An Evaluation of the Systematic Identification and Treatment of Tobacco Use Among Patients in an Academic Medical Center

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Abstract

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Background: The Joint Commission recently developed core measures for screening and treatment of tobacco use, as hospitalization provides a good opportunity for helping patients to quit smoking. This study was undertaken to evaluate a new program that systematically identifies and offers treatment to all inpatient tobacco users at University of Washington Medical Center (UWMC) and Harborview Medical Center (HMC) in Seattle. The program was implemented in conjunction with a new tobacco-free hospital campus policy and included modifications of electronic medical record-based processes for intake screening, physician orders, nursing protocols, and a pharmacist-delivered brief intervention.

Methods: Hospital records for all patients 18 years and older, admitted May 31 to December 31, 2011 were reviewed (n=22,306) to determine rates of screening for tobacco use and acceptance of nicotine replacement therapy (NRT) and counseling. Chi-square statistics were used to

describe relationships between demographic variables (gender, age, race/ethnicity, insurance type, and primary admission diagnosis) and screening and acceptance rates.

Results: Approximately 20% of all admitted patients screened positive for current smoking (past 30 days). Screening rate for tobacco use after policy implementation was high (79%) as was the rate for offering NRT (76.6%) and counseling (69.5%). However, less than half of tobacco-using patients (45.3%) accepted the offer of NRT and only a quarter (24.2%) accepted cessation counseling.

Conclusion: While rates of screening and offering tobacco treatment (NRT and counseling) are quite high in this inpatient setting, relatively few patients take advantage of assistance for quitting tobacco. Further evaluation is needed to assess factors associated with uptake of treatment in order to increase delivery of effective tobacco cessation interventions in this setting.

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CHAPTER I

INTRODUCTION

Background

Smoking cigarettes is the leading cause of preventable death in the United States (Center for Disease Control [CDC], 2011). Despite decades of health warnings and numerous public health interventions, tobacco use continues to be an epidemic leading to the premature deaths of an estimated 443,000 people each year (CDC, 2011). Of these deaths, 38% are due to lung and other cancer, 28% to ischemic heart disease, and 21% to chronic obstructive pulmonary disease (CDC, 2011). Smoking causes serious illness in an additional 8.6 million people (CDC, 2011). The risk of developing heart disease is two to four times higher among smokers compared to nonsmokers (Maa, Warner, & Schroeder, 2009). Of those who smoke, 70% report that they would like to quit but only 2-3% succeed each year (CDC, 2011). The prevalence of illness among those who smoke is higher than those who do not, thus creating a need for medical care that is often given in hospitals.

Washington State has had great success in reducing the prevalence of tobacco use over the past ten years. This can be attributed, in large part, to the implementation of Washington State Department of Health's comprehensive Tobacco Prevention and Control Program from 2000-2009, in conjunction with passage of a state law banning smoking in public places in 2005, and a rise in the price of cigarettes due to tobacco excise tax increases (Dilley, Harris, Boysun, & Reid, 2012). These interventions were associated with a decline in smoking that exceeded the national average and resulted in prevention of an estimated 36,000 hospitalizations and a savings of approximately $1.5 billion in health care costs (Dilley et al., 2012). Unfortunately, while the

TPCP resulted in a remarkable reduction in smoking rates, related adverse health effects, and financial costs, the program recently lost almost all of its funding (Dilley et al., 2012).

According to the Washington State Behavioral Risk Factor Surveillance System (BRFSS) data, the overall smoking prevalence in Washington State decreased from 22.4% in 2000 (ranking 26th nationally) to 14.9% in 2010, the third lowest in the US at that time. However, this laudably low rate masks significant disparities within the state, related to level of education, household income, and race/ethnicity. Among those who have received a high school degree or less, 26% are current smokers while college graduates smoke at a rate of 6%. Among those who make less than $25,000 per year, 29% smoke, while 10% of individuals who make more than $50,000 a year do so. Among Native Americans and Alaskan Natives, 33% of adults smoke. The group with the next highest smoking rate is African Americans at 20% followed by Whites at 15%, Hispanics at 11%, and Asians and Pacific Islanders at 9%. Such disparities must be taken into account when planning and implementing tobacco cessation interventions, in order to reduce tobacco use and related morbidity and mortality among vulnerable groups.

The 2010 Washington State BRFSS reports that only 62% of adults who smoke were advised to quit by their healthcare provider during a visit within the last year. The Department of Health and Human Services (DHHS) recommends that tobacco use should be addressed with all patients who smoke at every visit (DHHS, 2010). Due to statewide budget cuts, funding for the Washington State Tobacco Prevention and Control Program, which included the Washington State Tobacco Quitline, a key referral resource for healthcare providers, has been eliminated for all but a small group of smokers. At the time of writing this paper (March, 2012), the Quitline, which historically provided free cessation services for all Washington State residents, regardless of their insurance coverage, has had their services severely cut. Despite the phenomenal success

of the Quitline (Dilley et al., 2012), current treatment for tobacco use and dependence is now only covered through health plans of approximately 45 statewide employers and a limited number of Medicaid plans, with no covered services available for those who are uninsured or whose health plans do not cover tobacco cessation treatment. These cuts will likely have the biggest impact on those with lower socioeconomic status, which will further increase smoking related health disparities.

Hospitals can play a key role in motivating and supporting patients in their efforts to quit using tobacco, as hospitalization provides a unique opportunity for patients who smoke to obtain appropriate treatment for tobacco dependence. The hospital environment focuses on patient health and often requires abstinence, creating an ideal time for healthcare providers to intervene and assist in tobacco cessation. Furthermore, hospital related events, such as a diagnosis of cancer (Gritz et al., 2006) and treatment for coronary artery disease (Reid, Pipe, & Quinlan, 2006) increase motivation for and interest in smoking cessation. This window of opportunity is often referred to as a 'teachable moment' when intervention from healthcare providers can be particularly effective (Gritz et al., 2006). Smoking is especially detrimental to hospitalized patients, whose illnesses are often caused or exacerbated by smoking or other tobacco use. Smoking increases risk for cardiac and respiratory perioperative risks, such as thromboembolism and failure to wean from mechanical ventilation (Warner, 2007) as well as myocardial infarction, pneumonia, surgical site infection, and other wound healing complication (Myers, Hajek, Hinds, & McRobbie, 2011). Patients with a history of smoking who undergo surgery have longer hospital stays, higher risk of readmission, higher likelihood of being admitted to intensive care, and higher in-hospital mortality (Myers et al., 2011). Patients with coronary artery disease who

quit smoking reduce their risk for nonfatal reinfarction by a third and experience a 300% reduced risk for repeat coronary artery bypass graft (Smith & Burgess, 2009).

This research project examines outcomes of an inpatient tobacco treatment program at two hospitals: University of Washington Medical Center (UWMC) and Harborview Medical Center (HMC). Located in Seattle's university district, UWMC has 450 licensed beds and provides highly specialized care in areas including cardiology, high-risk obstetrics, oncology, and orthopedics (UWMC, 2009). It had an inpatient volume of 19,322 in 2009 (UWMC, 2009). Harborview Medical Center, a county hospital and regional Level 1 Trauma Center in downtown Seattle, has 413 licensed beds and reported 19,401 inpatient discharges, of which 30% received trauma service and 32% were mentally ill (HMC, 2009). Additionally, HMC provided $187 million in charity care during the 2010 fiscal year (HMC, 2009).

As a first step in addressing tobacco use, and in order to improve the health and safety of their patients, staff, and visitors, both UWMC and HMC implemented a comprehensive smoke- and tobacco-free campus policy on May 31, 2011. All designated smoking areas at UWMC and HMC were closed, which prohibited patients, staff, and visitors from smoking anywhere on the two hospital campuses, heightening the impetus for developing inpatient tobacco cessation resources. This new policy thus included a more rigorous tobacco use assessment and treatment protocol than existed before, and served to both support the smoke-free campus environment and help patients quit or remain tobacco free while in the hospital. Before implementation of the policy, patients were permitted to smoke at a designated smoking areas on the campus, adjacent to the hospital.

The main objective of the screening and treatment protocol was to ensure that all admitted patient tobacco users were identified and offered treatment. This is consistent with a

new, optional core measure enacted by the Joint Commission in January, 2012, expanding on previous measures that focused on a limited patient population (Fiore, Goplerud, & Schroeder, 2012). The new protocol included a four question tobacco use assessment done by a registered nurse at the time of admission (see Figure 1), rather than a single question that had been used before, along with offering patients nicotine replacement therapy (NRT) to manage withdrawal symptoms, and more information about how to quit smoking (cessation counseling). When the offer for NRT and/or counseling was accepted, the patient was referred to the pharmacist. A nurse would complete an NRT Order Form (see Appendix A) and fax it directly to the pharmacy. The pharmacist would then fill the NRT order and provide bedside counseling if accepted by the patient.

Evaluation Questions

The following evaluation questions regarding the identification and treatment of tobacco use among hospitalized patients will be answered through analysis of data collected from hospital records.

Question 1: What percentage of inpatients was screened for tobacco use before the policy was implemented and after the policy was implemented?

Rationale: To determine whether the change in policy affected the rates of screening.

Question 2: What percentage of admitted patients screened for tobacco use are current tobacco users or have recently quit?

Rationale: To determine what proportion of the patient population could benefit from cessation resources.

Question 3: Of current tobacco users and those who have recently quit, how many are offered NRT and/or cessation counseling?

Rationale: To determine if admitting nurses are offering resources appropriately.

Question 4: Of patients who were offered treatment, how many accepted the offer of NRT and/or cessation counseling?

Rationale: To determine the uptake of NRT and counseling as an indicator of demand for cessation resources by patients and encouragement from the RN to use this resource.

Question 5: Are there any relationships between patients receiving screening and (a) admission diagnosis (b) gender (c) age (d) race/ethnicity and (e) insurance type.

Rationale: To determine if there are factors that predict the likelihood of a patient being screened for tobacco use.

Question 6: Are there any relationships between patients accepting nicotine replacement therapy or cessation counseling and (a) admitting diagnosis (b) gender (c) age (d) race/ethnicity (e) insurance type.

Rationale: To determine predictors of acceptance of tobacco cessation resources.

Literature Review

Tobacco use and addiction. The 2010 Surgeon General's Report (DHHS, 2010) concludes that tobacco smoke can damage nearly every organ of the body with adverse health outcomes including cancer, cardiovascular and pulmonary diseases, and reproductive and developmental abnormalities. Smoking is estimated to be responsible for at least 30% of all cancer deaths, nearly 20% of cardiovascular disease deaths and nearly 80% of chronic obstructive pulmonary disease (COPD) deaths (CDC, 2008; Eyre, Kahn, & Roberston, 2004).

Cigarette smoke contains 4,800 identified chemicals, of which at least 250 cause cancers or are toxic in other ways. Sixty-one chemicals in tobacco smoke are known to cause cancer. Lung cancer, primarily caused by cigarette smoke, remains the most common type of cancer

related to tobacco use and is the leading cause of cancer death for both men and women. The chemicals in tobacco smoke, including carbon monoxide, also contribute to processes leading to cardiovascular disease. The risk for disease is the same for light and ultra-light cigarette smokers, despite long-held beliefs by smokers, deceived by tobacco industry marketing, that they would be exposed to lower concentrations of these toxic elements. Tobacco smoke also has dangerous effects on those involuntarily exposed to it in the environment. Secondhand smoke is especially damaging to children, leading to respiratory illnesses, other infectious diseases and sudden infant death syndrome. The need for action against the tobacco epidemic is clear and urgent (Giovino, 2007).

Those attempting to quit smoking battle a triad of addiction: physical symptoms of withdrawal, psychological dependency, and learned behavior patters. The physiological difficulty is related to the addictive nature of nicotine when absorbed through the lungs or oral mucosa. All tobacco products contain nicotine, which produces addiction in a process similar to many illicit drugs (Giovino, 2007). When smoke from a cigarette is inhaled, the nicotine is distilled from the tobacco, carried to the lungs, absorbed into the circulation and carried to the brain, all in under a minute (Benowitz, 2008). By acting on receptors in the central nervous system, nicotine releases neurotransmitters and produces reinforcing effects by activating the mesocorticolimbic dopamine system (Zbikowski, Swan, & McClure, 2004). Chronic exposure results in neuroadaptation so that when a person stops smoking, the absence of nicotine results in a subnormal release of dopamine and other transmitters. Nicotine withdrawal is generally classified by symptoms including irritability, restlessness, anxiety, difficulty concentrating, increased hunger, and craving for tobacco (Benowitz, 2008). Eating a meal, drinking a cup of coffee, driving a car, and other environmental cues related to common behaviors associated with

smoking, can also trigger strong desire for a cigarette. Thus when an individual attempts to quit smoking, he or she must combat addiction at different levels, fighting the desire for the pharmacological action, relief from uncomfortable withdrawal symptoms, and learned associations (Benowitz, 2008). Interventions are most effective when tailored to meet the biological and psychological needs of an individual battling nicotine addiction.

Chronic Care Model and tobacco use treatment. The Chronic Care Model (CCM), was developed as an alternative for the health system currently prevalent in the United States which is reactive, poorly coordinated, and oriented towards acute care (Wagner, 1998). Given the prevalence of chronic diseases, Wagner advocates the need for a change in the current system, requiring a different approach to health care. Components of the CCM include developing health information systems to allow effective management of chronic conditions, focusing on prevention and proactive care, and incentivizing coordination of care.

The CCM can be applied to smoking cessation. As an example, Glasgow, Orleans, Wagner, Curry & Solberg (2001) described efforts at Group Health Cooperative to promote tobacco cessation within the context of the CCM. These included collecting and documenting tobacco use status at every clinical visit, training clinicians to deliver brief tobacco cessation interventions, referral to cessation-specialist staffing support, telephone counseling, and measures such as elimination of co-pays for tobacco cessation services. The principles of the CCM can be extended to improve quality of care in hospitals including the integration of tobacco cessation interventions for hospitalized patients.

Tobacco cessation interventions. Decades of research have evaluated the most effective forms of interventions to help individuals successfully quit smoking. Combining pharmacological treatment and counseling increases the odds of a smoker successfully quitting

(Schroeder, 2005). Approved pharmacological treatment includes several types of nicotine replacement therapy (NRT) (some available over the counter and others by prescription only) and two prescription psychotropic medications. These pharmacological interventions are considered first-line medications by the Clinical Practice Guideline for Treating Tobacco Use and Dependence (DHHS, 2008) and have been approved by the FDA for smoking cessation (except in the presence of contraindications).

Nicotine replacement therapy is available in several forms, each with unique advantages and disadvantages. Nicotine patches deliver consistent levels of nicotine and are easily concealed. However, disadvantages include the inability to titrate doses and some minor side effects including insomnia and skin irritation. Nicotine gum may satisfy oral cravings but must be used properly to be effective. Nicotine lozenges are easily titrated but heavy users may experience hiccups, nausea, and dyspepsia. Nasal spray is rapidly absorbed, allowing titration to attain desired nicotine levels, which is most similar to the act of smoking. However, it can also cause high rates of nasal and throat irritation. Nicotine inhalers closely mimic the act of smoking but can also cause irritation, especially in individuals with bronchospastic disease (Schroeder, 2005).

Prescription psychotropic medication should also be considered. Bupropion is an atypical antidepressant, which is thought to decrease cravings for cigarettes and withdrawal symptoms by affecting levels of dopaminergic neurotransmitters. This medication can be taken in combination with NRT. It is recommended that this medication be started at least 1 week before cessation with 150-300 mg taken per day for 2 to 3 months after cessation. Bupropion is contraindicated for those with seizure disorders and may cause insomnia and dry mouth in the general population (Schroeder, 2005).

Varenicline is a partial agonist of the same receptor that nicotine acts on as a full agonist. Varenicline also blocks the effects of any nicotine that the individual uses while on this medication, and thus, should not be used with NRT (Benowitz, 2008). It has been shown to be more effective than Bupropion (Benowitz, 2008) but research suggests there may be a slightly increased risk of depression and suicidal/self-injurious behavior among those quitting tobacco with this medication (Moore, Furberg, Glenmullen, Maltsberger, & Singh, 2011).

Combination pharmacological therapy has proven more effective than a single form, which often under-doses the individual's physical need for nicotine. It is recommended that most patients should be prescribed combination NRT that includes a patch and one of the fast-acting formulations (Schroeder, 2005). An additional study has shown a higher cessation rate for those who combined the nicotine patch and bupropion (35.5%) compared to using the patch alone (16.4%) or bupropion alone (30.3%) (Jorenby et al., 1999). Counseling can include behavioral or cognitive therapy. Behavioral therapy includes changing the smoker's routine to avoid stimuli that trigger smoking. Cognitive therapy includes learning techniques of distraction, positivism, relaxation, and mental imagery (Lincoln et al., 2009). Motivational interviewing, which elicits intrinsic motivation to change, has been shown to have some efficacy in tobacco cessation, particularly for those with low levels of dependence (Hettema & Hendricks, 2010). A meta-analysis indicates that combining medication and counseling is more effective in improving abstinence rates than either intervention alone (DHHS, 2008).

Hospital-based smoking cessation programs. The hospital setting provides a unique opportunity for smokers to begin a successful quit attempt. Faseru et al. (2011) found that smokers in a hospital setting who were assessed for interest in quitting reported an average of 7.9 on a scale of 0 to 10, with 10 being very interested in quitting. However, a meta-analysis done by

Freund et al. (2008) of smoking cessation care among US hospitals found that smoking status was assessed in only 60% of patients. Of this population, 14% were given or encouraged to use nicotine replacement therapy and 42% were advised or counseled to quit.

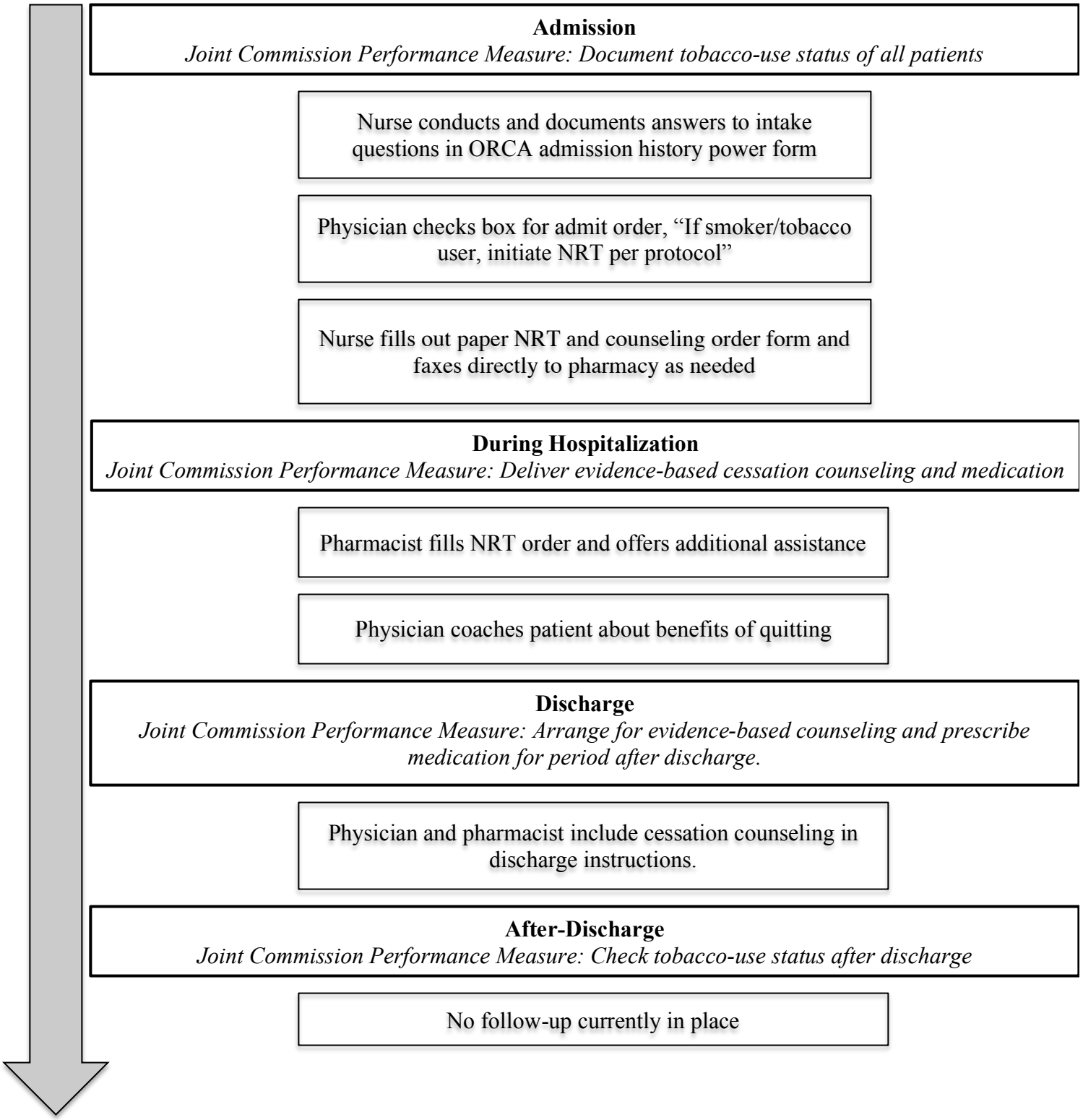
Practical counseling in the hospital setting may also yield success. Gadomski, Gavett, Krupa, Tallman, & Jenkins (2011) found that patients who were seen by a smoking cessation counselor while in the hospital were more likely to have quit smoking six months after discharge than those patients who did not see a smoking cessation counselor. A Cochrane Review (Rigotti, Munafo, & Stead, 2007) concluded that smoking cessation counseling interventions during hospitalization, including at least one month of post-discharge follow-up support, increased the odds of smoking cessation by 65% at 6-12 months after discharge. A recent randomized controlled study by Steinberg et al. (2011), measured the effect of Varenicline as an intervention to aid in tobacco cessation during hospitalization and after discharge. At 24 weeks post-discharge, there was no statistical difference in abstinence rates found between the Varenicline treatment group and the placebo group (23% vs. 31%). However, the study did indicate there was a possible benefit of face-to-face treatment following discharge. Of the 40% of hospitalized subjects who participated in face-to-face post-discharge treatment, the abstinence rate at 24 weeks showed a significant increase at 53% (Steinberg et al., 2011).

Researchers have examined the predictors of inpatient tobacco treatment to better understand the population of patients who are or are not screened and treated for tobacco use. An study done at the University of Kansas Medical Center (Faseru, Yeh, Ellerbeck, Befort, & Richter, 2009) found that those admitted for heart failure, myocardial infarction and pneumonia were the most likely to be referred to the hospital tobacco treatment program. This is not surprising as these are the only diagnoses for which tobacco intervention was mandated by the

Joint Commission until January of 2012. The second highest predictor was a history of smoking for more than 10 years. Those admitted electively were more likely to be referred than those admitted for emergency medical services. Longer length of stay was also a predictor for patients to receive tobacco cessation treatment.

Schultz, Finegan, Nykiforuk, & Kvern (2011) discuss barriers to implementing a tobacco-free hospital campus. Qualitative data from patients suggest that while they were consistently told they could not smoke, they were not consistently offered nicotine replacement therapy nor did they receive cessation counseling as part of their discharge process. Interviews with healthcare providers suggest that some did not feel knowledgeable enough to provide comprehensive information about managing withdrawal symptoms and had limited awareness of referral options within the community. Schroeder (2005) also found that time constraints, respect for patients' privacy, and lack of financial incentive were reasons physicians were reluctant to assist patients in tobacco cessation.

Figure 1. Model of Inpatient Tobacco Cessation Protocol Workflow



Chapter II

METHODS

Study Setting

The setting of this research project was a large academic medical center in the Pacific Northwest that included two hospitals: University of Washington Medical Center (UWMC) and Harborview Medical Center (HMC). Both hospitals implemented a comprehensive smoke- and tobacco-free campus policy on May 31, 2011, which included a new tobacco use assessment and treatment protocol for all patients admitted to the hospital.

Selection of study sample

Source. The data sources for this evaluation were the medical records of all adult inpatients admitted to HMC and UWMC between January 1, 2011 and December 31, 2011. Data from patient records were compiled electronically by a trained UW clinical analyst.

Sampling method/recruitment. As this was a secondary data analysis of medical records, there was no sampling done. Among the adult inpatients, all patient admit records were included.

Criteria for eligibility/exclusion of cases. The sample includes all adult inpatients 18 years and older admitted to UWMC and HMC between January 1, 2011 and December 31, 2011. Those admitted between January 1 and May 30, 2011 were classified as pre-policy patients and those admitted from May 31 to December 31, 2011 were classified as post-policy patients. Limited stay patients, i.e., those who spent less than 24 hours in the hospital were excluded from the sample.

Study Description

This study evaluates the initial fidelity with the new protocol and preliminary impacts of the systematic tobacco use screening and assessment protocol. The evaluation questions relate to

the main objective of the program, which is to increase delivery of tobacco cessation interventions to patients who are current tobacco users or have recently quit, and thus increase their rate of long-term abstinence from tobacco. This study also aims to identify demographic variables that predict the acceptance of tobacco cessation resources among adult inpatients. The implementation of the protocol supporting treatment of tobacco use will be analyzed through a process evaluation that will analyze post policy data, including offering treatment resources (by nurses), acceptance of treatment (by patients), and provision of treatment (by pharmacists) in the inpatient setting.

Only data necessary to the research project were requested. These data were compiled by a trained UW clinical analyst who removed patient identifiers, then reviewed by the systems information manager for the University of Washington Institute of Translational Health Sciences. Both the clinical analyst and the systems information manager were provided with a scanned copy of the Institutional Research Board (IRB) document, approving this evaluation. The de-identified data were then transferred to the researcher on Microsoft Excel spreadsheets.

Data collection

Source (record review). This research used data pulled from the online record of clinical activity (ORCA) charting system for adult inpatients admitted to UWMC and HMC and was limited to their time during hospitalization. The inclusive dates describing the period when the health care was provided are from January 1, 2011 to December 31, 2011.

Protocol for typical subject. Chart abstraction variables were compiled from patient records when eligibility criteria were met. Demographic variables included: facility, gender, age, race, insurance type, patient class (inpatient or limited stay), month of admission, length of stay, admission diagnosis as per ICD9 code, and unit at time of admission. Other variables included:

whether the patient was screened for tobacco use or not, whether a patient who screened positive had smoked more than 100 cigarettes in his/her lifetime, the last time the patient smoked or used tobacco, how often a current tobacco using patient uses tobacco products per day, whether the patient would like nicotine replacement therapy (NRT), whether the patient would like to learn more about quitting smoking, whether NRT was given to the patient, and whether the patient received tobacco/smoking cessation counseling.

Steps taken to assess and assure data quality. The UW Clinical Analyst was consulted twice after the initial transfer of data in order to clarify discrepancies and ensure data quality. For example, it was noted that several patients of the age 17 were included in the initial data spreadsheet. This error was easily corrected and the data were again complied and transferred to the researcher. Also, discharge counseling was originally separated into two columns. These were combined to more accurately represent the number of patients who received discharge counseling.

Analysis Plan

Hypothesis test/generation. Hypotheses regarding the predictors of inpatient acceptance were informed by a similar research study done at another academic medical center. Faseru (2009) found the strongest predictors of referral to an inpatient tobacco treatment program included core measure status, longer length of stay, and those admitted through the emergency department

Definition of key analysis variables. Patients classified as screened for tobacco were identified as one of the following:

Never smoker: Those who do not currently smoke and have smoked less than 100 cigarettes in their lifetime.

Current smoker: Those who have smoked at least 100 cigarettes in their lifetime and have smoked within the last 30 days.

Recently quit: Those who have smoked at least 100 cigarettes in their lifetime and have smoked within the last year but not within the last 30 days.

Former smoker: Those who have smoked at least 100 cigarettes in their lifetime but have not smoked in the last year.

Not collected: Those with a documented reason of why this information could not be collected.

Variables regarding tobacco cessation interventions included:

Offered NRT: Those who had a documented answer of "yes" or "no" to the question, "Would you like to use nicotine replacement therapy while you are in the hospital?"

Accepted NRT: Those who answered "yes" to the question, "Would you like to use nicotine replacement therapy while you are in the hospital?"

Offered counseling: Those who had a documented answer of "yes" or "no" to questions, "Would you like to learn more about how to quit smoking/tobacco?" (It should be noted that the word "counseling" does not appear in this question but this more concise term will be used throughout this paper when referring to this intervention.)

Accepted counseling: Those who answered "yes" to the question, "Would you like to learn more about how to quit smoking/tobacco?"

Sample size/power considerations. The large sample size in this study increases the power of the results to detect significant differences. This will decrease the chance of making a Type II error, i.e., the probability that the tests will fail to reject the null hypothesis when the null hypothesis is actually false.

Statistical methods. The data was analyzed using Microsoft Excel 2011 and the Stata/IC 11 statistical package. Using Excel, the initial analysis summarized demographic information about the study population and calculated the percentage of tobacco users screened as well as the offer or referral, and uptake of NRT and counseling. Next, using Stata, Chi-square tests were used to identify demographic predictors for patient screening rates, as well as acceptance of NRT and counseling. Factors with a *p* value equal or less than .05 level were considered statistically significant.

Institutional Review Board Approval

Approval for this study was obtained from the University of Washington IRB before proceeding. The following forms were completed and approved: Medical Records Review Application, Confidentiality Agreement, and HIPAA Authorization Waiver Request. The IRB also requested a document identifying the variables that were to be abstracted from the medical charts, which was completed and approved. The researcher is not aware of any conflicts of interest or ethical considerations that need to be addressed.

The patients involved in this study were not recruited. No patients were or shall be contacted regarding this study. Therefore, there were no informed consents or incentives for patients involved in this study. Instead the data was reviewed by a UW clinical analyst to remove patient identifiers and then stored in a secure location on the researcher's computer. Data will be presented only in the aggregate in order to protect patient confidentiality.

Chapter III

RESULTS

Demographics

Table 1 displays patient demographics of those admitted May 31 to December 31, 2011. While Harborview Medical Center (HMC) admitted more adult male patients, and University of Washington Medical Center (UWMC) admitted more female patients, the combined admitted population included more men (53.2%) than women (46.8%). The median patient age was 50.3 years old. Most patients (71.6%) were Caucasian and half (50.4%) had private health insurance.

Table 1. Demographics of Adult Inpatients

	HMC	UWMC	Total
	n= 11,348	n=10,958	n= 22,306
Gender %			
Female	37.3	56.7	46.8
Male	62.7	43.3	53.2
Age Mean (SD)	49.8 (17.3)	50.9 (17.5)	50.3 (17.4)
Age %			
18-24	7.9	6.9	7.4
25-34	14.7	16.2	15.4
35-44	15.9	13.4	14.7
45-54	21.6	17.1	19.4
55-64	20.3	23.2	21.7
65+	19.6	23.2	21.4
Race/ethnicity %			
American Indian	2.5	1.4	1.9
Asian	7.4	7.1	7.3
Black	13.8	7.9	10.9
Caucasian	68.0	75.3	71.6
Hispanic	6.6	4.8	5.7
Other/Not documented	1.7	3.5	2.6
Insurance %			
Private	33.3	47.4	40.2
Public	51.9	48.8	50.4
Not Documented	14.8	3.8	9.4

Tobacco Use

Of patients screened for tobacco use at the two hospitals, nearly half (48.7%) reported they had never smoked while 19.7% reported being current smokers. HMC had almost three times as many current smokers (31.3%) than UWMC (10.3%).

Table 2. Tobacco Use Among Adult Inpatients

	HMC	UWMC	Total
Tobacco Use*			
Current	31.3	10.3	19.7
Recent Quit	3.8	4.2	4.0
Former	12.4	21.7	17.5
Never	36.8	58.3	48.7
Unable to collect	15.7	5.5	10.0

*Among patients screened May 31 to December 31, 2011

Predictors of Tobacco Use Screening

There was a small but significant difference between the pre- and post-policy tobacco use assessment rate. The percentage of patients screened was 85% before the policy implementation and 79% afterwards ($p < 0.001$).

As shown in Table 3, there were also significant differences in screening rates observed with all five demographic variables measured: gender, race/ethnicity, insurance type, admission diagnosis, and age. Patients receiving higher screening rates included females, those with private insurance, those admitted with a circulatory or respiratory disease, and those between the ages of 25 and 34 years. Blacks and American Indians had lower screening rates (both around 75%) compared with Caucasians (79.8%), Hispanics (79.1%), Asians (74.9), and Other (80.8%) racial-ethnic groups ($p< 0.001$).

Table 3. Tobacco Use Screening by Demographic Variables

	Screened n= 17,638	Not Screened n= 4,668	Chi-Square Statistic	p- value
Gender %			120.438	<0.001**
Female	82.2	17.8		
Male	76.3	23.7		
Age %			26.315	<0.001**
18-24	78.0	22.0		
25-34	81.6	18.4		
35-44	77.7	22.3		
45-54	77.5	22.5		
55-64	79.4	20.6		
65+	79.8	20.2		
Race/ethnicity %			41.351	<0.001**
American Indian	74.9	25.1		
Asian	79.1	20.9		
Black	74.5	25.5		
Caucasian	79.8	20.2		
Hispanic	79.1	20.9		
Other/Not documented	80.8	19.2		
Insurance %			20.113	<0.001**
Private	81.1	18.9		
Public	78.6	21.4		
Admission Diagnosis			72.124	<0.001**
Circulatory/Respiratory	87.5	12.5		
Other	78.4	21.6		

**p< 0.001 significance

Tobacco Cessation Interventions for Current Smokers and Recent Quitters

More than three quarters (76.6%) of the post-policy sample were offered nicotine replacement therapy (NRT) but less than half of those (45.3%) accepted the offer (Table 4). Additionally, while over two thirds (69.5%) were offered cessation counseling, only 24.2% of those accepted (Table 4).

Table 4. Tobacco Cessation Interventions for Current Smokers and Recent Quitters

	HMC		UWMC		Total
	Current n= 2,463	Recent Quit n= 296	Current n= 1,006	Recent Quit n= 414	n= 4,179
Nicotine Replacement Therapy %					
Offered	76.8	55.7	86.1	67.9	76.6
Accepted*	51.0	22.4	47.5	14.2	45.3
Cessation Counseling %					
Offered	69.5	48.0	80.0	59.4	69.5
Accepted*	27.0	16.2	24.7	8.5	24.2

*Percentage calculated from among those who have a documented offer

Predictors of NRT Acceptance

As shown in Table 5, there were significant differences in NRT acceptance observed with all five demographic variables measured: gender, race/ethnicity, insurance type, admission diagnosis, and age ($p < 0.05$). Patients with higher acceptance rates included males, Caucasians, those with public insurance, and those not admitted with a circulatory or respiratory disease. Those between the ages of 18 and 24 had the lowest acceptance rate (30.8%), compared with those above the age of 65 (34.9%), those between the ages of 25 and 34 and those between the ages of 55 and 64 (around 45%), and those between the ages of 35 and 54 (around 50%).

Table 5. NRT Acceptance by Demographic Variables

	Accepted n= 1,455	Declined n= 1,759	Chi-Square Statistic	p- value
Gender %			0.919	<0.001**
Female	44.2	55.8		
Male	45.9	54.1		
Age %			52.952	<0.001**
18-24	30.8	69.2		
25-34	43.4	56.6		
35-44	50.2	49.8		
45-54	50.9	49.1		
55-64	45.5	54.5		
65+	34.9	65.1		
Race/ethnicity %			15.920	0.007*
American Indian	37.9	62.1		
Asian	36.8	63.2		
Black	45.8	54.2		
Caucasian	46.7	53.3		
Hispanic	32.8	67.2		
Other/Not documented	41.1	58.9		
Insurance %			31.969	<0.001**
Private	37.9	62.1		
Public	49.4	50.6		
Admission Diagnosis %			8.830	0.003*
Circulatory/Respiratory	34.5	65.5		
Other	45.9	54.1		

*p< 0.05 significance
**p< 0.001 significance

Predictors of Counseling Acceptance

As shown in Table 6, there were significant differences in those who accepted the offer for more information about quitting smoking (referred to as 'counseling') observed with three demographic variables measured: age, race/ethnicity, and insurance type (p< 0.05). Patients with higher acceptance rates included those between the ages of 35 and 44, Asians, and those with public insurance. Hispanics had the lowest acceptance rate (20.2%), compared with American

Indians and Caucasians (both around 25%) and Asians, Blacks and other (around 28%) racial-ethnic groups ($p < 0.001$). There were no differences observed by gender or admission diagnosis.

Table 6. Counseling Acceptance by Demographic Variables

	Accepted n= 710	Declined n= 2,206	Chi-Square Statistic	p- value
Gender %			1.757	0.185
Female	23.0	77.0		
Male	25.1	74.9		
Age %			32.003	<0.001**
18-24	21.0	79.0		
25-34	18.0	82.0		
35-44	28.2	71.8		
45-54	27.4	72.6		
55-64	27.2	72.8		
65+	16.7	83.3		
Race/ethnicity %			19.825	0.001*
American Indian	25.0	75.0		
Asian	27.7	72.3		
Black	27.0	73.0		
Caucasian	23.7	76.3		
Hispanic	20.2	79.8		
Other/Not documented	28.1	71.9		
Insurance %			4.5860	0.032*
Private	21.0	79.0		
Public	24.9	75.1		
Admission Diagnosis %			0.001	0.974
Circulatory/Respiratory	24.2	75.8		
Other	24.4	75.6		

*$p < 0.05$ significance
**$p < 0.001$ significance

Chapter IV

DISCUSSION

Relationship of Key Findings to Previous Studies and Other Tobacco Treatment Programs

Tobacco use. The results of this evaluation are better understood when compared to broader trends and similar programs. The higher rate of smoking we found among the hospitalized population relative to the overall state smoking prevalence is similar to other states. According to the Center for Disease Control and Prevention (CDC), the 2010 national smoking rate of adults (aged 18 years and older) in the US was 19.3%. Faseru (2009) found the smoking rate at an academic medical center in Kansas City, Kansas to be 21.9%, higher than both the national average and the Kansas state smoking rate (17.8%). The combined average smoking prevalence among inpatients at HMC and UWMC were consistent with these findings, with a smoking rate of 20%, much higher than the Washington state smoking rate (14.9%). These findings are not surprising given the adverse health effects of smoking which cause smokers to be hospitalized more often than nonsmokers (Faseru, 2009).

However, a significant disparity exists between the current smoking rates at the two medical centers in this evaluation. The combined 20% smoking rate is skewed by the high prevalence of smoking at HMC (31.3%) compared to the relatively low rate at UWMC (10.3%). This difference is likely related to the population served by HMC, a public, county hospital, where 32% of inpatients are mentally ill (HMC, 2009) and a higher percentage are of low socioeconomic status (SES). At a population level, approximately half of people with a psychiatric disorder also meet the criteria for lifetime substance use disorder (Thorton et al., 2012). This is especially concerning as tobacco use has been linked to a reduction in medication effectiveness and the exacerbation of psychiatric symptoms (Ziedonis & Nickou, 2011). The

higher prevalence of smoking at HMC also reflects the higher proportion of patients with both public and undocumented insurance than UWMC, an indicator of low SES. Low income individuals have a higher rate of tobacco use and experience disproportionately more tobacco-related illnesses and deaths (Fagan et al., 2004).

Screening for tobacco use. The difference found in pre- and post-policy tobacco use screening rates (85% before and 79% after) is likely due to the to the increased workflow steps and subsequent learning curve associated with the new protocol. Before the implementation of this policy, the admitting nurse was responsible only for documenting whether the patient was a current smoker, while implementation of the new policy required several additional steps. After documenting tobacco use, the admitting nurse is also charged with asking the patient who has ever used tobacco the last time they smoked, asking how often the patient uses tobacco products per day, reminding the patient about the hospital's tobacco-free campus policy, offering NRT and counseling, filling out a paper NRT order form (with dosage, as determined by current tobacco usage), checking a box for counseling, if offer accepted, and faxing the form to the pharmacy as needed. With the increased time required to complete these additional steps, a decrease in completed screenings was not unexpected, and is actually quite small in this case.

From 2004 to January 2012, tobacco use screening was a Joint Commission (JC) core measure only for patients hospitalized with heart failure, myocardial infarction, and pneumonia, as these conditions are highly attributable to smoking. Thus, tobacco use screening for these diagnoses have become more routine and one would expect these rates to be higher, as we found. This is consistent with Faseru's (2009) findings that having a JC core measure diagnosis was the strongest predictor of a patient's referral to the medical center's tobacco treatment program. The evaluation at HMC and UWMC also reflects this pattern as patients admitted with a disease of

the circulatory or respiratory system had higher tobacco screening rates than those with other primary admission diagnoses.

The HMC and UWMC evaluation does not address all predictors of tobacco use screening. For example, Faseru (2009) found that other predictors of referral included longer length of stay and admission through the emergency department. While these factors were not directly analyzed at HMC and UWMC, HMC has higher rates of admission through the emergency department (74.1%) than UWMC (23.1%) along with a higher smoking rate, consistent with Faseru's findings.

Nicotine Replacement Therapy. More than three-quarters of total current smokers and recent quitters were offered NRT. However, a small difference in the proportion of patients who were offered NRT can be seen between the two medical centers. Slightly more current smokers were offered NRT at UWMC (86.1%) than HMC (76.8%). This may be related to the fact that the policy was originally developed at UWMC and was later embraced by HMC. The rate of acceptance of NRT among current smokers was slightly higher at HMC (51%) than at UWMC (47.5%). This may be at least partly due to the higher percentage of males admitted to HMC (62.7%) than UWMC (43.3%) as research suggests that males are more likely to accept NRT than women (Bansal, Cummings, Hyland, & Giovino, 2004).

The rate of NRT acceptance found among all current smokers (40%) at HMC and UWMC combined was lower when compared to a similar but more established hospital-based tobacco treatment program on the east coast. A study at Massachusetts General Hospital in Boston, MA found that 62% of patients enrolled in the tobacco treatment service received NRT during hospitalization (Regan et al., 2011). Patients at Massachusetts General benefit from dedicated tobacco cessation specialist nurses, who conduct a cessation intervention with every

tobacco-using patient at their bedside, and provide additional support during the hospitalization and in preparation for discharge. This resource is not available at HMC or UWMC. Regan et al. (2011) further found that patients who used NRT in the hospital were five times more likely to report using NRT post-discharge, whether they had used it prior to hospitalization or not. Although the UWMC and HMC protocol does not include any post-discharge follow-up, we should be able to expect a similar benefit among this population, which could provide additional impetus for encouraging patients to use NRT while hospitalized.

Acceptance of cessation counseling. Smokers at both HMC and UWMC were less likely to accept counseling than NRT. It should again be noted that the term "counseling", which may denote a stigma of mental illness to some people, was not used when offering additional assistance to patients. Instead, patients were asked, "Would you like to learn more about how to quit smoking/tobacco?" Still, among those who accepted NRT, only 38.2% accepted counseling. Conversely, 100% of smokers who accepted counseling also accepted NRT. The low levels of counseling acceptance may improve with more encouragement by the admitting nurse. However, this finding reflects a broader trend; an analysis of a large population based dataset by Shiffman et al. (2008) found that among smokers who reported a quit attempt in the preceding year, 32.2% used medication while only 8.8% used behavioral treatment.

Smokers may have several rationalizations for declining counseling in this setting. Reasons that have emerged from prior studies include the belief that it is inappropriate to ask someone to change their behavior, that people have a right to smoke, and that smoking is a merely a bad habit but not an addiction, and thus people should be able to quit on their own without NRT or counseling (Schultz, 2007). While it is true that many smokers do quit without any medication or additional assistance, it is important for patients to realize that cessation

interventions can ease the discomfort of quitting, that they are more likely to succeed in maintaining abstinence with treatment, and that there should be no shame or stigma attached to accepting help.

Study Strengths and Limitations

A distinguishing feature of this evaluation is the large sample size, which gives it several strengths plus a weakness. The strengths are that no population subset was excluded from the evaluation, so the results represent the entire adult inpatient population, and that the large number increases the precision and sensitivity of the results, thus reducing the risk of type II errors. However, a limitation is that the sample size is so large that the analysis also detects differences that are statistically significant although of small effect. Thus, caution must be used regarding drawing policy or treatment implications from these results.

This study is also limited by its very nature, as it is a process evaluation and not a randomized or controlled trial, which would not be appropriate in this setting. Ethical considerations would prohibit the randomization of smokers into a non-treatment control group, as the hospital has an obligation to provide treatment services to all patients. Thus, this study is primarily evaluating implementation of a new inpatient tobacco treatment protocol, without assessing the impact of the treatment provided.

The results of this evaluation may be applicable to other urban, academic medical centers that wish to implement a similar inpatient tobacco treatment protocol in a comparable state or region. However, due to differences in smoking prevalence and policies, as well as variance in types of hospitals, the patients in our sample may not be representative of those in other hospital-based tobacco treatment programs, especially if located in areas with higher rates of smoking and less stringent tobacco control policies than we have here in the Pacific Northwest. The

normalization of tobacco use in such regions may negatively impact patients' willingness to accept tobacco cessation interventions.

The final limitation is that our data analyses were descriptive, utilizing Chi-square tests to investigate bivariate relationships between demographic factors and the screening for tobacco use and acceptance of treatment interventions. Thus, no causal implications can be drawn from this study. In order to further elucidate the associations we found, regression models would be needed to adjust for potentially confounding variables to determine demographic predictors of screening and acceptance rates, and better understand how we might be able to improve usage of the protocol.

Implications of Findings, Conclusions, and Recommendations

For theory or conceptual model described in the introduction. The conceptual model and findings of this evaluation are only able to address screening for tobacco use and the offer and acceptance of cessation treatment during hospitalization. One cannot draw any conclusions regarding outcomes of the UWMC and HMC tobacco treatment protocol because follow-up information is not currently being collected. Without the 30-day post-discharge support that is recommended by the Joint Commission (Fiore, Goplerud, & Schroeder, 2012), any effect that our tobacco treatment program may have on long-term abstinence is unknown. When the policy was developed, it was expected that health care providers at HMC and UWMC would be able to refer patients to the Washington State Quitline (WAQL) for further support and follow-up after discharge. However, this service is no longer available for most Washington state residents and there are no internal resources within the hospital to provide such support or evaluate outcomes.

The limitations and shortfalls of the program described above should not detract from the great success in creating and implementing a new smoke-free campus policy and treatment

protocol, which has clearly increased identification and treatment of tobacco use among inpatients at a large, prestigious academic medical center. Although the implementation of this tobacco treatment program may be considered suboptimal, critical first steps have been taken which open the door for further growth and improvement.

For public health practitioners or clinicians. Findings from this evaluation may be helpful for members of hospital health care teams involved in tobacco treatment to improve the health of their patients by helping them quit smoking. Extrinsic motivation for change may also be driven by desire for hospital accreditation by the Joint Commission. The expansion of the Joint Commission tobacco core measures from a few specified diagnoses to all inpatients, regardless of diagnosis, will likely substantially raise rates of screening, treatment and successful cessation nationally, especially if and when they become required rather than optional. This would also significantly improve compliance with the tobacco treatment at HMC and UWMC, as the hospitals' accreditation will be dependent on fulfilling all core measures, including follow-up, which is currently lacking.

In order to ensure appropriate identification and treatment of tobacco use, it is essential to reinforce the need for screening and supporting smokers' efforts to quit throughout the healthcare team. Nurses and physicians who admit patients need education, support, and prompting to advise, offer, and encourage the acceptance of NRT and counseling. The most successful hospital-based tobacco cessation programs have dedicated tobacco treatment specialists and a physician who oversees the necessary system changes and coordination of inpatient tobacco use treatment and post-discharge follow-up (Rigotti, Munafo, & Stead, 2008). The absence of such professionals at HMC and UWMC thwart the ability of the tobacco treatment program to provide optimal reach and effectiveness.

Final considerations and future interventions and research needs. As previously noted, a major shortcoming of the tobacco treatment program at HMC and UWMC is the lack of post-discharge follow-up. The current protocol does not include additional support or monitoring of tobacco abstinence after patients are discharged. Without such data, it is not possible to assess the long-term impact of the tobacco treatment protocol on patient health outcomes. Additionally, Rigotti, Munafo, & Stead (2008) found that counseling is most effective when supportive contacts continue for at least a month after discharge. In order to improve patient care, HMC and UWMC should invest resources into expanding this program to include a dedicated tobacco treatment specialist to conduct and coordinate treatment in the hospital and contact patients post-discharge.

The drop in screening rates post-policy, and low uptake of NRT and counseling by patients seen in this evaluation suggest gaps throughout the protocol workflow that need to be identified and addressed through future evaluation or research. This could include interviewing nurses who complete the admission forms to identify reasons why their rates of tobacco use screening and offering treatment are not higher. Key informant interviews with floor nurses and pharmacists who interact with the hospitalized patients may also help explain the low rate of intervention acceptance. Once the barriers to systematic screening and treatment are revealed, strategies to address them can be developed and tested. Thus, improvement is achievable, using evidence-based practice to offer enhanced tobacco cessation interventions to all hospitalized patients who smoke and provide optimal treatment to an increasing number who will accept it.

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APPENDIX A: Sample of NRT Order Form

UW Medicine Nicotine Replacement Therapy Order
(Adults Age 18 & over)

# of Cigarettes/Dips/ Cigars/Pipes per day	Nicotine Replacement Therapy Options (scheduled and PRN for nicotine withdrawal symptoms)

1-10 cigarettes/dips or 1-2 cigars/pipes	☐ **Nicotine patch 14 mg apply to skin daily***
	If patient unable to use patch, then
	☐ Nicotine gum 2 mg chew every 1 hour PRN, max 24 pieces daily
	If patient unable to use patch or gum, then
	☐ Nicotine lozenge 2 mg transmucosal every 1 hour PRN, max 20 pieces daily†
	*If withdrawal symptoms inadequately controlled by **patch** as above, **ADD***
	☐ Nicotine gum 2 mg chew every 1 hour PRN, max 24 pieces daily
	☐ Nicotine lozenge 2 mg transmucosal every 1 hour PRN, if unable to use gum, max 20 pieces daily†

11-24 cigarettes/dips or 3-4 cigars/pipes	☐ **Nicotine patch 21 mg apply to skin daily***
	If patient unable to use patch, then
	☐ Nicotine gum 2 mg chew every 1 hour PRN, max 24 pieces daily
	If patient unable to use patch or gum, then
	☐ Nicotine lozenge 2 mg transmucosal every 1 hour PRN, max 20 pieces daily†
	*If withdrawal symptoms inadequately controlled by **patch** as above, **ADD***
	☐ Nicotine gum 2 mg chew every 1 hour PRN , max 24 pieces daily
	☐ Nicotine lozenge 2 mg transmucosal every 1 hour PRN, if unable to use gum, max 20 pieces daily†

> 24 cigarettes/dips or > 4 cigars/pipes	☐ **Nicotine patch 21 mg apply to skin daily* PLUS nicotine gum 4 mg chew every 1 hour PRN, max 24 pieces daily**
	If patient unable to use gum, then
	☐ Nicotine patch 21 mg apply to skin daily* PLUS nicotine lozenge 4 mg transmucosal every 1 hour PRN, max 20 pieces daily†
	If patient unable to use patch, then
	☐ Nicotine gum 4 mg chew every 1 hour PRN, max 24 pieces daily
	If patient unable to use patch or gum, then
	☐ Nicotine lozenge 4 mg transmucosal every 1 hour PRN, max 20 pieces daily†

**Remove patch at bedtime if patient has nightmares or disturbing dreams. Patient may refuse removal.*
†*Not to exceed 5 lozenges in 6 hours*

☐ **Patient requests smoking cessation counseling. Please consult clinical pharmacist.**

For the INPATIENT setting only, a nurse or pharmacist may sign the NRT order form if the NRT protocol has been authorized in the physician admission orders.

PROVIDER (RN /RPH) SIGNATURE	PRINT NAME	TITLE	PHONE/PAGER	DATE	TIME

PT.NO

NAME

DOB

UW Medicine Health System
Harborview Medical Center – UW Medical Center
Northwest Hospital & Medical Center – University of Washington Physicians
Seattle, Washington

NICOTINE REPLACEMENT THERAPY ORDER

U3050
"U3050"

WHITE - MEDICAL RECORD