Smoking Cessation before Surgery and Effective Airway Management: Patient Education and Empowerment

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Abstract

Quitting smoking at any time benefits health. Research documents the benefits of temporary smoking cessation to surgical outcomes during, and post-surgical procedures. This phenomenon is central to anesthesia providers because of the potential cardiovascular and pulmonary problems related to the anesthetic management during surgery as a result of smoking. However, it is very challenging to get surgical patients who are smokers to adhere to the temporary preoperative smoking cessation instructions. Using the Transtheoretical model, the goal of this Quality Improvement (QI) project was to increase the number of surgical patients that comply with the 24-48 hours preoperative smoking cessation instructions through impactful education aimed at increasing patients' awareness on the benefits of temporary smoking cessation to better anesthetic management during surgery. An educational power point presentation was presented to members of the preoperative team. The intervention focused on changing the approach adopted when providing preoperative instructions. A post-intervention chart audit was performed to determine the patient's compliance to the 24-48 hours preoperative smoking cessation instructions. A descriptive study design was utilized to evaluate the effectiveness of the QI project interventions. Compliance rate with temporary preoperative smoking cessation following the implementation of the QI project increased from about 60% to 75%.

Keywords: Smoking cessation; airway management; preoperative instructions; Transtheoretical model

Introduction

Smoking has a negative effect on surgical outcome. An estimated 42.1 million U.S. adults (almost 18% of the population) currently smoke (Jamal et al., 2015). Each year, millions of cigarette smokers require surgery and anesthesia. Evidence suggests that well-timed preoperative smoking cessation can reduce postoperative complications, particularly wound and pulmonary. The length of time necessary to benefit previous smokers is not exactly clear. According to Lee (2015), twelve to 24 hours temporary smoking cessation before surgery is enough to decrease carboxyhemoglobin levels and shift the dissociation curve rightward (increasing oxygen availability to tissues).

The link between smoking and postoperative complications is well documented across surgical specialties. Warner (2006) states that smoking has repeatedly been shown to be a univariate and multivariate risk factor for respiratory failure, ICU admission, pneumonia, laryngospasm, and increased use of respiratory therapy services. Despite this, a quarter of patients undergoing surgery continue to smoke up to, and after surgery with advice on smoking cessation varying from surgeon to surgeon. Theadom (2006), revealed that only 58% of surgeons and 30% of anesthetists routinely advise patients to stop smoking before undergoing a surgical procedure. This may be because of the lack of clarity on the effect of smoking cessation on surgical complications and concern that a brief period of cessation may have a negative effect on surgical outcome but the American Society of Anesthesiologists (ASA) recommends that all patients should abstain from smoking for as long as possible both before and after surgery, and they should obtain help in doing so.

Evidence suggests that some important adverse effects in pulmonary and cardiovascular system induced by nicotine and carbon oxide could be restored within 24 to 48 hours of smoking

cessation (Ozturk, 2012). Following this outcome and giving the importance of such compliance to better anesthetic management (Barker et al., 2016), providing actionable clinical practice initiatives that guarantees improved compliance by surgical patients is imperative. Therefore, the purpose of this QI project is to focus on the empowerment of surgical patients through reinforcement of impactful education and effective awareness programs given to them by the preoperative team and the medical staffs at the doctor's office. By following the proposed guidelines and recommendations of this QI project, the preoperative team can successfully make a considerable impact on their patients' abilities to temporarily cease smoking 24 – 48 hours before surgery thereby increasing the compliance rate.

Problems Statement

Cigarette smoking has been implicated as a risk factor for postoperative complications across a spectrum of surgical specialties. There are ample findings from evidence-based research that clearly documents both the short-term and long-term benefits of smoking cessation before surgery (Smith & Taylor, 2013). This phenomenon is central to anesthesia providers because of the potential cardiovascular and pulmonary problems related to the anesthetic management during surgery as a result of smoking. Daily smokers are high-risk patients, developing 2-4 times more complications after surgery. Globally, over 230 million adults undergo major surgery annually, and millions of these patients experience major respiratory and cardiovascular complications (Chow & Devereaux, 2011).

Upwards of 30% of patients undergoing surgery are smokers at the time of their surgery (Chow & Devereaux, 2011). However, a substantial number of these surgical patients who are smokers do not actively comply with the 24-48 hours preoperative smoking cessation instruction. This non-adherence does pose a considerable challenge to anesthetic management and significant

risk postoperatively to these surgical patients. Compared with nonsmokers, smokers who undergo surgery have longer hospital stays, higher risk of readmission, are more likely to be admitted to an intensive care unit, and have an increased risk of in-hospital mortality (Myers et al., 2011).

Other similar preoperative instructions, such as eating cessation before surgery, are provided to patients. The difference in surgical patient's compliance between temporary smoking cessation and other similar preoperative instructions would be the cancellation or delay of the surgical procedure if the patient did not comply and ate after midnight before surgery, whereas the surgical procedure will still continue for surgical patients who violate the temporary smoking cessation instructions. Hence, anesthesia providers are faced with the potential cardiovascular and pulmonary difficulties that may be encountered during the perioperative period. Therefore, highlighting this clinical practice issue while proposing actionable initiatives and interventions that centers on impactful education geared towards increasing the awareness surgical patients on the benefits of temporary smoking cessation before surgery is of utmost importance.

Purpose Statement

The primary purpose of this DNP project was to identify and illustrate best-evidence clinical practices in the execution of a temporary preoperative smoking cessation instruction protocol that empowers surgical patients through reinforcement of impactful education and effective awareness programs given to them by the preoperative team and the medical staff at the doctor's offices. The secondary goals of the DNP project included dissemination of knowledge in relationship to design, implementation, and evaluation of a temporary preoperative smoking cessation instruction protocol. The project's aim was to change the approach adopted when

providing preoperative instructions to scheduled surgical patients especially as it relates to temporary smoking cessation 24-48 hours before surgery.

Attaining the purpose centered on the measurable interventions prescribed as a framework for increasing compliance with preoperative instructions regarding the temporary smoking cessation 24-48 hours before surgery. The framework for these interventions included information reinforcement and timely follow-up scheduled telephone-based conversations by preoperative nurses.

Project Objective

The objectives of this DNP project were to (1) increase the number of surgical patients that comply with the 24-48 hours preoperative smoking cessation instructions (2) teach the nursing staffs to educate and increase patients' awareness on the benefits of temporary smoking cessation to better anesthetic management during surgery (3) to improve the quality and to change the approach adopted when providing preoperative instructions to scheduled surgical patients by the preoperative team and the medical staffs at the doctor's office.

In context, achieving this objective was important (in part) given the assertions in Marks et al. (2015) regarding the "efficacy of smoking cessation during preoperative evaluation."

Project Question

Giving the documented effectiveness of the PICOT approach to developing a good clinical project question (Moran et al., 2014), stated below is the question the DNP student was seeking using the PICOT method.

> Are surgical patients **(P)**, who are smokers but have impactful education and awareness regarding the benefits of temporary smoking cessation 24-48 hours before surgery **(I)** compared with those without such education and awareness **(C)** at decreased risk for an

anesthetic management complication and other related postoperative outcomes **(O)** during surgery **(T)**?

Review of Literature

The surgical process involves three primary successive phases. These are (1) preoperative, (2) operative, and (3) postoperative stages. Each of these stages is important because the orderly outcome of one determines to a large extent the results of other successive phases. It is important to have effective coordination during each of these phases to achieve overall successful patient outcomes. Within the triad of the structure-process-outcome continuum (Wemer et al., 2016), this study focused on how to change the approach adopted when providing preoperative instructions to scheduled surgical patients especially as it relates to temporary smoking cessation 24-48 hours before surgery. The goal of these interventions was to effectively educate and enlighten surgical patients on the importance of smoking cessation during the preoperative phase on the anesthetic outcome during the operative stage and the implication for postoperative recovery.

The risk factors inherent in smoking among surgical patients are clearly documented in the literature (Kim et al., 2015). The complications arising from smoking during surgical procedures becomes exacerbated when the patient smokes 24-48 hours before surgery. This evidence is premised on the anesthetic risk that smokers are exposed to during surgery. Yousefzadeh et al. (2016) document that surgical patients who cease smoking before surgery are less likely to face increased risk of complications.

In addition to the operative and post-operative risks to surgical patients, some studies (Licker et al., 2007, Thomsen et al, 2014; Lee et al., 2015) have also argued that smoking cessation before surgery can reduce healthcare costs, substantially in part, because lesser

anesthesia resources are consumed. Such an efficient use of resources and the associated cost-savings could bend the curve of the continuously increasing healthcare costs in the U.S. Lawrence et al. (2006) argues that effective perioperative strategies (including smoking cessation before surgery) can alleviate the costs of healthcare interventions post-surgery (Brinn et al., 2013).

Pre-Anesthetic Management of Surgical Smoking Patients

Research documents the significance of appropriate pre-anesthetic evaluation of all surgical patients (Lee et al., 2015). This evaluation becomes extraordinarily important for the population of smokers who are scheduled to undergo surgical procedures due to pre-anesthetic risks and the potential anesthetic complications during surgery (Warner, 2005). In context, one would appreciate the challenge that an anesthesia provider may face with surgical patients that smoke if one considers the well-documented interactions between carbon monoxide and hemoglobin (Kambam et al., 1986; Warner, 2006). The toxicity of carbon monoxide complicates the transportation and utilization of oxygen in the blood system, and since hemoglobin is known to have approximately 200 times higher affinity for the toxic carbon monoxide gas relative to oxygen, carboxyhemoglobin level increases significantly in smokers which consequently elevates the anesthetic risk substantially during surgery. Specifically, these risks relate to a respiratory and pulmonary complications (such as chronic obstructive lung disease, coronary artery disease) coming from cigarette smoke inhalation leading to the compromised airway (Warner, 2005) that can potentially worsen surgical outcomes. In fact, Eriksson et al. (2005) note that pulmonary aspiration is a dangerous by-product of airway management problems.

Further, research findings show that smoking cessation eight weeks before scheduled surgery will be “best” for anesthesia administration during the surgery. However, realizing the

addictive nature of smoking and the difficulty of getting smokers to quit, Rodrigo (2000) maintains that smoking cessation should occur at least 24 hours before scheduled surgery mainly to minimize the adverse effects of nicotine and carboxyhemoglobin. The author argues that "even passive smoking affects anesthesia," and that this effects could be worse in "children with a history of passive smoking" (p. 147).

Perioperative Smoking Cessation Interventions

The Center for Disease Control and Prevention (2016) statistics shows that cigarette smoking ranks highest as the leading cause of preventable disease and death in the United States. Specifically, cigarette smoking was responsible for approximately 20% of the deaths in the U.S. in 2015. The prevalence of cigarette smoking among the U.S. adults is alarming, as over 15% of this population group actively smokes a cigarette. Smokers have difficulty quitting due to the dependence and the addictive nature of nicotine substance in cigarettes (Warner, 2005; U.S. DHHS, 2014). One ramification of this alarming statistics is that it contextualizes the potential (but real) implications that smoking can have for airway management during anesthesia administration, especially when smokers come for surgical procedure(s).

The short-term effectiveness of preoperative smoking cessation intervention was clearly highlighted in a study by Mark et al. (2015) that took place at the Preoperative Evaluation Clinic at the Mayo Clinic Florida. The authors obtained primary data through telephone calls from self-report smoking cessation (convenience sampling) participants who were surgical patients. They found that 88% of respondents maintained cessation three months after the surgery date. The authors argue that one implication of their study is that preoperative smoking cessation interventions are effective in the short-term. Although this study focuses on patients with metabolic syndrome, related evidence in the literature and clinical practice suggests its

implications can be extended to a variety of surgical patients who are smokers. In an earlier study, Rice and Stead (2008) investigate the value of smoking cessation interventions administered by perioperative nurses. Using randomized controlled trials of smoking cessation selection criteria, the authors searched the Cochrane Tobacco Addiction Group Specialized Register and CINAHL in July 2007, and document that smoking cessation advice and counseling is effective at increasing quit rate among patients.

Lee et al. (2015) examine the long-term quit rates among surgical patients who were exposed to perioperative smoking cessation interventions. Using a randomized control trial methodology, the authors follow a sample of 168 patients and found that subjects in the randomized group with smoking cessation interventions are 2.7 times more likely to quit smoking at one year. Thus, the authors conclude that there appear to be long-term benefits of perioperative smoking cessation interventions beyond surgery. Consequently, they believe that perioperative care providers are uniquely positioned to halt the epidemic of cigarette smoking in the U.S. by using effective smoking cessation techniques to encourage smoking patients to cease smoking before scheduled surgery.

However, the low compliance rate among smoking patients scheduled for surgery limits the applicability of the short- and long-term successes/benefits documented in Mark et al. (2015) and Lee et al. (2015). Therefore, the objective of this DNP project is to influence clinical practice by exploring policy initiatives that include effective and impactful educational and awareness strategies that perioperative nurses and staff, actively supported by anesthesia providers, can employ to increase compliance of preoperative smoking cessation interventions and instructions. After all, smoking cessation intervention/instruction can be a valuable “teachable moment”

(McBride, 2003). This moment is described in the literature as an episode that influences people to embrace health behaviors that diminish health risks.

One argument against brief smoking cessation which raises concerns among the smoking population and some healthcare providers is that such a cessation can be unsafe and be the source of anesthetic complications during and post-surgery. Bluman et al. (1998) have since debunked such fears but instead, argue for abstinence during periods leading to scheduled surgical procedure.

Preoperative Tools Employed for Smoking Cessation

Even though, there is no study specifically examining anxieties associated with surgery and smoking noncompliance, the increasing number of evidence-based research documenting the benefits of smoking cessation before elective surgery is a testimony to noncompliance with preoperative instructions regarding smoking cessation.

Preoperative fasting is well documented to have substantially higher compliance rate relative to smoking cessation among patients scheduled for surgery (Warner, 2005). Rodrigo (2000) notes that this type of fasting is well recognized globally and that there are more formal guidelines to implement and ‘enforce’ compliance. However, even though noncompliance to both preoperative fasting and smoking cessation instructions can individually post substantial risks for airway management during surgery, the higher noncompliance rate in the latter, relative to the former, is always ignored thereby leaving anesthesia providers to deal with the associated avoidable anesthesia-related pulmonary aspiration risks factors.

The literature documents tools that can be used by the preoperative teams to deliver smoking cessation interventions to surgical patients. For example, Smith and Taylor (2013) citing Egan and Wong (1992) identify these to include behavioral technique (such as telephone

counseling, face-to-face counseling) and pharmacotherapy technique (such as nicotine replacement therapy, varenicline). While the latter technique is considered an effective smoking cessation technique, the focus of this DNP project centered on the behavioral technique for the main reason that its administration is within the competence of preoperative nursing team.

With the advancement in technology and the mobile nature of smartphones, Bricker et al. (2014) explore the use of smartphone applications to achieve behavioral supports for smoking cessation and find "promising quit rates" among subjects on whom the "innovative smartphone-delivered acceptance commitment therapy (ACT) application was used. The interesting ramifications of this finding are that the quit rates using the smartphone applications rank higher than the U.S. Clinical Practice Guidelines, notwithstanding the small sample design employed by the study. Hence, such a strategy can be used to reinforce preoperative smoking cessation instructions especially among millennials who are more receptive to smartphone applications.

Rethinking Preoperative Smoking Cessation Intervention Process

Leadership is essential in the effort to rethink the preoperative smoking cessation intervention process. Consistent with the assertion of the American Organization of Nurse Executives (AONE, 2015), robust leadership is a sine qua non to excellence in patient care. A DNP-prepared nurse is henceforth equipped to provide such a strong leadership and act as an agent of change to create the ethos of innovation in this area.

Based on evidence in literature as it relates to compliance with preoperative smoking cessation, the initial conversations with the relevant stakeholders and the review of the preoperative guidelines of the facilities, a conclusion was drawn that there is a need to further address this issue and achieve higher compliance rate when it comes to preoperative smoking cessation instructions.

Scheduled surgery provides a distinctive opportunity and a teachable moment for the preoperative team to provide smoking cessation interventions to surgical patients who are smokers. This afforded the DNP student a unique opportunity to provide effective leadership into changing the approach adopted when providing preoperative instructions to scheduled surgical patients especially as it relates to temporary smoking cessation 24-48 hours before surgery.

In light of the above-documented research findings, it is implicitly clear that there was a demand for meaningful scale transformation and change that must be met by the supply of leadership and vision. Therefore, in an effort to translate research-based evidence into clinical practice, the following initiatives were implemented

1. A thorough and comprehensive review of the existing preoperative guidelines in general, and smoking cessation guidelines in particular.
2. Identification of gaps in those guidelines.
3. Presentation of the documented observations from 1 & 2 above to the relevant stakeholders.
4. Designing of innovative procedural manuals to update the existing preoperative guidelines in ways that elevate the presence of smoking cessation instructions/interventions.
5. Identifying educational and awareness tools that are known in the literature to encourage behavioral changes among the smoking population effectively.
6. Recommendation of incentive and punitive structures to compliance and non-compliance respectively.
7. Development of adaptive response strategies to organizational barriers and challenges that can hinder the implementation process of evidence-based practice initiatives.

Understanding the need to engage in systematic evaluation of the organization frameworks within the surgical facility to determine readiness for proposed quality initiatives is imperative. For example, the methodological foundation for quality improvement, and the 5 Ps (Purpose, Patients, Professionals, Processes, and Patterns) identified in Hall and Roussel (2017) will be relied upon in this assessment as a guide to quality improvement.

In sum, it was impossible to achieve this innovative change alone. Knowing that the proposed evidence-based practice initiatives required the commitment of organization' resources, and as clearly noted in Langley et al. (2009), the DNP student strongly advocated for stakeholders buy-ins and organizational support for these initiatives. Emphasis was placed on the need for effective collaboration and coordination with other healthcare professionals (as partners) in ways that advanced care, guaranteed the desired patient outcomes, and created sustainable stakeholders value.

Theoretical/Conceptual Framework

Suresh (2015) describes the theoretical framework as "a collection of interrelated concepts that depict a piece of theory to be examined as the basis for research studies." (p. 112). Moran et al. (2016) note that using appropriate theory is central to effectively studying a "phenomenon of interest" (chapter 5, p. 100). In essence, the authors argue that theoretical framework is a research "guide" that should "inform" the research project (chapter 11, p. 259).

The Transtheoretical Model (TTM) was selected as the foundation theory for the temporary preoperative smoking cessation program among surgical patients before undergoing scheduled or elective surgery. TTM is an effective model to provide a framework for the readiness of patients to change health behaviors and allows for fluctuation in readiness (Woody & Carlton, 2008).

Transtheoretical Theory: Identification and Historical Development

The Transtheoretical Model (TTM) as developed by Prochaska and DiClemente (2005) centers on influencing individuals to adopt a new but rather healthier behavior or lifestyle, especially among the at-risk population. Hence, it is commonly referred to as an integrative model of behavior change. The theoretical exercise of developing the model began in 1977 by both authors from the University of Rhode Island. As part of the continuous practice of refining and improving the model, the authors published the model in peer-review academic journals and books (Prochaska and DiClemente, 2005). Initially, the authors were motivated to develop this theoretical approach in response to what they described in their 2005 book as "a discontent with the state of affairs in psychotherapy theory, research, and practice" (p. 147). Researching and harnessing the commonalities across the rigid boundaries of several theories of therapy from different disciplines, the authors expanded the boundaries of therapeutic interventions using the Transtheoretical approach. Hence, the name 'trans' because major constructs of various theories are integrated into TTM. This means that the foundation and the applicability of the theory cut across several theoretical boundaries and clinical practices.

Applicability of Transtheoretical Model to Current Practice.

The Transtheoretical Model (TTM) is a theory that continues to be applied to practice since its inception. TTM is being used to achieve different clinical practice outcomes such as stress management, depression prevention, weight management, smoking cessation among others (Cole et al., 2016). Review of the literature indicates that within the last ten years, there is no shortage in the number of clinical studies that use TTM especially as it relates to smoking cessation. Specifically, TTM is one of the major theories used to guide clinicians in their quest to encourage smoking cessation. For example, DiClemente (2005) notes the applicability of TTM

to clinical nursing practice. Some of the application of the theory to current practice (within the past 10 years) are: transformative care strategies and nursing-sensitive patient outcomes (Chaboyer et al., 2010); smoking cessation in pregnant women (Karatay et al., 2010); efficacy and relevance of TTM for physical activity behavior (Nigg et al., 2011); smoking prevention program among pregnant women and mothers of young children (Huang et al., 2013); community-dwelling older persons with chronic pain (Tse et al., 2013); health promotion theories (Raingruber, 2014); longitudinal prediction of sun protection over a-24 month period (Yusufov et al.,2016); community pharmacy personnel interventions for smoking cessation (To-A-Nan et al., 2016). For earlier studies applying TTM to nursing practice, see, for example, Conn et al. (2001), and Bond (2005).

Notwithstanding the criticisms of the TTM as documented in Armitage (2009) and Nigg et al., (2011), the consensus among all the studies is that TTM is a valuable theory that guides clinicians in their efforts to provide effective clinical interventions aimed at changing/promoting positive health behaviors among individuals in a variety of clinical settings, including nursing and specifically in the area of smoking cessation interventions.

Tenets of Transtheoretical Model

Transtheoretical model (TTM) has several cardinal tenets as a guide to clinicians in their quest to change individuals' health behaviors. Primarily, TTM theorizes that positive health behavior change involves five stages of change. These are (1) precontemplation, (2) contemplation, (3) preparation, (4) action, and (5) maintenance (Prochaska and DiClemente, 2005). Navigating these stages can suggest progress or relapse. These stages are diagrammatically illustrated in Figures 1(a) and 1(b) provided in the appendix below.

Also, TTM relies on ten processes of change which in combination with decisional balance, self-efficacy, and temptations can produce and reinforce the needed progress on the continuum of healthy behavioral change. The interactions of these elements help researchers to gain understanding surrounding the complexity of change as well as the reason many individuals do not change even if it is in their best interest to do so (DiClemente, 2005). This understanding then helps clinicians to offer assistance, treatments and necessary clinical interventions.

Application of Transtheoretical Model to DNP project

The DNP project focused on using the leadership skills required of a DNP-prepared nurse to develop initiatives to improve compliance with temporary preoperative smoking cessation among surgical patients. After critically considering the literature, the DNP student relied on the Transtheoretical Model as a guide and map of the project. Using the tenants of TTM and relying on its applicability to clinical practice, the DNP student was able to impact clinical practice through improved compliance of temporary preoperative smoking cessation instructions given to scheduled surgical patients. TTM as well as empowerment of patients were used to lay out integrative behavioral processes that can interact with stages of change to achieve the desired health behavior change. More so that Armitage (2009) notes that TTM is "arguably the dominant model of health behavior change."

Description of Project Design

The focus of this Quality Improvement (QI) project was to increase the number of surgical patients that complied with the 24-48 hours preoperative smoking cessation instructions. The implementation of the QI interventions proposed possible modifications to the hospital's organizational protocol as it relates to giving preoperative instructions to patients scheduled for surgical procedures. This project developed evidence-based strategies to increase preoperative

smoking cessation compliance. It required initiating a protocol at the organizational level on how preoperative smoking cessation was communicated to the patient population.

The project design for the protocol implementation of the QI interventions included:

1. Analyzing patients' charts to assess compliance.
2. Reviewed 57 patients' chart that included information on the smoking status of the patients.
3. Used convenience sample size with the pre- and post-intervention data obtained from the patients' chart review, then analyzed the charts primarily by descriptive statistics.
4. Developed educational materials such as pamphlets that contained concise, but impactful, information on the benefits derivable from compliance and the associated anesthesia risks for noncompliance.
5. Initiated organizational protocol on the dissemination and communication of the educational/awareness materials. The initiatives included the following:
    a) Beginning in the doctor's offices, where the surgery was originally scheduled; the newly developed educational materials was given to scheduled patients as part of several other preoperative instructions that provided to the surgical patients.
    b) Upon receiving patients charts and information from the doctor's offices, the preoperative staff at the hospital contacted the scheduled surgical patients that are smokers, by telephone and text messages, one week to the scheduled surgery, to (1) confirm that they received the educational materials, (2) answered specific questions they may have regarding the materials, (3) reminded them of the need (not optional) to comply with the temporary smoking cessation, and (4) alerted them of the possibility of surgery-cancelation for failure to comply.

c) 72 hours before the scheduled surgery, the preoperative staff contacted the population of patients using the media itemized above to essentially reinforce items 2 through 4 in (b) above.

Multimedia platforms was used to reinforce the preoperative smoking cessation instruction. Evaluation of the interventions was done by reviewing preoperative and postoperative assessments in the patient's chart of the target population. The patient chart review was conducted at two time periods: at the initial visit when the surgery was scheduled and at the preoperative stage when the patient arrived for surgery. The purpose of the patients' post chart review was to see if the implemented interventions were effective, that is, how many of the patients voluntarily provided the information that they cease smoking after been exposed to this QI proposed interventions within the planned implementation protocol at the hospital level. Descriptive analysis procedures was used to provide necessary analysis of the data obtained. The findings can be used as added evidence for management to ensure the continuity of the proposed quality improvement interventions.

Sampling Method

The sampling method selected for this DNP project was convenience sampling. The QI project included a convenience sample of patients who were identified as smokers and were scheduled for a surgical procedure at the practice site. Pamphlets and other educational materials were given to the patients at the doctors' offices during the scheduling process. The medical charting process, within the electronic medical record (EMR) platform, at the hospital included a section that evaluates the patient history of smoking habits. As a result, the sample met the sampling criteria from the population of scheduled surgical patients who are smokers. Two main criteria was followed in selecting the sample unit:

- The subject was of the legal smoking age in the State of Texas, which currently is 18 years of age.
- The subject was provided with the preoperative instructions according to this QI proposed interventions to cease smoking before the scheduled surgery date temporarily.

According to Pallant (2013), sample sizes of 30+ are adequate. The audit of this QI intervention reviewed a total of 57 charts that was reviewed pre- and post-intervention.

Data Collection

Consistent with the objective of this QI project, a medical chart audit was conducted to collect the data. The data collection covered the target population using the criteria specified above. For the purpose of maintaining patient confidentiality, only smoking-related data, using no patient identifiers as contained in his/her medical record was accessed. The following specific steps was undertaken during the data collection process:

1. Permission was obtained from the Chief of Medical Record and Review Service of the hospital to conduct the patient chart audit using the surgical unit's electronic medical record system.
2. A simple chart audit tool was developed to record the smoking status, as volunteered by the patient at the scheduled stage in doctor's offices, prior to scheduled surgery.
3. The population of scheduled surgical patients who were smokers was identified from step two above.
4. Randomly selecting a minimum of 30 patients identified as smokers from step three above.
5. Recording the patients from step four above using individual patient specific code. This code will be unrelated to the patients' identifiers as contained in the patient's medical

record. The purpose of the code is to be able to follow the same sample of patients for the post-intervention chart review.

6. Conducting a post-chart review of the sample selected in step four above.

The data collection process will center on both the pre- and post-intervention EMR chart audits that will be executed manually. Since the patients' chart audits will be conducted manually, it will be repeated three times to guarantee accuracy. Completion of the DNP project interventions will be conducted during a 5 week period.

Population of Interest and Stakeholders

Population of Interest

The population of interest for this project included two group of healthcare providers. These healthcare providers were the preoperative team at the practice site and the medical staffs at the two orthopedic surgeons' offices. Both group were responsible for providing preoperative instructions to the population of patients who are smokers and scheduled for a surgical procedure. Recruitment for participation involved asking for volunteers within the two groups to attend the educational session. A total of 14 preoperative nurses at the practice site and five medical staffs at the doctors' offices attended the educational session. All participants were actively involved in completing educational sessions and their perceptions for effectiveness was verbally reviewed.

Even though the patients were not considered a population of interest in this DNP project, the chart audit was implemented at the practice site and it included adult patients age 18 and over, who were identified as smokers. Exclusion criteria included patients who were non-smokers.

Stakeholders

As argued by Meyer and O'Brien-Pallas (2010), interventions that are expected to bring change must be "integrated across subsystem, role and hierarchical boundaries to ensure stakeholder buy-in and to monitor performance." This brings the stakeholder theory in management into nursing practice. Therefore, recognizing the audience which goes beyond the patients, is an essential task. Lafreniere et al. (2013) contend that stakeholder perspective, promotes relationships within the hierarchical structures of an organization.

The stakeholders for this QI project included:

- The director of the surgical division.
- The hospital marketing and communications office.

The successful implementation and continuation of this QI project intervention, depended upon securing key stakeholders support especially in the area of cancellation of surgery among surgical patients that do not comply with the preoperative temporary smoking cessation.

Intervention/Project Timeline

The following table outlines the process objectives, responsible party, participants and the date of completion for the QI project implementation after IRB approval has been obtained and informal consent has been obtained from the practice site.

Major Process Objectives	Responsible Party	Process Participants	Date of Completion
Development of provider educational training PowerPoint presentation on the temporary preoperative smoking cessation	Project Leader	Project Leader	7/15/2017
PowerPoint presentation to preoperative nurses	Project Leader	Preoperative nurses	7/26/2017

on temporary smoking cessation before surgery			
PowerPoint presentation to medical staffs at the first orthopedic surgeon's office on temporary smoking cessation before surgery	Project Leader	Doctor's office medical staffs	7/27/2017
PowerPoint presentation to medical staffs at the second orthopedic surgeon's office on temporary smoking cessation before surgery	Project Leader	Doctor's office medical staffs	7/28/2017
Obtain data through EMR chart audits for patient smoking status assessment and smoking cessation counseling post-intervention	Project Leader	Project Leader	8/10/2017
Schedule follow up meeting to discuss findings and assess feedback regarding practice improvement project	Project Leader	Director of surgical service Stakeholders Preoperative nurses Doctor's office medical staffs	

Ethics and Human Subjects Protection

The following project was a quality improvement plan. Sarkar and Seshadri (2014) note that informed consent is not required for a quality improvement project. This QI project's design directly involve collecting "routine clinical information" from the patients' charts without including any patient identifiers while adhering to patient confidentiality.

This project was conducted at a surgical unit of a community hospital in Southern Texas. The participants of this project were the medical staff within the physician offices, and the perioperative staff providing preoperative instructions at the practice site. Privacy for participants was maintained, and no identifying criteria was collected. Even though individual patient data was collected for statistical analysis based on whether the patient is a smoker, the

patient was not a participant, but this data was part of the findings and outcome of the practice changes for this project. This information was anonymized, and no identifiable personal information was used. Data was collected only by the DNP student. There was minimal risk involved to the participants of this project. The project site did not require IRB approval for this project and written agreement to implement the project at the project site was obtained. Per IRB guidelines, the project met exempt status because the activity involved no more than a minimal risk to the participants as the participants were voluntarily participating in the DNP project. There was no compensation for participating in the DNP project.

Analysis and Interpretation of Results

Upon approval of the DNP proposal, the project leader used the educational materials developed to conduct the project at three sites: the surgery center site and two orthopedic doctor offices. The preoperative team then administered the interventions on the scheduled surgical patients that self-identified as smokers, after which the project leader conducted the chart reviews.

The statistical procedure involved the use of SPSS to analyze the data. Descriptive analysis were also used to demonstrate the results of the noncompliance rates after the implementation of the interventions by the preoperative nurses and the medical staffs at doctor's offices.

The presentation of the findings from the 57 chart reviews conducted by the DNP student included patients who were identified as smokers and were concurrently scheduled for a surgical procedure at the practice site. The hospital canceled 4 of the 57 patients' surgery for reasons unrelated to the violation of the preoperative smoking cessation instructions. There were only 53

patients' chart that were reviewed and usable for further statistical analysis. The next section presents the results of these exercises (see Table 1 for the description of the variables).

Table 1

Variable Description

Number	Variable	Description
1	PATIENTID	The unidentified number provided to individual surgical patient
2	PRE	Smoking status prior to QI intervention. It is equal to 1 for all sampled patients as per design.
3	POST	Smoking cessation at least 24-48 hours before scheduled surgery date: 0 = Patients who stopped smoking 1 = Patients who do not stop smoking
4	CANCELLED	Surgery cancellation for the category of patients who do not stop smoking after the intervention: 0 = Surgery not canceled 1 = Surgery canceled
5	GENDER	0 = Male 1 = Female
6	AGE	1 = 18-24 2 = 25-44 3 = 45-64 4 = 65 years or older

7	EDUCATION	Education status of sampled patients: 1 = No High School 2 = High School 3 = Two-Year College 4 = Baccalaureate 5 = Post-Baccalaureate

Distributional Characteristics

The project leader used a descriptive design to provide distributional characteristics of the data obtained from the chart review exercise. This analysis does not require a dependent or independent variables because the violation or departure from assumptions is not of primary concern. Therefore, Table 2 and Table 3 below present the distributional characteristics of the sample.

Frequency Distribution

As shown in Table 2 (frequency distribution) and as per the design of this QI project, all the sampled surgical patients self-identified as smokers and therefore, constitute 100% of the sample (Pre). However, nearly 25% (13 out of 53) of the sample (Post) admitted violating the preoperative smoking cessation instructions even after receiving the interventions developed by this QI project. On the other hand, approximately 75% (40 out of 53) of the sample followed the preoperative instruction after being exposed to the QI project interventions.

Still on Table 2, the variable ‘Cancelled’ provides another important information regarding one of the prescriptions of this QI project. Specifically, this QI recommends that the hospital cancels surgery for surgical patients who are smokers but refuse to abide by the temporary preoperative smoking cessation instructions. The hospital cancelled the surgeries of

only nearly 31% (4 out of 13) of those patients who were noncompliant with the temporary preoperative smoking cessation instructions. Nearly 70% (9 out of 13) of such surgeries continued even though the patients violated the temporary preoperative smoking cessation instructions.

The interpretation of the results presented in Table 2 especially as it relates to the three primary variables of interests (pre, post, and cancelled) is that there was a substantial reduction in the noncompliance rates relating to the temporary preoperative smoking cessation instructions. In other words, more scheduled surgical patients followed the temporary preoperative smoking cessation instructions given to them. Prior to the implementation of this QI project, it was estimated based on information gathered that more than 60% of the patients who are smokers and scheduled for surgery did not quit smoking before their procedures and the hospital did not cancel any surgical procedures based on noncompliance. However, following the implementation of this QI interventions, the results showed an increase in the compliance rate of patients who adhered to the temporary preoperative smoking cessation instructions. The results also demonstrated increased adherence to the policy by the hospital staff to cancel of some surgeries based on noncompliance (4 out of 13; 30.77%).

Table 2 also contains demographic information of the sample. For example, 43.40% (23 out of 53) of the patients are female, 56.60% (30 out of 53) are male. Also, approximately 23% (12 out of 53) are in the age group of 18 – 24 year old; 32.08% (17 out of 53) in the 25 – 44-year-old; 30.19% (16 out of 53) in the 45 – 64 years old; and just a little above 15% (8 out of 53) are 65 years or older. In other words, most of the patients are in the 25 – 44 years age bracket with the least being in the 65 years or older age bracket.

Finally, the education attainment level of the sampled surgical patients ranges from No High School (18.87%); High School (43.40%); Two-Year College (28.30%); Baccalaureate (5.66%); to Post-Baccalaureate (3.77%). Most of the patients in the sample obtained High School diploma with the least having Post-Baccalaureate education.

Table 2

Frequency Distribution

Variable	Level	Frequency	Percentage
PRE	1	53	100%
	0	Not Applicable	Not Applicable
POST	1	13	24.53%
	0	40	75.47%
CANCELLED	1	4	30.77%
	0	9	69.23%
GENDER	1	23	43.40%
	0	30	56.60%
AGE	1	12	22.64%
	2	17	32.08%
	3	16	30.19%
	4	8	15.09%
EDUCATION	1	10	18.87%
	2	23	43.40%
	3	15	28.30%
	4	3	5.66%

5	2	3.77%

Descriptive Statistics

Table 3 contains the descriptive statistics of the sample. Of the 53 usable observations, the mean (median) of the patients who received the QI interventions and either comply or fail to comply with the preoperative instructions (POST) was 0.25 (0). Similarly, the mean (median) of the patients whose surgery proceeded or canceled even though they refused to follow the temporary smoking cessation instructions was 0.31 (0) with 13 total observations. The median of the sample gender was male (0), with a median age of 42 years old and the median education level of High School Diploma. In other words, the information as provided in Table 3 corroborates those contained in Table 2. Figure 1 also shows a pictorial representation of the data.

Table 3

Descriptive Statistics

Variable	Mean	Median	Minimum	Maximum	*SD*	*n*
PRE	1	1	1	1	0	53
POST	0.25	0	0	1	0.43	53
CANCELLED	0.31	0	0	1	0.48	13
GENDER	0.43	0	0	1	0.50	53
AGE	43.34	42	18	89	19.66	53
EDUCATION	2.32	2	1	5	0.98	53

Notes. SD=Standard Deviation. *n*=number of participants.

Discussion and Significance

The focus of this DNP project was to implement a temporary preoperative smoking cessation program that empowers surgical patients through reinforcement of education and effective awareness programs given to them by the preoperative team and the medical staffs at the doctor's office. The overall goal of the DNP project was to change the approach adopted when providing preoperative instructions to scheduled surgical patients especially as it relates to temporary smoking cessation 24-48 hours before surgery.

Identifying current smokers who are scheduled for surgical procedures is the first step to utilizing effective interventions to increase patient's compliance with the temporary preoperative smoking cessation instruction. In addition, providing information and education materials aimed at increasing the patients' awareness on the benefits of temporary smoking cessation increases the likelihood of preoperative smoking compliance. Education was initially introduced at the doctors' office at the point of scheduling and reinforced with a follow- up scheduled telephone-based conversations by preoperative nurses.

In this DNP Project, 75% (40 out of 53) of the patients followed the preoperative instruction after being exposed to the QI interventions. The findings in this DNP project program reflect the connection between program process and patient outcomes, suggesting benefits that can be derived.

The DNP project has significant implications for nursing as it relates to the quality of care provided to surgical patients who are smokers. These evidence-based QI interventions can reduce anesthesia-induced post-operative complications thereby reducing recovery days, and shortened hospital stays thus reducing care costs and increasing the likelihood of achieving positive patient outcomes and improved patient satisfaction.

Limitation of Findings

Project Design

Limitation of this project design was directly related to the evaluation of the educational materials presented to the medical staffs and preoperative nurses. There was no pre-intervention and post-intervention assessment to evaluate their knowledge and understanding of the presented materials. Consequently, the recommendation for remediation of the limitation in future work is to develop a pre-test and post-test and provide an assessment of outcomes relative to the success or failure of the project implementation.

Data Recruitment

There were few limitations encountered during the implementation phase of this DNP project. The project leader was only able to present the preoperative smoking cessation educational materials to the medical staff at two orthopedic surgeon's offices due to time constraints. Data from this DNP project intervention suggest that interventions for preoperative smoking cessation were more successful when initiated at the doctor's office during the surgery scheduling phase. Hence, there are many potential opportunities for continuation of this project, such as participation of all surgical clinics. Immediate implications include the expansion of the project from only two orthopedic doctors' offices. Subsequently, the recommendation for future work would include an accumulation of a larger group involving a variety of surgical patients who are smokers with diverse scheduled surgical procedures to provide a more in-depth analysis of the impact on compliance rate.

Collection Methods

The primary method of data collection for the research study involved the patient's chart review by the DNP project leader. Although, there was no significant limitation noted as it

relates to the collection method in this DNP project except the cost of time by the project leader. The time allotted for each chart review was about 15 minutes. Due to time constraints only a few number of charts could be reviewed.

Data Analysis

There was no major limitation related to analyzing the data collected for this DNP project. The statistical procedure predominantly involved the use of SPSS to analyze the data. In the future, the project leader should consider the use of graphs in presenting data results to management and other stakeholders as this will provide a visual representation of the results.

Dissemination of Findings & Sustainability

Dissemination

The following project was a quality improvement project. A report of the findings of this DNP project was submitted to the director of surgical service at the practice site. The outcomes of the project were also presented within the clinical context to participants and stakeholders. Findings generated by completing this DNP project will be disseminated through a power point presentation to Touro University Nevada students and faculty via the online platform "Zoom." The DNP student plans on taking the information gathered in this project to improve research and practice by presenting the findings at a professional conference.

Sustainability

Sustainment is an essential aspect to quality improvement interventions. To sustain this intervention, further recommendations following the implementation of the project by the project leader were provided to the surgical director to include training in regards to temporary preoperative smoking cessation to new hires. Also, this DNP project can be thought of as a pilot study. According to Thabane et al. (2010), pilot studies assist in illuminating issues with

processes, resources, management, and science. Therefore, suggestions for sustainability included integration of temporary preoperative smoking cessation into routine preoperative instructions during patient visits to the doctor's office.

Further, this quality improvement project could be used to model additional health threat related to health behaviors. Considering that quality improvement projects are associated with research already completed, such an undertaking would require a separate and unique review of the literature as well as synthesis of the literature to ensure that interventions are evidenced based and specific to the issue.

Conclusion

Smoking is a significant problem in populations of people who are scheduled for surgical procedures. The intention of this process improvement project was to provide the preoperative team and the medical staffs at the doctor's office with a tool that can be adopted when providing preoperative instructions to scheduled surgical patients especially as it relates to temporary smoking cessation 24-48 hours before surgery. Subsequently, this DNP project reflected the importance of effective evidenced based intervention to address the complexity of temporary preoperative smoking cessation among scheduled surgical patients. The potential impact of this process improvement project originally included the implementation a temporary preoperative smoking cessation program that can empower surgical patients through reinforcement of impactful education and effective awareness programs.

Ultimately, it can be concluded that this a low cost, time efficient, evidenced based intervention to address of temporary preoperative smoking cessation among scheduled surgical patients was effective in terms of reducing anesthesia-induced post-operative complications thereby reducing recovery days, and shortened hospital stays thus reducing care costs and

increasing the likelihood of achieving positive patient outcomes and improved patient satisfaction.

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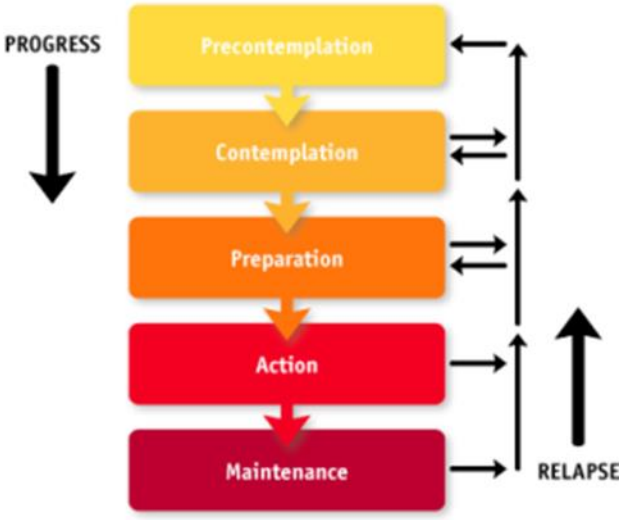
Appendix A

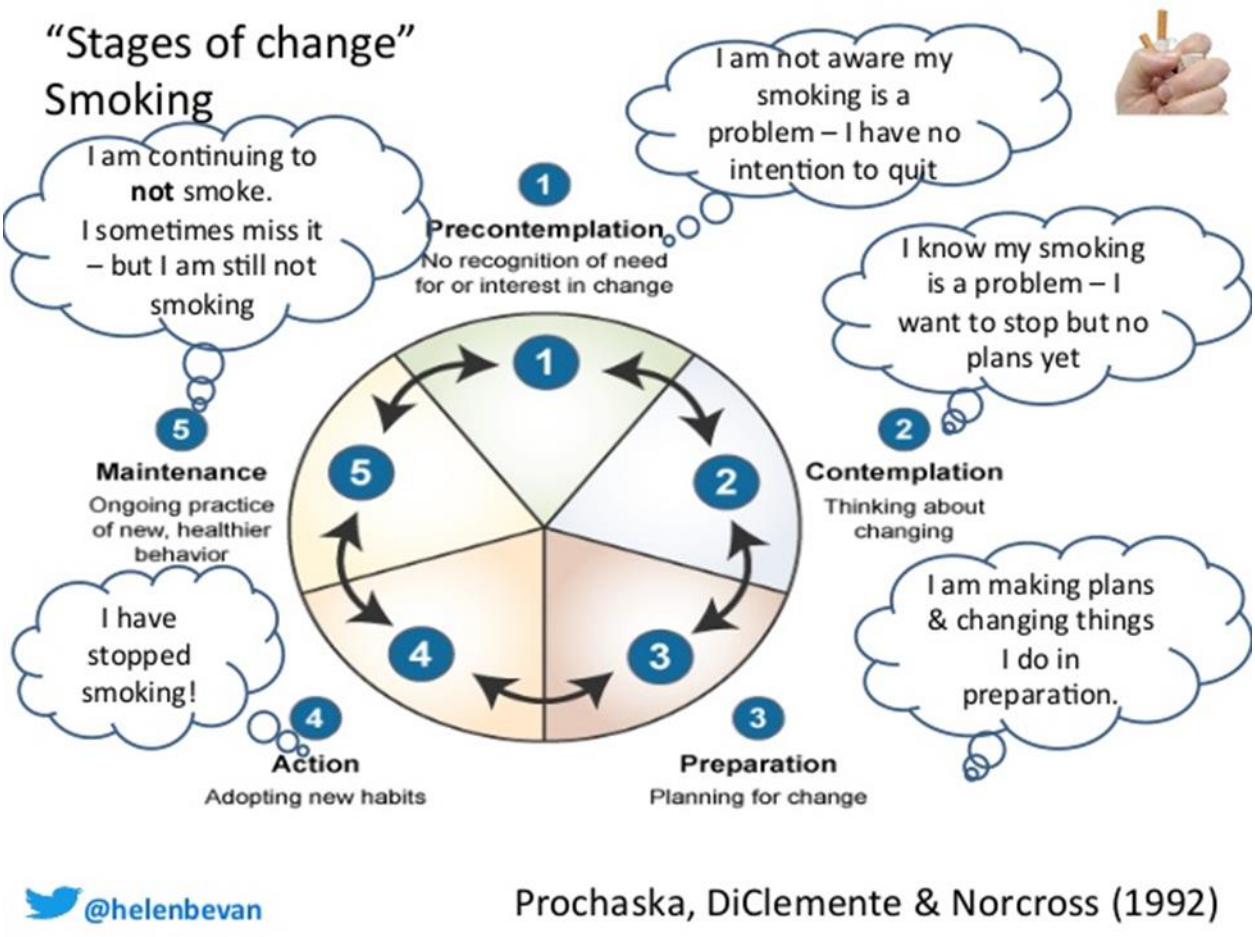
Figure 1(a): Five Stages of Transtheoretical Model



Source: Discovering Public Health (2012).

Appendix B

Figure 1(b): Synopsis of the Five Stages of TTM



Source: Prochaska, DiClemente and Norcross (1992)

Appendix C

Chart Audit Checklist Tool

Audit: □ Pre-Intervention □ Post-Intervention Auditor: _____

Chart Number: _____

Date of Audit: _____

Demographic Data: Gender: □ Male □ Female Age: _____

Type of Surgery	Emergency	Scheduled/Elective
	□ Yes □ No □ Unknown	□ Yes □ No □ Unknown
Pre-intervention Smoking/Tobacco Use	□ Yes □ No □ Unknown	□ Yes □ No □ Unknown
Post-intervention Smoking/Tobacco Use	□ Yes □ No □ Unknown	□ Yes □ No □ Unknown
Comments		