Original Article

Serious mental illness prolongs hospital admission following lung cancer resection

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Background: Serious mental illness (SMI) is associated with increased complications and worse outcomes in a variety of surgical diseases, however, SMI as a risk factor in thoracic surgery patients is incompletely understood. We aimed to investigate if comorbid SMI would impact mortality and morbidity following lung cancer resection.

Methods: We identified 615 patients from the Society of Thoracic Surgery (STS) database at the University of North Carolina – Chapel Hill (January 2013–June 2021) who underwent lung cancer resection for non-small cell lung cancer (NSCLC). Patients identified with comorbid SMI as defined in prior studies were identified and stratified into mood, anxiety, and psychosis disorders. We analyzed the risk-adjusted impact of SMI on composite morbidity and mortality and length of stay (LOS) using multivariable logistic regression and Poisson regression analysis, respectively.

Results: Patients with SMI were younger, more frequently female, and more likely to be a smoker. Among identified patients, 186 (37.1%) had comorbid SMI which were predominantly mood disorders (90.3%). Overall, 116 patients (23.2%) had the primary outcome of composite postoperative mortality or morbidity. Following multivariable risk adjustment, patients with and without SMI did not have significantly different morbidity and mortality [odds ratio (OR) =1.36; 95% confidence interval (CI): 0.86–2.15]. After adjusting for surgery performed and other covariates, LOS was significantly longer among patients with SMI [risk ratio (RR) =1.21; 95% CI: 1.13–1.30].

Conclusions: In a 7.5-year period from a single academic institution, patients undergoing lung cancer resection had high rates of SMI. While no difference in composite morbidity and mortality was demonstrated, patients with SMI had significantly longer LOS.

Keywords: Lung cancer; mental illness; thoracic surgery; non-small cell lung cancer (NSCLC)

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Introduction

The Centers for Disease Control and Prevention estimates that half of all Americans will be diagnosed with a mental illness or disorder at some point in their life (1). According to the National Institute of Mental Health, the severity of mental illness is typically defined by the degree of functional impairment, with serious mental illness (SMI) resulting in "*serious functional impairment, which substantially interferes with or limits one or more major life activities*" (2). It is well known that patients with SMI have a lower life expectancy, suffer from more medical illnesses, and receive worse medical care than those without mental illness (3,4). Given that mental illness is both highly prevalent and often devastating to health-related outcomes, it is important to consider the interplay between pre-operative mental illness and post-operative outcomes in patients undergoing surgery. A recent paper from Paredes and colleagues utilized Medicare data to compare post-operative outcomes after common, elective surgeries in patients with and without mental illness (5). They found that patients with pre-existing mental illness were at increased risk for surgical complications, extended length of stay (LOS), and hospital readmission, raising the argument that mental health should be incorporated into preoperative evaluation. The following year, Paredes *et al.* published another study demonstrating that patients with mental illness diagnosed with pancreatic cancer had worse overall survival and cancer-specific long-term outcomes (6). Another study revealed that SMI, especially psychosis, was independently associated with higher mortality and major morbidity [defined by the Society of Thoracic Surgeons (STS) as renal failure, prolonged ventilation, stroke, reoperation, and deep sternal wound infection] after cardiac surgery (7).

Within the field of thoracic surgery, mental illness is often discussed within the context of lung transplantation, as it is well-known that depression and other psychiatric disorders are highly prevalent among patients undergoing solid organ transplants and may be associated with increased mortality (8-10). Patients being considered for lung transplant undergo extensive preoperative evaluation, including psychological evaluation to determine the likelihood of adhering to immunosuppressive regimens and degree of social support (11). However, mental health evaluations are not the standard of care in the preoperative work-up for most thoracic operations. For patients undergoing anatomic lung resection (segmentectomy, lobectomy, bilobectomy, pneumonectomy) for lung cancer, the preoperative evaluation focuses on cardiopulmonary functioning and stratifies risk based on forced expiratory volume in 1 second (FEV1) and diffusing capacity for carbon monoxide (DLCO) (12). Given that SMI is highly prevalent among patients with cancer it is important to consider the effects that this may have on post-operative outcomes (13). We aimed to define the prevalence of SMI, including mood, anxiety, and psychosis disorders, among patients undergoing anatomic lung resection for lung cancer at our institution. Another objective was to compare post-operative outcomes in patients with and without preoperative diagnoses of SMI. We hypothesize that SMI will be common among our patient population, with mood disorders being the most prevalent, and that comorbid SMI will be associated with worse post-operative outcomes after lung cancer resection. We present this article in accordance with the STROBE reporting checklist (available at https://jtd.amegroups.com/article/view/10.21037/jtd-24-762/rc).

Highlight box

Key findings

- Patients undergoing lung cancer resection at the University of North Carolina – Chapel Hill had high rates of serious mental illness (SMI).
- While there was no difference in composite morbidity and mortality, patients with SMI had significantly longer length of stay (LOS).

What is known and what is new?

- Patients with SMI have previously been shown to have higher rates of morbidity and mortality in other fields of surgery.
- In this study, we have found that patients with SMI had significantly longer LOS after lung cancer resection.

What is the implication, and what should change now?

- Thorough peri-operative evaluation (including mental health) can help optimize surgical outcomes after lung cancer resection.

Methods

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Institutional Review Board of the University of North Carolina – Chapel Hill, Chapel Hill (IRB #21-1679) and individual consent for this retrospective analysis was waived. We identified 615 patients from the STS database at our institution [January 2013 when Epic electronic medical record (EMR) started–June 2021] who underwent lung cancer resection, including wedge

resection, segmentectomy, lobectomy, bilobectomy, and pneumonectomy. Baseline demographics, preoperative clinical features, comorbid SMI, and postoperative outcomes were obtained from the North Carolina Translation and Clinical Sciences Institute via the Carolina Data Warehouse. Patients identified as having comorbid SMI as defined by the National Institute of Mental Health and in prior studies were identified and stratified into mood, anxiety, and psychosis disorders (3,14). The SMI diagnoses included in this study were based on the International Classification of Disease (ICD)-9 and ICD-10 diagnosis codes included in the recent study by Tyerman *et al.* investigating SMI in cardiac surgery patients (7).

To capture additional patients in our cohort with SMI whose medical record may contain out of date or incorrect ICD diagnosis codes, we also utilized the Electronic Medical Record Search Engine (EMERSE) software (15). We searched the medical records of our patient population for terms such as anxiety diagnoses [i.e., panic, phobia, social phobia, obsessive compulsive, obsessive-compulsive disorder (OCD), obsession, compulsion, post-traumatic stress disorder (PTSD)], mood disorder diagnoses (i.e., depression, depressive, bipolar, manic); diagnoses that entail psychosis (i.e., psychosis, schizophrenia, schizoaffective, paranoid, dissociative identity disorder). The EMERSE search yielded 33 additional patients which were appropriately recategorized by mood, anxiety, and psychosis disorders.

The primary outcome was a composite of postoperative complications, including unexpected transfer to the intensive care unit (ICU), unexpected return to the operating room, pneumonia, discharge to long-term care facility, 30-day readmission, and 30-day mortality. LOS was also evaluated as a secondary outcome.

Statistical analysis

Demographic, clinical, and operative and post-operative characteristics of patients were compared between SMI and no SMI groups using *t*-test, Wilcoxon rank-sum test, and Chi-square test as appropriate, as determined by the distribution of data for continuous variables. We analyzed the risk-adjusted impact of SMI on composite morbidity and mortality and LOS using multivariable logistic regression and Poisson regression analysis, respectively. All statistical analyses were performed using R software (16).

Results

Patients who underwent non-anatomic resection (i.e., wedge resection, 114/615 patients) were excluded from the analysis. Of the remaining 501 patients who underwent resection for non-small cell lung cancer (NSCLC) (501/615), 186 (37.1%) had one or more comorbid SMI, which were predominantly mood disorders (168/186, 90.3%), followed by anxiety disorders (101/186, 54.3%) and psychosis disorders (22/186, 11.8%). Among patients with SMI, 91 patients (48.9%) were diagnosed with more than one category of SMI (e.g., mood disorder and psychosis disorder), and 14 patients (7.5%) were diagnosed with SMI that fell into all three categories. Three-hundred and fifteen patients (62.9%) did not have a documented SMI at the time of resection.

The median age of patients without SMI was 68 years, and the median age of patients with SMI was 64.5 years. Fewer patients without SMI were female (49.2%), whereas females composed 62.4% of patients with SMI. Compared to patients without SMI, patients with SMI were more likely to have a smoking history, 82.5% *vs.* 90.3%, respectively (*Table 1*). In patients without SMI, 29.2% were current smokers and 53.3% were past smokers. In patients with SMI, 33.9% were current smokers while 56.5% were past smokers. Among current and past smokers, the median number of pack years smoked was 40. Patients with SMI had a higher rate of diabetes (26.3% *vs.* 18.4% without SMI). Median FEV1 (predicted) was approximately 81% in both groups. Median DLCO (predicted) was 69% (SMI) *vs.* 71% (without SMI), which was completed in 93.3% of patients. In both groups, the percentage of patients who had other comorbidities such as hypertension, coronary artery disease, and peripheral vascular disease were not significantly different (*Table 1*).

There was no significant difference in the type of lung resection between both groups and lobectomy was the most commonly performed procedure (88.2% SMI *vs.* 84.8% without SMI). Robot-assisted thoracoscopic surgery was performed in 12.4% (SMI) *vs.* 19.4% (without SMI) of cases. Patients with SMI received blood intraoperatively more often than patients without SMI (9.1% *vs.* 4.1%), and a median of 2 units of packed red blood cells (pRBCs) were given when required. There was no difference in other post-operative complications including unexpected transfer to the

Table 1 Demographic and clinical characteristics of patient population

Demographics/clinical characteristics	No SMI (n=315)	SMI (n=186)	P value
Age (years)	68 [60–73]	64.5 [58.2–71]	0.02*
Female	155 (49.2)	116 (62.4)	0.006*
Race			
African American	65 (20.6)	43 (23.1)	0.59
Caucasian	238 (75.6)	134 (72.0)	0.45
Asian	5 (1.6)	2 (1.1)	>0.99
Native American	2 (0.6)	3 (1.6)	0.37
Other	2 (0.6)	1 (0.5)	>0.99
Hispanic	3 (1.0)	2 (1.1)	>0.99
Hawaiian/Pacific Islander	0 (0.0)	1 (0.5)	0.37
BMI (kg/m^2)	26.4 [23.4–30.4]	27.2 [23.8–32.5]	0.11
Smoking history	260 (82.5)	168 (90.3)	0.02*
Current smoker	92 (29.2)	63 (33.9)	0.32
Past smoker	168 (53.3)	105 (56.5)	0.56
Comorbidities			
Hypertension	212 (67.3)	131 (70.4)	0.53
Diabetes	58 (18.4)	49 (26.3)	0.048*
CAD	49 (15.6)	34 (18.3)	0.50
PVD	20 (6.3)	11 (5.9)	>0.99
Pulmonary function tests			
FEV1 predicted (%)	81 [68.4–96.5]	81 [67–94]	0.42
DLCO predicted (%)	71 [58.6–84]	69 [57–83.8]	0.75
ASA score			
ASA III	245 (77.8)	153 (82.3)	0.28
ASA IV	45 (14.3)	24 (12.9)	0.76
ASA II	25 (7.9)	8 (4.3)	0.16
ASA VI	0 (0.0)	1 (0.5)	0.37
SMI			
Mood disorder	0 (0.0)	168 (90.3)	NA
Psychosis disorder	0 (0.0)	22 (11.8)	NA
Anxiety disorder	0 (0.0)	101 (54.3)	NA

Data are presented as median [IQR] or n (%). *, indicates significant association. SMI, serious mental illness; BMI, body mass index; CAD, coronary artery disease; PVD, peripheral vascular disease; FEV1, forced expiratory volume in 1 second; DLCO, diffusing capacity of carbon monoxide; ASA, American Society of Anesthesiology score; NA, not applicable; IQR, interquartile range.

Table 2 Operative and post-operative characteristics

Peri-operative characteristics	No SMI (n=315)	SMI (n=186)	P value
Thoracic resection type			
Segmentectomy	17 (5.4)	10 (5.4)	>0.99
Lobectomy	267 (84.8)	164 (88.2)	0.35
Bilobectomy	16 (5.1)	3 (1.6)	0.055
Pneumonectomy	15 (4.8)	9 (4.8)	>0.99
Robot used	61 (19.4)	23 (12.4)	0.057
Intraoperative blood given	13 (4.1)	17 (9.1)	0.04*
Unexpected transfer to ICU	18 (5.7)	14 (7.5)	0.53
Unexpected return to operating room	10 (3.2)	10 (5.4)	0.25
Alive 30 days post-operative	310 (98.4)	182 (97.8)	0.91
Readmission 30 days post-discharge	33 (10.5)	18 (9.7)	0.89
Pneumonia	14 (4.4)	12 (6.5)	0.43
Discharged home (*vs.* other facility)	296 (94.0)	172 (92.5)	0.64
LOS (days)	5 [4–7]	5 [4–8]	0.09

Data are presented as n (%) or median [IQR]. *, indicates significant association. SMI, serious mental illness; ICU, intensive care unit; LOS, length of stay; IQR, interquartile range.

ICU, unexpected return to the operating room, operative mortality, pneumonia, or 30-day readmission rates (*Table 2*).

Overall, 116 patients (23.2%) had the primary outcome of composite postoperative mortality or morbidity. Among patients with SMI, 25.3% experienced the primary outcome of composite morbidity or mortality as compared to 21.9% of patients without SMI (P=0.45). Next, to reduce the risk of bias and control for confounding, we utilized a risk-adjusted model of comorbidities, patient characteristics, and operative characteristics to better assess the contribution of SMI to operative outcomes. Factors included in our risk-adjusted model were age, gender, body mass index (BMI), predicted FEV1, type of thoracic procedure, and comorbidities such as coronary artery disease, diabetes, and hypertension. These were standard covariates chosen by the authors, modeling the Tyerman *et al.* study (7). Following multivariable risk adjustment, patients with and without SMI did not have significantly different morbidity and mortality [odds ratio (OR) =1.36; 95% confidence interval (CI): 0.86–2.15] (*Table 3*). Individually, mood disorders (OR =1.23; 95% CI: 0.70–2.14), anxiety disorders (OR =1.11; 95% CI: 0.58–2.10), and psychosis disorders (OR =1.70; 95% CI: 0.60–4.54) did not significantly contribute to postoperative morbidity or mortality (Table S1). Multiple SMI diagnoses in the same patient did not contribute to the risk of postoperative morbidity or mortality.

In addition to the primary outcome, we also tested whether SMI and other patient or operative factors influenced hospital LOS following lung cancer resection (*Figures 1*,*2*). Male patients were more likely to have longer LOS [risk ratio (RR) =1.23; 95% CI: 1.14–1.32]. Extent of resection was significantly associated with LOS (*Table 4*). Patients with lower pre-operative FEV1 values and a lower BMI had longer hospital LOS. Diabetic patients had shorter post-operative LOS (RR =0.87; 95% CI: 0.80–0.95). Median hospital LOS was the same in patients with SMI (5 days) and in patients without SMI (5 days, P=0.09; *Table 2*). SMI was not associated with the extent of lung resection performed. After adjusting for type of procedure and other covariates, LOS was significantly longer among patients with SMI (RR =1.21; 95% CI: 1.13–1.30). SMI subgroup analysis revealed that anxiety disorders (RR =1.17; 95% CI: 1.05–1.29) and mood disorders (RR =1.13; 95% CI: 1.03–1.23) contributed to longer LOS (Table S2).

There was no missing data or patients lost to follow-up in our analysis.

Table 3 Predictors of composite morbidity and mortality (any SMI)

Predictors of composite morbidity and mortality	OR	95% CI		P value
		LCI	UCI	
SMI	1.36	0.86	2.15	0.19
Male sex (*vs*. female)	1.72	1.09	2.73	0.02*
Age	0.98	0.95	1.00	0.044*
FEV1 predicted	0.98	0.97	0.99	0.002*
BMI	0.96	0.92	1.00	0.047*
Hypertension	1.56	0.91	2.73	0.11
Comorbid CAD	1.37	0.77	2.41	0.27
Diabetes	0.98	0.56	1.67	0.93
Past smoker (*vs*. non-smoker)	1.56	0.71	3.75	0.30
Current smoker (*vs*. non-smoker)	1.21	0.53	3.02	0.66
Lobectomy (*vs*. segmentectomy)	1.19	0.48	3.42	0.73
Bilobectomy (*vs*. segmentectomy)	2.55	0.65	10.32	0.18
Pneumonectomy (*vs*. segmentectomy)	1.40	0.37	5.45	0.62

*, indicates significant association. SMI, serious mental illness; OR, odds ratio; CI, confidence interval; LCI, lower confidence interval; UCI, upper confidence interval; FEV1, forced expiratory volume in 1 second; BMI, body mass index; CAD, coronary artery disease.

Discussion

SMI is a known risk factor for poor postoperative outcomes (5-7). Cancer diagnoses can substantially impact mental health, and depression and anxiety often hinder cancer treatment and recovery, quality of life, and survival (17). In this study, we evaluated the impact of pre-existing SMI (identified through EMR search results of literature-based keywords) on various post-operative outcomes following lung cancer resection.

In a 7.5-year period from a single academic institution, patients undergoing lung cancer resection had high rates of SMI compared to the general population, which can affect the generalizability of the study. Additionally, this patient cohort had higher rates of SMI compared to published rates of SMI among lung cancer patients (37.1% *vs.* 12%) (18). Similar to the general population, the study population demonstrated a higher frequency of SMI among females than males (2). Nearly half of the patients with SMI in the study population were diagnosed with multiple categories of SMI, which complicates any conclusions about the risk associated with one SMI disease category. The majority of EMERSE-identified patients seemed unlikely to have functional impairment at a level to suggest SMI as defined by the National Institutes of Mental Health. Additionally, in agreement with the known association between smoking and lung cancer, the study population demonstrated high rates of current and past smoking. One possible confounding variable in our analysis is the significant and well-known association between smoking and SMI in our study population (4). Both patients with and without SMI demonstrated comparable rates of other preoperative characteristics and comorbidities.

Perioperative optimization of mental health

While no difference in composite morbidity and mortality was demonstrated, patients with SMI had significantly longer LOS after lung cancer resection in our study. This is possibly due to SMI being associated with delirium, patients with SMI taking more mental health-related medications (along with their associated side effects), atelectasis due to lack of motivation to deep breathe and cough and perform pulmonary toilet measures, decreased motivation for these patients to get out of bed and mobilize postoperatively, more frequent postoperative transfer to ICU due to respiratory failure, and decreased motivation to progress in their care. Patients with SMI often engage in certain

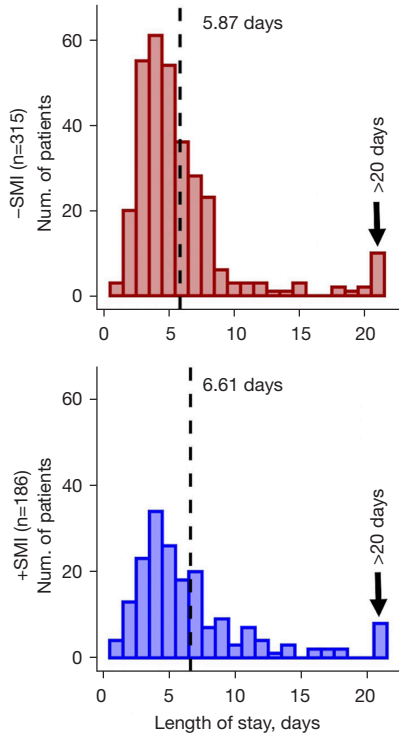

Figure 1 SMI was a risk factor for longer lengths of hospitalization after lung cancer resection. Dashed line indicates mean duration of hospitalization. SMI, serious mental illness; num., number.

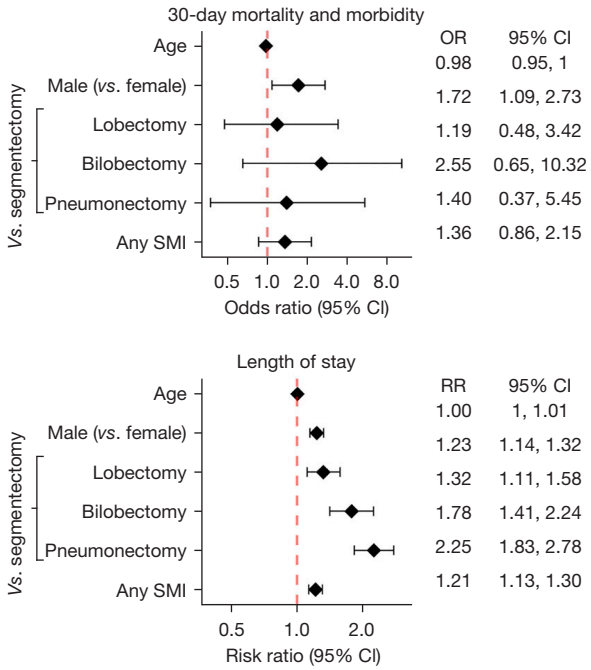

Figure 2 SMI did not contribute significantly to 30-day mortality and morbidity. Gender, type of resection, and SMI appeared to influence hospital LOS following lung cancer resection. OR, odds ratio; CI, confidence interval; RR, risk ratio; SMI, serious mental illness; LOS, length of stay.

Table 4 Predictors of hospital LOS (any SMI)

Predictors of hospital LOS	RR	95% CI		P value
		LCI	UCI	
Lobectomy (*vs*. segmentectomy)	1.32	1.11	1.58	0.002*
Bilobectomy (*vs*. segmentectomy)	1.78	1.41	2.24	<0.001*
Pneumonectomy (*vs*. segmentectomy)	2.25	1.83	2.78	<0.001*
Male sex (*vs*. female)	1.23	1.14	1.32	<0.001*
Age	1.00	1.00	1.01	0.11
FEV1 predicted	0.99	0.99	0.99	<0.001*
BMI	0.99	0.99	1.00	0.002*
Hypertension	1.04	0.96	1.13	0.35
Comorbid CAD	1.00	0.91	1.10	0.94
Diabetes	0.87	0.80	0.95	0.003*
Past smoker (*vs*. non-smoker)	1.05	0.93	1.19	0.41
Current smoker (*vs*. non-smoker)	1.06	0.94	1.21	0.34
SMI	1.21	1.13	1.30	<0.001*

*, indicates significant association. LOS, length of stay; SMI, serious mental illness; RR, risk ratio; CI, confidence interval; LCI, lower confidence interval; UCI, upper confidence interval; FEV1, forced expiratory volume in 1 second; BMI, body mass index; CAD, coronary artery disease.

behaviors (such as smoking, drug use, and poor nutrition) that can render their comorbidities more severe. Patients with anxiety disorders often request to stay an additional day or two in the hospital as well. Many patients with SMI are homeless or have other issues with discharge disposition that lead to prolonged LOS. Longer LOS is associated with higher hospitalization costs (approximately $2,500 per hospitalization day). To improve postoperative outcomes for this vulnerable population, surgeons should optimize perioperative mental health assessment and services. Recent studies have recommended using instruments such as the Brief Measure of Emotional Preoperative Stress (B-MEPS) and Short Form-12 Mental Component Summary (SF-12 MCS) to screen for and evaluate mental health pre- and postoperatively (19,20). Preoperative consultation with a patient's established counselor or psychiatrist or referral to preoperative psychiatric counseling may benefit patients with SMI or suspected SMI. Patients who take psychiatric medication should be promptly restarted on their home regimen after surgery. Enhanced recovery after surgery (ERAS) protocols have been highly effective in optimizing outcomes after thoracic surgery (21). SMI should be evaluated as a component of ERAS protocols for patients with resectable lung cancer. Future work may also evaluate the role of pain and post-operative opiate use on outcomes in patients with SMI.

Strengths and limitations of the study

To the author's knowledge, this is the first study investigating the effect of comorbid SMI on postoperative outcomes following lung cancer resection. The utilization of EMERSE was another strength of the study. However, there are a number of limitations to this study. Firstly, this was a single institution study with a small sample size. This study was modeled after the recent Tyerman *et al.* manuscript, and thus the SMI diagnoses included in the study were based on ICD-9 and ICD-10 diagnosis codes used by Tyerman *et al.* (7). No psychiatrists were initially consulted in the design of this study, and there is likely over-diagnosis that led to the lack of significant difference in outcomes. Given our limited data, it is difficult to assess these patients' severity of mental illness, including if there are any functional impairments associated with the SMI, if these patients are taking medications for their SMI, or if these patients have ever been hospitalized due to SMI. In addition, as mentioned above, the majority of EMERSE-identified patients seemed unlikely to have functional impairment at a level to suggest SMI as defined by the National Institutes of Mental Health. Finally, there are a few important study variables missing from the data set. Substance use, homelessness, and cognitive dysfunction, which are known to be associated with SMI, was not collected in this data set. The stage of lung cancer, histology, postoperative pain severity, and postoperative disposition issues for these patients, which can potentially affect LOS, were also not collected.

Delirium and SMI

Another limitation of the study, and also an additional potential reason that the majority of outcomes between the groups do not differ statistically or clinically significantly, is that postoperative delirium is common in thoracic surgery patients, with studies reporting incidences up to 25%. This could be a confounder as delirious patients may not have SMI, but may appear to have SMI to the untrained eye and in an EMR search based upon basic search terms. Risk factors of postoperative delirium after thoracic surgery include gender, age, comorbidities, opioid use, postoperative pain, prior history of delirium, use of benzodiazepines, abnormal electrolyte and glucose levels, lack of sleep, and duration of surgery (22). Studies have also shown that patients with schizophrenia or major depressive disorder are at higher risk for postoperative confusion or delirium, which was worsened by preoperative discontinuation of psychiatric medications (23-25). Therefore, it is especially important to implement delirium precautions in patients with SMI after thoracic surgery.

SMI effect on extent of lung resection

In the Surgical Treatment Outcomes for Patients with Psychiatric Disorders (STOPP) study, the authors discovered that Veterans Health Administration (VHA) patients with pre-existing SMI were less likely to receive surgery (26). In our study, SMI was not associated with the extent of lung resection performed. Though excluded from formal analyses in this study, patients who underwent non-anatomic resections (i.e., wedge resection) rather than anatomic resection frequently had poor PFTs. This demonstrates the importance of a complete overall evaluation of this patient population prior to lung cancer resection.

The use of EMERSE

As mentioned above, one of the strengths of this study was the utilization of EMERSE. New information retrieval tools such as EMERSE have been instrumental in improving chart review efficiency for research and have demonstrated high levels of sensitivity and specificity (27). While EMERSE is a useful tool for research projects with smaller sample sizes where accuracy is important enough to warrant human review, natural language processing (NLP) may be the preferable option to automatically code data for research projects involving larger sample sizes (28).

Future directions

North Carolina ranks 44th nationally in access to mental health care and 45th overall for pediatric mental health care (29). A 2016 study showed that 25 central counties of North Carolina appeared to have just 56% of the recommended number of inpatient psychiatric beds needed to adequately serve the SMI population (30). Future work is warranted to explore the individual impact of specific types of SMI on hospital LOS, and to design and test interventions to optimize perioperative and post-discharge care for our patients with SMI. The Washington University School of Medicine in St. Louis recently opened the Center for Perioperative Mental Health after realizing the importance of developing personalized, patient-centered pathways to optimize mental health during the perioperative period in order to optimize recovery (31). University of North Carolina Hospitals also has a Comprehensive Cancer Support Program to assist patients in coping with new cancer diagnoses and throughout treatment. Since patients with SMI are often more likely to smoke and lead to longer LOS due to smoking-related complications, establishing a successful tobacco cessation program is also extremely important. These programs can assist in cost-saving interventions in improving perioperative care and reducing LOS. The current trend of utilizing telehealth and digital apps to monitor patient symptoms could also assist with this endeavor. This study also demonstrates the advantage of information retrieval tools such as EMERSE and NLP in future research studies, especially those with large sample sizes.

Conclusions

Anatomic lung resection is the standard of care for patients with early-stage NSCLC, and thorough pre-operative evaluation can influence surgical management and patient outcomes. SMI in patients with lung cancer can contribute to prolonged hospitalization following lung cancer resection. SMI plays an important role in patient outcomes following thoracic surgery and interventions should be deployed to better facilitate recovery in this vulnerable population.

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Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist. Available at https://jtd.amegroups.com/article/view/10.21037/jtd-24-762/rc

Data Sharing Statement: Available at https://jtd.amegroups.com/article/view/10.21037/jtd-24-762/dss

Peer Review File: Available at https://jtd.amegroups.com/article/view/10.21037/jtd-24-762/prf

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://jtd.amegroups.com/article/view/10.21037/jtd-24-762/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Institutional Review Board of the University of North Carolina Chapel Hill (IRB #21-1679) and individual consent for this retrospective analysis was waived.

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