

Evaluation of University of Michigan Health System Critical Bed Alert System on COPD 30-day  
Readmissions

By

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### Dedication

Commitment and dedication were underlying elements for the completion of my master's thesis, but even more important was the support of my family. To my husband and two supportive children, my daughter Lauren and my son Jimmy, I dedicate this important personal achievement to them. Your love, support, presence, and understanding have allowed me to be able to achieve my goal.

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**Abstract**

*Background:* University of Michigan Health System (UMHS) is currently assessing modifiable risks in discharge planning that contribute to 30-day readmissions.

*Purpose:* To determine whether an association exists between critical bed alert system and COPD readmissions.

*Setting:* UMHS

*Subjects:* 261 COPD subjects

*Intervention:* Review of UMHS data of patients readmitted to the hospital within 30 days of a principal admission for COPD. Readmissions occurring from July 1, 2011 through June 30, 2012 were reviewed. Readmission rates for patients discharged within  $\pm 2$  days of a critical bed status alert (indicating very high occupancy rates) were compared to readmission rates for those not discharged within  $\pm$  days of a critical bed status alert.

*Research Design:* Retrospective Review

*Data Collection and Analysis:* 261 discharges occurred. There were 44 possible alert days for which 6 (14%) were readmitted. On non-alert days, 168 discharges occurred for which 49 (29%) were readmitted within 30 days. There was no statistical difference between readmission frequencies for patients discharged on alert versus non-alert days ( $p= 0.19$ ).

*Conclusion:* No association was found between critical bed status alerts and 30-day COPD readmission rates.

*Keywords:* COPD; 30-day readmission

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## **Chapter 1: Introduction and Background**

### **Introduction**

The Hospital Readmission Reduction Program (HRRP) established under the Affordable Care Act of March 2010 has created a shift in the health care industry from a fee-for-service model Inpatient Prospective Payment System (IPPS) to one that has an emphasis on patient outcomes. In the IPPS model, hospitals were paid for a patient's stay and were paid again when the patient returned for readmission. There was no incentive to keep patients out of the hospital. HRRP was created to incentivize hospitals to reduce readmissions. This program requires Centers for Medicare and Medicaid Services (CMS) to reduce payments to hospitals with excessive readmissions. HRRP incentives include escalating penalties that decrease a hospital's payments from all of its Medicare cases (Patient Protection and Affordable Care Act, 2010). As of October 1, 2012 hospitals began paying financial penalties for high risk adjusted 30-day readmission rates for congestive heart failure, acute myocardial infarction and pneumonia (Hospital Readmission Reductions Program, 2012). While the purpose of this program is to improve quality and lower costs for Medicare patients, hospitals are under pressure to develop new strategies to improve discharge planning without incurring excessive costs. According to the Medicare Payment Advisory Commission (Med PAC), hospital readmissions may indicate poor care or missed opportunities to better coordinate care in some cases. Despite the implication that a reduction in readmissions is achievable and an indicator of quality, in a recent study of a systematic review of interventions used to reduce readmissions it was concluded that no interventions studied reliably reduced readmission to hospital (van Walraven, Jennings, & Forster, 2012).

Readmission refers to a patient being admitted to a hospital within a certain time period from an initial admission. In the context of Medicare, readmissions have been generally defined as a patient being re-hospitalized within 30 days of an initial hospital stay (Fan, 2012).

The 30-day readmission measure is endorsed by the National Quality Forum (NQF), a non-profit organization dedicated to improving healthcare in the United States. When a measure is submitted for NQF endorsement, it goes through a standard process that includes a thorough review by a multi-stakeholder group of experts, a public comment period, voting by NQF's membership, and approval by NQF's Board of Directors. Measures endorsed by NQF meet tough requirements, so national, state, and local programs often prefer to use them (Forum, 2010). Excess readmission ratios are calculated using the 30-day readmission measure. Hospitals with a 30-day risk adjusted readmission rate for a condition greater than the national average will have their IPPS payment rates reduced. CMS has estimated that the HRRP would save \$280 million for the first year (77FR63751 2012).

### **Purpose of the Study**

As of October 2014, Chronic Obstructive Pulmonary Disease (COPD) will be added to the Hospital Readmissions Reduction Program (78FR50792 2013). The University of Michigan Health System (UMHS) has been working to identify risk factors that led to increased risk for 30-day readmission of the COPD patient. One risk factor explored here within is the critical bed status alert system. The critical bed status alert system may be a modifiable institutional factor that leads to poor discharge planning as identified by a 30-day readmission.

## **Incidence and Cost of COPD Readmissions**

CMS has good reason to add COPD to the next round of the HRRP. It has been reported that COPD is the 3<sup>rd</sup> leading cause of death in in the United States (Murphy S.L, 2013). The Behavioral Risk Factor Surveillance System (BRFSS) recently released data which indicated that over 15 million individuals in the U.S. are diagnosed with COPD. Twelve million individuals experience COPD symptoms but have not yet been identified or correctly diagnosed (American Lung Association (ALA), 2014).

As a chronic disease, COPD is a common yet debilitating disease associated with high healthcare expenditure and utilization, long-term care treatment needs and deterioration in quality of life. The 30-day readmission rate for COPD has been estimated to be 22.6% nationwide and accounts for 4% of all 30-day readmissions (Jencks, Williams, & Coleman, 2009). It is estimated that up to 70% of direct health care expenditure's associated with COPD is attributable to hospital admissions for management of exacerbations (Strassels, Smith, Sullivan, & Mahajan, 2001). A review of data from the Agency of Healthcare Research and Quality (AHRQ) demonstrated that costs are consistently higher (18%) for readmissions than for initial stays (Elixhauser, 2011).

When the Medicare Payment Advisory Committee (Med PAC) reported to Congress in 2007 it reported COPD as one of seven conditions most costly potentially preventable readmissions. Interestingly enough, two of the first round of conditions reported to Congress for 30-day readmission penalties were congestive heart failure and pneumonia; the two most common principal diagnosis with a secondary diagnosis of COPD. The AHRQ considers COPD a condition that can potentially prevent the need for hospitalization or for which early intervention can prevent complications or more severe disease (Hackbarth, 2007).

## **Understanding the Nature and Course of COPD**

COPD is characterized by airflow obstruction that is not fully reversible; symptoms include cough, sputum production and dyspnea with exertion. This disease impacts patients in that a progressive reduction in lung function correlates with a reduced quality of life (QOL). Diminished QOL in COPD is indicated by exercise intolerance, shortness of breath on exertion with daily activities and a continued physical decline. In later stages of the disease, exacerbations are expected as well as escalation in severity of exacerbations. As lung function continues to be compromised with a further rate of decline in lung function, there is a downward spiral of events leading to death (National Heart, 2014). As COPD progresses, multiple conditions like depression (DiMarco, 2006), co-morbid conditions, lung function status, body mass index and pulmonary hypertension are known risk factors (Barnes, 2009; Curkendall, 2006; Fan, 2012). Given the nature of the disease, COPD is complicated and can be difficult to manage with problematic co-morbidities. Frequent readmissions in this population may be more an indicator of the natural course of the disease rather than an indication of poor quality of care (Fromer, 2011; Goodman, 2013).

## **Known Risk Factors for Readmission**

Certain risk factors are well recognized and verified such as patient age, race, diagnosis, length of stay (LOS), comorbidities, insurance disposition and previous hospitalizations. Despite recognizable risk factors, studies have determined that only a certain percentage of admissions are preventable (Park, Andrade, Mastey, Sun, & Hicks, 2014). Efforts to develop a screening tool that providers can use have not been classified or predictable. One screening model developed to predict high risk readmission, the LACE index, in its simplicity has differentiated itself from other models. This model integrates

length of stay (L), the acuity of the patient's admission (A), the degree of comorbid illness (C) and the number of emergency room visits in the prior 6 months (E). A LACE index score of  $\geq 10$  would indicate a patient at high risk for 30-day readmission or death. A study utilized this index in a group of six Toronto area hospitals and was proven useful for identifying at risk patients who could require a more involved post-discharge care. The mean age of the high risk group was 71 years old. The high risk group was twice as likely to be readmitted, had longer length of stays and were more likely to die during the 30-day readmission (Grunier, 2011). In a study with a very large cohort group of 51,353 patients at risk for COPD readmissions was conducted at the Veterans Affairs Hospital System. It was determined the risk of re-hospitalization was 25% at 1 year and 44% at 5 years, and was increased by age, male gender, prior hospitalizations and comorbidities including asthma and pulmonary hypertension (McGhan, 2007). These findings may represent that 30-day readmissions are the uninterrupted characteristic of the disease of COPD.

### **Discharge Planning**

There are many research studies analyzing possible risk factors for 30-day readmission after discharges for exacerbations of COPD. Poor discharge planning or transitions of care are often cited. An avoidable readmission may be related to failed handoffs. An example of a failed handoff could be not reconciling patient medication, not providing patient education, not arranging for scheduling an appointment post discharge, lack follow up phone calls, home visits or bridging interventions such as a discharge coach who may personalize the discharge plan to the individual or maintaining physician continuity between the inpatient and outpatient setting (Hansen, Young, Hinami, Leung, & Williams, 2011). Quality improvement organizations have reported that some payers have begun to

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deny payment for readmissions if discharge planning is deemed to be inadequate. Ashton et al (1997) concluded that an early readmission is significantly associated with the process of inpatient care and found that patients who were readmitted were approximately 55 percent more likely to have had a quality of care problem (Ashton, 1997). A readmission may result from incomplete treatment or poor care of the underlying problem, or may reflect poor coordination of services at the time of discharge and afterwards, such as incomplete discharge planning and or inadequate access to care. Identifying system issues contributing to the failed handoff would provide opportunity for hospitals to improve the discharge process for all patients.

One proposed reason for poor discharge planning at the University of Michigan Hospital (UMHS) relates to the critical bed status alert system. The critical bed status alert system was designed to send an automated paging message to all physicians and designated staff when there is a shortage of hospital beds. This alert is triggered when high occupancy rates indicate that (1) even with movement of patients from ICU/telemetry units to acute care there is still no ICU/telemetry beds available and (2) there is a negative bed situation in ICU, telemetry and or Acute Care Units. It is during high alert that elective surgeries that must be cancelled and/or placed on provisional status or there are patients in the emergency department waiting to be admitted and no beds are available (Dawson & Radloff, 2009). This alert system puts increased pressure on UMHS staff to expeditiously clear a bed for a new admission and therefore theoretically could lead to patients being discharged too early or in a rushed and less complete fashion. This could be a modifiable indicator of risk that has been recognized by quality teams. Identification of the critical bed status alert system as reason for poor discharge planning leading to 30-day readmissions of the COPD patient could assist

quality teams to focus on processes to improve discharge during the crisis of bed shortage at UMHS.

### **UMHS Critical Bed Status Alert Policy**

The purpose of UMHCC POLICY 02-01-003 *Managing High Occupancy in University Hospital and the Cardiovascular Center* (Dawson & Radloff, 2009) provides guidelines for UMHS, the Cardiovascular Center (CVC) and the Admissions and Bed Coordination Center (ABCC) to ensure appropriate care location and access is provided in a timely manner for admissions of patients to University Hospital, the Cardiovascular Center, and stipulate an algorithm to be used to prioritize and triage patients appropriately. All patient placement, movement, and transfer decisions are coordinated through the ABCC to maximize and balance access from all sources, Emergency Department (ED), Operating Room (OR) transfers, scheduled admissions, etc., while maintaining internal flow.

High occupancy by definition is the point in which the occupancy rate exceeds, or is expected to exceed a defined rate of occupancy that historically has demonstrated constraints to the delivery of care in the right location or at the right time.

A.) moving all possible patients from the ICU/Telemetry units to acute care, there continues to be no ICU/Telemetry beds available.

B.) There is a negative bed situation in ICU, Telemetry and/or Acute Care Units

There are 4 alerts: Green indicating >92% capacity; Orange 92-95% capacity, orange indicates 95-97% capacity and red indicates >97%. The red alert is used in the analysis for this study. The red alert indicates that the hospital has exceeded or is anticipated to exceed

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all available inpatient bed and overflow accommodation resources. All surge locations are activated as staffing permits. ED flow is compromised by number of Inpatient waiting in ED for bed assignments, status of access to resuscitation bays and volume of patients waiting to be seen.

When the red alert is activated, actions to identify operating room cases that are required to be cancelled or rescheduled and assessment of nursing resource availability is collaborated with the House Manager. Transfers are prioritized by complexity (may require UMHS services or could cause harm), complications from procedures performed at UMHS and a decision to decline cases that can be done at another hospital (i.e. CHF).

During activation of the critical bed status alert, there are many resources required for notification:

Office of Clinical Affairs(OCA)	Hospital Administrator on call	Admissions and Bed coordination center staff
House managers	Assistant chief of staff	Assistant to Chief of Nursing
Operating room director	Pulmonary Critical Care fellows	Surgical Critical Care Fellows
Chief of staff	Survival flight	Trauma Attending
Director of social work	Director of discharge planning	Director of material services

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UH charge nurses

PACU nurse manager

ED administrator

Directors of patient care

UH nurse managers

services

Given the complexity of the resources required during a red alert along with activation of systems within various areas of the hospital, it is conceivable that coordination of care upon discharge would be less than optimal for the COPD patient. The chronically ill COPD patient will generally have one or more risk factors that include co-morbidities demonstrating more time and thorough planning would be indicated. Discharge management of this population is complex and as each COPD patient has different needs should be personalized. As with other chronic diseases, this could require a comprehensive discharge plan such as counseling on diet, self-care, oxygen systems, adherence to medication, coordination of transitions of care with other physicians and facilities such as nursing home, home care and identification of patient's barriers to care such as insurance or family support systems. Complex COPD discharge planning is challenging even under non-alert conditions. One can see how there is the potential for important aspects of care to slip through the cracks during the pressure of a critical bed alert. Once a transition is made, follow up is important to ensure a patient understands the discharge instructions. It is very common for the elderly to have cognitive issues. COPD is common in the elderly population. Flacker et al. found recall of pre-discharge communication of discharge instructions by hospital staff demonstrated significant gaps in communication between elderly patients and the hospital care team at the time of discharge (Flacker, 2007).

## **Chapter 2: Review of Literature**

Lowering hospital 30-day readmission rates has become a national concern. Given that hospitals in the United States have begun to receive penalties for excessive readmissions for CHF, AMI and pneumonia with a penalty cap of 3% by fiscal year 2015, there are many research studies attempting to identify hospital strategies, interventions or institution specific risk factors to reduce 30-day readmissions (Hackbarth, 2007).

A systematic review of 43 articles synthesized pre-discharge interventions, post-discharge interventions and bridging interventions. Pre-discharge interventions included patient education, medication reconciliation, scheduling of post follow-up appointments after discharge along with discharge planning. Post-discharge interventions included telephone calls, patient-activated hotlines, timely communication with ambulatory providers (with follow-up) and post-discharge home visits. Transition coaches, physician continuity across the inpatient and outpatient setting and patient centered discharge instruction were identified for bridging interventions. The conclusion of this systematic review was that no single intervention alone was regularly associated with reduced risk for 30-day re-hospitalization (Hansen et al., 2011).

Studies investigating pulmonary rehabilitation, education and self-management efforts to reduce COPD exacerbations have shown inconsistent results. In one randomized study involving 20 Veteran's Administration Hospitals designed to determine the efficacy of a comprehensive care program in reducing the risk for COPD hospitalization compared with guideline based usual care the trial was prematurely stopped. The comprehensive care program was associated with unanticipated excess mortality. Implications of this study indicated further evaluation as to which educational programs and care plans are useful for

which patients (Fan). Yet in another study, discharge intervention that included supervised inhaler use, respiratory therapy and education led to a reduction in readmissions in comparison with standard care (14% vs. 31%), but with no change in mortality (Lainscak et al., 2013).

The Global Strategy for Diagnosis, Management and Prevention of COPD or GOLD guidelines recommend a stepwise approach toward COPD management that is based on disease severity. Primary treatment goals in COPD are to relieve symptoms, prevent progression, prevent and treat exacerbations, and reduce mortality. Pharmacologic treatment options are included in the guidelines (Global Initiative for Chronic Obstructive Lung Disease (GOLD), 2014)

Although these directives are available, they are often not used in practice. In a retrospective record review it was found participants with COPD received 58% of recommended care and only 32% of COPD patients with baseline hypoxia received long term oxygen (LTOT). It was concluded that variability in the processes of care in the COPD patient presented significant opportunities for improvement (Mularski et al., 2006).

One retrospective review assessed institution specific risk factors with 30-day readmission of patients diagnosed with CHF, pneumonia or COPD. Provider associated factors (hours worked and census on the day of discharge and hospital associated factors (floor of discharge, season) were compared. Patients discharged in the winter were more likely to be readmitted compared to summer; patients discharged from the cardiac floor had a decreased readmission compared to a medical/oncology floor; and provider work flow factors were not associated with readmission. It was concluded that 30-day readmissions may be associated with institution specific risk factors. These institution risk factors may be

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targets for interventions to prevent readmissions (Park et al., 2014). The critical bed alert system at UMHS was highlighted in this research study as an institution specific risk factor to 30-day readmissions in the COPD population.

### **Chapter 3: Research Design and Methodology**

#### Methodology

*Setting:* Readmission data set created for the COPD Hospital Multidisciplinary Team

*Subjects:* 261 subjects discharged from UMHS with a primary diagnosis of COPD

*Intervention:* A retrospective review of all COPD patients hospitalized and readmitted within 30 days at UMHS from July 1, 2011 to June 30, 2012.

*Research Design:* Retrospective Cohort Study Review

*Data Collection and Analysis:* The data set includes 261 adult men and women (age 40 and older), who were discharged from the University of Michigan Hospital for a hospitalization with a primary diagnosis of Chronic Obstructive Pulmonary Disease (COPD) between July 1, 2011 and June 30, 2012. The patients were identified by their diagnosis at discharge utilizing the International Classification of Disease-9 (ICD-9) code for COPD. ICD-9 codes related to COPD: bronchitis, obstructive, chronic w/ exacerbation (491.21); emphysema (492); chronic airway obstruction (496). The hospital bed manager provided the dates that the critical bed status emails occurred at UMHS from October 13, 2010 through August 2, 2012. The dates provided included the timeframe of this study. The study identified the days the hospital alert system was initiated and set a rule to monitor anyone discharged  $\pm 2$  days of that alert. Of those discharged during  $\pm 2$  days, comparison of how many were readmitted within 30 days and how many were not readmitted during the same time period. The study also looked at the average length of stay (LOS) when discharged from the hospital. Results were compared to the national average LOS for COPD as indicated by data collected by the Centers for Disease and Agency for Healthcare Research and Quality (AHRQ). Chi-square test was calculated using the Statistical Analysis System (SAS) program to determine if the results posed

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between two sets of data (readmitted within 30 days  $\pm$  2 days of critical alert days vs. not readmitted during the critical alert period) are significantly different from each other.

## Chapter 4:

### Presentation and Analysis of Data

#### Primary Outcomes:

The demographic of this patient cohort are summarized in Table 1. A total of 261 patients were included in the analysis with a primary discharge diagnosis of COPD. The mean age was 70.7 years. Gender was represented by 132 (51%) male and 129 (49%) female. The average length of stay for all discharges was 4.1 days.

Table 1

#### *Demographics*

N=261	Mean
Age, years	70.7
Male Gender (%)	132 (51%)
Female Gender (%)	129 (49%)
Average length of stay	4.1 days

Table 2 represents the results of differences in 30-day readmissions during critical bed alerts and non-critical bed alert days. Eighteen hospital critical bed alerts were activated between July 01, 2011 and June 30, 2012. Given the rule of capturing patients discharged  $\pm 2$  days of the alert, there were 44 possible alert days. Of those possible alert days, 38 patients (86%) were not readmitted and 6 patients (14%) were readmitted. Compared with readmissions on non-alert days where 168 patients (78%) were not readmitted as compared to 49 (29%) who were admitted ( $p = 0.19$ ).

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Table 2

*Difference in 30-day readmissions classified by critical bed alert system*

	Not Readmitted	Readmitted
Critical alert during stay	38 (86%)	6 (14%)
No critical alert during stay	168 (78%)	49 (29%)

*Rule: patients discharged  $\pm$  2 days of critical bed alert were included in critical bed alert count*

Secondary Analysis:

Table 3

*Difference in Length of Stay by Critical Alert Status and Readmit Status*

	Not Readmitted	Readmitted
Critical alert during stay	4.5 (n=38)	3.0 (n=6)
No critical alert during stay	4.2 (n=168)	4.9 (n=49)

Average Length of stay (LOS) was 3 days for those discharged on alert days where readmitted compared to 4.5 days for those not readmitted. For those not readmitted on non-alert days the average LOS was 4.2 days where for those readmitted on non-alert days the average LOS was 4.9 days.

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Table 4

*Readmissions by Season Stratified by Alert Status*

Season	Alert Readmission Rate	Non-Alert Readmission Rate	Chi-Square P-Value
Winter (Jan-Mar)	2/20 (3%)	7 / 60 (12%)	0.84
Spring (Apr-Jun)	1/1 (100%)	11/64 (17%)	0.06
Summer (Jul-Sep)	3/7 (43%)	13/56 (21%)	0.28
Fall (Oct-Dec)	0/7 (0%)	9/58 (16%)	0.14

As can be seen in Table 4 no signal was detected for 30-day readmission when season was stratified by alert status.

## **Chapter 5: Summary, Conclusions, and Recommendations for Further Research**

### **Action:**

#### **Summary**

The characteristics of the COPD demographic are similar to those reported by AHRQ for 30-day readmission rates higher among males compared to females. The mean age found in this data set for COPD readmissions was 70.7 years which is slightly higher than the average of 69.7 years as reported by AHRQ.

Chi-square test revealed that the proportion of patients readmitted when originally discharged on an alert day was not statistically significantly different from the proportion of patients readmitted when originally discharged on a non-alert day ( $p = 0.19$ ).

A shortened LOS during the critical bed alert may be a signal of poor discharge planning of the COPD patient leading to a 30-day readmission. LOS was lower than the national average (4.8 days) for COPD as reported by the CDC and AHRQ.

A signal of readmissions by season stratified by alert status was not identified.

#### **Conclusions**

An association between hospital alert days on rate of 30-day readmissions could not be confirmed ( $p= 0.19$ ). This study had limitations. The sample size may not have been large enough to detect a difference; however no clear trend was seen. There was also no way to determine whether a patient may have actually been readmitted to a different hospital within 30-days of discharge, died after discharge, or if a patient may have checked out against medical advice (AMA) from UMHS. Although it is plausible that an association between the hospital critical bed alert system could be a modifiable risk factor for 30-day readmissions in COPD, a larger data set covering several years of COPD discharges is indicated.

Length of stay in hospital (LOS) is one of three (admissions, readmissions and LOS) quality measure priorities for improvement by National Quality Strategy. LOS measures the number of days that a patient will spend in the hospital. Shorter lengths of stay may indicate more efficient and effective care and a better outcome for the patient in that a shorter LOS may reduce the spread of nosocomial or hospital acquired infections.

A shortened LOS may also indicate a hasty discharge related to the critical bed alert system, thereby leading to a 30-day readmission. The average LOS on alert days with readmission was compared this with the average LOS on alert days without readmission. The mean LOS of 4.8 days for all COPD diagnoses was determined by the Centers for Disease and AHRQ in 2011. Table 3 results indicate a lower than average LOS occurred on alert days. Despite that there was not the power to detect a signal; it is meaningful to note that subjects readmitted on alert days had a much lower LOS of 3 days compared to non-alert readmissions with an original stay of 4.9 days. The 3 day LOS could indicate a hurried discharge or transition plan on critical alert days. When compared to LOS of nearly 5 days (which is closer to the national average of 4.8 days for COPD) for readmission on non-alert days, this may represent that the LOS measure may not properly reflect the severity and co-morbidity of the COPD subject being discharged. As previously mentioned, as COPD disease progresses, the series of exacerbations and readmission to hospital are more likely to occur. A patient admitted with a more severe stage of the disease would be expected to have a longer LOS due to the complexity of care. Alternatively, a longer hospital stay may mean the patient is in a healthier state for discharge and perhaps time for staff to execute quality discharge planning making the patient better prepared to be discharged home. In this study, a longer stay and no critical bed alert at time of discharge, there was a 29% 30-day readmission

rate. This represents a percentage higher than the nationwide 30-day readmission rate of 22.6% as reported in a study conducted by Jencks (Jencks et al., 2009). As a tertiary care facility, UMHS would be more inclined to care for and admit sicker patients than a general hospital. This could account for the higher than average readmission rate in the non-alert readmission group. There are some readmissions that may be planned or unavoidable. For example, a COPD patient could have a scheduled elective surgery after discharge or been readmitted for an illness unrelated to COPD. This study was not able to capture the reason for the 30-day readmissions. However, not all findings have proven reduced LOS as a measure of 30-day readmissions in COPD. Kaboli et al. identified a trend over a 14 year period in LOS for chronic obstructive pulmonary disease (17.9% to 14.6%) among other conditions without a significant increase in readmissions. Further exploration of the relationship was suggested in order to determine if there may be a tipping point that may exist between LOS and readmission rates (Kaboli et al., 2012). This variability in 30-day readmissions indicates the need to target interventions to improve discharge planning.

Finally, each season between July 1, 2011 and June 30, 2012 was examined for indicators that certain times throughout the year could show a higher rate of admissions as seasonal variations in the frequency of COPD exacerbations have previously been identified. (Donaldson, 2012). Seasons were identified as winter (Jan-Mar), spring (Apr-Jun), summer (Jul-Sep) and fall (Oct-Dec). Seasonal variation such as high humidity, extreme heat or cold weather conditions, the presence of pollens, influenza etc. are factors that can lead to COPD exacerbations requiring hospitalization. For example, studies have shown the winter months to have an increase in COPD exacerbations due to influenza (Wedzicha, 2007). There was no

correlation of seasonal variation identified in this study although the number of readmissions during bed alert days was limited.

### **Recommendations**

A larger data set is recommended for further evaluation of an association between hospital critical bed alert days on 30-day readmissions. A bigger data set would allow for a further exploration of comparison and logical regression/multivariate regression analysis to adjust for potential confounders such as age and gender. Further exploration of the LOS and seasonal variation could also be re-evaluated to determine if an association with 30-day readmissions exists at UMHS. Hospital critical bed alert systems are not unique to UMHS. Further analysis of the critical bed alert system on 30-day readmissions may prove valuable to other hospitals. This study evaluated 30-day readmission rates among the COPD population. Quality teams could adapt this method to evaluate other chronic disease states with a high risk of 30-day readmissions

As of October 2014, Chronic Obstructive Pulmonary Disease (COPD) has been added to the Hospital Readmissions Reduction Program (78FR50792 2013). Hospitals will be measured by outcomes in the quality and transitions of care of the COPD patient. Poor quality outcomes will cost hospitals money in escalating penalties in the years to come. Identification of a modifiable institution specific risk associated with critical bed alert systems may prove beneficial to the evaluation of other complex chronic health conditions with high readmission rates. The ability to identify modifiable institutional risks is an opportunity to improve care, promote improvements and quality of care received by the COPD patient and the outcomes they experience.

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**APPENDICES**

## Appendix A: Permission Letter



Medical School Institutional Review Board (IRBMED) • 2800 Plymouth Road, Building 520, Room 3214, Ann Arbor, MI 48109-2800 • phone (734) 763 4768 • fax (734) 763 9603 • irbmed@umich.edu

**To:** Ms. Mary Kay Hamby

**From:**

Michael Geisser  
Alan Sugar

**Cc:**

Mary Kay Hamby  
Meilan Han  
Irwin Martin

**Subject:** Initial Study Approval for [HUM00084306]

**SUBMISSION INFORMATION:**

Study Title: Critical Bed Alert System and COPD 30-day Readmission

Full Study Title (if applicable): A Retrospective Review analyzing the potential impact of the UMHS Critical Bed Alert System on COPD 30-day Readmissions

Study eResearch ID: [HUM00084306](#)

Date of this Notification from IRB: 2/13/2014

Review: Expedited

Initial IRB Approval Date: 2/13/2014

**Current IRB Approval Period: 2/13/2014 - 2/12/2015**

**Expiration Date:** Approval for this expires at 11:59 p.m. on 2/12/2015

**UM Federalwide Assurance (FWA): FWA00004969 (For the current FWA expiration date, please visit the [UM HRPP Webpage](#))**

**OHRP IRB Registration Number(s): IRB00001999**

**Approved Risk Level(s):**

Name	Risk Level
HUM00084306	No more than minimal risk

# EVALUATION OF CRITICAL BED ALERT SYSTEM ON COPD READMISSIONS

## APPENDIX B: CHHS-HSRC Approval Letter

**EASTERN**  
MICHIGAN UNIVERSITY  
*Education First*

COLLEGE of HEALTH & HUMAN SERVICES  
[www.emich.edu/chhs](http://www.emich.edu/chhs)

May 19, 2014

CHHS-HSRC Initial Application Determination: **ACCEPTED**

**To:** Mary Kay Hamby  
School of Health Sciences, Clinical Research Administration

**Re:** UHSRC #1153  
Category: **Approved Research Project**  
Approval Date: **May 19, 2014**  
Expiration Date: **May 19, 2015**

**Title:** Evaluation of University of Michigan Health System Critical Bed Alert System on COPD 30-day Readmission

The Eastern Michigan University' College of Health and Human Services' Human Subjects Review Committee (CHHS-HSRC) has completed their review of your project. I am pleased to advise you that **your proposal has been approved** in accordance with federal regulations.

**Renewals:** Expedited protocols need to be renewed annually. If the project is continuing, please submit the **Human Subjects Continuation Form** prior to the approval expiration. If the project is completed, please submit the **Human Subjects Study Completion Form** (both forms are found on the UHSRC website).

**Revisions:** Expedited protocols do require revisions. If changes are made to a protocol, please submit a **Human Subjects Minor Modification Form** or new **Human Subjects Approval Request Form** (if major changes) for review (see HSRC website for forms).

*Note that all requests for modification and continuation require a full board review. Forms need to be submitted at least one month in advance of the approval expiration to allow time for review.*

**Problems:** If issues should arise during the conduct of the research, such as unanticipated problems, adverse events, or any problem that may increase the risk to human subjects and change the category of review, notify the HSRC office within 24 hours. Any complaints from participants regarding the risk and benefits of the project must be reported to the HSRC.

**Follow-up:** If your expedited research project is not completed and closed after **three years**, the HSRC office will require a new **Human Subjects Approval Request Form** prior to approving a continuation beyond three years.

Please use the HSRC number listed above on any forms submitted that relate to this project, or on any correspondence with the HSRC office.

Good luck in your research. If we can be of further assistance, please contact us at 734-487-1250 or via e-mail at [chhs\\_human\\_subjects@emich.edu](mailto:chhs_human_subjects@emich.edu). Thank you for your cooperation.

Sincerely,



Dr. Jayne Yatzak, Chair  
College of Health and Human Services  
Human Subjects Review Committee

