process (CHF, 2011). While workflow analysis is part of the EHR design process, inadequate time is spent in integrating actual clinical workflows into EHR (Friedman et al., 2014). Workflow issues associated with EHR implementation have contributed to provider dissatisfaction, slow rates of EHR adoption, decreased productivity, and inefficient clinical documentation which can negatively impact patient safety and outcomes (Lowry et al., 2015). Understanding workflow effects of EHR is critical as alterations in clinical workflows have been one of the major barriers to successful EHR adoption (Vishwanath, Singh, & Winkelstein, 2010).

EHR Training

EHR training is critical to the success of EHR adoption. Changes to the workflows resulting from EHR adoption need to be appropriately communicated to clinicians through education (Topaz et al., 2013). In general, EHR training programs are

focused on navigating functions and EHR features (Harrington, 2015). EHR training programs that go beyond the technical aspects and emphasize the positive potential of the EHR associated with the change will lead to better learning outcomes and effective use of EHR (McAlearney et al., 2012). Clinicians will likely use and adopt the EHR if they perceive the benefits associated with the change. EHR training is effective when training is tailored to individual roles (role-based), actual working environment (mock training), and clinical workflows (process-based) (CHF, 2010; Cresswell, Bates, & Sheikh, 2013).

In a systematic review of 98 peer-reviewed journal publications, Nguyen, Belluci, and Nguyen (2014) reported the benefits and issues associated with the success or failure of EHR adoption. The authors emphasized the significance of integrating the clinical benefits and efficiencies of new EHRs into the training curriculum. Additionally, a mixed method study of 54 participants by Bredfeltdt et al. (2013) revealed the effectiveness and impact of a post-implementation EHR training that integrated topics related to EHR features and workflows. The study involved the development of EHR training classes using concrete patient scenarios on patient-level data management and workflow-related documentation tools. The training was well received by participants and resulted in an increased use of EHR tools that impact workflows.

ADDIE Model of Instructional Design

The ADDIE model of instructional design was used as the framework for this project. The elements of the model are **A**nalysis, **D**esign, **D**evelopment, **I**mplementation, **E**valuation (Hodell, 2011). This model provided a structure for illustrating workflows through process mapping; cognitive walkthroughs and comparative analysis of old and

new workflows; development of learning objectives, course content, and eLearning module; posting of eLearning module to the learning management system (LMS); distribution and collection of course evaluation; and analysis of evaluation results.

The ADDIE Model

This instructional design model is an iterative process (Sengstack & Boicey, 2015) in which repetition of the elements occurs until the process yields to a desired result. Figure 1 illustrates the cyclical process of ADDIE elements.

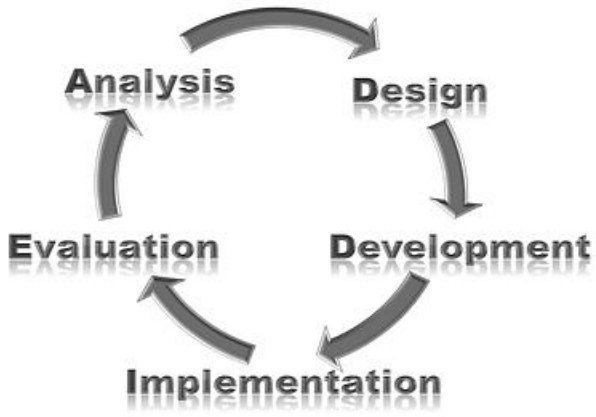

Figure 1. The ADDIE model of instructional design.

Analysis. Analysis is the foundation of an educational project. This element is the data-gathering phase in the ADDIE process in which pertinent information is gathered from subject matter experts that will be used throughout the process (Hodell, 2011). Information gathered through analysis may include the organizational needs that drive the educational project, nurses' learning needs, purpose and goals, identified gaps in performance, root cause of performance gap, current and future processes or workflows, roles and patient care areas affected by EHR adoption, and possible instructional

methods.

Design. Design is the blueprint or outline of an educational project. This element involves the development of learning objectives, selection of delivery method, identification of expected outcomes, schedule, equipment, and budget (Hodell, 2011; Robinson & Dearmon, 2013; Sengstack & Boicey, 2015).

Development. Development entails the production of materials based on the learning objectives, pilot testing, and revisions. This element involves collaboration with the stakeholders and subject matter experts to review and validate content (Hodell, 2011; Sengstack & Boicey, 2015).

Implementation. Implementation involves the delivery of educational materials to the learners through the method that was determined during the analysis and design phases. This element also includes the course evaluations, which provide an opportunity to gather information about how learners are gaining knowledge, and whether the educational materials are effective (Sengstack & Boicey, 2015). The course evaluation results may be used to make necessary improvements to the educational materials.

Evaluation. Evaluation takes place in every element of the ADDIE process. This element involves an appraisal of all tasks within each element to make essential improvements to the educational project (Hodell, 2011).

Use of ADDIE Model

The ADDIE model of instructional design is a systematic and iterative approach to content development. This model has been widely used by educators and instructional designers from across different industries. The use of this model dates back in the 1970s

when the Florida State University initially developed the model for the U.S. Armed Forces (Molenda, 2003). Multak, Khazraee, Rogers, and Dalrymple (2013) utilized the ADDIE model to evaluate EHR systems for educational use in a nursing informatics curriculum. The curriculum incorporated an EHR training program, which includes classroom lectures, and computer-based, simulated sessions that provided students access to an EHR system prior to using one with actual patients.

A mixed method study by Fink and Beck (2015) used the ADDIE model to develop and evaluate an online educational program to teach older adults to determine and assess high quality web-based health information. In developing the educational program, the researchers identified the participants' learning needs and preferences through focus groups and interviews (analysis), which guided the content selection and methodology (design). The researchers developed a prototype of the online education program, conducted a pilot test, and prototype review (development). Eighteen participants were asked to complete two online educational programs (experimental and comparison program) and an online evaluation survey to appraise each program's usability, appearance, and usefulness (implementation). Qualitative and quantitative data results were analyzed (evaluation). The experimental program yielded positive results.

Robinson and Dearmon (2013) used the ADDIE model to develop an evidence-based educational project to enhance knowledge transfer in undergraduate nursing students. The authors used the ADDIE model as the framework for simulation activities and a tool for the standardization of teaching and learning processes. Details about the

project implementation such as participants and project outcomes were not indicated in the article.

Diffusion of Innovations Theory

Rogers' DOI theory was used to inform the project about EHR adoption process and how end-users' perceptions affect the rate of adoption. Rogers (2003) defined diffusion as "the process in which an innovation is communicated through certain channels over time among the members of a social system" (p. 5). Derived from this definition, the four main elements in the diffusion of innovations are the (1) innovation, (2) communication channels, (3) time, and (4) the social system. These elements were used to describe the characteristics of innovations, the innovation-decision process related to EHR adoption, the impact of EHR on clinical workflows, and communication of the changes among nurses across the hospital system.

Characteristics of Innovations

Rogers (2003) proposes five characteristics of innovations to describe how individuals perceive innovations and how these perceptions affect the rate of adoption. These characteristics of innovations informed this project about how the perceptions of end users affected the rate of adoption.

Relative advantage. Relative advantage is the perceived benefit that the innovation is better than the previous idea. A more positive perceived relative advantage of an innovation will result in faster adoption rate (Rogers, 2003). An end-user who perceives that the new EHR is better than the previous means of documentation (paper and electronic-based) may rapidly accept and use the EHR.

Compatibility. Compatibility is the perceived value of an innovation as being consistent with existing values, previous experiences, and needs. An innovation that is compatible with the norms and values of a social system will result in faster adoption rate (Rogers, 2003). An EHR that is compatible with the organization's business and clinical workflows, end-users' characteristics, and population may result in faster adoption.

Complexity. Complexity is the perceived disadvantage of innovation as being difficult to understand and use. A complex innovation will result in slow adoption rate (Rogers, 2003). An EHR with complex designs and poor usability can be difficult to learn and can lead to slower adoption.

Trialability. Trialability is the perceived ability of an individual to experience an innovation on a pilot basis. Implementing an innovation on a trial basis will result to faster adoption (Rogers, 2003). Implementing an EHR in a phased approach and allowing end-users to practice using a simulated EHR environment can decrease difficulties in learning complicated applications.

Observability. Observability is the perceived ability of an individual to see the outcomes of an innovation will result to faster adoption (Rogers, 2003). A phased approach where departments in the organization implement the new EHR in phases over time may allow end-users to see the achievements and challenges of previous departments.

The Innovation-Decision Process

A new idea or innovation such as using a new EHR brings a certain degree of uncertainty and unpredictability. Communicating information about the innovation can

reduce uncertainty and perceived risks. The innovation-decision process depicted in Figure 2, has five stages: knowledge, persuasion, decision, implementation, and confirmation. This process is a path through which an individual obtains or receives initial information about an innovation and gains understanding of how innovation works; develops either positive or negative attitude towards the innovation which leads to an option to adopt or reject the innovation; implements; and confirms whether to adopt or reject the innovation (Rogers, 2003).

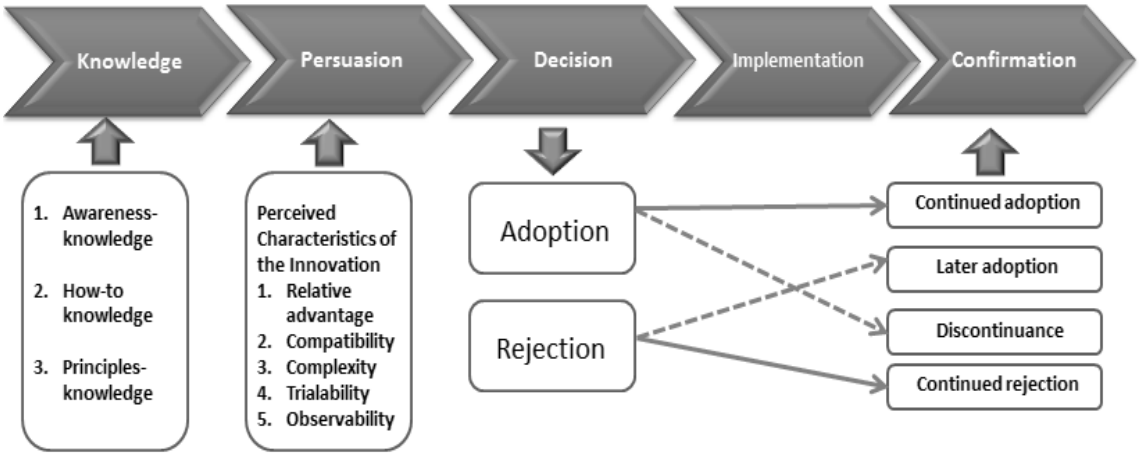

Figure 2. Communication channels, factors, and outcomes in the innovation-decision process. Adapted from "A Model of Five Stages in the Innovation-Decision Process," by E. Rogers, 2003, *Diffusion of Innovations*, 5E, p. 170. Copyright 1995, 2003 by Everett M. Rogers. Copyright 1962, 1971, 1983, by Free Press, a Division of Simon & Schuster, Inc. Reprinted with permission.

Diffusion of Innovations Theory and EHR Adoption

The DOI theory has been used as a conceptual framework to describe factors affecting EHR adoption and to derive evidence-based strategies that address barriers to EHR adoption. A quantitative study by Harmon, Fogle, & Rousell, (2015) with 23 participants used the DOI theory to assess and analyze nurses' perceptions of an EHR

five years post-implementation. The study was guided by the main elements of DOI as described by Rogers (2003): Innovation, communication, time, and social system. As defined in the study, the innovation is the EHR, communication is the transfer of information from one individual or organization to another, the social system is the nurses in the organization, and time is described as 5 years post-implementation. The researchers concluded with three recommendations that may improve the use of the EHR and contribute to evidence-based practices for future implementations and innovations. The recommendations include: enhance communication among caregivers using communication tools; facilitate EHR optimization that integrates clinical decision support; and conduct further time-motion research to determine the time spent on clinical tasks and to identify complex processes and workarounds related to the EHR.

In a systematic review, Kruse, DeShazo, and Kim (2014) explored 25 articles about an extensive range of organizational and environmental factors associated with the adoption of EHRs using the DOI theory and organization theories. The researchers used the characteristics of innovation: relative advantage, compatibility, complexity, trialability, and observability. Based on the systematic review, a conceptual model that is specific to large-scale EHR implementations was developed to explain the factors of EHR adoption. The researchers concluded with recommendations to perform empirical studies to better understand effective adoption strategies and measure the positive and negative effects of each of the identified factors.

The DOI theory was used to understand the process of how an innovation is communicated through education and how education helps individuals going through

innovation to decrease the degree of uncertainty, to have positive behaviors, and effectively use and adopt the innovation.

Instructional Strategies

Innovative instructional strategies such as gamification, scenario-based learning, and simulation were integrated into the eLearning module. Gamification is defined as the "use of game-based mechanics, aesthetics, and game thinking to engage people, motivate action, promote learning, and solve problems" (Kapp, 2012, p. 10). In a systematic review of 170 scholarly articles (Gibbs, Hewitt, & McLeod, 2016), researchers explored the use of game design elements in EHR training. The review revealed that the integration of game-based design to EHR system training facilitates active versus passive learning in a safe and learner-centered environment; engages and motivates learners; improves and accelerates learning; and improves role-based and team-based learning. Using game-based techniques provides an innovative way of teaching that meets all types of learning styles and facilitates critical thinking (Brull & Finlayson, 2016).

Scenario-based learning can enhance skills and accelerate expertise through a series of simulated task challenges that can be organized from simple to complex concepts (Clark, 2013). In an article about a focused clinician workflow EHR training (Nicklaus, Kusser, Zessin, & Amaya, 2015), the authors described how an EHR training was successfully transformed through the use of teaching strategies including workflow-focused scenarios.

Simulation replicates complex scenarios that enable the evaluation of clinical skills in a wide-range manner (Mohan, Scholl, & Gold, 2015). In an educational study on

simulation and EHR training (Vuk et al, 2015), the researchers revealed the positive impact of simulation training on providers self-confidence and preparedness to use EHRs. The participants described the simulation training as an excellent and effective way to learn EHRs (Vuk et al, 2015).

Background and Context

Driven by the hospital health system's strategic vision and mission, government regulatory requirements, Meaningful use requirements, and incentive programs, the system transitioned from paper and electronic medical records (EMRs) into an EHR that fully integrates the inpatient and ambulatory EMRs, utilization management, and inpatient care management clinical information systems. In 2015, the health system began a phased approach to EHR implementation in the primary, specialty care practices, occupational health services, and school health. The EHR roll out continued in four hospital campuses in 2016. This QI project involved a team approach with myself as the leader. The project was conducted to facilitate end-user knowledge of workflow changes resulting in EHR adoption.

Summary

In this section, I reviewed the scholarly literature and described how health IT could impact the quality, safety, and efficiency of healthcare. Literature confirmed the widespread adoption of EHRs, the anticipated changes to workflows caused by EHR adoption, the critical aspect of communicating the workflow changes to nurses in addition to technical EHR training, and the effective use of innovative instructional

strategies. Moreover, I presented existing scholarship related to the ADDIE model and the Diffusion of Innovation theory.

In Section 3, I discussed the approach and methods that were used in this project based on the ADDIE model. In addition, I described the population, sampling, recruitment, data collection, data analysis, time and resource, and evaluation.

Section 3: Approach/Methods

Introduction

The purpose of this project was to identify the workflow changes resulting from EHR adoption and to develop an educational module for nurses about the workflow changes. This project was conducted to facilitate end-user knowledge of workflow changes caused by EHR adoption. This section covers the following topics: approach and rationale, population, sampling, recruitment, data collection, data analysis, time and resources, and evaluation.

Approach and Rationale

To carry out the project activities, this QI project used a team approach and the ADDIE model of instructional design.. A team approach was selected to bring diverse perspectives to the discussion. Effective teams are comprised of members representing leadership expertise within the organization who have the necessary knowledge, skill, and authority to achieve project outcomes. The types of expertise include project sponsorship, clinical leadership, technical expertise, and day-to-day leadership (AHRQ, 2013). The team members' qualities and expertise offered a wide array of knowledge and skills from different health care disciplines which were significant to the project's success. Each team member provided expertise on old and current workflows, including the use of current EHR, along with other clinical information systems, paper-based patient records, and new EHR functions. The team used the ADDIE model to ensure that all pertinent activities were completed in an organized and efficient manner. The elements of the ADDIE model were discussed in Section 2.

The Project Team

I was the leader of the project team and was responsible for day-to-day leadership; I also ensured the progress and completion of the project's activities. The other team members were as follows: the nursing senior leadership for the EHR project, the director of professional practice and nursing quality officer, the director of clinical education, two EHR training managers, two clinical faculty members, the eLearning expert, and two EHR instructional designers. The team members represented each type of expertise in nursing, education, and informatics: project sponsorship, clinical leadership, technical expertise, and day-to-day leadership. Each member had different responsibilities. The, the EHR project director, who was the project sponsor and had executive authority in the organization, oversaw the project activities, including data collection, and served as the liaison to senior management and other key leaders of the hospital system. The clinical directors and EHR training managers represented the clinical leadership. The clinical faculty, EHR instructional designers, and eLearning expert represented the clinical and technical expertise.

Team Meetings

Effective team meetings are necessary to ensure the successful completion of tasks to achieve project outcomes. Some of the meeting practices that support productive team processes include organizing meeting logistics, providing an agenda before the meeting, starting/ending meetings on time, assigning tasks and action items, facilitating and summarizing decisions, evaluating and planning for improvement, and providing meeting minutes promptly (Association of American Medical Colleges, n.d.). These

recommendations were used as a guide during team meetings. In accordance with the ADDIE model, the meetings were scheduled with specific team members, based on the agenda, type of expertise, and project tasks. The meetings were conducted twice a week over a 10-week period. Each meeting ran for 1–2 hours.

DNP Project Activities

The project activities for identifying the workflow changes and developing an educational module for nurses include collaboration with the project team. Leadership support and team collaboration were significant to the project's success. The contexts of the analysis, design, development, implementation, and evaluation components of the ADDIE model guided the project. Table 1 outlines the activities based on these components.

Table 1

DNP Project Activities

	Activities
Analysis	1. Identified problem and purpose 2. Analysis and synthesis of literature 3. Identified stakeholders, clinical faculty, instructional designers 4. Met with stakeholders 5. Assessed the organization's needs, barriers and facilitators, and related initiatives 6. Identified gaps between current state and desired state 7. Identified current technology environment 8. Identified roles that will be affected 9. Initiated meetings with the clinical faculty and instructional designers 10. Identified old and new workflows, roles, and patient care areas affected by EHR adoption 11. Selected areas of focus (roles, patient care areas, tasks) 12. Conducted a series of meetings to develop process maps 13. Conducted a series of cognitive walkthrough meetings focused on the role of the RN and role-specific tasks in the ED and inpatient

	care areas 14. Reviewed clinical and administrative policies and procedures 15. Performed comparative analyses of workflows 16. Identified pilot participants (RNs from the ED and inpatient care areas) 17. Presented approved proposal to the team and nursing research council
Design	1. Developed workflow processes based on cognitive walkthroughs 2. Selected training delivery methods, eLearning authoring, gamification, and simulation tools 3. Designed learning objectives based on cognitive walkthroughs 4. Designed course outline 5. Designed the curriculum plan 6. Designed plan for implementation and evaluation
Development	1. Documented new ED and inpatient care workflows using Microsoft Visio (process maps) 2. Developed course content on workflow changes using Adobe Spark and Captivate (eLearning module) 3. Integrated video, gamification, scenarios, and simulation 4. Reviewed eLearning module with the EHR director of nursing and eLearning expert 5. Revised content based on feedback 6. Conducted a final review with the EHR director of nursing, clinical faculty, and instructional designers 7. Prepared eLearning module for publishing
Implementation	1. Published eLearning module in the learning management system 2. Assigned eLearning module to RN participants 3. Sent email notification to RN participants
Evaluation	1. Collected course evaluation results from the learning management system 2. Summarized and analyzed course evaluation results using descriptive statistics

Setting and Population

This QI project was conducted in a hospital health system, located in an East Coast metropolitan area of the United States. The health system is an integrated delivery

network comprised of eleven hospitals, an extended care facility, multiple primary and specialty care practices, school health, home care, care management, and managed care programs. In 2015, the health system began a phased approach of EHR implementation in the primary, specialty care practices, occupational health services, and school health. The EHR roll out continued in four hospital campuses in 2016. This project involved the development of an eLearning module designed to educate nurses about workflow changes resulting from EHR adoption. Also, this project involved RN volunteers who completed the eLearning module and course evaluation. The target population was RNs in the ED and inpatient care areas who have successfully completed the initial EHR implementation training.

Sampling and Recruitment

Purposive sampling was used in this project. In purposive sampling, the researcher selects a sample based on specific characteristics of a given population and then locates for potential participants that meet those characteristics (Terry, 2015). The specific characteristics for potential participants include registered nurses who provide direct patient care in the ED and inpatient care areas and have completed the initial EHR implementation training. The approved project proposal was presented to the project team, senior clinical leadership, and the nursing research council. The clinical directors of nursing and administrative nurse managers from three hospital campuses, as well as the chair, advisers, and members of the nursing research council offered help in asking for RN volunteers from the ED and inpatient care areas to complete and evaluate the

eLearning module. They provided names and work email addresses of 30 potential RN participants from the ED and inpatient care areas.

Ethical Protection of Participants

To ensure that the project met the ethical standards of the university and the hospital system, the ethics pre-application, or Form A, was submitted both to the Walden University IRB and to the hospital system's IRB for review and approval. The Walden University IRB approved the project (03-25-16-0454790); the hospital system's IRB reviewed the application and granted the project exempt status (IRB# 2016-6087). The eLearning module was distributed to potential participants through the LMS. Participation was completely voluntary. Completion of the eLearning module and course evaluation through the LMS implied consent. No demographic information was collected and only aggregate course evaluation results were generated from the LMS.

Instrument

The hospital system uses a standard course evaluation for eLearning modules delivered through the LMS. I published the eLearning module into the LMS and used the same course evaluation embedded in the system. The course evaluation includes a 6-point Likert scale (7 items) followed by closed-ended (4 items) and open-ended questions (3 items). The Likert scale ran from 1 (*strongly disagree*) to 6 (*strongly agree*).

Data Collection

The eLearning module along with the course evaluation was distributed to 30 RN volunteers through the LMS. I used the process of data saturation for data collection. This process takes place when a researcher collects data from potential participants, begins to

gather the same responses from most participants, and no additional new information is achieved (Terry, 2015). A weekly report was generated from the LMS for 3 weeks when saturation was achieved after 15 participants.

Data Analysis

Descriptive statistics are data analysis methods used to describe, to compare, and to characterize a relationship (Polit, 2010). Descriptive statistics was used to summarize the course evaluation data obtained from participants. The data analysis included the total sample size and the response rate for each item in the course evaluation. Responses from the course evaluation were generated from the LMS into a spreadsheet. The Likert items were analyzed by obtaining the mean scores for each item and were summarized in a table format. The percentage of respondents who selected an alternative for each closed-ended item was obtained. A narrative description was used to report the responses for closed-ended items. Also, the responses for open-ended items were summarized and presented in a table format.

Time and Resources

The hospital health system was at the peak of the EHR adoption process. The senior clinical leadership and EHR project directors had a rigorous schedule that was focused on achieving strict EHR project implementation milestones. The challenge was time and the project team members' conflicting schedules. This challenge affected the timeframe necessary to identify, compare, and document the old and new workflows. Budget was not considered as a challenge as there were no additional costs related to the project activities.

Pilot Implementation

The eLearning module was published into the LMS. RN participants completed a pilot of the eLearning module. Participants completed a course evaluation upon completion of the eLearning module. As recommended by the EHR director of nursing, I provided the EHR training manager and the director of professional practice and research with a copy of the eLearning module for future use. The eLearning module can be retrieved from the EHR training library and the LMS.

Evaluation

An ongoing evaluation was conducted to appraise the progress of activities within the analysis, design, and development elements of the ADDIE model. Upon completion of the eLearning module by participants, immediate feedback on the learning experience was obtained using a course evaluation embedded in the LMS. The course evaluation includes a Likert scale followed by a few open-ended questions. Course evaluation results were summarized and analyzed using descriptive statistics.

Summary

In this section, I described the team approach and the ADDIE model used to carry out the project activities. These activities involved process mapping, cognitive walkthrough, eLearning module development, pilot study, and evaluation. The Walden University IRB approved the project with the (approval number 03-25-16-0454790); the hospital system's IRB reviewed the application and granted the project with an exempt status (IRB# 2016-6087). A purposive sample of nurses (N = 30) from the ED and inpatient care areas were invited to complete the eLearning module and course

evaluation. Descriptive statistics was used to summarize the course evaluation data obtained from participants.

In Section 4, I discuss the process maps, cognitive walkthrough and comparative analysis, eLearning module, and course evaluation results. I summarize how the outcomes were achieved based on the ADDIE model; I present the implications, recommendations, as well as the study's strengths and limitations. Finally, I analyze myself as a scholar, educator, change agent, and project manager are.

Section 4: Findings and Recommendations

Introduction

The purpose of this QI project was to identify the changes the workflow that resulted from EHR adoption and to develop an educational module about the workflow changes for nurses in the ED and inpatient care. The goal was to facilitate end-user knowledge and improve communication of workflow changes resulting from EHR adoption.

The three outcomes were achieved: process maps (see Appendix A), cognitive walkthrough/comparative analysis, and eLearning module (see Appendix B). The project team identified significant workflow changes in the ED and inpatient care. It recommended that the eLearning module should focus on significant workflow changes and facilitate practice in completing the ED treatment plan and the interdisciplinary care plan. Overall, the course evaluation revealed positive results. In Section 4, I describe the evaluation and findings of each outcome, the implications of the project, strengths and limitations, and my abilities as a scholar, practitioner, and project manager.

Evaluation, Findings, and Discussion

This QI project involved the identification of workflows, an in-depth workflow analysis, eLearning module development, pilot implementation, and evaluation. The ADDIE model of instructional design guided the complex process.

Outcome 1. Process Maps

Discussion. The process maps were developed to illustrate the sequence of steps in the clinical process and the flow of work performed by RNs in the ED and inpatient

care areas. The workflows presented each step of the activity, the roles involved, and how a particular activity is completed and documented. The EHR director of nursing, the principal stakeholder, provided operational oversight and leadership support. The director of professional practice, the quality officer, and the director of clinical education for the hospital system provided SME support for identifying and comparing workflows. A series of team meetings was conducted to identify the steps and related policies and procedures. Based on those discussions, I developed role-based workflows using Microsoft Visio to illustrate the processes in the ED and inpatient care areas.

The process maps showed the differences between the old and current workflows. The system-wide transition to a single and comprehensive EHR facilitated the streamlining of workflows and standardization of processes across the three hospital campuses.

Evaluation. From the process of mapping out the workflows in the ED and inpatient care areas, the following workflow changes were identified:

- ED registration
- ED triage
- ED assessment
- Mobile device for ED documentation
- ED treatment plan
- Patient hand-off from ED to inpatient care area
- Chart review for all campuses
- Inpatient admission

- Medication administration
- Task assignments
- Best practice advisories integration
- Clinical practice guidelines integration
- Interdisciplinary care planning
- Patient education

Data. None

Recommendations. The team recommended that specific tasks within the workflows identified in the process maps need to be analyzed. The steps in the workflows and documentation requirements need to be verified and aligned with the hospital policies and procedures.

Outcome 2: Cognitive Walkthrough/Comparative Analysis

Discussion. A cognitive walkthrough is a task-oriented method for evaluating the usability of health information systems (Khajouei et al., 2016). This approach was used for the purpose of comparing specific tasks and analyzing changes between the old and current workflows in the ED and patient care areas. The team conducted a series of meetings to identify and analyze the steps within the workflows using the process maps as a guide. During the cognitive walkthrough meetings, Microsoft Excel spreadsheets were used to document and organize data for analysis. The columns within the spreadsheet were formatted to encompass the tasks, policy and procedure, role/function, steps, old workflow (using paper/EMR1/EMR2/EMR3), new EHR, and changes. Figure 3 presents the cognitive walkthrough template showing these data points.

Workflow	Task_ID	Policy&Procedure ID	Role/Function	Old Workflow_Paper/EMR1/EMR2/EMR3	New Workflow_New EHR	Changes

Figure 3. Cognitive walkthrough template.

Evaluation. The team compared and analyzed the old workflows that include the use of paper and three clinical information systems and the new workflows associated with the new EHR. After a series of cognitive walkthrough meetings, the team summarized the significant workflow changes. The project team accepted the summary.

Data. None

Recommendations. The team recommended that the eLearning module should address the significant workflow changes and should focus on new tasks such as completing the ED treatment plan and the inpatient interdisciplinary care planning including the integration of clinical practice guidelines.

Outcome 3. eLearning Module

Discussion. The course content for eLearning module was developed based on the process maps and cognitive walkthrough summary. The educational curriculum plan was developed which included the learning objectives, content outline, evidence, method of presentation, and method of evaluation. Instructional strategies, such as gamification, scenario-based learning, and simulation, were incorporated into the eLearning. The eLearning module was developed using Adobe Spark and Adobe Captivate authoring

tools to create the video, interactive tab templates, game-based quiz, scenarios, and EHR simulation.

The eLearning module presents the significant workflow changes and facilitates practice in completing EHR tasks through simulation. The module begins with an introduction video about the HITECH Act, Meaningful Use, and workflow changes resulting from EHR adoption. Next, the learner is directed to a set of slides describing the significant workflow changes in the ED and inpatient care areas. Learners view the slides at their own pace by clicking the tabs to proceed to the next slide. Afterwards, the learner completes a 12-item game-based quiz that provides real-time self-assessment of progress. Learners earn points for each correct answer. Immediate feedback is provided for incorrect answers. Multiple attempts are allowed.

The next part of the module branches into two role-specific paths. The learner who works in the ED selects the "ED treatment plan" and completes the simulation for ED treatment plan. The learner who works in the inpatient care areas selects the "Care Plan" and completes the simulation for the inpatient care plan. Workflow-focused scenarios were presented for each path to guide the simulation. The scenarios are customized to the learner's role and care setting. These scenarios were reviewed and approved by the project team. The EHR screens and features were replicated to enhance learning while providing a safe and realistic environment. Simple hints and immediate feedback are provided to describe next actions or steps in the simulated EHR. Multiple attempts are allowed. Completion of the eLearning module and course evaluation takes approximately 15 minutes.

The eLearning module was published into the LMS. The senior leadership and nursing research council have provided the names and work email addresses of potential RN participants from the ED and inpatient care areas. The eLearning module was assigned and an email notification was sent automatically to 30 candidates. The pilot implementation ran for 3 weeks in collaboration with the EHR training team and EHR director of nursing.

Evaluation. The team reviewed and approved the curriculum plan and eLearning design. The team conducted ongoing reviews and revisions. Prior to publishing, the EHR director of nursing, clinical faculty, instructional designers, and eLearning expert conducted a final review and approved the module.

Data. Upon completion of the eLearning module, the participants provided immediate feedback on the learning experience through the course evaluation embedded in the LMS. In collaboration with the eLearning expert, I ran weekly reports from the LMS until saturation of information was achieved. I was able to obtain adequate information in three weeks from 15 RN participants. The overall response rate was 50%. All participants provided responses for each item. The course evaluation includes a seven-item Likert scale followed by a few closed-ended and open-ended questions. The Likert scale had a six-point rating scale, from 1 (*strongly disagree*) to 6 (*strongly agree*). The mean scores for each question ranged from 5.13 to 5.40. Table 2 lists the Likert questions and corresponding mean scores.

Table 2

Mean Respondent Scores on 6-Point Likert Scale

Question	Question	Mean score
1	Course had clearly stated objectives.	5.13
2	Course content objectives were related to the purpose/goals of the activity.	5.33
3	Course content organized in an orderly manner and contributed to the achievement of the learning objectives.	5.27
4	The technology used was effective and appropriate for the delivery of course content.	5.40
5	The course content was effective.	5.27
6	Delivery method was appropriate for the course content.	5.27
7	Course content was valuable, informative and met my expectations.	5.27

Following the Likert items, the participants were asked about their level of understanding with the course content before and after completing the eLearning module. One-third of the respondents indicated that their level of understanding increased after completing the eLearning module while two-thirds of the respondents indicated that there was no change. Seventy-three percent of the respondents expressed that they would recommend the eLearning module to others. Some of them commented that the eLearning module was “good” and “helpful.” Five of the respondents indicated that they had gained a basic understanding, five indicated that their knowledge and skills increased, and five expressed that they will be able to apply the elements of the training

to their day-day job function and productivity. Table 3 lists the closed-ended questions and response options.

Table 3

Closed-ended Questions

Question number	Question
8	Before completing this course activity, my level of understanding with this course content was: • Novice/Beginner • Competent/Proficient • Expert
9	After completing this course activity, my level of understanding with this course content was: • Novice/Beginner • Competent/Proficient • Expert
10	I would recommend this course to others:
11	As a result of this continuing e-learning activity: • I gained a basic understanding of the elements of course activity. • I have gained in an increase of knowledge and skills from this course activity. • I will be able to apply the elements of the training to my day-day job function and productivity. • I remain unclear about elements of the course activity.

Table 4 presents detailed responses to the open-ended questions. Overall, the feedback from the participants was positive.

Table 4

Open-ended Questions

Question number	Question
12	What are the strengths of this course? ▪ "Clear" ▪ "Interactive" ▪ "Good visual/video and quizzes" ▪ "Focused" ▪ "Step by step instructions" ▪ "In-depth and easy to understand" ▪ "Online" ▪ "Quiz is so much fun" ▪ "Add more simulation" ▪ "Good content"
13	How could this course be improved? ▪ "Some screens had too many words" ▪ "Simplify or convert those screens to be interactive" ▪ "More visuals" ▪ "Include protocol explanation about the comprehensive care plan" ▪ "More practice scenarios" ▪ "Live instructor"
14	How will my practice change as a result of taking this course? ▪ "Practice will not change" ▪ "Develop better care plans" ▪ "It would not change, just increased knowledge" ▪ "Better documentation" ▪ "Making sure everything is done efficiently" ▪ "I will apply to my practice" ▪ "Ease in documentation, care plan documentation is much more clear and focused" ▪ "Better communication within multidisciplinary team"

Recommendation. The EHR training manager and eLearning expert shared their expertise in eLearning development and collection of course evaluation responses. The senior clinical leadership and the nursing research council assisted with inviting RN

volunteers to complete and evaluate the eLearning module. The EHR director of nursing recommended that I provide the EHR training manager and the director of professional practice and research with a copy of the eLearning module for future use. The eLearning module can be retrieved from the EHR training library and the LMS.

Implications

Policy

At present, EHR training is focused on the technical aspects such as the navigational functions and does not include information about the impact to workflows. Changes to the workflows need to be appropriately communicated to clinicians through education (Topaz et al., 2013). The literature review recognized the positive impact of gamification, scenario-based learning, and simulation in optimizing EHR training. This project places emphasis on educating nurses on workflow changes and integration of innovative strategies to communicate the changes resulting from EHR implementation. The project outcomes including the use of the ADDIE model can be applied to healthcare organizations for policy development that provide guidelines for enhancing EHR training programs. The development of policy related to EHR training can be useful in various opportunities for new EHR implementation, EHR optimization, new staff orientation, and ongoing competency-based training.

Practice

Training is a critical component of EHR adoption. The review of the literature confirmed that EHR adoption could significantly change clinical workflows and impact the way nurses perform and complete tasks. Workflow issues related to EHR

implementation have contributed to provider dissatisfaction, slow rates of EHR adoption, decreased productivity, and inefficient clinical documentation (Lowry et al., 2015). In response to workflow challenges, clinicians tend to develop workarounds (Lowry et al., 2015), which may lead to poor quality and inefficient patient care (Zheng et al., 2015). Successful adoption of EHRs necessitates an understanding of workflows and how EHRs impact the daily tasks of clinicians. In a recent study, McGeorge et al.(2015) revealed that EHRs affect workflows in many different ways such as eliminating steps in work processes, adding more steps, and producing either positive or negative changes in specific work tasks.

Multiple workflow changes have been identified during the analysis phase of this project. Changes that are critical to nursing practice are the integration of clinical practice guidelines, new ED treatment plan, and new interdisciplinary care plan. Prior to EHR implementation, each discipline used distinct paper and electronic-based tools for documenting care plans and notes. The new EHR features are designed to merge fragmented, discipline-specific plans of care into a single, comprehensive, evidence-based, and patient-centered care plan. These workflow changes have a high potential to improve cross-functional collaboration, facilitate effective clinical decision-making, and positively impact patient outcomes. Effective EHR training is essential to achieve the potential benefits to patients and interdisciplinary teams and to ensure the clinicians appropriate use of the EHR. This QI project highlighted the development of an eLearning module on workflow changes and the appropriate documentation of the ED treatment

plan and the interdisciplinary care plan which yielded positive course evaluation outcomes.

Research

This project highlighted the identification of workflow changes and the development of an eLearning module using innovative strategies to communicate the changes to nurses. Additional research is needed to explore the effectiveness of EHR training programs using evidence-based evaluation methods that will measure the learners' satisfaction, knowledge, skills, and behaviors that translate to improved performance outcomes. I recommend increasing the sample size and expanding the projects scope to other clinicians including physicians, pharmacists, physical therapists, and social workers. Furthermore, I recommend the use of game-based learning, scenarios, and simulation in post-implementation EHR training and orientation programs.

Social Change

The implications for positive social change include the potential impact of the QI project in enhancing the knowledge of nurses on workflow changes and in facilitating the efficient use of the new EHR. The effective use and continued adoption of EHRs can improve the quality of patient care, promote patient safety, reduce healthcare costs, and improve patient outcomes.

Strengths and Limitations

One of the strengths of this project was the overwhelming support from nurses at all levels and the collaboration with the EHR project director and training team. Also, the project involved an in-depth cognitive walkthrough of significant workflows and related

policies and procedures with the experts in the project team. This project also utilized innovative strategies that are proven to stimulate learning, engage learners, and retain knowledge. The course evaluation used in this project was developed by education experts and was embedded in the LMS. The downside was that the items in the evaluation may not be modified. One of the challenges was time and the project team members' conflicting schedules. The senior clinical leadership and EHR project directors had a rigorous schedule that was focused on achieving strict EHR project implementation milestones. This challenge affected the timeframe necessary to identify, compare, and document the old and new workflows. The additional time needed for the design and development of content pushed the implementation phase to a later date.

Analysis of Self

As Scholar

As a scholar, I realized and embraced the significance of evidence-based practice (EBP) in the nursing profession, particularly in the field of nursing professional development and nursing informatics. The translation of the best research into practice, appropriate dissemination, and integration of new knowledge are essential activities that have become my mental model. This educational experience has provided me with knowledge and skills on how to effectively explore, appraise, and apply relevant outcomes. These skills helped me to improve my leadership and mentorship skills. With an in-depth knowledge of EBP, I have gained confidence in presenting key issues, solutions, or recommendations to my peers and senior leaders.

As Practitioner

As a certified nursing professional development (NPD) specialist, my primary roles include education, EBP and research, change management, leadership, collaboration, and mentorship. My practice environment deals with managed care, care management, and population health. I am able to apply EBP research and innovative strategies in the design, development, and implementation of training curricula. I have become more efficient in managing complex projects related to clinical information systems implementation and training. Moreover, I have become a valued team member and a subject matter expert in informatics, EBP, competency development, and educational technology.

As Project Manager

In this QI project, I utilized the ADDIE model of instructional design as a framework for managing project activities. The analysis, design, development, implementation, and evaluation elements of the ADDIE model (Hodell, 2011) helped me to organize tasks and activities that involved stakeholders and project team members from different campus locations. The project activities were challenging. However, effective collaboration with the stakeholders and project team members helped me to achieve the project goals. I realized that establishing a good relationship with the stakeholders and team members and keeping them well engaged are critical to the successful completion of the project.

Contribution to My Professional Development

This QI project helped me to enhance my leadership and collaborative skills as a nursing professional development specialist and manager of training and development. The process has increased my level of comfort with applying research and EBP into projects related to informatics and population health programs. As I progressed through the DNP program, I have become actively involved in projects with greater scope and responsibilities and was able to do poster presentations at local and national conferences.

Summary

Workflow issues related to EHR adoption has led to unsafe workarounds, decreased productivity, inefficient clinical documentation, and slow rates of adoption (Lowry et al., 2015). The goal of this QI project was to facilitate nurses' knowledge of workflow changes resulting from EHR adoption. The project highlighted the identification of workflow changes and the development of an eLearning module using innovative strategies to communicate the changes to nurses. The ADDIE model of instructional design guided the complex process of analysis, design, development, implementation, and evaluation. After an in-depth cognitive walkthrough of workflows, significant workflow changes were identified. The significant changes are the ED registration, ED triage, ED assessment, mobile tools for ED documentation, ED treatment plan, patient handoff from ED to inpatient care area, chart review, inpatient admission, medication administration, task assignments, integration of best practice advisories and clinical practice guidelines into EHR, care planning, and patient education. The eLearning module presented an emphasis to these changes particularly the ED treatment

plan and interdisciplinary care plan. Fifteen participants completed the eLearning module and course evaluation through the LMS. The course evaluation results were analyzed using descriptive statistics. Overall, the course evaluation yielded positive results. The implications for positive social change include the potential impact of the DNP project in enhancing the knowledge of nurses on workflow changes and in facilitating the effective use of the new EHR. Section 5 presents the abstract for a podium presentation to disseminate the project outcomes to stakeholders and a broader scholarly audience.

Section 5: Scholarly Product

One of the purposes for dissemination of project outcomes is to communicate the project results to other professionals in similar environment (Zaccagnini & White, 2011). The scholarly product will be disseminated to nursing professional development (NPD) practitioners through a podium presentation at the Association for Nursing Professional Development (ANPD) Annual Convention. NPD practitioners are learning facilitators, change agents, mentors, leaders, champions for scientific inquiry, partners for practice transitions, and advocates for NPD in different interprofessional practice and learning environments (Harper & Maloney, 2016). This section delineates the elements of the podium presentation abstract based on the abstract submission guidelines provided by the ANPD (ANPD, 2016).

Podium Presentation Abstract

The podium presentation abstract adheres to the abstract submission guidelines provided by the ANPD. The following abstract presents the elements required by the ANPD.

Identification of Professional Practice Gap

Current State. NPD practitioners need to educate clinicians on workflow changes resulting from electronic health record (EHR) adoption.

Desired State. NPD practitioners will develop an eLearning module on workflow changes resulting from EHR adoption and incorporate gamification, scenario-based learning, and EHR simulation to facilitate skills-practice and engage learners.

Outcomes

After reviewing this poster presentation, the NPD practitioner will be able to:

1. Describe the project activities based on the Analysis, Design, Development, Implementation, Evaluation (ADDIE) model of instructional design.
2. Discuss the innovative strategies utilized in the project.

Abstract

Workflow issues related to electronic health record (EHR) adoption has led to unsafe workarounds, decreased productivity, inefficient clinical documentation, and slow rates of EHR adoption. The problem addressed in this project was the nurses' lack of knowledge about the workflow changes that result from EHR adoption. The project was conducted to identify the workflow changes resulting from EHR adoption and to develop an eLearning module to communicate the changes. The Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model of instructional design guided this project. The project involved the identification of workflows, cognitive walkthrough, eLearning module development, pilot implementation, and evaluation. The cognitive walkthrough revealed significant changes particularly the inclusion of clinical practice guidelines, the ED treatment plan, and the interdisciplinary care plan in the new EHR. Gamification, scenario-based learning, and EHR simulation were used in the eLearning module to present the significant workflow changes. A purposive sample of nurses (n=30) from the emergency department (ED) and inpatient care areas were invited to complete the eLearning module and course evaluation. The course evaluation includes a 6-point Likert scale and a few closed and open-ended questions. Data were collected until

saturation of data was achieved from 15 nurses. Descriptive statistics described the participants' positive learning experience. This project contributes to positive social change by enhancing the knowledge of nurses on workflow changes and by facilitating the effective use of the new EHR which can improve the quality of patient care, promote patient safety, reduce healthcare costs, and improve patient outcomes.

Teaching Method

Podium presentation

References (abstract only)

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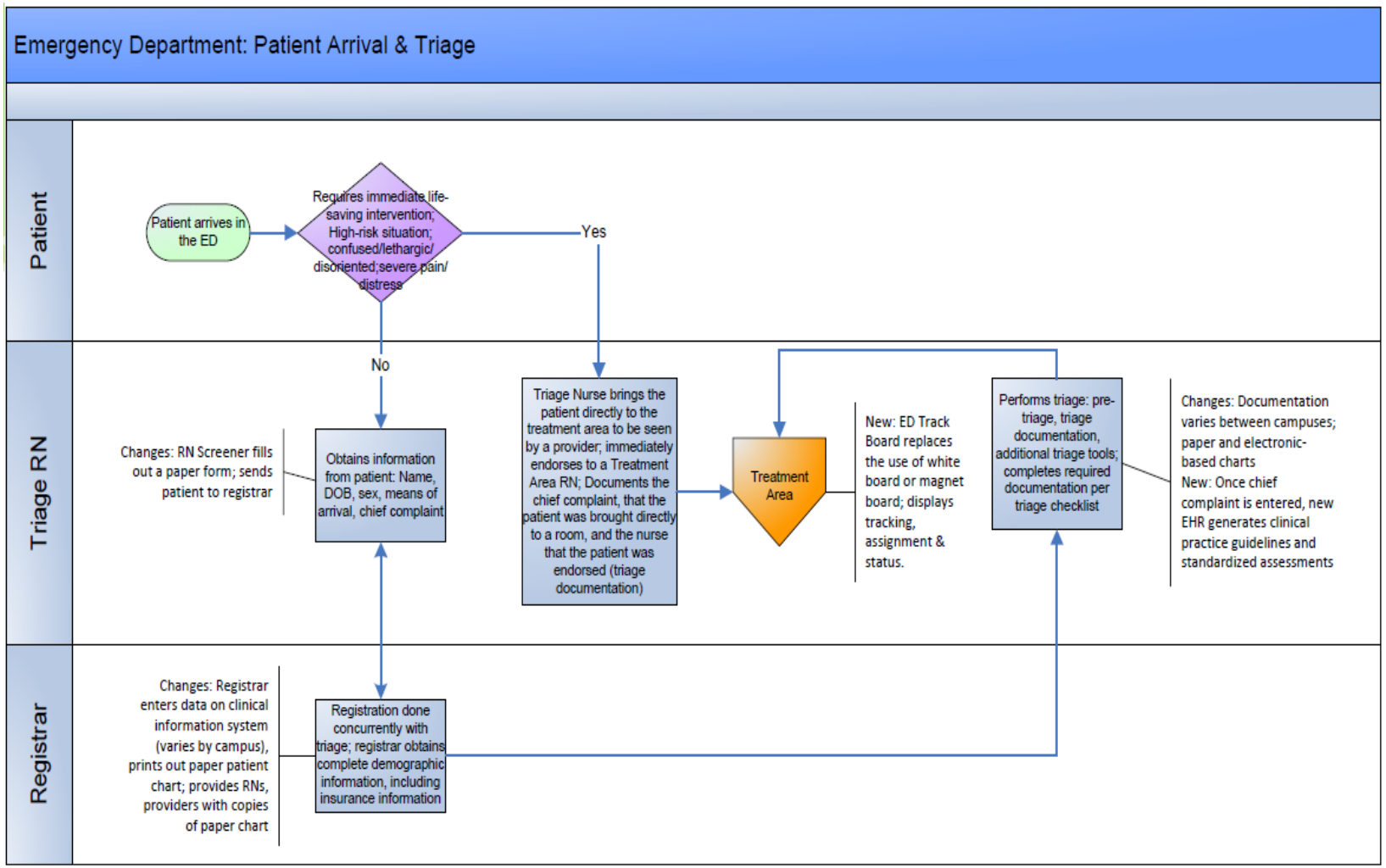
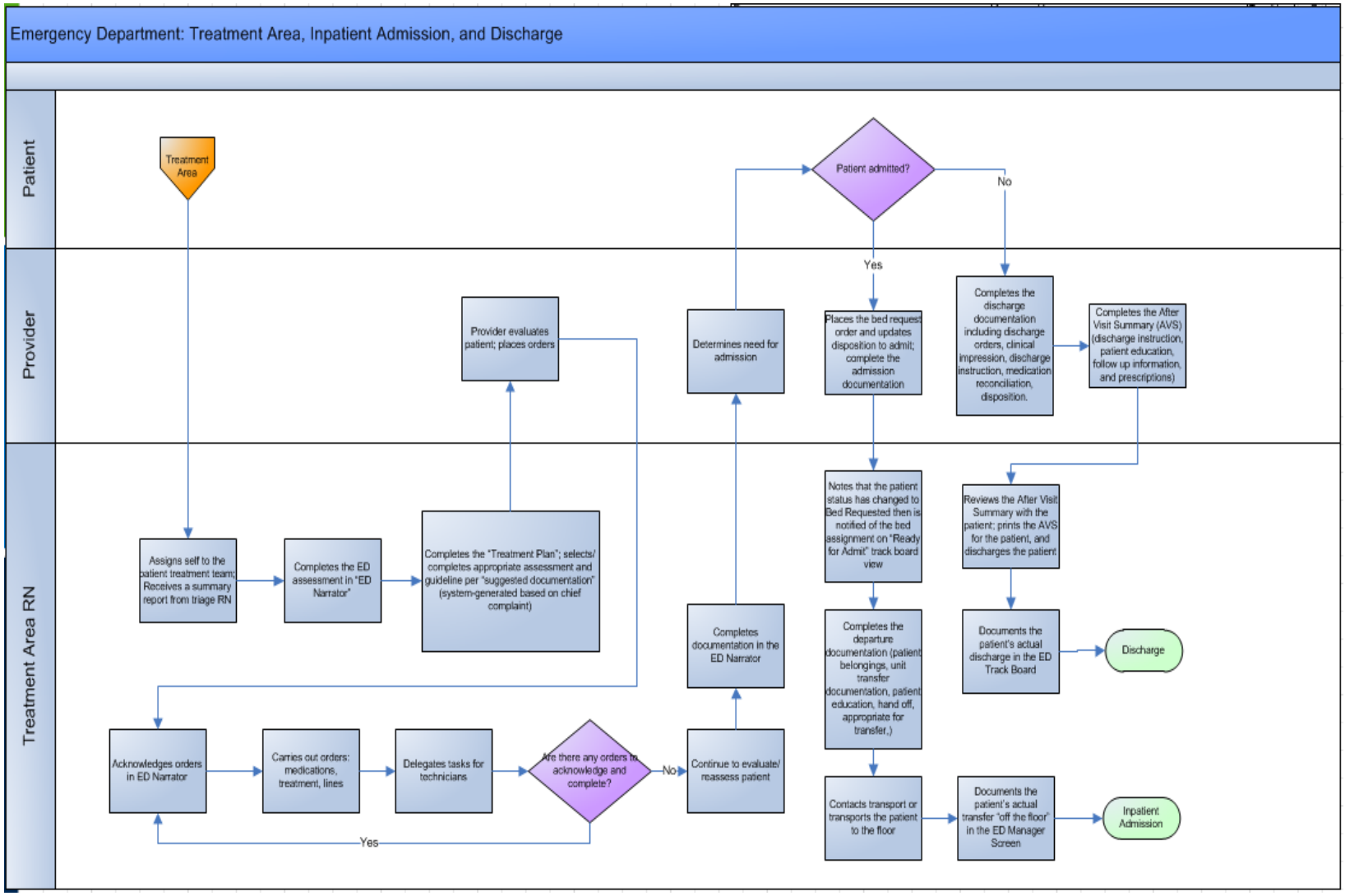
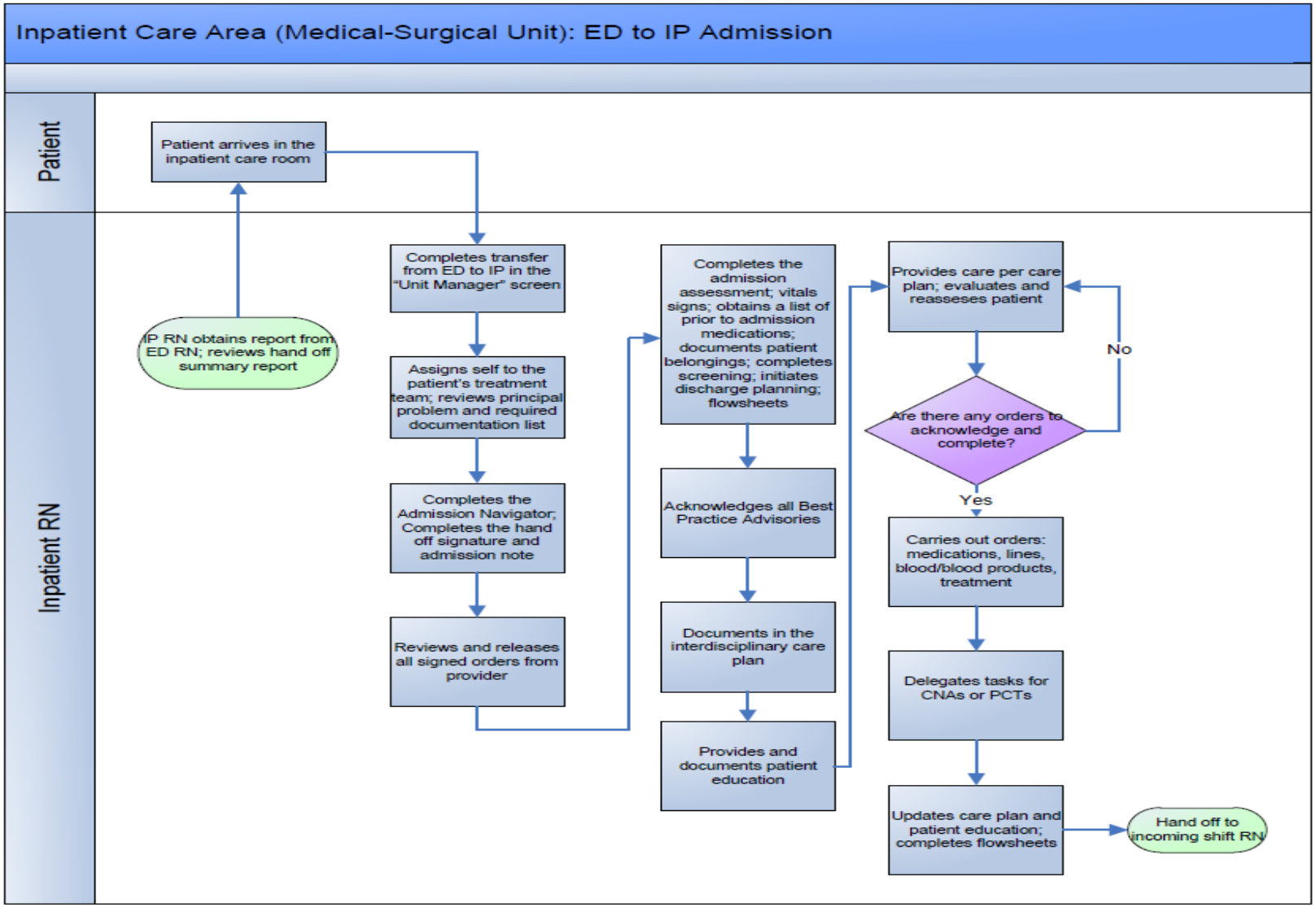
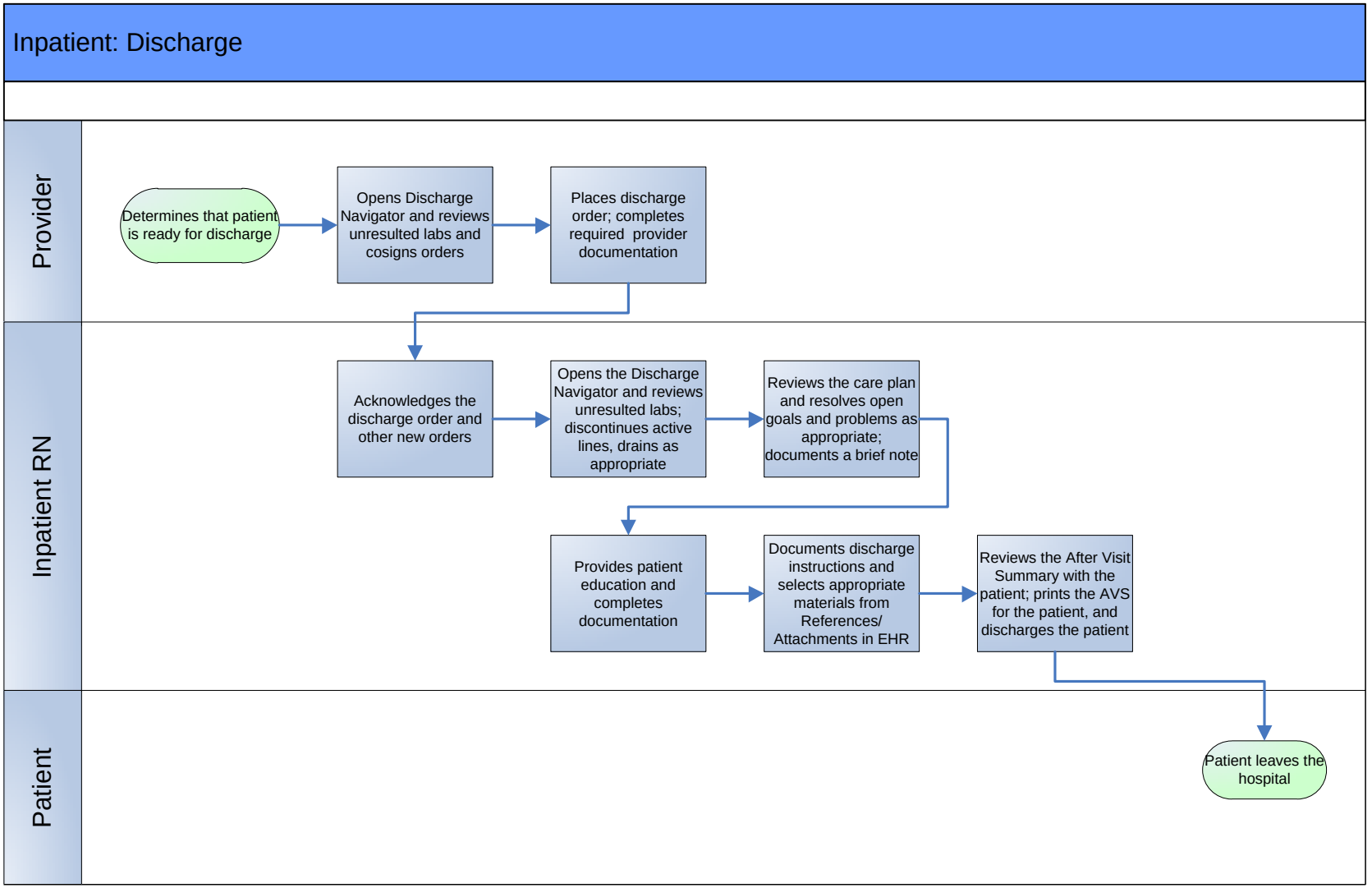
Appendix A: Process Maps

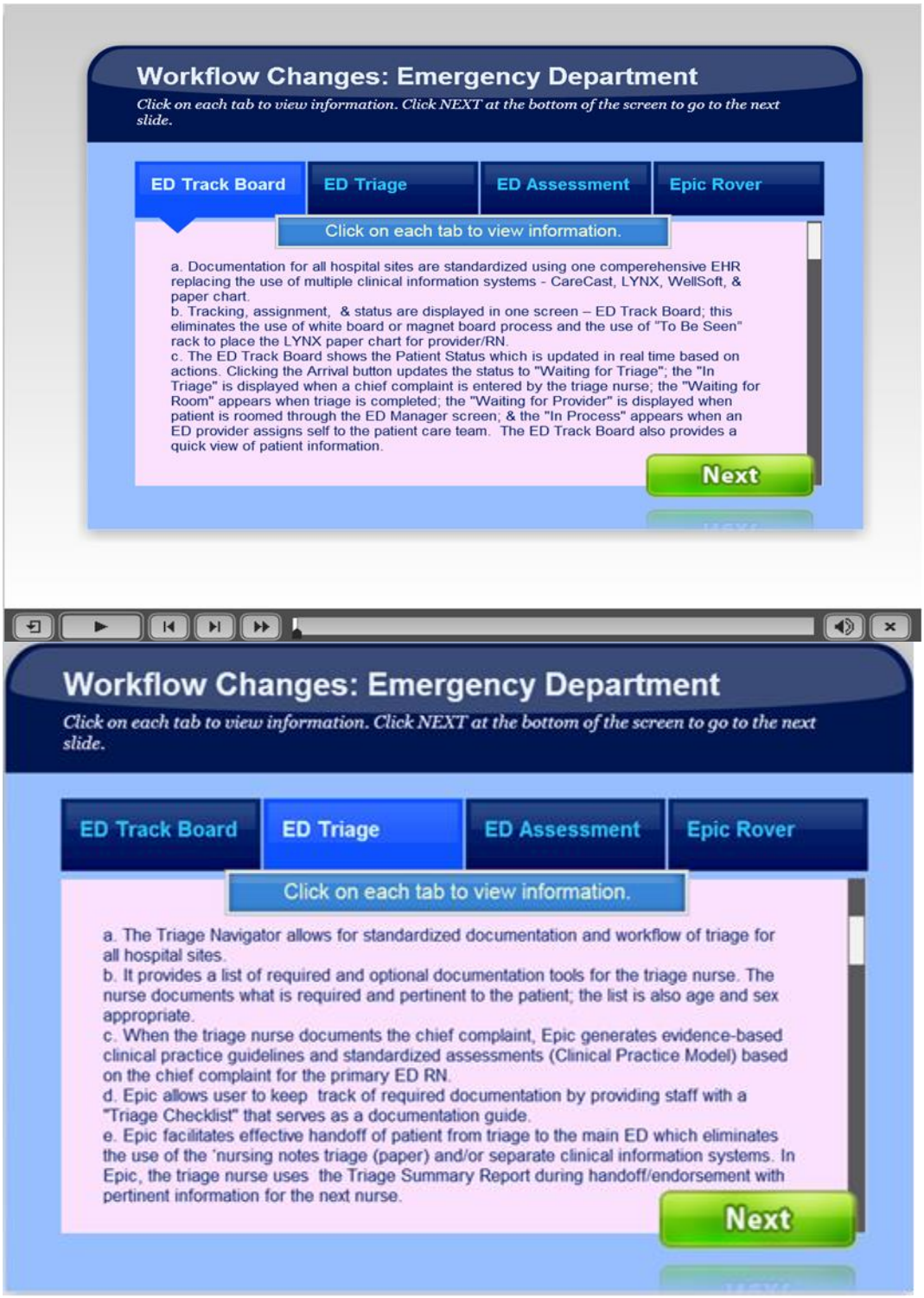


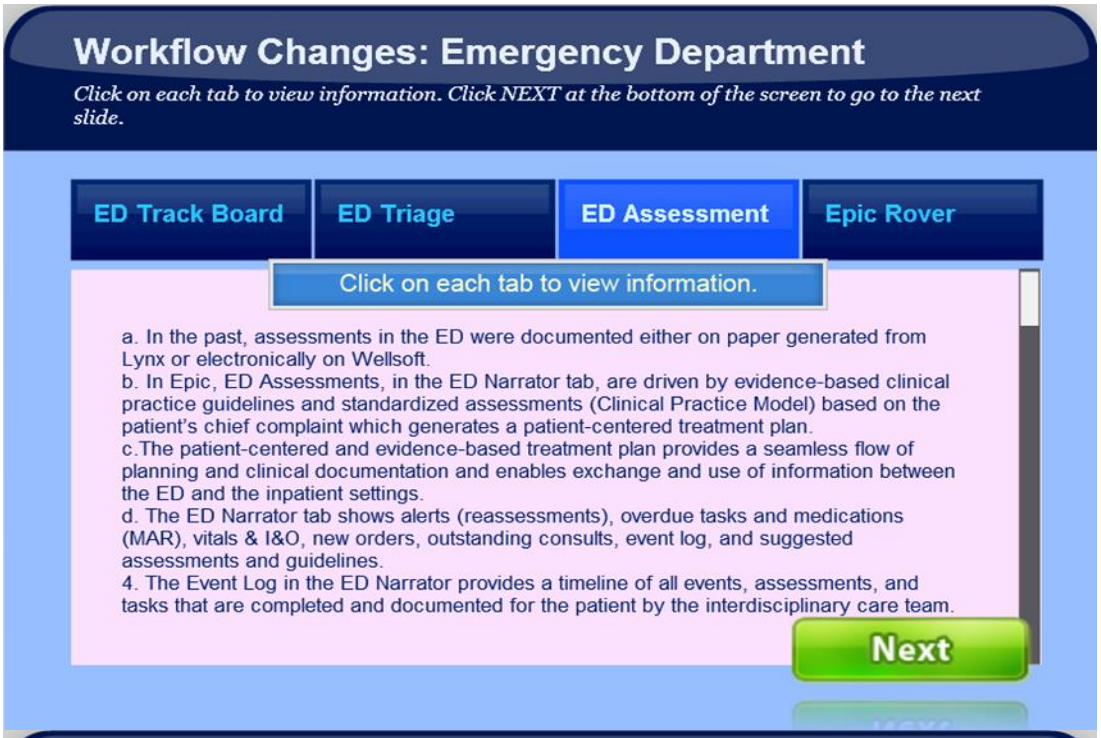

Emergency Department: Treatment Area, Inpatient Admission, and Discharge
Patient
Provider
Treatment Area RN
Treatment Area
Patient admitted?
No
Yes
Provider evaluates patient; places orders
Determines need for admission
Places the bed request order and updates disposition to admit; complete the admission documentation
Completes the discharge documentation including discharge orders, clinical impression, discharge instruction, medication reconciliation, disposition.
Completes the After Visit Summary (AVS) (discharge instruction, patient education, follow up information, and prescriptions)
Assigns self to the patient treatment team; Receives a summary report from triage RN
Completes the ED assessment in "ED Narrator"
Completes the "Treatment Plan"; selects/ completes appropriate assessment and guideline per "suggested documentation" (system-generated based on chief complaint)
Notes that the patient status has changed to Bed Requested then is notified of the bed assignment on "Ready for Admit" track board view
Reviews the After Visit Summary with the patient; prints the AVS for the patient, and discharges the patient
Completes documentation in the ED Narrator
Completes the departure documentation (patient belongings, unit transfer documentation, patient education, hand off, appropriate for transfer,)
Documents the patient's actual discharge in the ED Track Board
Discharge
Acknowledges orders in ED Narrator
Carries out orders: medications, treatment, lines
Delegates tasks for technicians
Are there any orders to acknowledge and complete?
No
Yes
Continue to evaluate/ reassess patient
Contacts transport or transports the patient to the floor
Documents the patient's actual transfer "off the floor" in the ED Manager Screen
Inpatient Admission

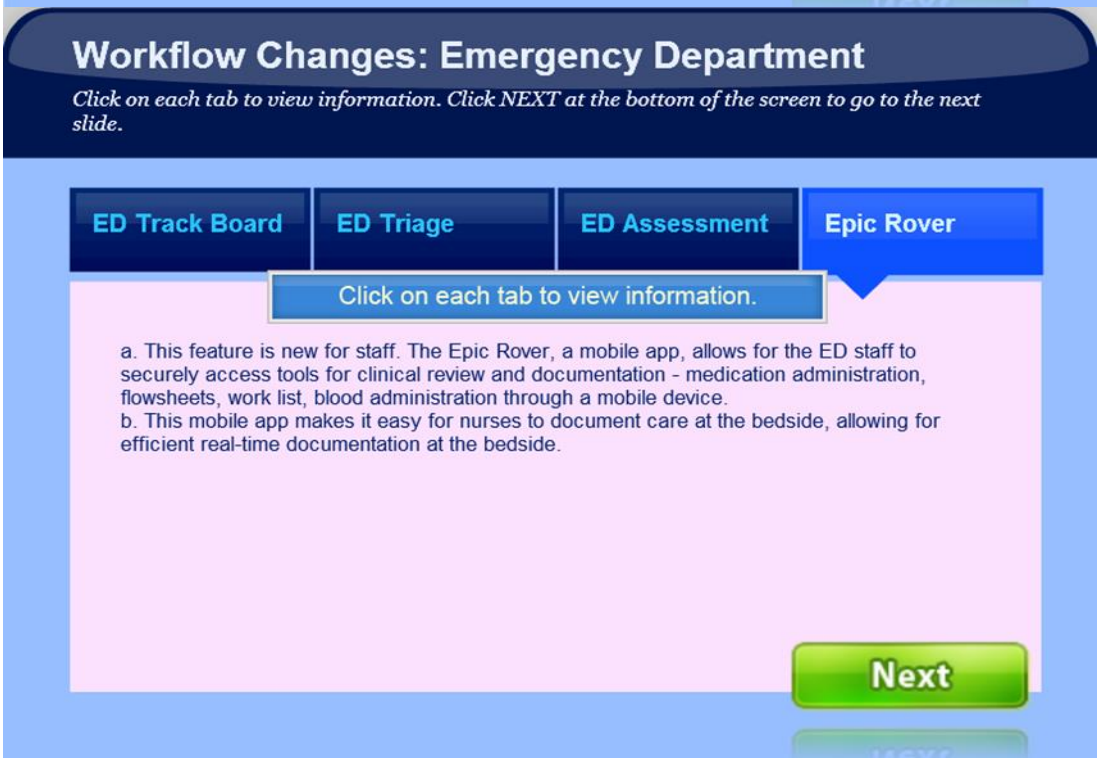

Inpatient Care Area (Medical-Surgical Unit): ED to IP Admission
Patient
Inpatient RN
Patient arrives in the inpatient care room
IP RN obtains report from ED RN; reviews hand off summary report
Completes transfer from ED to IP in the "Unit Manager" screen
Assigns self to the patient's treatment team; reviews principal problem and required documentation list
Completes the Admission Navigator; Completes the hand off signature and admission note
Reviews and releases all signed orders from provider
Completes the admission assessment; vitals signs; obtains a list of prior to admission medications; documents patient belongings; completes screening; initiates discharge planning; flowsheets
Acknowledges all Best Practice Advisories
Documents in the interdisciplinary care plan
Provides and documents patient education
Provides care per care plan; evaluates and reasseses patient
Are there any orders to acknowledge and complete?
No
Yes
Carries out orders: medications, lines, blood/blood products, treatment
Delegates tasks for CNAs or PCTs
Updates care plan and patient education; completes flowsheets
Hand off to incoming shift RN


Inpatient: Discharge
Provider
Inpatient RN
Patient
Determines that patient is ready for discharge
Opens Discharge Navigator and reviews unresulted labs and cosigns orders
Places discharge order; completes required provider documentation
Acknowledges the discharge order and other new orders
Opens the Discharge Navigator and reviews unresulted labs; discontinues active lines, drains as appropriate
Reviews the care plan and resolves open goals and problems as appropriate; documents a brief note
Provides patient education and completes documentation
Documents discharge instructions and selects appropriate materials from References/ Attachments in EHR
Reviews the After Visit Summary with the patient; prints the AVS for the patient, and discharges the patient
Patient leaves the hospital

Appendix B: eLearning Module Screenshots




Workflow Changes: Emergency Department
Click on each tab to view information. Click NEXT at the bottom of the screen to go to the next slide.
ED Track Board
ED Triage
ED Assessment
Epic Rover
Click on each tab to view information.
a. In the past, assessments in the ED were documented either on paper generated from Lynx or electronically on Wellsoft.
b. In Epic, ED Assessments, in the ED Narrator tab, are driven by evidence-based clinical practice guidelines and standardized assessments (Clinical Practice Model) based on the patient's chief complaint which generates a patient-centered treatment plan.
c.The patient-centered and evidence-based treatment plan provides a seamless flow of planning and clinical documentation and enables exchange and use of information between the ED and the inpatient settings.
d. The ED Narrator tab shows alerts (reassessments), overdue tasks and medications (MAR), vitals & I&O, new orders, outstanding consults, event log, and suggested assessments and guidelines.
4. The Event Log in the ED Narrator provides a timeline of all events, assessments, and tasks that are completed and documented for the patient by the interdisciplinary care team.
Next


Workflow Changes: Emergency Department
Click on each tab to view information. Click NEXT at the bottom of the screen to go to the next slide.
ED Track Board
ED Triage
ED Assessment
Epic Rover
Click on each tab to view information.
a. This feature is new for staff. The Epic Rover, a mobile app, allows for the ED staff to securely access tools for clinical review and documentation - medication administration, flowsheets, work list, blood administration through a mobile device.
b. This mobile app makes it easy for nurses to document care at the bedside, allowing for efficient real-time documentation at the bedside.
Next

Workflow Changes: Emergency Department

Click on each tab to view information. Click NEXT at the bottom of the screen to go to the next slide.

ED Medication Administration | ED Treatment Plan | ED Transfer/Admission to Inpatient

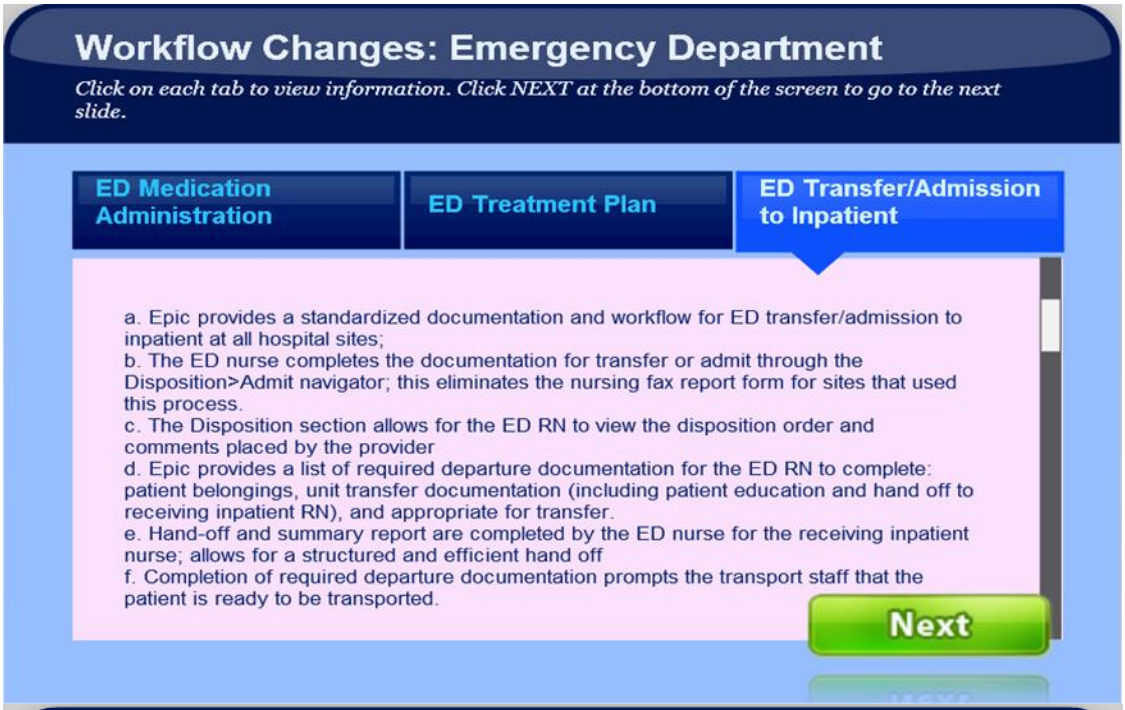
a. In Epic, scanning of the patient's wristband and medication barcodes is required to ensure the right medication is administered to the correct patient at the right time.
b. Documentation in MAR can be done using the Epic Rover.
c. Patient's chart/ED narrator opens automatically upon scanning of patient's wristband; ensures that you have the right patient's chart open
d. Medication administration window opens automatically upon scanning of medication barcode
e. Due and/or overdue medications appear in the ED Narrator Toolbox>MAR section
f. The report icon provides more information about the medication
g. Arrows icon appears when there's a drug interaction

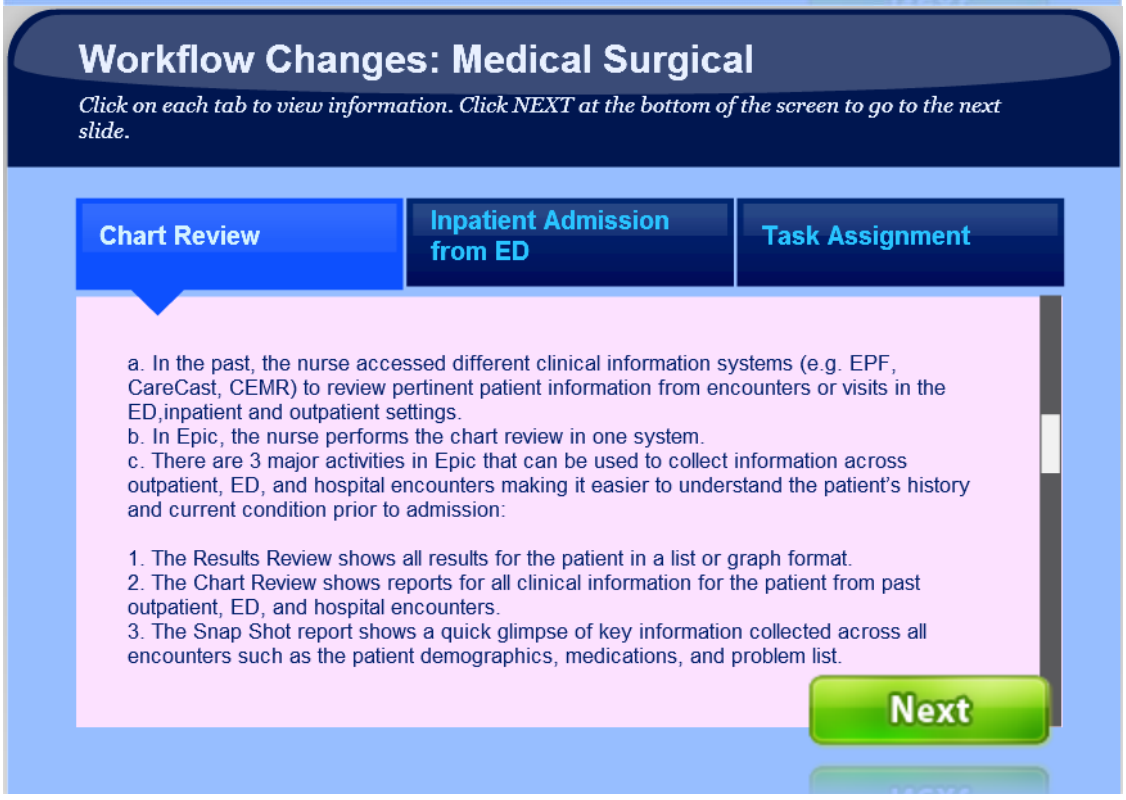
Workflow Changes: Emergency Department

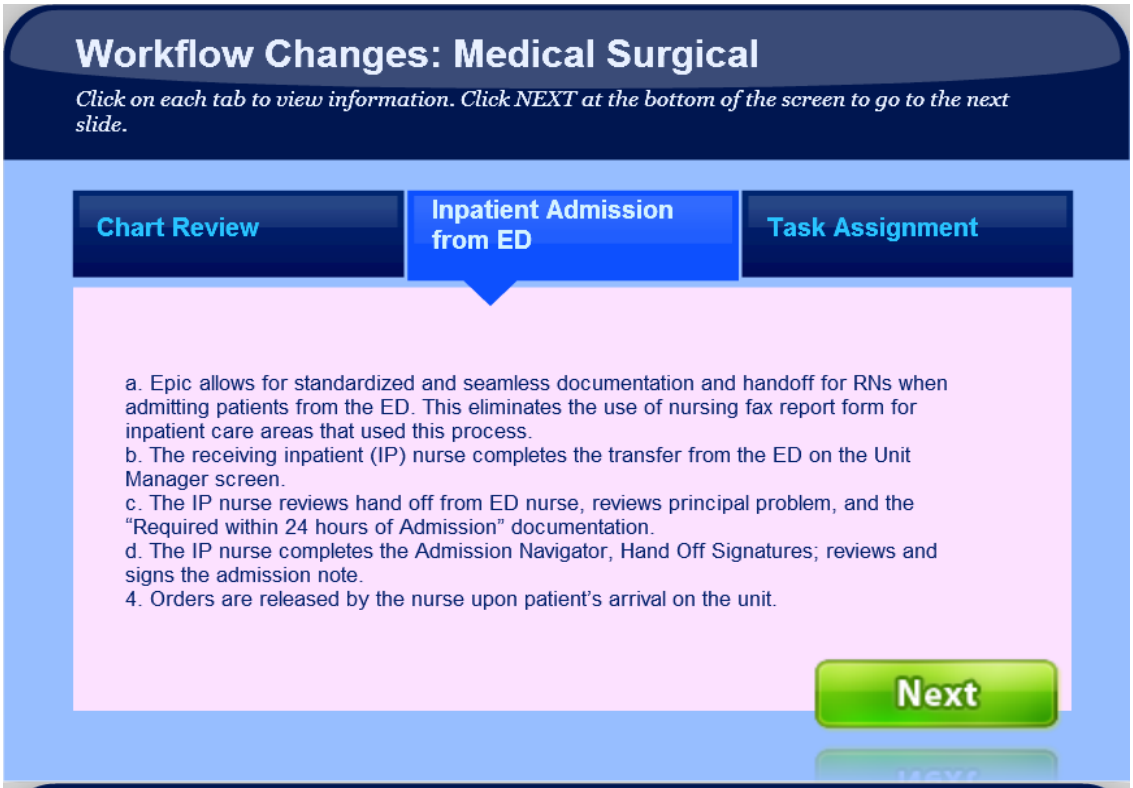
Click on each tab to view information. Click NEXT at the bottom of the screen to go to the next slide.

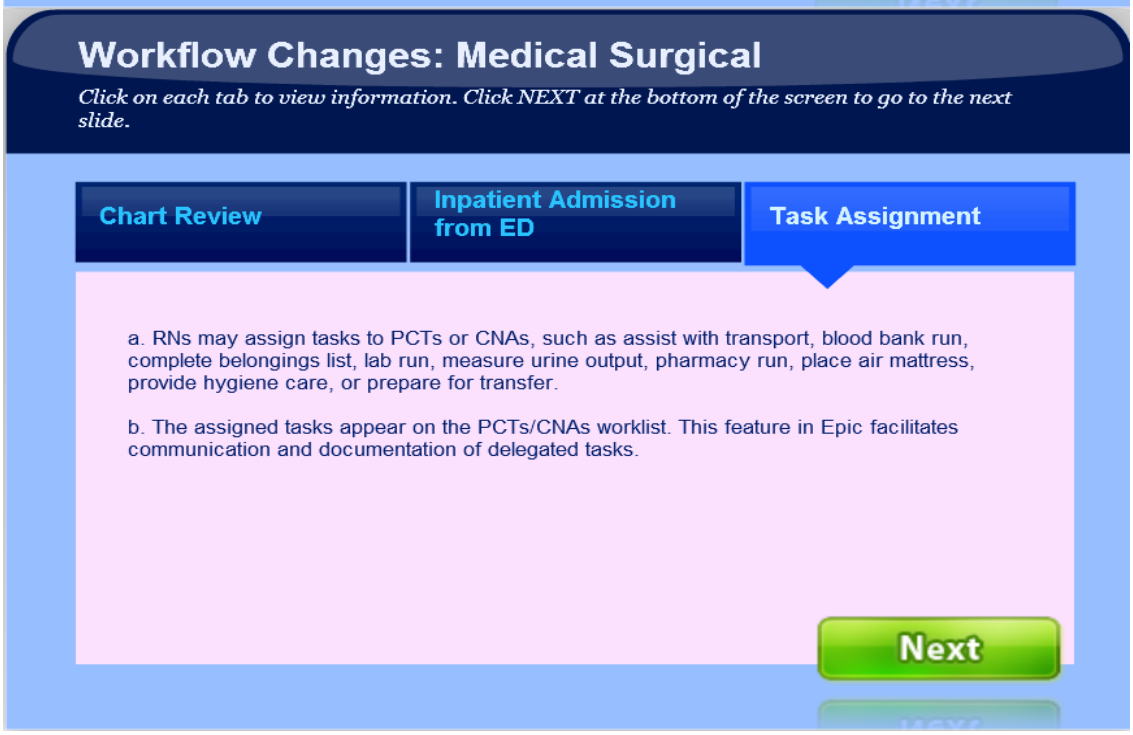
ED Medication Administration | **ED Treatment Plan** | ED Transfer/Admission to Inpatient

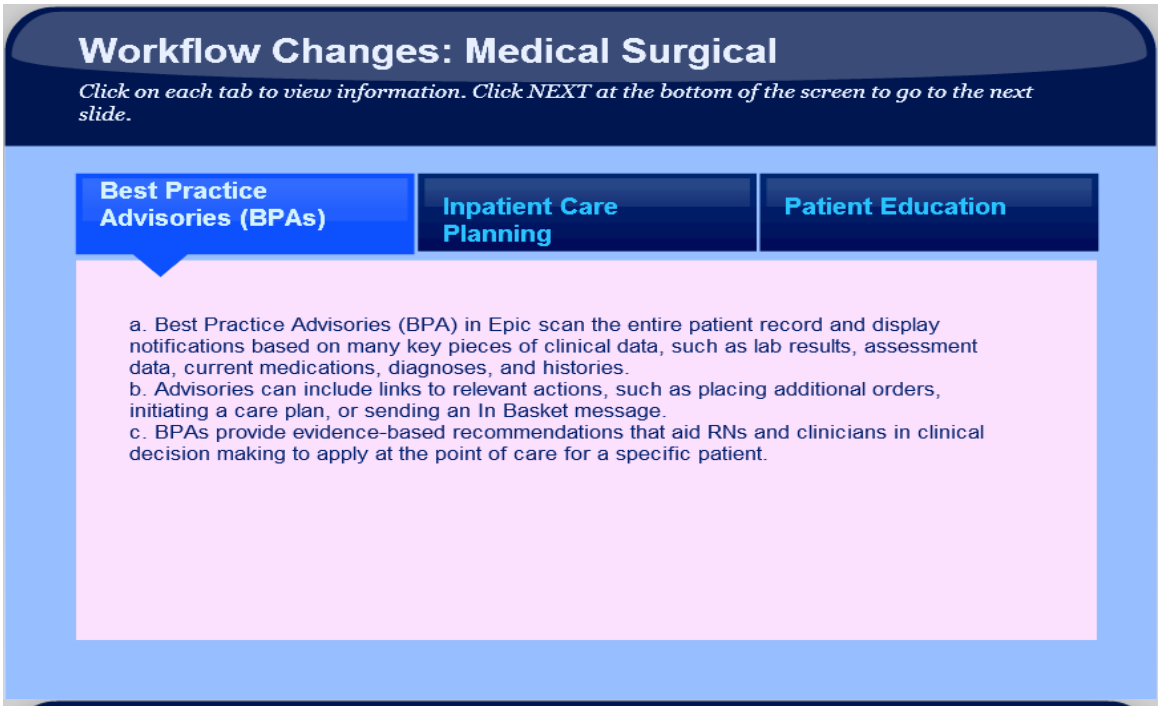
a. The Epic ED treatment plan provides a consistent, focused, individualized treatment planning based on the latest scientific and clinical guidelines on a wide range of problems, symptoms, and conditions encountered in the ED.
b. In documenting and completing a treatment plan, the ED nurse must select both an assessment and a guideline.
c. The treatment plan brings forward patient-centered assessments and interventions based on the patient's chief complaint; nurse may bring additional assessment data as needed.
d. Treatment plan is initiated in triage and is driven by the patient's chief complaint.
e. Pertinent assessments and guidelines are selected by the nurse from the list of suggested patient-centered assessments and guidelines; provides a description of goals of for any ED stay; allows nurses to individualize the plan of care for the patient.
6. Treatment plan is completed in the ED on discharge, admission, or transfer using the disposition navigator>discharge doc; provides a place to document progress toward the

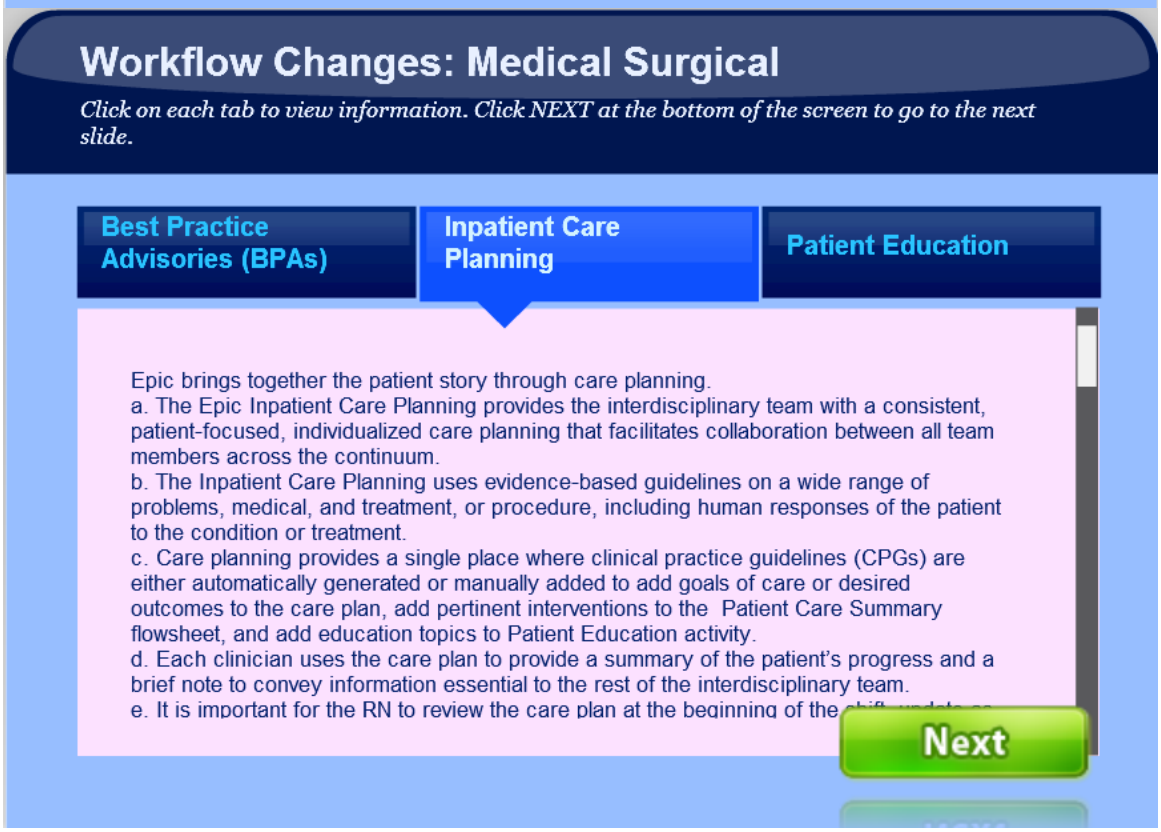

Workflow Changes: Emergency Department
Click on each tab to view information. Click NEXT at the bottom of the screen to go to the next slide.
ED Medication Administration
ED Treatment Plan
ED Transfer/Admission to Inpatient
a. Epic provides a standardized documentation and workflow for ED transfer/admission to inpatient at all hospital sites;
b. The ED nurse completes the documentation for transfer or admit through the Disposition>Admit navigator; this eliminates the nursing fax report form for sites that used this process.
c. The Disposition section allows for the ED RN to view the disposition order and comments placed by the provider
d. Epic provides a list of required departure documentation for the ED RN to complete: patient belongings, unit transfer documentation (including patient education and hand off to receiving inpatient RN), and appropriate for transfer.
e. Hand-off and summary report are completed by the ED nurse for the receiving inpatient nurse; allows for a structured and efficient hand off
f. Completion of required departure documentation prompts the transport staff that the patient is ready to be transported.
Next

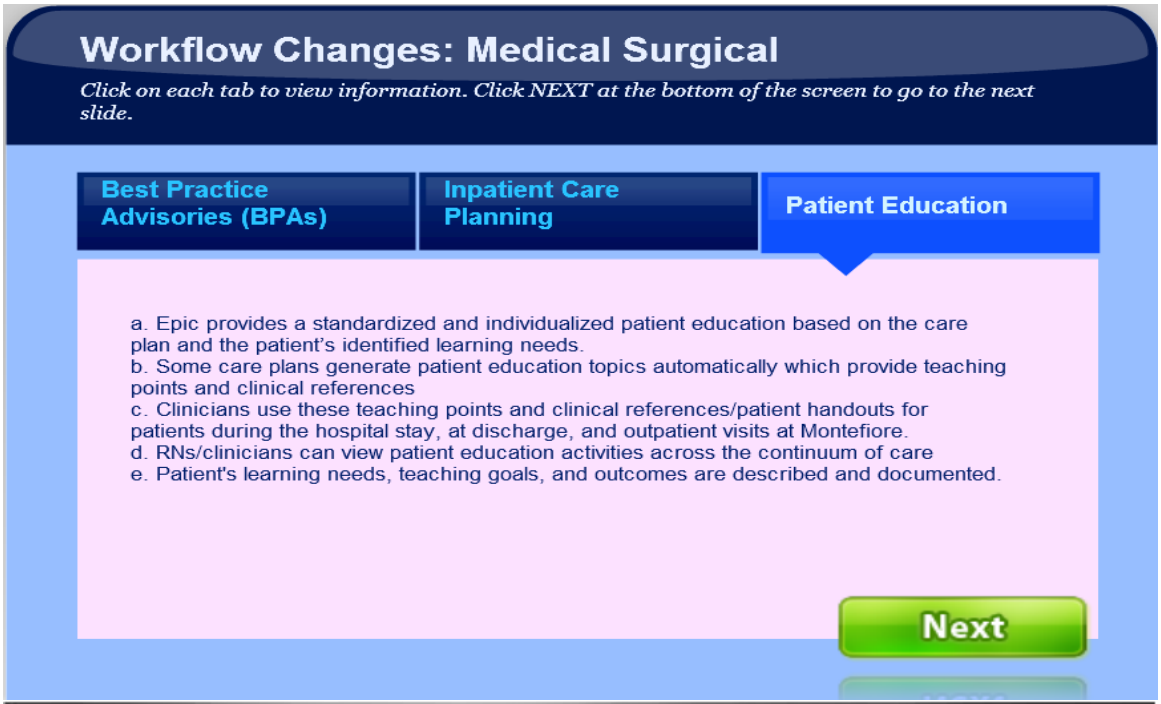

Workflow Changes: Medical Surgical
Click on each tab to view information. Click NEXT at the bottom of the screen to go to the next slide.
Chart Review
Inpatient Admission from ED
Task Assignment
a. In the past, the nurse accessed different clinical information systems (e.g. EPF, CareCast, CEMR) to review pertinent patient information from encounters or visits in the ED,inpatient and outpatient settings.
b. In Epic, the nurse performs the chart review in one system.
c. There are 3 major activities in Epic that can be used to collect information across outpatient, ED, and hospital encounters making it easier to understand the patient's history and current condition prior to admission:
1. The Results Review shows all results for the patient in a list or graph format.
2. The Chart Review shows reports for all clinical information for the patient from past outpatient, ED, and hospital encounters.
3. The Snap Shot report shows a quick glimpse of key information collected across all encounters such as the patient demographics, medications, and problem list.
Next

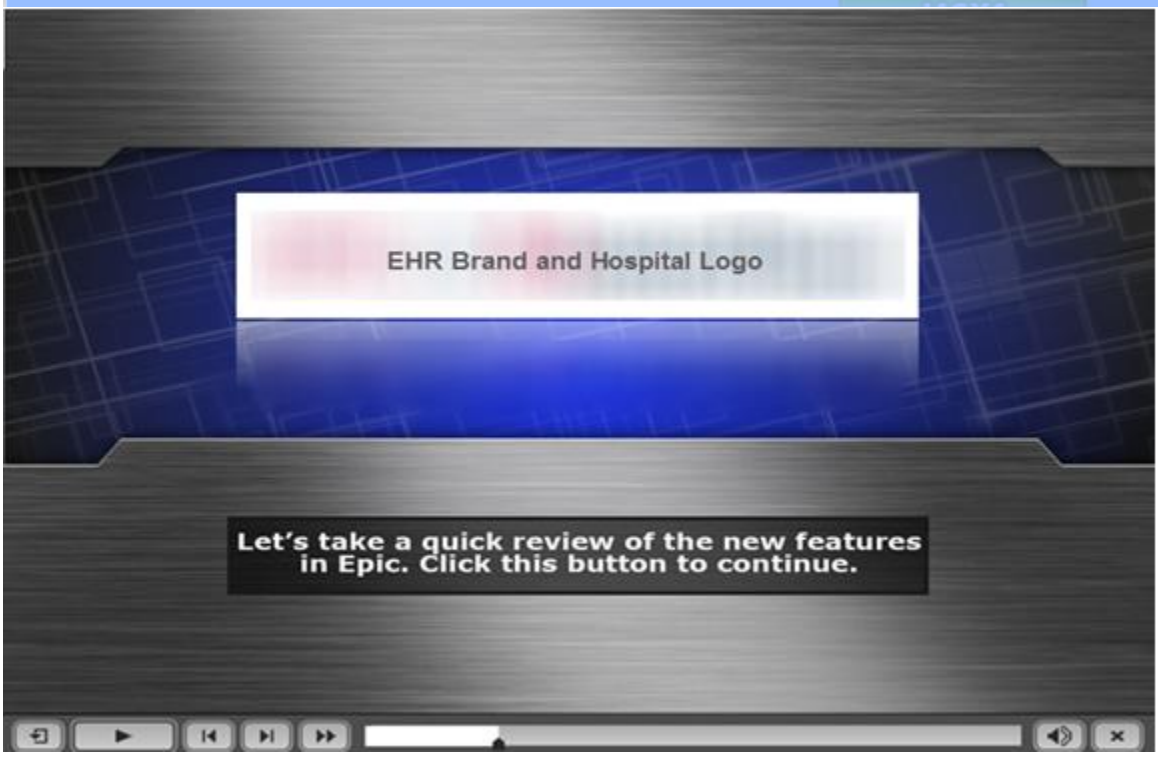

Workflow Changes: Medical Surgical
Click on each tab to view information. Click NEXT at the bottom of the screen to go to the next slide.
Chart Review
Inpatient Admission from ED
Task Assignment
a. Epic allows for standardized and seamless documentation and handoff for RNs when admitting patients from the ED. This eliminates the use of nursing fax report form for inpatient care areas that used this process.
b. The receiving inpatient (IP) nurse completes the transfer from the ED on the Unit Manager screen.
c. The IP nurse reviews hand off from ED nurse, reviews principal problem, and the "Required within 24 hours of Admission" documentation.
d. The IP nurse completes the Admission Navigator, Hand Off Signatures; reviews and signs the admission note.
4. Orders are released by the nurse upon patient's arrival on the unit.
Next

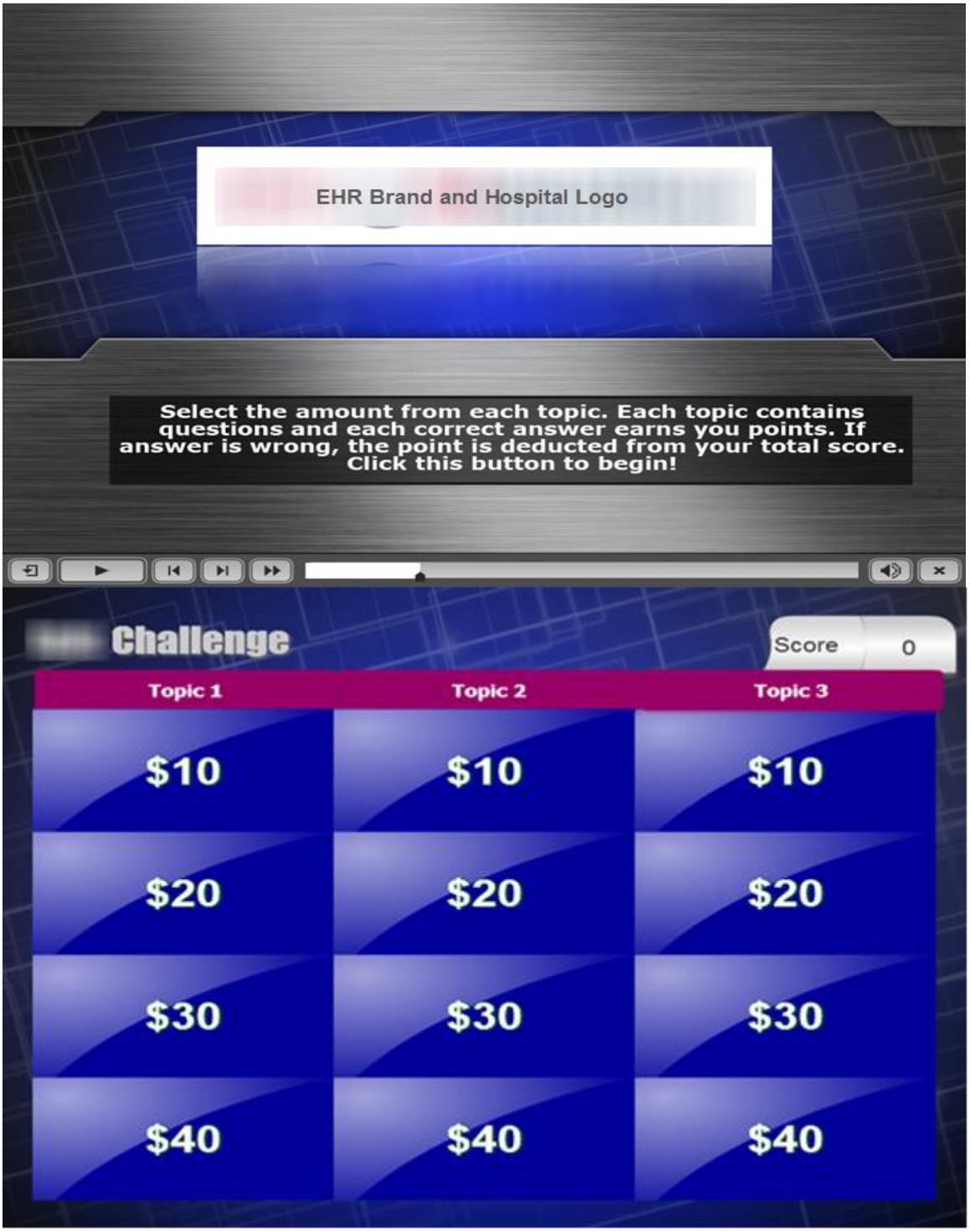

Workflow Changes: Medical Surgical
Click on each tab to view information. Click NEXT at the bottom of the screen to go to the next slide.
Chart Review
Inpatient Admission from ED
Task Assignment
a. RNs may assign tasks to PCTs or CNAs, such as assist with transport, blood bank run, complete belongings list, lab run, measure urine output, pharmacy run, place air mattress, provide hygiene care, or prepare for transfer.
b. The assigned tasks appear on the PCTs/CNAs worklist. This feature in Epic facilitates communication and documentation of delegated tasks.
Next

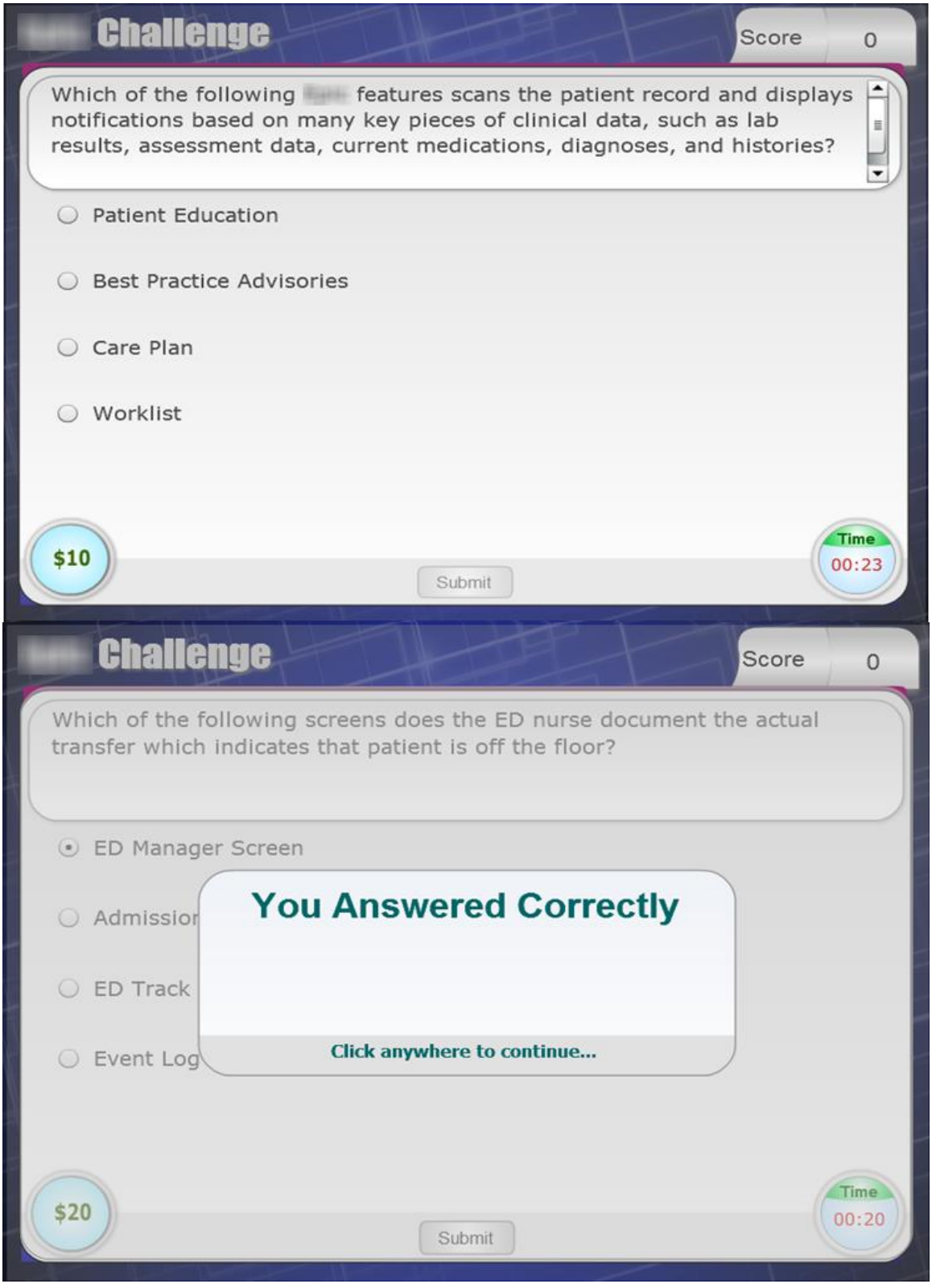

Workflow Changes: Medical Surgical
Click on each tab to view information. Click NEXT at the bottom of the screen to go to the next slide.
Best Practice Advisories (BPAs)
Inpatient Care Planning
Patient Education
a. Best Practice Advisories (BPA) in Epic scan the entire patient record and display notifications based on many key pieces of clinical data, such as lab results, assessment data, current medications, diagnoses, and histories.
b. Advisories can include links to relevant actions, such as placing additional orders, initiating a care plan, or sending an In Basket message.
c. BPAs provide evidence-based recommendations that aid RNs and clinicians in clinical decision making to apply at the point of care for a specific patient.

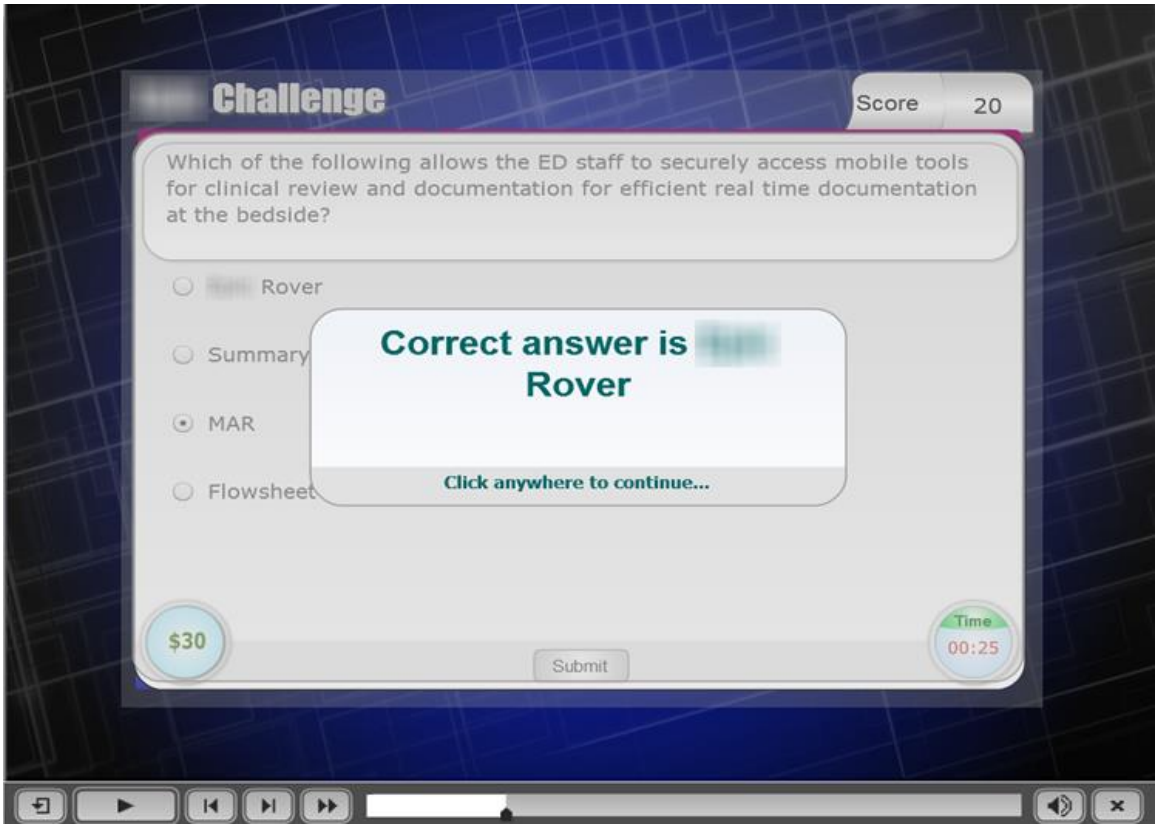

Workflow Changes: Medical Surgical
Click on each tab to view information. Click NEXT at the bottom of the screen to go to the next slide.
Best Practice Advisories (BPAs)
Inpatient Care Planning
Patient Education
Epic brings together the patient story through care planning.
a. The Epic Inpatient Care Planning provides the interdisciplinary team with a consistent, patient-focused, individualized care planning that facilitates collaboration between all team members across the continuum.
b. The Inpatient Care Planning uses evidence-based guidelines on a wide range of problems, medical, and treatment, or procedure, including human responses of the patient to the condition or treatment.
c. Care planning provides a single place where clinical practice guidelines (CPGs) are either automatically generated or manually added to add goals of care or desired outcomes to the care plan, add pertinent interventions to the Patient Care Summary flowsheet, and add education topics to Patient Education activity.
d. Each clinician uses the care plan to provide a summary of the patient's progress and a brief note to convey information essential to the rest of the interdisciplinary team.
e. It is important for the RN to review the care plan at the beginning of the
Next

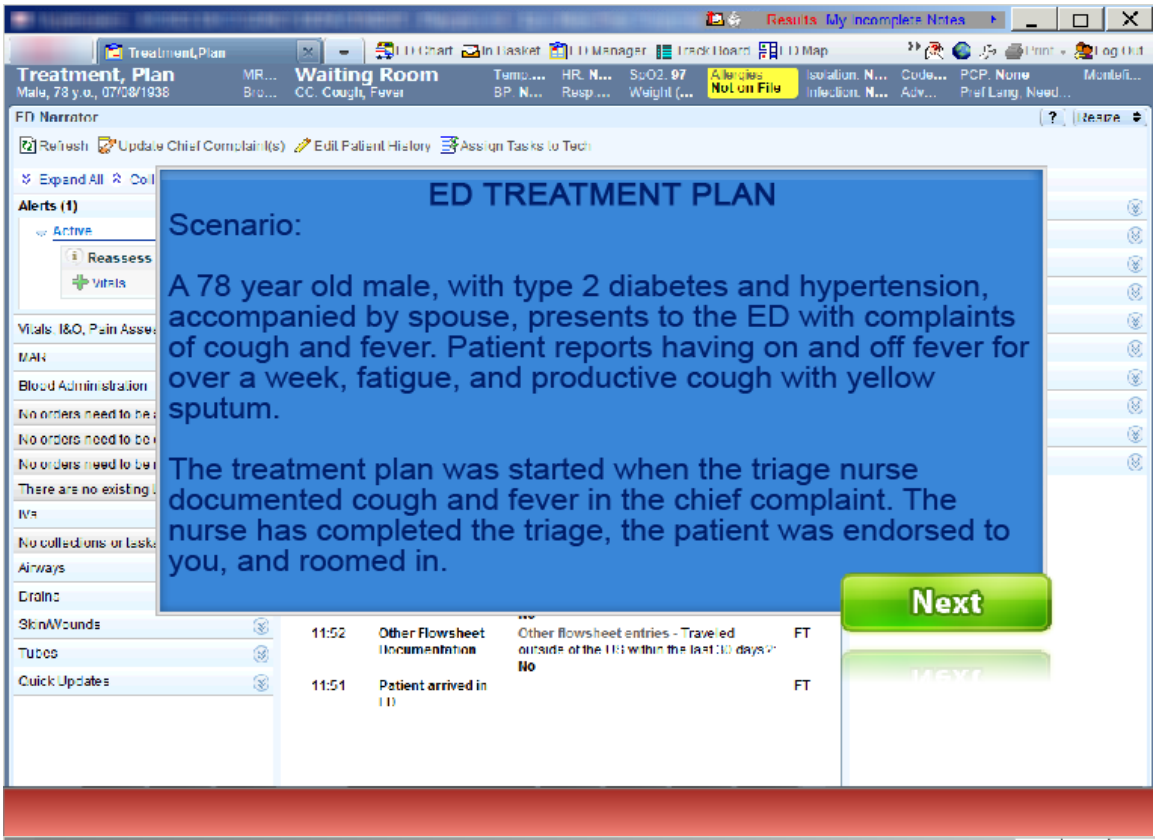

Workflow Changes: Medical Surgical
Click on each tab to view information. Click NEXT at the bottom of the screen to go to the next slide.
Best Practice Advisories (BPAs)
Inpatient Care Planning
Patient Education
a. Epic provides a standardized and individualized patient education based on the care plan and the patient's identified learning needs.
b. Some care plans generate patient education topics automatically which provide teaching points and clinical references
c. Clinicians use these teaching points and clinical references/patient handouts for patients during the hospital stay, at discharge, and outpatient visits at Montefiore.
d. RNs/clinicians can view patient education activities across the continuum of care
e. Patient's learning needs, teaching goals, and outcomes are described and documented.
Next

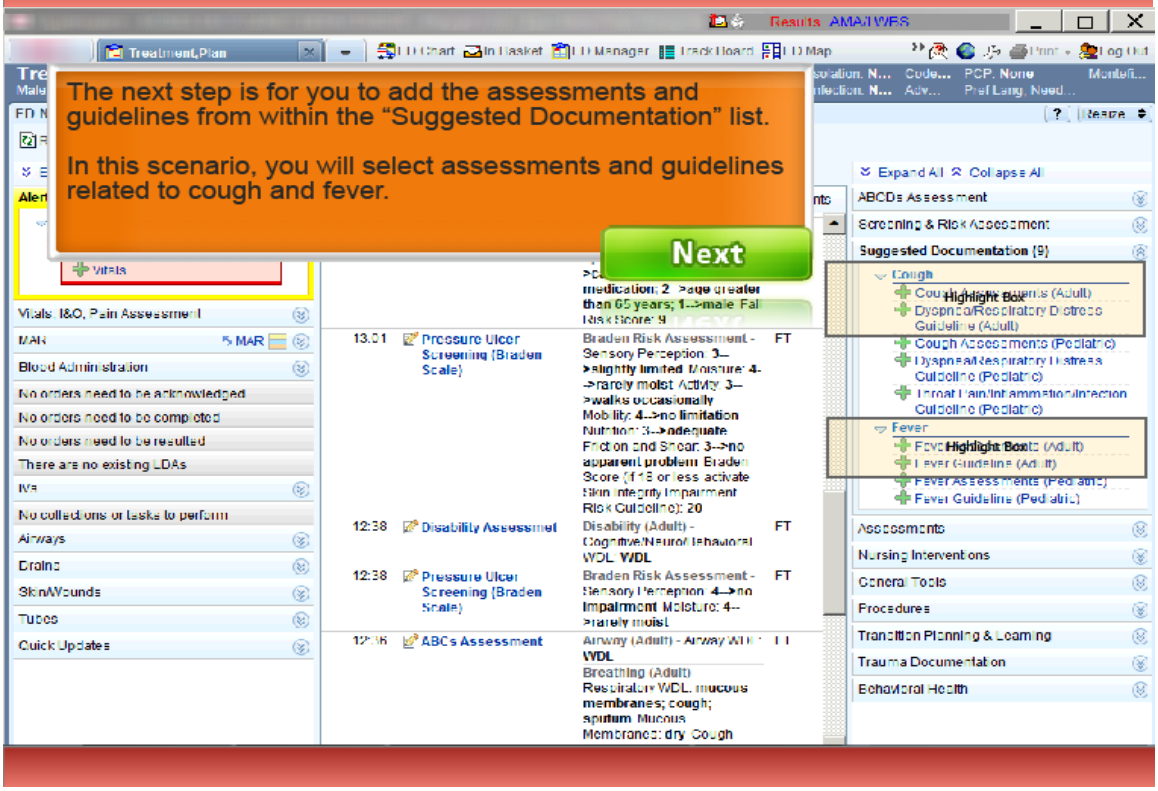

EHR Brand and Hospital Logo
Let's take a quick review of the new features in Epic. Click this button to continue.

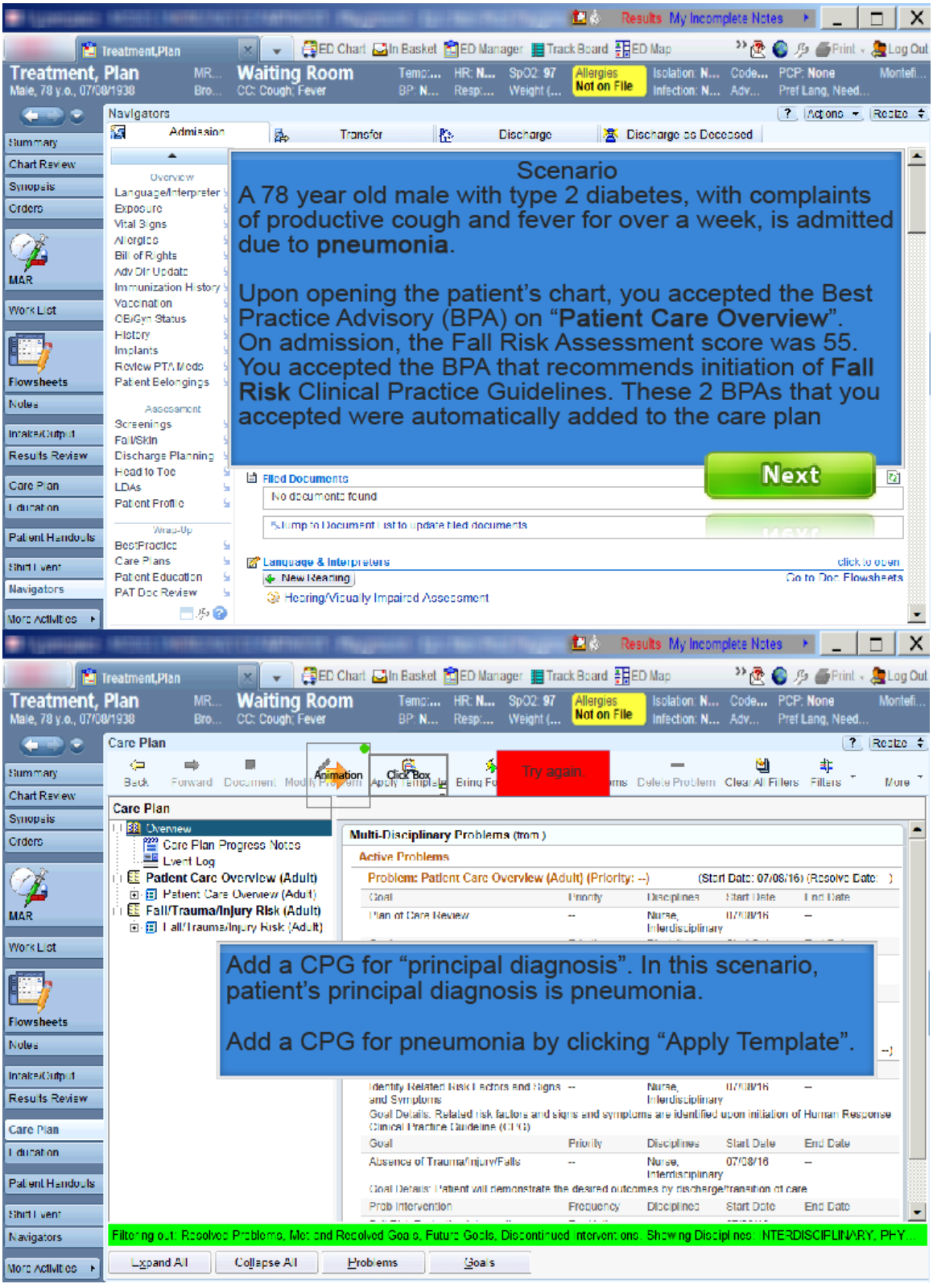

EHR Brand and Hospital Logo
Select the amount from each topic. Each topic contains questions and each correct answer earns you points. If answer is wrong, the point is deducted from your total score. Click this button to begin!
Challenge
Score 0
Topic 1
Topic 2
Topic 3
$10
$10
$10
$20
$20
$20
$30
$30
$30
$40
$40
$40


Challenge
Score 0
Which of the following features scans the patient record and displays notifications based on many key pieces of clinical data, such as lab results, assessment data, current medications, diagnoses, and histories?
Patient Education
Best Practice Advisories
Care Plan
Worklist
$10
Time
00:23
Submit
Challenge
Score 0
Which of the following screens does the ED nurse document the actual transfer which indicates that patient is off the floor?
ED Manager Screen
Admissior
ED Track
Event Log
You Answered Correctly
Click anywhere to continue...
$20
Time
00:20
Submit


Challenge
Score 20
Which of the following allows the ED staff to securely access mobile tools for clinical review and documentation for efficient real time documentation at the bedside?
Rover
Summary
MAR
Flowsheet
Correct answer is Rover
Click anywhere to continue...
$30
Time
00:25
Submit


ED TREATMENT PLAN
Scenario:
A 78 year old male, with type 2 diabetes and hypertension, accompanied by spouse, presents to the ED with complaints of cough and fever. Patient reports having on and off fever for over a week, fatigue, and productive cough with yellow sputum.
The treatment plan was started when the triage nurse documented cough and fever in the chief complaint. The nurse has completed the triage, the patient was endorsed to you, and roomed in.
Next


The next step is for you to add the assessments and guidelines from within the "Suggested Documentation" list.
In this scenario, you will select assessments and guidelines related to cough and fever.
Next


Scenario
A 78 year old male with type 2 diabetes, with complaints of productive cough and fever for over a week, is admitted due to pneumonia.
Upon opening the patient's chart, you accepted the Best Practice Advisory (BPA) on "Patient Care Overview". On admission, the Fall Risk Assessment score was 55. You accepted the BPA that recommends initiation of Fall Risk Clinical Practice Guidelines. These 2 BPAs that you accepted were automatically added to the care plan
Next
Try again.
Add a CPG for "principal diagnosis". In this scenario, patient's principal diagnosis is pneumonia.
Add a CPG for pneumonia by clicking "Apply Template".

Appendix C: Curriculum Plan

Project Title: Educating Nurses in Workflow Changes Resulting from an Organization-wide Electronic Health Record (EHR) Adoption

Problem: The problem identified is the nurses' lack of knowledge about the clinical workflow changes that will result from an organization-wide electronic health record adoption (EHR) adoption.

Purpose: The purpose of this DNP QI project was to identify the workflows changes resulting from EHR adoption and to develop an educational module for nurses about the workflow changes in the emergency department (ED) and inpatient care areas.

Goal: The goal of this DNP project is to facilitate end-user knowledge of workflow changes resulting from EHR adoption.

Title of eLearning Module: EHR Workflow Changes

Objectives	Content Outline	Evidence	Method	Method of Evaluation
At the conclusion of this eLearning module, the learner will be able to: 1. Identify significant workflow changes in the emergency department (ED) and inpatient care areas	1. Introduction a. HITECH Act b. Meaningful Use c. Knowledge of workflow changes 2. Summary of workflow changes: a. ED track board b. ED triage c. ED assessment d. Epic Rover e. Medications administration f. ED treatment plan	Topaz, M., Rao, A., Creber, R., & Bowles, K. (2013). Educating clinicians on new elements incorporated into the electronic health record: Theories, Evidence, and one educational project. CIN: Computers, Informatics, Nursing,	eLearning module	A 12-item game-based quiz will be used to provide real-time self-assessment of progress. Learner earns points for each correct answer. Immediate, actionable feedback is

Objectives	Content Outline	Evidence	Method	Method of Evaluation
	g. ED transfer/admission to inpatient h. Chart review i. Inpatient admission from ED j. Task assignment k. Best Practice Advisories l. Interdisciplinary care plan m. Patient Education	31(8), 375-379. Vishwanath, A., Singh, S., & Winkelstein, P. (2010). The impact of electronic medical record systems on outpatient workflows: A longitudinal evaluation of its workflow effects. International Journal of Medical Informatics, 79(11), 778-791.		provided for incorrect answers. Multiple attempts will be allowed to achieve mastery.
2. Demonstrate steps in completing EHR tasks through simulation	1. Complete a treatment plan 2. Complete a care plan	Mohan, V., Scholl, G., & Gold, J. A. (2015). Intelligent Simulation Model To Facilitate EHR Training. AMIA Annual Symposium Proceedings, 2015, 925–932. Vuk, J., Anders, M.,	eLearning module	Simple hints and immediate feedback will be provided to describe next actions. Multiple attempts will be allowed to achieve mastery.

Objectives	Content Outline	Evidence	Method	Method of Evaluation
		Mercado, C., Kennedy, R., Casella, J., & Steelman, S. (2015). Impact of simulation training on self-efficacy of outpatient health care providers to use electronic health records. International Journal of Medical Informatics, 84(2015), 423-429.		

Appendix D: Permission to Use

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VIA EMAIL

November 17, 2016

Rhoda Lynn San Jose
Doctor of Nursing Practice Candidate
54 Sears Avenue
Elmsford, NY 10523

Dear Rhoda Lynn San Jose:

You have our permission to include Figure 5-1: "A Model of Five Stages in the Innovation-Decision Process" on p. 170 of our book, DIFFUSION OF INNOVATIONS, 5E by Everett M. Rogers, in your doctoral dissertation entitled "Educating Nurses in Workflow Changes Resulting from an Organization-wide Electronic Health Record (EHR) Adoption."

The following acknowledgment is to be reprinted in all copies of your dissertation:

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Sincerely,

Christine J. Lee

Christine J. Lee

AGREED TO AND ACCEPTED

Rhoda Lynn San Jose